REDACTED

# REMEDIAL SITE ASSESSMENT DECISION - EPA REGION IV



**EPA ID:** TND100842343 **Site Name:** HOWARD HIGH SCHOOL LANDFILL **State ID:** 33-

**Alias Site Names:** HOWARD HIGH SCHOOL LANDFILL

**City:** CHATTANOOGA **County or Parish:** HAMILTON **State:** TN

**Refer to Report Dated:** 09/01/2001 **Report Type:** SITE INSPECTION 002

**Report Developed by:**

**DECISION:**

- [X] **1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:**
  - [X] **1a. Site does not qualify for further remedial site assessment under CERCLA (No Further Remedial Action Planned - NFRAP)**
  - [ ] **1b. Site may qualify for action, but is deferred to:**
- [ ] **2. Further Assessment Needed Under CERCLA:**
  - **2a. Priority:** [ ] **Higher** [ ] **Lower**
  - **2b. Other: (recommended action)** NFRAP (No Futher Remedial Action Planned

**DISCUSSION/RATIONALE:**

The first SI performed did not identify the site as a hazard. However, in 1993, concerns were raised by school officials about contaminants being present at the site. This resulted in a Site Inspection Prioritization (SIP) being performed in 1993-1994. The SIP discovered the presence of elevated levels of PAHs and metal in surface soils. In December 1993 Prescore 2.0 was used to score the site using the data collected during the SIP. The composite site score at that time was 36.79. This score was caused mainly by the soil exposure pathway.

As a result of the SIP, the City of Chattanooga (the PRP) began a remedial action in June 1997 to abate the surface soil contamination. Three recommendations for reducing the risk were identified in the risk assessment, which was approved by ATSDR. The City implemented all three recommendations which resulted in significantly reducing the human health risk to soil contamination at the site. The work was completed in 1997.

Based on the remedial action that was completed by the City of Chattanooga, the Tennessee Department of Environment and Conservation (TDEC) reevlauated the site score in September 2001. The new score is 1.05.

EPA and TDEC have concluded that no further remedial action is required.

Nestor Young
Remedial Project Manager

10086045

**Site Decision Made by:** NESTOR YOUNG

**Signature:** Nestor Young **Date:** 12/06/2001

**EPA Form # 9100-3**

# Site Update & Rescore

NFRAP 12/06/2001

**Howard High School Landfill**
**Hamilton County, Tennessee**

**CERCLIS NO.: TND100842343**

**STATE ID#: 33-606**

**PREPARED BY:**
**Troy Keith, RG, RPM**
**Tennessee Department of Environment and Conservation, Division of Superfund (TDSF)**

**September, 2001**

Prepared By:
Troy Keith

Reviewed By:
Nancy Frazier

# CONTENTS

I. Site Summary and Previous Scoring Decisions
II. Discussions of Recent Site Developments
III. Discussion of Site Rescore
IV. Recommendations
Appendix

---

## I. Site Summary and Previous Scoring Decisions

This site was operated as a dump for brush and demolition debris from the 1972 to 1976 and eventually attained an approximate size of 44 acres. The dump was located on a flood plain and old meander channel of Chattanooga Creek left behind from when the creek was artificially redirected. In addition to serving as a dump, a second intended purpose of the landfill was the benefit of filling in the low areas left over from the rechannelization project. A Preliminary Assessment (PA) was conducted in 1986 and a Site Investigation (SI) was concluded two years later, in 1988. Given the inspection format at that time, the site was not identified as a hazard. In 1993, concerns were raised by school officials about contaminants being present at the site. This resulted in a Site Inspection Prioritization (SIP) being performed in 1993-1994. The SIP discovered the presence of elevated levels of Polynuclear Aromatic Hydrocarbons (PAH's) and metals in surface soils (Ref. 1, Executive Summary).

The site is located at 2500 South Market Street, latitude 35° 01' 25" North and longitude 85° 18' 24" West (Ref. 1, page 2). Howard High School was already present at the time of the dumping activity (Ref. 1, Page 5). However, the Maurice Kirby Child Care Center was built some time after the closing of the dump and is positioned over the western leg of the dump. A nature trail is also located over the southwestern portion of the dump (Fig. 1) (Ref. 1, page 13).

In December 1993 Prescore 2.0 was used to score the site using the data collected in the SIP. In this study, the site received a draft site score of 36.79 as shown below (Ref. 2):

| | |
|---|---|
| Ground Water Migration Pathway Score | 0.00 |
| Surface Water Migration Pathway Score | 0.00 |
| Soil Exposure Pathway | 73.58 |
| Air Migration Pathway Score | 1.05 |
| Composite Site Score | 36.79 |

As clearly can be seen, the main reason for this high site score is the concern over the soil exposure pathway.

## II. Discussions of Recent Site Developments

There have been a number of developments since the last DSF investigation was completed that pertain to the overall site rating. After the SIP was completed, in June 1997 the City of Chattanooga, via an environmental contractor, began remedial actions that would have the effect of significantly reducing the soil exposure pathway. Specifically, all soil within the fenced boundary of the Maurice Kirby Day Care was removed to a depth of 26 inches and replaced with: six inches of compacted clay, a 60 mil synthetic liner with drainage pipe and followed by twenty inches of top soil. Fence was installed to limit access to the capped portion of the landfill, and the Nature Trail was resurfaced along the walkways and sitting areas (Ref. 3, Pages 4-7 and Ref. 5).

## III. Discussion of Site Rescore

The site rescore assumes no change to the groundwater, surface water and air migration pathways. The change in score is fully attributable to the remedial work that affects the soil exposure pathways. The rescore factors into account that the soil exposure pathway has been mitigated via removal of contaminants, covering of contaminants or restricting access to contaminants.

The "Investigation of Immediate Site Hazards, Howard School and Montague Park" report performed by Associated Environmental Services, Inc. in 1995 indicated, to the agreement of the ATSDR, that the work that was eventually conducted would reduce the risk exposure to a level deemed acceptable (Ref. 3, pages 2-3 and Ref. 4). The three recommendations for reducing risk that were presented in the risk assessment, and agreed to by the ATSDR were:

1. Restrict access to the Old Channel Area (part of the landfill) by fencing and posting of signs.
2. Limit exposure to the soils in the Nature Trail Area.
3. Remove and replace with clean soil the soil surrounding the daycare facility to a depth of 18 inches with an impermeable barrier placed at the base of the excavation.

As stated earlier, the work performed in 1997 by the City of Chattanooga addressed and mitigated the three sources of soil risk exposure outlined in the risk assessment. With the completion of the 1997 work, and the associated reduction in risk, it is appropriate to reevaluate the site so that the site score reflects the significant changes that have taken place in relation to the soil exposure pathways.

The new scores are as follows:

| | |
|---|---|
| Ground Water Migration Pathway Score | 0.00 |
| Surface Water Migration Pathway Score | 0.00 |
| Soil Exposure Pathway | 0.00 |
| Air Migration Pathway Score | 1.05 |
| | |
| Composite Site Score | 1.05 |

The revised score as based on the following assertions:

1. There is no change in the Ground Water, Surface Water or Air Migration Pathways
2. There is no longer a soil exposure pathway given the removal of soil at the daycare, the covering of the Nature Trail, and the physical restriction (fencing) to remaining areas.

## IV. Recommendations

This site has undergone a significant change in conditions that result in a very different site score when it is reevaluated. The risk presented by this site has obviously decreased as a result of the work done by the City of Chattanooga after the last evaluation in 1995. The TDSF recommends no further remedial action required at present.

## Appendix

References


1. "Howard High School Dump Site Inspection Prioritization Narrative Report", TDEC-Division of Superfund, January 1994

2. "Howard High School Dump Prescore", TDEC-Division of Superfund, December 1994

3. Letter report "Environmental Improvements to Howard High School", Marion Environmental Inc. September 5, 2001

4. "Investigation of Immediate Site Hazards Howard School and Montague Park", Associated Environmental Services, Inc. June 9, 1995

5. "Work Plan for Environmental Improvements to the Howard School", Marion Environmental Inc. October 26, 1996

Reference 1

Executive Summary
Howard High School Dump
TND 100842343

Attached is the Site Inspection Prioritization (SIP) for the Howard School Dump. The site is located at 2500 South Market Street in South Chattanooga, Hamilton County, Tennessee. The surrounding area is urban characterized by schools, industries, businesses, and residential development. The site lies to the south and east of Howard High School near Chattanooga Creek. The dump is approximately 44 acres in size. The past operator and owner of the dump is the City of Chattanooga, Tennessee. The dump is inactive except for a small volume of brush and soil that continues to be dumped on the western leg of the site.

The site was originally meander channels of Chattanooga Creek. During the late 1960's Chattanooga Creek was rechannelized for the construction of a railroad track located south of the site. The rechannelization resulted in a flooded area at the present site location. The City of Chattanooga, moved to reclaim this wet land with brush and demolition debris. The city's previous dump located on Amnicola Highway was being closed out and a new dumping location was needed. The project called the "South Market (28th) Street Trash Disposal Site" operated from 1972 to approximately 1976. Brush, demolition debris, foundry sand, and spoil dirt was used to fill the depression. A series of culverts were placed below the fill to drain the site.

The dump was in operation before the passage of RCRA legislation, therefore no state or federal oversight was available during site activity. After the creation of the Tennessee Division of Superfund (TDSF), the Howard School Dump was placed on a state file index of potential sites with the completion of a Site Discovery Form. A resulting Preliminary Assessment (PA) was performed in 1986 by TDSF. A Site Inspection (SI) Report was completed in 1988 by TDSF. Under the inspection format of that time the site was not considered to be a hazard. In early 1993, interest in the Howard High School Dump was renewed when complaints from school officials indicated that site hazards may be present. It was decided that a Site Inspection Prioritization (SIP) was needed to update the older SI to reflect current investigative procedures.

This Site Inspection Prioritization (SIP) has discovered the presence of Polyaromatic Hydrocarbons (PAH's) and some metals at elevated levels in the surface soils of the site. The greatest health risk appears by way of the Soil Exposure Pathway. Site access is unrestricted and Howard School is located very near the old dump. A school day care center is located over the western leg of the dump. These findings lead this SIP to conclude that further site characterization should be pursued.

## 2.0 SITE CHARACTERIZATION

### 2.1 Location

The Howard High School Dump is located at 2500 South Market Street behind the Howard School and near 28th Street (Ref.1,2). The geographic coordinates of the site are latitude 35° 01' 25" north and longitude 85° 18' 24" west (See Site Location Map, Figure 1)(Ref.3). To reach the site from Interstate 24, travel south on Market Street for approximately 1/4 of a mile. At the 1st traffic light, turn left into the Howard School parking lot. The Howard High School Dump is immediately to the south and east (Ref.4).

Hamilton County, Tennessee receives 56 inches of annual precipitation and the 1-year/24 hour rainfall is 3.1 inches. The wettest months are December-March, and driest are May-June, and August-November. Snowfall is possible December-March (Ref.5).

### 2.2 Site Description

The site occupies approximately 44 acres of low-lying land adjacent to Chattanooga Creek. The site wraps around Howard School and lies between the school and the present Chattanooga Creek location. The area surrounding the site is urban with heavy residential, commercial, and industrial development (Ref.4). The site is located in congressional district 3 (Ref.51).

A 4-mile radius sweep around the site takes in part of Chattanooga (population: 152,466) as well as parts of Rossville (population: 3,601), East Ridge (population: 21,101), and Lookout Mountain (population: 1,901)(Ref.6,7). An estimate of the population within 4 miles of the site is 80,000 people (Ref.8). The nearest school to the site is the Howard School which houses an elementary and high school (Ref.4). A child day care center is located on the west arm of the filled area (Ref.10).

The site is roughly V shaped and relatively flat (Ref.9,10). It is presently heavily vegetated with grass, bushes, and trees. In some areas dump material is exposed on the surface as evidenced by tires, bricks, black shale, and scrap metal (Ref.11). The site is underlain by drainage culverts to eliminate standing water (Ref.11,12). One easily accessed storm drain grate is located just south of the school practice field (Ref.11).

The site is bordered on the south and east by railroad tracks and Chattanooga Creek, on the north by the Marice Poss Homes and Interstate-24, and on the west by the Howard School and Market Street (Ref.4). The site is not entirely fenced and it

is easily accessible either on foot or by car. The site is unoccupied and it is not guarded (Ref.10,11).

## 2.3 Operational History

The location of Howard High School Dump was originally meander channels of Chattanooga Creek (Ref.9). During the late 1960's, the area now occupied by the site, was drained as part of a Louisville and Nashville Railroad track relocation project. The railroad track was built up to an elevation of 665 feet (Ref.13). Chattanooga Creek was diverted from its previous location in the present Howard School Dump to a channelized section running south along the new railroad track. The old meanders of Chattanooga Creek continued to hold standing water (Ref.12).

In 1972, the City of Chattanooga, Division of Public Works, moved to fill the area north of the new railroad track and reclaim the flooded land. The city was in need of an area to dispose of brush and demolition debris so they selected the area behind Howard High School. City documents call the project the "South Market (28th) Street trash disposal site" (Ref.12).

The previously flooded, low lying land between Howard School and the new railway relocation was built up by filling with brush, demolition waste, foundry sand, and spoil dirt. The majority of the filling occurred in the early 1970's (Ref.12). Small amounts of demolition debris and brush continue to be dumped today by the Chattanooga Public Works Division near a school parking area and day care center (Ref.10).

The common practice of disposal at the Howard School dump was to fill in an area with two 8 to 10 foot lifts. A dozer was used to compact the waste. Dirt and stone cover were placed at the end of each working day. Prior to filling the area, a network of storm sewers were placed in the low area (Ref.12). A 60" concrete pipe culvert connects with a city combined sewer overflow (CSO). The CSO conducts water under the railroad tracks and discharges into Chattanooga Creek (Ref.14).

## 2.4 Waste Characteristics

The capacity of the dump can be estimated at 0.7 million cubic yards. This assumes an average compacted fill depth of 10 feet in a 44-acre depression. The estimated area of the landfill is $1.9 \times 10^6$ square feet (Ref.12).

Most of the waste in the Howard School Dump is dirt and demolition debris, including foundry sand, wood products, asphalt, roofing materials, tires, glass, brush, and ash (Ref.12). An old picture taken during the time of landfill filling shows black sludge, cardboard boxes, and scrap metal

## 5.0 SOIL EXPOSURE AND AIR PATHWAYS

### 5.1 Physical Conditions

When the site was closed out in the early 1970's a clay cap was placed over the fill (Ref.12). From recent site investigations, the cap appears thin to nonexistent (Ref.11). Rubbish is exposed on the surface in some locations and dense vegetations grows over most of the dump (Ref.11). Howard School dump is heavily vegetated with hackberry trees, catawba trees, blackberry bushes, and long stem grasses, so much so that a nature trail has been built through the area (Ref.10).

The Howard School dump is easily accessible (Ref.10,11). Some sections of the dump are fenced but most are not. Access can be gained from the Howard School, Poss Homes, Market Street, and the railroad tracks. An automobile can be driven onto the dump along unimproved roads (Ref.10).

### 5.2 Soil and Air Targets

The Maurice Kirby Child Care Center is located on the western leg of the Howard School Dump. There are 55 children that attend this day care during the school year and approximately 6 stay during the summer. There are 15 teachers at the day care. Students from Howard School attend child development classes in the center. The Day Care is operated primarily for teachers and students with children. The day care is open year round from 0630 to 1530 (Ref.45,46).

Howard School is located less than 200' from the Kirby day care and the western leg of the Howard School Dump (Ref.4,9). Howard School consists of a high school and elementary school. In the high school there are 1074 students and 65 teachers. The elementary school has 417 students and 27 teachers (Ref.45,46).

Maurice Poss Homes is located immediately north of the dump and 150 people currently reside there. Access from Poss Homes to the dump is easily obtained through holes in a partial fence and a road by the 23rd Street Pumping Station (Ref.45).

There are approximately 700 residents within 0.25 mile of the site. This value does not include students, teachers, or children associated with Howard School. There are approximately 1300 residents from 0.25 to 0.5 mile, 6500 residents from 0.5 to 1 mile, 16500 residents from 1 to 2 miles, 21400 from 2 to 3 miles, 32100 from 3 to 4 miles of the Howard School Dump (Ref.4,8,45,46).

Sensitive environments within a 4 mile radius of the site include the Chattanooga National Battlefields on Lookout Mountain and Missionary Ridge, both approximately 2.5 miles distant. A Audubon Society Wildlife Refuge on Maclellan

HRS DOCUMENTATION RECORD
Howard High Landfill - 12/16/93

1. Site Name: Howard High Landfill
   (as entered in CERCLIS)

2. Site CERCLIS Number: TND100842343

3. Site Reviewer: Don VanHook and Craig Stannard

4. Date: December 1993

5. Site Location: Chattanooga/Hamilton, Tennessee
   (City/County,State)

6. Congressional District: 3

7. Site Coordinates: Single

   Latitude: 35½01'25. Longitude: 085½18'24.

| | Score |
|---|---|
| Ground Water Migration Pathway Score (Sgw) | 0.00 |
| Surface Water Migration Pathway Score (Ssw) | 0.00 |
| Soil Exposure Pathway Score (Ss) | 73.58 |
| Air Migration Pathway Score (Sa) | 1.05 |
| Site Score | 36.79 |

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

DRAFT
STATE OF TENNESSEE
NOT THE CONTENT OF U.S. EPA

RECEIVED
SEP 07 2001
ENVIRONMENTAL ASSISTANCE CENTER AT CHATTANOOGA

Marion Environmental Incorporated

1914 Polymer Drive Chattanooga, TN. 37421 Telephone: (423)499-4919 Fax: (423)892-5122

September 5, 2001

MEI Reference No. 96107

Mr. Troy Keith
TDEC Division of Superfund
540 McCallie Avenue, Suite 550
Chattanooga, Tennessee 37402-2013

DSF FILE NO._____
CC: DSF CO_____

**RE: ENVIRONMENTAL IMPROVEMENTS TO HOWARD SCHOOL**

Dear Mr. Keith:

In response to our telephone conversations of August 29 and September 4, 2001, Marion Environmental, Inc. (MEI) has prepared the following project description.

**Background**

The Environmental Improvements to the Maurice Kirby Day Care at Howard School were performed for the City of Chattanooga, Tennessee under the City contract number SF-1-96. The project background information is given as follows.

The Tennessee Department of Environment and Conservation (TDEC) Division of Superfund (TN-DSF) apparently conducted a Site Inspection Prioritization (SIP) to determine if the Howard School site should be included on the National Priorities List (NPL). The results of this SIP were then used to prepare a "Public Health Consultation for Howard School" dated May 23, 1994 by the Tennessee Department of Health that evaluated possible exposures to PAHs in soil for the Howard School site.

According to the U.S. Agency for Toxic Substances and Disease Registry (ATSDR;, a division of the U.S. Department of Health and Human Services, the May 23, 1994 Public Health Evaluation contained two recommendations (refer to ATSDR September 30, 1996 "Health Consultation" pg 3):

1. Sample and analyze surface soil in areas where exposures are most likely to occur.

2. Sample and analyze gray water in areas where exposures are most likely to occur.

Subsequently, on March 14, 1995, Don van Hook and Curt Spaeth of the TN-DSF and Doye Cox of Associated Environmental Services (AES) inspected the grounds of the Howard School to identify areas where exposures would be likely. Six areas were selected for sampling (refer to the attached Site Map identified as Figure 1, dated June 10, 1995):

1. The Nature Trail Area,
2. The Old Channel (i.e., the filled former stream bed of Chattanooga Creek),
3. The Practice Field,

4. The Day Care,
5. The Baseball Field, and
6. The Soccer Field

The following two days, March 15 and 16, 1995, twenty-seven (27) samples were collected by Doye Cox and Ron Walker of AES, with Don van Hook of TN-DSF observing, in the locations identified above. Samples of both shallow surface soils (within approximately two inches of the soil surface) and, in the case of the daycare, soils at an approximate 18-inch depth were collected for analysis. The samples were analyzed for the eight RCRA metals, volatile, semi-volatile, base/neutral, and acid extractible organic compounds as well as PCBs and pesticides.

The results of these analyses were described in a report, "Investigation of Immediate Site Hazards - Howard School and Montague Park" dated June 9, 1995 and prepared by AES for the City of Chattanooga (copy attached). This investigation report contained a quantitative risk assessment of the potential health hazards from contact with soils at the Howard School campus. The risk assessment was based on the results of extensive soil sampling and analyses conducted at the campus, the results of which were also described in the investigation report. The investigation report contained three recommendations to mitigate potential health hazards at the site. These three recommendations were:

1. The Old Channel Area of Chattanooga Creek, a portion of the former creek channel that had been filled at the site, should be posted and fenced. The risk assessment indicated that exposure to this area should be limited.

2. No digging should be allowed in the Nature Trail area and activities should be limited to those of an observational nature only. The soil sampling results indicated that subsurface contaminant levels might be substantially higher than surface soil concentrations. The risk assessment indicated that exposure to these subsurface soils should be limited.

3. The surface soil at the Day Care Center should be removed to a depth of approximately 18 inches and an impermeable barrier should be placed in the bottom of the excavation. A suggested reasonable design for this barrier was 6 inches of native clay, compacted to obtain a permeability of $1 \times 10^{-6}$ centimeters per second, overlain by a synthetic liner and drainage mat. The remaining one-foot deep void would be filled with clean fill and topsoil. The risk assessment indicated that the probable maximum cancer risks only marginally exceeded the theoretical target of $1 \times 10^{-6}$. The calculated theoretical "upper bound incremental excess lifetime cancer risks" were approximately $3 \times 10^{-6}$ to $4 \times 10^{-6}$. Nevertheless, to err on the side of protecting public health, the investigation report recommended excavation of the soil in the daycare playground areas.

The U.S. Agency for Toxic Substances and Disease Registry (ATSDR), a division of the U.S. Department of Health and Human Services, conducted a "Health Consultation" dated September 30, 1996 for the site. This Health Consultation consisted of reviewing the June 9, 1995 "Investigation of Immediate Site Hazards - Howard School and Montague Park" report and determining if the recommendations were protective of public health. The ATSDR found that, "The recommendations made by the City of Chattanooga for the Howard School site are protective of public health."

The City of Chattanooga subsequently prepared bid specifications (bid Contract No. SF-1-96, dated July 16, 1996) to perform the recommended work at the site. Marion Environmental, Inc. (MEI) was the low bidder and was subsequently awarded the contract to perform the work.

**Work Plan**

A Work Plan to perform the recommend scope of work was described in the "Work Plan for Environmental Improvements to the Howard School" dated October 21, 1996 prepared by MEI and submitted to the TN-DSF (copy attached). The work plan, including several suggested TN-DSF modifications, was approved by the TN-DSF on December 9, 1996.

The proposed scope of work in the October 21, 1996 Work Plan is described as follows:

1.1 Cap Improvement and Vegetation Cover

The contractor would be required to provide improvement for the bare spots in a landfill cap in some areas. The typical cap areas requiring improvements might have ranged from 30 to 120 square feet; there would have been several areas that the Contractor would be required to fix. The Contractor would provide a 6-inch clay layer overlain by 6 inches of topsoil. The last component (topsoil) of the system would be for vegetation cover. The Contractor would be required to provide grass or equivalent provision as vegetation cover to avoid the potential for erosion as well as reducing cap maintenance. The Contractor would prepare surface prior to applying the recommended seeding group and seeding rate (Sericea lespedeza, tall fescue, and annual lespedeza with respective 60, 30, 10 percentages and 1.1, 0.55 and 0.18 lb per 1,000 square feet seeding rates). The Contractor would provide soil sampling and analyses; fertilizer, lime and mulch application; and adequate watering. The Contractor would be responsible for obtaining representative samples of the top soil for nutrients and pH analyses.

The replacement topsoil would consist of friable, fertile soil of loamy character with organic matter normal to the region, capable of sustaining healthy vegetation, and reasonable free from subsoils roots, brush, noxious weeds, sticks and other deleterious matter.

1.2 Fencing, Gates and Signs

The Contractor would provide standard 6 foot chain link fence system including gates and signs for the estimated length of 1000 feet. The fencing would be installed according to manufacturer's specifications, recommended installation procedures and work execution plans. The location of the fencing with signs is shown on the attached figures.

The Contractor would provide to the City product/material data, including but not limited to: (1) Fences: dimensions, fabric, posts, rails, post braces and assemblies, stretcher bars and bands, tension wires, floor shoes, ties, etc.; (2) Gates: dimensions, frame, fabrics (same as used in a fence), cross-bracing, stretcher bars, hinges, latches, truss rods, etc.; and (3) Signs: all necessary hardware and write-up details, etc.

2.0 Day Care Center

2.1 Subsurface Soil Removal

The Contractor would be required to remove the chain link fence (estimated length 542 feet) and play ground equipment prior to start of the work and replace them back at the completion of the work. The Contractor would be required to remove subsurface soil up to 26 inch depth for 11,200 square foot areas (all areas not covered by buildings or concrete). The estimated quantity of excavated soil would be 899 cubic yards. The Contractor would be required to perfonn excavating of every type of material encountered within the limits of work to the lines, grades, specified elevations and depth. The proposed handling of the excavated soil would be to load the dump trucks as the work is being carried out and transported to the City's Summit Landfill for disposal, at the City's expense, as a "special waste". The Contractor would be required to prepare disposal paper work, obtain the special waste disposal permit from the Tennessee Department of Environment and Conservation, Division of Solid Waste. All transportation and disposal paper work would be submitted to the owner. Contractor would furnish loading and transportation.

The Contractor would replace the fence and reconstruct the bark play areas. Playground equipment and benches would be reinstalled.

Extent of Excavation: The total area proposed for excavation was 11,200 square feet. This entire area would be excavated to a depth of 26 inches (2.167 feet) for a total volume of 899 cubic yards. Using the density factor found in the bid document of 1.366 tons/cy, a total of 1228 tons of material would be removed from within the limits of the play ground.

Excavated Material: The majority of material proposed for excavation would be fill material of unknown origin. The excavated material was anticipated to consist of top soil, wood chips, timbers, and concrete.

Staging Area for Excavation: The excavated material would be staged within the fence line of the excavation area surrounding the day care.

## 2.2 Native Clay Compacted Cover

The cohesive soils consisting of native soils would be placed over the entire bottom of the 26-inch deep excavated area of 11,200 square feet. A final thickness of 6-inches of compacted clay, at 95% compaction, would be placed in the bottom of the excavation. At least three test results for 95% compaction would be provided by the Contractor. The compacted 6-inch clay layer would provide permeability of 1 x 10-7 crn/s. The soil to be used for this work would be free of Chert, roots, organics, etc.

## 2.3 Synthetic Liner

A 60 mil thick High Density Polyethylene (HDPE) liner would be placed over the compacted soil layer. The HDPE liner would have a permeability of 1 x 10-12 cm/s. The synthetic layer to be used for the facility would be provided by the owner. The Contractor would follow product specifications, installation procedures, engineered construction plans for liner (prepared by incorporating manufacturer's recommendations) and QA/QC procedures supplied by the manufacturer for approval. The required synthetic liner material would be adequate to cover 11,200 square feet.

## 2.4 Backfill Material Work

The contractor would be required to provide enough top soil backfill material to bring the remaining 20-inch deep void back to grade. The estimated quantity of top soil backfill was approximately 692 cubic yards. The soil material was to be free from organic matter and deleterious substances, containing no rocks, sizable lumps (over 6 inches) roots or other deleterious matter.

The Contractor would be required to place backfill and fill materials in layers not to exceed 6 inches in loose depth and then compact each layer of fill and backfill materials at approximately 90% of maximum density. The entire work would be performed in a manner that would provide proper drainage of the area at all times.

## 2.5 Associated Work

Upon completion of the work, the Contractor would re-seed the remaining uncovered areas with fescue grass, including fertilizer, lime, and mulch. The Contractor would acquire representative samples of the soil for pH and nutrient analyses and would

apply fertilizer, lime, and mulch in accordance with U.S. Soil Conservation Service recommendations.

The Contractor would replace the fence around the play areas and reconstruct the bark play areas. Playground equipment and benches would then be reinstalled.

3.0 Nature Trail

3.1 Repair Gray Water Tile

The Contractor would repair an approximate 12-foot length of existing broken piping. The repair work would be free of defects and up to the satisfaction of the owner or his designee. The Contractor would be required to provide repair procedures including the list of compatible materials to be used for the work for the owner's approval prior to the start of work.

3.2 Resurface Nature Trail Area

The Contractor would provide pug mix as specified for a 3-foot wide nature trail walk area including circular sitting areas. The total area to be provided with pug mixture, approximately 22 tons, was estimated to be 2,600 square feet.

4.0 Restrict Access

4.1 Restrict Access to the East Side of Former Landfill Area

Access to the east side of the former landfill would be restricted by constructing a fence. The work specifications and the procedure would be the same as proposed for the Howard Landfill Improvement work under item 1.2 above (Fencing, Gates and Signs). The location of this fence is shown on the attached figures.

**Site Work**

The work detailed in the Work Plan described above was performed at the site in the summer of 1997. Work on the project began on approximately June 9, 1997 after the public schools had dismissed for the summer vacation.

The attached **Figure 1**, "Excavation and Sampling Plan", shows the locations adjacent to the Daycare center where the 899 cubic yards of material were excavated. As stated in the Work Plan above, the approximate total surface area of the excavations was 11,200 square feet. The attached **Figures 2-5** give the dimensions of the play areas excavated and the locations of the playground equipment that was removed and replaced.

The excavated material was disposed at the Hamilton County Summit Landfill in accordance with a Special Waste Permit granted by the TDEC Division of Solid Waste Management (TN-DSWM). All material was sampled prior to disposal at the landfill, in accordance with the permit.

The Nature Trail was also resurfaced and the gray water drain tile was repaired as described in the work plan above. Additionally, access to the east side of the former landfill was restricted by placing fencing in the area and by placing signs along the fence.

## Conclusions

In conclusion, the Site Investigation, Risk Assessment, Health Consultation, proposed remedies, Scope of Work and Work Plan for the Environmental Improvements to the Howard School were developed through a cooperative effort involving City, State, Federal and private consulting environmental professionals and engineers. Through this process, the potential human health risks from environmental contaminants at the site appear to have been thoroughly characterized. Corrective action measures to mitigate these potential health risks were then proposed by the City, with subsequent review, modifications, and final approval by the appropriate Federal and State regulatory agencies (ATSDR and TN-DSF). These corrective actions were then implemented by the City's contractor, with oversight by City engineers and State regulatory agencies (TN-DSF and TN-DSWM). Therefore, the corrective action measures implemented at the Howard School, under City Contract No. SF-1-96, appear to have successfully mitigated the potential public health risks at the site.

Finally, MEI would like to emphasize that preparation of this project report/description was not required under the contract executed between the City and MEI, but is instead being provided as a courtesy to the TN-DSF at MEI's expense. If you have any questions, please call me at (423) 499-4919.

Sincerely,
MARION ENVIRONMENTAL INCORPORATED

Steve Wild, P.G.
Senior Hydrogeologist

attachments: Report - "Investigation of Immediate Site Hazards-Howard School & Montague Park"
"Work Plan for Environmental Improvements to Howard School"
(Includes Health Consultation by ATSDR)
"Playground Excavation and Lining/Nature Trail Construction Plans" (8 pages)
Figure 1 - "Site Map" by AES, November 21, 1995
Figure 2 - "Detail Sheet" by AES, November 21, 1995
Figure 1 - "Excavation and Sampling Plan" by MEI, November 22, 1996

cc: Mr. Indu Thaker, Hamilton County Engineer's Office

Associated Environmental Services, Inc.

RECEIVED
SEP 07 2001
ENVIRONMENTAL ASSISTANCE
CENTER AT CHATTANOOGA

# INVESTIGATION
# OF
# IMMEDIATE SITE HAZARDS
# HOWARD SCHOOL AND MONTAGUE PARK

Prepared by:

**Associated Environmental Services, Inc.**
**411 West 25th St.**
**Chattanooga, TN 37108**

Prepared for:

**The City of Chattanooga**
**400 Pioneer Bank Building**
**Chattanooga, TN 37402**

June 9, 1995

# INVESTIGATION
# OF
# IMMEDIATE SITE HAZARDS
# HOWARD SCHOOL AND MONTAGUE PARK

Prepared by:

**Associated Environmental Services, Inc.**
**411 West 25th St.**
**Chattanooga, TN 37108**

Prepared for:

**The City of Chattanooga**
**400 Pioneer Bank Building**
**Chattanooga, TN 37402**

June 9, 1995

# INVESTIGATION OF
# IMMEDIATE SITE HAZARDS
# HOWARD SCHOOL AND MONTAGUE PARK

## HOWARD SCHOOL

### SITE HISTORY- HOWARD SCHOOL

Howard School is a part of the City of Chattanooga Public School System. It was constructed in the mid-1950s. It is located one block south of the junction of I-24 and Alton Park Blvd/Market Street. The school is bounded on the north by a public housing project which lies across Machine Street, on the west by Alton Park Blvd. and residential housing. When the school was constructed, it was bounded on the south and east by meanders of Chattanooga Creek.

During the 1960s and 1970s the City of Chattanooga operated an unregulated landfill on city property to the south of the creek meanders. In the mid 1970s Chattanooga Creek was rerouted and the old channel that formed the boundary of the school property was filled as a part of landfill operations. The landfill was closed in 1977. The landfill closure was conducted as was the practice at that time, by constructing a clay cap over the fill area. No records were available regarding the design of the cap (thickness of the clay layer, permeability of the clay, drainage layers, topsoil or establishment of vegetative cover).

In the late 1980's a day care center was opened to the south of the main building of Howard School. The center provides care for children ages 6 weeks to 5 years. Enrollment is limited to children whose parents attend Howard School. The day care center is located atop a portion of the old landfill that once had been the main channel of Chattanooga Creek.

A portion of Chattanooga Creek has been added to the National Priority List (NPL). This portion does not include the old channel area that borders Howard School. Contamination of the creek is thought to be primarily PAHs from past coal coking and wood creosoteing operations in the Chattanooga Creek watershed. The Howard School site is being investigated for inclusion on the NPL.

### STUDY RATIONALE AND DESCRIPTION- HOWARD SCHOOL

The Tennessee Division of Superfund (TN-DSF) has conducted a Site Inspection Prioritization (SIP) for this site. The results of this study were used to prepare a health

consultation for the site. The health consultation recommended that the following work be accomplished:

1. Sample and analyze surface soils in areas where exposures are most likely to occur.

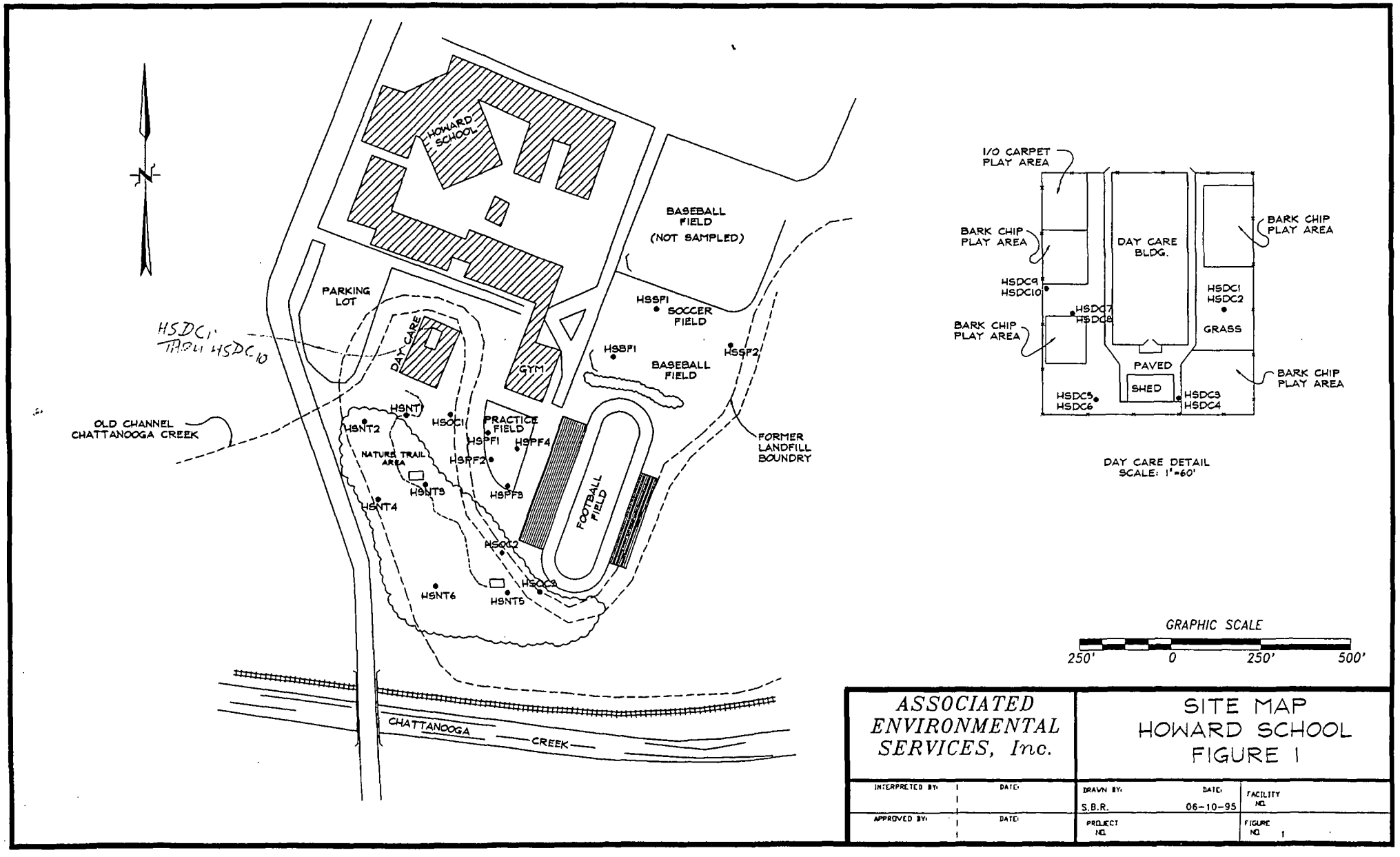
2. Sample and analyze gray water in areas where exposures are likely to occur.

On March 14th 1995, Don Van Hook and Curt Spaeth of the TN-DSF and Doye B. Cox of Associated Environmental Services, Inc. inspected the grounds of Howard School to identify areas where exposures would be likely. The following areas (Refer to figure 1) were selected for sampling:

1. Nature Trail Area
2. Old Channel
3. Practice Field
4. Day Care
5. Baseball Field
6. Soccer Field

The gray water was discovered when sampling being conducted by the TN-DSF broke a small clay tile near the Nature Trail. During the inspection of March 14th it was determined that this clay tile was placed to drain the near surface of the fill into storm drains that run adjacent to the Old Channel and are presumed to empty into Chattanooga Creek. If the clay tile is repaired and covered, there will be no reasonable chance of exposure, so the gray water was not sampled.

Samples of surface soils, and in the case of the Day Care Center, soils at 18" depth as well, were collected for analysis. Surface samples were collected so as to represent the top two inches of the soil surface. Where a deep, thick root zone occurred, the samples were collected as close to the surface as practicable. Samples were collected using clean stainless steel sampling utensils. The utensils were cleaned using a mild detergent and distilled water rinsed between each sample. Samples were placed into new precleaned sample bottles provided by Analytical Industrial Research Lab, Inc. Each sample was labeled and kept cool until they were placed on ice (within a few minutes of collection). The samples were analyzed for the eight RCRA metals, volatile, semi-volatile, base neutral, and acid extractable organics as well as PCB and Pesticides. A complete description of sampling protocol and sample locations is presented in Appendix 1 - Sample Notes from Howard High School and Montague Park.




| ASSOCIATED ENVIRONMENTAL SERVICES, Inc. | SITE MAP HOWARD SCHOOL FIGURE 1 | | |
|---|---|---|---|
| INTERPRETED BY: / DATE: | DRAWN BY: S.B.R. | DATE: 06-10-95 | FACILITY NO. |
| APPROVED BY: / DATE: | PROJECT NO. | | FIGURE NO. 1 |

# Table 1
# Data Summary for Howard School

**Metals Data**
**mg/Kg**

| Sample # | As | Ba | Cd | Cr | Pb | Hg | Se | Ag |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | 6.62 | 118.00 | <0.1 | 117.00 | 67.10 | <0.01 | <1.50 | 6.40 |
| HSNT2 | 5.63 | 146.00 | <0.1 | 40.50 | 223.00 | <0.01 | <1.50 | <0.500 |
| HSNT3 | 3.20 | 138.00 | <0.1 | 141.00 | 91.40 | <0.01 | <1.50 | 8.20 |
| HSNT4 | 5.83 | 105.00 | <0.1 | 151.00 | 154.00 | <0.01 | <1.50 | <0.500 |
| HSNT5 | 7.62 | 42.60 | <0.1 | 24.20 | 27.50 | <0.01 | <1.50 | <0.500 |
| HSNT6 | 8.24 | 50.50 | <0.1 | 16.70 | 29.50 | <0.01 | <1.50 | <0.500 |
| HSOC1 | 4.28 | 60.80 | <0.1 | 18.90 | 65.60 | <0.01 | <1.50 | <0.500 |
| HSOC2 | 5.35 | 67.20 | <0.1 | 23.50 | 48.30 | <0.01 | <1.50 | <0.500 |
| HSOC3 | 3.11 | 47.00 | <0.1 | 16.40 | 63.80 | <0.01 | <1.50 | <0.500 |
| HSPF1 | 4.04 | 79.30 | <0.1 | 26.50 | 63.40 | <0.01 | <1.50 | 1.17 |
| HSPF2 | 3.12 | 72.90 | <0.1 | 15.20 | 29.50 | <0.01 | <1.50 | <0.500 |
| HSPF3 | 6.85 | 119.00 | <0.1 | 38.00 | 140.00 | <0.01 | <1.50 | <0.500 |
| HSPF4 | 2.40 | 129.00 | <0.1 | 14.90 | 23.60 | <0.01 | 2.27 | <0.500 |
| HSDC1 | 3.59 | 46.40 | <0.1 | 14.90 | 24.80 | <0.01 | <1.50 | <0.500 |
| HSDC2 | 5.84 | 41.60 | <0.1 | 12.50 | 11.80 | <0.01 | <1.50 | <0.500 |
| HSDC3 | 3.48 | 74.00 | <0.1 | 13.60 | 22.40 | <0.01 | <1.50 | <0.500 |
| HSDC4 | 4.90 | 130.00 | <0.1 | 13.00 | 44.10 | <0.01 | <1.50 | <0.500 |
| HSDC5 | 4.65 | 122.00 | <0.1 | 13.60 | 50.50 | <0.01 | <1.50 | <0.500 |
| HSDC6 | 3.60 | 37.00 | <0.1 | 15.20 | 15.90 | <0.01 | <1.50 | <0.500 |
| HSDC7 | 5.40 | 76.40 | <0.1 | 18.30 | 39.10 | <0.01 | <1.50 | <0.500 |
| HSCD8 | 16.70 | 153.00 | <0.1 | 655.00 | 155.00 | <0.01 | <1.50 | <0.500 |
| HSDC9 | 4.62 | 105.00 | <0.1 | 12.50 | 41.30 | <0.01 | <1.50 | <0.500 |
| HSDC10 | 11.40 | 144.00 | <0.1 | 29.80 | 307.00 | <0.01 | <1.50 | <0.500 |
| HSBF1 | 3.03 | 59.90 | <0.1 | 14.90 | 8.25 | <0.01 | <1.50 | <0.500 |
| HSSF1 | 5.99 | 86.60 | <0.1 | 24.40 | 62.40 | <0.01 | <1.50 | <0.500 |
| HSSF2 | 5.00 | 66.20 | <0.1 | 12.90 | 38.60 | <0.01 | <1.50 | <0.500 |
| AVG. | 5.56 | 89.1 | <0.1 | 57.5 | 71.1 | <0.01 | <2.27 | <5.26 |
| STD. DEV. | 2.94 | 36.7 | 0.00 | 125.5 | 69.4 | 0.00 | 0.00 | 2.98 |
| VARIANCE | 8.66 | 1343.8 | 0.00 | 15742.2 | 4819.9 | 0.00 | 0.00 | 8.89 |

# Table 1 (Cont.)
# Data Summary for Howard School

**Base Neutrals**
**ug/Kg**

| Sample # | 2- Methylnaphthalene | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Dibutylphthalate |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | | | | | | | | 1600 |
| HSNT2 | 540 | 1200 | 700 | 2400 | 2900 | 34000 | 7700 | 8000 |
| HSNT3 | | | | | | 110 | | |
| HSNT4 | | 130 | 250 | 290 | 220 | 3300 | 930 | |
| HSNT5 | | | 160 | | 170 | 1300 | 400 | |
| HSNT6 | | | | | | | | |
| HSOC1 | | | | 450 | 330 | 3800 | 980 | |
| HSOC2 | | | | | | 560 | 130 | |
| HSOC3 | | | | 240 | 210 | 3100 | 710 | |
| HSPF1 | | | | | | 620 | | |
| HSPF2 | | | | | | 280 | | |
| HSPF3 | | | 750 | | | | 650 | |
| HSPF4 | | | | | | | | |
| HSDC1 | 260 | | | | | 420 | | |
| HSDC2 | | | | | | | | |
| HSDC3 | | | | | | | | |
| HSDC4 | | | | | | | | |
| HSDC5 | | | | | | | | |
| HSDC6 | 1000 | 2700 | | 5000 | 4600 | 39000 | 10000 | |
| HSDC7 | | | | | | 130 | | |
| HSCD8 | | | | 140 | 130 | 1400 | 430 | 8800 |
| HSDC9 | | | | 160 | 140 | 920 | | 4400 |
| HSDC10 | 230 | 210 | | 130 | 150 | 1600 | | 5100 |
| HSBF1 | | | | | | | | 3400 |
| HSSF1 | | | 200 | | | | 150 | |
| HSSF2 | | | | | | | | 1300 |
| COUNT | 4 | 4 | 5 | 8 | 9 | 15 | 10 | 7 |
| AVG. | 508 | 1060 | 412 | 1101 | 983 | 6036 | 2208 | 4657 |
| STD. DEV. | 309 | 1036 | 258 | 1638 | 1533 | 12037 | 3372 | 2694 |

# Table 1 (Cont.)
## Data Summary for Howard School

**Base Neutrals**
**ug/Kg**

| Sample # | *Chrysene* | *Benzo(a)anthracene* | *Benzo(b)fluoranthene* | *Benzo(k)fluoranthene* | *Benzo(a)pyrene* | *Ideno(1,2,3-cd)pyrene* | *Dibenzo(a,h)anthracene* | *Sum of 7 Carcinogenic PAHs* |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | | | | | | | | |
| HSNT2 | 18000 | 32000 | 28000 | 7900 | 20000 | 12000 | 2500 | 120400 |
| HSNT3 | | | 250 | | | 120 | | 370 |
| HSNT4 | 3100 | 3000 | 4500 | 2200 | 3100 | 2400 | 500 | 18800 |
| HSNT5 | 620 | 600 | 830 | 370 | 620 | 400 | | 3440 |
| HSNT6 | 120 | | 270 | | 130 | 110 | | 630 |
| HSOC1 | 2400 | 2500 | 4600 | 1700 | 2600 | 2300 | 420 | 16520 |
| HSOC2 | 460 | | 370 | | 520 | 450 | | 1800 |
| HSOC3 | 2400 | | 3800 | 1600 | 2000 | 1500 | 360 | 11660 |
| HSPF1 | 490 | 420 | 390 | | 570 | 510 | | 2380 |
| HSPF2 | 270 | | 560 | | 260 | 250 | | 1340 |
| HSPF3 | 2500 | 1900 | 4900 | 1600 | 3400 | 2800 | 600 | 17700 |
| HSPF4 | | | | | | | | 0 |
| HSDC1 | 290 | 260 | 390 | 270 | 350 | 320 | | 1880 |
| HSDC2 | | | | | | | | 0 |
| HSDC3 | 390 | | 300 | | 420 | 420 | | 1530 |
| HSDC4 | | | | | | | | 0 |
| HSDC5 | 230 | 190 | 180 | | 250 | 210 | | 1060 |
| HSDC6 | 18000 | 22000 | 21000 | 9000 | 14000 | 10000 | 2200 | 96200 |
| HSDC7 | 110 | 110 | 250 | | 150 | 120 | | 740 |
| HSCD8 | 740 | | 480 | | 790 | 560 | 140 | 2710 |
| HSDC9 | 480 | | 400 | | 530 | 510 | | 1920 |
| HSDC10 | 1000 | 1100 | 1300 | 820 | 1200 | 940 | 240 | 6600 |
| HSBF1 | | | | | | | | 0 |
| HSSF1 | 510 | 440 | 1400 | | 690 | 670 | 130 | 3840 |
| HSSF2 | 210 | | 540 | 150 | 260 | 240 | | 1400 |
| COUNT | 20 | 12 | 21 | 10 | 20 | 21 | 9 | |
| AVG. | 2616 | 5377 | 3558 | 2561 | 2592 | 1754 | 788 | |
| STD. DEV. | 5205 | 9925 | 7055 | 3026 | 4989 | 3113 | 851 | |
| VARIANCE | 27090884 | 98501106 | 49769818 | 9157749 | 24894876 | 9693328 | 723862 | |

*Carcinogenic PAHs in italics*

# Table 1 (Cont.)
# Data Summary for Howard School

| | Base Neutrals ug/Kg | | | | PCB ug/Kg | | |
|---|---|---|---|---|---|---|---|
| Sample # | Fluoranthene | Pyrene | Benzo(g,h,i)perylene | Dibutyl benzyl phthalate | Arochlor 1260 | Arochlor 430 | Sum of all PAHs |
| HSNT1 | | | | 450 | | | 2050 |
| HSNT2 | 50000 | 60000 | 11000 | | | | 298840 |
| HSNT3 | 210 | 160 | 120 | 3500 | | | 4470 |
| HSNT4 | 6300 | 5800 | 2300 | | 190 | | 38320 |
| HSNT5 | 2000 | 1100 | 340 | | | | 8910 |
| HSNT6 | 230 | 160 | | | | | 1020 |
| HSOC1 | 6600 | 4600 | 2100 | | | | 35380 |
| HSOC2 | 1200 | 720 | 420 | | | | 4830 |
| HSOC3 | 6700 | 4000 | 1500 | | | | 28120 |
| HSPF1 | 1400 | 890 | 510 | | | | 5800 |
| HSPF2 | 640 | 440 | 240 | | | | 2940 |
| HSPF3 | 2200 | 1600 | 2700 | | | | 25600 |
| HSPF4 | | | | | | | 0 |
| HSDC1 | 750 | 480 | 330 | | | | 4120 |
| HSDC2 | | | | | | | 0 |
| HSDC3 | 930 | 600 | 390 | | | | 3450 |
| HSDC4 | | | | | | | 0 |
| HSDC5 | 610 | 410 | 190 | | | | 2270 |
| HSDC6 | | 52000 | 9500 | | | | 220000 |
| HSDC7 | 290 | 200 | 110 | | | | 1470 |
| HSCD8 | 1900 | 1400 | 530 | | | | 17440 |
| HSDC9 | 1400 | 900 | 500 | | | | 10340 |
| HSDC10 | 2600 | 1800 | 940 | | | 430 | 19360 |
| HSBF1 | | | | | | | 3400 |
| HSSF1 | 670 | 470 | 600 | | | | 5930 |
| HSSF2 | 320 | 230 | 210 | | | | 3460 |
| COUNT | 20 | 21 | 20 | 2 | 1 | 1 | |
| AVG. | 4348 | 6570 | 1727 | 1975 | 190 | 430 | |
| STD. DEV. | 10672 | 16155 | 2946 | 1525 | 0 | 0 | |
| VARIANCE | 113881819 | 260994100 | 8681293 | 2325625 | 0 | 0 | |

## DATA PRESENTATION AND RESULTS- HOWARD SCHOOL

A summary of the results of the sampling program for Howard School is presented in Table 1. No non-detects are presented. The complete analytical results as presented by the laboratory appear as Appendix 2. Five of the 8 metals tested appear to be higher than the background levels established by EPA for the Chattanooga Creek Sediment Profile Study. Arsenic, silver, and chromium appear to be within the range of background concentrations at most locations with a few samples showing elevated concentrations. Nineteen different PAHs were detected in the various samples. The highest total PAH concentrations (298 and 220 ppm) occurred in a sample from the Nature Trail and a sample at 18" depth from the Day Care Center respectively. The PAHs appearing in the most samples were Pyrene (21), Benzo(b)fluoranthene (21), Ideno(1,2,3-cd)pyrene (21), Fluoranthene (20), Chrysene (20), Benzo(g,h,i)perylene (20), and Benzo(a)pyrene (20). The compounds occurring in the highest average concentrations were Pyrene (6569 ug/kg), Phenanthrene (6036 ug/kg), Benzo(a)anthracene ( 5376 ug/kg), Dibutylphthalate (4657 ug/kg), and Fluoranthene (4347 ug/kg). The Chattanooga Creek Study indicates that the background concentrations of these and other PAHs analyzed should be below or very near detection limit.

# MONTAGUE PARK

## SITE HISTORY- MONTAGUE PARK

Montague Park is a public park owned and operated by the City of Chattanooga. It serves primarily as a facility for adult softball games. A small play ground area has been developed for children of players. The area has nominal use when games are not scheduled. The property was the site of an open unsecured dump from the mid-1940's to the mid-1960's. It has been reported that commercial, residential, and industrial waste were disposed of at the landfill.

Historical aerial photography of the site corroborates anecdotal evidence that several water filled pits were part of the site. One of these pits was probably the "blue hole" so named because of the blue color of the water, reportedly from the presence of textile or mill wastes.

## STUDY RATIONALE AND DESCRIPTION- MONTAGUE PARK

As was the case with Howard School, the Tennessee Department of Health has conducted a health consultation for this site. The health consultation for the site contained the following recommendations:

1. Attempt to confirm the anecdotal information concerning historical dumping activities at the site.

2. Sample and analyze surface soil (0-3 inches) to allow an adequate evaluation of potential public health threats.

3. Characterize the nature and extent of contamination at the area of the former "Blue Hole" and other areas where it is thought that industrial waste is buried.

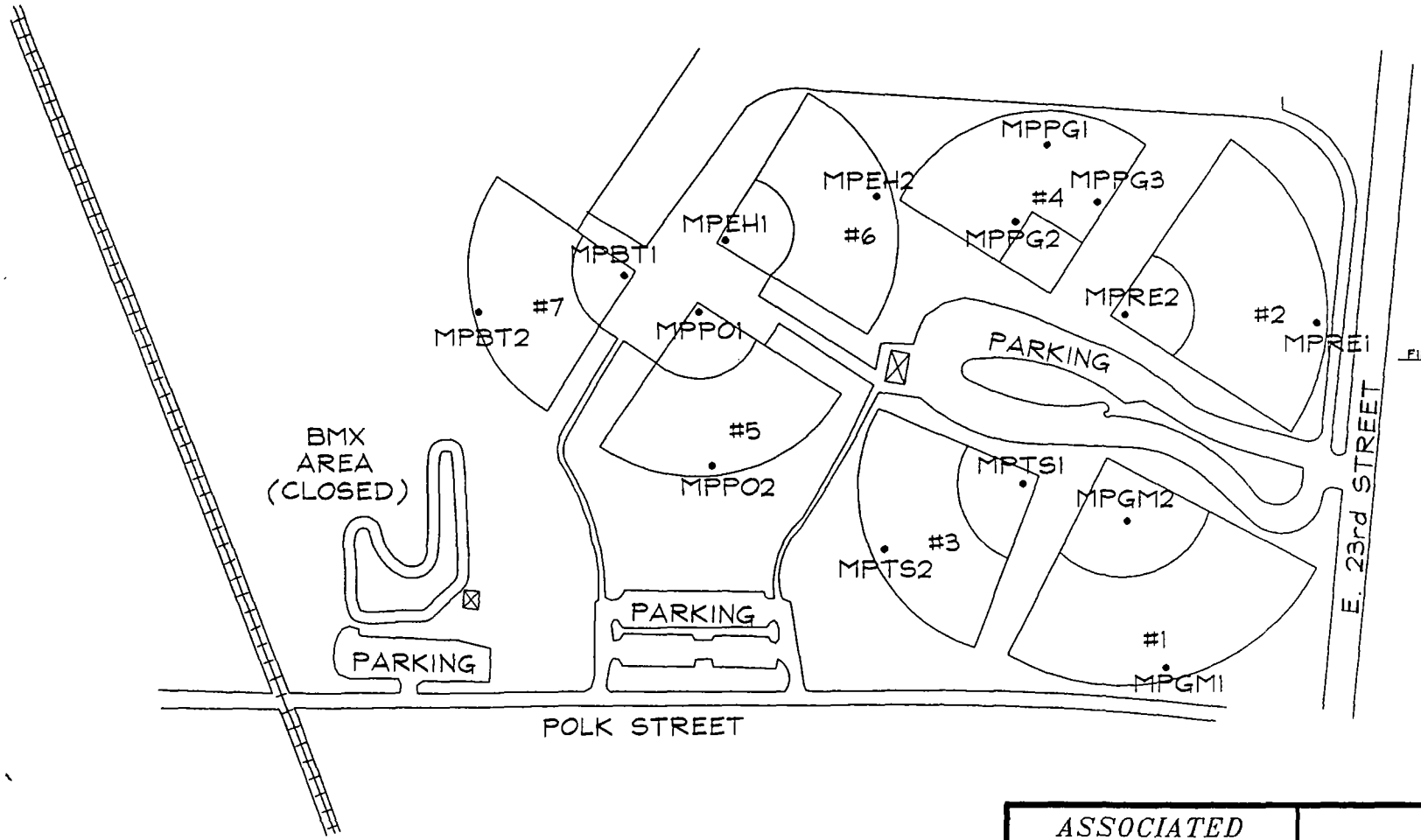
4. Determine the extent of use of private wells in the vicinity of the site.

5. Monitor the groundwater for site related contaminants, if private wells are being used for potable purposes.

City and State files were searched and no information was available to confirm or repute the anecdotal information regarding the dumping activities at the site. Historical aerial photographs from the 1950's and 1960's were reviewed and were inconclusive (i.e. contained no evidence of industrial dumping but no evidence that such dumping was not occurring.)

Surface soils were sampled as recommended. Samples were collected from the infield (generally behind home plate assuming the catcher would have the most contact with surface soils) and from the outfield of each of the six ballfields. Sample locations are depicted in Figure 2. Samples were also collected from the former Henry Simms Field, which has been converted to a children's playground. Samples were collected so as to represent the top two inches of the soil surface. Where a deep, thick root zone occurred, the samples were collected as close to the surface as practicable. Samples were collected using clean stainless steel sampling utensils. The utensils were cleaned using a mild detergent and distilled water rinsed between each sample. Samples were placed into new precleaned sample bottles provided by Analytical Industrial Research Lab, Inc. Each sample was labeled and placed on ice. The samples were analyzed for the eight RCRA metals; volatile, semi-volatile, base neutral, and acid extractable organics; and PCB and Pesticides. A complete description of sampling protocol and sample locations is presented in Appendix 1 - Sample Notes from Howard High School and Montague Park. Figure 2 depicts the Montague Park area.

No attempt was made to characterize any contamination that may have existed in or




| FIELD # | FIELD NAME |
|---|---|
| 1 | GEORGE McINTURFF FIELD |
| 2 | RAY EVANS FIELD |
| 3 | TAPP SIMMS FIELD |
| 4 | PLAYGROUND |
| 5 | PHIL DANIEL FILED |
| 6 | ERNEST HOLT FIELD |
| 7 | BILL TEPPENPAW FIELD |

GRAPHIC SCALE

400' 0 400' 800'

| ASSOCIATED ENVIRONMENTAL SERVICES, Inc. | | SITE MAP BALL PARK FIGURE 2 | |
|---|---|---|---|
| INTERPRETED BY: | DATE: | DRAWN BY: S.B.R. | DATE: 06-10-95 | FACILITY NO. |
| APPROVED BY: | DATE: | PROJECT NO. | FIGURE NO. 2 |

around the "Blue Hole". This decision was made for three reasons. (1) There is no hard evidence that industrial waste was disposed in this area, nor in any area of the former landfill. (2) If such waste were disposed of in the area, it would have been most likely randomly distributed in "hot spots" throughout the fill. (3) Most aqueous pits, like the "Blue Hole" contained lower concentrations of actual toxicant per unit of industrial waste than would a sludge or solid disposed randomly throughout the fill.

According to the Division of Water Supply (DWS) records, there are no wells within one-half mile of Montague Park. The use of private wells in the area is limited to two known wells; neither of the wells is used for potable water. At Nation Hosiery Mill at 1200 E. Main Street a well was developed for providing process water only to the mill. The well was never put into production and is not used. The well was sampled by the Tennessee Department of Health and Environment in April, 1988. Some halogenated organics and aromatic hydrocarbons were present in the part per billion range. A well appears on the DWS records at the former Johnson Truck Stop at 4th Ave and Interstate 24. The well cannot be located nor are there other records regarding its location. It is generally assumed to be abandoned. Since neither well is used for potable purposes, no monitoring of groundwater for site-related contaminants is recommended.

### DATA PRESENTATION AND RESULTS- MONTAGUE PARK

A summary of the results of the sampling program for Montague Park is presented in Table 2. No non-detects are presented. The complete analytical results as presented by the laboratory appear as Appendix 2. With the possible exception of barium, and one lead sample, metals concentrations appear to be within the range of background concentrations established by EPA for the Chattanooga Creek Sediment Profile Study. No organics were detected in the playground. The outfield sample taken from Ray Evans Field contained the highest concentrations and most positive results for organics. Eight compounds were detected with total PAH concentrations approaching 6 ppm.

## RISK ASSESSMENT

In order to determine if the concentration of these contaminants pose a risk to human health, a risk assessment was performed. The risk assessment was performed using protocols, risk factors and assumptions developed and/or recommended by EPA or the Agency for Toxic Substances and Disease Registry (ATSDR). Assumptions specific to the site have been developed based on interviews with city personnel. The risk assessment results indicate that no unusual risks are posed to any of the potential receptor populations except the children and adult workers at the Day Care Center at Howard School. There the hazard indices for children approach the action level of 1 and calculated cancer risks for the children and for the adult care providers marginally exceed $1 \times 10^{-6}$. The full text of the risk assessment appears as Appendix 3.

# Table 2
# Data Summary for Montague Park

## Metals Data
## mg/Kg

| Sample # | As | Ba | Cd | Cr | Pb | Hg | Se | Ag |
|---|---|---|---|---|---|---|---|---|
| MPPG1 | 2.35 | 120.00 | <0.100 | 26.00 | 18.50 | <0.01 | <1.50 | <0.500 |
| MPPG2 | 3.05 | 177.00 | <0.100 | 18.00 | 8.28 | <0.01 | <1.50 | <0.500 |
| MPPG3 | 2.25 | 95.30 | <0.100 | 36.40 | 16.50 | <0.01 | <1.50 | <0.500 |
| MPRE1 | 2.98 | 53.70 | <0.100 | 28.80 | 54.10 | <0.01 | <1.50 | <0.500 |
| MPRE2 | 1.42 | 119.00 | <0.100 | 11.30 | 6.59 | <0.01 | <1.50 | <0.500 |
| MPGM1 | 6.00 | 102.00 | <0.100 | 13.60 | 14.10 | <0.01 | <1.50 | <0.500 |
| MPGM2 | 3.15 | 99.30 | <0.100 | 14.40 | 7.68 | <0.01 | <1.50 | <0.500 |
| MPTS1 | 2.24 | 77.60 | <0.100 | 12.50 | 6.38 | <0.01 | <1.50 | <0.500 |
| MPTS2 | 1.61 | 69.50 | <0.100 | 27.80 | 27.80 | <0.01 | <1.50 | <0.500 |
| MPPD1 | 2.16 | 67.10 | <0.100 | 11.70 | 4.38 | <0.01 | <1.50 | <0.500 |
| MPPD2 | 2.10 | 123.00 | <0.100 | 15.20 | 9.65 | <0.01 | <1.50 | <0.500 |
| MPEH1 | <1.00 | 20.70 | <0.100 | 4.13 | 1.82 | <0.01 | <1.50 | <0.500 |
| MPEH2 | 2.21 | 71.70 | <0.100 | 16.90 | 12.10 | <0.01 | <1.50 | <0.500 |
| MPBT1 | 1.68 | 56.20 | <0.100 | 8.53 | 3.69 | <0.01 | <1.50 | <0.500 |
| MPBT2 | 3.10 | 98.80 | 3.18 | 25.50 | 28.30 | <0.01 | <1.50 | <0.500 |
| AVG. | 2.42 | 90 | 0.21 | 18.1 | 14.7 | 0.00 | 0.00 | 0.00 |
| STD. DEV. | 1.09 | 36 | 0.00 | 8.6 | 13.1 | 0.00 | 0.00 | 0.00 |
| VARIANCE | 1.18 | 1295 | 0.00 | 74.0 | 171.9 | 0.00 | 0.00 | 0.00 |

## Table 2 (Cont.)
## Data Summary for Montague Park

(ug/Kg)

| | Base Neutrals | | | | | | | | Pesticides |
|---|---|---|---|---|---|---|---|---|---|
| Sample # | Benzo(a)pyrene | Ideno(1,2,3-cd)pyrene | Benzo(b)fluoranthene | Chrysene | Anthracene | Fluoranthene | Pyrene | Benzo(g,h,i)perylene | 4,4'-DDD |
| MPPG1 | | | | | | | | | |
| MPPG2 | | | | | | | | | |
| MPPG3 | | | 140 | | | 160 | | | |
| MPRE1 | 530 | 360 | 1100 | 540 | 230 | 1800 | 1100 | 330 | 54 |
| MPRE2 | | | | | | | | | |
| MPGM1 | | | 110 | | | 120 | | | |
| MPGM2 | | | | | | | | | |
| MPTS1 | | | | | | | | | |
| MPTS2 | | | | | | | | | |
| MPPD1 | | | | | | | | | |
| MPPD2 | | | | | | | | | |
| MPEH1 | | | | | | | | | |
| MPEH2 | | | | | | | | | |
| MPBT1 | | | | | | | | | |
| MPBT2 | | | 180 | | | 210 | | | |
| COUNT | 1 | 1 | 4 | 1 | 1 | 4 | 1 | 1 | 1 |
| AVG. | 530 | 360 | 383 | 540 | 230 | 573 | 1100 | 330 | 54 |
| STD. DEV. | 0 | 0 | 415 | 0 | 0 | 709 | 0 | 0 | 0 |
| VARIANCE | 0 | 0 | 172219 | 0 | 0 | 503269 | 0 | 0 | 0 |

## RECOMMENDATIONS

Based upon the data and the risk assessment, it is recommended that:

- The Old Channel Area should be posted and fenced. The risk assessment suggests it would be prudent to limit exposure in this area.

- No digging should be allowed in the Nature Trail Area and activities should be limited to those of an observational nature. Subsurface levels of contaminants may be substantially higher than surface soil levels, and the risk assessment suggests it would be prudent to limit exposure

- The surface soil at the Day Care Center should be removed to a depth of approximately 18 inches and an impermeable barrier be placed at that level. A reasonable design for this barrier would be a 6" layer of native clay compacted so as to obtain a permeability of $1 \times 10^{-6}$ (cm/sec) overlain by a synthetic liner and drainage mat. The remaining foot would be filled using clean fill and topsoil. The risk assessment results for the Day Care Center are borderline. When results are this close it is generally accepted practice to err on the side of over protecting rather than under protecting the public.

## Sampling Notes from Howard School and Montague Park

Tuesday, March 14th- 2:00 P.M.

Doye B. Cox of Associated Environmental Services, Inc. (Associated) met with Kurt Spaeth and Don Vanhook of the Tennessee Department of Environment and Conservation, Division of Superfund (TN-DSF) at Howard School to discuss sampling of the school property and locate potential sampling points. We pinpointed the locations as outlined in the plan proposed to the city with one change: Addition of one sample location inside the day care center play yard area so that a total of five locations (10 samples) were sampled in this area. We agreed to look at Montague and the area to the east of the football stadium the next day.

Wednesday, March 15th- 7:00 A.M.

Doye B. Cox and Ron Walker of Associated met Don Vanhook of TN-DSF at Howard School to begin sampling. All protocols as required by SW-846 were observed. New precleaned sample bottles were provided by Analytical Industrial Research Lab, Inc. (AIRL). All samples except where noted were at the soil surface. Where areas were grassed, the grass was carefully removed and the soil directly underneath was sampled. Samples were collected using stainless steel utensils. Latex gloves were worn by sampling personnel and changed between each sampling event. Sampling utensils were washed with mild detergent between each sample and rinsed with distilled water. Samples were kept cool until they were placed on ice (within a few minutes of collection). Each sampling location was described in detailed notes by the sampling team leader and, where appropriate, flagged with a corrosion resistant metal spike and caution tape. Upon further inspection of the Old Channel Area it was decided that samples at 18' depth were not required. The grassy area east of the football stadium was not sampled. Instead areas of the old baseball field and the soccer field were sampled. Field blank samples were collected.

The following samples were collected:

| Location | Sample # | Description |
|---|---|---|
| <u>Howard School</u> | | |
| Nature Trail | HSNT1 | Approximately 50 feet along the trail on the right side at depression caused by old field tile break. |

| | | |
|---|---|---|
| Nature Trail | HSNT2 | At small depression located appx. 10 feet west of small hackberry tree and appx. 125 ft west of HSNT1. (Note wooden stake) |
| Nature Trail | HSNT3 | At Nature Trail Lecture Area, appx. 4 feet to the south of the westernmost bench. |
| Nature Trail | HSNT4 | At barren area of appx. 2 feet in diameter, appx. 75 feet to the west south west of the Lecture Area. |
| Nature Trail | HSNT5 | At lone bench along the trail to the south of the Lecture Area, appx. 4 feet to the south of the bench. |
| Nature Trail | HSNT6 | At barren area of appx. 4 feet diameter, appx. 100 feet to the southwest of HSNT5. (Note wooden stake) |
| Old Channel | HSOC1 | At appx. 2 feet west of the fence separating the nature trail area from the practice field, perpendicular to a point 70 feet (7 posts) from the northwest corner of the fence. |
| Old Channel | HSOC2 | At appx. 35 feet to the east of HSNT5. Very near leachate drainage. |
| Old Channel | HSOC3 | At appx 80 feet north of large grated drain and appx. 30 feet to the northwest of a large grated drain that lies east of the fence and drains the south west corner of the track. |
| Practice Field | HSPF1 | At appx 5 feet east of the west fence of the practice field, perpendicular to a point appx. 20 feet to the south of a cedar tree in the fence. |
| Practice Field | HSPF2 | At appx. 5 feet east of the west fence of the practice field, perpendicular to a point appx. 150 feet north of a concrete drain way passing under the fence. |
| Practice Field | HSPF3 | At appx. 15 feet to the northwest of the southwestern most concrete support pillar of the stadium. |
| Practice Field | HSPF4 | At appx. 120 feet west of the stadium entrance as |

| | | |
|---|---|---|
| | | measured from the west curb of the stadium access road. |
| Day Care | HSDC1 | At appx. 15 feet from the east fence, perpendicular to a point 65 feet (6.5 posts) north of the southeast corner of the fence. Near sand box. |
| Day Care | HSDC2 | Same location 18" depth. |
| Day Care | HSDC3 | At appx. 2 feet east of the south east corner of the shed located along the south fence line. |
| Day Care | HSDC4 | Same location 18" depth. |
| Day Care | HSDC5 | At appx. 10 feet west south west of the south west corner of the shed located along the south fence line. |
| Day Care | HSDC6 | Same location 18" depth. |
| Day Care | HSDC7 | At appx. 15 feet from the west fence line, perpendicular to a point 50 feet (5 posts) from the south west corner. At edge of bark chip play area. |
| Day Care | HSDC8 | Same location 18" depth. |
| Day Care | HSDC9 | At appx. 2 feet from the west fence line, perpendicular to a point 60 feet (6 posts) from the north west corner |
| Day Care | HSDC10 | Same location 18" depth. |
| Baseball Field | HSBF1 | At location of second base on ball field east of the gym |
| Soccer Field | HSSF1 | At the center of the field. (Equidistant from goals and sidelines). |
| Soccer Field | HSSF2 | At appx. 35 feet to the east north east of the north pole of the goal on the east side of the field. |

## Thursday, March 16th- 7:00 A.M.

Montague Park

Doye B. Cox and Ron Walker of Associated met Don Vanhook of TN-DSF at Montague Park to begin sampling. All protocols as required by SW-846 were observed. New precleaned sample bottles were provided by Analytical Industrial Research Lab, Inc. (AIRL). All samples were at the soil surface. Where areas were grassed, the grass was carefully removed and the soil directly underneath was sampled. Samples were collected using stainless steel utensils. Latex gloves were worn by sampling personnel and changed between each sampling event. Sampling utensils were washed with mild detergent between each sample and rinsed with distilled water. Samples were kept cool until they were placed on ice (within a few minutes of collection). Each sampling location was described in detailed notes by the sampling team leader and, where appropriate, flagged with a corrosion resistant metal spike and caution tape. Upon inspection of the area it was decided to add one sample at the play ground area and to abandon the 6" depth samples. Because of concerns in compositing for volatiles, all samples were collected as individual grab samples. Field blank samples were collected.

The following samples were collected:

| Location | Sample # | Description |
|---|---|---|
| Playground | MPPG1 | Montague Park Playground Area (formerly Gordon Gambill Field), At north edge of large water holding depression in center field. |
| Playground | MPPG2 | At 1 foot from north edge of the barked play area, perpendicular to a point 5 feet from the north east corner. (Note treated timbers may influence Arsenic numbers). |
| Playground | MPPG3 | At appx. 45 feet north of the east post of the gate on the south fence line. |
| Ray Evans Field | MPRE1 | At appx. 15 feet from the outfield fence, perpendicular to a point 50 feet east of light pole # 2 as counted from the west. |
| Ray Evans Field | MPRE2 | At appx. 4 feet behind home plate. |

| | | |
|---|---|---|
| George McInturff Field | MPGM1 | At appx. 120 feet from the outfield fence, perpendicular to a point equidistant between poles # 1 & 2 as counted from the south. |
| George McInturff Field | MPGM2 | At appx 2 feet in front of pitchers rubber. (Home plate area covered with aluminized paint). |
| Tapp-Simms Field | MPTS1 | At appx. 2 feet behind home plate. |
| Tapp-Simms Field | MPTS2 | At appx. 65 feet from the outfield fence, perpendicular to light pole # 2 as counted from the west. |
| Phil Daniel Field | MPPD1 | At appx. 2 feet behind home plate. |
| Phil Daniel Field | MPPD2 | At appx. 75 feet from the outfield fence, perpendicular to light pole # 2 as counted from the north. |
| Ernest Holt Field | MPEH1 | At appx. 2 feet behind home plate. |
| Ernest Holt Field | MPEH2 | At appx. 80 feet from the outfield fence, perpendicular to light pole # 3 as counted from the west. |
| Bill Teppenpaw Field | MPBT1 | At appx. 2 feet behind home plate. |
| Bill Teppenpaw Field | MPBT2 | At appx. 25 feet from the outfield fence, perpendicular to a point equidistant between poles # 2 & 3 as counted from the west. |

# APPENDIX 2

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD., SUITE 611
CHATTANOOGA, TN 37421-2177

Report To:
Doye B Cox
Associated Env. Svcs Inc.
411 W. 25th St.
Cha 37408

Invoice To:
same

# Chain of Custody Record

Page 1 of 3

PROJECT SITE: Howard School
PO#:
SITE NAME:
COLLECTED BY (Signature): Doye B Cox
PROJECT #:
DATE REPORT DUE: 3/29/95
VERBAL/FAX/HARDCOPY: Call when ready 265-3108

| FIELD SAMPLE ID | RUSH FACTOR | SAMPLE | DATE/ TIME | | NO. OF CONTAINERS | RCRA Metals (T) | Volatiles | Base Neutrals | Acid Extract. | Pest & Herb | PCB | REMARKS | LAB ID NO. (for lab use only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HSNT1 | | Soil | 3/15 | 7:25 | 2 | X | | | | | | | |
| HSNT2 | | " | | 7:36 | 2 | X | | | | | | | |
| HSNT3 | | " | | 7:48 | 2 | X | | | | | | | |
| HSNT4 | | " | | 7:55 | 2 | X | | | | | | | |
| HSNT5 | | " | | 8:08 | 2 | X | | | | | | | |
| HSNT6 | | " | | 8:25 | 2 | X | | | | | | | |
| HSOC1 | | " | | 8:45 | 2 | X | | | | | | | |
| HSOC2 | | " | | 8:14 | 2 | X | | | | | | | |
| HSOC3 | | " | | 8:35 | 2 | X | | | | | | | |

REMARKS:

RELINQUISHED BY: Doye B Cox — DATE 3/15 — TIME 1:40

| RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME | RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

**LAB USE ONLY**

| RECEIVED FOR LAB BY: | DATE | TIME | AIRBILL NO. | OPENED BY: | DATE | TIME | TEMP °C | SEAL # | CONDITION: |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 3/15/95 | 1340 | | | | | | | good |

REMARKS:

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD., SUITE 611
CHATTANOOGA, TN 37421-2177

Report To:
Doye B. Cox
Associated Environmental Services
411 W. 25th St
Cin 37408

Invoice To:
Same

# Chain of Custody Record

Page 2 of 3

PROJECT SITE: Howard School
PO#:
SITE NAME:
COLLECTED BY (Signature): Doyle B Cox
PROJECT #:
DATE REPORT DUE: 3/29/95
VERBAL/FAX/HARDCOPY: Call when Ready 265-3108

| FIELD SAMPLE ID | RUSH FACTOR | SAMPLE | DATE/TIME | NO. OF CONTAINERS | RCRA Metals (T) | Volatiles | Bnc Neutrals | Acid Extract | Pest + Herb | PCB | REMARKS | LAB ID NO. (for lab use only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HSPF1 | | Soil | 3/13 /9:18 | 1 | X | → | → | → | → | | | |
| HSPF2 | | " | /9:27 | 1 | X | → | → | → | → | | | |
| HSPF3 | | " | /9:35 | 1 | X | → | → | → | → | | | |
| HSPF4 | | " | /9:43 | 1 | X | → | → | → | → | | | |
| HSOC1 | | " | /10:11 | 1 | X | → | → | → | → | | | |
| HSOC2 | | " | /10:24 | 1 | X | → | → | → | → | | | |
| HSOC3 | | " | /10:34 | 1 | X | → | → | → | → | | | |
| HSOC4 | | " | /10:42 | 1 | X | → | → | → | → | | | |
| HSOC5 | | " | /10:52 | 1 | X | → | → | → | → | | | |

REMARKS:

RELINQUISHED BY: Doyle B Cox — DATE 3/15 — TIME 1:40

| RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME | RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

LAB USE ONLY

| RECEIVED FOR LAB BY: | DATE | TIME | AIRBILL NO. | OPENED BY: | DATE | TIME | TEMP °C | SEAL # | CONDITION |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 3/15/95 | 1250 | | | | | | | Good |

REMARKS:

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD., SUITE 611
CHATTANOOGA, TN 37421-2177

Report To: Doye B. Cox
Associated Environmental Sen
411 W. 25th St
Cin 37408

Invoice To: Same

# Chain of Custody Record

Page 3 of 3

PROJECT SITE: Hamm School
PO#:
SITE NAME:
COLLECTED BY (Signature): Doye B Cox
PROJECT #:
DATE REPORT DUE: 3/29/95
VERBAL/FAX/HARDCOPY: Call when Ready 265-3108

| FIELD SAMPLE ID | RUSH FACTOR | SAMPLE | DATE | TIME | NO. OF CONTAINERS | RCRA Metals (8) | Volatiles | Base Neutrals | Acid Extract | Pest + Herb | PCB | REMARKS | LAB ID NO. (for lab use only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HSDC6 | | Soil | 3/6 | 11:00 | 1 | X | → | → | → | → | → | → | |
| HSDC7 | | " | ↓ | 11:10 | 1 | X | → | → | → | → | → | → | |
| HSDC8 | | " | | 11:20 | 1 | X | → | → | → | → | → | → | |
| HSDC9 | | " | | 11:28 | 1 | X | → | → | → | → | → | → | |
| HSDC10 | | " | | 11:40 | 1 | X | → | → | → | → | → | → | |
| HS-Field Blank | | " | | 11:55 | 1 | X | → | → | → | → | → | | |
| HSBF1 | | " | | 12:10 | 1 | X | → | → | → | → | → | | |
| HSSF1 | | " | | 12:15 | 1 | X | → | → | → | → | → | | |
| HSSF2 | | " | | 12:21 | 1 | X | → | → | → | → | → | | |

REMARKS:

RELINQUISHED BY: Doye B. Cox — DATE 3/15 — TIME 1:40

| RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME | RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

LAB USE ONLY

| RECEIVED FOR LAB BY: | DATE | TIME | AIRBILL NO. | OPENED BY: | DATE | TIME | TEMP °C | SEAL # | CONDITION |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 3/15/95 | 1240 | | | | | | | good |

REMARKS:

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD., SUITE 611
CHATTANOOGA, TN 37421-2177

Report To: Doye B. Cox
Associated Environmental Service
411 W. 25th St
Cin 37408

Invoice To: Same

# Chain of Custody Record

Page 2 of 2

PROJECT SITE: Montague Park
PO#:
SITE NAME:
COLLECTED BY (Signature): Doye B Cox
PROJECT #:
DATE REPORT DUE: 3/29/95
VERBAL/FAX/HARDCOPY: Call 265-3108 Jim Rand

| FIELD SAMPLE ID | RUSH FACTOR | SAMPLE | DATE/TIME | NO. OF CONTAINERS | RCRA Metals (T) | Volatiles | Base Neutral | Acid Extract | Pest + Herb | PCB | REMARKS | LAB ID NO. (for lab use only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MPBT1 | | Soil | 3/16 9:55 | 2 | X | → | → | → | → | → | | |
| MPBT2 | | | 10:00 | 2 | X | → | → | → | → | → | | |
| MPEH1 | | | 9:37 | 2 | X | → | → | → | → | → | | |
| MPEH2 | | | 9:44 | 2 | X | → | → | → | → | → | | |
| Field Blank | | | 9:25 | 2 | X | → | → | → | → | → | Volatile in same bottles. | |
| MPTS1 | | | 8:47 | 2 | X | → | → | → | → | → | | |
| MPPD2 | | | 9:20 | 2 | X | → | → | → | → | → | | |
| MPPD1 | | | 9:10 | 2 | X | → | → | → | → | → | | |
| ~~[illegible]~~ | | | | ~~2~~ | ~~X~~ | | | | | | | |

REMARKS:

RELINQUISHED BY: Doye B Cox — DATE 3/16 — TIME 10:40

| RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME | RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

**LAB USE ONLY**

| RECEIVED FOR LAB BY: | DATE | TIME | AIRBILL NO. | OPENED BY: | DATE | TIME | TEMP °C | SEAL # | CONDITION: |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 3/16 | 10:40 | | | | | | | GOOD |

REMARKS:

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD., SUITE 611
CHATTANOOGA, TN 37421-2177

Report To: Doye B Cox
Associated Environmental Services
411 W. 25th St.
City 37408

Invoice To: Same

# Chain of Custody Record

Page 1 of 2

PROJECT SITE: Monroque Park
PO#:
SITE NAME:
COLLECTED BY (Signature): Doye B Cox
PROJECT #:
DATE REPORT DUE: 3/29/95
VERBAL/FAX/HARDCOPY: Call when Ready 265-3108

| FIELD SAMPLE ID | RUSH FACTOR | SAMPLE | DATE/TIME | NO. OF CONTAINERS | Acid Metals (T) | Volatiles | Base Neutrals | Acid Extractables | Pest + Herb | PCB | REMARKS | LAB ID NO. (for lab use only) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MPTS2 | | Soil | 3/16 8:53 | 2 | X | | | | | | | |
| MPGM1 | | " | 8:20 | 2 | X | | | | | | | |
| MPGM2 | | " | 8:35 | 2 | X | | | | | | | |
| MPRE1 | | " | 8:02 | 2 | X | | | | | | | |
| MPRE2 | | " | 8:10 | 2 | X | | | | | | | |
| MPPG1 | | " | 7:18 | 2 | X | | | | | | | |
| MPPE2 | | " | 7:35 | 2 | X | | | | | | | |
| MPPO3 | | " | 7:45 | 2 | X | | | | | | | |
| | | " | | 2 | X | | | | | | | |

REMARKS:

RELINQUISHED BY: Doye B Cox — DATE 3/16 — TIME 9:40

| RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME | RECEIVED BY: | DATE | TIME | RELINQUISHED BY: | DATE | TIME |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |

**LAB USE ONLY**

| RECEIVED FOR LAB BY: | DATE | TIME | AIRBILL NO. | OPENED BY: | DATE | TIME | TEMP °C | SEAL # | CONDITION: |
|---|---|---|---|---|---|---|---|---|---|
| [illegible] | 3/16/95 | 12:11 | | | | | | | GOOD |

REMARKS:

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

APR 03 1995

**LAB. NO.:950315-03937**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 6.62 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 118 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 117 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 67.1 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | 6.40 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03937

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03937

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **1600** | **100** |
| 2-Methylnaphthalene | ND | 100 | Fluoranthene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 | Pyrene | ND | 100 |
| Isophorone | ND | 100 | **Butyl benzyl phthalate** | **450** | **100** |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | Benzo (b) fluroanthene | ND | 100 |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | Ideno (1,2,3-cd) pyrene | ND | 100 |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03937

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03937

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03938**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT2

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 5.63 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 146 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 40.5 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 223 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray P. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03938

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT2 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03938

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03938

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT2 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **34000** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **7700** | **100** |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **8000** | **100** |
| **2-Methylnaphthalene** | **540** | **100** | **Fluoranthene** | **50000** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **60000** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| **Naphthalene** | **1200** | **100** | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **18000** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **32000** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **28000** | **100** |
| **Acenaphythylene** | **700** | **100** | **Benzo (k) fluoranthene** | **7900** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **20000** | **100** |
| **Acenaphthene** | **2400** | **100** | **Ideno (1,2,3-cd) pyrene** | **12000** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **2500** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **11000** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **2900** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03938

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03939**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT3

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 3.20 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 138 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 141 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 91.4 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | 8.20 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03939

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03939

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT3 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **110** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **210** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **160** | **100** |
| Isophorone | ND | 100 | **Butyl benzyl phthalate** | **3500** | **100** |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **250** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **120** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,l) perylene** | **120** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3939

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSNT3 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03939

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03940**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION: DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT4

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 5.83 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 105 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 151 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 154 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Floy B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03940

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSNT4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03940

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT4 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **3300** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **930** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **6300** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **5800** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| **Naphthalene** | **130** | **100** | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **3100** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **3000** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **4500** | **100** |
| **Acenaphythylene** | **250** | **100** | **Benzo (k) fluoranthene** | **2200** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **3100** | **100** |
| **Acenaphthene** | **290** | **100** | **Ideno (1,2,3-cd) pyrene** | **2400** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **500** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **2300** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **220** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3940

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150

ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03940

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | **Aroclor-1260** | **190** | **160.0** |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03941**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT5

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 7.62 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 42.6 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 24.2 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 27.5 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03941

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT5 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03941

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT5

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

ANALYTICAL INDUSTRIAL RESEARCH LABORATORY
4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

LAB. NO.:950315-03942

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSNT6

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 8.24 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 50.5 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 16.7 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 29.5 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By ______________________

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03942

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT6 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03942

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT6 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **230** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **160** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **120** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **270** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **130** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **110** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3942

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSNT6 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03942

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSNT6

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION


# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102


**LAB. NO.:950315-03943**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSOC1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 4.28 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 60.8 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 18.9 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 65.6 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03943

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSOC1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03943

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSOC1 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **3800** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **980** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **6600** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **4600** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **2400** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **2500** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **4600** | **100** |
| Acenaphythylene | ND | 100 | **Benzo (k) fluoranthene** | **1700** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **2600** | **100** |
| **Acenaphthene** | **450** | **100** | **Ideno (1,2,3-cd) pyrene** | **2300** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **420** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **2100** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **330** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3943

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSOC1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03943

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSOC1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

ANALYTICAL INDUSTRIAL RESEARCH LABORATORY
4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

LAB. NO.:950315-03944

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSOC2

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 5.35 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 67.2 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 23.5 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 48.3 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03944

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSOC2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03944

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSOC2 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **560** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **130** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **1200** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **720** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **460** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **370** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **520** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **450** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **420** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3944

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSOC2 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03944

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSOC2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03945**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSOC3

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.11 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 47.0 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 16.4 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 63.8 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ........... SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03945

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSOC3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03945

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSOC3 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **3100** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **710** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **6700** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **4000** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **2400** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **3800** | **100** |
| Acenaphythylene | ND | 100 | **Benzo (k) fluoranthene** | **1600** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **2000** | **100** |
| **Acenaphthene** | **240** | **100** | **Ideno (1,2,3-cd) pyrene** | **1500** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **360** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,I) perylene** | **1500** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **210** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3945

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSOC3 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03945

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSOC3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/27/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03946**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSPF1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 4.04 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 79.3 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 26.5 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 63.4 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | 1.17 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03946

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSPF1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/18/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03941

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSNT5 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **1300** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **400** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **2000** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **1100** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **620** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **600** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **830** | **100** |
| **Acenaphythylene** | **160** | **100** | **Benzo (k) fluoranthene** | **370** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **620** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **400** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **340** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **170** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3941

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSNT5 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED: 03/22/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03946

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSPF1 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **620** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **1400** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **890** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **490** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **420** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **390** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **570** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **510** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,I) perylene** | **510** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3946

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSPF1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03946

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSPF1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03947**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSPF2

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.12 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 72.9 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 15.2 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 29.5 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03947

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSPF2 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03947

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSPF2 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/25/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **280** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **640** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **440** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **270** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **560** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **260** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **250** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **240** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3947

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSPF2 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03947

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSPF2

CUSTOMER PO :
SAMPLE DATE:03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED:03/30/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03948**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSPF3

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 6.85 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 119 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 38.0 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 140 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Roy B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03948

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSPF3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES, INC.
4295 CROMWELL RD, STE 611
CHATTANOOGA, TN 37421-2177
PHONE: (615) 899 - 9301 FAX: (615) 892 - 9402

A.I.R.L. SAMPLE ID: 03948

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSPF3

CUSTOMER PO:
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS (8270)

ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| N-Nitrosodimethylamine | ND | 100 |
| Hexachloroethane | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 |
| Benzyl Alcohol | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 |
| Nitrobenzene | ND | 100 |
| Hexachlorobutadiene | ND | 100 |
| 2-Methylnaphthalene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 |
| Isophorone | ND | 100 |
| Naphthalene | ND | 100 |
| 4-Chloroaniline | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 |
| 2-chloronaphthalene | ND | 100 |
| 2-Nitroaniline | ND | 500 |
| **Acenaphythylene** | **750** | **100** |
| 3-Nitroaniline | ND | 500 |
| Acenaphthene | ND | 100 |
| Dibenzofuran | ND | 100 |
| Dimethylphthalate | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 |
| Fluorene | ND | 100 |
| 4-Nitroaniline | ND | 500 |
| 4-Chlorophenyl phenyl ether | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4-Dinitrotoluene | ND | 100 |
| Diethylphthalate | ND | 100 |
| N-Nitrosodiphenylamine | ND | 100 |
| Hexachlorobenzene | ND | 100 |
| Phenanthrene | ND | 100 |
| 4-Bromophenyl phenyl ether | ND | 100 |
| **Anthracene** | **650** | **100** |
| Dibutylphthalate | ND | 100 |
| **Fluoranthene** | **2200** | **100** |
| **Pyrene** | **1600** | **100** |
| Butyl benzyl phthalate | ND | 100 |
| Bis (2-ethylhexyl) phthalate | ND | 100 |
| **Chrysene** | **2500** | **100** |
| **Benzo (a) anthracene** | **1900** | **100** |
| 3,3'-Dichlorobenzidene | ND | 100 |
| Di-n-octyl phthalate | ND | 100 |
| **Benzo (b) fluroanthene** | **4900** | **100** |
| **Benzo (k) fluoranthene** | **1600** | **100** |
| **Benzo (a) pyrene** | **3400** | **100** |
| **Ideno (1,2,3-cd) pyrene** | **2800** | **100** |
| **Dibenzo (a,h) anthracene** | **600** | **100** |
| **Benzo (g,h,i) perylene** | **2700** | **100** |
| 1,2-Dichlorobenzene | ND | 100 |
| 1,3-Dichlorobenzene | ND | 100 |
| 1,4-Dichlorobenzene | ND | 100 |

ACIDS (8270)

ANALYZED: 03/25/95

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| Benzoic Acid | ND | 500 |
| Phenol | ND | 100 |
| 2-chlorophenol | ND | 100 |
| 2-nitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 |
| 2,4-dimethylphenol | ND | 100 |
| 4-methylphenol | ND | 100 |
| 2,4-dichlorophenol | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4,6-trichlorophenol | ND | 100 |
| 2,4,5-trichlorophenol | ND | 500 |
| 4-chloro-3-methylphenol | ND | 100 |
| 2,4-dinitrophenol | ND | 500 |
| 2-methyl-4,6-dinitrophenol | ND | 500 |
| Pentachlorophenol | ND | 500 |
| 4-nitrophenol | ND | 500 |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3948

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSPF3 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03948

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSPF3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03949**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSPF4

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 2.40 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 129 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 14.9 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 23.6 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | 2.27 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03949

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSPF4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03949

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSPF4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | Fluoranthene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 | Pyrene | ND | 100 |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | Benzo (b) fluroanthene | ND | 100 |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | Ideno (1,2,3-cd) pyrene | ND | 100 |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3949

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSPF4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150

ANALYZED:03/28/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03949

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSPF4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION


# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY
4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102


**LAB. NO.:950315-03950**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.59 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 46.4 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 14.9 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 24.8 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03950

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03950

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSDC1 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **420** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| **2-Methylnaphthalene** | **260** | **100** | **Fluoranthene** | **750** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **480** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **290** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **260** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **390** | **100** |
| Acenaphythylene | ND | 100 | **Benzo (k) fluoranthene** | **270** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **350** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **320** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **330** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3950

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03950

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03951**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC2

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 5.84 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 41.6 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 12.5 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 11.8 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03951

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03951

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSDC2 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | Fluoranthene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 | Pyrene | ND | 100 |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | Benzo (b) fluroanthene | ND | 100 |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | Ideno (1,2,3-cd) pyrene | ND | 100 |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3951

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC2 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03951

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03952**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC3

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.48 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 74.0 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 13.6 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 22.4 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Roy B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03952

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03952

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSDC3 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **930** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **600** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **390** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **300** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **420** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **420** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,I) perylene** | **390** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3952

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03952

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC3

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

LAB. NO.: 950315-03953

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION: DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE : HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
: HSDC4

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic ..... | 4.90 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ..... | 130 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium ..... | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ..... | 13.0 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ..... | 44.1 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury ..... | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ..... | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ..... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ..... SEE ATTACHED

BNA's ..... SEE ATTACHED

HERBICIDES ..... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Roy R Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03953

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03953

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSDC4 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | Fluoranthene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 | Pyrene | ND | 100 |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | Benzo (b) fluroanthene | ND | 100 |
| Acenaphthylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | Ideno (1,2,3-cd) pyrene | ND | 100 |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3953

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC4 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03953

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC4

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03954**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC5

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 4.65 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 122 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 13.6 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 50.5 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Boy B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03954

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC5

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/20/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03954

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC5

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| N-Nitrosodimethylamine | ND | 100 |
| Hexachloroethane | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 |
| Benzyl Alcohol | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 |
| Nitrobenzene | ND | 100 |
| Hexachlorobutadiene | ND | 100 |
| 2-Methylnaphthalene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 |
| Isophorone | ND | 100 |
| Naphthalene | ND | 100 |
| 4-Chloroaniline | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 |
| 2-chloronaphthalene | ND | 100 |
| 2-Nitroaniline | ND | 500 |
| Acenaphythylene | ND | 100 |
| 3-Nitroaniline | ND | 500 |
| Acenaphthene | ND | 100 |
| Dibenzofuran | ND | 100 |
| Dimethylphthalate | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 |
| Fluorene | ND | 100 |
| 4-Nitroaniline | ND | 500 |
| 4-Chlorophenyl phenyl ether | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4-Dinitrotoluene | ND | 100 |
| Diethylphthalate | ND | 100 |
| N-Nitrosodiphenylamine | ND | 100 |
| Hexachlorobenzene | ND | 100 |
| Phenanthrene | ND | 100 |
| 4-Bromophenyl phenyl ether | ND | 100 |
| Anthracene | ND | 100 |
| Dibutylphthalate | ND | 100 |
| **Fluoranthene** | **610** | **100** |
| **Pyrene** | **410** | **100** |
| Butyl benzyl phthalate | ND | 100 |
| Bis (2-ethylhexyl) phthalate | ND | 100 |
| **Chrysene** | **230** | **100** |
| **Benzo (a) anthracene** | **190** | **100** |
| 3,3'-Dichlorobenzidene | ND | 100 |
| Di-n-octyl phthalate | ND | 100 |
| **Benzo (b) fluroanthene** | **180** | **100** |
| Benzo (k) fluoranthene | ND | 100 |
| **Benzo (a) pyrene** | **250** | **100** |
| **Ideno (1,2,3-cd) pyrene** | **210** | **100** |
| Dibenzo (a,h) anthracene | ND | 100 |
| **Benzo (g,h,i) perylene** | **190** | **100** |
| 1,2-Dichlorobenzene | ND | 100 |
| 1,3-Dichlorobenzene | ND | 100 |
| 1,4-Dichlorobenzene | ND | 100 |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| Benzoic Acid | ND | 500 |
| Phenol | ND | 100 |
| 2-chlorophenol | ND | 100 |
| 2-nitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 |
| 2,4-dimethylphenol | ND | 100 |
| 4-methylphenol | ND | 100 |
| 2,4-dichlorophenol | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4,6-trichlorophenol | ND | 100 |
| 2,4,5-trichlorophenol | ND | 500 |
| 4-chloro-3-methylphenol | ND | 100 |
| 2,4-dinitrophenol | ND | 500 |
| 2-methyl-4,6-dinitrophenol | ND | 500 |
| Pentachlorophenol | ND | 500 |
| 4-nitrophenol | ND | 500 |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3954

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC5 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03954

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC5

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03955**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC6

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.60 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 37.0 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 15.2 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 15.9 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03955

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC6

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03955

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC6

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| N-Nitrosodimethylamine | ND | 100 |
| Hexachloroethane | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 |
| Benzyl Alcohol | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 |
| Nitrobenzene | ND | 100 |
| Hexachlorobutadiene | ND | 100 |
| **2-Methylnaphthalene** | **1000** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 |
| Isophorone | ND | 100 |
| **Naphthalene** | **2700** | **100** |
| 4-Chloroaniline | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 |
| 2-chloronaphthalene | ND | 100 |
| 2-Nitroaniline | ND | 500 |
| Acenaphythylene | ND | 100 |
| 3-Nitroaniline | ND | 500 |
| **Acenaphthene** | **5000** | **100** |
| Dibenzofuran | ND | 100 |
| Dimethylphthalate | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 |
| **Fluorene** | **4600** | **100** |
| 4-Nitroaniline | ND | 500 |
| 4-Chlorophenyl phenyl ether | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4-Dinitrotoluene | ND | 100 |
| Diethylphthalate | ND | 100 |
| N-Nitrosodiphenylamine | ND | 100 |
| Hexachlorobenzene | ND | 100 |
| **Phenanthrene** | **39000** | **100** |
| 4-Bromophenyl phenyl ether | ND | 100 |
| **Anthracene** | **10000** | **100** |
| Dibutylphthalate | ND | 100 |
| Fluoranthene | ND | 100 |
| **Pyrene** | **52000** | **100** |
| Butyl benzyl phthalate | ND | 100 |
| Bis (2-ethylhexyl) phthalate | ND | 100 |
| **Chrysene** | **18000** | **100** |
| **Benzo (a) anthracene** | **22000** | **100** |
| 3,3'-Dichlorobenzidene | ND | 100 |
| Di-n-octyl phthalate | ND | 100 |
| **Benzo (b) fluroanthene** | **21000** | **100** |
| **Benzo (k) fluoranthene** | **9000** | **100** |
| **Benzo (a) pyrene** | **14000** | **100** |
| **Ideno (1,2,3-cd) pyrene** | **10000** | **100** |
| **Dibenzo (a,h) anthracene** | **2200** | **100** |
| **Benzo (g,h,i) perylene** | **9500** | **100** |
| 1,2-Dichlorobenzene | ND | 100 |
| 1,3-Dichlorobenzene | ND | 100 |
| 1,4-Dichlorobenzene | ND | 100 |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| Benzoic Acid | ND | 500 |
| Phenol | ND | 100 |
| 2-chlorophenol | ND | 100 |
| 2-nitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 |
| 2,4-dimethylphenol | ND | 100 |
| 4-methylphenol | ND | 100 |
| 2,4-dichlorophenol | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4,6-trichlorophenol | ND | 100 |
| 2,4,5-trichlorophenol | ND | 500 |
| 4-chloro-3-methylphenol | ND | 100 |
| 2,4-dinitrophenol | ND | 500 |
| 2-methyl-4,6-dinitrophenol | ND | 500 |
| Pentachlorophenol | ND | 500 |
| 4-nitrophenol | ND | 500 |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3955

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC6 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03955

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC6

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED:03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03956**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC7

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 5.40 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 76.4 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 18.3 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 39.1 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03956

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC7

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03956

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC7

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 )

ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| N-Nitrosodimethylamine | ND | 100 |
| Hexachloroethane | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 |
| Benzyl Alcohol | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 |
| Nitrobenzene | ND | 100 |
| Hexachlorobutadiene | ND | 100 |
| 2-Methylnaphthalene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 |
| Isophorone | ND | 100 |
| Naphthalene | ND | 100 |
| 4-Chloroaniline | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 |
| 2-chloronaphthalene | ND | 100 |
| 2-Nitroaniline | ND | 500 |
| Acenaphythylene | ND | 100 |
| 3-Nitroaniline | ND | 500 |
| Acenaphthene | ND | 100 |
| Dibenzofuran | ND | 100 |
| Dimethylphthalate | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 |
| Fluorene | ND | 100 |
| 4-Nitroaniline | ND | 500 |
| 4-Chlorophenyl phenyl ether | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4-Dinitrotoluene | ND | 100 |
| Diethylphthalate | ND | 100 |
| N-Nitrosodiphenylamine | ND | 100 |
| Hexachlorobenzene | ND | 100 |
| **Phenanthrene** | **130** | **100** |
| 4-Bromophenyl phenyl ether | ND | 100 |
| Anthracene | ND | 100 |
| Dibutylphthalate | ND | 100 |
| **Fluoranthene** | **290** | **100** |
| **Pyrene** | **200** | **100** |
| Butyl benzyl phthalate | ND | 100 |
| Bis (2-ethylhexyl) phthalate | ND | 100 |
| **Chrysene** | **110** | **100** |
| **Benzo (a) anthracene** | **110** | **100** |
| 3,3'-Dichlorobenzidene | ND | 100 |
| Di-n-octyl phthalate | ND | 100 |
| **Benzo (b) fluroanthene** | **250** | **100** |
| Benzo (k) fluoranthene | ND | 100 |
| **Benzo (a) pyrene** | **150** | **100** |
| **Ideno (1,2,3-cd) pyrene** | **120** | **100** |
| Dibenzo (a,h) anthracene | ND | 100 |
| **Benzo (g,h,i) perylene** | **110** | **100** |
| 1,2-Dichlorobenzene | ND | 100 |
| 1,3-Dichlorobenzene | ND | 100 |
| 1,4-Dichlorobenzene | ND | 100 |

ACIDS ( 8270 )

ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| Benzoic Acid | ND | 500 |
| Phenol | ND | 100 |
| 2-chlorophenol | ND | 100 |
| 2-nitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 |
| 2,4-dimethylphenol | ND | 100 |
| 4-methylphenol | ND | 100 |
| 2,4-dichlorophenol | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4,6-trichlorophenol | ND | 100 |
| 2,4,5-trichlorophenol | ND | 500 |
| 4-chloro-3-methylphenol | ND | 100 |
| 2,4-dinitrophenol | ND | 500 |
| 2-methyl-4,6-dinitrophenol | ND | 500 |
| Pentachlorophenol | ND | 500 |
| 4-nitrophenol | ND | 500 |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3956

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC7 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03956

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC7

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03957**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC8

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 16.7 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 153 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 655 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 155 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray B. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03957

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSDC8 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03957

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC8

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| N-Nitrosodimethylamine | ND | 100 |
| Hexachloroethane | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 |
| Benzyl Alcohol | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 |
| Nitrobenzene | ND | 100 |
| Hexachlorobutadiene | ND | 100 |
| 2-Methylnaphthalene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 |
| Isophorone | ND | 100 |
| Naphthalene | ND | 100 |
| 4-Chloroaniline | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 |
| 2-chloronaphthalene | ND | 100 |
| 2-Nitroaniline | ND | 500 |
| Acenaphythylene | ND | 100 |
| 3-Nitroaniline | ND | 500 |
| **Acenaphthene** | **140** | **100** |
| Dibenzofuran | ND | 100 |
| Dimethylphthalate | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 |
| **Fluorene** | **130** | **100** |
| 4-Nitroaniline | ND | 500 |
| 4-Chlorophenyl phenyl ether | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4-Dinitrotoluene | ND | 100 |
| Diethylphthalate | ND | 100 |
| N-Nitrosodiphenylamine | ND | 100 |
| Hexachlorobenzene | ND | 100 |
| **Phenanthrene** | **1400** | **100** |
| 4-Bromophenyl phenyl ether | ND | 100 |
| **Anthracene** | **430** | **100** |
| **Dibutylphthalate** | **8800** | **100** |
| **Fluoranthene** | **1900** | **100** |
| **Pyrene** | **1400** | **100** |
| Butyl benzyl phthalate | ND | 100 |
| Bis (2-ethylhexyl) phthalate | ND | 100 |
| **Chrysene** | **740** | **100** |
| Benzo (a) anthracene | ND | 100 |
| 3,3'-Dichlorobenzidene | ND | 100 |
| Di-n-octyl phthalate | ND | 100 |
| **Benzo (b) fluroanthene** | **480** | **100** |
| Benzo (k) fluoranthene | ND | 100 |
| **Benzo (a) pyrene** | **790** | **100** |
| **Ideno (1,2,3-cd) pyrene** | **560** | **100** |
| **Dibenzo (a,h) anthracene** | **140** | **100** |
| **Benzo (g,h,i) perylene** | **530** | **100** |
| 1,2-Dichlorobenzene | ND | 100 |
| 1,3-Dichlorobenzene | ND | 100 |
| 1,4-Dichlorobenzene | ND | 100 |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| Benzoic Acid | ND | 500 |
| Phenol | ND | 100 |
| 2-chlorophenol | ND | 100 |
| 2-nitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 |
| 2,4-dimethylphenol | ND | 100 |
| 4-methylphenol | ND | 100 |
| 2,4-dichlorophenol | ND | 100 |

| COMPOUND | RESULT | SOIL MDL |
|---|---|---|
| 2,4,6-trichlorophenol | ND | 100 |
| 2,4,5-trichlorophenol | ND | 500 |
| 4-chloro-3-methylphenol | ND | 100 |
| 2,4-dinitrophenol | ND | 500 |
| 2-methyl-4,6-dinitrophenol | ND | 500 |
| Pentachlorophenol | ND | 500 |
| 4-nitrophenol | ND | 500 |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3957

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC8 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03957

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC8

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03958**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC9

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 4.62 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 105 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 12.5 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 41.3 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03958

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC9

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03958

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC9

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **920** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **4400** | **100** |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **1400** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **900** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **480** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **400** | **100** |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **530** | **100** |
| **Acenaphthene** | **160** | **100** | **Ideno (1,2,3-cd) pyrene** | **510** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **500** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **140** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3958

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC9 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03958

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC9

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03959**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSDC10

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TOTAL METALS: | | | | | | |
| Arsenic .............. | 11.4 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 144 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 29.8 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 307 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Roy R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03959

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE: HSDC10

CUSTOMER PO :
SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846)

ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03959

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC10 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | **Phenanthrene** | **1600** | **100** |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **5100** | **100** |
| **2-Methylnaphthalene** | **230** | **100** | **Fluoranthene** | **2600** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **1800** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| **Naphthalene** | **210** | **100** | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **1000** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **1100** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **1300** | **100** |
| Acenaphythylene | ND | 100 | **Benzo (k) fluoranthene** | **820** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **1200** | **100** |
| **Acenaphthene** | **130** | **100** | **Ideno (1,2,3-cd) pyrene** | **940** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **240** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,i) perylene** | **940** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| **Fluorene** | **150** | **100** | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3959

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSDC10 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03959

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSDC10

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | **Aroclor-1254** | **430** | **160.0** |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03961**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSBF1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 3.03 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 59.9 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 14.9 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 8.25 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03961

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSBF1 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03961

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSBF1 SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **3400** | **100** |
| 2-Methylnaphthalene | ND | 100 | Fluoranthene | ND | 100 |
| 1,2,4-trichlorobenzene | ND | 100 | Pyrene | ND | 100 |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | Chrysene | ND | 100 |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | Benzo (b) fluroanthene | ND | 100 |
| Acenaphythylene | ND | 100 | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | Benzo (a) pyrene | ND | 100 |
| Acenaphthene | ND | 100 | Ideno (1,2,3-cd) pyrene | ND | 100 |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | Benzo (g,h,i) perylene | ND | 100 |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3961

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSBF1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03961

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSBF1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/29/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03962**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSSF1

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 5.99 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 86.6 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 24.4 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 62.4 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03962

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSSF1 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03962

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSSF1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | **Anthracene** | **150** | **100** |
| Hexachlorobutadiene | ND | 100 | Dibutylphthalate | ND | 100 |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **670** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **470** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **510** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | **Benzo (a) anthracene** | **440** | **100** |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo (b) fluroanthene** | **1400** | **100** |
| **Acenaphythylene** | **200** | **100** | Benzo (k) fluoranthene | ND | 100 |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **690** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **670** | **100** |
| Dibenzofuran | ND | 100 | **Dibenzo (a,h) anthracene** | **130** | **100** |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,I) perylene** | **600** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3962

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSSF1 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03962

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSSF1

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/30/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(615) 894-8102

**LAB. NO.:950315-03963**

CUSTOMER: 1160
ASSOCIATED ENVIRONMENTAL SERV.
411 WEST 25TH STREET
CHATTANOOGA, TN 37408

DATE RECD. : 03/15/95
SAMPLE DATE: 03/15/95

ATTENTION:DOYE COX
(615) 265-3108 FAX:

DATE REQUESTED : 03/29/95
CUST P.O.:

SAMPLE :HOWARD SCHOOL SOIL SAMPLED BY ASSOCIATED ENVIRONMENTAL
:HSSF2

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TOTAL METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| Arsenic .............. | 5.00 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Barium ............... | 66.2 | mg/Kg | 0.050 | 6010 | 03-20-95 | DS |
| Cadmium .............. | <0.100 | mg/Kg | 0.100 | 6010 | 03-20-95 | DS |
| Chromium ............. | 12.9 | mg/Kg | 0.150 | 6010 | 03-20-95 | DS |
| Lead ................. | 38.6 | mg/Kg | 1.00 | 6010 | 03-20-95 | DS |
| Mercury .............. | <0.01 | mg/Kg | 0.01 | 7471 | 03-18-95 | RP |
| Selenium ............. | <1.50 | mg/Kg | 1.50 | 6010 | 03-20-95 | DS |
| Silver ............... | <0.500 | mg/Kg | 0.500 | 6010 | 03-20-95 | DS |

VOLATILES ............ SEE ATTACHED

BNA's ................ SEE ATTACHED

HERBICIDES ........... SEE ATTACHED

PESTICIDES/PCB'S ..... SEE ATTACHED

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By ____________________

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03963

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE: HSSF2 SAMPLE DATE: 03/15/95

VOLATILE COMPOUNDS
METHOD 8240 (SW-846) ANALYZED: 03/23/95 BY: SVG

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| chloromethane | ND | 10 | trichloroethene | ND | 5 |
| bromomethane | ND | 10 | benzene | ND | 5 |
| vinyl chloride | ND | 5 | chlorodibromomethane | ND | 5 |
| chloroethane | ND | 10 | 1,1,2-trichloroethane | ND | 5 |
| methylene chloride | ND | 5 | trans-1,3-dichloropropene | ND | 5 |
| acetone | ND | 5 | bromoform | ND | 5 |
| carbon disulfide | ND | 5 | 2-hexanone | ND | 10 |
| 1,1-dichloroethene | ND | 5 | 4-methyl-2-pentanone | ND | 10 |
| 1,1-dichloroethane | ND | 5 | 1,1,2,2-tetrachloroethane | ND | 5 |
| 1,2-dichloroethene (total) | ND | 5 | tetrachloroethene | ND | 5 |
| 1,2-dichloropropane | ND | 5 | toluene | ND | 5 |
| chloroform | ND | 5 | chlorobenzene | ND | 5 |
| 1,2-dichloroethane | ND | 5 | ethylbenzene | ND | 5 |
| 2-butanone | ND | 10 | styrene | ND | 5 |
| 1,1,1-trichloroethane | ND | 5 | total xylenes | ND | 5 |
| carbon tetrachloride | ND | 5 | 1,2-dichlorobenzene | ND | 5 |
| vinyl acetate | ND | 10 | 1,3-dichlorobenzene | ND | 5 |
| dichlorobromomethane | ND | 5 | 1,4-dichlorobenzene | ND | 5 |
| cis-1,3-dichloropropene | ND | 5 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03963

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSSF2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

BASE/NEUTRAL COMPOUNDS ( 8270 ) ANALYZED: 03/27/95 BY: JLJ

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| N-Nitrosodimethylamine | ND | 100 | 2,4-Dinitrotoluene | ND | 100 |
| Hexachloroethane | ND | 100 | Diethylphthalate | ND | 100 |
| Bis (2-chloroethyl) ether | ND | 100 | N-Nitrosodiphenylamine | ND | 100 |
| Benzyl Alcohol | ND | 100 | Hexachlorobenzene | ND | 100 |
| Bis (2-chloroisopropyl) ether | ND | 100 | Phenanthrene | ND | 100 |
| N-nitrosodi-n-propylamine | ND | 100 | 4-Bromophenyl phenyl ether | ND | 100 |
| Nitrobenzene | ND | 100 | Anthracene | ND | 100 |
| Hexachlorobutadiene | ND | 100 | **Dibutylphthalate** | **1300** | **100** |
| 2-Methylnaphthalene | ND | 100 | **Fluoranthene** | **320** | **100** |
| 1,2,4-trichlorobenzene | ND | 100 | **Pyrene** | **230** | **100** |
| Isophorone | ND | 100 | Butyl benzyl phthalate | ND | 100 |
| Naphthalene | ND | 100 | Bis (2-ethylhexyl) phthalate | ND | 100 |
| 4-Chloroaniline | ND | 100 | **Chrysene** | **210** | **100** |
| Bis (2-chloroethoxy) methane | ND | 100 | Benzo (a) anthracene | ND | 100 |
| Hexachlorocyclopentadiene | ND | 100 | 3,3'-Dichlorobenzidene | ND | 100 |
| 2-chloronaphthalene | ND | 100 | Di-n-octyl phthalate | ND | 100 |
| 2-Nitroaniline | ND | 500 | **Benzo(b)fluroanthene** | **540** | **100** |
| Acenaphythylene | ND | 100 | **Benzo(k)fluoranthene** | **150** | **100** |
| 3-Nitroaniline | ND | 500 | **Benzo (a) pyrene** | **260** | **100** |
| Acenaphthene | ND | 100 | **Ideno (1,2,3-cd) pyrene** | **240** | **100** |
| Dibenzofuran | ND | 100 | Dibenzo (a,h) anthracene | ND | 100 |
| Dimethylphthalate | ND | 100 | **Benzo (g,h,I) perylene** | **210** | **100** |
| 2,6-Dinitrotoluene | ND | 100 | 1,2-Dichlorobenzene | ND | 100 |
| Fluorene | ND | 100 | 1,3-Dichlorobenzene | ND | 100 |
| 4-Nitroaniline | ND | 500 | 1,4-Dichlorobenzene | ND | 100 |
| 4-Chlorophenyl phenyl ether | ND | 100 | | | |

ACIDS ( 8270 ) ANALYZED: 03/27/95

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| Benzoic Acid | ND | 500 | 2,4,6-trichlorophenol | ND | 100 |
| Phenol | ND | 100 | 2,4,5-trichlorophenol | ND | 500 |
| 2-chlorophenol | ND | 100 | 4-chloro-3-methylphenol | ND | 100 |
| 2-nitrophenol | ND | 500 | 2,4-dinitrophenol | ND | 500 |
| 2-methylphenol | ND | 100 | 2-methyl-4,6-dinitrophenol | ND | 500 |
| 2,4-dimethylphenol | ND | 100 | Pentachlorophenol | ND | 500 |
| 4-methylphenol | ND | 100 | 4-nitrophenol | ND | 500 |
| 2,4-dichlorophenol | ND | 100 | | | |

ALL RESULTS AND MDL'S ARE IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 3963

CUSTOMER: ASSOCIATED ENV. SERV. CUSTOMER PO :
SAMPLE:HSSF2 SAMPLE DATE: 03/15/95

CHLORINATED HERBICIDES
METHOD ( SW - 846 ) 8150 ANALYZED:03/23/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| 2 , 4 - D | ND | 20 | 2 , 4 , 5 - TP ( SILVEX ) | ND | 4 |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES , INC .
4295 CROMWELL RD, STE 611
CHATTANOOGA , TN 37421-2177
PHONE: ( 615 ) 899 - 9301 FAX : ( 615 ) 892 - 9402

A.I.R.L. SAMPLE ID : 03963

CUSTOMER: ASSOCIATED ENV. SERV.
SAMPLE:HSSF2

CUSTOMER PO :
SAMPLE DATE: 03/15/95

PESTICIDE COMPOUNDS ( 8080 ) ANALYZED: 03/30/95 BY: RAP

| COMPOUND | RESULT | SOIL MDL | COMPOUND | RESULT | SOIL MDL |
|---|---|---|---|---|---|
| alpha-BHC | ND | 8.0 | Endrin aldehyde | ND | 16.0 |
| beta-BHC | ND | 8.0 | Endosulfan sulfate | ND | 16.0 |
| delta-BHC | ND | 8.0 | Methoxychlor | ND | 80.0 |
| Lindane (gamma-BHC) | ND | 8.0 | alpha-Chlordane | ND | 80.0 |
| Heptachlor | ND | 8.0 | gamma-Chlordane | ND | 80.0 |
| Aldrin | ND | 8.0 | Toxaphene | ND | 80.0 |
| Heptachlor epoxide | ND | 8.0 | Aroclor-1016 | ND | 160.0 |
| Endosulfan I | ND | 8.0 | Aroclor-1221 | ND | 80.0 |
| 4,4'-DDE | ND | 16.0 | Aroclor-1232 | ND | 80.0 |
| Dieldrin | ND | 16.0 | Aroclor-1242 | ND | 80.0 |
| Endrin | ND | 16.0 | Aroclor-1248 | ND | 80.0 |
| 4,4'-DDD | ND | 16.0 | Aroclor-1254 | ND | 160.0 |
| Endosulfan II | ND | 16.0 | Aroclor-1260 | ND | 160.0 |
| 4,4'-DDT | ND | 16.0 | | | |

ALL RESULTS AND MDL'S IN MICROGRAMS/KILOGRAM

# APPENDIX 3

**Quantitative Assessment of the Potential Health Risks Associated with Exposure to Soils in the Howard School and Montague Park Sites**

Prepared by Janice P. Cox
June 1, 1995

SUMMARY: Chronic toxicity and lifetime cancer risks were evaluated for probable maximum exposure scenarios at six sites: the nature trail, the old channel, the day care center and the ballfields at Howard School; and at the playground and ballfields at Montague Park. Calculated probable risks were well below the level of concern at all sites except the day care. Hazard indices for children at the day care approach 1.0; calculated upper bound cancer risks for the children and for the adult care providers at the day care marginally exceed $1 \times 10^{-6}$.

Given the uncertainties inherent in risk assessment and the fact that adverse effects from lead are believed to be without a threshold, screening of blood lead levels in children at the day care center should be considered in order to provide additional data to support a decision on the need for remediation or other public health intervention.

## 1.0 TOXICITY ASSESSMENT

Toxicity values for this assessment were taken from IRIS, EPA's Risk-Based Concentration Table (January-June 1995) and the FDA. Reference doses (RfDs), noncancer endpoints, cancer potency slope factors (CPSs), and EPA weight-of-evidence classifications for carcinogens are shown for the contaminants of concern in Table 1.

Quantitative toxicity information was not available for all of the contaminants reported from the soils of these sites. Major gaps included:

- No toxicity information was available for 2-methyl naphthalene or for dibutyl benzyl phthalate.

- There are no reference doses published for the seven carcinogenic PAHs detected at the sites or for acenaphthylene. Therefore, noncancer toxicity for these compounds and their potential contribution to hazard index scores could not be quantitatively evaluated.

- There are no reference doses or slope factors specific to the dermal exposure pathway for any of the compounds. Oral RfDs and CPSs were used to estimate risk after correction for incomplete absorption via the dermal pathway.

- There was no information on the percentage of detected chromium that was in the trivalent versus the hexavalent state. A conservative assumption was made that all the chromium was in the more toxic, carcinogenic hexavalent Cr(VI) form.

- There is no RfD available for lead. Because lead was obviously a major contributor to the potential toxicity from exposure to the sites, reference doses were estimated from FDA Provisional Total Tolerable Daily Intakes (PTTDIs) (Bolger, 1992). The PTTDI of 6 micrograms per day for children age 0-6 was combined with a 15-kg bodyweight to provide an estimated RfD

# Table 1
## Toxicity Assessment of Detected Contaminants

| | $RfD_o$ | $RfD_i$ | $CPS_o$ | $CPS_i$ | Toxicity Endpoint | Noncancer Carcinogenicity Classification |
|---|---|---|---|---|---|---|
| 2 -Methylnaphthalene | Not | on | IRIS | | --- | --- |
| Napthalene | 4.00 E-02 | --- | --- | --- | --- | --- |
| Accnaphythylene | pending? | | | | --- | D |
| Acenaphthene | 6.00 E-02 | --- | --- | --- | hepatotoxicity | --- |
| Fluorene | 4.00 E-02 | | | D | hematologic cffects | --- |
| Phenanthrene | No | data | | | --- | D |
| Anthracene | 3.00 E-01 | --- | --- | --- | based on NOAEL | D |
| Fluoranthene | 4.00 E-02 | --- | --- | --- | nephrotoxicity hepatoxicity | D |
| Pyrene | 3.00 E-02 | --- | --- | --- | nephrotoxicity | --- |
| Chrysene | --- | --- | 7.30 E-03 | 6.10 E-03 | --- | B2 |
| Benz(a)anthracene | --- | --- | 7.30 E-01 | 6.10 E-01 | --- | B2 |
| Benzo(b)fluoranthene | --- | --- | 7.30 E-01 | 6.10 E-01 | --- | B2 |
| Benzo(k)fluoranthene | --- | --- | 7.30 E-02 | 6.10 E-03 | --- | B2 |
| Benzo(a)pyrene | --- | --- | 7.30 E+00 | 6.10 E+00 | --- | B2 |
| Indero(1,2,3-cd)pyrene | --- | --- | 7.30 E-01 | 6.10 E-01 | --- | B2 |
| Dibenzo(a,h)anthracene | --- | --- | 7.30 E+00 | 6.10 E+00 | --- | B2 |
| Benzo(g,h,i)perylene | --- | --- | --- | --- | --- | D |
| Dibutylphthalate | 1.00 E-01 | --- | --- | --- | --- | --- |

## Table 1 Continued

| | $RfD_o$ | $RfD_i$ | $CPS_o$ | $CPS_i$ | Toxicity Endpoint | Noncancer Carcinogenicity Classification |
|---|---|---|---|---|---|---|
| Dibutyl benzyl phthalate | Not | on | IRIS | | | |
| Aroclor 1260 | --- | --- | 7.70 E+00 | | developmental toxicity | B2 |
| Aroclor 1254 | 2.00 E-05 | --- | 7.70 E+00 | | developmental toxicity | B2 |
| 4,4 - DDD | --- | --- | 2.40 E-01 | | developmental toxicity | B2 |
| Cadmium | 5.00 E-04 | --- | --- | 6.30 E+00 | proteinuria | B1 |
| Arsenic | 3.00 E-04 | --- | 1.75 E+00 | 1.51 E+01 | neuropahty skin lesions | A |
| Barium | 7.00 E-02 | 1.43 E-04 | --- | --- | --- | --- |
| Chromium(VI) | 5.00 E-03 | --- | --- | 4.20 E+01 | based on NOAEL | A |
| Pb | | | | | developmental toxicity | --- |
| Hg (inorganic) | 3.00 E-04 | 8.57 E-05 | --- | --- | --- | --- |
| Silver | 5.00 E-03 | --- | --- | --- | --- | --- |
| Se | 5.00 E-03 | --- | --- | --- | --- | --- |

of 4E-04 mg/kg-day for children. The PTTDI of 75 micrograms per day for adult males was combined with a 70-kg bodyweight to provide an estimated RfD of 1.1E-03 mg/kg-day for adults.

- There are no inhalation cancer potency slope factors available for the Aroclors or for 4,4'-DDD. For these compounds, oral RfDs were used for evaluating carcinogenic risk from dust inhalation. This is physiologically reasonable given that contaminants absorbed to particles larger than 10 microns are cleared from the respiratory tract by the mucociliary escalator and are ultimately ingested.

## 2.0 EXPOSURE ASSESSMENT

The analytical results for the soil samples were segregated into six exposure areas with similar contaminant concentrations and probable exposure patterns. The six areas are: nature trail, old channel, day care center, Howard High School ballfields, Montague Park playground, and Montague Park ballfields. The average contaminant concentrations for each of the six areas are shown in Table 2.

"Probable maximum" exposure scenarios based on best professional judgement were developed for each of the exposure areas and are summarized in Table 3. This scenario is not equivalent to a Reasonable Maximum Exposure (ME), which is based largely on using 95th percentile upper bound estimates for most variables. Rather, this "probable maximum" scenario was constructed to give a better estimate of the central tendency of the risk while still being protective of the majority of receptors.

The exposure pathways assumed to be complete are: incidental soil ingestion, inhalation of site dust, and dermal contact with site soils. Because residents of the area have domestic water provided by the City of Chattanooga, and there is no evidence of groundwater being used for potable supply, ingestion of contaminated groundwater was assumed to be an incomplete exposure pathway.

The vapor pressures of the organic contaminants detected in the soil samples are less than 1mm mercury at ambient temperatures, so volatilization was assumed to be

**Table 2**
**Average Contaminant Concentrations in Site Soils**
**(inorganics in mg/kg; organics in ug/kg)**

| INORGANICS | Nature Trail | Day care Surface | Howard School Ballfields | Old Channel | Montague Playground | Montague Ballfields |
|---|---|---|---|---|---|---|
| Arsenic | 6.19 | 4.35 | 4.35 | 4.24 | 2.55 | 2.39 |
| Barium | 100.0 | 84.8 | 87.6 | 58.3 | 130.8 | 79.9 |
| Cadium | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 | <0.1 |
| Chromium | 81.7 | 14.6 | 20.97 | 19.6 | 26.67 | 15.86 |
| Lead | 98.75 | 35.62 | 52.25 | 59.23 | 14.43 | 14.7 |
| Mercury | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Selenium | <1.5 | <1.5 | <1.50 | <1.50 | <1.50 | <1.50 |
| Silver | 2.43 | <0.5 | <0.17 | <0.5 | <0.50 | <0.50 |
| **ORGANICS** | | | | | | |
| Napthalene | 222 | --- | --- | --- | --- | --- |
| Acenapthylene | 185 | --- | 158 | --- | --- | --- |
| Acenapthene | 448 | 32 | --- | 230 | --- | --- |
| Fluorene | 548 | 28 | --- | 180 | --- | --- |
| Phenanthrene | 6,452 | 294 | 129 | 2,487 | --- | --- |
| Anthracene | 1,505 | --- | 114 | 607 | --- | --- |
| Dibutylphthalate | 1,600 | 880 | 671 | --- | --- | --- |
| Fluoranthene | 9,790 | 796 | 747 | 4,833 | 53 | 178 |
| Pyrene | 11,203 | 518 | 518 | 3,107 | --- | 92 |
| Chrysene | 3,640 | 300 | 568 | 1,753 | --- | 45 |
| Benzo(a) anthracene | 5,933 | 112 | 394 | 833 | --- | --- |
| Benzo(b) fluoranthene | 5,642 | 304 | 1,113 | 2,923 | 47 | 116 |
| Benzo(k) fluoranthene | 1,745 | 54 | 250 | 1,100 | --- | --- |
| Benzo(a)pyrene | 3,975 | 340 | 740 | 1,707 | --- | --- |
| Indeno (1,2,3-cd)pyrene | 2,505 | 316 | 639 | 1,417 | --- | 30 |
| Dibenzo(a,h) anthracene | 500 | --- | 104 | 260 | --- | --- |
| Aroclor 1260 | 32 | --- | --- | --- | --- | 28 |
| 4,4'-DDD | --- | --- | --- | --- | --- | 45 |

## Table 3 Assumptions for Probable Maximum Exposure Scenarios

AREA 1: NATURE TRAIL

- most sensitive receptors are children age 5-18.
- exposure occurs for 1 hour/month, 3 months/year, over a period of 13 years.
- complete pathways are inhalation, dermal absorption, and incidental soil ingestion.
- dermal contact was made only on the hands.
- inhalation rates used were appropriate for light activity levels.

AREA 2: DAY CARE CENTER

- most sensitive receptor for chronic noncancer toxicity are children age 1-6; their exposure occurs for 9 hours/day, 250 days/year, for 5 years.
- for cancer risk, the exposure of adult long term care givers was also evaluated. The workers were assumed to have 100 mg/day soil ingestion and 7.5m $^3$ air intake per 9-hour workday. Exposure duration for these receptors was assumed to be 25 years (95th percentile exposure duration based on labor statistics).
- complete pathways for the children are inhalation, dermal absorption, and incidental soil ingestion.
- dermal exposure in the children was assumed to be the arms, hands and legs for 20 weeks/year and hands only for 30 weeks/year. No regular dermal contact with the soil was evaluated for the adult care givers.
- inhalation rates for the children were appropriate for quiet activity for 8 hours per day and vigorous play for 1 hour per day.

**Table 3 Continued**

AREA 3: HOWARD SCHOOL BALLFIELDS

- o receptors are assumed to be children in grades 9 through 12 involved in regular sports activities for 2 hours per day, 4 days/week during an annual season of 12 weeks. The exposure duration was assumed to be 4 years.
- o complete exposure pathways are inhalation, dermal absorption, and incidental soil ingestion.
- o dermal exposure occurred on the hands, forearms, and lower legs.
- o soil ingestion was assumed to be 200 mg/day.
- o inhalation rates appropriate to vigorous activity were assumed.

AREA 4: MONTAGUE PLAYGROUND

- o receptors were assumed to be children ages 1-10 who have contact with the site for an average of 3 hours/day, 1 day/week, 20 weeks/year, for a duration of 9 years.
- o complete exposure pathways are inhalation, dermal absorption, and incidental soil ingestion.
- o dermal exposure occurs on the hands, arms and legs.

AREA 5: OLD CHANNEL

- o Note: this site is heavily overgrown but is probably entered sporadically.
- o receptors are children age 5-18 years.
- o complete exposure pathways are inhalation and dermal absorption.Because the duration of each exposure incident was limited, it was assumed that soil ingestion was negligible.
- o dermal contact was assumed to occur only on the hands.
- o inhalation rates were appropriate for a moderate activity level.
- o exposure takes place for 2 hours once each year over a period of 13 years.

**Table 3 Continued**

AREA 6: MONTAGUE PARK BALLFIELDS

- adults are the most heavily exposed receptors.
- complete exposure pathways are inhalation, soil ingestion, and dermal absorption.
- inhalation rates were appropriate for a moderate to vigorous activity level.
- dermal exposure occurs on the hands, forearms and lower legs.
- exposure occurs for 12 days/year over 15 years.

negligible. (NOTE: This assumption may not be protective during hot weather near areas where grass ground cover is not maintained). The inhalation pathway was therefore completed only by inhalation of respirable-size suspended dust particles with a chemical composition reflecting the soil at the site.

An assumption was made that children at the day care center would only come into contact with the surface soils. No quantitative risk evaluation was done for the soils sampled from 18 inches depth. Given the apparent history of these sites, areas of excavation may differ markedly from the soil samples evaluated in this risk assessment.

Quantitative information on absorption of the contaminants by various exposure pathways was generally not available, so conservative assumptions were used (Table 4). In the absence of information to the contrary (i.e. for lead and Cr(VI), absorption was assumed to be 100 percent complete for the ingestion and inhalation pathways. The ATSDR Toxicological Profile indicates that dermal absorption of the various PAHs is highly variable. The reported value of 3 percent was used for benzo(a)pyrene, while a value of 50 percent was used for the remaining organics. Cr(VI) is known to penetrate intact skin to some degree, so a dermal absorption of 50 percent was used. There was no indication that the remaining inorganics penetrate intact skin, so their dermal absorption was assumed to be zero.

Additional exposure assumptions used to calculate intakes through the various pathways are shown in Table 5. Default exposure factors from EPA's Exposure Factor Handbook (1989) were used whenever appropriate for a "probable maximum" exposure. The generic equations used to calculate intakes by the various pathways are shown in Table 6.

**Table 4**
**Absorption Factor Estimates by Pathway**

| | Ingestion | Dermal | Inhalation |
|---|---|---|---|
| Arsenic | 1.0 | 0 | 1.0 |
| Cadmium | 1.0 | 0 | 1.0 |
| Barium | 1.0 | 0 | 1.0 |
| ChromiumVI | 0.5 | 0.5 | 1.0 |
| Lead | 0.5 | 0 | 1.0 |
| Silver | 1.0 | 0 | 1.0 |
| | | | |
| Dibutyl phthalate | 1.0 | 0.5 | 1.0 |
| Aroclor 1260 | 1.0 | 0.5 | 1.0 |
| 4,4' - DDD | 1.0 | 0.5 | 1.0 |
| Napthalene | 1.0 | 0.5 | 1.0 |
| Acenaphthylene | 1.0 | 0.5 | 1.0 |
| Acenaphthene | 1.0 | 0.5 | 1.0 |
| Fluorene | 1.0 | 0.5 | 1.0 |
| Phenanthrene | 1.0 | 0.5 | 1.0 |
| Anthracene | 1.0 | 0.5 | 1.0 |
| Fluoranthene | 1.0 | 0.5 | 1.0 |
| Pyrene | 1.0 | 0.5 | 1.0 |
| Chrysene | 1.0 | 0.5 | 1.0 |
| Benzo(a)anthracene | 1.0 | 0.5 | 1.0 |
| Benzo(b)fluoranthene | 1.0 | 0.5 | 1.0 |
| Benzo(k)fluoranthene | 1.0 | 0.5 | 1.0 |
| Benzo(a)pyrene | 1.0 | 0.3 | 1.0 |
| Indeno(1,2,3-cd)pyrene | 1.0 | 0.5 | 1.0 |
| Dibenz(a,h)anthracene | 1.0 | 0.5 | 1.0 |

## Table 5 Generic Exposure Assumptions

Soil adherence to skin:

- 2.77 mg/cm$^2$

Incidental soil ingestion:

- 200 mg/day for children under age 10 and for older children playing on the Howard School ballfields
- 100 mg/day for adults

Inhalation rates:

- child age 1-10 = 0.8 m$^3$/hr during sedentary activity
  = 2.0 m$^3$/hr during moderate activity
  = 2.4 m$^3$/hr during vigorous activity
- adolescents age 14-18 = 4.8 m$^3$/hr during sports activities
- adult care givers = 7.5 m$^3$ per 9-hr workday
- adult ballplayers = 2.5 m$^3$/hr during sports activities

Particulate concentration in the air:

- 75 micrograms/m$^3$

Dermal surface area:

- child age 1-6 hands = 410 cm$^2$
  arms+legs+hands = 3100 cm$^2$
- child age 6-10 hands = 430 cm$^2$
  arms+legs+hands = 4200 cm$^2$
- child age 14-18 hands+forearms+lower legs = 4000 cm$^2$
- adult hands+forearms+lower legs = 4050 cm$^2$

## Table 5 Continued

Body weight:

- o child age 1-6 = 15kg
- o child age 6-9 = 25kg
- o child age 14-18 = 65kg
- o adult = 70kg

Lifetime Exposure duration = 70 years

**Table 6**
**Risk Characterization**

| Scenario | Receptor | Pathway | Hazard Index | Upper Bound Incremental Excess Lifetime Cancer Risk |
|---|---|---|---|---|
| Nature Trail | child | soil ingestion | <0.1 | $5x10^{-7}$ |
| | | dermal absorption | <0.1 | |
| | | dust inhalation | <0.1 | $1x10^{-8}$ |
| | | Total | <0.1 | $5x10^{-7}$ |
| Day Care Center | child | soil ingestion | 0.6 | $3x10^{-6}$ |
| | | dermal absorption | 0.3 | |
| | | dust inhalation | <0.1 | $3x10^{-7}$ |
| | | Total | 0.9 | $3x10^{-6}$ |
| | adult care giver | soil ingestion | <0.1 | $4x10^{-6}$ |
| | | dust inhalation | <0.1 | $1x10^{-6}$ |
| | | Total | <0.1 | $5x10^{-6}$ |
| Howard School Ballfields | child | soil ingestion | <0.1 | $1x10^{-6}$ |
| | | dermal absorption | <0.1 | |
| | | dust inhalation | <0.1 | $7x10^{-8}$ |
| | | Total | <0.1 | $1x10^{-6}$ |
| Old Channel | child | dermal absorption | <0.1 | $<<10^{-6}$ |
| | | dust inhalation | <0.1 | $<<10^{-6}$ |
| | | Total | <0.1 | $<<10^{-6}$ |
| Montague Playground | child | soil ingestion | <0.1 | $<<10^{-6}$ |
| | | dermal absorption | <0.1 | |
| | | dust inhalation | <0.1 | $<<10^{-6}$ |
| | | Total | <0.1 | $<<10^{-6}$ |
| Montague Ballfields | adult | soil ingestion | <0.1 | $<<10^{-6}$ |
| | | dermal absorption | <0.1 | |
| | | dust inhalation | <0.1 | $<<10^{-6}$ |
| | | Total | <0.1 | $<<10^{-6}$ |

## 3.0 RISK CHARACTERIZATION

Hazard quotients for exposure to the individual contaminants were calculated as the ratio of the chronic daily intake to the reference dose (Table 6). The hazard quotients for each pathway were summed to produce a hazard index in accordance with EPA guidance. Hazard indices for each area tended to be driven primarily by lead and arsenic concentrations through the soil ingestion pathway, and chromium through the dermal absorption pathway. Only for children at the day care site did hazard indices exceed 0.1 which is an order of magnitude below the target of 1.0.

Upper bound incremental lifetime excess cancer risks were calculated by multiplying lifetime average daily dose (over a 70-year lifetime) by the cancer potency slope appropriate for the contaminant and the pathway (Table 5). The cancer risks were added to produce an upper bound cancer risk for probable maximum exposure at each site. By definition, an "upper bound" cancer risk means the risk is highly unlikely to exceed the value shown, and may, in fact, be zero. The cancer risks calculated here tended to be driven by ingestion of arsenic in soil and by inhalation of Cr(VI)-containing dust.

Only at the day care site did maximum probable cancer risks exceed a theoretical target of $1 \times 10^{-6}$, and then only marginally so. It is worth noting, however, that the calculated cancer risks were driven by arsenic and chromium(VI) , which are both known human carcinogens (class A). The contribution of the PAHs, which are only probable human carcinogens (class B2) was significantly lower.

Cancer risks for care givers with long-term exposure at the day care site were similar to the cancer risks for the shorter-term but more intensely exposed children (i.e., in the range $10^{-5}$ to $10^{-6}$).

The fact that lead made major contributions to the hazard indices for soil ingestion is of some concern given that there is no peer-reviewed reference dose available for lead. The estimated RfDs used here are based on FDA's Provisional Total Tolerable Daily Intakes, which are not widely used. Given that lead effects are believed to be without a threshold and that children at this day care are likely to be at risk for significant lead exposures from other sources, I recommend that the City of Chattanooga contact CDC and/or ATSDR for guidance about the possible need to screen blood lead levels in these children.

## REFERENCES CITED


CDC, 1991. Preventing Lead Poisoning in Young Children, U.S. Dept. Health and Human Services, Public Health Service,Centers for Disease Control.

ATSDR, 1990. Toxicological Profile for Lead, U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, ATSDR/TP-88/17.

USEPA, 1989. Risk Assessment Guidance for Superfund, Vol. 1 - Human Health Evaluation Manual(Part A), U.S. Environmental Protection Agency, Office of Emergency & Remedial Response, EPA/540/1-89/002.

Bolger, M., 1992. U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition, Personal communication.

ATSDR, 1989. Toxicological Profile for Chromium, U.S. Public Health Service, Agency for Toxic Substances and Disease Registry, ATSDR/TP-88/10.

USEPA, 1989. Exposure Factors Handbook, U.S. Environmental Protection Agency, Office of Health and Environmental Assesment, EPA/600/8-89/043.

ATSDR, 1990. Toxicological Profile for Polycyclic Aromatic Hydrocarbons, U.S. Dept. of Health and Human Services, Agency for Toxic Substances & Disease Registry, TP-90-20.

ATSDR, 1989. Toxicological Profile for Arsenic, U.S. Public Health Service, ATSDR, ATSDR/TP-88-02.

USEPA, 1995. Risk-Based Concentration Table, January - June 1995, USEPA Region III Technical Support Section.

EXAMPLE EQUATIONS

PATHWAY: SOIL INGESTION

$$\text{Chronic daily dose (mg/kg-day)} = \frac{F * \frac{mgX}{Kg\ soil} * \frac{mg\ soil}{day} * \frac{10^{-6}Kg}{mg} * \frac{days\ exposed}{year} * years\ exposed}{Kg\ body\ weight * years\ exposed * \frac{365\ days}{year}}$$

*where F = fraction absorbed*

$$\text{Hazard Quotient} = \frac{chronic\ daily\ dose}{RfD_o}$$

Where $RfD_o$ = reference done for oral pathway (mg/Kg-day)

$$\text{Lifetime average daily dose (mg/kg-day)} = \frac{\sum F * \frac{mgX}{Kg\ soil} * \frac{mg\ soil}{day} * \frac{10-^{6}Kg}{mg} * \frac{days\ exposed}{year} * years\ exposed}{70Kg * 70\ years * 365\ days/year}$$

$$\text{where } \sum = \frac{sum}{age} - \text{specific soil ingestion patterns}$$

Upper Bound Incremental Excess Lifetime Cancer Risk = Lifetime average daily dose x $CPS_o$

where $CPS_o$ = Cancer potency slope for ingestion pathway

EXAMPLE EQUATIONS

PATHWAY: DERMAL ABSORPTION

$$\text{Chronic daily dose } (mg/Kd\text{-}day) = \frac{\sum F * \frac{mgX}{Kg\ soil} * \frac{10^{-6} Kg\ soil}{mG\ soil} * cm^2 * mg/cm^2 * \frac{seasonal\ exposure\ events}{year} * years\ exposed}{Kg\ bodyweight * years\ exposed * \frac{365 days}{year}}$$

where $\sum$ = sum over seasonal exposure events
$F$ = fraction absorbed
$cm^2$ = skin surface exposed for season
$mg/cm^2$ = soil adherence

$$\text{Hazard Quotient} = \frac{\text{chronic daily dose}}{RfD}$$

where RfD = ingestion reference dose (dermal reference doses not available)

$$\text{Lifetime average daily dose } (mg/Kg\text{-}day) = \frac{\sum * \frac{mgX}{Kg\ soil} * \frac{10^{-6} Kg\ soil}{mg\ soil} * cm^2\ surface * mg/cm^2 * \frac{seasonal\ exposure\ events}{year} * years\ exposed}{70\ Kg * 70\ years * 365\ days/yr}$$

Where $\sum$ = sum over seasonal exposure events
$cm^2$ = skin surface exposed, by season
$mg/cm^2$ = soil adherence

70 years = averaging period for carcinogens

Upper Bound Incremental Excess Lifetime Cancer Risk = Lifetime average daily dose x $CPS_o$
where $CPS_0$ = cancer potency slope for ingestion pathway [(mg/kg-day)]

EXAMPLE EQUATIONS

PATHWAY: DUST INHALATION

$$\text{Chronic daily dose } (Mg/Kg\text{-}day) = \frac{\sum F * 7.5x10^{-8} \frac{Kg\ soil}{M^3\ air} * \frac{mgX}{Kg\ soil} * m^3/hr * \frac{hours\ of\ activity\ level}{day} * \frac{exposed\ days}{year} * years\ exposed}{Kg\ bodyweight * years\ exposed * \frac{365\ days}{year}}$$

*Where* $\sum$ = *sum over inhalation rates specific to various activity levels*
$F$ = *fraction absorbed*
$m^3/hr$ = *inhalaton rate @ activity level*

$$\text{Hazard Quotient} = \frac{\text{Chronic daily dose}}{RfD_i}$$

Where $RfD_i$ = reference dose for inhalation pathway

$$\text{Lifetime average daily dose } (mg/Kg\text{-}day) = \frac{\sum F * \frac{mgX}{Kg\ soil} * 7.5\ x\ 10^{-8} \frac{Hg\ Soil}{m^3\ air} * m^3/hour * \frac{hours\ of\ activity\ level}{day} * \frac{exposed\ days}{year} * years\ exposed}{70\ kg * 70\ years * 365\ days/year}$$

*Where* $\sum$ = *sum over inhalation rates specific to inhalation rates for various activity levels*
$m^3/hr$ = *inhalation rate at activity level*
70 *years* = *averaging period for carcinogens*

Upper Bound Incremental Excess Lifetime Cancer Risk = Lifetime average daily dose x $CPS_i$
where $CPS_i$ = cancer potency slope for inhalation pathway $([mg/Kg\text{-}day])^{-1}$

(Note: CPS for ingestion was used when CPSi was not available)

RECEIVED
SEP 0 7 2001
ENVIRONMENTAL ASSISTANCE
CENTER AT CHATTANOOGA

# Work Plan for Environmental Improvements to the Howard School

October 21, 1996

Submitted to:
State of Tennessee
Department of Environment and Conservation
Superfund Division
401 Church Street
Chattanooga, Tennessee 37243-1548

Prepared by:
Marion Environmental Inc.
1914 Polymer Drive
Chattanooga, Tennessee 37421

MEI Job # 96-107

# Table of Contents

Appendix 1 . . . . . Scope of Work

Appendix 2 . . . . . Schedule of Work

Appendix 3 . . . . . Health Consultation (ATSDR)

Appendix 4 . . . . . Additional Analytical

Appendix 1
Scope of Work

SECTION 01010

SUMMARY OF WORK

A. GENERAL

The work covered by this contract document is pertaining to the Howard High Landfills and will be performed under one contract as follows: Refer to the attached Figures 1 and 2 for details.

1. Howard Landfill Improvements

   1.1 Cap improvement and vegetation cover
   1.2 Fencing, gates and signs

2. Day Care Center

   2.1 Subsurface soil removal
   2.2 Native clay compacted cover
   2.3 Synthetic liner

3. Nature Trail

   3.1 Repair gray water tile
   3.2 Resurface nature trail area

4. ~~Football Practice Field~~

   ~~4.1 Area drainage improvement~~

This Section has been deleted.

5. Restricted Access

   5.1 Restrict access to a sewer grate
   5.2 Restrict Access to east side of dump area

B. SPECIFIC

All work to be performed for the following listed items will be paid at the specified rate per the attached bid schedule. The contractor will be responsible for furnishing the appropriate and adequate documents for measurements, weight tickets, etc.

1. Howard Landfill Improvements

1.1 Cap improvement and vegetation cover

The contractor will be required to provide improvement for the bare spots in a landfill cap in some areas. The typical cap areas requiring improvements may range from 3 0 to 120 square feet and there will be several areas that Contractor will be required to fix. The Contractor will be required to provide unit price $/square foot and will be paid in accordance with the actual measurements taken for the work performed. The Contractor will provide a 6-inch clay layer overlain by 6 inches of topsoil. The last component (topsoil) of the system will be for vegetation cover. The Contractor will be required to provide grass or equivalent provision as vegetation cover to avoid the potential for erosion as well as reducing cap maintenance. The Contractor will prepare surface prior to applying the recommended seeding group and seeding rate (Sericea lespedeza, tall fescue, annual lespedeza group with 60,30,10 percentiles (respectively) at seeding rates of 1.1, 0.55, 0.18 lbs. Per 1,000 square feet, respectively. Refer to the attached literature for information), fertilizer, lime and mulch. The Contractor will be responsible for required soil sampling and analysis, rate and type of fertilizer, lime and mulch application (in accordance with the Soil Conservation Service recommendations) and adequate watering, etc. The Contractor will be responsible for obtaining representative samples of the top soil for nutrients and pH analyses. The area to be covered for this work and the required quantity of topsoil, clay for cap and vegetation cover requirements win be furnished by the Contractor and will be a part of a unit price $/square foot.

The topsoil to be furnished by Contractor will be consisting of friable, fertile soil of loamy character with organic matter normal to the region, capable of sustaining healthy vegetation, and reasonable free from subsoils roots, brush, noxious weeds, sticks and other deleterious matter.

1.2 Fencing, gates and signs

The Contractor will provide standard 6 foot chain link fence system including gates and signs for the estimated length 1000.00 lin feet. Within 14 calendar days after the Contractor has received the owner's contract award for the work, the Contractor will be required to submit the following for approval:

1. A material list of items proposed to be provided under this work.

2. Manufacturer's specifications, shop drawings in sufficient details to show fabrication, installation, anchorage, etc.

3. Manufacturer's recommended installation procedures and work execution plans, details prepared by Contractor.

4. Provide product/material data but not limited to: (1) Fences: dimensions, fabric, posts, rails, post braces and assemblies, stretcher bars and bands, tension wires, floor shoes, ties, etc. (2) Gates: dimensions, frame, fabrics (same as used in a fence), cross-bracing, stretcher bars, hinges, latches, truss rods, etc. (3) Signs: all necessary hardware and write-up details, etc.

5. The Contractor will be required to provide a fence installation plan indicating proposed location of the gates, signs and any other details required for the work.
Contractor please note small section of fence at Chattanooga creek.

2. Day Care Center

2.1 Subsurface Soil Removal

The Contractor will be required to remove the chain link fence (estimated length 542.00 feet) and play ground equipment prior to start of the work and replace them back at the completion of the work. The Contractor will be required to remove subsurface soil up to 26 inch depth for 11200.00 square foot areas (all areas not covered by buildings or concrete). The estimated quantity of excavated soil will be 899 cubic yards. The Contractor will be required to perform excavating of every type of material encountered within the limits of work to the lines, grades, specified elevations and depth. The proposed handling of the excavated soil will be to load the dump trucks as the work is being carried out and transported to the City's Summit Landfill for disposal, at the City's expense, as a "special waste". The Contractor will be required to prepare disposal paper work, obtain the special waste disposal permit from the Tennessee Department of Environment and Conservation as well as any other requirements that are required by the owner. All transportation and disposal paper work will be submitted to the owner. Contractor will furnish loading and transportation.

The Contractor will replace the fence; construct the bark play areas as detailed in Figures 1 and 2. Playground equipment and benches will be reinstalled. Any equipment or benches damaged or missing from this effort will be replaced at the Contractor's expense.

It must be noted here that the soil material with shrubs between the day care center building walls and the existing concrete walk needs to be removed from the small area. The Contractor will be required to propose how he plans to execute this work at what cost while maintaining the integrity of the building as well as the side walk. The Contractor may choose to remove and replace the side walk to his option and cost.

## 2.2 Native Clay Compacted Cover

The cohesive soils consisting of native soils will be placed over the entire 26 inches excavated area (11200.00 sq. ft.) and 6-inch clay layer will be obtained by 95% compaction. At least three test results for 95% compaction will be provided by the Contractor. The compacted 6-inch clay layer will provide permeability of $1 \times 10^{-7}$ cm/s. The soil to be used for this work will be free of Chert, roots, organics, etc.

## 2.3 Synthetic Liner

A 60 mil thick High Density Polyethylene (HDPE) liner will be placed over the compacted soil layer. The HDPE liner will have a permeability of $1 \times 10^{-12}$ cm/s. The synthetic layer to be used for the facility will be provided by the owner. The Contractor will follow product specifications, installation procedures, engineered construction plans for liner (prepared by incorporating manufacturer's recommendations) and QA/QC procedures supplied by manufacturer for approval. The required synthetic liner material will be adequate to cover 11200.00 sq. ft. area.

## 2.4 Backfill Material Work

The contractor will be required to provide enough top soil backfill material to bring the remaining 20 inches excavated depth back to grade. The estimated quantity to be around 692 cubic yards. The soil material is to be free from organic matter and deleterious substances, containing no rocks or sizable lumps (over 6 inches). The fill material is subject to the approval of the owner or his designee, and is that material removed from excavations or transported from off-site burrow areas, predominantly granular, free from roots and other deleterious matter.

The Contractor will be required to place backfill and fill materials in layers not to exceed 6 inches in loose depth. Compact each layer of fill and backfill materials at 90% of maximum density. The entire work to be performed in a satisfactory manner and sequence that will provide proper drainage of area at all times.

## 2.5 All Associated Work

At the completion of the work the Contractor will be required to re-seed the remaining uncovered areas with fescue grass included with fertilizer, lime, and mulch. The Contractor will be responsible for acquiring representative samples of the soil for pH, nutrient analyses, and will apply fertilizer, lime, and mulch in accordance with the Soil Conservation Service recommendations (refer to the attached literature).

The Contractor will replace the fence; construct the bark play areas as detailed in Figures 1 and 2. Playground equipment and benches will be reinstalled. Any equipment or benches damaged or missing from this effort will be replaced at the Contractor's expense.

3. Nature Trail

3.1 Repair Gray Water Tile

The Contractor will be required to repair an approximate 12.00 feet length of existing broken piping. The repair work will be free of defects and up to the satisfaction of the owner or his designee. The Contractor will be required to provide repair procedures including the list of compatible materials to be used for the work for the owner's approval prior to the start of work.

3.2 Resurface Nature Trail Area

The Contractor will be required to provide pug mix as specified for a 3-feet wide nature trail walk area including circular sitting areas. The total area to be provided with pug mixture, approximately 22 tons, is estimated to be 2,600 sq.ft. The pug mix is Class A Grading D. The specifications and procedure for the mixture are provided in the enclosed information.

4.0 Football Practice Field

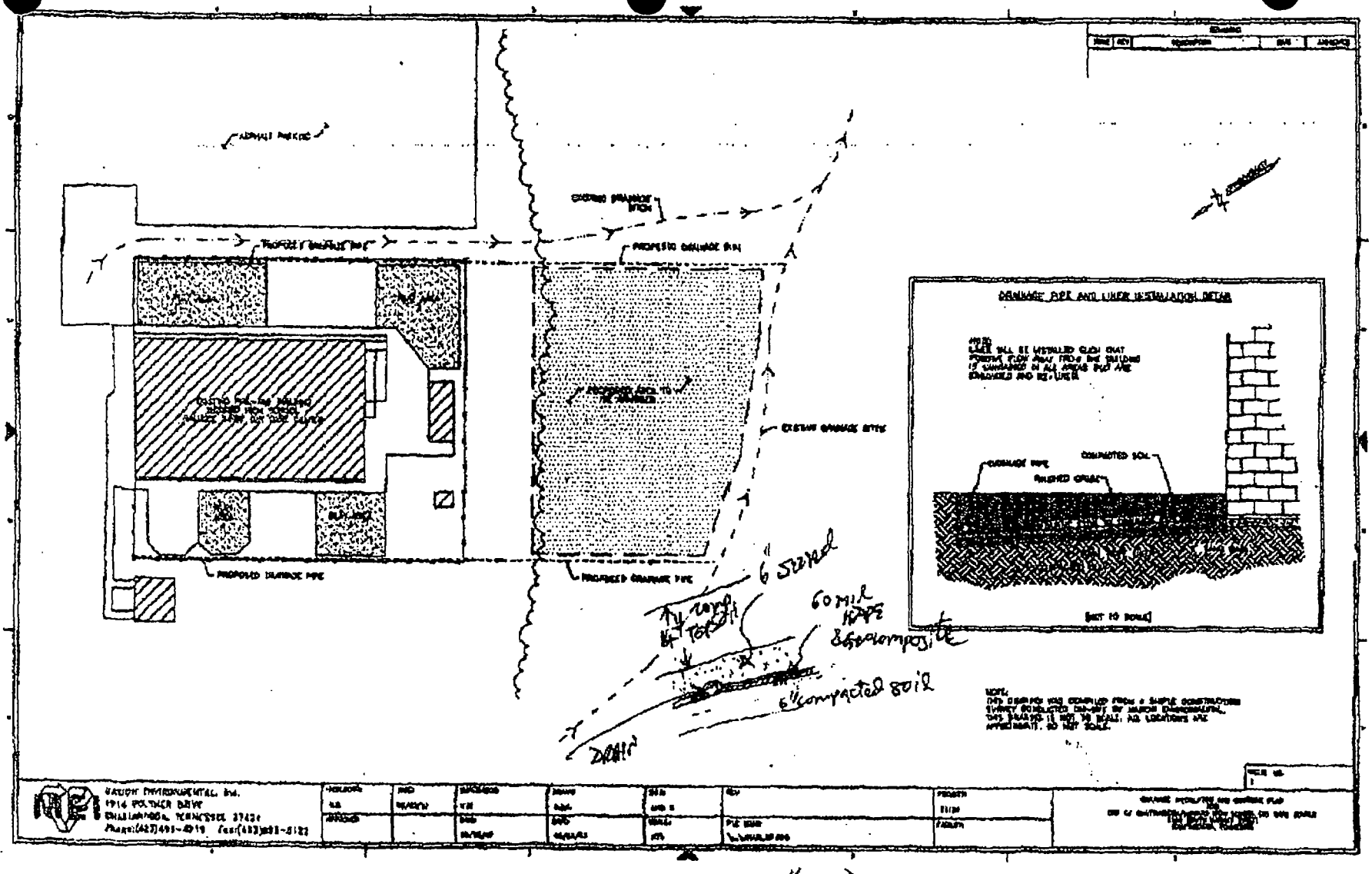
The scope of work is yet to be evaluated and estimated. Therefore, the Contractor will exclude this work from the bid.

5.0 Restricted Access

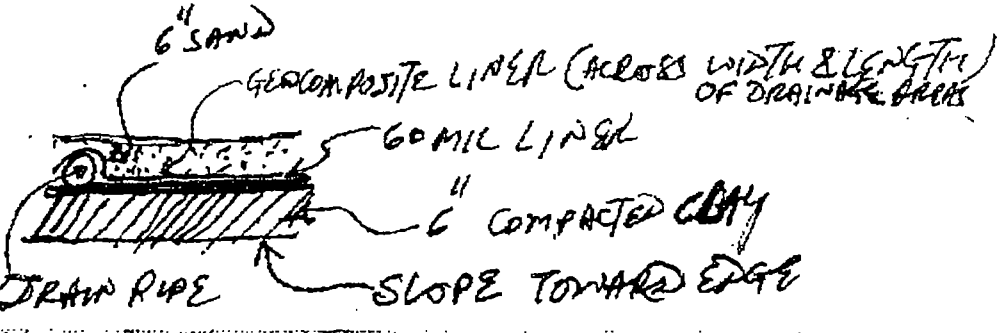
5.1 Restricted Access to Sewer Grate

5.2 Restricted Access to the East Side of Dump Area

This access will be restricted by constructing the fence. The required fencing material is included under item 1.2 (Fencing, gates and signs). The work specifications and the procedure will be the same as proposed for the Howard Landfill Improvement work under item 1.2 (Fencing, gates and signs).


ASPHALT PARKING
PROPOSED DRAINAGE PIPE
EXISTING DRAINAGE DITCH
PROPOSED DRAINAGE PIPE
PROPOSED AREA TO BE DRAINED
EXISTING DRAINAGE DITCH
PROPOSED DRAINAGE PIPE
PROPOSED DRAINAGE PIPE
DRAINAGE PIPE AND LINER INSTALLATION DETAIL
DRAINAGE PIPE
COMPACTED SOIL
PACKED GRAVEL
(NOT TO SCALE)
6" SAND
60 MIL HDPE & GEOCOMPOSITE
6" COMPACTED SOIL
DRAIN
HARTON ENVIRONMENTAL INC.
1914 POLYTHER DRIVE
CHATTANOOGA, TENNESSEE 37421

DRAFT


6" SAND
GEOCOMPOSITE LINER (ACROSS WIDTH & LENGTH OF DRAINAGE AREA)
60 MIL LINER
6" COMPACTED CLAY
COMPACTED CLAY
DRAIN PIPE
SLOPE TOWARD EDGE

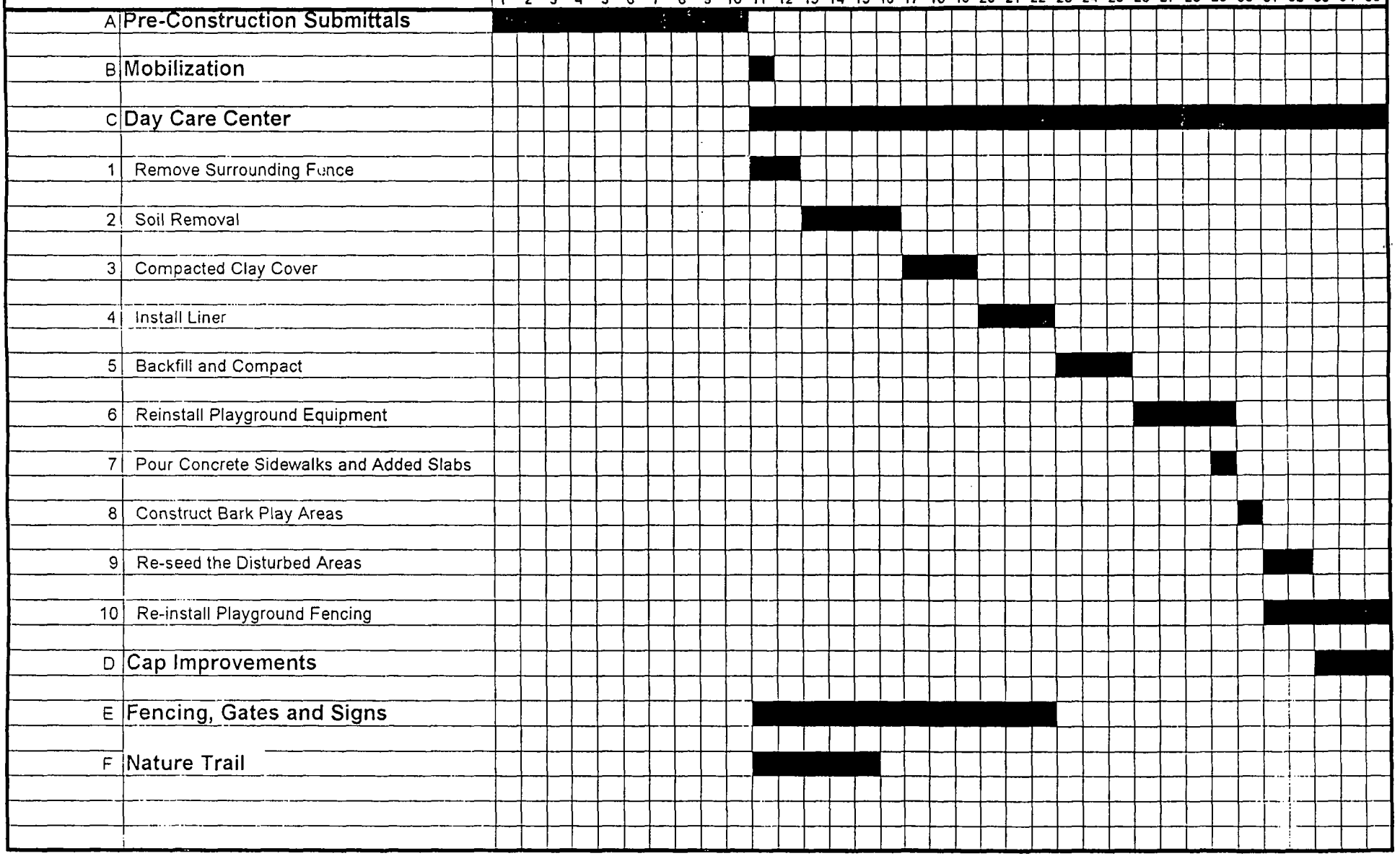
Appendix 2
Work Schedule

# Environmental Improvements to Howard School
# Chattanooga, Tennessee
# Proposed Schedule

Howard School - Chattanooga, TN

Schedule starts after receiving written Notice To Proceed.

Work Days - Based on 5 day work weeks. Weekends not included



Appendix 3
Health Consultation from the ATSDR

# Health Consultation

## Howard School (4#TN)
## Chattanooga, Hamilton County, Tennessee

September 30, 1996

U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia

Health Consultation
Howard School (4#TN)
Chattanooga, Hamilton County, Tennessee

**Background and Statement of Issues**

The city of Chattanooga Department of Public Works requested that the Agency for Toxic Substances and Disease Registry (ATSDR) review the "Investigation of Immediate Site Hazards, Howard School and Montague Park," and determine if the recommendations for the Howard School site are protective of public health [1]. A prior health consultation has been written addressing public health issues at the Howard School site by the Tennessee Department of Health (TDH) and provides additional background [2].

Howard School is a part of the Chattanooga Public School System and is located in Chattanooga, Hamilton County, Tennessee, in the Alton Park area. A former unregulated landfill occupies a large portion of the school property. The entire site is approximately 44 acres in size. A day care facility is located on-site and occupies approximately less than 1 acre of the site.

Howard School was built in the mid-1950s and is located 1 block south of the junction of I-24 and Alton Park Boulevard/Market Street. The school is bordered on the north by a public housing project which lies across Machine Street and on the west by Alton Park Boulevard and residential housing. When the school was constructed, it was bordered on the south and east by the Chattanooga Creek [1].

During the 1960s and 1970s the city of Chattanooga operated an unregulated landfill on city property to the south of Howard School and the Chattanooga Creek [1]. In the mid-1970s Chattanooga Creek was rerouted and the Old Channel that formed the boundary of the school property was filled as part of the landfill operations. The landfill was closed in 1977. The landfill closure was conducted by constructing a clay cap over the fill area. No records were available regarding the design of the cap (thickness of the clay layer, permeability of the clay. drainage layers, topsoil or establishment of vegetative cover) [1].

In the late 1980s a day care facility was opened south of the main building of Howard School. The facility provides day care for children ages 6 weeks to 5 years of age. The day care is located on a portion of the old landfill that once had been the main channel of the Chattanooga Creek [1].

A portion of Chattanooga Creek has been added to the National Priority List (NPL). Howard school is approximately 1.5 miles northwest of the of the NPL site. This portion does not include the Old Channel (of the Chattanooga Creek) that borders Howard School. Contamination of the creek is thought to be primarily polyaromatic hydrocarbons (PAHs) from past coal coking and wood creosoteing operations in the Chattanooga Creek watershed [1].

On May 23, 1994, a public health consultation was written that evaluated possible exposures to PAHs in soils for the Howard School site [2]. The following recommendations were made in the document:

1. Sample and analyze surface soil in areas where exposures are most likely to occur.

2. Sample and analyze gray water in areas where exposures are most likely to occur.

On March 14, 1995, the Tennessee Department of Superfund (TN-DSF) inspected the grounds of the Howard School site to identify areas where exposures were likely to occur and areas where gray water was observed. The number of surface (depth: 0 to 2 inches) and subsurface (depth: 18 inches) soil samples and the locations of the sampling at the Howard School site are as follows (see Attachment 1; Figure 1, Site Map, Howard School): nature trail area (5 surface and 1 subsurface soil samples), Old Channel area (3 surface soil samples), practice field (4 surface samples), day care (5 surface and 5 subsurface soil samples), baseball field (1 surface soil sample), and soccer field (2 surface soil samples). The soil samples were analyzed for eight RCRA metals (arsenic, barium, cadmium, lead, total chromium, mercury, selenium, and silver), volatile organic compounds (VOCs), semi-VOCs, PAHs, polychlorinated biphenyls (PCBs), and pesticides. Contaminants were detected in soil samples at the following maximum concentrations (see Attachment 1; Site Map Howard School and Analytical Results): **sample # HSNT2** (subsurface soil sample located on the nature trail), 298 parts per million (ppm) total PAHs, 120 ppm carcinogenic PAHs (sum of 7 carcinogenic PAHs; see Attachment 1); **sample # HSDC6** (subsurface soil sample located in the playground area of the day care), 220 ppm total PAHs, 96.2 ppm carcinogenic PAHs; **sample # HSDC8** (subsurface soil sample located in the playground area of the day care), 655 ppm total chromium.

The day care soil sampling locations were limited to areas outside four bark chip play areas. No soil sampling (surface or subsurface) was conducted in the bark chip play areas.

Gray water was discovered by the TN-DSF when they were conducting prior sampling at the site and broke a small clay tile near the nature trail. ~~The broken~~ clay tile then exposed gray water at the surface of the site near the nature trail. During the inspection on March 14, 1995 it was determined that this clay tile was placed to drain gray water (source appears to be from a sewer line) into storm drains that run adjacent to the Old Channel of the Chattanooga Creek and are presumed to empty into Chattanooga Creek [1]. The source of the gray water was not sampled by the TN-DSF because they have planned to repair and cover the clay tile [1]. To date, the clay tile has not been repaired.

The City of Chattanooga has provided the following recommendations for the Howard School site in the report, "Investigation of Immediate Site Hazards, Howard School and Montague Park" [1]:

1. The Old Channel area should be posted and fenced.

2. No digging should be allowed in the nature trail area and activities should be limited to those of an observational nature.

3. The surface soil at the day care facility should be removed to a depth of approximately 18 inches and an impermeable barrier be placed at that level. A reasonable design for this barrier would be a 6 inch layer of native clay compacted so as to obtain a permeability of $1 \times 10^{-6}$ cm/sec overlain by a synthetic liner and drainage mat. The remaining foot would be filled using clean fill and topsoil.

Discussion

A large portion of the Howard School site is occupied by a former unregulated landfill. No information exists regarding the design of the landfill cap, the current integrity of the existing landfill cap, or who is responsible for future maintenance of the landfill cap.

PAHs were detected in subsurface soil samples on the nature trail (298 ppm total PAHs, 120 ppm carcinogenic PAHs) and at the day care facility (220 ppm total PAHs, 96.2 ppm carcinogenic PAHs) of the Howard School site. Total chromium (655 ppm) was also detected in subsurface soils of the day care facility. Exposures to the subsurface contaminated soils are unlikely to occur unless the soils are brought to the surface from excavation, digging, etc.

The soil sampling at the day care facility did not include the bark chip play areas of the playground.

The gray water identified at the site by TDH and TN-DSF was not sampled. A broken clay tile is said to be responsible for the gray water surface seepage onto the site.

**Conclusions**

**The recommendations made by the city of Chattanooga for the Howard School site are protective of public health. However, additional recommendations are necessary to ensure that potential public health threats do not exist at this site.**

The contaminants (PAHs and total chromium) detected in subsurface soils on the nature trail and at the day care facility do not represent a public health threat because these are not accessible. However, if these contaminants are brought to the surface from excavation, digging, etc., a potential public health threat may exist from dermal contact with soil, ingestion of soils, or inhalation of dust from contaminated soils. All other contaminants detected in surface and subsurface soils were below levels of public health concern.

Since no surface or subsurface soil samples were collected from the playground areas covered with bark chips at the day care facility, ATSDR cannot determine if a potential public health threat exists from exposures to these soils.

Because the gray water surface seepage was not sampled at the site and the clay tile remains broken allowing the gray water run-off to continue on-site, ATSDR cannot determine if a potential public health threat exists from exposure to the gray water.

ATSDR concurs with the recommendation to fence and post with signs the Old Channel of the Chattanooga Creek, based on the following: the boundary of the Old Channel of Chattanooga Creek follows essentially the same boundaries of the landfill (see Attachment 1; Site Map), no information exists on the integrity of the landfill cap, and limited soil data exists near and on the boundary (only four surface soil samples collected near the landfill boundary). Fencing and posting of this area with signs is prudent public health practice.

**Recommendations**

In addition to the recommendations made by the city of Chattanooga to protect public health at the Howard School site, and based on the information evaluated, ATSDR provides the additional following recommendations:

1. Adequately characterize the nature and extent of the on-site gray water. Disregard this recommendation if the clay tile has been repaired and gray water seepage at the surface no longer represents a potential public health threat.

2. Determine and monitor the integrity of the landfill cap to ensure that no future public health threat exists.

3. Adequately characterize the nature and extent of contamination in surface (0 to 3 inches) and subsurface soils in the bark chip areas of the playground to determine if contaminants present a public health threat. Disregard this recommendation if the City of Chattanooga's recommendation to excavate, line, backfill, and cap the bark chip play areas of the playground is followed.

Tammie McRae

Concurred: Steven Kinsler, Ph.D.

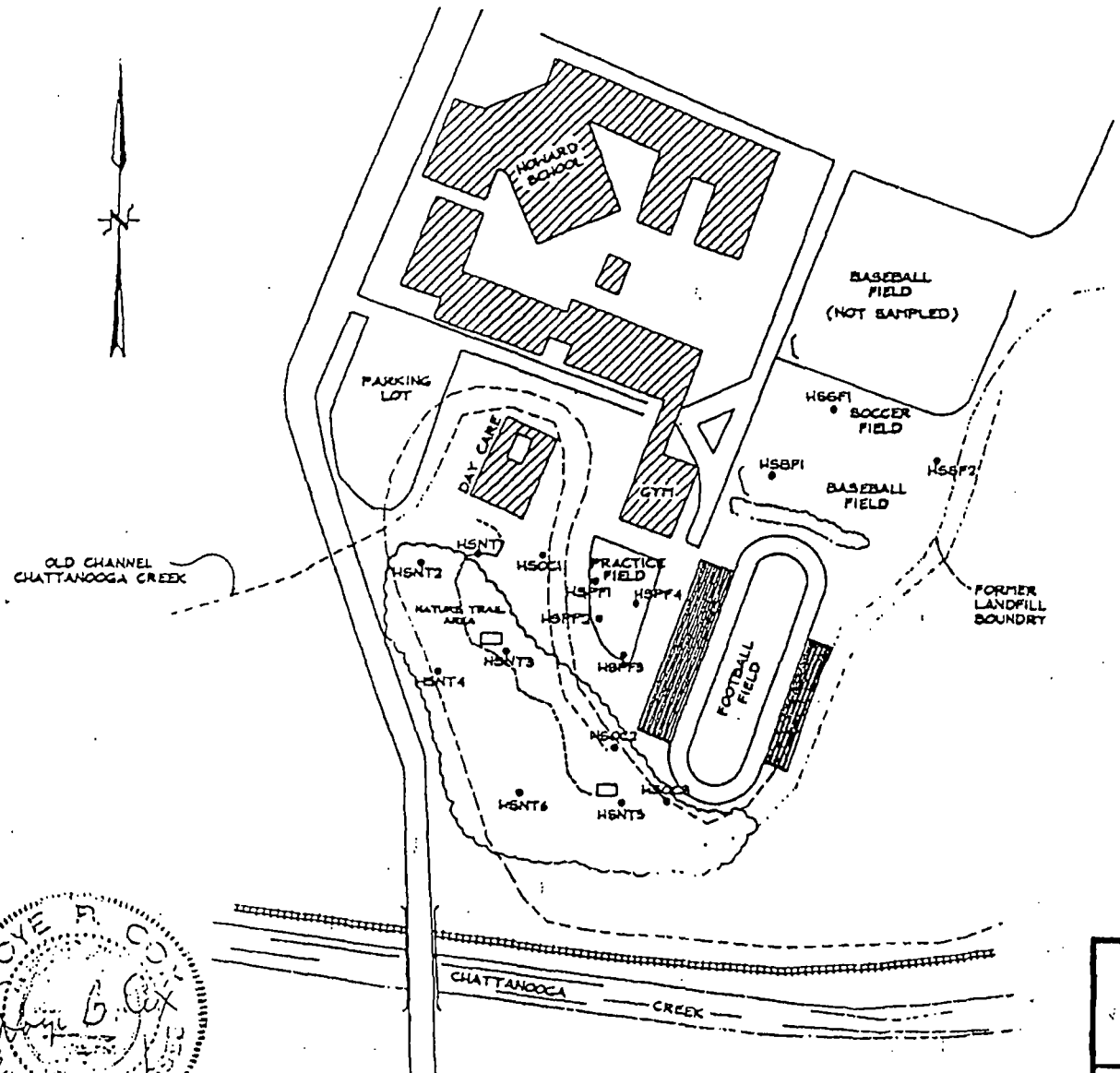
References:

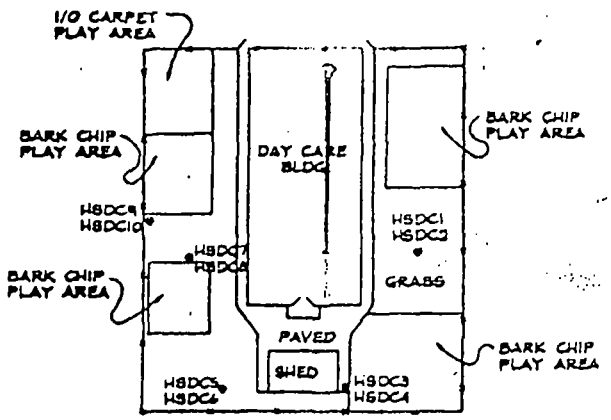
1. "Investigation of Immediate Site Hazards Howard School and Montague Park," prepared by Associated Environmental Services, Inc. for the city of Chattanooga, June 22, 1995

2. Public Health Consultation for Howard School. May 23, 1994. Tennessee Department of Health.

Attachment 1

Howard School Site Map and Analytical Data




DAY CARE DETAIL
SCALE: 1"=60'

GRAPHIC SCALE
250' 0 250' 500

| ASSOCIATED ENVIRONMENTAL SERVICES, Inc. | SITE MAP HOWARD SCHOOL FIGURE 1 | | |
|---|---|---|---|
| INTERPRETED BY / DATE | DRAWN BY S.U.R. / DATE 06-10-95 | FACILITY NO. | |
| APPROVED BY NBC / DATE | PROJECT NO. | FIGURE NO. 1 | |

BOYD R. COX
CHAIRMAN

09/30/96 16:09 0404 659 0000 ELUB

# Table 1
## Data Summary for Howard School

Metals Data
mg/Kg

| Sample # | As | Ba | Cd | Cr | Pb | Hg | Se | Ag |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | 6.62 | 118.00 | <0.1 | 117.00 | 67.10 | <0.01 | <1.50 | 6.40 |
| HSNT2 | 5.63 | 146.00 | <0.1 | 40.50 | 223.00 | <0.01 | <1.50 | <0.500 |
| HSNT3 | 3.20 | 138.00 | <0.1 | 141.00 | 91.40 | <0.01 | <1.50 | 8.20 |
| HSNT4 | 5.83 | 105.00 | <0.1 | 151.00 | 154.00 | <0.01 | <1.50 | <0.500 |
| HSNT5 | 7.62 | 42.60 | <0.1 | 24.20 | 27.50 | <0.01 | <1.50 | <0.500 |
| HSNT6 | 8.24 | 50.50 | <0.1 | 16.70 | 29.50 | <0.01 | <1.50 | <0.500 |
| HSOC1 | 4.28 | 60.80 | <0.1 | 18.90 | 65.60 | <0.01 | <1.50 | <0.500 |
| HSOC2 | 5.35 | 67.20 | <0.1 | 23.50 | 48.30 | <0.01 | <1.50 | <0.500 |
| HSOC3 | 3.11 | 47.00 | <0.1 | 16.40 | 63.80 | <0.01 | <1.50 | <0.500 |
| HSPF1 | 4.04 | 79.30 | <0.1 | 26.50 | 63.40 | <0.01 | <1.50 | 1.17 |
| HSPF2 | 3.12 | 72.90 | <0.1 | 15.20 | 29.50 | <0.01 | <1.50 | <0.500 |
| HSPF3 | 6.85 | 119.00 | <0.1 | 38.00 | 140.00 | <0.01 | <1.50 | <0.500 |
| HSPF4 | 2.40 | 129.00 | <0.1 | 14.90 | 23.60 | <0.01 | 2.27 | <0.500 |
| HSDC1 | 3.59 | 46.40 | <0.1 | 14.90 | 24.80 | <0.01 | <1.50 | <0.500 |
| HSDC2 | 5.84 | 41.60 | <0.1 | 12.50 | 11.80 | <0.01 | <1.50 | <0.500 |
| HSDC3 | 3.48 | 74.00 | <0.1 | 13.60 | 22.40 | <0.01 | <1.50 | <0.500 |
| HSDC4 | 4.90 | 130.00 | <0.1 | 13.00 | 44.10 | <0.01 | <1.50 | <0.500 |
| HSDC5 | 4.65 | 122.00 | <0.1 | 13.60 | 50.50 | <0.01 | <1.50 | <0.500 |
| HSDC6 | 3.60 | 37.00 | <0.1 | 15.20 | 15.90 | <0.01 | <1.50 | <0.500 |
| HSDC7 | 5.40 | 76.40 | <0.1 | 18.30 | 39.10 | <0.01 | <1.50 | <0.500 |
| HSCD8 | 16.70 | 153.00 | <0.1 | 655.00 | 155.00 | <0.01 | <1.50 | <0.500 |
| HSDC9 | 4.62 | 105.00 | <0.1 | 12.50 | 41.30 | <0.01 | <1.50 | <0.500 |
| HSDC10 | 11.40 | 144.00 | <0.1 | 29.80 | 307.00 | <0.01 | <1.50 | <0.500 |
| HSBF1 | 3.03 | 59.90 | <0.1 | 14.90 | 8.25 | <0.01 | <1.50 | <0.500 |
| HSSF1 | 5.99 | 86.60 | <0.1 | 24.40 | 62.40 | <0.01 | <1.50 | <0.500 |
| HSSF2 | 5.00 | 66.20 | <0.1 | 12.90 | 38.60 | <0.01 | <1.50 | <0.500 |
| AVG. | 5.56 | 89.1 | <0.1 | 57.5 | 71.1 | <0.01 | <2.27 | <5.26 |
| STD. DEV. | 2.94 | 36.7 | 0.00 | 125.5 | 69.4 | 0.00 | 0.00 | 2.98 |
| VARIANCE | 8.66 | 1343.8 | 0.00 | 15742.2 | 4819.9 | 0.00 | 0.00 | 8.89 |



09/30/96 16:11 0404 659 0033 ELCB 001/1

# Table 1 (Cont.)
## Data Summary for Howard School

Base Neutrals
ug/Kg

| Sample # | 2- Methylnaphthalene | Naphthalene | Acenaphthylene | Acenaphthene | Fluorene | Phenanthrene | Anthracene | Dibutylphthalate |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | | | | | | | | 1600 |
| HSNT2 | 540 | 1200 | 700 | 2400 | 2900 | 34000 | 7700 | 8000 |
| HSNT3 | | | | | | 110 | | |
| HSNT4 | | 130 | 250 | 290 | 220 | 3300 | 930 | |
| HSNT5 | | | 160 | | 170 | 1300 | 400 | |
| HSNT6 | | | | | | | | |
| HSOC1 | | | | 450 | 330 | 3800 | 980 | |
| HSOC2 | | | | | | 560 | 130 | |
| HSOC3 | | | | 240 | 210 | 3100 | 710 | |
| HSPF1 | | | | | | 620 | | |
| HSPF2 | | | | | | 280 | | |
| HSPF3 | | | 750 | | | | 650 | |
| HSPF4 | | | | | | | | |
| HSDC1 | 260 | | | | | 420 | | |
| HSDC2 | | | | | | | | |
| HSDC3 | | | | | | | | |
| HSDC4 | | | | | | | | |
| HSDC5 | | | | | | | | |
| HSDC6 | 1000 | 2700 | | 5000 | 4600 | 39000 | 10000 | |
| HSDC7 | | | | | | 130 | | |
| HSCD8 | | | | 140 | 130 | 1400 | 430 | 8800 |
| HSDC9 | | | | 160 | 140 | 920 | | 4400 |
| HSDC10 | 230 | 210 | | 130 | 150 | 1600 | | 5100 |
| HSBF1 | | | | | | | | 3400 |
| HSSF1 | | | 200 | | | | 150 | |
| HSSF2 | | | | | | | | 1300 |
| COUNT | 4 | 4 | 5 | 8 | 9 | 15 | 10 | 7 |
| AVG. | 508 | 1060 | 412 | 1101 | 983 | 6038 | 2208 | 4657 |
| STD. DEV. | 309 | 1036 | 258 | 1638 | 1533 | 12037 | 3372 | 2694 |

# Table 1 (Cont.)
## Data Summary for Howard School

Base Neutrals
ug/Kg

| Sample # | Chrysene | Benzo(a)anthracene | Benzo(b)fluoranthene | Benzo(k)fluoranthene | Benzo(a)pyrene | Ideno(1,2,3-cd)pyrene | Dibenzo(a,h)anthracene | Sum of 7 Carcinogenic PAHs |
|---|---|---|---|---|---|---|---|---|
| HSNT1 | | | | | | | | |
| HSNT2 | 18000 | 32000 | 28000 | 7900 | 20000 | 12000 | 2500 | 120400 |
| HSNT3 | | | 250 | | | 120 | | 370 |
| HSNT4 | 3100 | 3000 | 4500 | 2200 | 3100 | 2400 | 500 | 18800 |
| HSNT5 | 620 | 600 | 830 | 370 | 620 | 400 | | 3440 |
| HSNT6 | 120 | | 270 | | 130 | 110 | | 630 |
| HSOC1 | 2400 | 2500 | 4600 | 1700 | 2600 | 2300 | 420 | 16520 |
| HSOC2 | 460 | | 370 | | 520 | 450 | | 1800 |
| HSOC3 | 2400 | | 3800 | 1600 | 2000 | 1500 | 380 | 11660 |
| HSPF1 | 490 | 420 | 390 | | 570 | 510 | | 2380 |
| HSPF2 | 270 | | 560 | | 260 | 250 | | 1340 |
| HSPF3 | 2500 | 1900 | 4900 | 1600 | 3400 | 2800 | 600 | 17700 |
| HSPF4 | | | | | | | | 0 |
| HSDC1 | 290 | 260 | 390 | 270 | 350 | 320 | | 1880 |
| HSDC2 | | | | | | | | 0 |
| HSDC3 | 390 | | 300 | | 420 | 420 | | 1530 |
| HSDC4 | | | | | | | | 0 |
| HSDC5 | 230 | 190 | 180 | | 250 | 210 | | 1060 |
| HSDC6 | 18000 | 22000 | 21000 | 9000 | 14000 | 10000 | 2200 | 96200 |
| HSDC7 | 110 | 110 | 250 | | 150 | 120 | | 740 |
| HSCD8 | 740 | | 480 | | 790 | 560 | 140 | 2710 |
| HSDC9 | 480 | | 400 | | 530 | 510 | | 1920 |
| HSDC10 | 1000 | 1100 | 1300 | 820 | 1200 | 940 | 240 | 6800 |
| HSBF1 | | | | | | | | 0 |
| HSSF1 | 510 | 440 | 1400 | | 690 | 670 | 130 | 3840 |
| HSSF2 | 210 | | 540 | 150 | 260 | 240 | | 1400 |
| COUNT | 20 | 12 | 21 | 10 | 20 | 21 | 9 | |
| AVG. | 2616 | 5377 | 3558 | 2561 | 2592 | 1754 | 788 | |
| STD. DEV. | 5205 | 9925 | 7055 | 3028 | 4989 | 3113 | 851 | |
| VARIANCE | 27090884 | 98501108 | 49769818 | 9157749 | 24894876 | 9693328 | 723862 | |

*Carcinogenic PAHs in italics*

# Table 1 (Cont.)
## Data Summary for Howard School

| | Base Neutrals ug/Kg | | | | PCB ug/Kg | | |
|---|---|---|---|---|---|---|---|
| Sample # | Fluoranthene | Pyrene | Benzo(g,h,i)perylene | Dibutyl benzyl phthalate | Arochlor 1260 | Arochlor 430 | Sum of all PAHs |
| HSNT1 | | | | 450 | | | 2050 |
| HSNT2 | 50000 | 60000 | 11000 | | | | 298840 |
| HSNT3 | 210 | 160 | 120 | 3500 | | | 4470 |
| HSNT4 | 6300 | 5800 | 2300 | | 190 | | 38320 |
| HSNT5 | 2000 | 1100 | 340 | | | | 8910 |
| HSNT6 | 230 | 160 | | | | | 1020 |
| HSOC1 | 6600 | 4600 | 2100 | | | | 35380 |
| HSOC2 | 1200 | 720 | 420 | | | | 4830 |
| HSOC3 | 6700 | 4000 | 1500 | | | | 28120 |
| HSPF1 | 1400 | 890 | 510 | | | | 5800 |
| HSPF2 | 640 | 440 | 240 | | | | 2940 |
| HSPF3 | 2200 | 1600 | 2700 | | | | 25600 |
| HSPF4 | | | | | | | 0 |
| HSDC1 | 750 | 480 | 330 | | | | 4120 |
| HSDC2 | | | | | | | 0 |
| HSDC3 | 930 | 600 | 390 | | | | 3450 |
| HSDC4 | | | | | | | 0 |
| HSDC5 | 610 | 410 | 190 | | | | 2270 |
| HSDC6 | | 52000 | 9500 | | | | 220000 |
| HSDC7 | 290 | 200 | 110 | | | | 1470 |
| HSCD8 | 1900 | 1400 | 530 | | | | 17440 |
| HSDC9 | 1400 | 900 | 500 | | | | 10340 |
| HSDC10 | 2600 | 1800 | 940 | | | 430 | 19380 |
| HSBF1 | | | | | | | 3400 |
| HSSF1 | 670 | 470 | 600 | | | | 5930 |
| HSSF2 | 320 | 230 | 210 | | | | 3460 |
| COUNT | 20 | 21 | 20 | 2 | 1 | 1 | |
| AVG. | 4348 | 6570 | 1727 | 1975 | 190 | 430 | |
| STD. DEV. | 10672 | 16155 | 2946 | 1525 | 0 | 0 | |
| VARIANCE | 113861819 | 260994100 | 8681293 | 2325625 | 0 | 0 | |

Appendix 4
Additional Analytical

OPERATIONS LABORATORY SERVICES CONSULTATION

ANALYTICAL INDUSTRIAL RESEARCH LABORATORY
4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(423) 894-8102

LAB. NO.:961008-13785

CUSTOMER: 1132
MARION ENVIRONMENTAL INC./MEI
1914 POLYMER DRIVE
CHATTANOOGA, TN 37421

DATE RECD. : 10/08/96
SAMPLE DATE: 10/08/96

ATTENTION:ADAM DRIVER
(423) 499-4919 FAX:

DATE REQUESTED :
CUST P.O.: 6246

SAMPLE :PROJ. # 96-107 HOWARD SCHOOL
:HSDC8-2 SOIL

ASAP

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| TCLP METALS: | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| hromium .......... | <0.500 | mg/L | 0.500 | 6010 | 10-11-96 | RL |
| Lead ............. | <0.500 | mg/L | 0.500 | 6010 | 10-11-96 | RL |

RECEIVED
OCT 16 1996

otes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

OPERATIONS LABORATORY SERVICES CONSULTATION

ANALYTICAL INDUSTRIAL RESEARCH LABORATORY
4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(423) 894-8102

LAB. NO.:961008-13786

CUSTOMER: 1132
MARION ENVIRONMENTAL INC./MEI
1914 POLYMER DRIVE
CHATTANOOGA, TN 37421

DATE RECD. : 10/08/96
SAMPLE DATE: 10/08/96

ATTENTION:ADAM DRIVER
(423) 499-4919 FAX:

DATE REQUESTED :
CUST P.O.: 6246

SAMPLE :PROJ. # 96-107 HOWARD SCHOOL
:HSDC10-2 SOIL

ASAP

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TCLP METALS: | | | | | | |
| Lead .............. | <0.500 | mg/L | 0.500 | 6010 | 10-11-96 | RL |

RECEIVED
OCT 16 1996

Notes:

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By Ray R. Patterson

OPERATIONS LABORATORY SERVICES CONSULTATION

# ANALYTICAL INDUSTRIAL RESEARCH LABORATORY

4295 Cromwell Road, Suite 614
Chattanooga, Tennessee 37421-2177
(423) 894-8102

**LAB. NO.:961008-13786**

CUSTOMER: 1132
MARION ENVIRONMENTAL INC./MEI
1914 POLYMER DRIVE
CHATTANOOGA, TN 37421

DATE RECD. : 10/08/96
SAMPLE DATE: 10/08/96

ATTENTION:ADAM DRIVER
(423) 499-4919 FAX:

DATE REQUESTED :
CUST P.O.: 6246

SAMPLE :PROJ. # 96-107 HOWARD SCHOOL
:HSDC10-2 SOIL

**ASAP**

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

ANALYSIS

| | | | M.D.L. | Methods | Date | Initial |
|---|---|---|---|---|---|---|
| TCLP METALS: | | | | | | |
| Lead .............. | <0.500 | mg/L | 0.500 | 6010 | 10-11-96 | RL |

RECEIVED OCT 16 1996

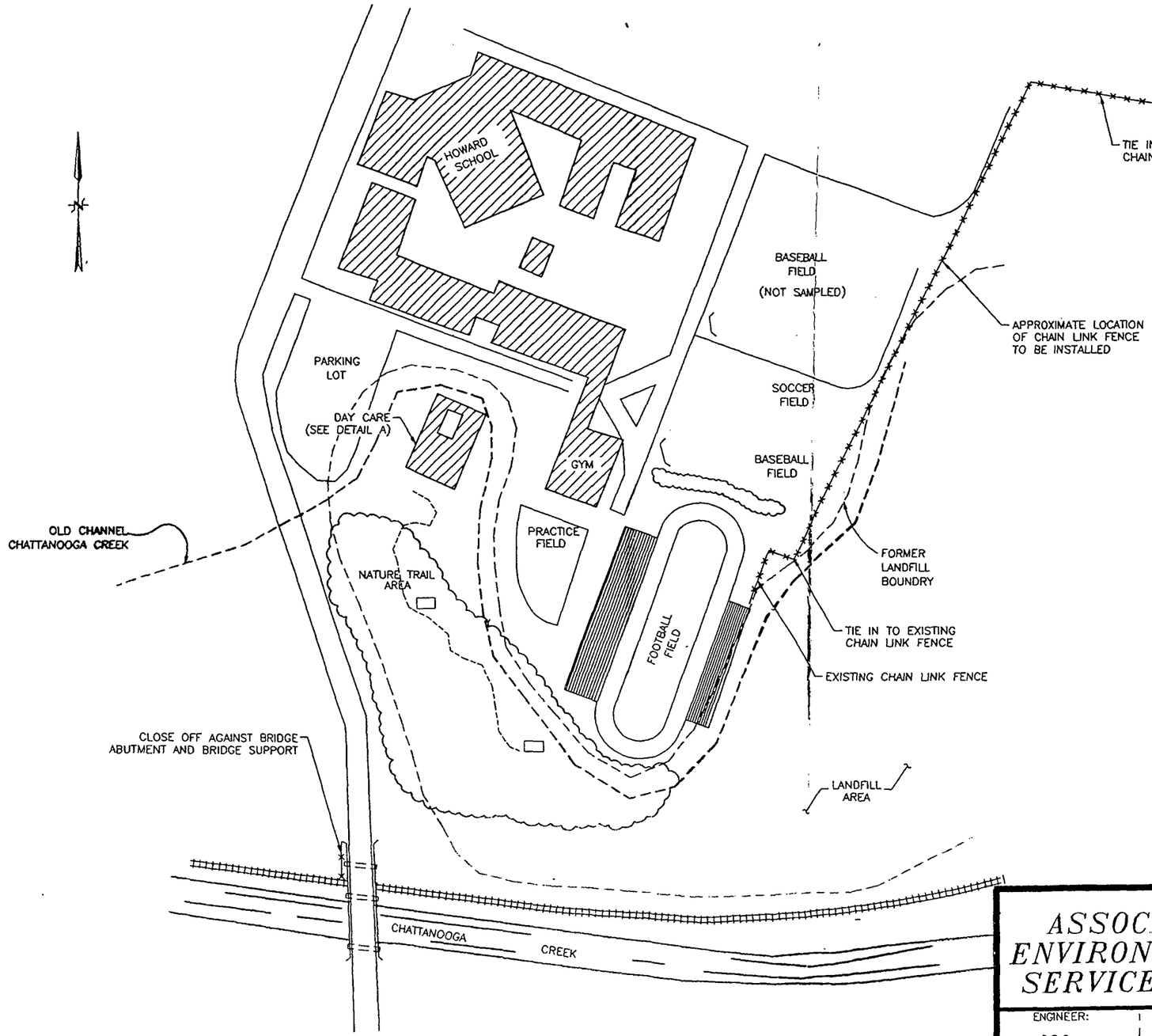
Notes:

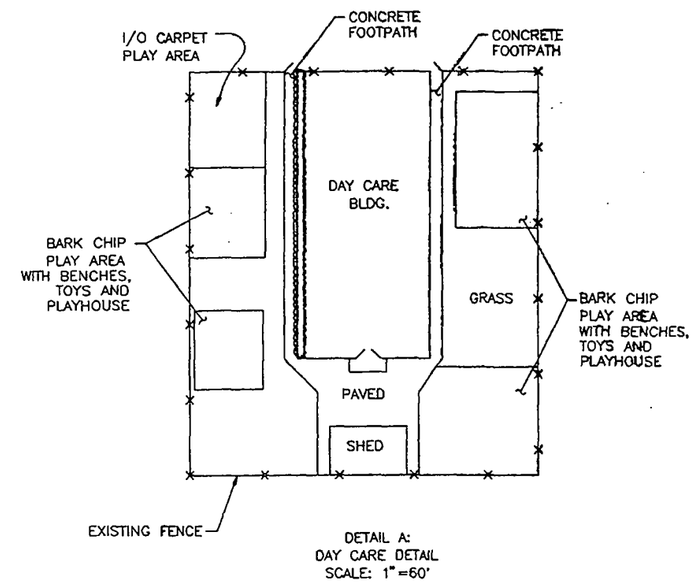
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

We hereby certify that the analytical procedures employed are those approved by the Environmental Protection Agency or other applicable methods for these analyses.

ANALYTICAL INDUSTRIAL RESEARCH LABORATORIES

By [signature] Ray R. Patterson




DETAIL A:
DAY CARE DETAIL
SCALE: 1"=60'

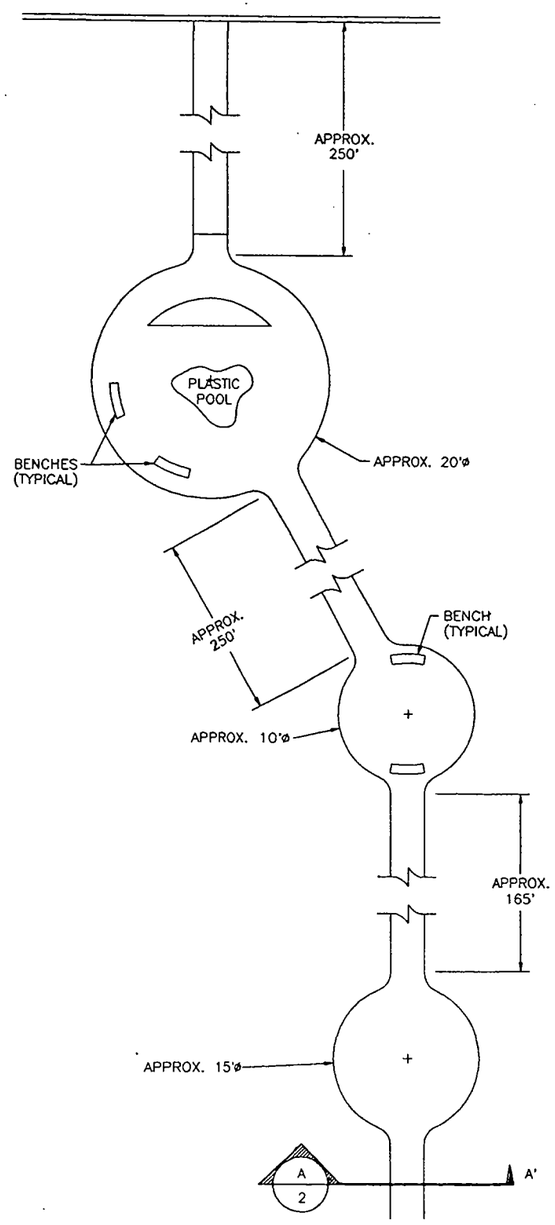
GRAPHIC SCALE

250' 0 250' 500'

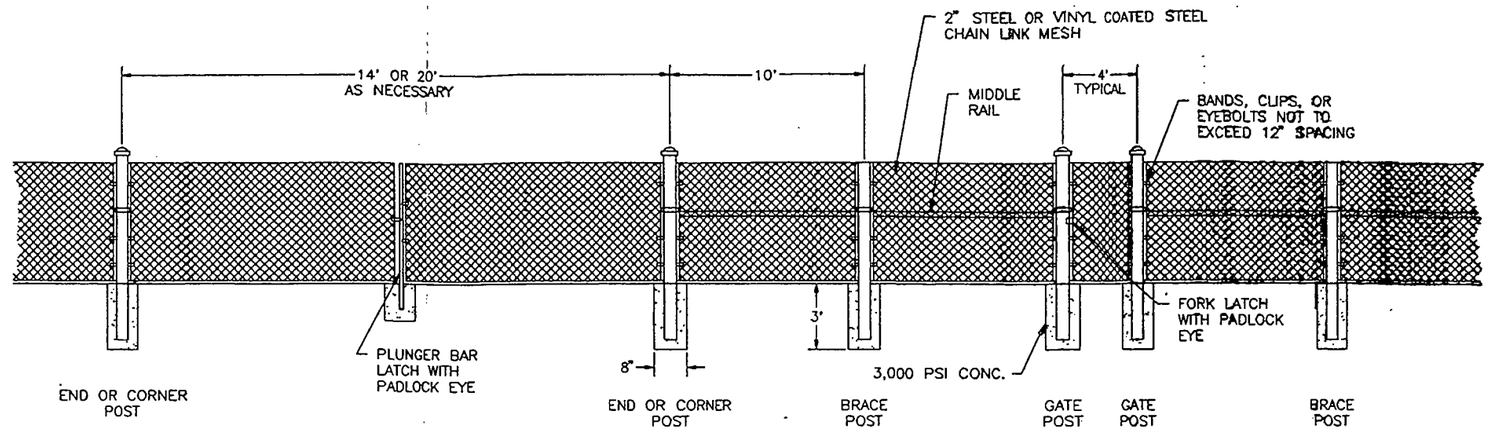
ASSOCIATED ENVIRONMENTAL SERVICES, Inc.

SITE MAP
HOWARD SCHOOL
FIGURE 1

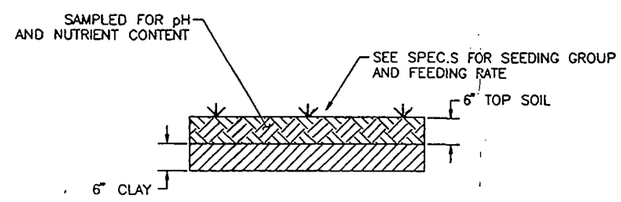
| | | | |
|---|---|---|---|
| ENGINEER: D.B.C. | DATE: 11-21-95 | DRAWN BY: S.B.R. DATE: 11-21-95 | FACILITY NO. N/A |
| APPROVED BY: | FILENAME: \95-513\HOWARD | PROJECT NO. 95-513 | FIGURE NO. 1 |



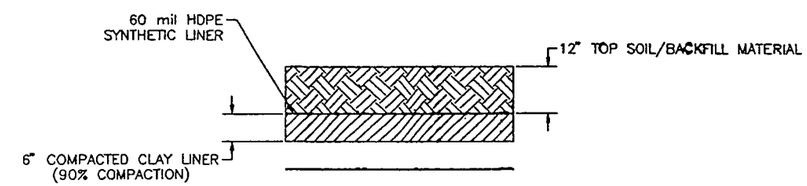

NATURE TRAIL DETAIL
NOT TO SCALE



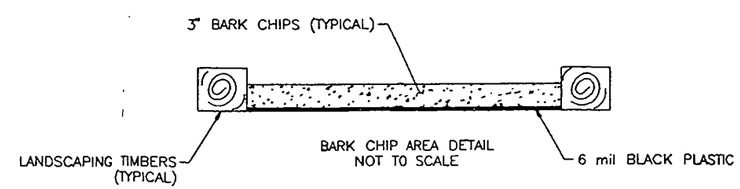

TYPICAL FENCE DETAIL
NOT TO SCALE



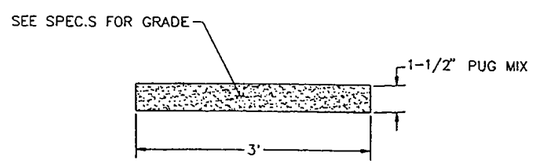

LANDFILL CAP AND BARE SPOT
IMPROVEMENT DETAIL
NOT TO SCALE




(DAY CARE CENTER) LANDFILL CAP
IMPROVEMENT DETAIL
NOT TO SCALE




BARK CHIP AREA DETAIL
NOT TO SCALE




SECTION A–A'
NOT TO SCALE

| | | | | |
|---|---|---|---|---|
| ASSOCIATED ENVIRONMENTAL SERVICES, Inc. | | DETAIL SHEET<br>HOWARD SCHOOL<br>FIGURE 2 | | |
| ENGINEER: D.B.C. | DATE: 11-21-95 | DRAWN BY: S.B.R. | DATE: 11-21-95 | FACILITY NO. N/A |
| APPROVED BY: | FILENAME \95-513\HOWARD | PROJECT NO. 95-513 | | FIGURE NO. 2 |

DATE REPORT ACCEPTED 3/20/95
DISPOSITION Low Priority ESI
SAM SIGNATURE

# SITE INSPECTION PRIORITIZATION NARRATIVE REPORT

## HOWARD HIGH SCHOOL DUMP
## CHATTANOOGA, TENNESSEE

CERCLIS No. TND 100842343
TENNESSEE FILE No. 33-606

Howard High School Dump

Hamilton County, Tennessee

TND 100842343

Site Inspection Prioritization (SIP)

Prepared for the
TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF SUPERFUND
in cooperation with
WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

DATE: January, 1994


Prepared by
Don VanHook and
Craig Stannard

Reviewed by
Wayne Everett

Approved by
Nancy Thomas


Don VanHook
Craig Stannard

Wayne S Everett
Nancy Thomas TDS&F/SAM
1/4/94

Executive Summary
Howard High School Dump
TND 100842343

Attached is the Site Inspection Prioritization (SIP) for the Howard School Dump. The site is located at 2500 South Market Street in South Chattanooga, Hamilton County, Tennessee. The surrounding area is urban characterized by schools, industries, businesses, and residential development. The site lies to the south and east of Howard High School near Chattanooga Creek. The dump is approximately 44 acres in size. The past operator and owner of the dump is the City of Chattanooga, Tennessee. The dump is inactive except for a small volume of brush and soil that continues to be dumped on the western leg of the site.

The site was originally meander channels of Chattanooga Creek. During the late 1960's Chattanooga Creek was rechannelized for the construction of a railroad track located south of the site. The rechannelization resulted in a flooded area at the present site location. The City of Chattanooga, moved to reclaim this wet land with brush and demolition debris. The city's previous dump located on Amnicola Highway was being closed out and a new dumping location was needed. The project called the "South Market (28th) Street Trash Disposal Site" operated from 1972 to approximately 1976. Brush, demolition debris, foundry sand, and spoil dirt was used to fill the depression. A series of culverts were placed below the fill to drain the site.

The dump was in operation before the passage of RCRA legislation, therefore no state or federal oversight was available during site activity. After the creation of the Tennessee Division of Superfund (TDSF), the Howard School Dump was placed on a state file index of potential sites with the completion of a Site Discovery Form. A resulting Preliminary Assessment (PA) was performed in 1986 by TDSF. A Site Inspection (SI) Report was completed in 1988 by TDSF. Under the inspection format of that time the site was not considered to be a hazard. In early 1993, interest in the Howard High School Dump was renewed when complaints from school officials indicated that site hazards may be present. It was decided that a Site Inspection Prioritization (SIP) was needed to update the older SI to reflect current investigative procedures.

This Site Inspection Prioritization (SIP) has discovered the presence of Polyaromatic Hydrocarbons (PAH's) and some metals at elevated levels in the surface soils of the site. The greatest health risk appears by way of the Soil Exposure Pathway. Site access is unrestricted and Howard School is located very near the old dump. A school day care center is located over the western leg of the dump. These findings lead this SIP to conclude that further site characterization should be pursued.

## TABLE OF CONTENTS


| Section | | Page |
|---|---|---|
| 1. | INTRODUCTION | 1 |
| | 1.1 Objectives | 1 |
| | 1.2 Scope of Work | 1 |
| 2. | SITE CHARACTERIZATION | 2 |
| | 2.1 Location | 2 |
| | 2.2 Site Description | 2 |
| | 2.3 Operational History | 5 |
| | 2.4 Waste Characteristics | 5 |
| | 2.5 Potential Offsite Sources | 6 |
| | 2.6 RCRA Status | 6 |
| 3. | GROUNDWATER PATHWAY | 7 |
| | 3.1 Hydrogeology | 7 |
| | 3.2 Targets | 7 |
| | 3.3 Sample Locations | 10 |
| | 3.4 Analytical Results | 10 |
| | 3.5 Conclusions | 10 |
| 4. | SURFACE WATER PATHWAY | 10 |
| | 4.1 Hydrology | 10 |
| | 4.2 Targets | 12 |
| | 4.3 Sample Locations | 12 |
| | 4.4 Analytical Results | 12 |
| | 4.5 Conclusions | 12 |
| 5. | SOIL EXPOSURE AND AIR PATHWAYS | 13 |
| | 5.1 Physical Conditions | 13 |
| | 5.2 Soil and Air Targets | 13 |
| | 5.3 Soil Gas Sampling Locations | 14 |
| | 5.4 Soil Gas Sampling Results | 14 |
| | 5.5 Air Monitoring | 14 |
| | 5.6 Surface Soil Sample Locations | 14 |
| | 5.7 Surface Soil Analytical Results | 14 |
| | 5.8 Conclusions | 22 |
| 6. | SUMMARY AND CONCLUSIONS | 22 |
| | REFERENCES | 23 |

TABLE OF CONTENTS (cont.)

List of Tables: Page

Table 1: Results from Soil Gas Probe Investigation.....15
Table 2: Sample Collection.....17
Table 3:Part 1: Analytical Results for Non-Aqueous Samples..18
Part 2: Analytical Results for Aqueous Samples.....9
Table 4: Approximate Area Population Values.....21

List of Figures:

Figure 1: Site Location Map.....3
Figure 2: Site Layout.....4
Figure 3: Geology of the Howard School Landfill Area....8
Figure 4: SIP Soil Gas Probe Locations.....16
Figure 5A: SIP Sample Locations.....19
Figure 5B: SIP Sample Locations (measured distances)....20
Figure 6: 15 Mile Surface Water Pathway.....11

Appendix:

A. References
B. 4-Mile Site Radius Map
C. Site Photographs

| | |
|---|---|
| REPORT: | Site Investigation Prioritization Narrative Report |
| SITE: | Howard High School Dump |
| CERCLIS NO.: | TND 100842343 |
| TN-FILE NO.: | 33-606 |
| PREPARED BY: | Craig Stannard and Don VanHook<br>Tennessee Department of Environment and Conservation |
| DATE: | December 1993 |

# 1.0 INTRODUCTION

The Tennessee Division of Superfund (TDSF), under cooperative agreement with the U.S. Environmental Protection Agency (EPA), conducted a Site Investigation Prioritization (SIP) of the Howard High School Dump in Chattanooga, Tennessee. This investigation was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the Superfund Amendments and Reauthorization Act of 1986 (SARA).

## 1.1 Objectives

The purpose of this investigation was:

- to collect information concerning conditions at the site sufficient to assess the threat to human health and the environment;
- to identify, if possible, sources which could be attributed to known site contamination;
- and to determine the need for further investigation under CERCLA/SARA or other authority.

## 1.2 Scope of Work

The objectives were achieved through completion of the following specific tasks:

- review of available file information;
- a comprehensive target survey;
- sampling environmental media to evaluate and document HRS factors;
- and on-site reconnaissance.

## 2.0 SITE CHARACTERIZATION

### 2.1 Location

The Howard High School Dump is located at 2500 South Market Street behind the Howard School and near 28th Street (Ref.1,2). The geographic coordinates of the site are latitude 35° 01′ 25" north and longitude 85° 18′ 24" west (See Site Location Map, Figure 1)(Ref.3). To reach the site from Interstate 24, travel south on Market Street for approximately 1/4 of a mile. At the 1st traffic light, turn left into the Howard School parking lot. The Howard High School Dump is immediately to the south and east (Ref.4).

Hamilton County, Tennessee receives 56 inches of annual precipitation and the 1-year/24 hour rainfall is 3.1 inches. The wettest months are December-March, and driest are May-June, and August-November. Snowfall is possible December-March (Ref.5).

### 2.2 Site Description

The site occupies approximately 44 acres of low-lying land adjacent to Chattanooga Creek. The site wraps around Howard School and lies between the school and the present Chattanooga Creek location. The area surrounding the site is urban with heavy residential, commercial, and industrial development (Ref.4). The site is located in congressional district 3 (Ref.51).

A 4-mile radius sweep around the site takes in part of Chattanooga (population: 152,466) as well as parts of Rossville (population: 3,601), East Ridge (population: 21,101), and Lookout Mountain (population: 1,901)(Ref.6,7). An estimate of the population within 4 miles of the site is 80,000 people (Ref.8). The nearest school to the site is the Howard School which houses an elementary and high school (Ref.4). A child day care center is located on the west arm of the filled area (Ref.10).

The site is roughly V shaped and relatively flat (Ref.9,10). It is presently heavily vegetated with grass, bushes, and trees. In some areas dump material is exposed on the surface as evidenced by tires, bricks, black shale, and scrap metal (Ref.11). The site is underlain by drainage culverts to eliminate standing water (Ref.11,12). One easily accessed storm drain grate is located just south of the school practice field (Ref.11).

The site is bordered on the south and east by railroad tracks and Chattanooga Creek, on the north by the Marice Poss Homes and Interstate-24, and on the west by the Howard School and Market Street (Ref.4). The site is not entirely fenced and it

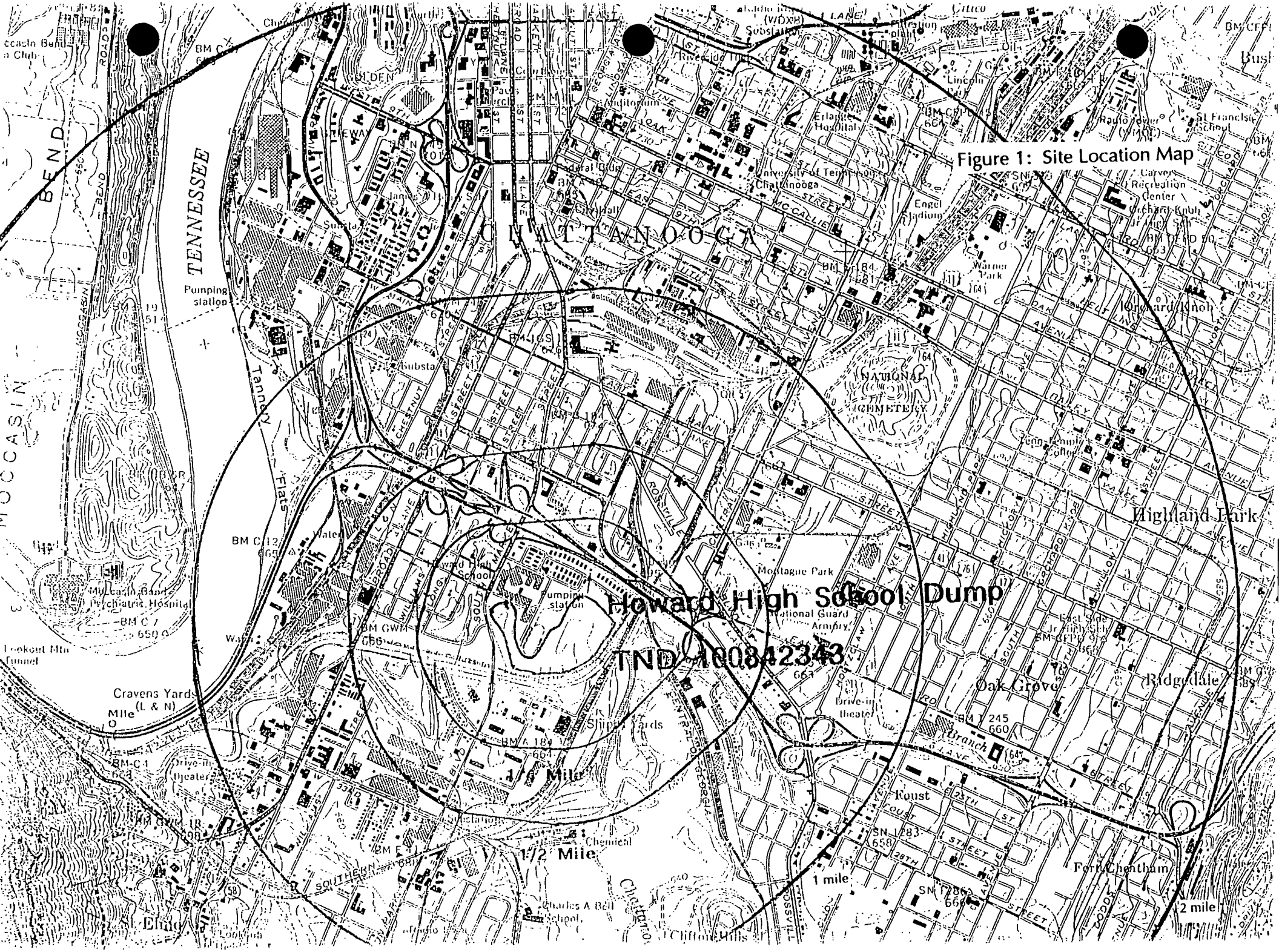



Figure 1: Site Location Map

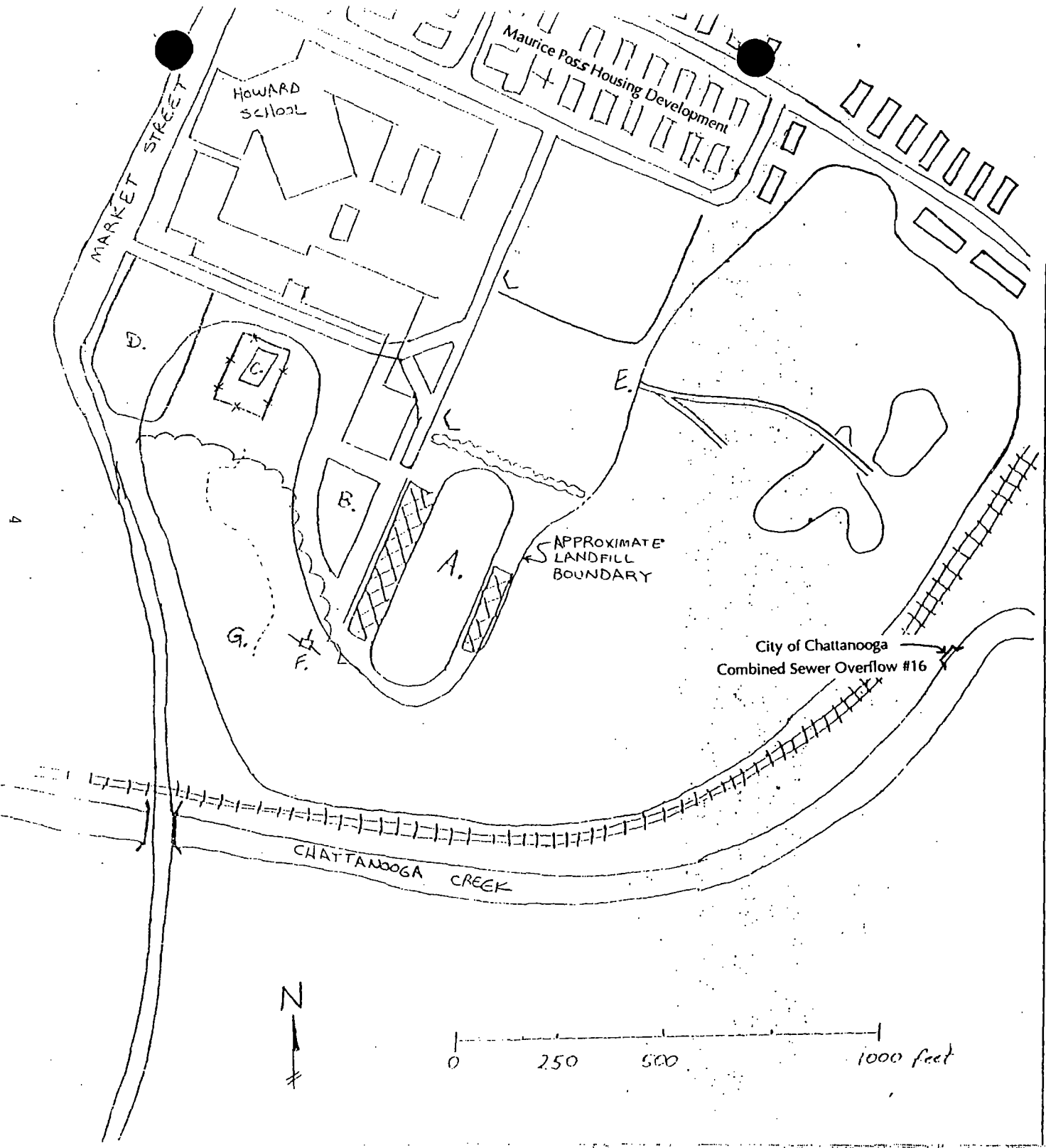



Figure 2: Site Layout

# Howard High School Dump

A. FOOTBALL FIELD
B. PRACTICE FIELD
C. DAY CARE CENTER
D. PARKING AREA
E. APPROACH ROAD INTO LANDFILL FROM BASEBALL FIELD
F. DRAINAGE CULVERT
G. NATURE TRAIL IN BIOLOGICAL AREA.

by: Don VanHook
TN. Division of Superfund
November, 1993

is easily accessible either on foot or by car. The site is unoccupied and it is not guarded (Ref.10,11).

## 2.3 Operational History

The location of Howard High School Dump was originally meander channels of Chattanooga Creek (Ref.9). During the late 1960's, the area now occupied by the site, was drained as part of a Louisville and Nashville Railroad track relocation project. The railroad track was built up to an elevation of 665 feet (Ref.13). Chattanooga Creek was diverted from its previous location in the present Howard School Dump to a channelized section running south along the new railroad track. The old meanders of Chattanooga Creek continued to hold standing water (Ref.12).

In 1972, the City of Chattanooga, Division of Public Works, moved to fill the area north of the new railroad track and reclaim the flooded land. The city was in need of an area to dispose of brush and demolition debris so they selected the area behind Howard High School. City documents call the project the "South Market (28th) Street trash disposal site" (Ref.12).

The previously flooded, low lying land between Howard School and the new railway relocation was built up by filling with brush, demolition waste, foundry sand, and spoil dirt. The majority of the filling occurred in the early 1970's (Ref.12). Small amounts of demolition debris and brush continue to be dumped today by the Chattanooga Public Works Division near a school parking area and day care center (Ref.10).

The common practice of disposal at the Howard School dump was to fill in an area with two 8 to 10 foot lifts. A dozer was used to compact the waste. Dirt and stone cover were placed at the end of each working day. Prior to filling the area, a network of storm sewers were placed in the low area (Ref.12). A 60" concrete pipe culvert connects with a city combined sewer overflow (CSO). The CSO conducts water under the railroad tracks and discharges into Chattanooga Creek (Ref.14).

## 2.4 Waste Characteristics

The capacity of the dump can be estimated at 0.7 million cubic yards. This assumes an average compacted fill depth of 10 feet in a 44-acre depression. The estimated area of the landfill is $1.9 \times 10^6$ square feet (Ref.12).

Most of the waste in the Howard School Dump is dirt and demolition debris, including foundry sand, wood products, asphalt, roofing materials, tires, glass, brush, and ash (Ref.12). An old picture taken during the time of landfill filling shows black sludge, cardboard boxes, and scrap metal

mixed in with the fill dirt (Ref.10). An inspection report memo written during the dumping project states that metal drums and small amounts of household garbage were being mixed with the fill material (Ref.15).

It has been suggested that some industrial sludges may have been buried in the fill (Ref.16,52). There is no evidence to substantiate this allegation, but the dump was in an industrial area and not closely regulated during its active period. Other city dumps filled during this time were found to contain industrial wastes and have been addressed through CERCLA (Ref.17).

## 2.5 Potential Offsite Sources

The relocated Chattanooga Creek lies to the south of the Howard School Dump and has been shown to contain polluted sediments (Ref.18,19). Because of the this, Chattanooga Creek is on the state Superfund promulgated list (Ref.20). These sediments were most likely mixed with the fill in the dump and could have been graded by workers across the surface of the site (Ref.53).

Surface water contamination from Howard School will be difficult to prove because Chattanooga Creek is currently polluted (Ref.18). There are a number of coal tar pits and combined sewer overflows (CSO) along the creek banks (Ref.18). CSO #16 is located south of Howard School Dump and the drainage from the dump appears to connect with this CSO (Ref.12). Industrial wastewaters from industries throughout south Chattanooga are carried by the local sewer system and have overflown at CSO #16 (Ref.14).

Another source of contamination near the site could have resulted from air emissions at the Chattanooga Coke and Chemical plant. Historical records indicate that a large amount of air pollution was attributable to the Coke Plant (Ref.21). The closed Coke plant is located generally upwind of Howard School approximately 2 miles (Ref.4).

## 2.6 RCRA Status

The Howard School Dump was not in operation under the authority of RCRA legislation. The dump was active in the early 1970's and RCRA was passed in 1976. Activities at the dump were finished by 1976. The Tennessee Division of Solid Waste Management does not currently have a file on the Howard Dump (Ref.22).

# 3.0 GROUNDWATER PATHWAY

## 3.1 Hydrogeology

The site is in the Ridge and Valley Province of east Tennessee. Geologically, this region is characterized by folded and faulted sedimentary rocks of Paleozoic age (Ref.23).

The Chattanooga thrust fault runs in a north-south direction across the middle of the site. The eastern half of the site is underlain by the Knox Group. The western half of the site is underlain by the upper part of the Chickamauga Limestone (Ref.24).

The Knox Group consists of dolomite and reaches a thickness of approximately 2,600 feet. The Knox Group dolomites are very siliceous, light to dark gray, fine to coarse grained, and thin to thick bedded. There are no confining layers (Ref.23).

The upper part of the Chickamauga Limestone is approximately 500 feet thick. It is mainly gray, fine to medium grained, and thin to thick bedded with minor amounts of chert. The upper part of the Chickamauga Limestone has no confining layers (Ref.23).

Native soils in the area consist of brown, tan, or gray alluvial silts and clays (Ref.25). The depth to bedrock at the site is estimated to be 15 to 30 feet. The depth to groundwater is probably in the range of 10 to 30 feet (Ref.26).

Both bedrock units at the site are predominantly carbonate in composition and are subject to karst development. Groundwater occurs in the bedrock along fractures, joints, and bedding planes that have been enlarged through chemical weathering. Groundwater yields near the site are most likely great due to increased weathering of the karst aquifer resulting from Chattanooga Creek and the underlying Chattanooga fault (Ref.23).

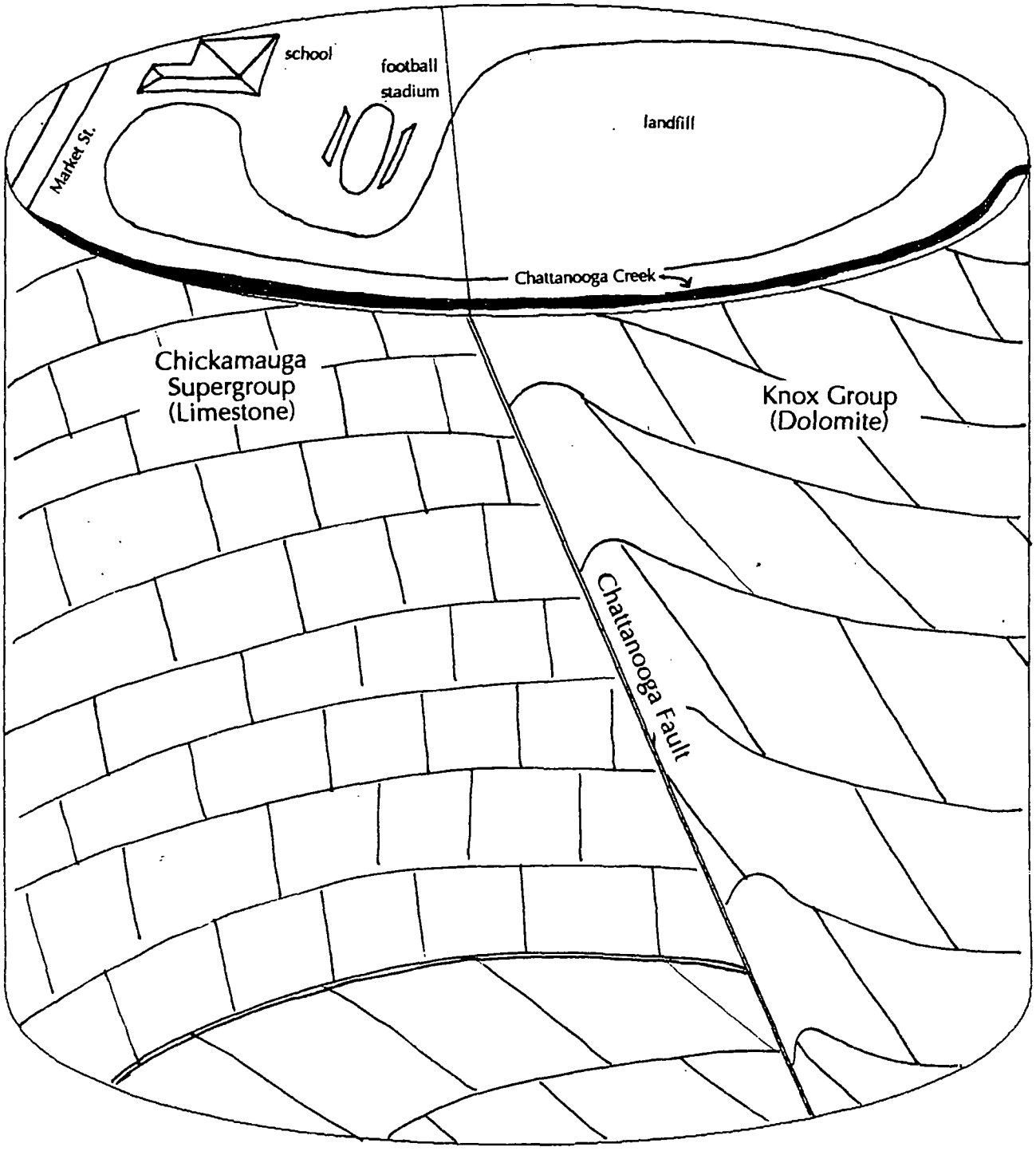
Precipitation is the primary type of recharge to the aquifer. Discharge is via seepage to surface streams and wells (Ref.23). The groundwater gradient, as inferred from nearby monitoring well data, is to the south towards Chattanooga Creek (Ref.26).

## 3.2 Targets

The closest wells to the Howard School Dump are monitoring wells 1/4 mile south at Southern Wood Piedmont (Ref.26). There are no known private or public drinking water wells within 4-miles of the site (Ref.27,28,29). Drinking water is supplied to area residents by the Tennessee American Water

Figure 3:

# Geology of the Howard School Landfill Area
# TND 100842343




by: Don VanHook, TN Division of Superfund
November 1993

Table 3: Part 2:
Analytical Results for Aqueous Samples
Howard High School Landfill
TND 100842343
State ID #33-606

| Substance | SCDM Toxicity | MCL's for groundwater | HH-GW-01 location same as HH-SS-06 |
|---|---|---|---|
| **Inorganics, mg/L** | | | |
| Aluminum | – | – | 33.6 |
| Arsenic | 10000 | 0.05 | <0.002 |
| Barium | 10 | 2 | 0.701 |
| Cadmium | 10000 | 0.005 | 0.003 |
| Calcium | – | – | 367 |
| Chromium | 10000 | 0.1 | 0.367 |
| Cobalt | 1 | – | 0.025 |
| Copper | – | – | 0.087 |
| Cyanide | 100 | 0.2 | <0.02 |
| Iron | – | – | 82.4 |
| Lead | 10000 | – | 0.176 |
| Magnesium | – | – | 25.7 |
| Manganese | 10000 | – | 3.22 |
| Mercury | 10000 | 0.2 | 0.0003 |
| Nickel | 10000 | 0.1 | 0.046 |
| Potassium | – | – | 1.3 |
| Selenium | 100 | 0.05 | <0.002 |
| Silver | 100 | – | <0.01 |
| Sodium | – | – | 10.1 |
| Zinc | 10 | – | 0.453 |

* No organic substances were detected above sample quantitation limits in this aqueous sample

Company (TAWC) (Ref.30,32). The TAWC intakes are in the Tennessee River upgradient from the site's surface water pathway (Ref.32). There is no known use of groundwater for irrigation or livestock watering within 4-miles of the site (Ref.31). There are no wellhead protection areas (WHPA) designated within Hamilton County (Ref.31).

### 3.3 Sample Locations

Groundwater sampling was performed at only one location, HH-GW-01, at a depth of 2 feet 2 inches (Ref.11). A decontaminated shovel was used to dig the hole in the collection of this sample. However, observations made during digging indicate that this may not be a true representative groundwater sample for the site (Ref.33). It appeared, at the time of sampling, that the water sampled at HH-GW-01 was seepage from a ruptured field tile line that extends into the landfill from the Howard School (Ref.34). The water had a sewage-like odor and appearance. The aqueous sample location is shown in Figure 5.

### 3.4 Analytical Results

There were no significant concentrations of either organic or inorganic compounds in sample HH-GW-01 (Ref.35). Aqueous sample results are shown in Table 3: Part 2.

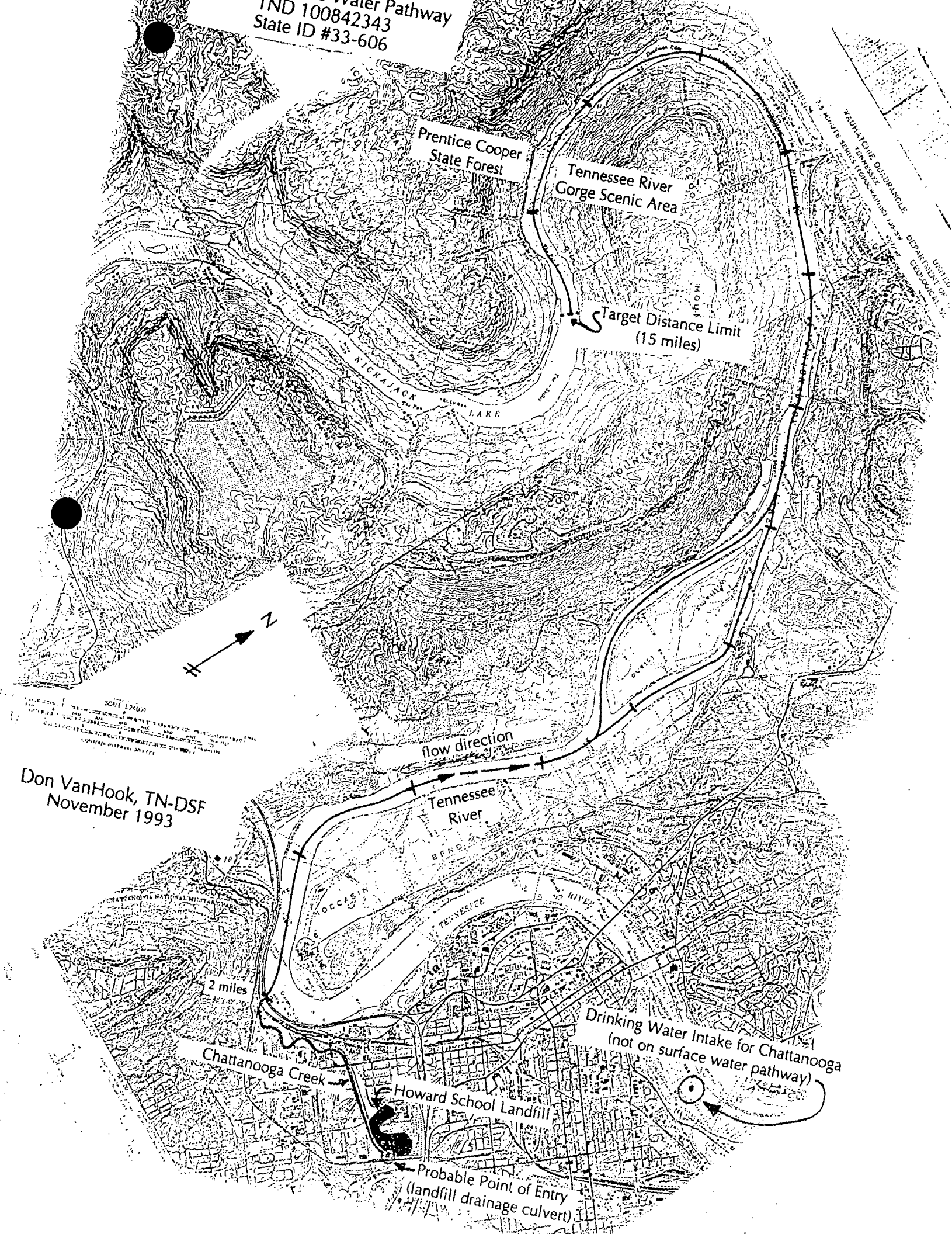
### 3.5 Conclusions

If site constituents have contaminated the groundwater at the site, it should pose little or no health threat to workers or residents in the area due to the complete absence of drinking water wells within four miles of the site. The only wells potentially affected by the site are monitoring wells or industrial wells.

## 4.0 SURFACE WATER PATHWAY

### 4.1 Hydrology

The Howard High School Landfill is within the 100 and 500 year flood zones of Chattanooga Creek (Ref.36). The site is surrounded by higher ground on all four sides (Ref.4). There is no known surface drainage from the site (Ref.4). All precipitation appears to leave the site by seeping into a shallow subsurface storm sewer that traverses the site in a southeasterly direction (Ref.12). The storm sewer empties into Chattanooga Creek at creek mile 1.7 (Ref.14). Chattanooga Creek flows to the west and empties into the Tennessee River (Nickajack Lake) at river mile 460.6 (Ref.37). The Tennessee River comprises the lower portion of the downstream segment.


Water Pathway
TND 100842343
State ID #33-606
Prentice Cooper
State Forest
Tennessee River
Gorge Scenic Area
Target Distance Limit
(15 miles)
NICKAJACK
LAKE
N
flow direction
Tennessee
River
Don VanHook, TN-DSF
November 1993
2 miles
Drinking Water Intake for Chattanooga
(not on surface water pathway)
Chattanooga Creek
Howard School Landfill
Probable Point of Entry
(landfill drainage culvert)

## 4.2 Targets

There are no surface water intakes located within the 15-mile downstream segment (Ref.31). The Tennessee American Water Company supplies drinking water to the entire Chattanooga, Rossville, and East Ridge areas (all residents within a 4-mile radius of the site) (Ref.32). An estimated 177,855 people are served by this system (Ref.32). The five raw water intakes for this system are located on the Tennessee River at river mile 465.4, approximately 4.8 miles upstream from the confluence of Chattanooga Creek and the Tennessee River (Ref.32).

The average flow of the Tennessee River is 36,650 cubic feet per second (cfs) (Ref.6). The average flow of Chattanooga Creek is 125 cfs (Ref.38). The Tennessee River, along the site's surface water pathway, is used for fishing (both commercial and private), recreation, irrigation, and it is a water source for livestock and wildlife (Ref.39,44). Chattanooga Creek has been heavily polluted by local industrial activity, but it is considered to be a small recreational fishery (Ref.40,41).

There are no known wetlands, sensitive environments, or critical habitats downstream from the site (Ref.42). Known U.S. endangered species in Hamilton County, Tennessee are the bald eagle, peregrine falcon, dromedary pearly mussel, pink mucket, orangefoot pimpleback, Cumberland monkeyface, and the large-flowered skullcap (Ref.43).

## 4.3 Sample Locations

N/A, No surface water or sediment samples were collected during the SIP sampling event (Ref.11).

## 4.4 Analytical Results

N/A, No surface water or sediment samples were collected during the SIP sampling event (Ref.11).

## 4.5 Conclusions

There are no drinking water inlets within the 15-mile downstream segment. There are no known wetland habitats, sensitive environments, or critical habitats. The main health threat via the surface water exposure migration pathway appears to be through the human food chain. Those who eat aquatic organisms from Chattanooga Creek or the Tennessee River are at risk. These findings have been posted along the creek by the Tennessee Division of Water Pollution Control.

## 5.0 SOIL EXPOSURE AND AIR PATHWAYS

### 5.1 Physical Conditions

When the site was closed out in the early 1970's a clay cap was placed over the fill (Ref.12). From recent site investigations, the cap appears thin to nonexistent (Ref.11). Rubbish is exposed on the surface in some locations and dense vegetations grows over most of the dump (Ref.11). Howard School dump is heavily vegetated with hackberry trees, catawba trees, blackberry bushes, and long stem grasses, so much so that a nature trail has been built through the area (Ref.10).

The Howard School dump is easily accessible (Ref.10,11). Some sections of the dump are fenced but most are not. Access can be gained from the Howard School, Poss Homes, Market Street, and the railroad tracks. An automobile can be driven onto the dump along unimproved roads (Ref.10).

### 5.2 Soil and Air Targets

The Maurice Kirby Child Care Center is located on the western leg of the Howard School Dump. There are 55 children that attend this day care during the school year and approximately 6 stay during the summer. There are 15 teachers at the day care. Students from Howard School attend child development classes in the center. The Day Care is operated primarily for teachers and students with children. The day care is open year round from 0630 to 1530 (Ref.45,46).

Howard School is located less than 200' from the Kirby day care and the western leg of the Howard School Dump (Ref.4,9). Howard School consists of a high school and elementary school. In the high school there are 1074 students and 65 teachers. The elementary school has 417 students and 27 teachers (Ref.45,46).

Maurice Poss Homes is located immediately north of the dump and 150 people currently reside there. Access from Poss Homes to the dump is easily obtained through holes in a partial fence and a road by the 23rd Street Pumping Station (Ref.45).

There are approximately 700 residents within 0.25 mile of the site. This value does not include students, teachers, or children associated with Howard School. There are approximately 1300 residents from 0.25 to 0.5 mile, 6500 residents from 0.5 to 1 mile, 16500 residents from 1 to 2 miles, 21400 from 2 to 3 miles, 32100 from 3 to 4 miles of the Howard School Dump (Ref.4,8,45,46).

Sensitive environments within a 4 mile radius of the site include the Chattanooga National Battlefields on Lookout Mountain and Missionary Ridge, both approximately 2.5 miles distant. A Audubon Society Wildlife Refuge on Maclellan

Island is located approximately 2.2 miles from the site (Ref.4).

## 5.3 Soil Gas Sampling Locations

Various locations around the site were selected for soil gas sampling. Activity was concentrated on the border between the dump and Howard School for boundary delineation (Ref.11). Soil gas monitoring was accomplished by using an OVA meter, oxygen meter, and HNu meter attached to a steel pipe driven into the ground (Ref.47). The locations of the soil gas samples are shown in Figure 4.

## 5.4 Soil Gas Sampling Results

Soil gas sampling results give an indication of where the dump is located. When readings were obtained with the OVA meter it indicated the presence of a gas in the soil. The gas was most likely methane which is a by-product of organic degradation. The highest soil gas readings and lowest oxygen readings were obtained in the middle of the eastern leg of the dump (Ref.47). High soil gas readings were also observed in the area of the Howard School nature trail (Ref.11). The results from the soil gas investigation are given in Table 1. These results assisted in the selection of surface soil sample locations (Ref.48,49).

## 5.5 Air Monitoring

Portable air quality monitors (OVA and HNu) were used during this SIP (Ref.11). No measurements greater than background were detected in the above ground environment (Ref.11). No formal long-term air monitoring program was conducted.

## 5.6 Surface Soil Sample Locations

Ten surface soil samples were collected to investigate the soil exposure pathway (Ref.11). Samples were located to assess the threat to onsite and nearby targets (Ref.48). Sample locations are shown on Figure 5A.

## 5.7 Surface Soil Analytical Results

Polyaromatic Hydrocarbons (PAH's) were detected in some samples of disturbed soils on site (Ref.35,50). Soil that appeared native (HH-SS-04) did not show PAH's above sample quantitation limits (Ref.11). The PAH detected that causes the most concern is benzo(a)pyrene, a known carcinogen. Elevated levels of chromium were detected in the area of the nature trail. Elevated levels of zinc and lead were detected in the dump (Ref.35). Sample HH-SS-11 contained soil as well as dump debris and is used to characterize typical dump components (Ref.33). The results of the surface soil samples are given in Table 3: Part 1.

Table 1:
Results from Soil Gas Probe Investigation
Howard High School Landfill
TND 100842343
State ID #33–606

| Probe Number | Location | Date | Time | Depth (feet) | OVA reading (ppm) | Oxygen meter reading (%) | LEL reading (%) | HnU meter reading (ppm) |
|---|---|---|---|---|---|---|---|---|
| 1 | N of baseball fields | 8/16/93 | 0830 | 1.5 | 0.8 – 1 | – | – | – |
| 2 | On landfill. 73' from baseball fields along approach road | 8/16/93 | 1020 | 3 – 4 | >2000 | 2.1 | 27 | 0 |
| 3 | At boundary of baseball fields and landfill, at beginning of approach road | 8/16/93 | 1115 | 3 – 4 | 1 | – | – | – |
| 4 | NE of football field on berm, 12' inside football field fence | 8/16/93 | 1145 | 3 – 4 | 2.3 | 10.6 | 0 | 0 |
| 5 | SE of football field on berm, 6' inside football field fence | 8/16/93 | 1230 | 4 – 5 | 2.7 | 12.2 | 0 | 0 |
| 6 | On landfill, SW of day care center 1' outside of day care fence | 8/16/93 | 1400 | 3 – 4 | 11 – 72 | 14.5 – 15 | 0 | 0 |
| 7 | On landfill, 200' S of daycare, along nature trail in biology area | 8/16/93 | 1450 | 4 – 5 | >1000 | – | – | 0 |
| 8 | On landfill, along nature trail in group rest area | 8/16/93 | 1530 | 4 – 5 | 390 | 17 – 18 | 1 | – |
| 9 | On landfill, in east section at spot with no vegetation | 8/16/93 | 1630 | 4 – 5 | >1000 | 7.7 | 43 | – |
| 10 | On landfill, in east section at large barren area | 8/16/93 | 1700 | 4 – 5 | >400 | 3.7 | 10 | – |

– = data not gathered during this investigation

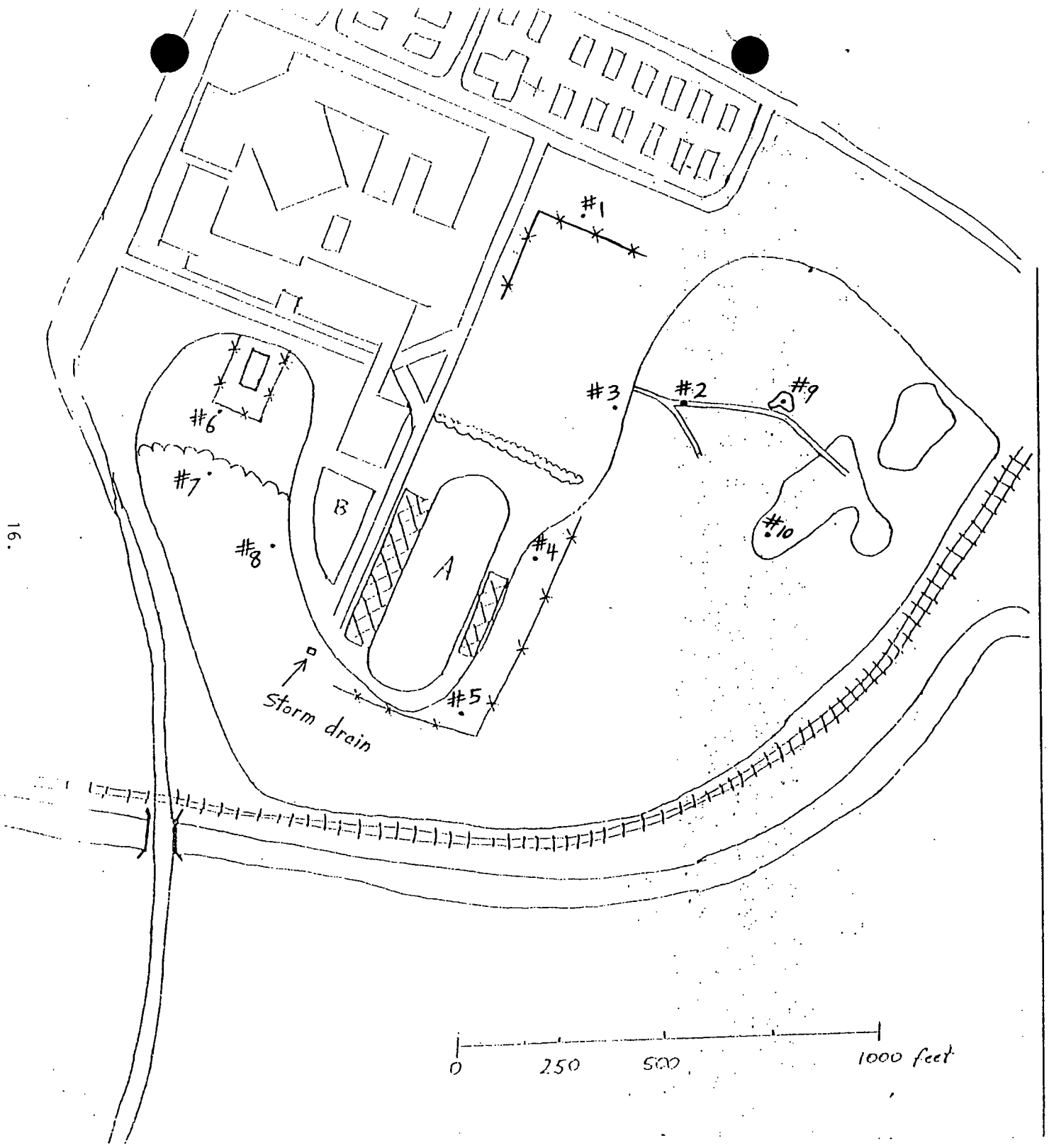



Figure 4:
Howard High School Dump
Soil Gas Probe Locations
Fall 1993

Soil/Gas Survey

TABLE 2: SAMPLE COLLECTION
HOWARD HIGH SCHOOL DUMP SIP
TND 100842343

| Sample Number | Sample Type | Depth (inches) | Location | Characteristics | Date | Time |
|---|---|---|---|---|---|---|
| HH–SS–01 | Surficial Soil | 4 – 7 | North of baseball fields, south of Potts Homes Originally intended for a background sample, but PAH's detected. | mixed reddish brown clay w/ glass chips, rocks | 8/24/93 | 0830 |
| HH–SS–02 | Surficial Soil | 6 – 12 | On landfill. In day care fence on east side 36 ' from day care, 190' from Howard School | orange brown clay | 8/24/93 | 0910 |
| HH–SS–03 | Surficial Soil | 4 – 6 | On landfill. In day care fence at southwest corner. 61' from day care | mixed dark brown soil w/ gravel, black chips, glass and brick fragments | 8/24/93 | 0945 |
| HH–SS–04 | Surficial Soil (Background) | 6 | West side of practice field. 190' southwest of Howard school gymnasium | reddish brown clay appears native | 8/24/93 | 1045 |
| HH–SS–10 | Surficial Soil (Duplicate) | 6 | same as HH–SS–04 | reddish brown clay appears native | 8/24/93 | 1045 |
| HH–SS–05 | Surficial Soil (Background) | 6 | South side of practice field. 80' from football stadium bleachers | reddish brown clay appears native | 8/24/93 | 1115 |
| HH–SS–06 | Surficial Soil | 20 – 24 | On landfill. Along nature trail in biology area. 180' from day care fence | yellow brown clay mix w/ glass, slag, gravel, and black–grey chunks | 8/24/93 | 1340 |
| HH–GW–01 | Water | 30 | Same as HH–SS–06, only deeper | water from buried metal 1" pipe. Grey, cloudy, and smelled like sewage. | 8/24/93 | 1415 |
| HH–SS–07 | Surficial Soil | 14 | On landfill. Along nature trail in biology area. In a group center/ rest area. 130' to SS–06, 135' to practice field fence. | dark brown soil | 8/24/93 | 1500 |
| HH–SS–08 | Surficial Soil | 6 – 12 | On landfill. Along approach road, 100' from baseball fields. Access is not restricted | grey clay with black charcoal like chunks | 8/25/93 | 0900 |
| HH–SS–09 | Surficial Soil | 6 – 8 | On landfill. In barren area, 400' from SS–08. | grey, rubbery clay with black charcoallike chunks | 8/25/93 | 0930 |
| HH–SS–11 | Surficial Soil/ Landfill waste | 6 – 10 | On landfill. 500' from SS–08, 200' from football stadium | gravelly grey brown material with many pieces of wood and brick. | 8/25/93 | 1030 |

Table 3: Part 1:
Analytical Results for Non-Aqueous Surface Soil Samples
Howard High School Landfill
State ID #33-606
EPA ID # TND 100842343

| Substance | SCDM Toxicity | SCDM Soil Pathway Benchmark | HH-SS-01 N. of Baseball Field | HH-SS-02 Day Care | HH-SS-03 Day Care | HH-SS-04 Practice Field | HH-SS-10 Practice Field -04 Duplicate | HH-SS-05 Practice Field | HH-SS-06 Nature Trail | HH-SS-07 Nature Trail | HH-SS-08 Landfill | HH-SS-09 Landfill | HH-SS-11 Landfill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Organics, ug/kg** | | | | | | | | | | | | | |
| Benzo(a)Anthracene | 1000 | – | 500 | D | 696 | – | – | D | 1120 | – | – | – | 1400 |
| Benzo(a)Pyrene | 10000 | 80(**) | 493 | D | 801 | – | – | – | 1390 | – | – | – | 1770 |
| Benzo(g,h,i)Perylene | – | – | – | – | D | – | – | – | D | – | – | – | 1350 |
| Bis(2-ethylhexyl)Phthalate | 100 | 12000(*), 42(**) | – | D | D | D | – | D | 1170 | – | D | – | D |
| Chrysene | – | – | 402 | D | 644 | – | – | – | 1290 | D | – | – | 1370 |
| Fluoranthene | – | – | 480 | D | 1060 | D | D | D | 1520 | D | D | D | 2480 |
| Indeno(1,2,3-cd)Pyrene | – | – | – | – | D | – | – | – | D | – | – | – | 2190 |
| Pyrene | 100 | 17000(*) | 433 | D | 911 | D | D | D | 1330 | D | D | – | 2160 |

* = Reference Dose Screening Concentration
** = Cancer Risk Screening Concentration
D = Compound detected, but below sample quantitation limit
– = Material analyzed for but not detected

| Substance | SCDM Toxicity | SCDM Soil Pathway Benchmark | HH-SS-01 N. of Baseball Field | HH-SS-02 Day Care | HH-SS-03 Day Care | HH-SS-04 Practice Field | HH-SS-10 Practice Field -04 Duplicate | HH-SS-05 Practice Field | HH-SS-06 Nature Trail | HH-SS-07 Nature Trail | HH-SS-08 Landfill | HH-SS-09 Landfill | HH-SS-11 Landfill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inorganics, mg/kg** | | | | | | | | | | | | | |
| Aluminum | – | – | 43000 | 38400 | 26000 | 38500 | 19000 | 30500 | 15100 | 25400 | 11000 | 13100 | 1570 |
| Arsenic | 10000 | 170(*), 0.33(**) | 3.4 | 3.5 | 5 | 9.3 | 9.9 | 5.5 | 9.5 | 8.7 | 14.4 | 27.8 | 4 |
| Barium | 10 | 41000(*) | 131 | 82 | 156 | 92 | 76 | 107 | 80 | 164 | 50 | 36 | 624 |
| Cadmium | 10000 | 290(*) | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | 1.2 | 0.7 |
| Calcium | – | – | 1200 | 1200 | 14900 | 579 | 699 | 1600 | 3690 | 17700 | 476 | 2360 | 26500 |
| Chromium | 10000 | 2900(*) | 11 | 12 | 25 | 12 | 11 | 22 | 103 | 108 | 8 | 9 | 14 |
| Cobalt | 1 | – | 16 | 10 | 10 | 12 | 13 | 8 | 8 | 24 | 9 | 8 | 12 |
| Copper | – | – | 17.3 | 9.3 | 65.6 | 12 | 11.2 | 30.2 | 26.3 | 64.4 | 18.7 | 21.5 | 30 |
| Cyanide | 100 | 12000(*) | <1 | <1 | <1 | <1 | <1 | <1 | <1 | 3.42 | <1 | <1 | <1 |
| Iron | – | – | 27500 | 28200 | 27100 | 27700 | 30300 | 40000 | 41300 | 38900 | 35200 | 40400 | 18400 |
| Lead | 10000 | – | 48 | 17 | 190 | 17 | 16 | 86 | 41 | 84 | 21 | 20 | 353 |
| Magnesium | – | – | 1210 | 97.3 | 2560 | 877 | 913 | 1870 | 1210 | 1330 | 1920 | 1590 | 4700 |
| Manganese | 10000 | 58000(*) | 1380 | 767 | 1150 | 1130 | 1040 | 492 | 358 | 518 | 110 | 67 | 510 |
| Mercury | 10000 | 170(*) | 1.7 | 1.3 | 3.8 | 1 | 1.1 | 4.5 | 1.8 | 10.5 | 1.3 | 1.2 | 6.4 |
| Nickel | 10000 | 12000(*) | 13 | 6 | 28 | 8 | 8 | 18 | 11 | 39 | 17 | 15 | 17 |
| Potassium | – | – | 2010 | 683 | 1050 | 1200 | 1160 | 1390 | 2220 | 2010 | 4420 | 4460 | 1080 |
| Selenium | 100 | 2900(*) | <0.2 | 0.2 | 0.4 | 0.7 | 0.3 | 0.3 | 0.9 | 0.6 | 0.2 | 0.5 | <0.2 |
| Silver | 100 | 2900(*) | <1 | <1 | 2 | <1 | <1 | <1 | <1 | 6 | <1 | <1 | <1 |
| Sodium | – | – | 63 | 39 | 81 | 91 | 83 | 67 | 92 | 121 | 95 | 120 | 132 |
| Zinc | 10 | 170000(*) | 93.4 | 40.1 | 370 | 33.6 | 33.8 | 168 | 85.9 | 380 | 62 | 53.3 | 175 |

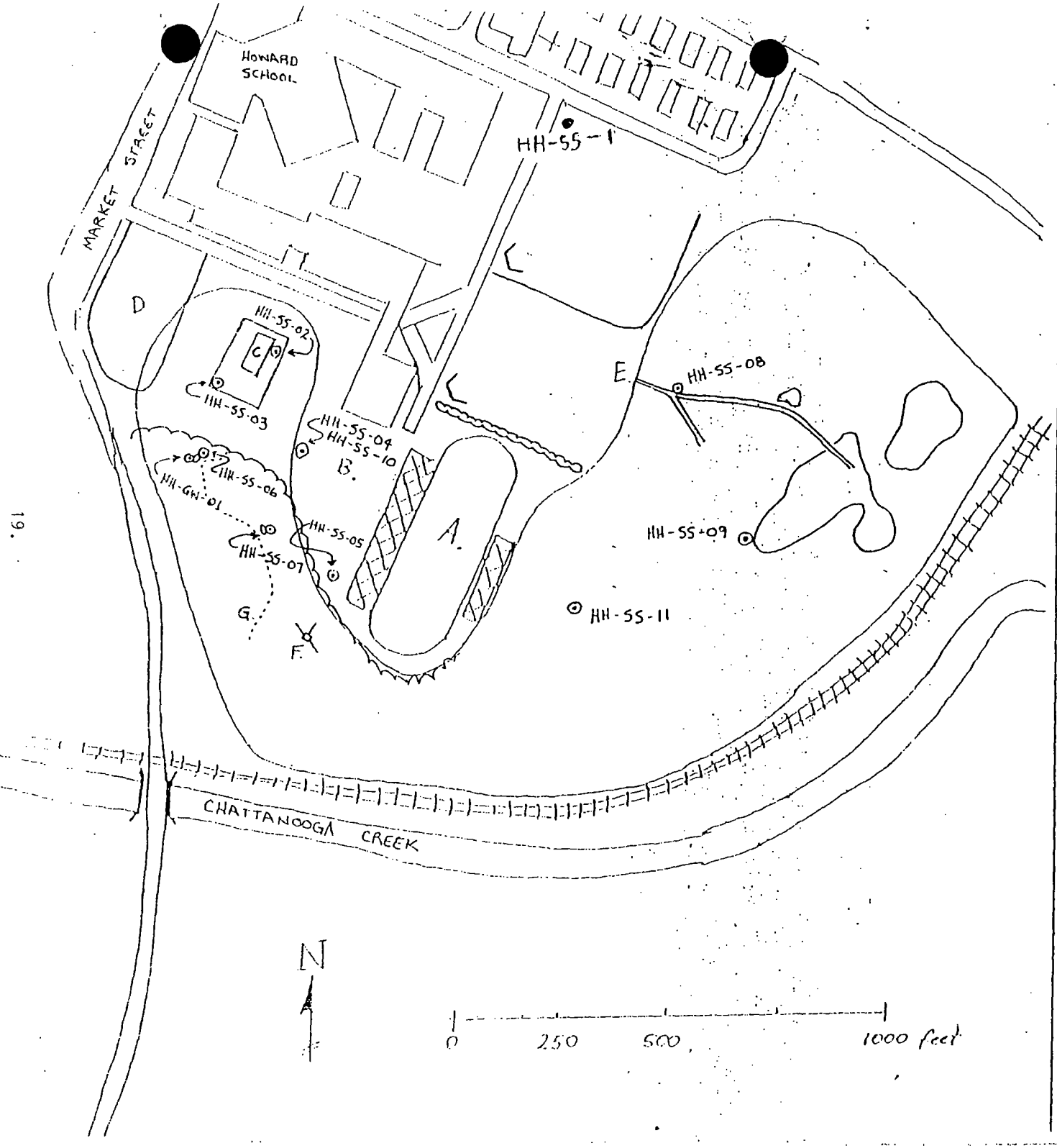



Figure 5A:
Howard High School Dump
SIP Sample Locations
Fall 1993

- HH-SS-01 surface soil sample
- HH-SS-02 : SURFACE SOIL SAMPLE
- HH-SS-03 "
- HH-SS-04 "
- HH-SS-05 "
- HH-SS-06 "
- HH-SS-07 "
- HH-SS-08 "
- HH-SS-09 "
- HH-SS-10 : SURFACE SOIL SAMPLE DUPLICATE
- HH-SS-11 : SURFACE SOIL SAMPLE
- HH-GW-01 : PERCHED WATER SAMPLE

A : FOOTBALL FIELD
B : PRACTICE FIELD
C : DAY CARE CENTER
D : PARKING AREA
E : APPROACH ROAD INTO LANDFILL FROM BASEBALL FIELD
F : DRAINAGE CULVERT
G : NATURE TRAIL IN BIOLOGICAL AREA

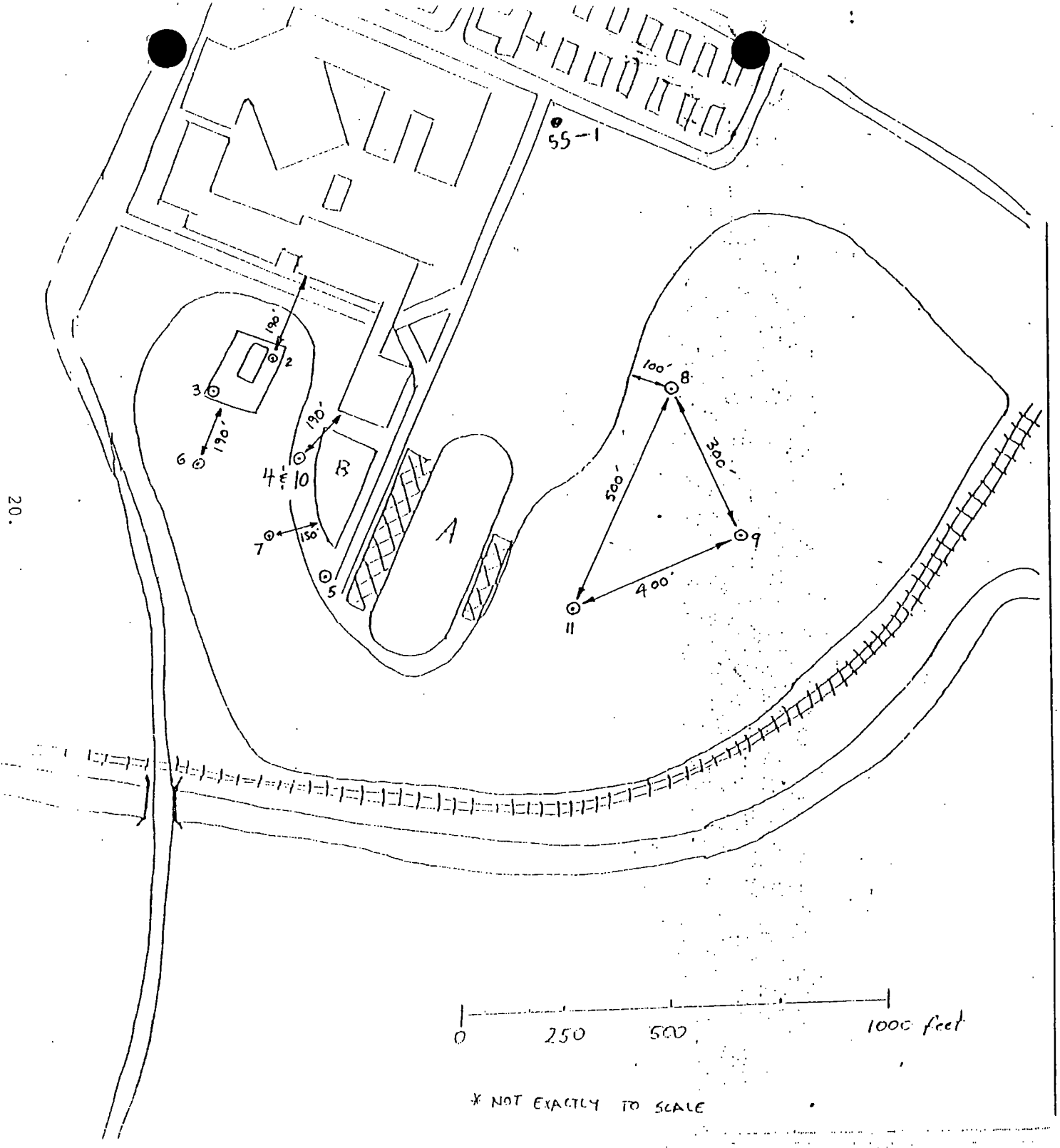



Figure 5B:
Howard High School Dump
SIP Sample Locations
Measured Distances

• 55 -1. surface soil sample

Table 4:
Approximate Area Population Values
Howard High Landfill
TND 100842343

| | Residents | Students | Teachers |
|---|---|---|---|
| **Onsite:** | | | |
| Maurice Kirby Child Care Center | – | 55 | 15 |
| Howard Elementary (K–5) | – | 417 | 27 |
| Howard High School (9–12) | – | 1074 | 65 |
| Total | – | 1546 | 107 |
| **0 to 0.25 Mile:** | | | |
| Maurice Potts Homes | 150 | – | – |
| Mary Walker Towers | 138 | – | – |
| Other | 412 | – | – |
| Total | 700 | – | – |
| **0.25 to 0.5 Mile** | 1300 | – | – |
| **0.5 to 1 Mile:** | 6500 | – | – |
| Calvin Donelson Elementary | – | 355 | – |
| **1 to 2 Miles** | 16502 | – | – |
| **2 to 3 Miles** | 21433 | – | – |
| **3 to 4 Miles** | 32103 | – | – |
| **TOTAL** | 78538 | | |

## 5.8 Conclusions

Howard High Dump is located in an urban area near a housing development and active school. A day care center has been built on the western leg of the dump. The elementary and high school are located within 200' of the dump on the same legal property. There are approximately 55 students in the day care and approximately 1500 students in Howard school. This SIP found elevated levels of Polyaromatic Hydrocarbons and various metals in the site's surface soil.

# 6.0 SUMMARY AND CONCLUSIONS

The Howard High Dump SIP was performed to update the previous SI and gather additional data necessary to evaluate the site as a candidate for the NPL according to current guidelines. Environmental samples were collected and analyzed to characterize the types of substances found at the site. In addition, information was collected to confirm target populations and environmentals potentially at risk from the site.

Howard High Dump was an unregulated landfill used as a land reclamation project in the early 1970's. Chattanooga Creek was channelized as part of a railroad relocation project and the old meanders were filled with mostly dirt and demolition debris. Industrial sludges and foundry sand are alleged to have been deposited in the dump, but no official records exist. The fill is as deep as 20 feet over the old creek bed and occupies approximately 44 acres. Small amounts of filling continue today on the western leg of the dump.

The Maurice Kirby Day Care Center has been built over the western leg of the Howard High School Dump. A high school and elementary school are on the same parcel and located within 200 feet of the filled area. Housing developments are located within 0.25 mile of the site. The dump is easily accessible from the railroad, along roads, and an existing nature trail.

The SIP indicated surface contamination at the dump. One sample indicating PAH contamination was within 200' of the day care. The day care is within 200' of Howard School. Analytical results of sampling are presented in Table 3. The substances found in elevated concentrations near the surface of the Howard School Dump include benzo(a) pyrene, benzo(a) anthracene, benzo(g,h,i) perylene, bis(2-ethylhexyl) phthalate, chrysene, fluoranthene, indeno(1,2,3-cd) pyrene, pyrene, chromium, zinc, and lead.

## REFERENCES


1. Tennessee Division of Superfund (TDSF), Tony Damiano. 1988. "Site Inspection Report, Howard High School Landfill". August 29.

2. Hamilton County, Tennessee. Register. 1971. Property Deed and Plat Map. Book 1972, Page 962.

3. VanHook, Don. 1993. "Latitude and Longitude Calculation Worksheet". September 29.

4. USGS. 1976 Chattanooga Quadrangle, Tennesee/ 1976 East Chattanooga Quadrangle, Tennessee/ 1982 East Ridge Quadrangle, Tennessee-Georgia/ 1982 Fort Oglethorpe Quadrangle, Tennessee-Georgia. U.S. Geological Survey, 7.5 Minute Series (Topographic).

5. U.S. Department of Commerce. 1961. "Technical Paper No. 40, Rainfall Frequency Atlas of the United States". Washington D.C., May.

6. TDSF. 1992. Memo from Craig Stannard concerning nearby wetlands, Tennessee River flow, and Chattanooga population. April 24.

7. TDSF, Craig Stannard. 1992. "Preliminary Assessment Report, Tennessee Transformer, Hamilton County, Tennessee". October 19.

8. Chattanooga/ Hamilton County Regional Planning Commission. 1992. "Population Trends, 90". March.

9. Tennessee Department of Transportation. 1972-74. South Chattanooga Aeriel Photographs.

10. TDSF. 1993. "SIP Photographs for the Howard School Dump". Fall.

11. TDSF. 1993. "SIP Field Logbook for Howard School Dump". Fall.

12. City of Chattanooga, Department of Public Works. 1972. "Howard Dump Design Plans". August/ September.

13. TDSF, Charles Rush. 1986. "Preliminary Assessment, Howard High School Landfill, Chattanooga, Tennessee". September 29.

14. Chattanooga Department of Public Works, George Kurz. 1987. "Combined Sewer Overflows Inspection Report". October 27.

15. Tennessee Division of Water Pollution Control (TDWPC), Charles Steele. 1972. Memo regarding contents of Howard School Dump. November 16.

16. TDSF, Anthony Damiano. 1987. Memo regarding unauthorized dumping in south Chattanooga. November 6.

17. U.S. Environmental Protection Agency (EPA). Region IV. 1993. "Amincola Dump Fact Sheet".

18. USEPA, Region IV. 1992. "Chattanooga Creek Sediment Profile Study, Chattanooga, Tennessee". April/ August.

19. Tennessee Department of Health and Environment, Division of Water Management. 1981- 1982. "Chattanooga Creek Survey". June 1983.

20. TDSF, 1993. "Promulgated Sites in Tennessee". August 5.

21. TDSF, Ferman Miller. 1990. "Site Inspection Report, Chattanooga Coke and Chemical, Hamilton County, Tennessee". August 22, 1990.

22. TDSF, Don VanHook. 1993. Memo regarding RCRA history and Howard Dump. December 3.

23. DeBuchananne and Richardson. 1956. Groundwater Resources of East Tennessee. Bulletin 58, Part 1. Nashville, TN.

24. Tennessee Division of Geology. 1964. "Geologic Map and Mineral Resources Summary of the Chattanooga Quadrangle, Tennessee". Nashville.

25. US Soil Conservation Service. 1974. Soil Survey of Hamilton County, Tennessee. United States Department of Agriculture.

26. Law Environmental. 1988. "1987 Annual Ground-Water Quality Assessment Report for the Southern Wood Piedmont Company, Chattanooga, Tennessee". February.

27. TDSF, Craig Stannard. 1987. memo regarding wells in the Chattanooga area. November 19.

28. Tennessee Department of Health and Environment (TDHE), G. Caruthers. 1986. memo regarding Chattanooga water supplies and groundwater. November 25.

29. Tennessee American Water Company. 1986. letter regarding wells in the Chattanooga area. December 19.

30. TDHE, G. Caruthers. 1986. Trip report discussing water supplies in North Georgia. August 29.

31. Tennessee Division of Water Supply. "Community Public Water Supplies in Tennessee".

32. TDSF, Craig Stannard. Memo regarding public drinking water supplies. April 14.

33. TDSF, Don VanHook. 1993. Trip report of sampling activities during Howard Dump SIP. August 26.

34. TDSF, Don VanHook. 1993. Memo regarding Howard School drainage pipes. September 2.

35. Tennessee Environmental Labratories. 1993. Sample results for the Howard School SIP. Fall.

36. U.S. Department of Housing and Urban Development. 1980, 1982. "Flood Insurance Rate Map for Chattanooga, Hamilton County, Tennessee". Panels 20 and 21.

37. Tennessee Valley Authority. 1974. "Drainage Areas for Streams in Tennessee River Basin". Table 6, page 38.

38. U.S. Department of Interior, Geological Survey. 1970-74. "Water Resources Data for Tennessee". pgs. 100, 212.

39. Tennessee Department of Water Pollution Control. 1991. "Use Classifications for Surface Waters". Chapter 1200-4-4. September.

40. TDSF, Craig Stannard. 1993. Memo regarding fishing in Chattanooga Creek. April 15.

41. Tennessee Department of Conservation, Greg Denton. 1991. Memo regarding contaminated fish in Chattanooga Creek. June 28.

42. Tennessee Wildlife Resources Agency, Bob Hatcher. 1985. Letter listing critical habitats of Tennessee. December 19.

43. Tennessee Department of Conservation, Ecological Services Division. 1989. "Rare Species in Hamilton County, Tennessee". January 31.

44. Tennessee Wildlife Resources Agency. 1991. "Statewide Summary of Creel Clerk Effort".

45. TDSF, Don VanHook. 1993. Memo regarding area population values. November 19.

46. TDSF, Don VanHook. 1993. Memo regarding Howard population values. November 22.

47. TDSF, Craig Stannard. 1993. Trip report for Soil Gas investigation for Howard Dump SIP. August 20.

48. TDSF, Andy Binford. 1993. Memo regarding suggested soil sampling locations. August 11.

49. TDSF, Artur Kolodziejski. 1993. "Study Plan, Howard School Dump SIP". June 23.

50. TDSF, Don VanHook. 1993. Memo regarding Howard School risk assessment. December 3.

51. Chattanooga Times. 1991. "Congressional Redistricting". August 26.

52. TDSF. "New Site Discovery Program, Howard School Landfill".

53. TDSF, Ferman Miller. 1993. Memo regarding Howard sample results. November 5.

**Site Name:** Howard High School Dump

**Site Number:** TND 100842343

Appendix A.

References

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 1

# Potential Hazardous Waste Site

# Site Inspection Report

HOWARD HIGH SCHOOL LANDFILL 33606
TND 100842343
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

---

*Revision* 1

*Prepared By* Anthony Damiano *Date* August 29, 1988

*Reviewed By* Wayne S. Everett *Date* August 31, 1988

HOWARD HIGH SCHOOL LANDFILL

IND 100842343

TABLE OF CONTENTS

EXECUTIVE SUMMARY

REGULATORY SUMMARY

NARRATIVE SUMMARY

1.0 Introduction

2.0 Site Characterization

3.0 Target Analysis

4.0 Field Investigation

5.0 Summary

# HOWARD HIGH SCHOOL LANDFILL

IND 100842343

EXECUTIVE SUMMARY

## A. Site History/Description

The Howard High School Landfill is located on 2500 South Market Street and contains approximately 40 acres of low land remaining after the rechannelization of the Chattanooga Creek in the 1960's. The landfill was intended to be used as a land reclamation project. The elevation was to be built up by disposing brush and demolition debris only. It was alleged that some industrial sludges were dumped on site. The amount and composition of alleged waste is unknown, since the landfil was not closely regulated.

## B. Geologic Setting

The site is 2 miles south of Lookout Mountain and miles west of Missionary Ridge.

The site is underlain by highly fractured limestone and dolomite from the Knox geologic formation. Surface soils in the area are primarily silty clay of low permeability. Surface and groundwater contamination from migration is possible if hazardous substances are present.

## C. Targets Affected

The Marice Poss Homes, A multiple-family housing development, and Howard High School are located within 1/2 mile radius of the site.

There are no drinking water wells in the vicinity of the site and all drinking water is supplied by the Tennessee American Water Company. The Tennessee American Water intake is more than 5 river miles upstream from the site and the nearest water intake is greater than 15 miles downstream.

## D. Recommendations

There is no evidence that past waste handling at the landfill are affecting the population or the environment. The Howard High Landfill site should be given a low priority due to the fact of very low preliminary HRS scores and no surface or ground water receptors, and the site is located adjacent to the Chattanooga Creek, a historic industrially polluted creek. With these facts known, any further work on the site is properly done at the State level.

HOWARD HIGH SCHOOL LANDFILL

TND 110842343

REGULATORY SUMMARY

The Howard High School Landfill, also known as the South Market Street Landfill or the 28th Street Landfill, was in operation during the period from 1972 to 1976. During this time period there was no formal state permitting process for the strict regulation of landfills designated to be used for brush and demolition debris.

GSC/ib

# HOWARD HIGH SCHOOL LANDFILL

TND 100842343

NARRATIVE SUMMARY

## 1.0 Introduction

A screening Site Investigation was performed by the Chattanooga Superfund Office on 29 September 1987. It is alleged that some industrial sludges were deposited at the Howard High School landfill site. There is no evidence to substantiate this allegation, however due to the fact that the landfill was not closely regulated during it's active period the potential exists for migration off-site if hazardous substances are present.

## 2.0 Site Characterization

### 2.1 Site Background and History

The Howard High School Landfill is located on 2500 South Market Street behind the Howard High Scool. The site contains approximately 40 acres of low-lying land remaining after the rechannelization of the Chattanooga Creek during the late 1960's due to a railroad track relocation. The landfill was intended to be used as a land reclamation project. The elevation of the low land was to be built up by disposing brush and demolition waste only (Ref. 3). Prior to the filling of the area, a drainage culvert was placed in the low area running underneath the railroad embankment and discharging into the Chattanooga Creek.

## 2.2 Site Description

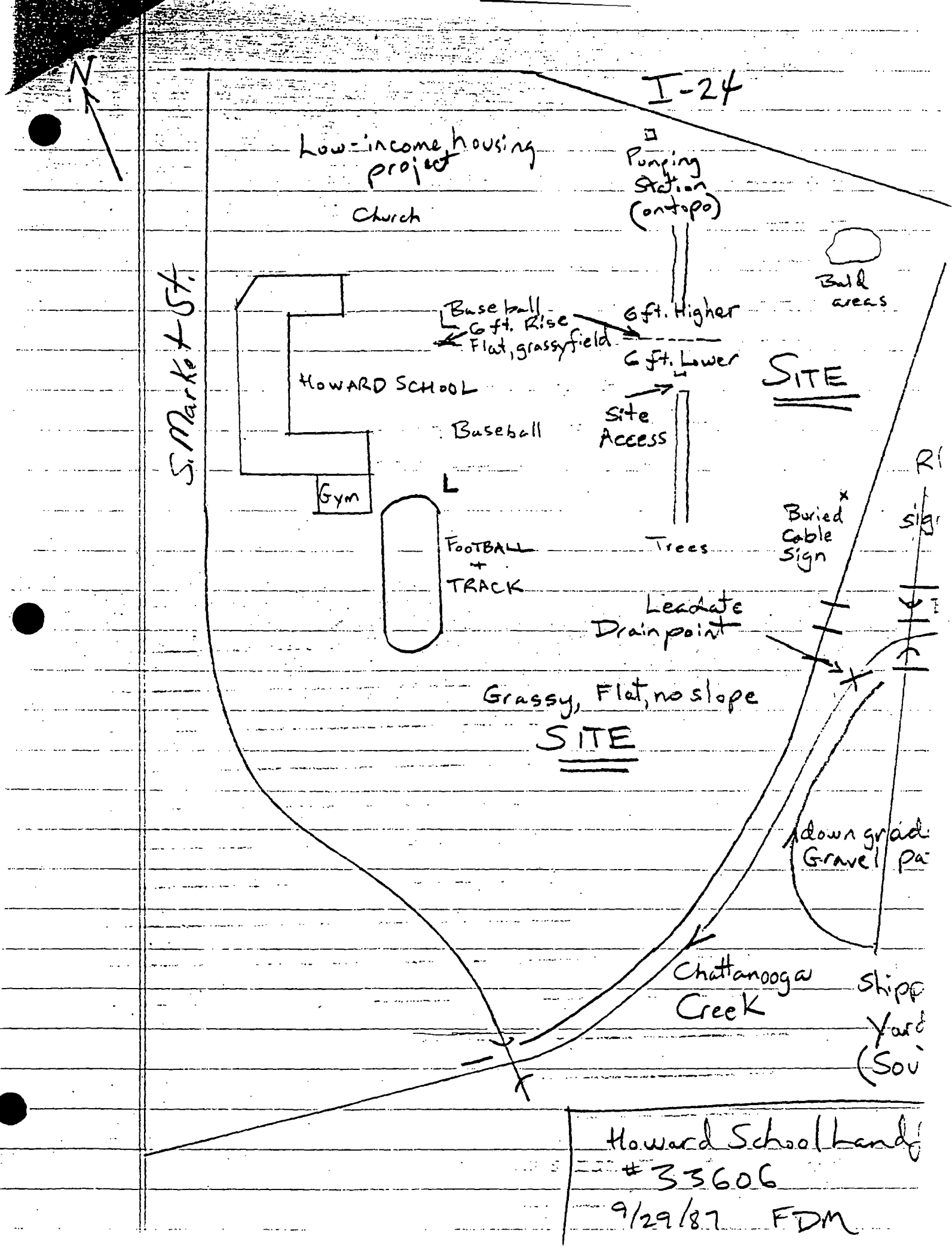
The landfill's operation during its active period was not closely regulated to the type of waste actually dumped on site. It is alleged by personnel from the Division of Water Management (TDWM) that some industrial sludges were dumped at the landfill. A photograph of two drums, alleged to be industrial sludge dumped on site , is in the possession of TDWM. The above referenced photograph was viewed and determined not be sufficient proof alone to definitively prove the existence of industrial sludge dumping on site. The amount and composition of the alleged sludge materials are unknown, but if any hazardous substances are present at the site there is a potential for migration off site.

Note-- see attached site sketch on next page.

The close proximity of the landfill to the Chattanooga Creek and the presence of an underground drainage system to the creek could contribute to surface and subsurface migration pathways. The site is surrounded on three sides by an elevated railroad embankment and one side by thick underbrush that borders Howard High's practice baseball field and football field.

## 2.3 Environmental/Regional Setting

The site lies between Lookout Mountain to the south, the Tennesee River to the west, Missionary Ridge to the east, and the city of Chattanooga to the north.


N
I-24
Low-income housing project
Church
Pumping Station (on topo)
Bald areas
S. Market St.
Baseball
6 ft. Rise
Flat, grassy field
6 ft. Higher
6 ft. Lower
SITE
HOWARD SCHOOL
Site Access
Baseball
Gym
FOOTBALL + TRACK
Trees
Buried Cable Sign
Leachate Drainpoint
Grassy, Flat, no slope
SITE
Chattanooga Creek
Howard School Landf
#35606
9/29/87 FDM

The Marice Poss Homes, a multiple family housing development is adjacent and located to the north of the site. Howard High School is adjacent and located to the west of the site (Ref. 14). The site is easily accessed by foot or 4WD vehicle. Entrance can be made through a break in the thick underbrush along the outfield of Howard High's practice baseball field.

The site is located in a highly urban/ industrial area of Chattanooga.

2.4 Geology/Hydrogeology

The one year, 24 hour rainfall is 3.0 inches. The mean annual precipitation is 58 inches.

There is little surface drainage from the site. Water tends to pool in depression areas and evaporate as opposed to draining from the site.

Surface soils in the area are primarily silty clay of low permeability. A thrust fault runs through the center of the landfill and could act as a pathway for direct migration to the groundwater. Underlying bedrock is highly fractured limestone and dolomite of the Knox geologic group (Ref. 13).

There are no drinking water wells in the vicinity of the site and all drinking water in the area is supplied by the Tennessee American Water Company (TAWC) (Ref. 12) The TAWC intake is located at River Mile 465.3, the Chattanooga Creek empties into the Tennessee River at River Mile 460.8, and the site is approximately 1.25 miles (creek miles) from the creek's outfall point on the river. The City of Chattanooga water

intake is in excess of five river miles upstream from the site (Ref. 14).

## 3.0 Target Analysis

Population potentially affected by this site are as follows:

3.1 Surface Water: None identified within 15 miles downstream.

3.2 Ground water: None identified within a 4 mile radius.

3.3 Air route: None identified- no air release potential evaluated.

3.4 On-site Exposure: The potential for on-site exposure via direct contact exists due to the location of the Marice Poss Homes, a multiple family housing development.

Surface target analysis was based on recreational use only of waters within 15 miles downstream. No identified water intakes located within 15 miles downstream and no population exposed via drinking water. Ground water target analysis was based on drilling records, documentation from the Tennessee American Water Company, and demographic investigation. The affected radius for ground water is serviced by municipal water, however there always exists the potential for undiscovered holdouts from the municipal water system. Air route was not evaluated as a migration pathway since little potential exists for an air release. There is a housing development bordering the northern side of the site; therefore a potential exists for on-site exposure.

## 4.0 Field Investigation

The field investigation for this site was conducted on 29 September 1987. No evidence of hazardous substances were found on-site, and no visible signs of leachate or other potential migration pathways were noted. Due to the presence of an intact cap over the filled area, no soil augering was attempted and no soil samples were taken. The only potential pathway for leachate migration would be the culvert passing under the landfill and discharging into the Chattanooga Creek. Since The culvert outfall at the creek was approximately two feet below the surface and the creek is already documented as being heavily polluted with heavy metals and organics, it was thought not feasible to collect samples from this outfall (Ref. 1).

## 5.0 Summary

Field investigations of the Howard High School Landfill revealed that no receptors via groundwater migration route are affected since municipal water supply covers the 4 mile radius from the site.

Examination of the surface water migration route downgradient from the site has identified no human exposure targets or sensitive environments within 15 miles.

Field investigation for the potential of direct contact revealed a possibility for direct contact; however, there is no substantiated information that hazardous substances are or were ever present on site.

It is the conclusion of this investigation that the Howard High School Landfill presents little to no significant hazard to the public health and the environment via groundwater, surface water, or direct contact.

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

II. SITE NAME AND LOCATION

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER |
|---|---|
| Howard High School Landfill | 2500 South Market Street |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 COUNTY | 07 COUNTY CODE | 08 CONG. DIST. |
|---|---|---|---|---|---|
| Chattanooga | TN | 37402 | Hamilton | 33 | 03 |

| 09 COORDINATES LATITUDE | LONGITUDE | 10 TYPE OF OWNERSHIP (Check one) |
|---|---|---|
| 35° 01' 25".N | 85° 18' 24".W | ☐ A. PRIVATE ☐ B. FEDERAL ____ ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL ☐ F. OTHER ____ ☐ G. UNKNOWN |

III. INSPECTION INFORMATION

| 01 DATE OF INSPECTION | 02 SITE STATUS | 03 YEARS OF OPERATION |
|---|---|---|
| 9 29 87 (Month Day Year) | ☐ ACTIVE ☒ INACTIVE | 1972 / 1976 (Beginning Year / Ending Year) ____ UNKNOWN |

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ____ (Name of firm) ☒ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ____ (Name of firm)
☒ E. STATE ☐ F. STATE CONTRACTOR TDSF (Name of firm) ☐ G. OTHER ____ (Specify)

| 05 CHIEF INSPECTOR | 06 TITLE | 07 ORGANIZATION | 08 TELEPHONE NO. |
|---|---|---|---|
| Anthony P. Damiano, Jr. | Environmental Spec. II | TDSF | (615) 624-992 |

| 09 OTHER INSPECTORS | 10 TITLE | 11 ORGANIZATION | 12 TELEPHONE NO. |
|---|---|---|---|
| Ferman D. Miller | Environmental Engineer II | TDSF | (615) 624-992 |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |

| 13 SITE REPRESENTATIVES INTERVIEWED | 14 TITLE | 15 ADDRESS | 16 TELEPHONE NO. |
|---|---|---|---|
| Pat Janardanan | Engineer City of Chatt. | Dept. Public Works Rm. 209 | (615) 757-545 |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | |

| 17 ACCESS GAINED BY (Check one) | 18 TIME OF INSPECTION | 19 WEATHER CONDITIONS |
|---|---|---|
| ☒ PERMISSION ☐ WARRANT | 2:00 pm (EDT) | Cloudy and Warm Temp. mid 70's |

IV. INFORMATION AVAILABLE FROM

| 01 CONTACT | 02 OF (Agency/Organization) | 03 TELEPHONE NO. |
|---|---|---|
| Pat Janardanan | City of Chattanooga, Public Works Dept. | (615) 757-545 |

| 04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NO. | 08 DATE |
|---|---|---|---|---|
| Anthony P. Damiano | TDHE | DSF | (615) 624-9921 | 11 5 87 (Month Day Year) |

EPA FORM 2070-13 (7-81)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 2 - WASTE INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

**01 PHYSICAL STATES** (Check all that apply)

- [X] A SOLID
- [ ] B POWDER FINES
- [X] C SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] 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)

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

Unknown

## III. WASTE TYPE

| CATEGORY | SUBSTANCE NAME | 01 GROSS AMOUNT | 02 UNIT OF MEASURE | 03 COMMENTS |
|---|---|---|---|---|
| SLU | SLUDGE | | | |
| OLW | OILY WASTE | | | |
| SOL | SOLVENTS | | | |
| PSD | PESTICIDES | | | |
| OCC | OTHER ORGANIC CHEMICALS | unknown | | Alleged industrial sludge disposa |
| IOC | INORGANIC CHEMICALS | | | at site, but no existence of |
| ACD | ACIDS | | | supporting documentation. Ref. 2 |
| BAS | BASES | | | |
| MES | HEAVY METALS | unknown | | |

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

| 01 CATEGORY | 02 SUBSTANCE NAME | 03 CAS NUMBER | 04 STORAGE/DISPOSAL METHOD | 05 CONCENTRATION | 06 MEASURE OF CONCENTRATION |
|---|---|---|---|---|---|
| | Unknown | | Unlined Landfill | Unknown | -- |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## 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)

Memo to the TDSF which documents the rationale for using heavy metal and organic pollutants in the site investigation package. (Ref. 2)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION
The area has a shallow water table and ground water contamination is possible through leaching, if hazardous substances are present. No domestic use of ground water is known within 3 miles.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION
The site lies adjacent to, and in the flood plain of Chattanooga Creek and has a storm sewer drain that empties into the Chattanooga Creek. No surface water intakes are downgradient of the site within 3 miles. Population estimate reflects persons exposed via fishing and water contact. (1 mile radius population.)

01 [ ] C. CONTAMINATION OF AIR — 02 [ ] OBSERVED (DATE: _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
No odors were smelled.

01 [ ] D. FIRE/EXPLOSIVE CONDITIONS — 02 [ ] OBSERVED (DATE: _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
Not evaluated.

01 [X] E. DIRECT CONTACT — 02 [ ] OBSERVED (DATE: _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION
Accessible to the public. Population estimate reflects number of persons living within 1 mile.

01 [X] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 40 (Acres) — 04 NARRATIVE DESCRIPTION
The site is an old municipal landfill and if hazardous substances were dumped at the site, then soil contamination is possible.

01 [ ] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION
N/A The city is on a public water supply which is drawn from the Tennessee River upstream from Chattanooga Creek.

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

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

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

II. HAZARDOUS CONDITIONS AND INCIDENTS (continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Some bald spots on site. Appear to be due to low nutrient/moisture content rather than toxicity to vegetation.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names of species)

None known.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Chattanooga Creek is used for fishing and harvesting of frogs and turtles, presumably to be used for food.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION

No liner or containment structure present.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

Discussions with past city officials indicated industrial waste being dumped at the site. No record exists to reveal the type or quantity of potentially hazardous waste dumped on site.

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

Chattanooga Creek is heavily polluted with organic chemicals and toxic metals from industrial discharges and numerous waste disposal sites. Chattanooga Creek is used for recreation (fishing, etc.).

III. TOTAL POPULATION POTENTIALLY AFFECTED: 6000

IV. COMMENTS

It is not certain whether the landfill ever received hazardous waste or not. Site conditions are such that, if hazardous wastes are present, they could easily leach from the site.

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

Preliminary Assessment - Charlie Rush 29 September 86

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION
### PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

## II. PERMIT INFORMATION

| 01 TYPE OF PERMIT ISSUED (Check all that apply) | 02 PERMIT NUMBER | 03 DATE ISSUED | 04 EXPIRATION DATE | 05 COMMENTS |
|---|---|---|---|---|
| ☐ A. NPDES No | | | | |
| ☐ B. UIC | | | | |
| ☐ C. AIR | | | | |
| ☐ D. RCRA No | | | | Site has underground leachate |
| ☐ E. RCRA INTERIM STATUS | | | | collection system discharging |
| ☐ F. SPCC PLAN | | | | into the creek. |
| ☐ G. STATE (Specify) | | | | |
| ☐ H. LOCAL (Specify) | | | | |
| ☐ I. OTHER (Specify) | | | | |
| ☐ J. NONE | | | | |

## III. SITE DESCRIPTION

| 01 STORAGE/DISPOSAL (Check all that apply) | 02 AMOUNT | 03 UNIT OF MEASURE | 04 TREATMENT (Check all that apply) | 05 OTHER |
|---|---|---|---|---|
| ☐ A. SURFACE IMPOUNDMENT | | | ☐ A. INCINERATION | ☐ A. BUILDINGS ON SITE |
| ☐ B. PILES | | | ☐ B. UNDERGROUND INJECTION | None |
| ☐ C. DRUMS, ABOVE GROUND | | | ☐ C. CHEMICAL/PHYSICAL | |
| ☐ D. TANK, ABOVE GROUND | | | ☐ D. BIOLOGICAL | |
| ☐ E. TANK, BELOW GROUND | | | ☐ E. WASTE OIL PROCESSING | 06 AREA OF SITE |
| ☒ F. LANDFILL | unknown | | ☐ F. SOLVENT RECOVERY | 40 (Acres) |
| ☐ G. LANDFARM | | | ☐ G. OTHER RECYCLING/RECOVERY | |
| ☐ H. OPEN DUMP | | | ☐ H. OTHER (Specify) | |
| ☐ I. OTHER (Specify) | | | | |

07 COMMENTS

## IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☒ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

The railroad bed to the south and east of the site is elevated forming some containment. No liner was used.

## V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☒ NO

02 COMMENTS

The site is not capped, but it does have a hard surface. No waste visible or accessible.

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

W. Smith (WPC)
S. Baxter (SWM)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check all sources)

| | SURFACE | WELL |
|---|---|---|
| COMMUNITY | A. ☒ | B. ☐ |
| NON-COMMUNITY | C. ☐ | D. ☐ |

02 STATUS

| ENDANGERED | AFFECTED | MONITORED |
|---|---|---|
| A. ☐ | B. ☐ | C. ☐ |
| D. ☐ | E. ☐ | F. ☐ |

03 DISTANCE TO SITE

A. upstream (mi.)
B. _____ (mi.)

## III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Other sources available) ☐ D. NOT USED, UNUSEABLE

COMMERCIAL, INDUSTRIAL, IRRIGATION (No other main sources available)

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL unknown (mi.)

| 04 DEPTH TO GROUNDWATER | 05 DIRECTION OF GROUNDWATER FLOW | 06 DEPTH TO AQUIFER OF CONCERN | 07 POTENTIAL YIELD OF AQUIFER | 08 SOLE SOURCE AQUIFER |
|---|---|---|---|---|
| 10-30 (ft) | to South & West | 20 (ft) | - (gpd) | ☐ YES ☒ NO |

09 DESCRIPTION OF WELLS (including usage, depth, and location relative to population and buildings)

No private drinking water wells in a three mile radius have been identified. Several industrial wells have been identified, (Ref. #12, 14.)

10 RECHARGE AREA

☐ YES ☒ NO COMMENTS

11 DISCHARGE AREA

☒ YES ☐ NO COMMENTS Site is along Chattanooga Creek

## IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

| NAME: | AFFECTED | DISTANCE TO SITE |
|---|---|---|
| Chattanooga Creek | ☐ | 5200 ft (mi) |
| Tennessee River | ☐ | 1.0 (mi) |
| | ☐ | (mi) |

## V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

| ONE (1) MILE OF SITE | TWO (2) MILES OF SITE | THREE (3) MILES OF SITE |
|---|---|---|
| A. >5,000 (NO. OF PERSONS) | B. >20,000 (NO. OF PERSONS) | C. >70,000 (NO. OF PERSONS) |

02 DISTANCE TO NEAREST POPULATION <0.5 (mi.)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE >1,000

04 DISTANCE TO NEAREST OFF-SITE BUILDING <0.5 (mi.)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site (e.g., total population, density, distribution, urban, rural))

The site is in a high density mix of urban/industrial area. The population figure is a rough estimate taken from the Chattanooga census in 1980.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
TN D 100842343

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A $10^{-6}$ – $10^{-8}$ cm/sec ☒ B $10^{-4}$ – $10^{-6}$ cm/sec ☐ C. $10^{-4}$ – $10^{-3}$ cm/sec ☐ D GREATER THAN $10^{-3}$ cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A IMPERMEABLE (Less than $10^{-6}$ cm/sec) ☐ B RELATIVELY IMPERMEABLE ($10^{-4}$ – $10^{-6}$ cm/sec) ☒ C RELATIVELY PERMEABLE ($10^{-2}$ – $10^{-4}$ cm/sec) ☐ D VERY PERMEABLE (Greater than $10^{-2}$ cm/sec)

| 03 DEPTH TO BEDROCK | 04 DEPTH OF CONTAMINATED SOIL ZONE | 05 SOIL pH |
|---|---|---|
| 30-50 (ft) | 20 ft. (ft) | Fill Material |

| 06 NET PRECIPITATION | 07 ONE YEAR 24 HOUR RAINFALL | 08 SLOPE: SITE SLOPE | DIRECTION OF SITE SLOPE | TERRAIN AVERAGE SLOPE |
|---|---|---|---|---|
| 14.9 (in) | 3.1 (in) | 0-3 % | to S & E | < 2 % |

09 FLOOD POTENTIAL
SITE IS IN 10 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. N/A (mi)
OTHER: B. N/A (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

_____ (mi)
ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY

DISTANCE TO:

| COMMERCIAL/INDUSTRIAL | RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES | AGRICULTURAL LANDS: PRIME AG LAND | AG LAND |
|---|---|---|---|
| A. 0.2 (mi) | B. 0.3 (mi) | C. _____ (mi) | D. _____ (mi) |

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site is in a low-lying area surrounded on three sides by elevated railroad tracks. The railroad tracks act like an earthen berm preventing proper water drainage There are signs that water pools in irregular depressions located on the site. (Ref. 1, 3, 4)

VIII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling analysis, reports)

Soil Survey of Hamilton County; Hazard Ranking System User's Manual, the 1980 Population Census of Chattanooga, U.S.G.S. topographic and geologic maps and Preliminary Geological Report (Ref. 13).

TND 100842343

Facility name: Howard High School Landfill

Location: 2500 South Market Street

EPA Region: IV

Person(s) in charge of the facility: P. Janardanan, Engineer

Chattanooga Department of Public Works

Chattanooga, Tennessee

Name of Reviewer: Anthony P. Damiano Date: November 6, 1987

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site was classified an old municipal demolition and debris landfill and not a sanitary landfill because of geological and hydrologic considerations. The site was unlined and improperly capped with available backfill material. Industrial sludge waste was allegedly dumped, but no documentation exists to confirm the allegation. There is the possibility of a leachate problem if hazardous substances are present in the landfill.

Scores: $S_M$ = 4.2 ($S_{gw}$ = 3.6 $S_{sw}$ = 6.4 $S_a$ = 0.0 )

$S_{FE}$ = Not Rated

$S_{DC}$ = Not Rated

**FIGURE 1**
**HRS COVER SHEET**

Howard High School Landfill
TND 100842343

| Ground Water Route Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
| 1 Observed Release | (0) 45 | 1 | 0 | 45 | 3.1 |
| If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 3.2 |
| Depth to Aquifer of Concern | 0 1 2 (3) | 2 | 6 | 6 | |
| Net Precipitation | 0 1 (2) 3 | 1 | 2 | 3 | |
| Permeability of the Unsaturated Zone | 0 (1) 2 3 | 1 | 1 | 3 | |
| Physical State | 0 1 2 (3) | 1 | 3 | 3 | |
| Total Route Characteristics Score | | | 12 | 15 | |
| 3 Containment | 0 1 2 (3) | 1 | 3 | 3 | 3.3 |
| 4 Waste Characteristics | | | | | 3.4 |
| Toxicity/Persistence | 0 3 6 9 12 15 (18) | 1 | 18 | 18 | |
| Hazardous Waste Quantity | 0 (1) 2 3 4 5 6 7 8 | 1 | 1 | 8 | |
| Total Waste Characteristics Score | | | 19 | 26 | |
| 5 Targets | | | | | 3.5 |
| Ground Water Use | 0 (1) 2 3 | 3 | 3 | 9 | |
| Distance to Nearest Well/Population Served | (0) 4 6 8 10<br>12 16 18 20<br>24 30 32 35 40 | 1 | 0 | 40 | |
| Total Targets Score | | | 3 | 49 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5<br>If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | 2,052 | 57,330 | |
| 7 Divide line 6 by 57,330 and multiply by 100 | | $S_{gw}$ = 3.6 | | | |

FIGURE 2
GROUND WATER ROUTE WORK SHEET

## Surface Water Route Work Sheet

| Rating Factor | Assigned Value (Circle One) | Multi-plier | Score | Max. Score | Ref. (Section) |
|---|---|---|---|---|---|
| 1 Observed Release | (0) 45 | 1 | 0 | 45 | 4.1 |
| If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 4.2 |
| Facility Slope and Intervening Terrain | (0) 1 2 3 | 1 | 0 | 3 | |
| 1-yr. 24-hr. Rainfall | 0 1 2 (3) | 1 | 3 | 3 | |
| Distance to Nearest Surface Water | 0 1 2 (3) | 2 | 6 | 6 | |
| Physical State | 0 1 2 (3) | 1 | 3 | 3 | |
| Total Route Characteristics Score | | | 12 | 15 | |
| 3 Containment | 0 1 2 (3) | 1 | 3 | 3 | 4.3 |
| 4 Waste Characteristics | | | | | 4.4 |
| Toxicity/Persistence | 0 3 6 9 12 15 (18) | 1 | 18 | 18 | |
| Hazardous Waste Quantity | 0 (1) 2 3 4 5 6 7 8 | 1 | 1 | 8 | |
| Total Waste Characteristics Score | | | 19 | 26 | |
| 5 Targets | | | | | 4.5 |
| Surface Water Use | 0 1 (2) 3 | 3 | 6 | 9 | |
| Distance to a Sensitive Environment | (0) 1 2 3 | 2 | 0 | 6 | |
| Population Served/Distance to Water Intake Downstream | (0) 4 6 8 10; 12 16 18 20; 24 30 32 35 40 | 1 | 0 | 40 | |
| Total Targets Score | | | 6 | 55 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5; If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | 4,104 | 64,350 | |
| 7 Divide line 6 by 64,350 and multiply by 100 | | | $S_{sw}$ = 6.4 | | |

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

| | S | $S^2$ |
|---|---|---|
| Groundwater Route Score ($S_{gw}$) | 3.6 | 12.96 |
| Surface Water Route Score ($S_{sw}$) | 6.4 | 40.96 |
| Air Route Score ($S_a$) | 0.0 | 0.00 |
| $S_{gw}^2 + S_{sw}^2 + S_a^2$ | | 53.92 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$ | | 7.343 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$ | | 4.2 |

**FIGURE 10**
**WORKSHEET FOR COMPUTING $S_M$**

# DOCUMENTATION RECORDS
# FOR
# HAZARD RANKING SYSTEM

FACILITY NAME: Howard High School Landfill

FACILITY DESCRIPTION: Municipal Demolition Debris Landfill

LOCATION: Chattanooga, Hamilton County, Tennessee

DATE SCORED: November 6, 1987

PERSON SCORING: Anthony P. Damiano, Jr.

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):

State Superfund Files; Site Inspection on 29 Sept 87 by TDSF

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

Air Route, Fire and Explosion, Direct Contact

COMMENTS OR QUALIFICATIONS:

Site is in Chattanooga Creek basin. The entire area (Chattanooga Creek sites) has elevated levels of heavy metals and several chemicals from various industries and dumps in the area.

# GROUND WATER ROUTE

## 1 OBSERVED RELEASE

Contaminants detected (5 maximum):

None indicated

Rationale for attributing the contaminants to the facility:

N/A

## 2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

Knox dolomite and Chickamauga limestone, faulted and fractured and folded with solution channels among formations, acting as one aquifer. (Ref. 3, 13, 17)

Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer of concern:

At the surface--portion of the site in a marshy area. (Ref. 3, 4 and 13)

Depth from the ground surface to the lowest point of waste disposal/storage:

20 ft.--1972 proposal for site recommended inert fill material until up to an elevation of 660 feet. (Ref. 3)

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

52 inches (Ref. 5)

Mean annual lake or seasonal evaporation (list months for seasonal):

37 inches (Ref. 5)

**Net precipitation (subtract the above figures):**

15 inches

Permeability of Unsaturated Zone

**Soil type in unsaturated zone:**

Silt loam, clay-like subsoil (Ref. 6)

**Permeability associated with soil type:**

$10^{-5}$ to $10^{-7}$ cm/sec (silty loam, clay loam) (Ref. 5)

Physical State

**Physical state of substances at time of disposal (or at present time for generated gases):**

Sludge (Ref. 2)

* * *

## 3 CONTAINMENT

Containment

**Method(s) of waste or leachate containment evaluated:**

Unlined, improperly capped landfill in previously marshy area designated for demolition debris and inert material. (Ref. 3 and 8)

**Method with highest score:**

Unlined landfill (Ref. 5)

## 4 WASTE CHARACTERISTICS

Toxicity and Persistence

**Compound(s) evaluated:**

Plating wastes containing chromium and nickel have been found in numerous dump sites in the area. Lacking specific analytical results for this site, chromium and nickel are assumed as worst-case. (Ref. 2)

**Compound with highest score:**

Chromium:
toxicity 3 (Ref. 5)
persistence 3 (Ref. 5)

Hazardous Waste Quantity

**Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):**

Assume two drums minimum. (Ref. 2, 4)

**Basis of estimating and/or computing waste quantity:**

Presence of industrial wastes containing various toxic metals and organic chemicals must be assumed based on investigation of several other dump sites in the area and the history of this particular site. Since it was not practical to sample the site and available evidence documents only two drums onsite, this figure was used for waste quantity. (Ref. 2, 4)

## 5 TARGETS

Ground Water Use

**Use(s) and aquifer(s) of concern within a 3-mile radius of the facility:**

Commercial and industrial with an alternate unthreatened source available (Ref. 9, 10, 11, and 12)

Distance to Nearest Well

**Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:**

No private well usage identified. Some industrial wells in use. (Ref. 9, 10, 11, and 12)

**Distance to above well or building:**

Approx. 2.5 miles to industrial well. (Ref. 9, 10, 11, and 12)

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

None identified. (Ref. 9, 10, and 11)

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

None identified. (Ref. 9, 10, 11, and 12)

Total population served by ground water within a 3-mile radius:

None identified. (Ref. 9, 10, 11, and 12)

# SURFACE WATER ROUTE

## 1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

None identified

Rationale for attributing the contaminants to the facility:

Not applicable

* * *

## 2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

0-3% (Ref. 13)

Name/description of nearest downslope surface water:

Chattanooga Creek
Primarily used for Recreation (Ref. 13, 14)

Average slope of terrain between facility and above-cited surface water body in percent:

0-3% (Ref. 13, 14)

Is the facility located either totally or partially in surface water?

No (Ref. 3, 14)

Is the facility completely surrounded by areas of higher elevation?

Yes, the site is presently surrounded on three sides by railroad tracks raised on an earthen berm. See photographs in log book. (Ref. 1)

1-Year 24-Hour Rainfall in Inches

3.1 inches (Ref. 5)

Distance to Nearest Downslope Surface Water

Less than 0.25 mile (Ref. 1 and 14)

Physical State of Waste

Allegation - Sludge (Ref. 2)

* * *

## 3 CONTAINMENT

Containment

**Method(s) of waste or leachate containment evaluated:**

Landfill with no liner, not adequately covered, with unsound diversion system. (Ref. 1, 7, 13)

**Method with highest score:**

Landfill; not adequate covered and unsound diversion system. (Ref. 5)

## 4 WASTE CHARACTERISTICS

Toxicity and Persistence

**Compound(s) evaluated:**

Plating wastes containing chromium and nickel have been found in numerous dump sites in the area. Lacking specific analytical results for this site, chromium and nickel are assumed as worst-case. (Ref. 2)

**Compound with highest score:**

Chromium:
toxicity 3 (Ref. 5)
persistence 3 (Ref. 5)

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Assume 2 drums

(Ref. 4)

Basis of estimating and/or computing waste quantity:

Presence of industrial wastes containing various toxic metals and organic chemicals must be assumed based on investigation of several other dump sites in the area and the history of this particular site. Since it was not practical to sample the site and available evidence documents only two drums onsite, this figure was used for waste quantity. (Ref. 2, 4)

## 5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreation - fishing, wading, harvesting of frogs and turtles, etc. (Ref. 18)

Is there tidal influence?

No (Ref. 14)

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

None identified (Ref. 14)

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

None identified (Ref. 14)

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

None identified (Ref. 14)

## Population Served by Surface Water

**Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:**

None identified. Chattanooga's water supply is drawn from TN River mile 465.3, near Citico Creek on the TN River. The intake is upstream from the site and Chattanooga Creek outfall point. (Ref. 12 and 14)

**Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):**

Not applicable

**Total population served:**

None identified

**Name/description of nearest of above water bodies:**

Chattanooga Creek, Tennessee River (Ref. 14)

**Distance to above-cited intakes, measured in stream miles:**

Not applicable

INDICATION OF INCLUSION IN THIS REPORT

HOWARD HIGH SCHOOL LANDFILL

TND 100842343

REFERENCE LIST


1. Field logbook of Site Investigation activities, 9-29-87, TDSF.

2. Memo to demonstrate the reasoning for using the alleged industrial sludge waste as a proven fact in the documentation record and the HRS scoring sheets, 11-06-87, A. Damiano, Chattanooga Superfund Office.

3. Letter from James Templeton (City Chatt.) to Jack McCormick (TDWQC), Subject: Request for Certification of Compliance for proposed South Market Landfill Project with State Water Quality Standards, 9-28-72.

4. Memo from Charles A. Steele to Wayne McCoy (TDPH), 11-61-72, Subject: Certification of Compliance for City of Chattanooga 28th Street Dump.

5. Uncontrolled Hazardous Waste Site Ranking System, A User's Manual (HW-10), EPA 1984.

6. Soil Survey - Hamilton County, Tennessee, USDA/Soil Conservation Service, May 1982.

7. Trip Report of Site Inspection with site sketch, by F. Miller (TDSF), 9-29-87.

8. Telephone Memo with James Templeton (former employee for City of Chattanooga

Public Works Department, Subject: Old Demolition Landfills in the Chattanooga Creek basin, 9-28-87.

9. Telephone Memo of Gordon Caruthers and Ed Short (Miller Drilling Co.) Subject: Well information for the Chattanooga urban area, 11-26-86.

10. Memo from Gordon Caruthers (TDSF) and Bob Burrell (TN Amer. Water Co.), Subject: Well information from the Chattanooga urban area, 11-25-86.

11. Trip Report - Gordon Caruthers (TDSF), Subject: Well water survey in Rossville, GA as connected with Chattanooga Creek sites, 8-29-86.

12. Document listing known Industrial and private well usage, source: TN American Water Company, 12-19-86.

13. Preliminary Geologic Review of Howard High Dump site, source: TN Department of Public Health, 8-18-72.

14. USGS Topographic Map #105 S.E. Chattanooga Date: 1976.

15. Chattanooga (Hamilton County), TN Climatological Data.

16. Public Water Supplies, Hamilton County, TN.

17. Memo; R. L. Powell of TDSF to file 33606; Geologic Assessment of the Howard High School Dump Site; 20 Nov 1987.

18. Chattanooga Creek Survey, 1981-1982; by Tennessee Department of Health and Environment, Division of Water Management; 1983.

GSC/lag SF#7

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 2

"A"

155 C ; 155D E

2, 3

HOWARD HIGH SCHOOL OWNES 2 & 3

| | BOOK | PAGE | |
|---|---|---|---|
| 155D A 2 | 1021 | 413 | 40.5 AC |
| 155D A 1 | 1972 | 962 | 15.6 AC |
| 155D A 3 | — | — | 5.9 AC |
| 155D A 5 | 1397 | 128 | 25.5 AC |

CHATT HOUSING AUTHORITY

NOTES @ COURT HOUSE
9/30
DV

Register

Dept Reg

z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z
Tax $15.00 Fee 15¢ Total $15.15 Paid Apr 11 1950
Jack Hixson County Court Clerk

B-564 IN CONSIDERATION of Ten thousand ($10,000.00) dollars cash in hand paid, the receipt of which is hereby acknowledged;

We, J. W Williams and wife, Addie E. Williams, do hereby sell, transfer andconvey unto the City of Chattanooga, A municipal corporation under the laws of the State of Tennessee, the following described real estate in the City of Chattanooga, Hamilton County, Tennessee:

Lots Eight (8) Nine (9) and Ten (10) Block Sixteen (16) White's Addition; said lots form one tract of ground fronting one hundred twenty five and 7/10 (125.7) feet on the eastern line of Read Avenue and extending back eastwardly between parallel lines, and along the northern line of East 25th Street one hundred thirty five (135) feet seven (7) inches to the west line of an alley.

SUBJECT to the requirements of Zoning Ordinances No. 1843 and No. 2962 of the City of Chattanooga, Tennessee, and any amendment of either of said ordinances.

The grantee herein assumes and agrees to pay all taxes for 1950.

TO HAVE AND TO HOLD the same unto the said City of Chattanooga, a municipal corporation underthe laws of the State of Tennessee, its successors and assigns, forever in fee simple.

We covenant that we are lawfully seized and possessed of said real estate, have full power and lawful authority to sell andconvey the same; that the title thereto is clear, free and unencumbered except as hereinabove mentioned and we will forever warrant and defend the same against all lawful claims.

Witness our hands this 13th day of March 1950.

J. W. WILLIAMS

Witness to mark: A. C. Rinchley

ADDIE E. WILLIAMS (her X mark)

STATE OF TENNESSEE
COUNTY OF HAMILTON On this 23rd day of March 1950 before me personally appeared J. W Williams and wife, Addie E. Williams, to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

Witness my hand and notarial seal.

z z z z z z z z z z z z z z z z z z z z z
z W. W. Woodhead, Notary Public z
z Hamilton Co. Tenn. z
z z z z z z z z z z z z z z z z z z z z z

W. W. Woodhead, Notary Public

My commission expires: 7-12-1953

Internal revenue stamps $11.00 attached and canceled.

STATE OF TENNESSEE
HAMILTON COUNTY The above Instrument and certificate were filed Apr. 11 1950 at 1:54 P. M., entered in Note Book No, 43 Page 75 and recorded in Book 1021 Page 413.

WITNESS my hand at office in Chattanooga, Tenn.

Register

Dept Reg

z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z z
Tax $4.50 Fee 15¢ Total $4.65 Paid Apr 11 1950
JackHixson County Court Clerk

Y-151 IN CONSIDERATION of Three thousand ($3000.00) dollars cash in hand paid, the

JUL 7 - 1971

TRANSFERRED _____ JUL 7 - 1971

A. E. Trimble Assessor of Property

By J. Brasses
Deputy

NO TAX DUE

BOOK 1972 PAGE 962

DOROTHY P. BRAMMER
County Register

IN CONSIDERATION of the desire by the Grantor herein to make a gift unto the Grantee herein;

CHEMETRON CORPORATION, a Delaware Corporation, subject to the Restrictive Covenants hereinafter recited and set forth, and the provision for reversion of title in connection therewith, does hereby give, grant, transfer and convey unto the CITY OF CHATTANOOGA, TENNESSEE, a Municipal Corporation, the following described Real Estate:

IN THE CITY OF CHATTANOOGA, HAMILTON COUNTY, TENNESSEE:
Being a tract of land located in the Southeast Quarter of Section Thirty-three (33), Township Two (2), Range Four (4), West of the Basis Line, Ocoee District, described as follows: BEGINNING at a point in the Northeastern line of property conveyed City of Chattanooga, Tennessee on May 17, 1910, where it is intersected by the newly located Northern right-of-way line of L & N Railroad; thence along said Northeastern line of property of City of Chattanooga North 65 degrees 30 minutes West to the center of the channel of Chattanooga Creek; thence Northwardly with and along the center of the channel of Chattanooga Creek to the Southwestern corner of the five acres tract conveyed City of Chattanooga, Tennessee by Deed recorded in Book 1874, page 607, in the Register's Office of Hamilton County, Tennessee; thence along the Southwestern line of the said five acres tract, South 65 degrees 30 minutes East 530 feet, more or less, to the center of Chattanooga Creek; thence Southwardly and Eastwardly with the center of Chattanooga Creek to its intersection with the Northwestern line of right-of-way of L & N Railroad; thence Southwestwardly and Westwardly with the Northwestern and Northern line of right-of-way of L & N Railroad to the point of beginning.
REFERENCE is made for prior title to Book 1017, page 18, of the Register's Office of Hamilton County, Tennessee.
SUBJECT TO Sewer Easement recorded in Book H, Vol. 10, page 694, in the Register's Office of Hamilton County, Tennessee.
SUBJECT TO Easement to City of Chattanooga, recorded in Book B, Vol. 24, page 690, of the Register's Office of Hamilton County, Tennessee.
SUBJECT TO TVA Flowage Easement recorded in Book 878, page 41, of the Register's Office of Hamilton County, Tennessee.
SUBJECT TO Governmental zoning and subdivision ordinances or regulations in effect thereon.

The above described Real Estate is conveyed subject to the Restrictive Covenant that said property is to be used for recreational purposes only, for a period of forty (40) years from the date hereof; that in the event the Grantee herein, its successors or assigns, should fail to make use of the property for recreational purposes within a period of five (5) years from the date hereof, or for any continuous period of five (5) years, or should use said property for purposes other than recreational use, then Chemetron Corporation, its successors or assigns, shall have the right and privilege of re-entry and re-possession of the premises, and the fee simple title thereto shall be divested out of City of Chattanooga, Tennessee, its successors or assigns, and shall thereupon be revested in Chemetron Corporation, its successors or assigns. By its acceptance of this conveyance, the Grantee herein does hereby agree to said Restrictive Covenant, and the provision for reversion of title. It is stipulated that if the right of re-entry and re-possession is not exercised within said period of forty (40) years from the date hereof, the right to declare a reversion or forfeiture of title, and to re-enter and re-possess the property shall be terminated, whether these Restrictive Covenants have been violated or not.

This conveyance is made subject to any taxes on the property for the Year 1971.

TO HAVE AND TO HOLD the said described Real Estate unto City of Chattanooga, its successors and assigns, forever in fee simple.

Drafted By
HALE & ELLIS, Attorneys
722 CHERRY STREET
CHATTANOOGA, TENN. 37402

CHEMETRON CORPORATION covenants that it is lawfully seized and possessed of said described Real Estate; has good right and lawful authority to give, grant and convey the same; that the title thereto is clear, free and unencumbered, except as hereinabove set out; and it will forever warrant anddefend the same against all other lawful claims.

IN WITNESS WHEREOF Chemetron Corporation has caused its corporate name to be signed by its duly authorized officers, on this the 4th day of June, 1971.

CHEMETRON CORPORATION

BY George M. Hohmann
Vice President

ATTEST BY Roger D. Ericson
Assistant Secretary

STATE OF ILLINOIS )
COUNTY OF COOK )

On this 4th day of June, 1971, before me personally appeared George M. Hohmann and Roger D. Ericson, with whom I am personally acquainted, and who upon oath acknowledged themselves to be the Vice President and Assistant Secretary respectively, of Chemetron Corporation, the within named bargainor, and that they as such officers, being authorized so to do, executed the foregoing instrument for the purposes therein contained, by signing the name of the said corporation, by themselves as such officers thereof.

IN WITNESS WHEREOF I have hereunto set my hand and Notarial Seal.

Notary Public

My commission expires:
3-4-73

A71016

IDENTIFICATION REFERENCE

JUL 7 11 23 AM '71

DOROTHY P. BRAMMER
REGISTER
HAMILTON COUNTY
STATE OF TENNESSEE

JUL-75 WDEED 8* 4.00 * 4.00

128

WITNESS my hand and Notarial Seal at Chattanooga, Tennessee.

Notary Public

My Commission expires:

April 24, 1960

STATE OF TENNESSEE, HAMILTON COUNTY:

The above Deed of Trust and Certificate were filed Mar 28 1960 at 3:40 PM. Entered in Note Book No. 52 Page 361 and recorded in Book 1397 Page 127.

WITNESS my hand at office in Chattanooga, Tenn.

Register.

128

IN CONSIDERATION of the sum of Fifty-eight Thousand and No/100 Dollars ($58,000.00), cash in hand paid, the receipt of which is hereby acknowledged;

I, D. W. MOULTON, Commissioner of Highways of the State of Tennessee, acting for and on behalf of the State of Tennessee and of Department of Highways, under authority of sec. 12-212 of the Tennessee Code Annotated, do hereby sell transfer and convey unto CHATTANOOGA HOUSING AUTHORITY, a Tennessee Corporation, the following described Real Estate:

IN THE CITY OF CHATTANOOGA, HAMILTON COUNTY, TENNESSEE:
Beginning at a point in the North line of Bruce Alley, located South 66 degrees 30 minutes East along said North line of Bruce Alley a distance of 20 feet from an iron pin in the Eastern line of South Market Street, measured from its original width of 30 feet; thence North 29 degrees 53 minutes East 191.1 feet to a point in the North line of East 24th Street; thence South 66 degrees 21 minutes East 311.19 feet to a point; thence South 75 degrees 44 minutes East 364.96 feet to a point; thence South 70 degrees 30 minutes East 100 feet to a point; thence South 65 degrees 00 minutes East 400 feet to a point; thence South 58 degrees 50 minutes East 55.5 feet to a point; thence South 23 degrees 46 minutes West 102.0 feet to a point, being the Southwestern corner of a fence of City of Chattanooga Pumping Station; thence continuing along the South line of the pumping station tract owned by the City of Chattanooga, South 66 degrees 35 minutes East 179.4 feet to the Southeast corner thereof; thence along the East line of said pumping station tract, North 23 degrees 50 minutes East 34 feet to a point; thence South 63 degrees 10 minutes East 200.5 feet; thence South 66 degrees 15 minutes East 316 feet to a point in the proposed L. & N. right-of-way; thence South 33 degrees 42 minutes West 147.5 feet to a point; thence North 64 degrees 42 minutes West 15 feet to a point in the East line of Goldsmith Road; thence along the East line of Goldsmith Road, South 25 degrees 17 minutes West 55.05 feet to a point; thence running diagonally through the said right-of-way of Goldsmith Road, South 33 degrees 42 minutes West 214 feet to a point in the Western line thereof; thence South 64 degrees 43 minutes East 15.9 feet to a point; thence South 23 degrees 24 minutes 27 seconds West 494.34 feet to a corner; thence continuing South 23 degrees 24 minutes 27 seconds West 37 feet to a point in the center line of Chattanooga Creek; thence in a Westerly, Northerly and Northwesterly direction along the center line of Chattanooga Creek 1240 feet, more or less, to a point in the East line of Chattanooga Board of Education tract; thence along the East line of Chattanooga Board of Education tract, North 23 degrees 30 minutes East 115 feet, more or less, to the Northeast corner of said Chattanooga Board of Education tract; thence along the Northern line of said Chattanooga Board of Education tract, North 66 degrees 30 minutes West 326.5 feet to Southeast corner of the New Emanuel Baptist Church property; thence along the East line of the Church tract North 23 degrees 32 minutes East 125 feet to the Northeast corner thereof; thence along the North line of the Church property, North 66 degrees 30 minutes West 200 feet to the East line of Baldwin Street; thence along the East line of Baldwin Street, North 23 degrees 32minutes East 35.4 feet, more or less, to a point; thence South 65 degrees 47-3/4 minutes East 328.03 feet to a point; thence North 23 degrees 33-1/4 minutes East 125 feet, more or less, to a point; thence North 65 degrees 47-3/4 minutes West 83.36 feet to a stake corner; thence North 23 degrees 33-1/4 minutes East 79.1 feet to a stake corner, in the North line of East 24th Street; thence along said line, North 66 degrees 30 minutes West 762 feet, more or less, to a point; thence South 23 degrees 32 minutes West 190 feet to a point in the North line of Bruce alley; thence along the Northern line of Bruce Alley, North 66 degrees 30 minutes West 28 feet to the point of beginning.

REFERENCE is made for prior title to Book 1287, page 307, Book 1290, page 307, Book 1296, page 316, Book 1287, page 319, Book 1290, page 350, Book 1278, page 642, and Book 1290, page 362, in the Register's Office of Hamilton County, Tennessee.

MAR 28 1960

JACK HIXSON

MACHINE
ST
200'
4
6
5
25 TH ST
F.W.
P.B. 11
KINSEY SUB
PG 26
"A"155-D
CR
2
"A"
1
1553 AC
3
0.9 AC
"F" SUB
PG 36
STREET
CREEK
CHATTANOOGA
PB. 4 - 363
1.2
2.50 AC.
1.3
TR 3
TR 2
255.36'
CHATTANOOGA
L & N RAILROAD CO.
CHATTANOOGA CREEK

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 3

LATITUDE AND LONGITUDE CALCULATION WORKSHEET #1
LI USING CUSTOM RULER OR COORDINATOR™

SITE NAME: HOWARD HIGH SCHOOL DUMP CERCLIS #: TND 100842343

AKA: 28TH STREET DUMP SSID: 33-606

ADDRESS: 2500 SOUTH MARKET STREET

CITY: CHATTANOOGA STATE: TN ZIP CODE: 37408-2679

SITE REFERENCE POINT: IN MIDDLE OF LANDFILL ; TO EAST OF FOOTBALL STADIUM

USGS QUAD MAP NAME: CHATTANOOGA TOWNSHIP: ____ N/S RANGE: ____ E/W

SCALE: 1:24,000 MAP DATE: 1976 SECTION: ____ 1/4 ____ 1/4 ____ 1/4

MAP DATUM: (1929) 1983 (CIRCLE ONE) MERIDIAN: ____

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

LONGITUDE: 85 ° 15 ' 00 " LATITUDE: 35 ° 00 ' 00 "

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

LONGITUDE: 85 ° 18 ' 00 " LATITUDE: 35 ° 00 ' 00 "

CALCULATIONS: LATITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH BOTTOM OF GRID. ALIGN THE TOP OF THE SCALE WITH THE TOP OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- OR 0.5-SECOND INTERVALS (INTERPOLATE).

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 1 ' 25 . ____ "

D) ADD TO STARTING LATITUDE: 35 ° 00 ' 00 . ____ " + 1 ' 25 . ____ =

SITE LATITUDE: 35 ° 01 ' 25 . ____ "

CALCULATIONS: LONGITUDE (7.5' QUADRANGLE MAP)

A) ALIGN THE BOTTOM OF THE SCALE WITH RIGHT SIDE OF GRID. ALIGN THE TOP OF THE SCALE WITH THE LEFT SIDE OF GRID. POSITION EDGE OF RULER OVER SITE REFERENCE POINT WHILE KEEPING TOP AND BOTTOM ALIGNED.

B) READ TICS ON RULER AT 1- or 0.5-SECOND INTERVALS. (INTERPOLATE)

C) EXPRESS IN MINUTES AND SECONDS (1' = 60"): 0 ' 24 . ____ "

D) ADD TO STARTING LONGITUDE: 85 ° 18 ' 00 . ____ " + 0 ' 24 . ____ =

SITE LONGITUDE: 85 ° 18 ' 24 . ____ "

INVESTIGATOR: DON VANHOOK DATE: 9/29/93

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 4

* SEE APPENDIX B FOR TOPOGRAPHIC MAP

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 5

U.S. DEPARTMENT OF COMMERCE
LUTHER H. HODGES, Secretary

WEATHER BUREAU
F. W. REICHELDERFER, Chief

1 8 1973
of Water Quality Control
mental Health Services
uilding Suite 6100
e Center
ooga, Tennessee 37411

TECHNICAL PAPER NO. 40

# RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

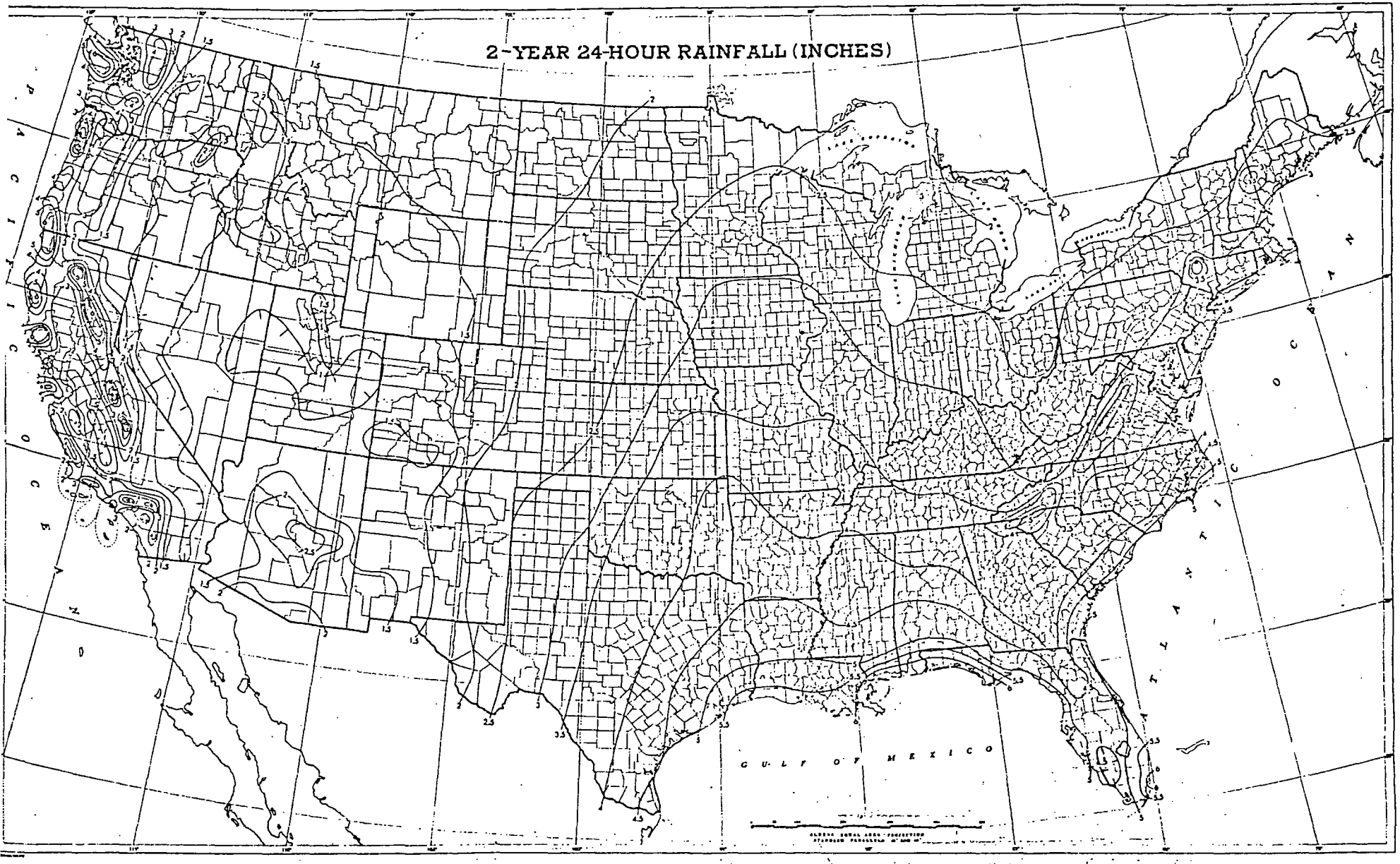
## for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

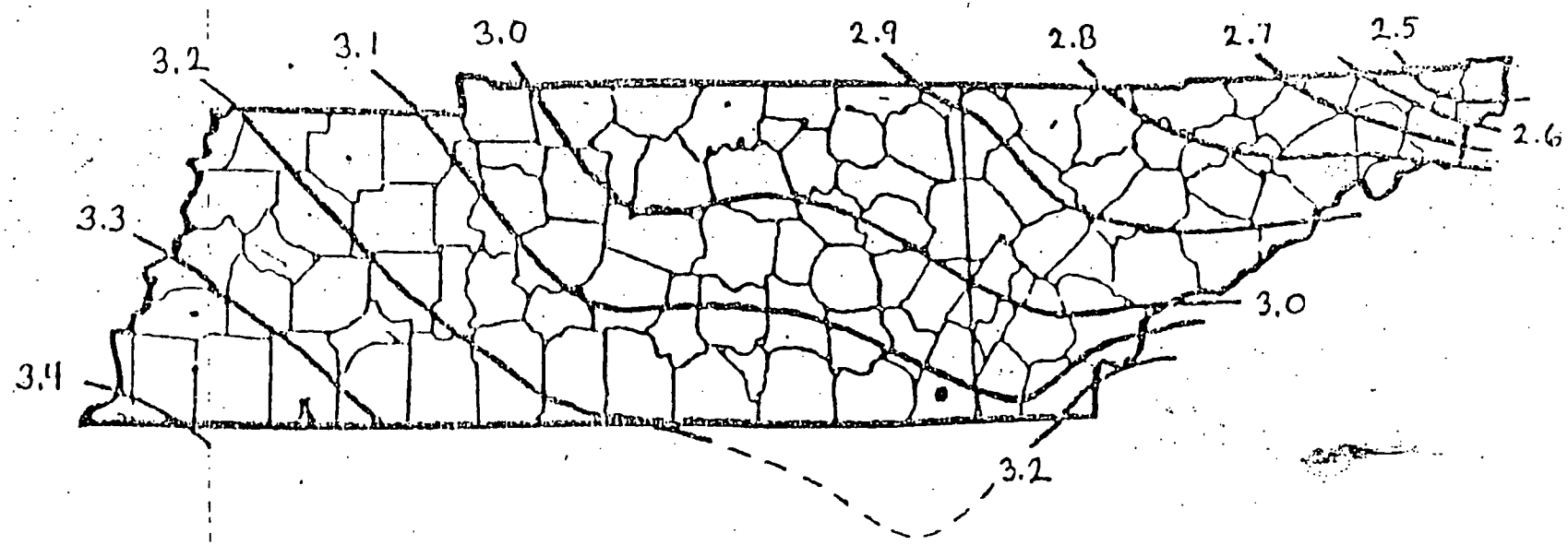
Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

WASHINGTON, D.C.
May 1961
Repaginated and Reprinted January 1963

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price $1.25
(202) 783-3238

still valid - 3/8/96


2-YEAR 24-HOUR RAINFALL (INCHES)
GULF OF MEXICO




1-YEAR 24-HOUR RAINFALL (INCHES)

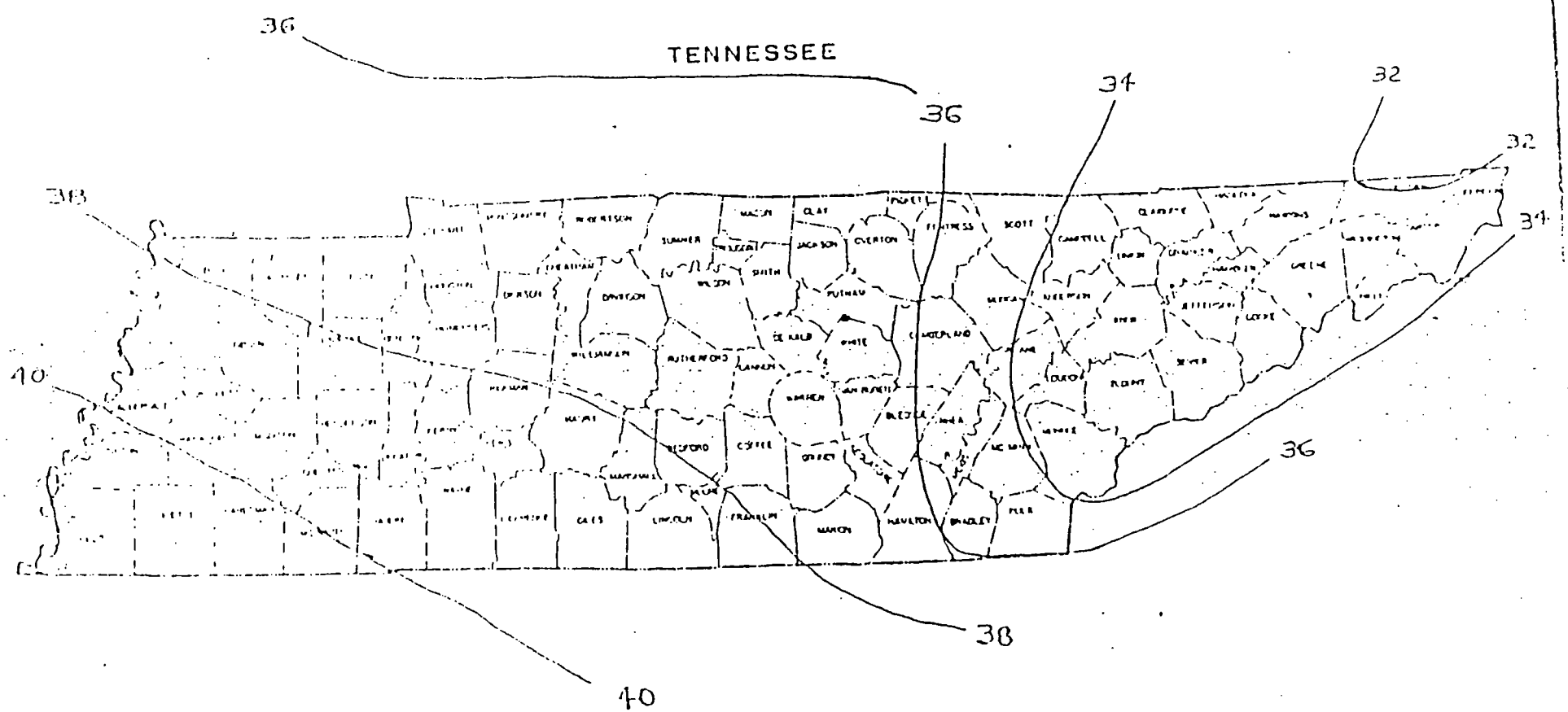



FIGURE 4
**MEAN ANNUAL LAKE EVAPORATION**
**(IN INCHES)**

TENNESSEE

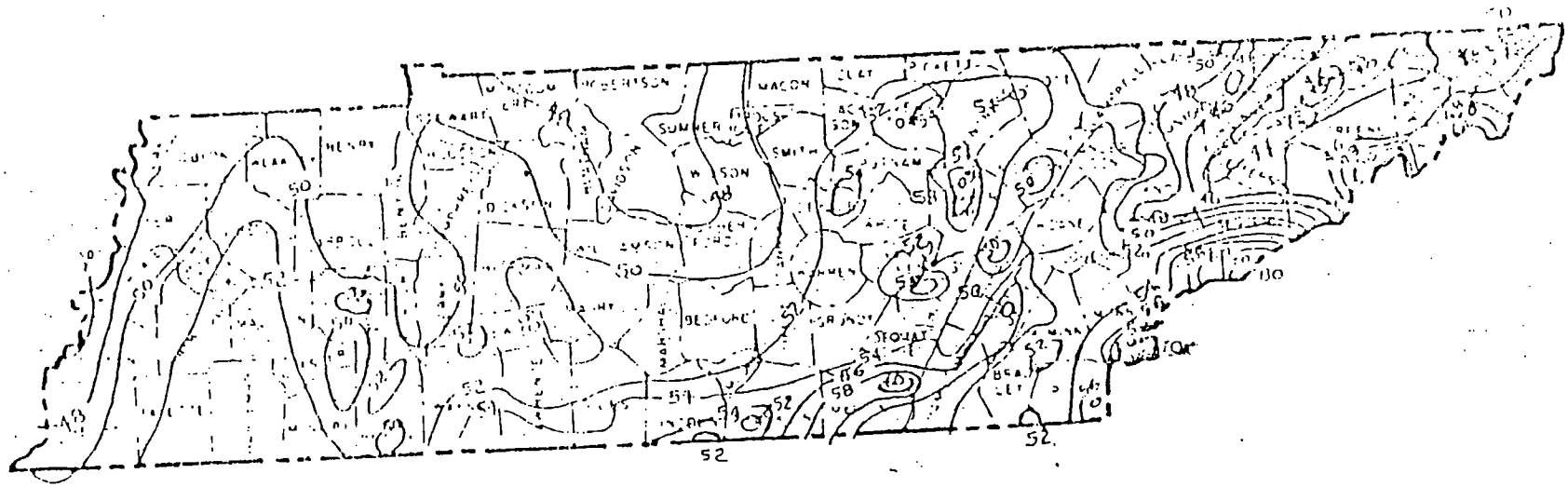



FIGURE 5
AVERAGE ANNUAL PRECIPITATION, IN INCHES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Chattanooga, Tenn.]

| Month | Temperature[1] | | | | | | Precipitation[1] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Average daily | 2 years in 10 will have-- Maximum temperature higher than-- | 2 years in 10 will have-- Minimum temperature lower than-- | Average number of growing degree days[1] | Average | 2 years in 10 will have-- Less than-- | 2 years in 10 will have-- More than-- | Average number of days with 0.10 inch or more | Average snowfall |
| | °F | °F | °F | °F | °F | Units | In | In | In | | In |
| January---- | 49.4 | 30.0 | 39.7 | 73 | 5 | 31 | 5.30 | 3.28 | 7.12 | 9 | 1.8 |
| February--- | 53.0 | 31.7 | 42.4 | 74 | 9 | 48 | 5.16 | 2.97 | 6.94 | 8 | 1.3 |
| March------ | 60.6 | 38.3 | 49.5 | 82 | 19 | 121 | 5.99 | 3.24 | 8.23 | 9 | .7 |
| April------ | 72.5 | 47.4 | 60.0 | 89 | 29 | 305 | 4.40 | 2.47 | 5.95 | 7 | .0 |
| May-------- | 80.2 | 55.5 | 67.9 | 93 | 37 | 555 | 3.76 | 2.25 | 5.10 | 7 | .0 |
| June------- | 86.5 | 63.7 | 75.2 | 97 | 48 | 756 | 3.32 | 1.78 | 4.57 | 7 | .0 |
| July------- | 89.1 | 67.8 | 78.5 | 99 | 56 | 884 | 4.64 | 2.13 | 6.69 | 8 | .0 |
| August----- | 88.6 | 67.1 | 77.9 | 98 | 56 | 865 | 3.51 | 1.99 | 4.75 | 7 | .0 |
| September-- | 83.1 | 61.0 | 72.1 | 97 | 43 | 663 | 3.89 | 1.76 | 5.62 | 6 | .0 |
| October---- | 72.8 | 48.0 | 60.4 | 88 | 28 | 332 | 2.94 | 1.27 | 4.28 | 5 | .0 |
| November--- | 60.3 | 37.0 | 48.7 | 79 | 19 | 58 | 3.97 | 2.39 | 5.38 | 7 | .0 |
| December--- | 51.3 | 31.8 | 41.6 | 73 | 10 | 33 | 5.45 | 3.07 | 7.39 | 8 | .8 |
| Year----- | 70.6 | 48.3 | 59.5 | 100 | 3 | 4,652 | 52.33 | 45.16 | 59.23 | 88 | 4.6 |

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 6

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

DATE: April 24, 1992

TO: Southern Railway - Citico Yards Site, File #33634

FROM: Craig Stannard, Geologist, CFO

SUBJECT: Demographic and Surface Water Quality Data

On 4-21-92, CJS checked with Phil Stewart (Manager, TDWPC in Chattanooga) regarding the existence of wetlands in the vicinity of the Southern Railway - Citico Yards site. Phil said that several areas bordering the Tennessee River, within a mile of the site, qualify as wetlands according to the Federal definition. However, he said none of these areas are as yet officially classified as such.

On 4-23-92, CJS telephoned Drew Thornton (TVA Data Services in Knoxville, phone: 632-2817) concerning flow data for the Tennessee River in Chattanooga. He said the average flow, taken over a period of 116 years, is 36,650 cfs. CJS then telephoned the USGS in Nashville (736-5424) and spoke with Charles Gamble concerning Citico Creek. Mr. Gamble said flow recordings they have for Citico Creek range from a low of 0.53 cfs (1973 data) to a high of 12.16 cfs (1973).

On 4-23-92, CJS telephoned the Chattanooga-Hamilton County Regional Planning Commission and spoke with Deborah Maddox (757-5216). According to Ms. Maddox, the most recent population figures for Chattanooga and Red Bank are 152,466 and 12,322 respectively.

CJS/31042114

| FROM | DATE |
|---|---|
| | |

TO

| | |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PH-0301
SR 3/77

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 7

CFO Copy #33635

# PRELIMINARY ASSESSMENT REPORT
# TENNESSEE TRANSFORMER
# HAMILTON COUNTY, TENNESSEE
# TND 987774478

October 19, 1992

TENNESSEE DIVISION OF SUPERFUND

Prepared by

Craig Stannard

Reviewed by

Approved by

## 5. SOIL EXPOSURE AND AIR PATHWAYS

### 5.1 Physical Conditions

The site has several areas of PCB contaminated soil. These areas appear to be located near the middle of the site within or adjacent to the transformer storage yard. Only employees of Tennessee Transformer, Inc. appear to have access to contaminated areas within the transformer storage yard. The identified PCB contaminated areas on the Starkey Printing Company parking lot appear to have fewer access restrictions. A chain-link fence encloses this area but the gated entrance is left open during working hours. Other potentially contaminated soil areas on site such as the front loading dock of the TTI building have virtually no access restrictions (Refs. 10,11,24,29).

### 5.2 Soil and Air Targets

The site is in an urban area characterized by heavy commercial, residential, and industrial development (Refs. 24,32). There are an estimated 15 to 20 on-site workers. The nearest residence to the site is located approximately 100 feet east of the site. The closest school is a junior high school 1/2 mile to the south (Refs. 21,24,32).

There are an estimated 160,000 people living within a 4-mile radius of the site. Cities located within a 4-mile radius of the site include Rossville (population 3,601), East Ridge (population 21,101), and Chattanooga (population 152,466). Land use for the area of concern is proportioned 49.1% residential, 3.4% industrial, and 7.3% commercial (Refs. 4,20,24).

### 5.3 Soil Exposure and Air Pathway Conclusions

Most of the contaminated soil areas appear to be located within fenced-in areas such as the transformer storage yard and the SPCI parking lot. Consequently, the soil exposure pathway appears to pose the greatest threat to on-site employees who have ready access to these areas. These contaminated areas appear to pose little threat to nearby residents due to the site being an active business that is not likely to see public encroachment.

There is no recorded air release from the site and this exposure pathway appears to pose only a minimal threat, mainly to on-site workers and to nearby residents. The most likely worst case scenario would be the inhalation by workers and residents of PCB contaminated wind blown dust.

## 6. SUMMARY AND CONCLUSIONS

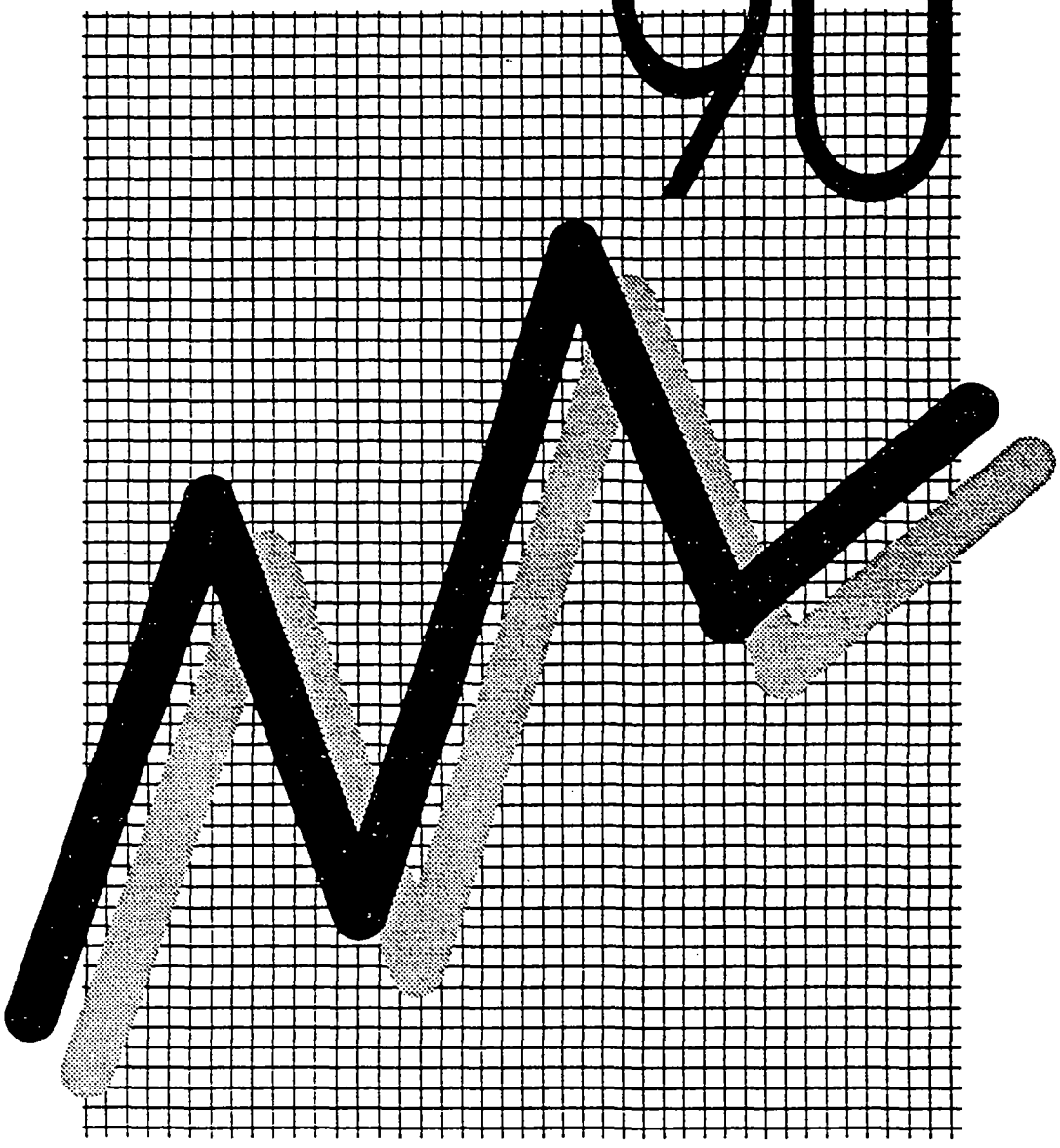
Analytical data indicates that surface soil, subsurface soil, and groundwater at the site is contaminated with PCBs, oily waste, and solvents. The greatest health risk appears to be by way of the

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 8

# Population Trends 90



Includes Census Figures from 1960, 1970, 1980, and 1990

chattanooga / hamilton county
regional
planning
commission

March, 1992

12/6/93
DV

# HOWARD RADIUS POPULATION ESTIMATES

ONSITE = 1546

% IN RADIUS — CENSUS TRACT #

## 0 - 1 MILE (NOT ONSITE)

1071
732
1081
559
918
2132
586
866
551

$\boxed{8496}$ ~8500

## 1 - 2 MILE

.6(#16) = 1378
.5(#9) = 206
#31 = 709
.4(#15) = 447
.2(#5) = 59
#10 = 1881
.7(#11) = 1205
.8(#14) = 2202
.4(#13) = 994
.25(#26) = 360
.6(#27) = 565
.4(#25) = 1732
.4(#24) = 1538
.4(#23) = 586
.3(#19) = 1599
.3(#18) = 1041

$\boxed{16,502}$

## 2-3 MILE

.5(#9) = 205
.6(#5) = 178
.2(#8) = 281
.3(#6) = 894
.8(#4) = 2914
.3(#11) = 516
.5(#12) = 1883
.6(#13) = 1490
.2(#28) = 631
.4(#27) = 376
.6(#25) = 2598
.8(#119) = 1558
.2(#118) = 1293
.4(#24) = 1538
.2(#23) = 293
.2(#19) = 1066
.4(#18) = 1388
.3(#120) = 570
.2(#121) = 1069

20,733

ESTIMATE +700 IN GA

$\boxed{21,433}$

## 3-4 MILE

.8(#8) = 1123
.7(#6) = 2086
.5(#7) = 1849
.1(#115) = 159
.5(#3) = 1351
.1(#4) = 364
.5(#12) = 1883
.5(#2) = 597
.2(#32) = 987
.1(#33) = 646
.5(#29) = 1224
.6(#28) = 1894
.2(#119) = 388
.5(#117) = 2221
.4(#118) = 2586
.2(#24) = 769
.3(#18) = 1041
.5(#120) = 951
.2(#121) = 1069
.2(#109) = 1915

$\boxed{25103}$

ESTIMATE +7000 IN GA

$\boxed{32103}$

** FROM: HAMLT. CO PLANNING COMMISSION
'90 POPULATION TRENDS

∴ ONSITE + TOTAL

$\boxed{\Sigma = 80,080}$

chattanooga / hamilton county
regional
planning
commission

November 19, 1993

Mr. Don Van Hook
TN Department of Environment
540 McCallie Street
Suite 550
Chattanooga, TN 37406

Dear Mr. Van Hook:

I have enclosed a report of the population trends by census tract for the Hamilton County-Chattanooga area. The tracts of interest are highlighted within the report. I hope this information will be helpful.

Sincerely,

FOR THE EXECUTIVE DIRECTOR

John B. Bridger, Jr.
Senior Planner

JBB:jb
Enclosures

File 721

chattanooga / hamilton county
regional
planning
commission
JOHN B. BRIDGER
SENIOR PLANNER
200 CITY HALL ANNEX • CHATTANOOGA, TENNESSEE 37402
(615) 757-5216 • FAX: (615) 757-5532 • TDD No.: (615) 757-0011

# Table Of Contents

## Charts

Page

Population Trends for 1980-1990 ..... 1-2
Population Trends for 1970-1980 ..... 6
Population Trends for 1960-1970 ..... 7-8
Tract Comparability: 1960-1970 ..... 9

## Maps

Hamilton County Population Trends: Increase 1980-1990 ..... 3
Hamilton County Population Trends: Decrease 1980-1990 ..... 4
Census Tract Boundaries that changed from 1980 to 1990 ..... 5
1990 Hamilton County Census Tracts ..... 10
1990 Chattanooga Urban Area Census Tracts ..... 11
1980 Hamilton County Census Tracts ..... 12
1980 Chattanooga Urban Area Census Tracts ..... 13
1970 Hamilton County Census Tracts ..... 14
1970 Chattanooga Urban Area Census Tracts ..... 15
1960 Hamilton County Census Tracts ..... 16
1960 Chattanooga Urban Area Census Tracts ..... 17

**Source**: Census of Population & Housing
1960, 1970, 1980, 1990

Federal Bureau of the Census

# POPULATION TRENDS FOR 1980-1990
# HAMILTON COUNTY, TENNESSEE

| CENSUS TRACT | 1980 POP. | 1990 POP. | TOTAL OF SPLIT TRACTS [f] | 80-90 % CHANGE | % CHANGE OF SPLIT TRACTS [f] |
|---|---|---|---|---|---|
| 1 | 3,370 | 3,045 | - | -9.6% | - |
| 2 | 1,666 | 1,194 | - | -28.3% | - |
| 3 | 3,463 | 2,702 | - | -22.0% | - |
| 4 | 4,847 | 3,642 | - | -24.9% | - |
| 5 | 954 | 297 | - | -68.9% | - |
| 6 | 3,369 | 2,980 | - | -11.5% | - |
| 7 | 3,945 | 3,698 | - | -6.3% | - |
| 8 | 1,913 | 1,404 | - | -26.6% | - |
| 9 | 459 | 411 | - | -10.5% | - |
| 10 | 2,149 | 1,881 | - | -12.5% | - |
| 11 | 2,611 | 1,721 | - | -34.1% | - |
| 12 | 4,634 | 3,765 | - | -18.8% | - |
| 13 | 3,283 | 2,484 | - | -24.3% | - |
| 14 | 4,495 | 2,753 | - | -38.8% | - |
| 15 | 1,832 | 1,117 | - | -39.0% | - |
| 16 | 3,060 | 2,296 | - | -25.0% | - |
| 18 | 4,188 | 3,470 | - | -17.1% | - |
| 19 | 7,515 | 5,331 | - | -29.1% | - |
| 20 | 1,726 | 1,071 | - | -37.9% | - |
| 21 | 1,379 | 732 | - | -46.9% | - |
| [a]22 | 167 | [a] | - | - | - |
| 23 | 1,925 | 1,466 | - | -23.8% | - |
| 24 | 4,705 | 3,846 | - | -18.3% | - |
| 25 | 5,064 | 4,330 | - | -14.5% | - |
| 26 | 1,657 | 1,441 | - | -13.0% | - |
| 27 | 1,162 | 941 | - | -19.0% | - |
| 28 | 3,398 | 3,156 | - | -7.1% | - |
| 29 | 2,636 | 2,447 | - | -7.2% | - |
| 30 | 2,372 | 2,324 | - | -2.0% | - |
| 31 | 872 | 709 | - | -18.7% | - |
| 32 | 5,530 | 4,934 | - | -10.8% | - |
| 33 | 6,629 | 6,461 | - | -2.5% | - |
| 34 | 3,795 | 4,380 | - | 15.4% | - |
| 101 | 6,887 | 9,080 | - | 31.8% | - |
| 102 | 4,522 | 5,218 | - | 15.4% | - |
| 103.01 | 6,897 | 7,757 | - | 12.5% | - |
| 103.02 | 6,668 | 7,317 | - | 9.7% | - |
| 104.01 | 12,026 | - | 13,629 | - | 13.3% |
| *104.11* | - | ***5,581*** | | - | - |
| *104.12* | - | ***4,545*** | - | - | - |
| *104.13* | - | ***3,503*** | - | - | - |
| 104.02 | 7,421 | 6,917 | - | -6.8% | - |
| 104.03 | 14,807 | - | 16,369 | - | 10.5% |
| *104.31* | - | ***5,927*** | - | - | - |

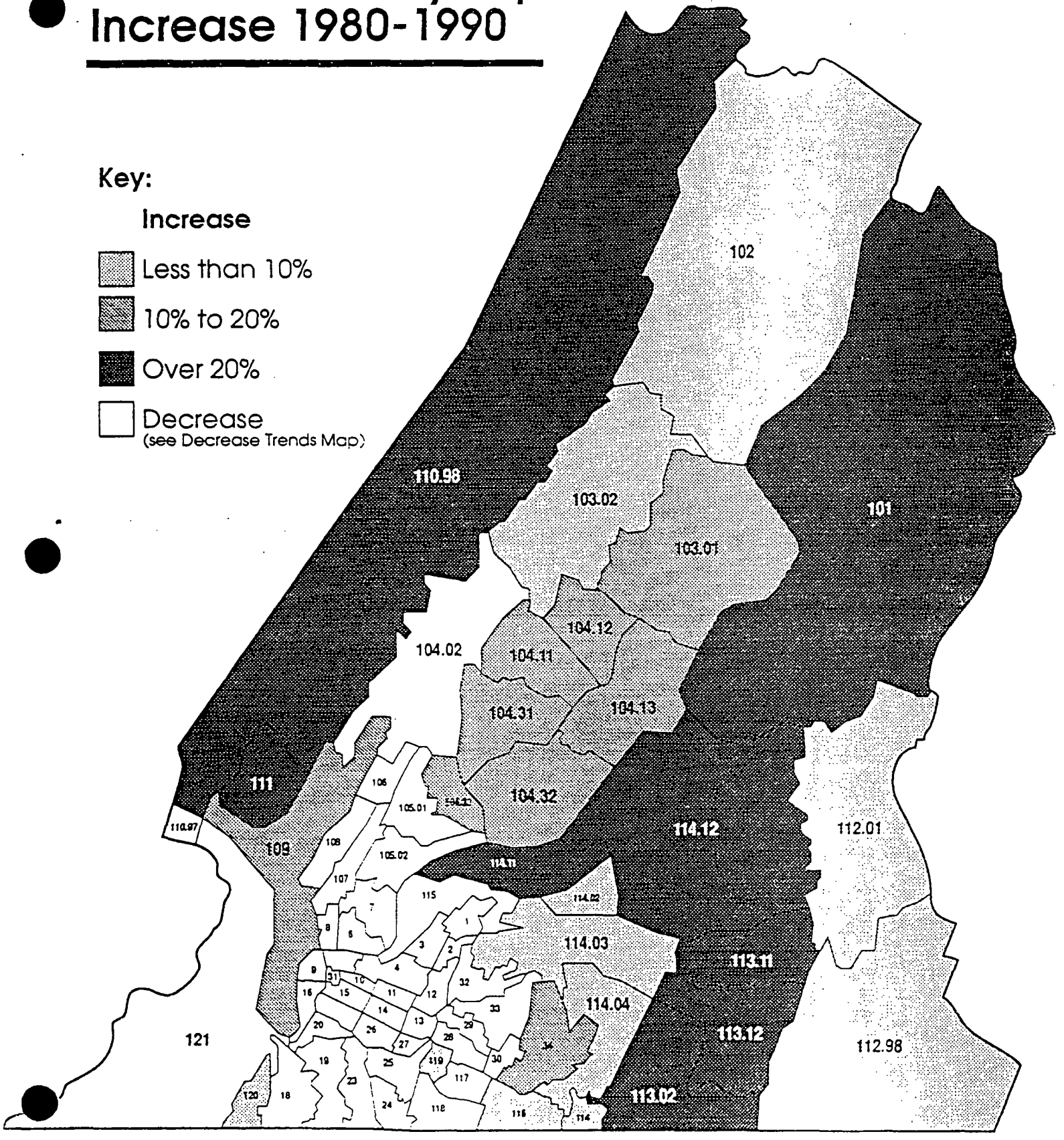
## POPULATION TRENDS FOR 1980-1990 CONTINUED

| | CENSUS TRACT | 1980 POP. | 1990 POP. | TOTAL OF SPLIT TRACTS [f] | 80-90 % CHANGE | % CHANGE OF SPLIT TRACTS [f] |
|---|---|---|---|---|---|---|
| | ***104.32*** | - | ***5,255*** | - | - | - |
| | ***104.33*** | - | ***5,187*** | - | - | - |
| | 105.01 | 7,163 | 6,359 | - | -11.2% | - |
| | 105.02 | 2,826 | 2,778 | - | -1.7% | - |
| | 106 | 3,326 | 3,044 | - | -8.5% | - |
| | 107 | 2,675 | 2,658 | - | -0.6% | - |
| | 108 | 4,789 | 4,464 | - | -6.8% | - |
| | 109 | 5,792 | 6,384 | - | 10.2% | - |
| b | 110 | 5,376 | b | - | - | 20.9% |
| c | ***110.97*** | - | ***12*** | - | - | - |
| b | ***110.98*** | - | ***6,499*** | - | - | - |
| | 111 | 5,339 | 6,437 | - | 20.6% | - |
| | 112 | 10,620 | - | 11,710 | | 10.3% |
| | ***112.01*** | - | ***3,921*** | - | - | - |
| | ***112.98*** | - | ***7,789*** | - | - | - |
| | 113.01 | 12,098 | - | 15,493 | - | 28.1% |
| | ***113.11*** | - | ***4,956*** | - | - | - |
| | ***113.12*** | - | ***10,537*** | - | - | - |
| | 113.02 | 6,783 | 8,220 | - | 21.2% | - |
| d | 114 | - | 1,310 | - | - | - |
| | 114.01 | 11,083 | - | 13,422 | - | 21.1% |
| | ***114.11*** | - | ***3,369*** | - | - | - |
| | ***114.12*** | - | ***10,053*** | - | - | - |
| | 114.02 | 5,739 | 5,901 | - | 2.8% | - |
| | 114.03 | 6,917 | 7,205 | - | 4.2% | - |
| e | 114.04 | 7,747 | 7,138 | 8,448 | - | 9.0% |
| | 115 | 2,156 | 1,585 | - | -26.5% | - |
| | 116 | 6,101 | 6,109 | - | 0.1% | - |
| | 117 | 4,524 | 4,441 | - | -1.8% | - |
| | 118 | 7,187 | 6,466 | - | -10.0% | - |
| | 119 | 1,882 | 1,938 | - | 3.0% | - |
| | 120 | 1,886 | 1,901 | - | 0.8% | - |
| c | 121 | 5,733 | 5,346 | 5,358 | - | -6.5% |
| | TOTAL | 287,740 | 285,536 | 84,429 | -0.8% | - |

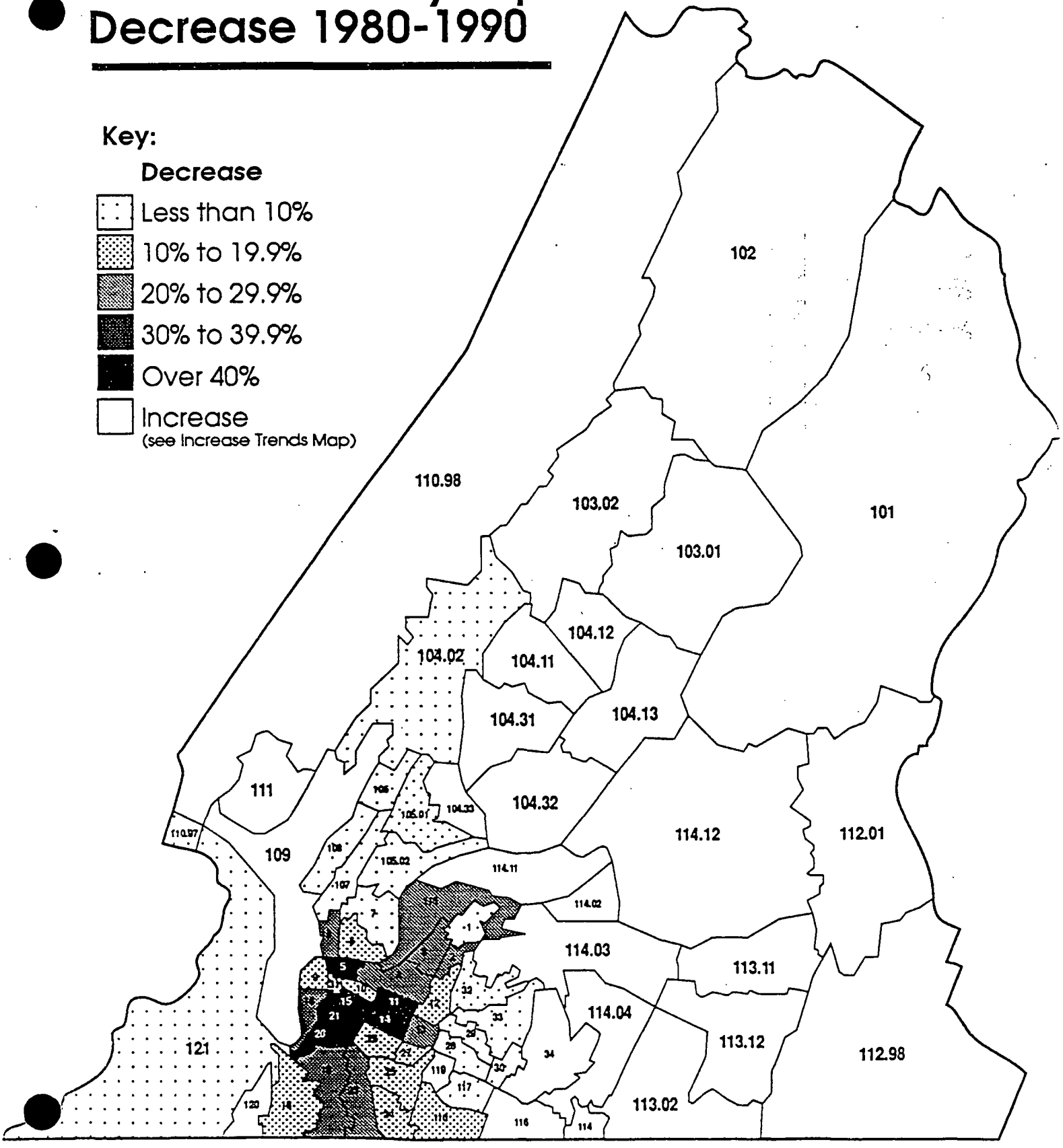
**FOOTNOTES:**

a Merge with Tract 26 in 1990 Census.
b In 1990 Tract 110 has been renumbered to 110.98 because of a Census Bureau error.
c In 1990 Tract 121 was split into Tracts 121 and 110.97 by Census Bureau error.
d Tract 114 was part of 114.04 in 1980. The Tract boundary is not the same as Tract 114 in the 1960 Census. Refer to note e.
e In 1990 Tract 114.04 was split into Tracts 114 and 114.04 by Census Bureau error. As a result Tract 114.04 in 1990 is smaller than Tract 114.04 in 1980. Refer to note d.
f These are combinations of 1990 Split Tracts which conform with the 1980 Tract boundaries.

# Hamilton County Population Trends Increase 1980-1990



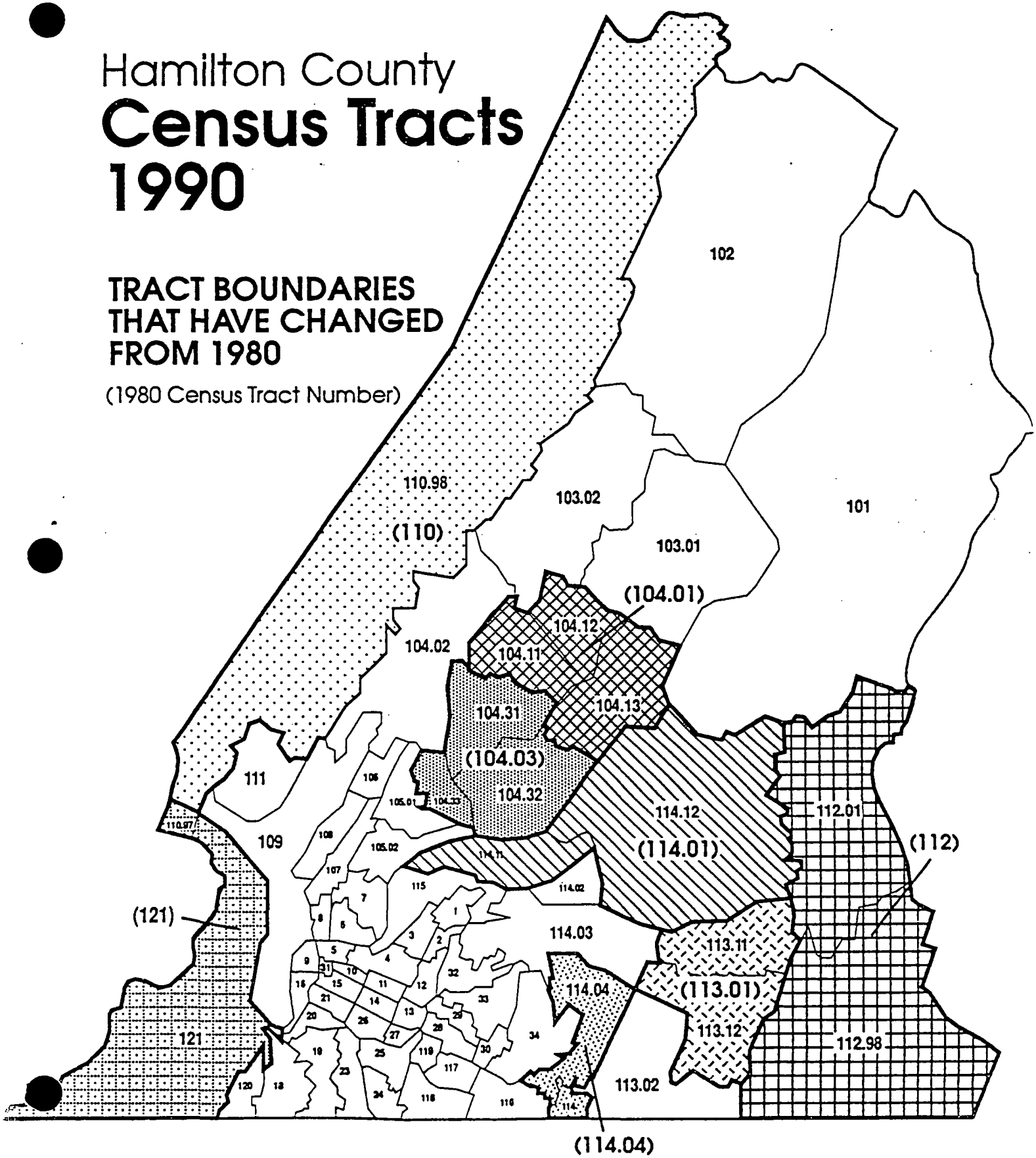
# Hamilton County Population Trends Decrease 1980-1990



# Hamilton County
# Census Tracts 1990

## TRACT BOUNDARIES THAT HAVE CHANGED FROM 1980

(1980 Census Tract Number)



## POPULATION TRENDS FOR 1970-1980
## HAMILTON COUNTY, TN

| CENSUS TRACT | 1970 POP. | 1980 POP. | 70-80 % CHANGE |
|---|---|---|---|
| 1 | 3,274 | 3,370 | 2.9% |
| 2 | 1,683 | 1,666 | -1.0% |
| 3 | 3,138 | 3,463 | 10.4% |
| 4 | 7,846 | 4,847 | -38.2% |
| 5 | 1,957 | 954 | -51.3% |
| 6 | 3,722 | 3,369 | -9.5% |
| 7 | 3,748 | 3,945 | 5.3% |
| 8 | 2,138 | 1,913 | -10.5% |
| 9 | - | 459 | - |
| 10 | 2,985 | 2,149 | -28.0% |
| 11 | 3,184 | 2,611 | -18.0% |
| 12 | 3,840 | 4,634 | 20.7% |
| 13 | 3,544 | 3,283 | -7.4% |
| 14 | 3,472 | 4,495 | 29.5% |
| 15 | 2,589 | 1,832 | -29.2% |
| 16 | 2,200 | 3,060 | 39.1% |
| 18 | 4,948 | 4,188 | -15.4% |
| 19 | 8,901 | 7,515 | -15.6% |
| 20 | 1,488 | 1,726 | 16.0% |
| 21 | 1,918 | 1,379 | -28.1% |
| 22 | 279 | 167 | -40.1% |
| 23 | 2,429 | 1,925 | -20.7% |
| 24 | 5,398 | 4,705 | -12.8% |
| 25 | 5,304 | 5,064 | -4.5% |
| 26 | 2,083 | 1,657 | -20.5% |
| 27 | 1,314 | 1,162 | -11.6% |
| 28 | 3,546 | 3,398 | -4.2% |
| 29 | 2,432 | 2,636 | 8.4% |
| 30 | 2,643 | 2,372 | -10.3% |
| 31 | 842 | 872 | 3.6% |
| 32 | 4,878 | 5,530 | 13.4% |
| 33 | 7,065 | 6,629 | -6.2% |
| 34 | 3,473 | 3,795 | 9.3% |
| 101 | 4,365 | 6,887 | 57.8% |
| 102 | 3,694 | 4,522 | 22.4% |
| 103.01 | 3,425 | 6,897 | 101.4% |
| 103.02 | 6,268 | 6,668 | 6.4% |
| 104.01 | 4,850 | 12,026 | 148.0% |
| 104.02 | 6,239 | 7,421 | 18.9% |
| 104.03 | 10,509 | 14,807 | 40.9% |
| 105.01 | 6,911 | 7,163 | 3.6% |
| 105.02 | 2,900 | 2,826 | -2.6% |
| 106 | 3,440 | 3,326 | -3.3% |
| 107 | 2,445 | 2,675 | 9.4% |
| 108 | 4,749 | 4,789 | 0.8% |
| 109 | 3,806 | 5,792 | 52.2% |
| 110 | 4,201 | 5,376 | 28.0% |
| 111 | 4,861 | 5,339 | 9.8% |
| 112 | 7,096 | 10,620 | 49.7% |
| 113.01 | 5,175 | 12,098 | 133.8% |
| 113.02 | 5,207 | 6,783 | 30.3% |
| 114.01 | 6,947 | 11,083 | 59.5% |
| 114.02 | 5,884 | 5,739 | -2.5% |
| 114.03 | 5,364 | 6,917 | 29.0% |
| 114.04 | 6,727 | 7,747 | 15.2% |
| 115 | 2,437 | 2,156 | -11.5% |
| 116 | 6,768 | 6,101 | -9.9% |
| 117 | 4,689 | 4,524 | -3.5% |
| 118 | 7,758 | 7,187 | -7.4% |
| 119 | 1,691 | 1,882 | 11.3% |
| 120 | 1,741 | 1,886 | 8.3% |
| 121 | 5,828 | 5,733 | -1.6% |
| TOTAL | 254,236 | 287,740 | 13.2% |

# POPULATION TRENDS FOR 1960-1970
# HAMILTON COUNTY, TN

| | CENSUS TRACT | 1960 POP. | 1970 POP. | TOTAL OF SPLIT TRACTS [a] | 60-70 % CHANGE | % CHANGE OF SPLIT TRACTS [a] |
|---|---|---|---|---|---|---|
| • | 1 | 3,954 | 3,274 | - | -17.2% | - |
| • | 2 | 1,686 | 1,683 | - | -0.2% | - |
| | 3 | 3,420 | 3,138 | - | -8.2% | - |
| | 4 | 8,788 | 7,846 | - | -10.7% | - |
| | 5 | 3,595 | 1,957 | - | -45.6% | - |
| | 6 | 4,446 | 3,722 | - | -16.3% | - |
| • | 7 | 3,946 | 3,748 | - | -5.0% | - |
| • | 8 | 2,603 | 2,138 | - | -17.9% | - |
| • | 9 | 700 | - | - | - | - |
| | 10 | 4,613 | 2,985 | - | -35.3% | - |
| | 11 | 4,080 | 3,184 | - | -22.0% | - |
| | 12 | 3,261 | 3,840 | - | 17.8% | - |
| | 13 | 4,134 | 3,544 | - | -14.3% | - |
| | 14 | 4,597 | 3,472 | - | -24.5% | - |
| | 15 | 5,934 | 2,589 | - | -56.4% | - |
| • | 16 | 2,613 | 2,200 | - | -15.8% | - |
| • | 18 | 5,372 | 4,948 | - | -7.9% | - |
| • | 19 | 8,984 | 8,901 | - | -0.9% | - |
| • | 20 | 2,758 | 1,488 | - | -46.0% | - |
| | 21 | 5,163 | 1,918 | - | -62.9% | - |
| • | 22 | 628 | 279 | - | -55.6% | - |
| | 23 | 3,292 | 2,429 | - | -26.2% | - |
| | 24 | 6,283 | 5,398 | - | -14.1% | - |
| | 25 | 7,161 | 5,304 | - | -25.9% | - |
| • | 26 | 2,172 | 2,083 | - | -4.1% | - |
| | 27 | 2,307 | 1,314 | - | -43.0% | - |
| | 28 | 3,925 | 3,546 | - | -9.7% | - |
| | 29 | 2,556 | 2,432 | - | -4.9% | - |
| | 30 | 3,154 | 2,643 | - | -16.2% | - |
| | 31 | 537 | 842 | - | 56.8% | - |
| • | 32 | 4,562 | 4,878 | - | 6.9% | - |
| • | 33 | 5,978 | 7,065 | - | 18.2% | - |
| • | 34 | 3,304 | 3,473 | - | 5.1% | - |
| | 101 | 3,538 | 4,365 | - | 23.4% | - |
| | 102 | 2,934 | 3,694 | - | 25.9% | - |
| | 103 | 8,377 | - | 9,693 | - | 15.7% |
| | *103.01* | - | *3,425* | - | - | - |
| | *103.02* | - | *6,268* | - | - | - |
| | 104 | 10,974 | - | 21,598 | - | 96.8% |
| | *104.01* | - | *4,850* | - | - | - |
| | *104.02* | - | *6,239* | - | - | - |
| | *104.03* | - | *10,509* | - | - | - |
| | 105 | 7,399 | - | 9,811 | - | 32.6% |
| | *105.01* | - | *6,911* | - | - | - |
| | *105.02* | - | *2,900* | - | - | - |

## POPULATION TRENDS FOR 1960-1970 CONTINUED

| | CENSUS TRACT | 1960 POP. | 1970 POP. | TOTAL OF SPLIT TRACTS [a] | 60-70 % CHANGE | % CHANGE OF SPLIT TRACTS [a] |
|---|---|---|---|---|---|---|
| * | 106 | 3,166 | 3,440 | - | 8.7% | - |
| * | 107 | 2,999 | 2,445 | - | -18.5% | - |
| * | 108 | 4,612 | 4,749 | - | 3.0% | - |
| * | 109 | 3,038 | 3,806 | - | 25.3% | - |
| * | 110 | 3,750 | 4,201 | - | 12.0% | - |
| * | 111 | 3,413 | 4,861 | - | 42.4% | - |
| | 112 | 4,590 | 7,096 | - | 54.6% | - |
| | 113 | 7,248 | - | 10,382 | - | 43.2% |
| | ***113.01*** | - | ***5,175*** | - | - | - |
| | ***113.02*** | - | ***5,207*** | - | - | - |
| | 114 | 12,220 | - | 24,922 | - | 103.9% |
| | ***114.01*** | - | ***6,947*** | - | - | - |
| | ***114.02*** | - | ***5,884*** | - | - | - |
| | ***114.03*** | - | ***5,364*** | - | - | - |
| | ***114.04*** | - | ***6,727*** | - | - | - |
| * | 115 | 2,849 | 2,437 | - | -14.5% | - |
| | 116 | 6,854 | 6,768 | - | -1.3% | - |
| | 117 | 4,898 | 4,689 | - | -4.3% | - |
| | 118 | 6,126 | 7,758 | - | 26.6% | - |
| | 119 | 1,692 | 1,691 | - | -0.10% | - |
| | 120 | 1,817 | 1,741 | - | -4.2% | - |
| * | 121 | 4,905 | 5,828 | - | 18.8% | - |
| | TOTAL | 237,905 | 254,236 | 76,406 | 6.9% | - |

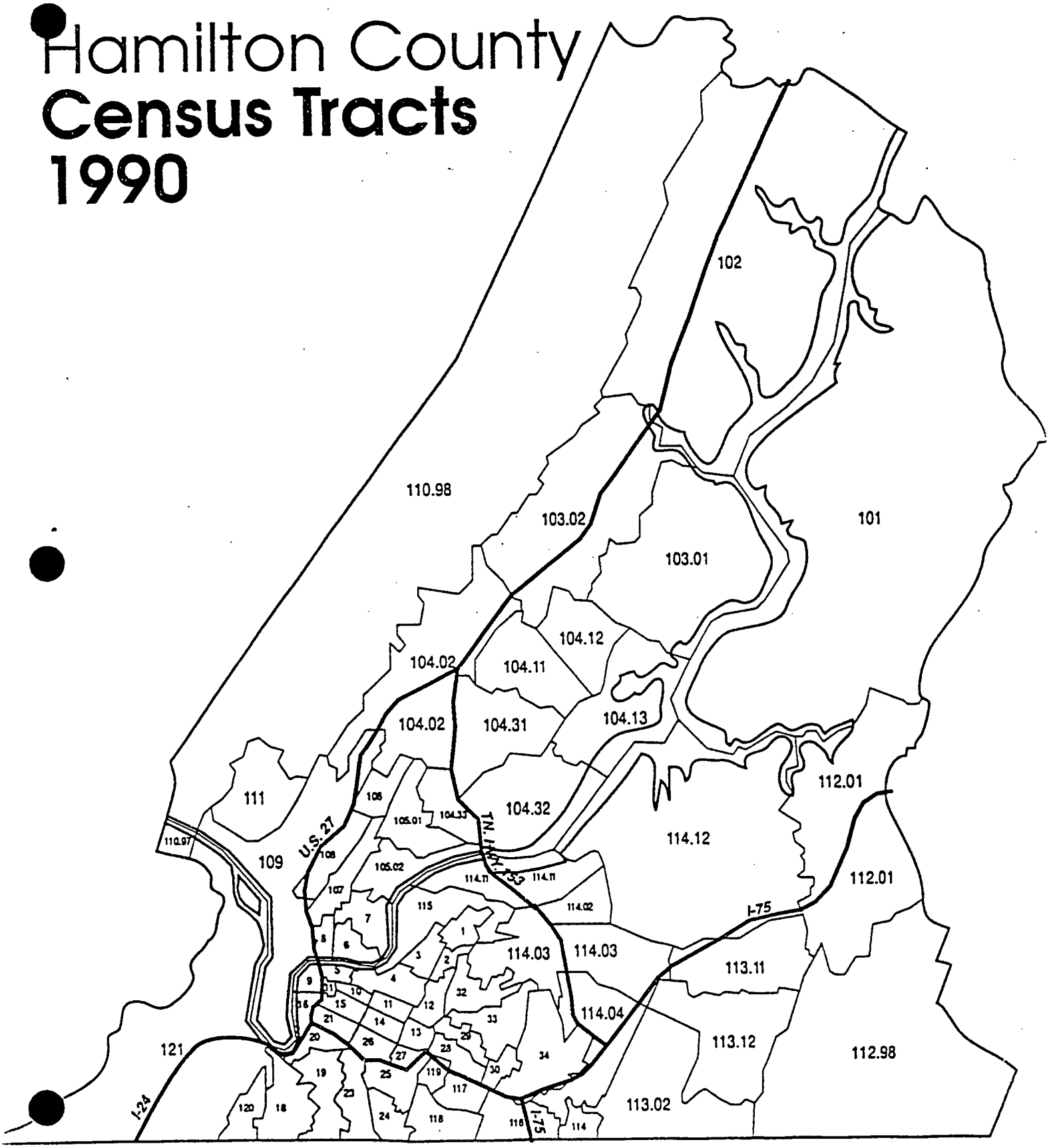
FOOTNOTES:
* BOUNDARY CHANGED FROM 1960 TO 1970 CENSUS. Refer to next page.
a THESE ARE COMBINATIONS OF 1970 SPLIT TRACTS WHICH CONFORM WITH THE 1960 BOUNDARIES.

# TRACT COMPARABILITY: 1960 TO 1970
# HAMILTON COUNTY, TENNESSEE

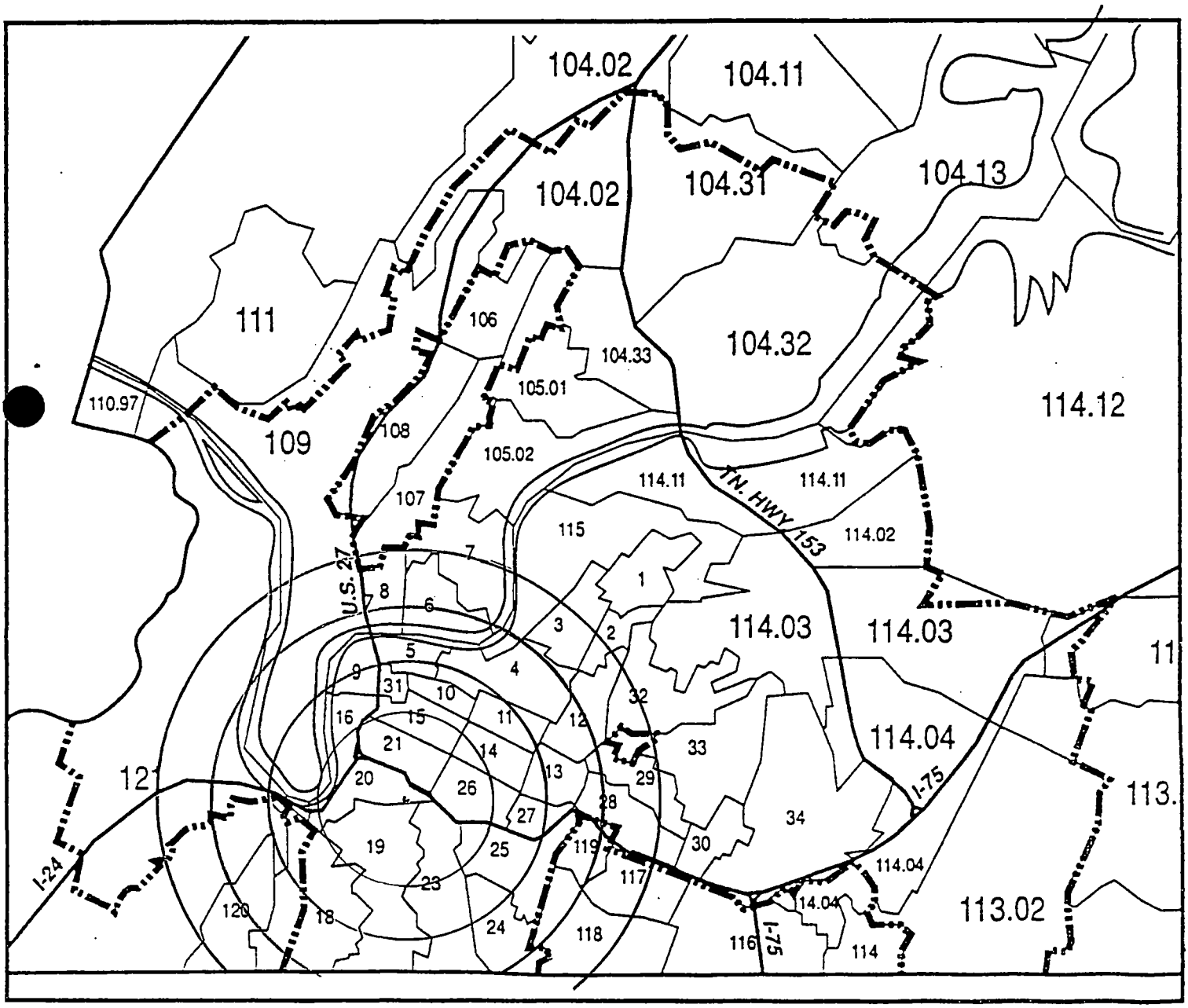
(Only part of the area was tracted in 1960.)

| 1960 TRACT | 1970 TRACT |
|---|---|
| 0001 | 0001 PART<br>0115 PART |
| 0002 | 0002<br>0114.03 PART |
| 0007 | 0007<br>0105.02 PART |
| 0008 | 0008<br>0109 PART |
| 0009 | 0009<br>0016 PART |
| 0016 | 0016 PART |
| 0018 | 0018 PART |
| 0019 | 0019 PART<br>0020 PART<br>0121 PART |
| 0020 | 0019 PART<br>0020 PART |
| 0022 | 0022<br>0026 PART |
| 0026 | 0026 PART |
| 0032 | 0032 PART<br>0114.03 PART |
| 0033 | 0032 PART<br>0033 PART |
| 0034 | 0034 PART<br>0114.04 PART |
| ER-0116 | 0116 |
| ER-0117 | 0117 |
| ER-0118 | 0118 |
| ER-0119 | 0119 |
| HC-0101 | 0101 |
| HC-0102 | 0102 |
| HC-0103 | 0103.01<br>0103.02 |
| HC-0104 | 0104.01<br>0104.03<br>0104.02 PART<br>0109 PART |
| HC-0105 | 0105.01 PART<br>0105.02 PART<br>0107 PART |
| HC-0109 | 0109 PART |
| HC-0110 | 0110 PART<br>0111 PART |
| HC-0112 | 0112 |
| HC-0113 | 0113.01<br>0113.02 |
| HC-0114 | 0114.01<br>0114.02<br>0032 PART<br>0033 PART<br>0034 PART<br>0114.03 PART<br>0114.04 PART |
| HC-0115 | 0001 PART<br>0114.03 PART<br>0115 PART |
| HC-0121 | 0018 PART<br>0121 PART |
| LM-0120 | 0120 |
| RW-0106 | 0106<br>0104.02 PART<br>0105.01 PART |
| RW-0107 | 0105.01 PART<br>0105.02 PART<br>0107 PART<br>0109 PART |
| RW-0108 | 0108<br>0109 PART |
| SM-0111 | 0109 PART<br>0110 PART<br>0111 PART |

# Hamilton County
# Census Tracts
# 1990

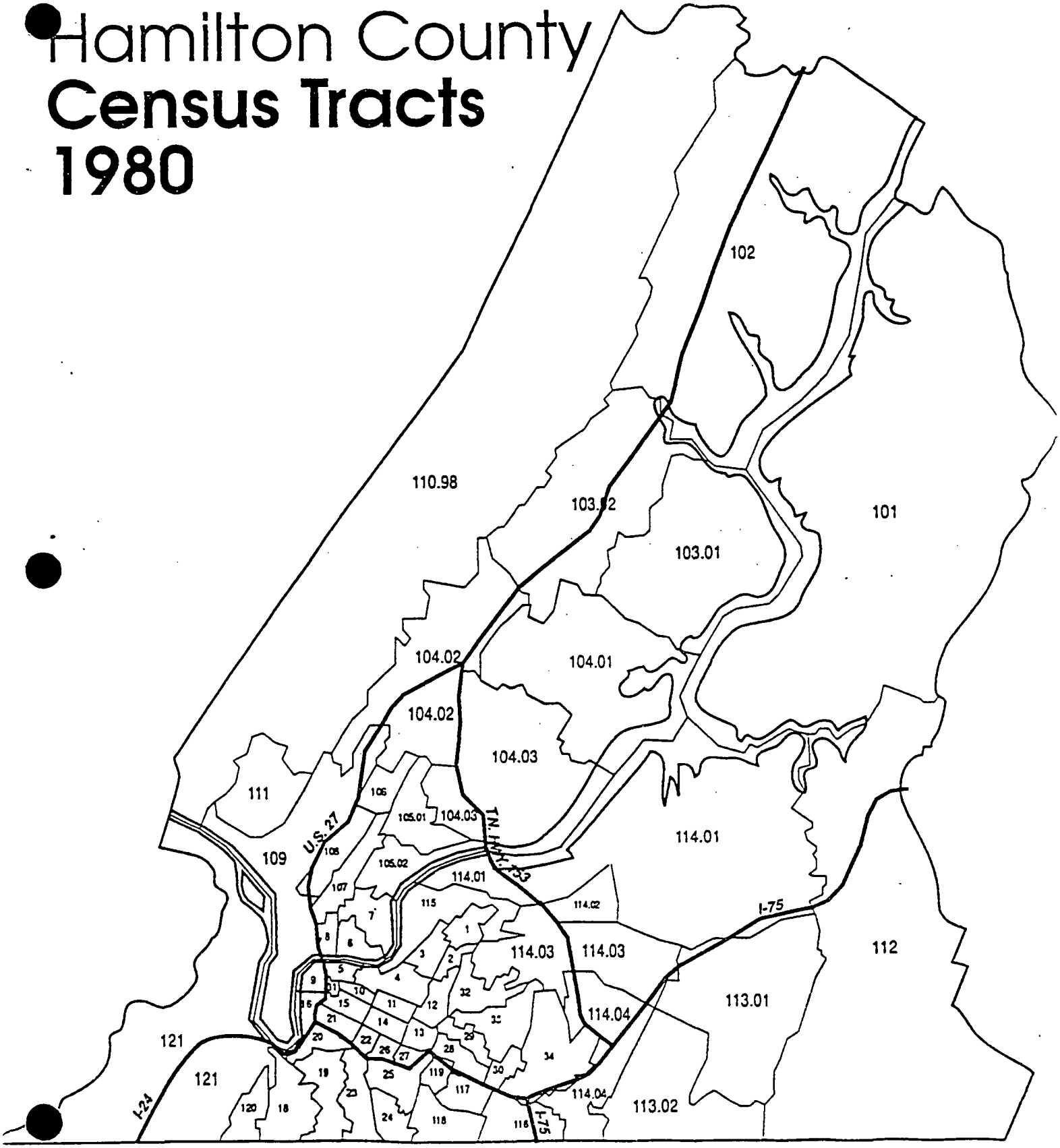


# Chattanooga Urban Area
# 1990 Census Tracts

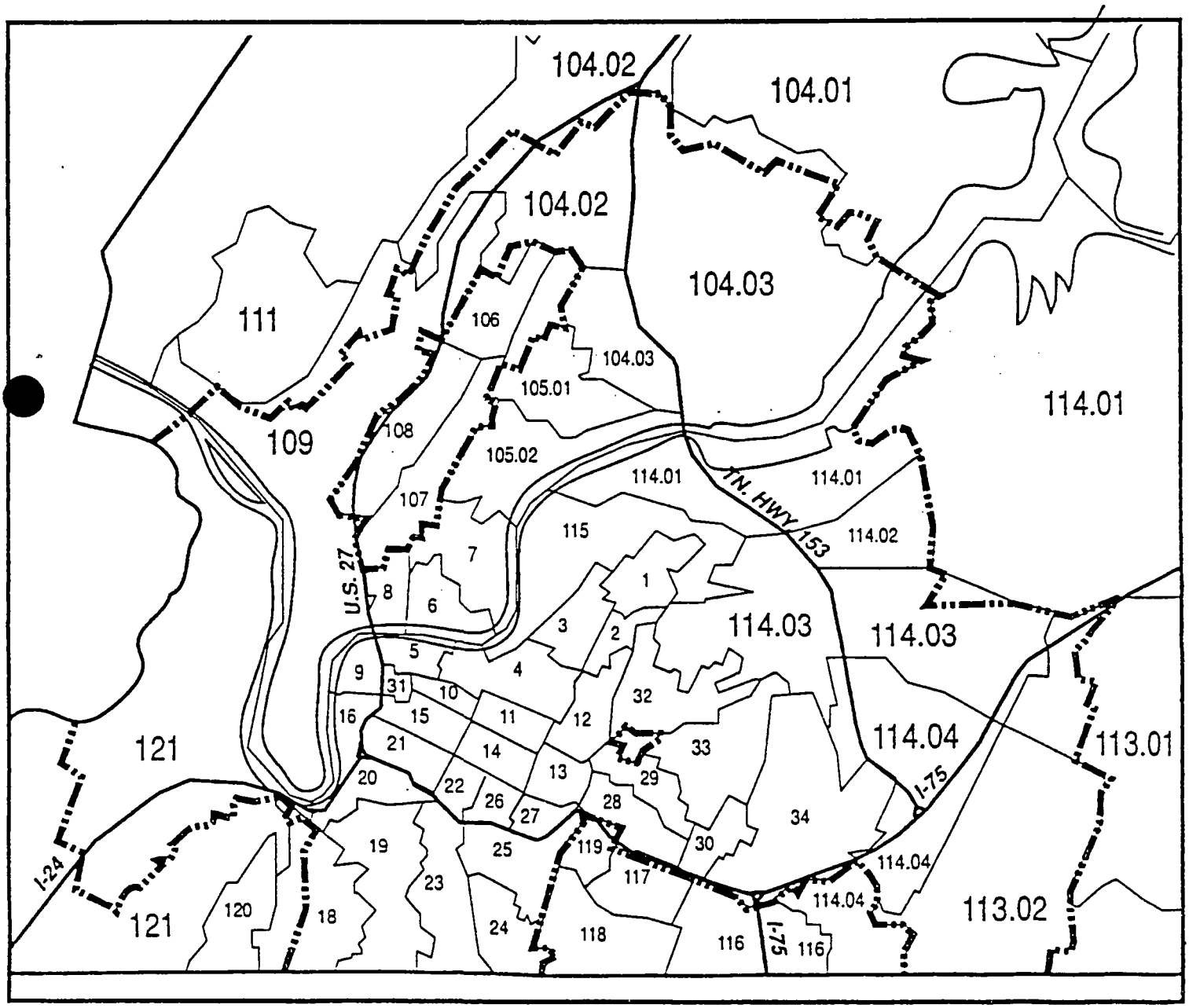



Chattanooga City Limit Line

# Hamilton County
# Census Tracts
# 1980

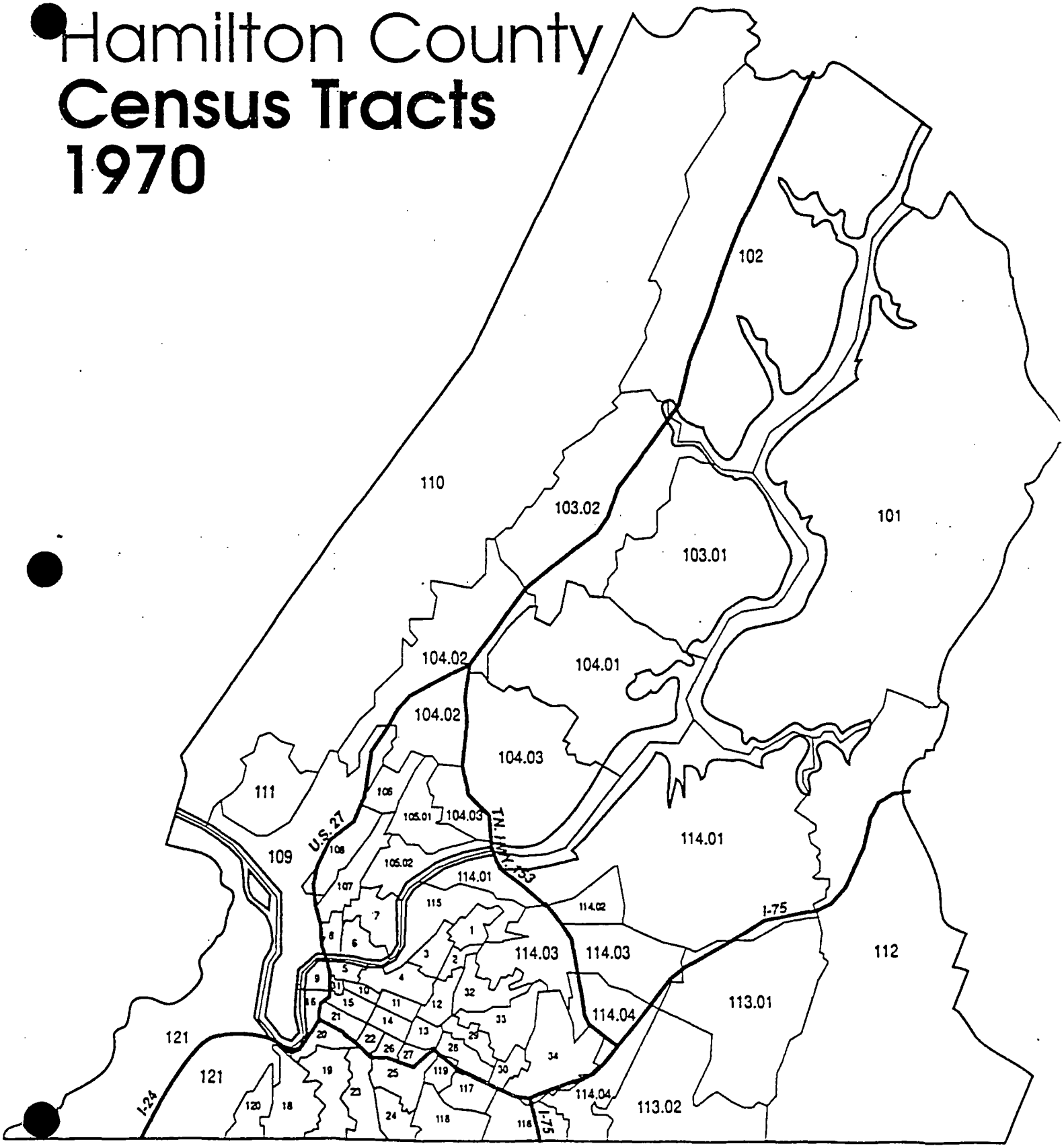


# Chattanooga Urban Area
# 1980 Census Tracts

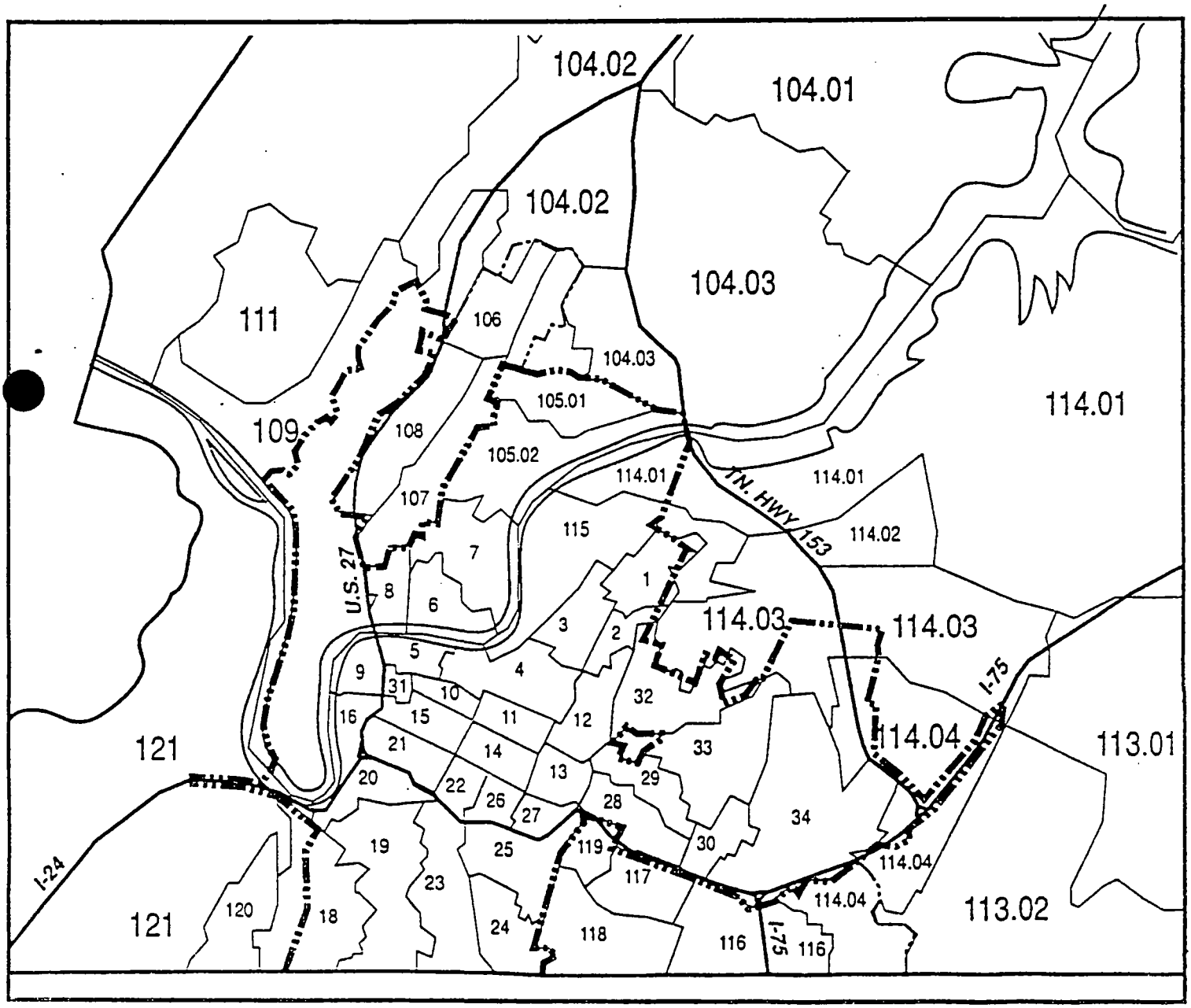



Chattanooga City Limit Line

# Hamilton County
# Census Tracts
# 1970

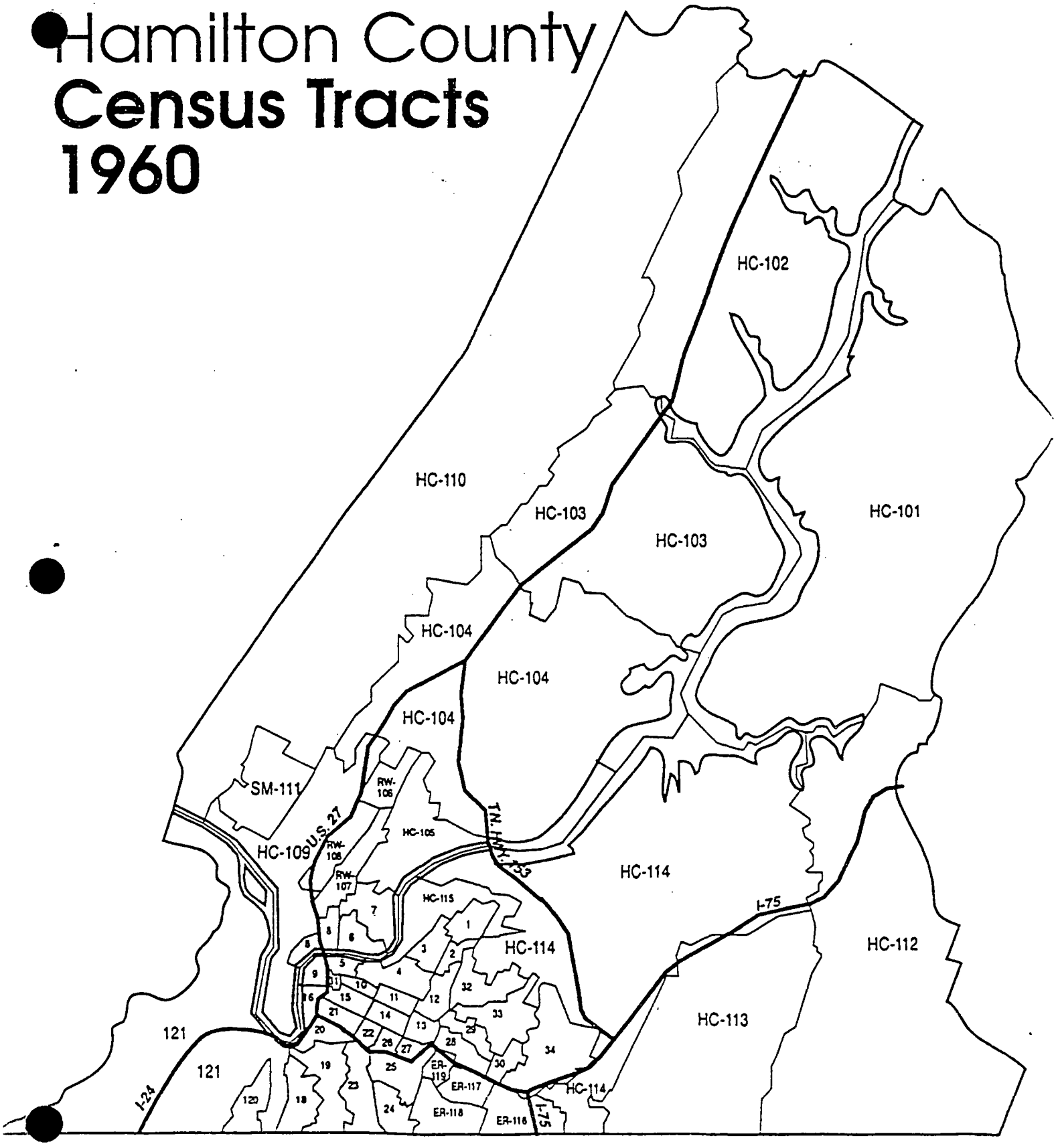


# Chattanooga Urban Area
# 1970 Census Tracts

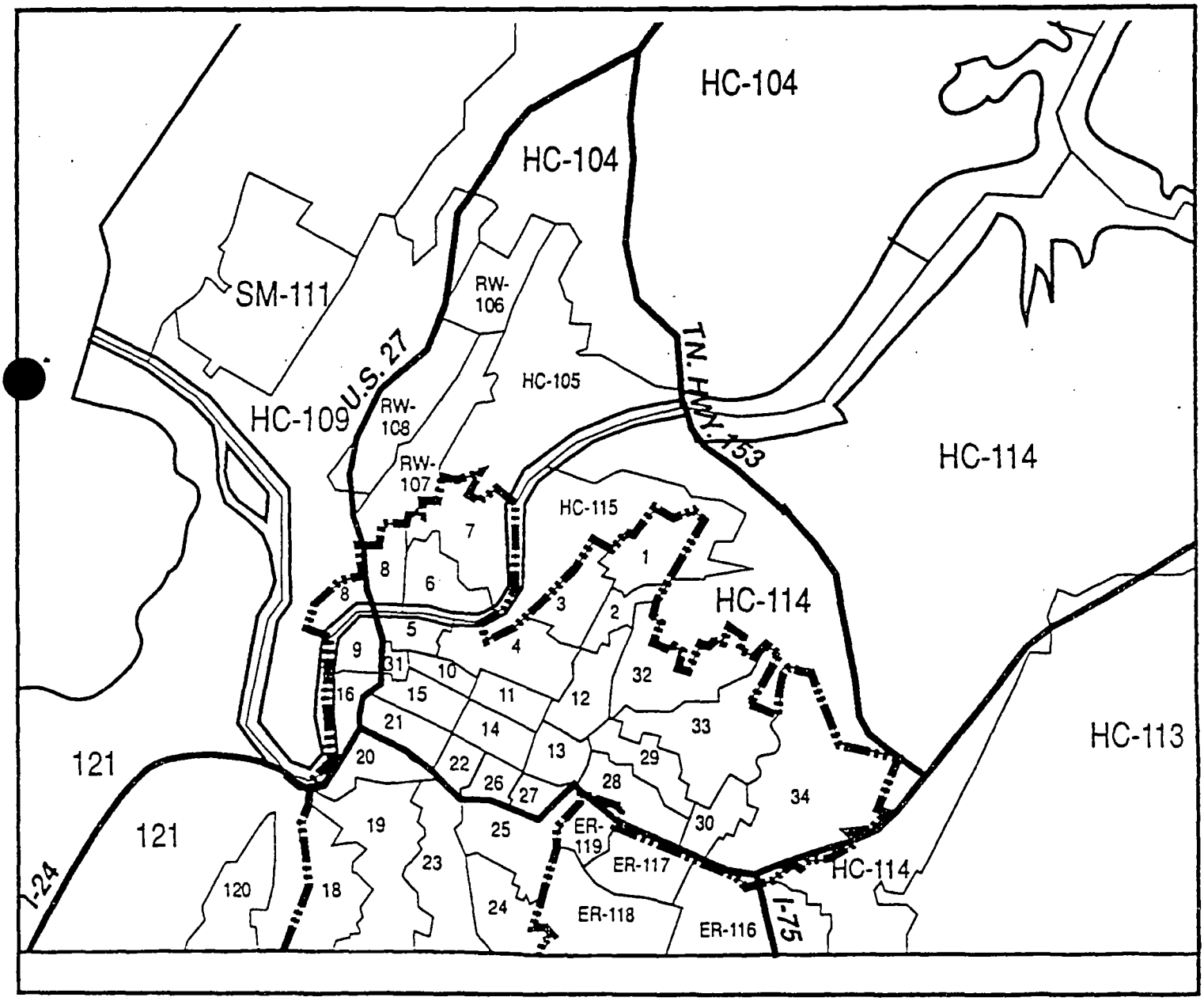



Chattanooga City Limit Line

# Hamilton County
# Census Tracts
# 1960



# Chattanooga Urban Area
# 1960 Census Tracts



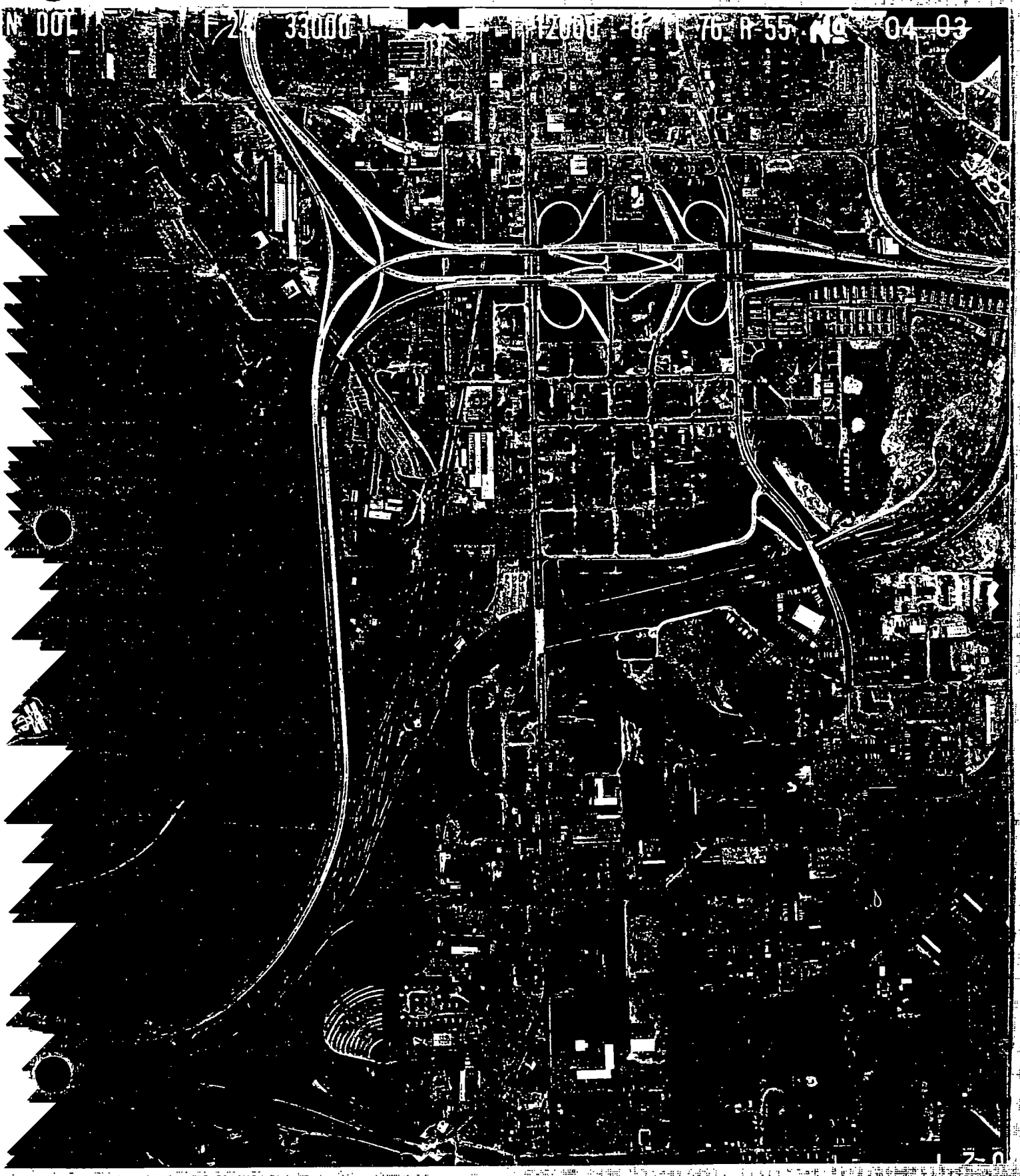

Chattanooga City Limit Line

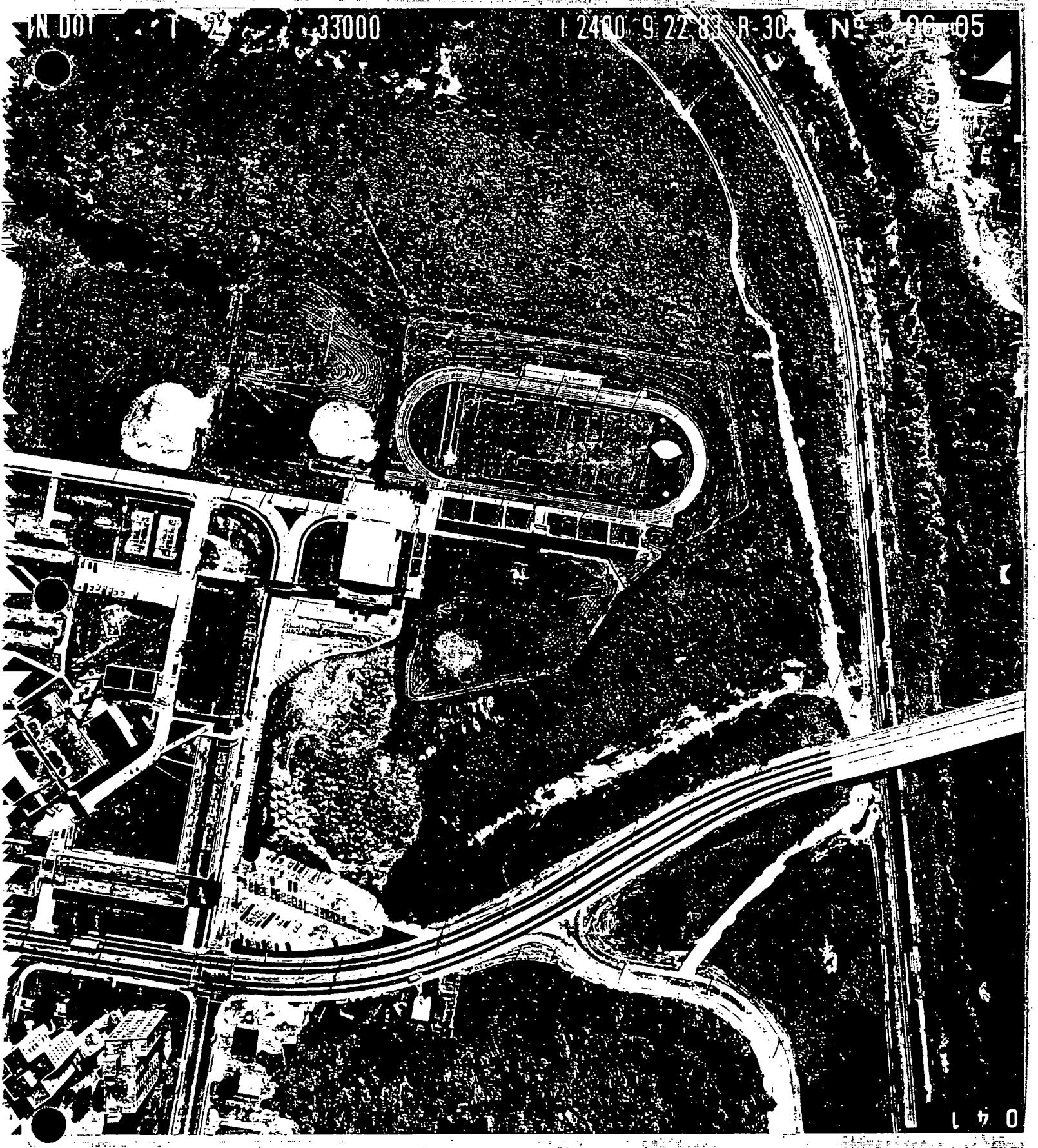
Site Name: Howard High School Dump

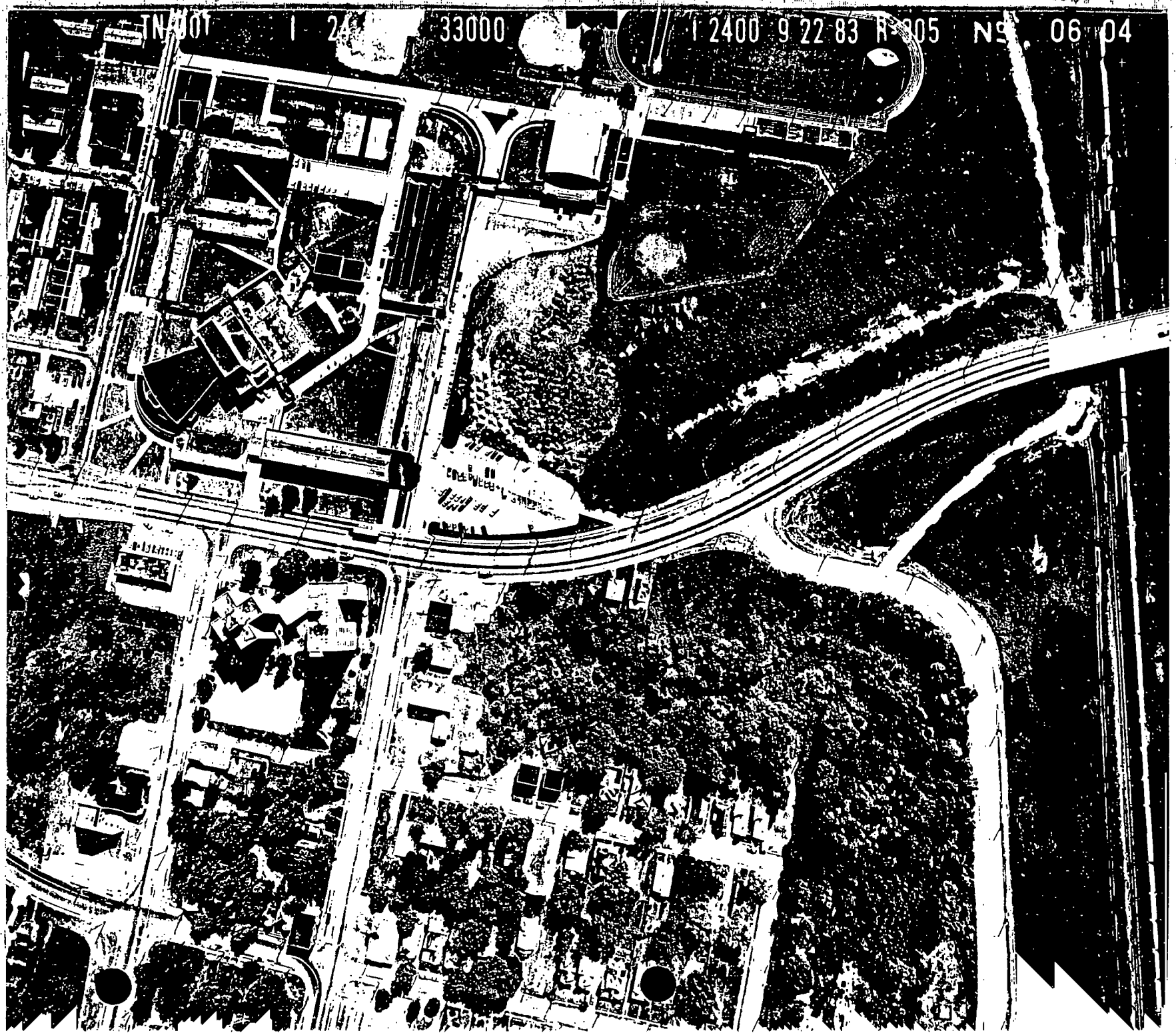
Site Number: TND 100842343

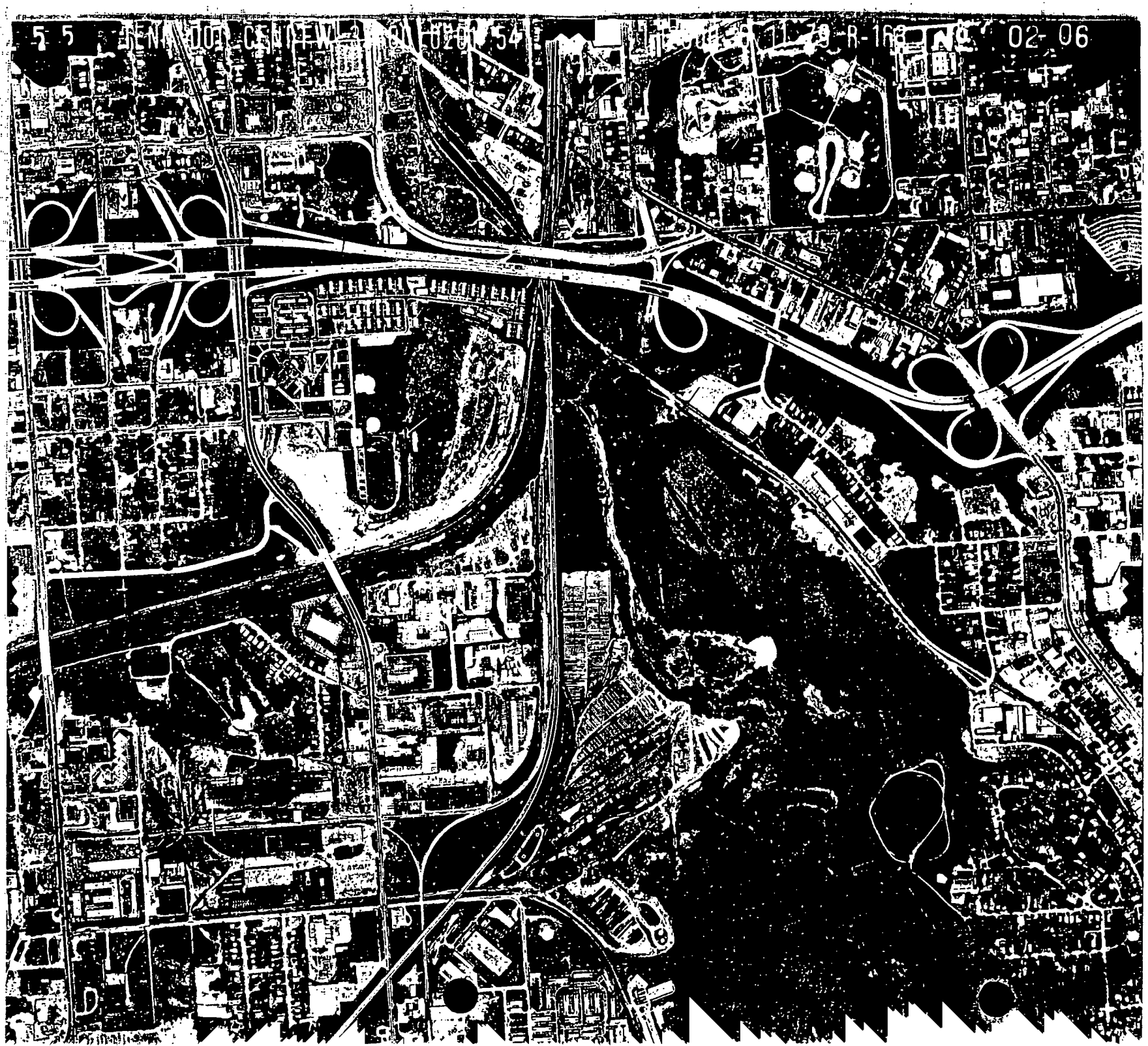
Reference Number: 9

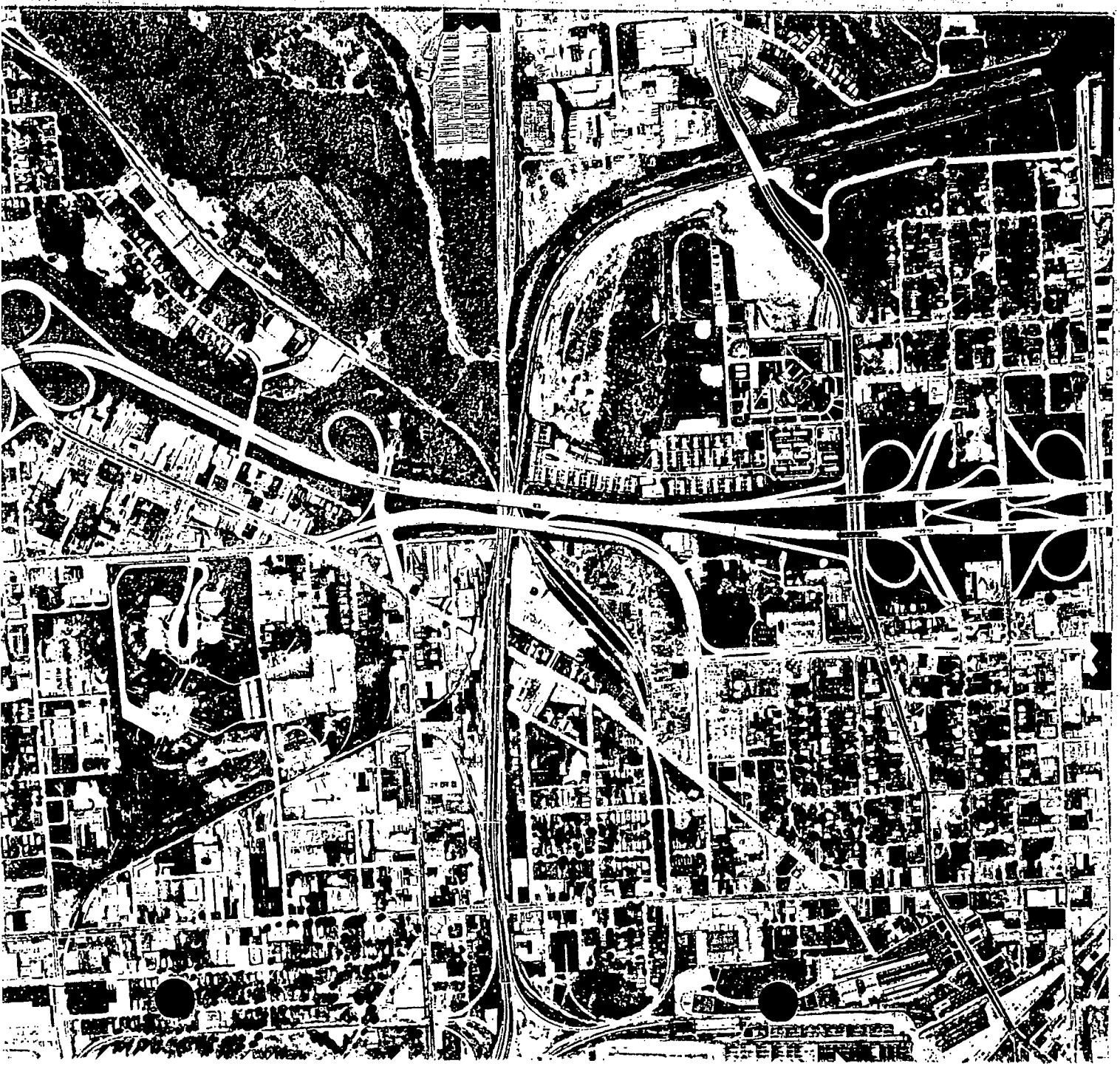
ENN DOT
№ 05 04


N DOL
F/24 33000
8 11 76 R-55 Nº 04 03


33000
9 22 83 R-30
05


TN 001 I 24 33000 I 2400 9 22 83 R 305 N9 06 04


5 5
02 06



№ 02 04

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 10

* SEE APPENDIX C FOR PHOTOGRAPHIC DOCUMENTATION

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 11

U.S. EPA REGION IV

# SDMS

## POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

*PLEASE CONTACT THE APPROPRIATE RECORDS CENTER TO VIEW THE MATERIAL

"Rite in the Rain"®

ALL-WEATHER

# LINE RULE

Notebook No. 391

| |
|---|
| Howard High #33606 |
| SIP ✓ |
| TND 100842343 |
| |
| |

"Rite in the Rain"
ALL-WEATHER WRITING PAPER ®

Name

Address

TN-DEC, Chattan, TN

Phone 634-575

Project

Yellow Polyethylene Protective Slipcovers (Item #31) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

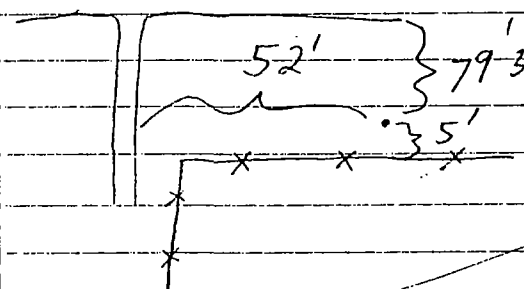
8:00 AM Monday - 8/16/93

Clear, dead calm, 70's

Craig Stannard (CJS), Andy Binford, Don VanHook, Andy Shevis.

We are performing a soil-gas survey

8:10 AM - at control point




5' north of 4th fence post or 52' east of road, 79'3" south of road

Craig Stannard 8/16/93

$\frac{1}{2}$" pipe was forced into ground $1\frac{1}{2}$'.

Photo by CJS 8:30AM

#4 soil gas monitoring with the OVA at control pt #1.

OVA Background reding 0.8 ppm from pipe (Calibrated at 0.0 ppm

8:45 SKC Air Check Sampler is used to pump air to OVA

OVA still reading 0.8 ppm

Readings go up to 1.00 ppm.

Readings go down to 0.9 ppm

8:52 air check pump used to fill zip lock bag

Gary Stannard 8/16/93

Zip-lock bag OVA reading is 1.0 ppm

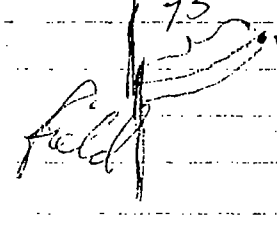
Over at Control Point 8:54 AM.

Photos #6, 5

10:20 AM — sampling at well point #2!

3.4' Deep

OVA Readings were above 10 ppm >2000 ppm.



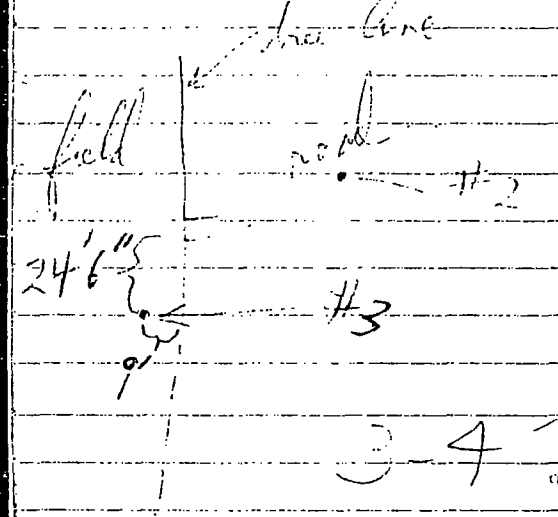

HnU — nothing

Temperature — upper 80s hot + hazy

Gary Stannard 8/16/93

$O_2$ reading went down to 2.1% with $O_2$ meter
LEL - 27% also

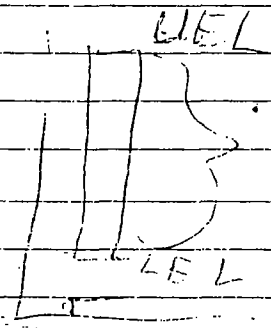
Gas-test point #3 Photo #7 11:12 AM




11:15 OVA readings 1.0 ppm.

#3 is an existing hole

Craig Stannard 8/16/93




11:45 AM Hole #4

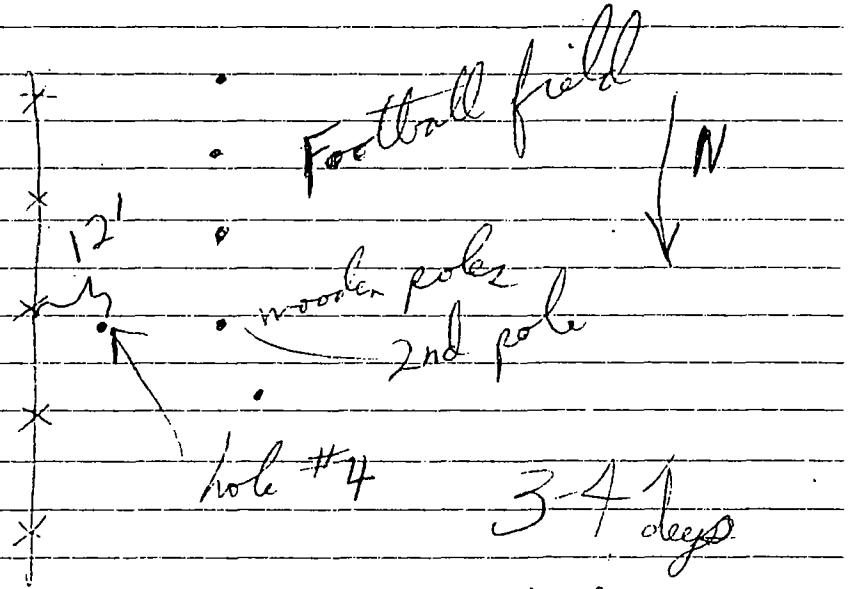



Photo #8 hole #4

Craig Stannard 8/16/93

~~[illegible]~~ hole # 4

10.6% $O_2$

0% LEL

2.3 ppm from OVA

no readings from HNu meter

---

Hole (12:30 PM)

#5 6' from SE corner

of football field

12.2% $O_2$ 4-5' deep

0% LEL

OVA - 2.7 ppm

[illegible] 1/1/93

2:00 PM Grouping at Hole

#6 5' east of SW corner

of Dayschool fence. (1' from fence)

OVA pegged out.

Photo #9 - hole #6

OVA measured 11 ppm a second

time. to 15%

14.5% $O_2$ 3-4' deep

0% LEL

From bag, OVA measured

22 ppm

From bag again - 72 ppm.

[illegible] 1/1/93

2:00 PM Poor days 66 (Mid-90's)

#7 on edge of parking area surface water hole

Approx. 200' of chain fence.

> 1000 ppm 4-5 days

No HNu readings

#10 photo of hole #7

3:30 PM finished digging hole #5

PID #11 - hole #7

OVA capped at 700 ppm

Gary Hammond 8/16/93

OVA capped at 300 ppm

#8 Black pool

17% LEL 4-5 days

17-18% $O_2$

390 ppm on OVA a second time.

(20% $O_2$ at sewer grate water surface

0% LEL)

Gary Hammond 8/16/93

4:00 PM Hole #9 at clear spot at left 5' of road into landfill.

> 1000 ppm on OVA

43 % LEL

[illegible] $O_2$ 4-5' deep

Hole #9 is 378' up into the landfill from well (hole) #2.

Photo #12 hole #9

2 in day care
2 biology
2 practice field

3 in big landfill area (by entry)

Gray Stannard 8/16/93

5:00 PM Hole #10 in barren area in middle of landfill Photo #13 - hole #10.

400 + ppm on OVA

70% LEL 4-5' deep

3.7 % $O_2$

Photo #14 hole #10.

SE or East 382' from hole #9

Get back to office at 5:50 PM

10 Miles 53DJ73

Gray Stannard 8/16/93

9:00 AM - arrived at HH-SS-02

As per instructions from Nancy Thomas HH-SS-02 is collected by CJS from 6"-1' (orange-brown soil / clay)

#17 FDM took photo at 9:05 of HH-SS-02

[illegible] completed @ 9:10

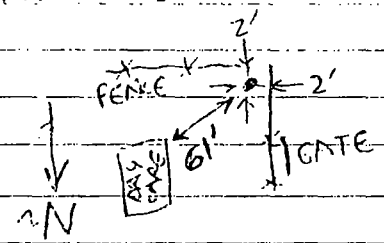
HH-SS-02: 190' from BUILDING DOWN FENCE, TWO FOOT IN DAY CARE FROM FENCE. NEAR SE OF BUILDING 36' TO DAY CARE BLDG

9:20 DV at SS-03 post hole digger blade bent. Soil hard, shallow, rocky. SW corner of Day Care not in session.

Craig Hammond 8/24/93

9:40 photo #18 by FDM of DV @ SS-03 Trench @ 4" depth ~1' high pile of wood chips nearby.

9:45 DM SAMPLES HH-SS03 VOLATILE FIRST DK. BROWN SOIL - DISTURBED WITH MUCH GRAVEL, BLACK CHIPS, GLASS, BRICK PIECES. VERY DRY. HARD DIGGING. 5"



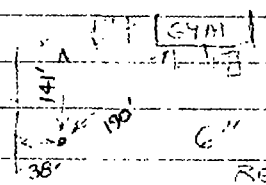

10:15 PICTURE #19 OF FDM BY DV STANDING ON PILE OF BLACK TAR MATERIAL (ROOFING?) DAY CARE IN BACKGROUND APPROX. 100'

Craig Hammond 8/24/93

10:35 arrive at sample
pond HH SS-04 and
Playground HH-SS-10

10:37 DV DIGS HH-SS-04
IN PRACTICE FIELD
190' FROM GYMNASIUM,
38' TO FENCE, 141' TO FRONT FENCE

10:40
Photo of DV + CJS at SS-04, 10
Gym on the right.
In the Practicing Field.




CJS SAMPLES
#4 & #10 @ 10:45
6" NATIVE SOIL
RED BR. CLAY

11:15 DV SAMPLES HH-SS-05
6" depth, 2' from rock-lined
drainway, 6' sign fence,
of Practice field.
GYM

Appears to be virgin soil.
~80' TO STADIUM BLEACHERS

1:15 CJS DIGGING HOLE FOR
HH-SS-06 & HH-GW-01
HH-SS-06 IS ~180' FROM FENCE
OF DAYCARE CENTER, ~~NEAR~~ IN BIOLOGICAL
AREA. THIS IS IN AREA WHERE
LOCAL TEACHER GOT WATER
SAMPLE. CLAY FILL (BROWN)
SOME ROCKS & GRAVEL

1:40 DV Sampling soil
pit 2' deep. No water.
Some glass hit at 1'6"-2'0".
Photo #22 also slag
yellow-brown clay
moist chunks of gray-black soil
in SS-06.

2:00
STRUCK 4" METAL PIPE @ 2½' DEPTH
WATER GUSHED IN GRAY, CLOUDY $H_2O$
SMELLS LIKE SEWAGE. SUNKEN VAGUE
TRENCH TO W OF TRAIL - COULD ARE

Photo #23 - CJS took photo
of DV holding tape (2' above
water in hole) (2:10 PM)

2:15 PM DV sampling HH-GW-01
Photo by CJS ↗

3:00 pm SS-07
Dark brown soil
14" depth
at group center/rest stop 1' IN FRONT OF BENCH
Photo #25 of DV by FDM
135' TO PRACTICE FIELD FENCE
130' TO SS-06 FROM SS-07

#26 PHOTO: PRACTICE FIELD & STADIUM

8/5 11:10 VISITED DRAIN CULVERT NEAR
FOOTBALL FIELD. TRYING TO DETERMINE
DEPTH OF CLAY CAP. IT IS UNDETERMINABLE
BUT APPEARS SHALLOW. BRICKS & ROCKS
ALL THE WAY TO THE TOP OF CULVERT
SLOPE. BOTTLES & ASPHALT ON SURFACE

MISTAKE
MEANT TO PUT AT END OF NEXT ENTRY
Gary Hammond 8/24/93

Wed 8/25/93

8:30 AM at site
CJ Stannard
D Vanhook
FD Miller
Cldy, 80°, expected hi-mid 90's

9:00 SS-08 gray clay, dry, stiff
w/ mottles.
6-12" depth
100' in approach road from
baseball/soccer field.
perpendicular
chunks of black matl in shovelled
hole.
Photo #1 by CJS of SS-08

clay cap ~ 2" thick
fill hit gray matl.

SS-09 400' from SS-08
145° to left of line SS08/SS11

SS-11 500' from SS-08 approx parallel to cleared area in Howard School (baseball area)

SS-09 Don digging black coal-like matl burnt smell. 5' diam barren area.
9:30 Sample time gray sludge at 4" depth 6-8" depth

9:30 Photo #2 by FDM of DV gray soil is rubbery.

10:15 DIGGING SS-11 ~200' INTO LANDFILL FROM NORTH EAST STADIUM LIGHT.
YELLOW BROWN LOAM, EASY DIGGING PACKED AT 6".
COLOR CHANGE GRAVELY GREY BROWN MATL.
PIECES OF BRICK

Gary Hammond 8/25/93

SS-11
10:30 SAMPLE TAKEN BY DV 6"-10" PIECES OF BRICK & WOOD. HARD TO DIG DEEPER BECAUSE OF BIG PIECES OF WOOD.

10:30 AM – CJS took photo of DV at sample HH-SS-11.
Stadium light pole in background.

| | | | |
|---|---|---|---|
| 9/25 DROVE | 53 DJ | 73 | 18mi |
| 9/24 DROVE | " | | 8mi |

Back at office at 1:00 PM
The End? NEVER!

Gary Hammond 8/25/93

- BRIDGE

JENT

CREEK

ET SPOKEN

CAR BY

ER OVERFLOW "16"

TER, LOOKS

G

BUBBLING

N WATER

IT UP

D UPGRADIENT

OILYNESS.

DV/11-18

3 pm : CHT CK UNDER ~~BROAD~~ MARKET ST.
BRIDGE. EASY ACCESS AT
MARKET ~~BROAD~~ ST FROM HOUND SCHOOL.
LOOKS LIKE PEOPLE HAVE
BEEN THERE OUT A BIT.

PICTURE #9: CITY DUMP TRUCK
UNLOADING NEAR DAY CARE

SHOWED A & A SOIL SAMPLE LOCATIONS

LEFT @ 3:25 pm

DV 11/18

"Rite in the Rain"®

ALL-WEATHER

# LINE RULE

Notebook No. 391

| |
|---|
| HOWARD #1 NOTEBOOK |
| #33-606 |
| |
| |
| |

"Rite in the Rain"
ALL-WEATHER WRITING PAPER ®

Name

Address

Phone

Project

Yellow Polyethylene Protective Slipcovers (Item #31) are available for this style of notebook. Helps protect your notebook from wear & tear. Contact your dealer or the J. L. Darling Corporation.

Howard High 33-606

Preliminary OVA & Hmw investigation (10.2 ev)

1:30 PM CJS, AK, DVH, Andy, Sherie, Andy Binford arrive at Howard High site; overcast, 80's slight breeze. (sun popped out later)

#17 - DVH took photo of group in pkg lot (CJS) 1:30pm

#18 - AK reading sewer grate with Hmwf 2:05pm

#19 - Andy Binford + Andy Sherie doing OVA readings in subbasement feature

Craig Stannard 8/5/93

3150 returned to vehicle and on
[illegible] letter to the office
Left site at 4:15 PM

4 Miles SS BR52
Ram

Craig Hammond 8/25/93

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 12

OCT 4 1972

OCT 2 - 1972

# City of Chattanooga

DEPARTMENT OF
PUBLIC WORKS, STREETS AND AIRPORTS
Chattanooga, Tennessee 37402

CHARLES A. ROSE
COMMISSIONER

ELLIS L. SPENCER
CITY ENGINEER

September 28, 1972

Mr. Jack McCormack
Division of Water Quality Control
6200 Building, Suite 6100
Chattanooga, Tenn. 37411

Dear Mr. McCormack:

We wish to request from the Division of Water Quality Control a Certificate of Complinace with State Water Quality Standards for the following project proposed by our Department:

Description: A land reclamation-refuse disposal project involving the deposit of approximately 20 feet of fill material over a 40-acre tract.

Location: East of South Market Street and north of Chattanooga Creek approximately 2 miles upstream of Mile 460 of the Tennessee River.

Two copies of plans describing the general design of the project, two copies of a map showing its location, together with two copies of a report of the anticipated environmental consequences resulting from the proposed project are attached. We are also including a copy of a report previously submitted to the Tennessee Division of Solid Waste Management describing operational procedures for the project.

We have submitted similar plans to the TVA for approval under Section 26 of the 1933 TVA Act. Please request your Nashville office to forward a copy of the required certificate directly to the following office:

~~Mr. Robert D. Brown~~
~~Land Use Agent, Central District~~
~~Division of Reservior Properties~~
~~516 N. Madison Avenue~~
~~Athens, Tennessee 37303~~

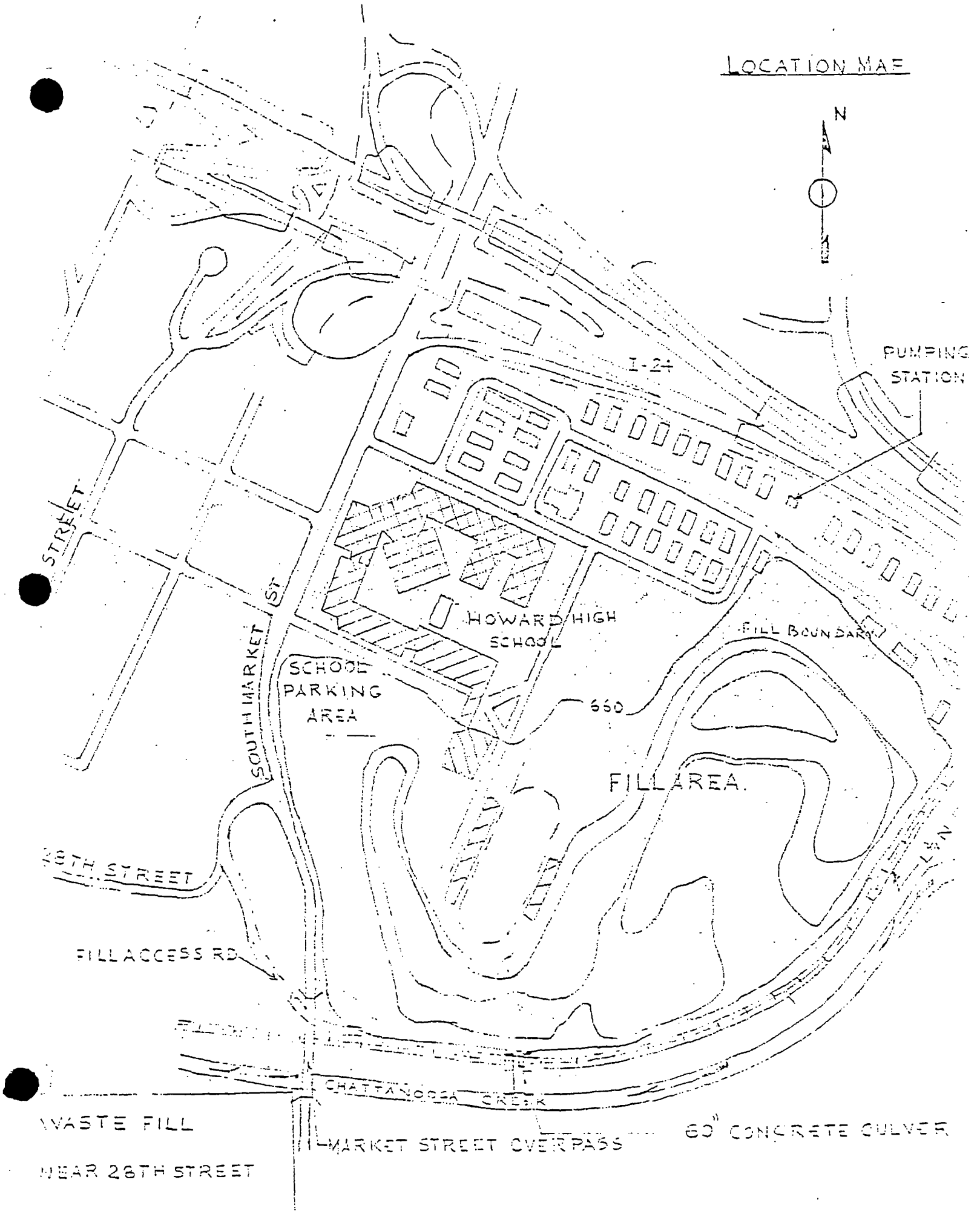
Mr. Fred Massengill
523 New Sprankle Bl.
500 Union Av.
Knoxville, Tenn. 37

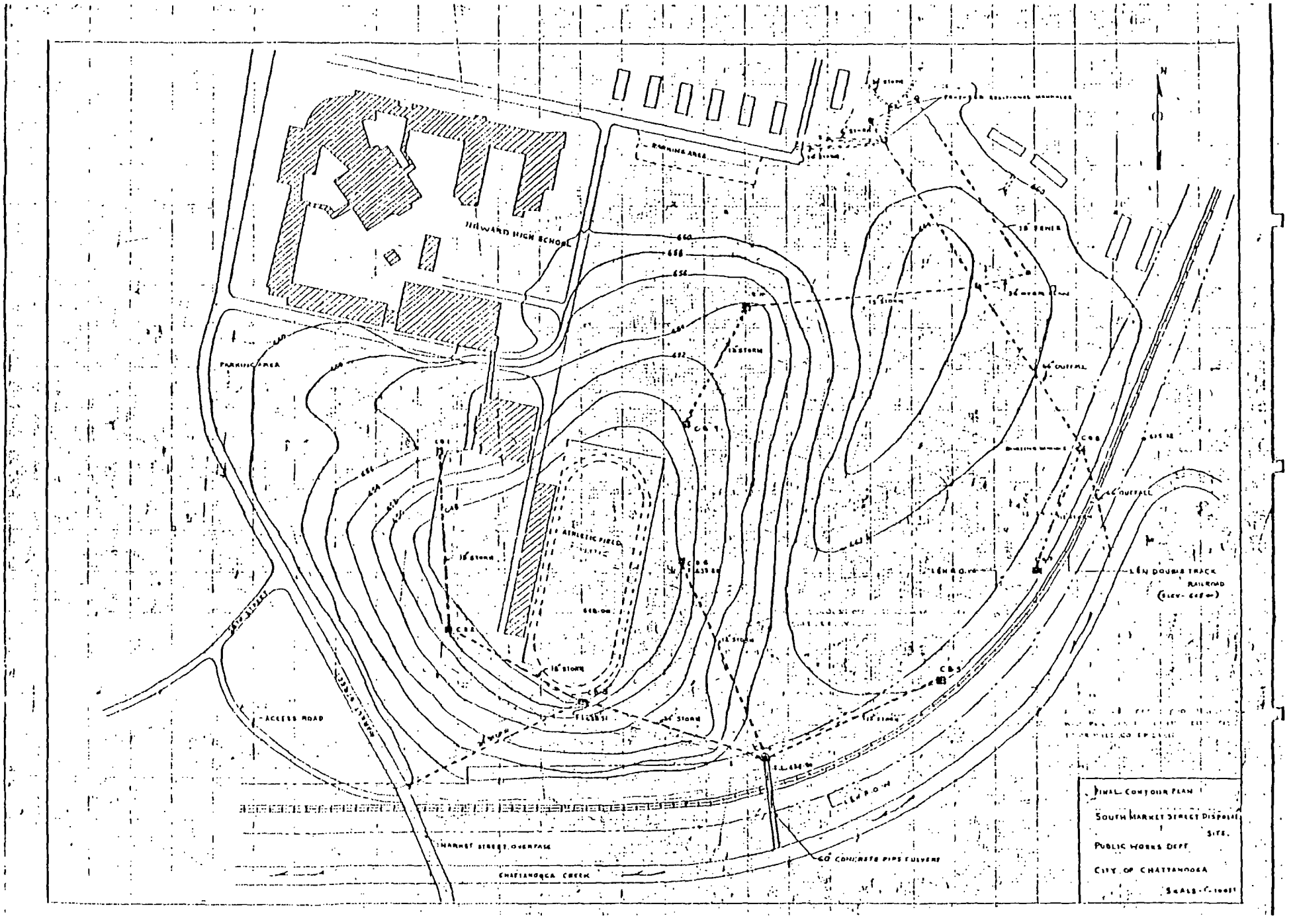
Please call us if you have any questions about the enclosed documents.

Sincerely,

James H. Templeton

James H. Templeton
General Superintendent


LOCATION MAP
N
I-24
PUMPING STATION
STREET
SOUTH MARKET ST
HOWARD HIGH SCHOOL
FILL BOUNDARY
SCHOOL PARKING AREA
660
FILL AREA.
28TH STREET
FILL ACCESS RD
CHATTANOOGA CREEK
WASTE FILL
NEAR 28TH STREET
MARKET STREET OVERPASS
60" CONCRETE CULVER


HILLWARD HIGH SCHOOL
PARKING AREA
ATHLETIC FIELD
ACCESS ROAD
MARKET STREET OVERPASS
CHATTANOOGA CREEK
LEN DOUBLE TRACK RAILROAD
FINAL CONTOUR PLAN
SOUTH MARKET STREET DISPOSAL SITE.
PUBLIC WORKS DEPT.
CITY OF CHATTANOOGA

# ANTICIPATED ENVIRONMENTAL CONSEQUENCES OF LAND RECLAMATION-REFUSE DISPOSAL PROJECT

1. Environmental Impact

The project will be of significant benefit to the immediate neighborhood by reclaiming some 40 acres of low, overgrown property to a uniform and usable elevation. Breeding grounds for vermin due to the ponding of surface runoff from surrounding property will be eliminated. Proper contouring during and after construction together with a network of catch basins and subsurface drains will insure improvement of existing drainage in the area.

2. Probable Adverse Effects

None. Refuse is restricted to those materials which will not pollute surface or subsurface water. Waste materials are covered and compacted daily in accordance with state-approved landfilling techniques.

3. Alternatives to Proposed Project

None. The selective and carefully-supervised deposit of refuse materials as fill provides the only method for physical improvement of an area of this size.

4. Relationship Between Long and Short-term Use

There is no use for the proposed fill area in its present condition. An average fill of 20 feet to the 660-foot elevation will provide 40 acres of land adjacent to a high-density residential project and to a large school for use as open space and for recreation facilities. Such features, properly planned and landscaped, will enhance the quality of life and the aesthetic appeal of the neighborhood.

5. Irreversible Committment of Resources

None, other than the municipal funds required to carry out the filling and reclamation project in an environmentally satisfactory manner.

Exhibit 3

CERTIFICATE OF COMPLIANCE WITH STATE WATER QUALITY STANDARDS

The plans of the City of Chattanooga, hereinafter called "Applicant," for construction and operation of a Brush and Demolition Refuse Disposal Site on land bordering the Chattanooga Creek in Hamilton County, Tennessee, 2 miles upstream of the Tennessee River, Mile 460, which plans involve surface drainage only into Chattanooga Creek, have been duly examined and reviewed by the responsible officials of the

Division of Water Quality Control

hereinafter called "Agency." The undersigned hereby certifies that Agency has determined, in accordance with section 21(b) of the Federal Water Pollution Control Act, as amended, that there is reasonable assurance that construction and operation of the proposed facilities in accordance with the aforesaid plans submitted by the Applicant and reviewed by this office will be conducted in a manner which will not violate applicable water quality standards of the State of Tennessee.

_____
(State agency responsible for water quality control)

Date_____ By_____

Title_____

August 17, 1972

# SOUTH MARKET STREET TRASH DISPOSAL SITE

## A. Background

In developing adequate disposal facilities for its solid waste, the City of Chattanooga faces a difficult task in identifying sites which are both environmentally acceptable and convenient to the sources of waste generation. Improvement and registration of the Summitt sanitary landfill has greatly enhanced the City's disposal system. However, there remain large amounts of waste which either are inert or decompose slowly and with little negative environmental effects. For these materials a metropolitan disposal site is highly desirable so as to avoid the excessive public and private costs of transfer to the Summitt landfill.

These materials do not pose the threat to water quality of residential garbage and highly soluble commercial and industrial waste. They do not provide sustenance for rodents or insects, and they are not the source of odors or fires due to organic decomposition and spontaneous combustion. Precautions are necessary in their handling, but locational and operational requirements are somewhat less stringent than those pertaining to more noxious wastes.

An area surrounding the old creekbed of the now diverted Chattanooga Creek has been identified which is thought not only to comply with solid waste regulations but to offer the possibility of significant land reclamatic as well. In the following sections operational procedures will be outlined which will assure that disposal at this site conforms to all State Standards

## B. Existing Practice

At present two municipal locations exist for the disposal of dry trash and demolition waste. One of these is off Amnicola Highway just east of the Tennessee River. This site is strictly supervised and receives mainly excavation dirt, stone, lumber, and brush. An air-curtain destructor is maintained on the site for the incineration of lumber and wood. Leaves and stumps which cannot be burned are covered and compacted.

The second location now receiving assorted trash is the 38th Street disposal site. Dry refuse of various descriptions is received here but is often mixed in the same load or in other deliveries with refuse of a biodegradable nature which is unacceptable for disposal in such close proximity to Chattanooga Creek which flows to the west of the fill.

In accordance with State and federal directives, both of these sites are being closed to further waste disposal and will be covered, compacted, seeded and abandoned by the end of September, 1972. August 19 is presently

scheduled as the last day for public use of either of the above sites. It is imperative, therefore, that an acceptable alternative be designated for disposal of the municipal trash constantly being generated within the City of Chattanooga.

C. Site Description

The site is located in South Chattanooga east of South Market Street and 1/2 mile south of I-24, thus making it easily accessible from all parts of the City. It consists of some 44 acres of low land remaining after diversion of Chattanooga Creek in 1969 in a railroad relocation project. The new Louisville and Nashville Railroad embankment at an elevation of 665 feet forms the southern and eastern boundary of the proposed fill area. The Maurice Poss Homes, a multiple-family housing development, and Howard School, an elementary through high school facility, lie north of the fill.

The entire 44 acres of the site are under City ownership. However, a restriction on 10 acres conveyed to the City in 1971 requires that this portion of the property be used within five years for recreational purposes. This requirement was a major factor in the City's decision to reclaim the low-lying property to a usable condition and accounts for the high priority attached to the project. Accordingly, much of the operational plan is designed to prepare the site for final use as a recreational facility.

Original soil in the fill area of the former creekbed is silty soil of the Lindside-Melvin-Philo classification. Available records indicate that the old creekbed was filled to a level of 635 feet with a variety of shaly soil after diversion was completed. An open drainage-way was left and is connected with Chattanooga Creek to the south by a 60-inch pipe beneath the railroad embankment.

D. Proposed Operational Procedures

1. Waste Restrictions

The Department of Public Works is well aware of the potential for both water pollution and adverse public reaction from improperly operated disposal sites. Proper usage and correct operation are mandatory for the success of the South Market Street project. Consequently, the key element in plans for the site is the committment of all necessary personnel and resources to regulate the flow of waste into the site and to assure that no inappropriate or harmful materials are permitted.

Operation of the trash site is integrally related to operation of other components of Chattanooga's waste management system and is critical to the acceptability thereof. In order to afford a clear definition of the function of the South Market Street site, as full as possible a listing is given below of those materials which will and will not be permitted for disposal:

## Materials Permitted*

Demolition materials:

a. Stone and masonry
b. Concrete
c. Asphalt
d. Timber
e. Roofing material
f. Structural steel

Trees, limbs, and stumps
Brush and yard trimmings

Leaves
Stone
Dirt
Ash
Cinders
Foundry sand
Street sweepings
Glass and ceramics
Tires
Wood products, pallets, and crates

## Prohibited Materials*

a. Furniture
b. Appliances
c. Bulky Machine Parts
d. Wire and Screen
e. Leather
f. Textiles and rugs
g. Paper and cardboard
h. Rubber and plastic materials
i. Garbage
j. Liquids

2. Site Capacity

With an average fill of 20 feet in the 44-acre depression, some 1.25 million cubic yards of compacted waste can be received by the site. At a liberally estimated rate of 2000 cubic yards of waste per day, the site would have a utilization life of approximately 2 1/4 years.

*As amended August 22, 1972.

3. Survey Procedures

The existing and final site plans submitted with this report are taken from TVA Flood Control maps of 1 inch to 100 foot scale. Some extrapolation was necessary to account for contour changes subsequent to the diversion of Chattanooga Creek from the proposed fill area. Preliminary survey work verified the elevations of existing drainage structures and of the surrounding rail and school facilities.

Elevations will be set throughout the construction period to indicate to operating personnel the required level of fill and necessary slopes. Periodic checks will be made to assure full utilization of fill capacity and proper drainage grades.

4. Access: Roads and Fencing

Access shall be via an all-weather road from a point on 28th Street 225 fe west of South Market Street some 800 feet to and under the Market Street viaduct and into the fill depression. This route will avoid the problems of heavy traffic passing in the vicinity of the school and housing project.

From the end of the paved access road, a compacted roadway will be prepared to respective fill areas. This road will be gravelled if necessary to withstand wet weather and will be sprinkled in dry weather to eliminate dust.

The site is presently enclosed on all sides either by fence or creek and railroad tracks and is thus inaccessible with the exception of this one road. One gate with padlock will be installed at the entrance from 28th Street and another at the viaduct itself which will completely restrict ingress.

5. Filling and Cover

Filling will begin in the western section (A) of the depression south of the Howard School parking lot and will proceed to an intersection with the 60-inch railroad drain. Work will then begin in the eastern section (B) south of Maurice Poss Homes and move to the south and west.

Two 8 to 10 foot lifts are expected to bring the entire depression to the desired elevation. The entire fill area will be divided into 3 to 4 acre divisions with the two lifts being constructed sequentially in each division before filling is begun on the next division.

In each working division waste will be deposited by delivery vehicles at the toe of a 200-foot working face. Waste will then be compacted by a dozer working upwards on a 3:1 slope. Excavation dirt and stone will be stockpilec

r cover at the end of each working day. Normal disposal of dirt is expected to provide sufficient soil for at least partial daily cover. Complete cover will be provided once weekly with any additional dirt that may be necessary being hauled in from a nearby source by City vehicles.

Odors are not expected to be a problem at the site as no putrescible waste will be accepted. Daily and weekly cover will, therefore, be primarily designed to prevent fire and unsightliness.

6. Drainage

With ultimate recreation use under consideration, surface drains are deemed inappropriate for the site. A system of catch basins and underground conduits has therefore been designed to carry off surface water from the fill area.

An initial problem lies in the need to provide for drainage from the school parking lot and gymnasium into Section A of the fill area and to intercept five surface drains presently emptying into Section B. In Section A catch basin I will receive surface drainage from school property into a 15-inch pipe which will in turn connect with the 60-inch railroad drain. In addition, catch basins 2 and 3 will collect surface runoff from the fill itself into the 15-inch pipe. Catch basin 4 near the 60-inch railroad drain will collect water from the southern portion of the fill. Basins 5 and 6 in section B also connect via 12-inch pipes to the 60-inch drain.

The five storm sewers in the northern portion of Section B will be connected with a 66-inch overflow line presently crossing the site. Catch basins 7, 8, 9 and 10 will tie in to this line to provide surface drainage from the sides of the fill in Section B.

The fill in Section A will be sloped from the west to east and south while Section B will be sloped from a north-south ridge line to both east and west. The fill in Section B will connect with the railroad embankment some 5 to 6 feet below its top and will adjoin Howard School playing fields at varying elevations and at 1 to 4% slopes. Section B will have a slight north to south slope as well.

7. Air-Curtain Destructor

The air-curtain destructor now located at the Amnicola brush dump will b transfered to the South Market Street site. It will be installed in the southern portion of the depression the greatest possible distance from both the Poss Homes and Market Street. By keeping this installation a sufficient distance from the working area of the trash fill, the two operations will remain separate in the mind of the public and of those who use the site.

This unit will afford a significant volume reduction for lumber, wood products, and brush which are delivered to the site. The destructor and burning pit will be constructed and operated in conformity with guidelines of the Chattanooga-Hamilton County Air Pollution Bureau.

8. Supervision and Administration

The Department of Public Works shall supervise and administer the site. Personnel involved in the daily operation will include two watchmen, two operators, one spotter, and one foreman. Watchmen will be on duty from 7 A.M. to 11 P.M. The day watchman will be charged with controlling access and will assist the spotter in directing vehicle movement. The night watchman will collect any blowing litter from the day's operation and will prevent any trespassing or illegal dumping. The foreman will help regulate access and will have on-site responsibility for filling and cover operations and for enforcing disposal regulations.

9. Equipment

One TD-15 and one TD-20 dozer will be used for movement, cover, and compaction of the waste. A Bucyrus Erie crane will be utilized to convey flammable wood products into the air-curtain burning pit for incineration.

10. Signs

A prominant sign at the gate will set forth disposal hours and regulations. Limitations on the material permissible at the site will be clearly spelled out. Vehicles bearing wastes other than those listed in Paragraph 1 above will be directed to deliver these materials either to a transfer station or directly to the sanitary landfill, depending upon volume and composition of the load.

11. Communications

Telephone connections will be installed at the site for ready communication with Public Works and Police Department offices in the event of any emergency or any attempted violation of disposal regulations.

12. Employee Facilities

A shelter will be provided for City personnel employed at the site.

13. Public Education

Public announcement of the regulations governing this site will be made upon its opening to inform contractors, businesses, and the community at large of the requirements for disposal. Pre-segregation of waste will be encouraged to allow for disposal at the proper facilities with a minimum of inconvenience for both waste generators and City supervisory personnel. A permit system for haulers of large amounts of demolition waste may be instituted if judged to facilitate better regulation.

It shall be made clear to the public that scavenging, trespassing, setting fires, littering, and disposing of unauthorized waste will not be tolerated. Strict enforcement of these regulations and arrest and assessment of the maximum fine for any violations thereof will give further weight to the educational effort.

14. Final Use

As each division of the fill is completed and brought to final contours, it will be graded and seeded to give the reclamation project a more attracti appearance. Hedges will also be planted where needed to screen the working area from public view.

Upon completion of the fill, a large area will become available as open space and a passive recreation facility. Discussions have already been held between City recreation personnel and school officials and local residents concerning recreation needs in the area. Picnic tables, barbeque pits, athletic fields, and a children's playground are among the possible uses which aroused the most interest. An expansion of the school parking facilit on the fill in Section A also seems highly desirable.

September 1, 1972

## Addenda

### 1. Fill Progression Description

The accompanying Fill Progression Plan illustrates the sequence of filling for the estimated 118-week life of the South Market (28th) Street Disposal Site. Initial activity will be devoted to preparation of a 120 by 2000 foot access road constructed on eight feet of compacted and covered refuse. This phase of the operation, represented by the diagonally-lined Section C on the Fill Plan, is expected to take six weeks.

When the access road reaches the northeast corner of Section B, cell construction will begin in north to south progression. Each cell throughout the fill will be 300 by 175 by 8 to 10 feet in dimension and will contain the refuse of two weeks. The 175-foot working face of each cell shall be given a six-inch cover at the end of each day and the entire cell shall receive an intermediate one-foot cover upon completion.

Two lifts will be required throughout the fill area to reach the desired elevation. With one exception the first lift of cells will be completed throughout Sections A and B before the second lift is begun. This will allow for additional compaction through movement of vehicles and equipment and some settlement prior to construction of the second layer of fill. The exception to this sequence will be in the area of the four northernmost cells in Section B. Here the first and second lifts shall be constructed successively. A final two-foot cover shall then be applied, graded and seeded. This will be done to remove the working area of the fill some distance from the adjacent dwelling units and to demonstrate to the local residents the anticipated appearance of the finished fill.

Throughout the remainder of Section B, construction of the first lift will occupy weeks 23 through 46 while the second lift will proceed from week 47 through week 87. In Section A, 15 weeks will be required for the completion of the first lift and 16 for the second.

During filling, more easily compacted refuse such as brush and tree limbs will be deposited at the foot of the working face and worked into the fill by upward passage of a dozer. Heavier items such as masonry and large timbers will be deposited on the upper edge of the working face and compacted downward. Such items are difficult to work up a slope with a dozer and serve the function, when deposited on looser refuse from above, of providing natural compaction by their own weight.

Throughout construction of the first lift, the intermediate surface shall be kept sloped to collection points to the underlying drainage pipe network in the same conformity as the proposed final contours.

The above fill plan represents a revision of the sequence submitted in our August 17 report wherein work was to commence at the north end of Section A and move later to Section B. It is now felt that it would be best to fill that portion of the depression nearest the residential area and to bring it to completed form as soon as possible. Also a change in site designation from South Market Street to 28th Street is considered desirable.

2. Drainage

Measures for control of the drainage from Howard High School and parking lot are detailed in Section 6, paragraph 2 on Page 5 of the report submitted on August 17.

3. Air Curtain Destructor

A new location is being sought for the air curtain destructor formerly operated at the Amnicola brush disposal site. A burning pit lined with brick or steel sheet pilings will be constructed in conformity with Air Pollution Control Bureau guidelines and the Division of Sanitation and Solid Waste Management will be appraised of operational procedures.

4. Fencing

As mentioned in Section 4, Paragraph 3 of the earlier report, the disposal site is fenced along the northern perimeter bounding Howard High School. It is not felt that further fencing is justified on sides of the fill away from the school as site attendants have been charged with prohibiting ingress from these quarters.

5. Material Restrictions

The foreman at the disposal site has been directing private and commercial vehicles bearing prohibited wastes to proceed to the Summitt Landfill. Haulers delivering mixed loads are advised to segregate their waste items to permit continued use of the 28th Street Site. Compliance has been obtained from regular haulers of unacceptable waste and is currently being sought with occasional and smaller-scale haulers previously accustomed to the use of a municipal dump.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 13

#33606

# Potential Hazardous Waste Site

## PRELIMINARY ASSESSMENT

HOWARD HIGH SCHOOL LANDFILL CHATTANOOGA, TENNESSEE TND 100842343

PRELIMINARY ASSESSMENT

HOWARD HIGH SCHOOL LANDFILL

CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

TND 100842343

## I. HISTORY OF SITE

The Howard High School Landfill is located on South Market Street, ½ mile south of Interstate 24 behind Howard High School. It consists of some 40 acres of low land remaining after Div~~i~~ERsion of Chattanooga Creek in 1969 during a railroad relocation project. The new Louisville and Nashville Railroad embankment at an elevation of 665 feet forms the southern and eastern boundary of the landfill. The Marice Poss Homes, a multiple-family housing development, and Howard School facility, lie north of the landfill. The landfill was to be used to reclaim the land left by the Creek Diversion and was to be used as a brush and demolition refuse disposal site only but photo documentation by the Division of Water Management shows that industrial sludges were disposed of, out of regulation at the landfill.

## II. NATURE OF HAZARDOUS MATERIALS

Amount and composition of the sludges are unknown but ~~ty~~ if any hazardous substances are present since the site lies in an old diverged area of Chattanooga Creek and a ~~f~~fault ~~f~~runs through the site and any migration of contaminates could follow the fault to groundwater. The close proximity of the site to Chattanooga Creek and the drainage system under the site could contribute to surface migration of any hazardous substances than may be at the landfill.

## III. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS.

In a new site discovery form by Michael J. Higgs he states that the Division of Water Management has photo documentation of industrial sludges dumped at the landfill. Also according to an office memo sent by Mr. Charles A. Steele to Mr. V. Wayne McCoy he states that paper cartons, household garbage, and metal drums had been dumped at the landfill. All of the above substances are contained on the prohibited materials list contained in the certificate of compliance with State Water Quality Standards issued to the landfill.

## IV. ROUTES OF CONTAMINATION

The Landfill lies adjacent to Chattanooga Creek and is underlain by a storm drainage system that empties into Chattanooga Creek, any leachate from the landfill could be carried to the Creek by either surface run-off or by the storm drainage system. A thrust fault runs through the center of the landfill and could act as a route for direct migration to groundwater if vertical migration of any possible hazardous substances occurs.

## V. POSSIBLE AFFECTED POPULATION AND RESOURCES

Possible surface and groundwater contamination from migration if hazardous substances are present. No drinking wells are in the vicinity and all drinking water is supplied by Chattanooga Municipal Utilities Service which has its source at River Mile 465.3 which is 3 miles upstream from the mouth of Chattanooga Creek. The immediate area is an urban residential area of Chattanooga, Tennessee. The population of Hamilton County in the 1980 Census was 287,740.

## VI. RECOMMENDATIONS AND JUSTIFICATIONS

There is no evidence that past waste handling practices at the landfill are affecting the population or environment. However due to the observed dumping of prohibited materials and the unknown composition of the waste a low priority is given to the landfill and should be sampled on a time available basis.

## VII. REFERENCE TO SUPPORTING DATA SOURCES


1. New site discovery information, Nashville Central Superfund file.

2. Preliminary geologic review of trash sites, City of Chattanooga, Nashville Central Superfund files.

3. Office memorandum from Charles A. Steele to V. Wayne McCoy, Nashville Central Superfund fils.

4. Certificate of compliance with water quality standards, Nashville Central Superfund files.

5. Field notes of Michael J. Higgs and Margaret E. Dew dated 1-25-84, Nashville Central Superfund files.

6. Chattanooga, Tennessee 7½ minute quadrangle topographic map (1969)

7. Fort Oglethorpe, GA - Tennessee 7½ minute Quadrangle Topographic Map (1982).

EPA

# POTENTIAL HAZARDOUS WASTE SITE PRELIMINARY ASSESSMENT
## PART 1 - SITE INFORMATION AND ASSESSMENT

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

**II. SITE NAME AND LOCATION**

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER |
|---|---|
| Howard High School Landfill | South Market Street |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 COUNTY | 07 COUNTY CODE | 08 CONG DIST |
|---|---|---|---|---|---|
| Chattanooga | TN | 37402 | Hamilton | 33 | 3 |

| 09 COORDINATES LATITUDE | LONGITUDE |
|---|---|
| 35° 01' 25.7" | 85° 18' 24.3" |

10 DIRECTIONS TO SITE (Starting from nearest public road)

Southeast of the intersection of South Market Street and Interstate 24.

**III. RESPONSIBLE PARTIES**

| 01 OWNER (If known) | 02 STREET (Business, mailing, residential) |
|---|---|
| City of Chattanooga | |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 TELEPHONE NUMBER |
|---|---|---|---|
| Chattanooga | | | ( ) |

| 07 OPERATOR (If known and different from owner) | 08 STREET (Business, mailing, residential) |
|---|---|
| Same | |

| 09 CITY | 10 STATE | 11 ZIP CODE | 12 TELEPHONE NUMBER |
|---|---|---|---|
| | | | ( ) |

13 TYPE OF OWNERSHIP (Check one)

☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: / / (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: / / (MONTH DAY YEAR) ☒ C. NONE

**IV. CHARACTERIZATION OF POTENTIAL HAZARD**

01 ON SITE INSPECTION

☐ YES DATE / / (MONTH DAY YEAR)
☒ NO

BY (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)

☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION

1972 (BEGINNING YEAR) | 1976? (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Site was to be operated as a brush and debris landfill only, but the Division of Water Management has photo documentation that industrial sludges and other wastes were put there in violation of restrictions.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

The site was described in a 1972 geologic report as being low and swampy, shallow water table, surface connections to Chattanooga Creek, probably underlain by solution cavities, underlain by a thrust fault, and suitable for inert waste only.

**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) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect 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 |
|---|---|---|
| Phil Stewart | Division of Water Management | (615) 624-9921 |

| 04 PERSON RESPONSIBLE FOR ASSESSMENT | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NUMBER | 08 DATE |
|---|---|---|---|---|
| Charles R. Rush | TDH&E | Superfund | (615) 741-6287 | 9 / 29 / 86 (MONTH DAY YEAR) |

EPA FORM 2070-12 (7-81)

EPA

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

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| TN | D 100842343 |

## II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED unidentified — 04 NARRATIVE DESCRIPTION
Area has a shallow water table and ground water contamination is possible by leaching if hazardous waste is present.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED unidentified — 04 NARRATIVE DESCRIPTION
Site lies adjacent to, and in the flood plain of Chattanooga Creek and has storm drains that empty into Chattanooga Creek.

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 [ ] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 40 (Acres) — 04 NARRATIVE DESCRIPTION
The site is an old landfill and if hazardous waste was dumped at the site, then soil contamination is probable.

01 [ ] G. DRINKING WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [ ] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED. _____ — 04 NARRATIVE DESCRIPTION

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

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

Site Name: Howard High School Dump

Site Number: TND 100842343

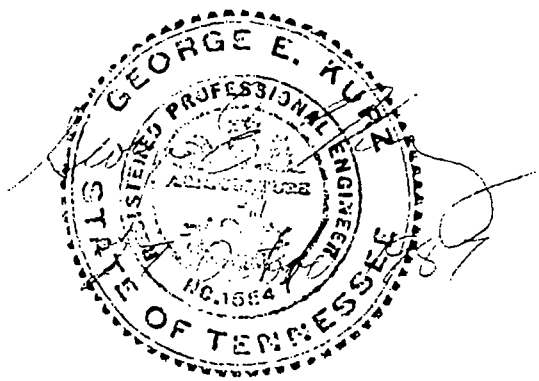
Reference Number: 14

INSPECTION REPORT

Combined Sewer Overflows and
Sanitary Sewer Overflows

Chattanooga Interceptor Sewer System

27 October 1987

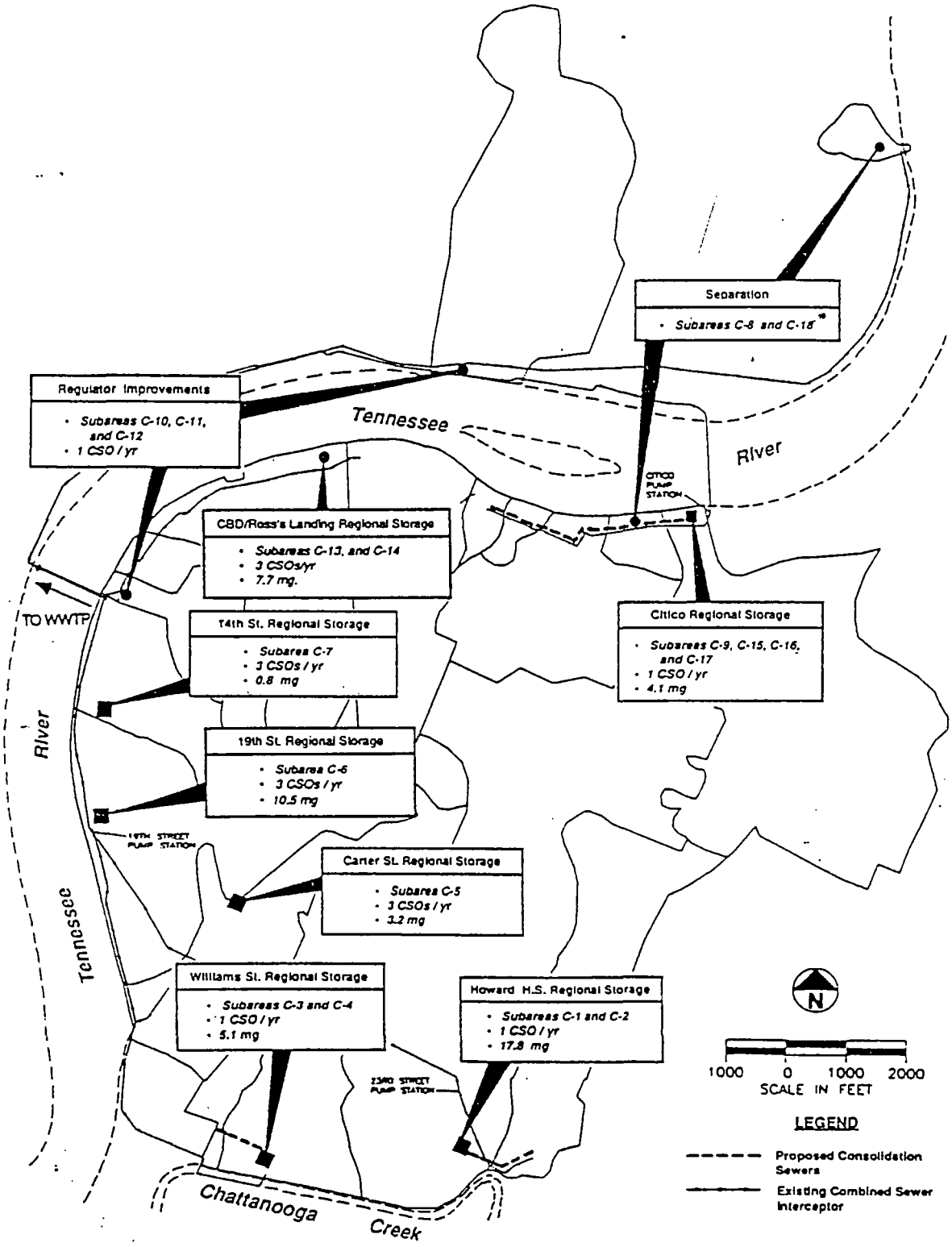



by

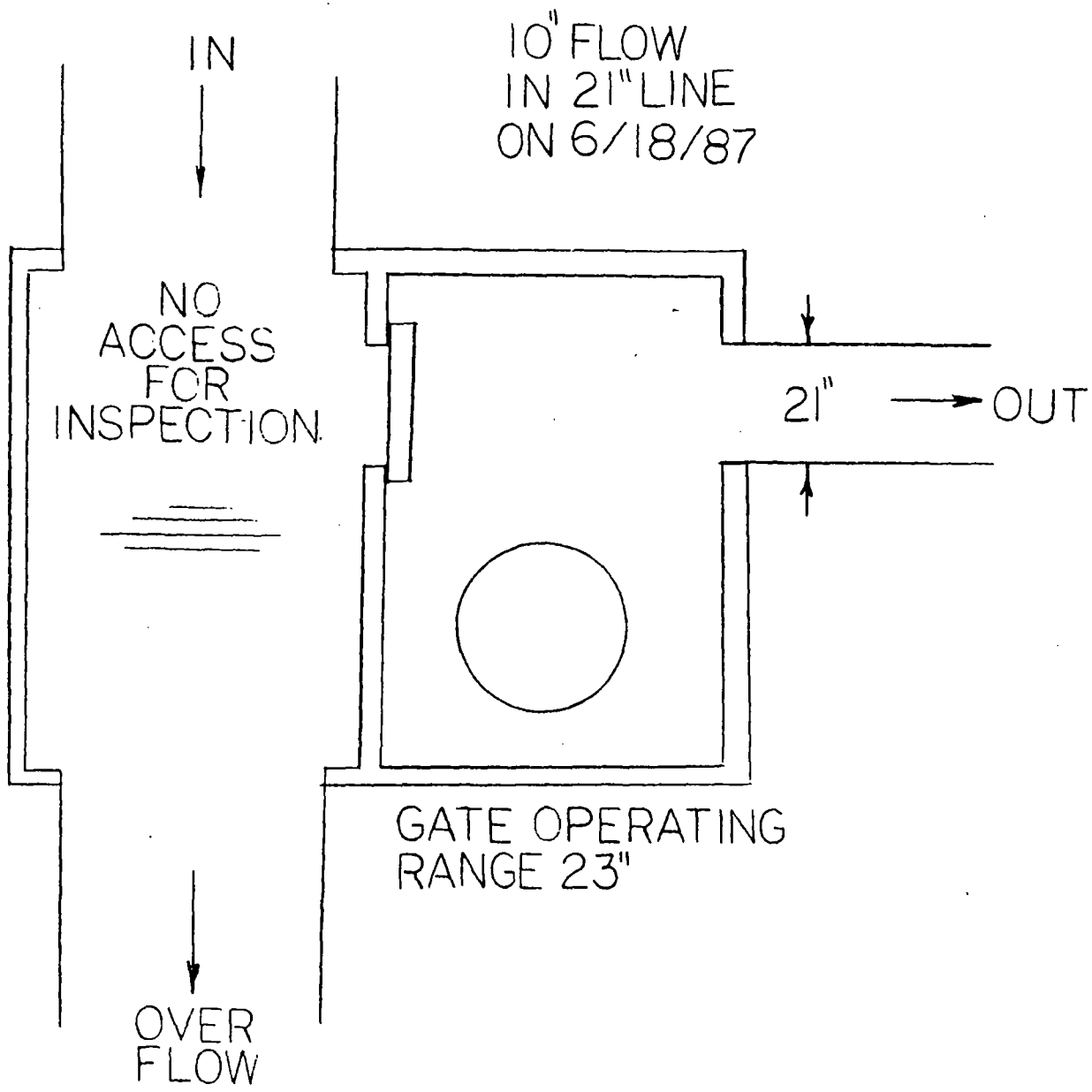
George E. Kurz, PE, System Engineer
& David A. Wilson, EIT, I/I Coordinator

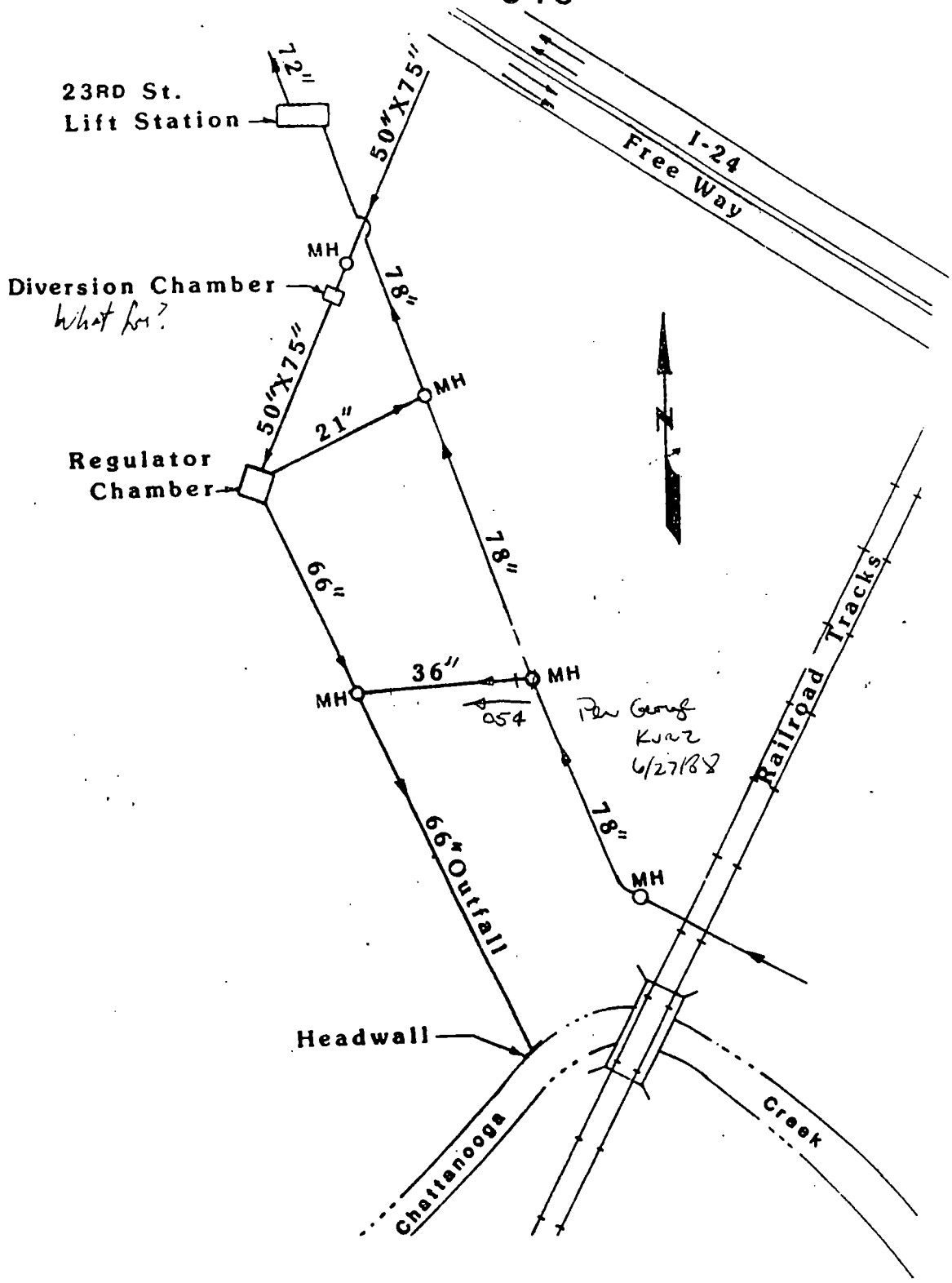
FIGURE 7-1 (Revised)

# CHATTANOOGA CSO FACILITY PLAN

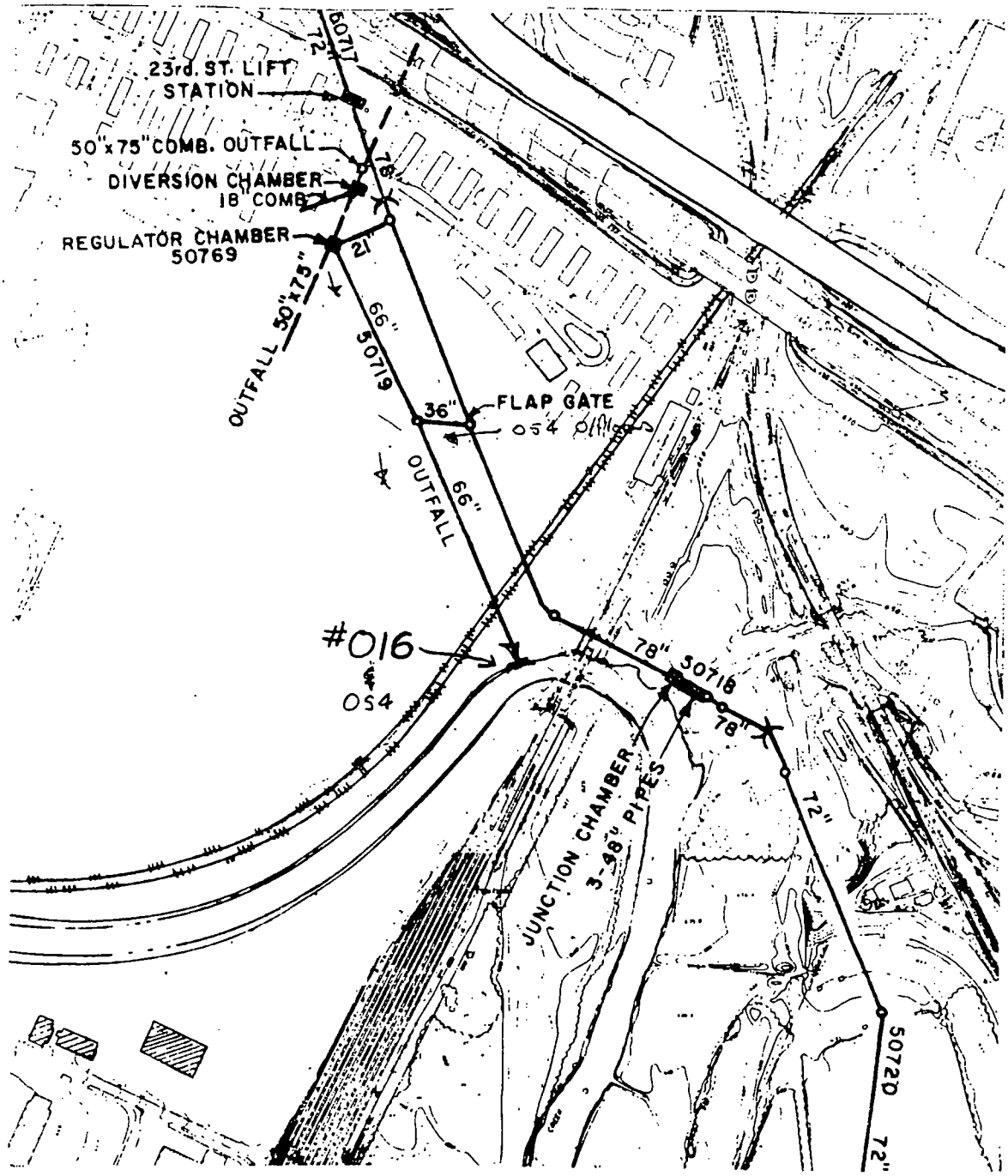


016


IN
10" FLOW
IN 21" LINE
ON 6/18/87
NO
ACCESS
FOR
INSPECTION
21"
OUT
GATE OPERATING
RANGE 23"
OVER
FLOW


23RD St.
Lift Station
72"
50"X75"
I-24
Free Way
MH
Diversion Chamber
what for?
78"
50"X75"
MH
21"
Regulator
Chamber
N
78"
66"
36"
MH
MH
054
Per George
Kurz
6/27/88
Railroad Tracks
78"
66" Outfall
MH
Headwall
Chattanooga
Creek

016BR


23rd. ST. LIFT STATION
50"x75" COMB. OUTFALL
DIVERSION CHAMBER
18" COMB.
REGULATOR CHAMBER
50769
OUTFALL 50"x75"
66"
50719
36"
FLAP GATE
054
OUTFALL
66"
#016
054
78"
50718
78"
JUNCTION CHAMBER
3-48" PIPES
72"
50720
72"
72"
78"
21"

Number: 016 BR 5054
Basin: C-2
Map#: C-2
Sanitary: ____ CSO: X

# CHATTANOOGA ISS DISCHARGES INSPECTION REPORT

Name/Location: Adams St. Regulator and 23rd St. Pump Station Bypass

Receiving streams (stream mile): Chattanooga Creek mile 2.1

Type of exposure during overflow (residential neighborhood, industrial, recreation, etc.) wooded but near residences, school

Physical condition: unknown

Tide gate, flap gate, check valve present?: unk Condition?: ____

Upstream industrial wastes: areas: B-9, B-8, B-7, and Dawn, ConAgra, National Linen, D. M. Steward, Mor Flo, R & D Products

Dry weather depth of flow in interceptor (in): 10" Calculated Flow (MGD): 3.7

Height of combined sewer weir/dam: 27" or height to overflow invert: ____

Maximum calculated flow capacity before overflow occurs (MGD): 10.54

Operating range of regulator chamber float: 23"

Outside diameter of pipe extension: unk Distance pipe extends beyond headwall: ____

Maximum submergence of overflow pipe discharge: 2'

Short term corrective actions: need to verify all lines, also condition of flap if present access

Estimated required maintenance actions: Monthly inspection and cleaning

Comments (environmental effects, observed flows, residue, or etc.): drwg #134-A-30 and 134-A-22 overflow submerged in Chatta. Creek, (also called "Washington St. Reg.")

Neareast power pole: - telephone pole: ____

Describe physical access & access problems: could not access overflow chamber (dam) access by foot

Inspected by: I/I Date: 6/18/87

See attached map, sketch, & photographs

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 15

OFFICE MEMORANDUM

CAS
JRM 11/16
JAC 11/17

TDWPC

File
Chattanooga and Hamilton County Dumps

DATE: November 16, 1972

TO: V. Wayne McCoy

FROM: Charles A. Steele

SUBJECT: Certificate of Compliance for City of Chattanooga's 28th Street Dump

On November 13, 1972 I inspected the dump operated by the City of Chattanooga near 28th and South Market Streets. The site is a low-lying swampy area which was one of the meanders of Chattanooga Creek prior to its channelization. In its present condition the land is little more than a mosquito hole. I concur with the environmental statement attached to the city's request.

The restrictions in subsection 1 of Section D were not being observed in early November. Large piles of paper, largely corrugated paper cartons, appeared to have been dumped from compactor equipment. There were metal drums and small amounts of household garbage in evidence.

Granting of the certificate is recommended. The Division of Sanitation and Solid Waste Management will have the greater voice in the matter.

CS

C.A.S.

CAS:ft

Attachments

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 16

TO: Howard High School File -- # 33606

FROM: Anthony P. Damiano, Jr. - Environmental Specialist II (TDSF)

DATE: November 6, 1987

SUBJECT: Documentation to show the reason ~~for~~ of using the alleged unauthorized industrial dumping as a proven fact.

It is a historical fact that most municipal landfills designated for brush and demolition debris in the 1950's, 1960's, and early 1970's ; especially the landfills in the Chattanooga Creek basin, had no mechanism (reporting system) for recording the type of waste actually being placed in the landfill. It had been reported by personnel from the TN Division of Water Quality that alleged dumping of industrial sludge was taking plac at the landfill against operating restrictions. There is a high probability that some industrial dumping took place, since no enforceable regulations existed. The reason for using industrial sludge containing organics and heavy metals in the site investigation package was based on past findings (sampling results and professional judgements) at other landfills with similar histories and operational practices.

A.P.D.

APD

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 17

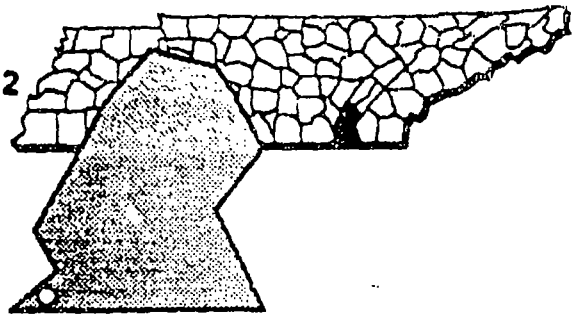
SAVE AS: H:\GEOCODE\BROWN\CHATT CFO File #3353

# AMNICOLA DUMP

## TENNESSEE

EPA ID# TND980729172

**EPA REGION 4**
CONGRESSIONAL DIST. 03
Hamilton County
In Chattanooga, along the east bank of the Tennessee River



## Site Description

The 18-acre inactive Amnicola Dump site, located in Chattanooga, was used for clay mining operations in the 1930s, and several water-filled pits were left behind. These subsequently were used for disposal of construction debris. The City operated the dump between 1964 and 1973, incinerating waste wood on site and disposing of the ashes over 12 acres. The operation was closed in 1973 due to concerns about unauthorized dumping and leachate seeping into the Tennessee River. Streams of leachate containing low concentrations of trichloroethylene (TCE) leave the site seasonally and enter the Tennessee River; however, water quality downstream has not been noticeably affected. The former site owner burned, stored, and handled creosote railroad ties, activities that contributed to elevated contamination in the surface soil. The site lies in an industrial area, and about 150,000 people live within a 2-mile radius of the site. No residential areas are in the immediate vicinity, and the nearest population center is about 1/2 mile away. The site is situated along the eastern bank of the Tennessee River, 1/2 mile upstream from the city intake, although no site-related contaminants have been identified.

**Site Responsibility:** This site is being addressed through Federal and potentially responsible parties' actions.

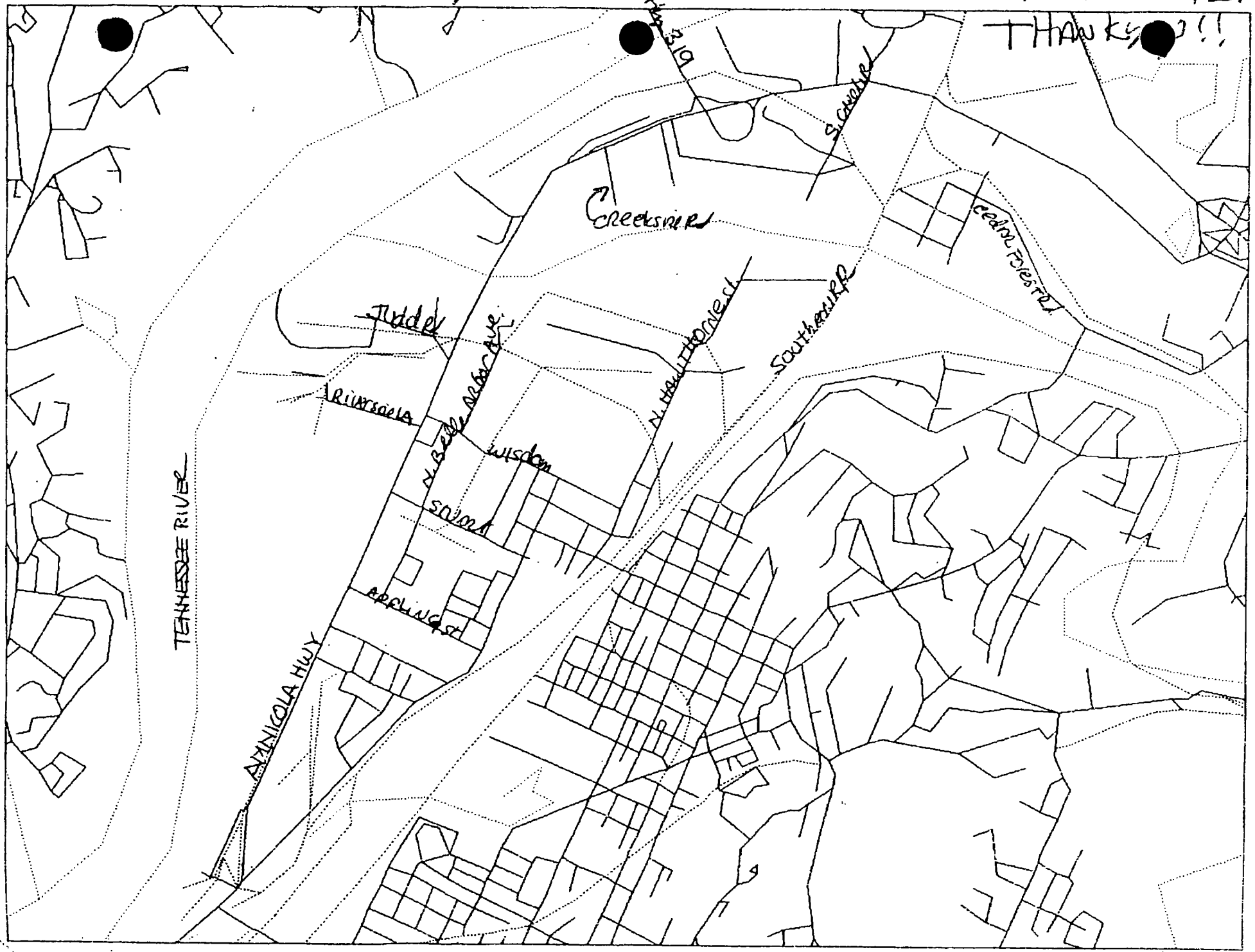
**NPL LISTING HISTORY**
Proposed Date: 12/01/82
Final Date: 09/01/83

## Threats and Contaminants

Groundwater, debris, and soil on the site contain polycyclic aromatic hydrocarbons (PAHs) and heavy metals including chromium from the incineration of waste wood. Sediments are polluted with phenols. People can be exposed to pollutants by coming in direct contact with contaminated soil or leachate or inhaling contaminants that evaporate into the air. The Tennessee River flows by the site and may be affected by contamination from the site.



VISTA ENVIRONMENTAL PAGE 2 of 2




BARBARA GREENWOOD (619) 450-6119

page 1 of 2

Site Name: Howard High School Dump

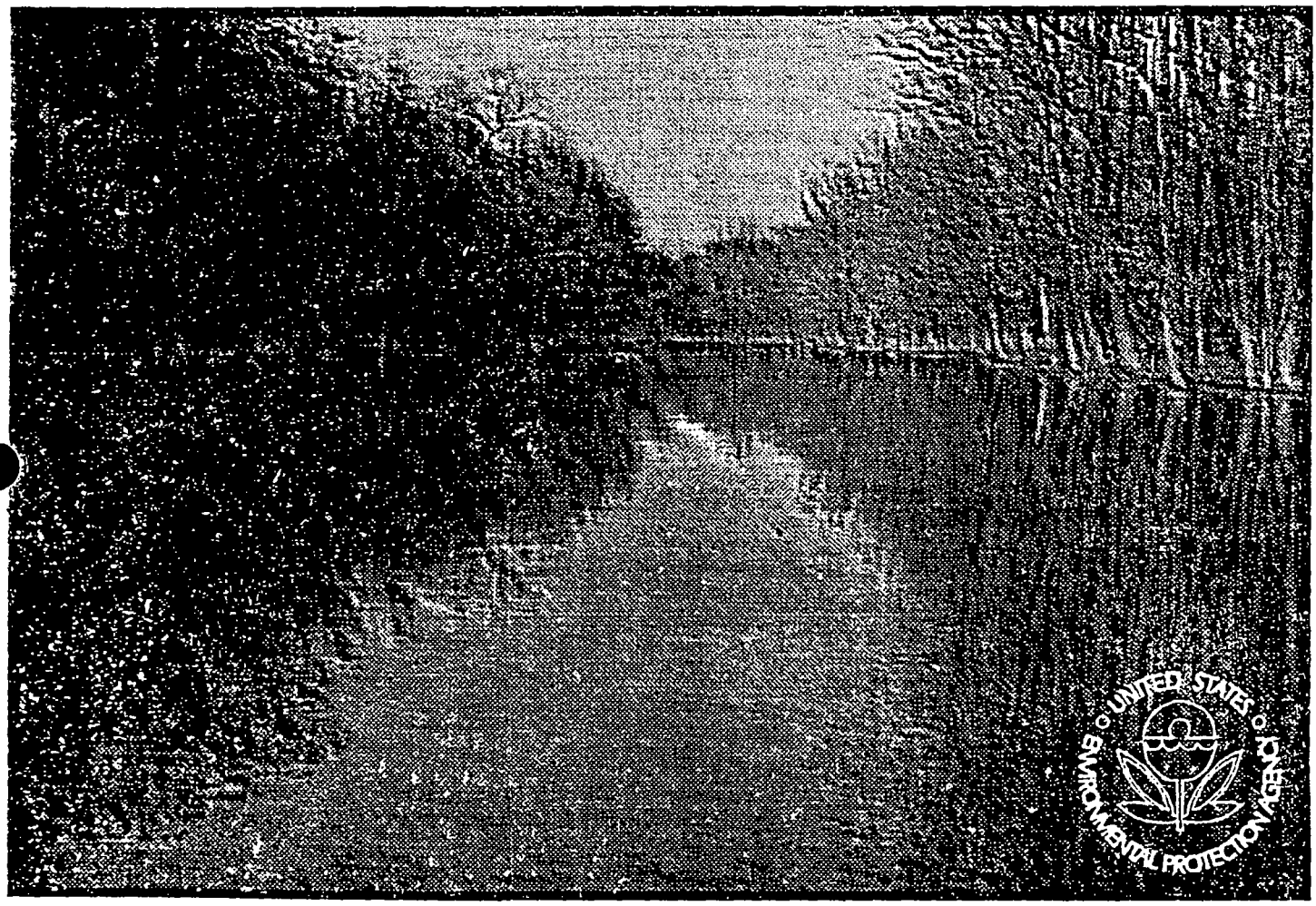
Site Number: TND 100842343

Reference Number: 18

Acc 3/92
CFO File Copy
Site # 33E4

# U.S. EPA REGION IV

## CHATTANOOGA CREEK SEDIMENT PROFILE STUDY
## CHATTANOOGA, TENNESSEE
## APRIL/AUGUST, 1992



U.S. ENVIRONMENTAL PROTECTION AGENCY
Region IV, Environmental Services Division
Hazardous Waste Section
960 College Station Road
Athens, Georgia 30613-0801

# CHATTANOOGA CREEK SEDIMENT PROFILE STUDY
# CHATTANOOGA, TENNESSEE
# APRIL/AUGUST, 1992

## INTRODUCTION

Personnel from the U.S. Environmental Protection Agency (EPA), Environmental Services Division (ESD), EPA contractors (ManTech and Dynamac) and the Tennessee Department of Environment and Conservation (TNDEC) conducted two studies of Chattanooga Creek during the spring and summer of 1992. Although the creek is located in Georgia and Tennessee, the major objective was to evaluate sediment quality in the Hamilton County, Tennessee portion of the creek. The investigations were requested by the Waste Management Division, Region IV, Atlanta, Georgia to support the RCRA Permitting and Compliance Branch (RCRA Compliance Section); as well as the Superfund Site Assessment Section and Office of Health Assessment as they evaluate options for future cleanup and restoration.

The first phase of the sediment profile was conducted during the week of April 27, 1992 and the second phase was conducted during the week of August 24, 1992.

## BACKGROUND

### Site Background

Chattanooga Creek begins in Georgia, flows northward and drains an approximate area of 75 square miles (Figure 1). Nearly twenty percent of this drainage area is in Tennessee and occupies the northern portion of the Chattanooga Valley between Lookout Mountain and Missionary Ridge. This drainage area is classified as mostly urban and industrial with some wooded floodplains adjacent to the creek in the upper reaches and at lesser amounts in the lower portion of the creek. There are some areas where industrial development and/or public use have infringed upon the floodplain and provide public access.

The Chattanooga Creek Valley has a long history of industrial development. Much of that development was located near, or in the floodplain of the creek. Consequently, much of the wetland of Chattanooga Creek has been filled and used for industrial development. The creek has historically been subjected to gross pollution via industrial waste discharges from coke production, organic chemicals, metallurgical and foundry works, tannery operations and woodtreaters. The public is still using the creek and floodplain as a solid waste dumping ground.

The EPA Site Assessment Section, Waste Management Division has listed 37 potential Superfund sites in the Chattanooga Creek basin in Tennessee. Many of these sites are located along the creek bank and have contributed contaminants to the creek, while others may potentially affect the creek. The 37 sites are on the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) list, but are not presently on the National Priority List (NPL) for Superfund.

The implementation of Federal and Tennessee Department of Health and Environment (now Tennessee Department of Environment and Conservation) National Pollutant Discharge Elimination System (NPDES) permits during the 1970s and 80s, along with an improved classification of the creek, opened an era for significant water quality improvement.

In 1973 and 1977, the EPA conducted a number of studies in the area, including two focusing on Chattanooga Creek (1,2). The early studies centered on water quality, and did not address the creek sediment. The major sources of contamination were identified, and the wastewater discharges, as well as Chattanooga Creek surface water were characterized. These early studies included analyses of water for organic compounds.

During the 1970's the Tennessee Division of Water Quality Control (TDWQC) made much progress in issuing NPDES permits to companies, thus bringing industrial discharges entering the creek under some environmental control.

In 1980, the Tennessee Valley Authority (TVA) conducted a special survey for toxic priority pollutants which included sediment samples. The findings indicated that much of the creek sediment was contaminated. During this period an agreement was reached between EPA and Velsicol Chemical Company to prevent the migration of contaminants from the area known as "Residue Hill". This area, located south of the facility, contained chemical residue and was producing leachate. The area was capped and a leachate collection system installed, thus stabilizing the site. The finding of toxic materials in Chattanooga Creek during the TVA study, along with the Velsicol project, highlighted the need for further data to support a chemical characterization of Chattanooga Creek water, sediment and aquatic life. An aquatic life study was conducted by TDWQC during June 1981; EPA, TVA and TDWQC performed a sediment study of the creek during 1981 and a water quality study was completed by TDWQC in July 1982 (3).

During 1990, a water and sediment study of Chattanooga Creek was completed for EPA by Dynamac Corporation (4). In addition, RCRA 3007 information request letters were sent to all industries located along Chattanooga Creek. The results provided some information concerning potential sources of contamination from these industries.

Results of Previous Sampling Investigations

- Results of the combined Chattanooga Creek sediment study conducted during 1981 (EPA, TVA, TDWQC) showed that the most severe organic contamination in the creek occurred between creek mile (cm) 5.06 and cm 2.10. This stretch of creek included the Hamill Road Dump #1 site which contained a wide variety of organic compounds, and the tributary that served as a conduit for Velsicol Chemical Corporation and Chattanooga Coke and Chemical wastewater discharges into Chattanooga Creek for a number of years before regulatory controls were implemented. A major deposit of polynuclear aromatic hyrdocarbons (PAHs) was detected near cm 4.47, which is at the confluence of the tributary and Chattanooga Creek.

- In August 1990, the U. S. EPA, Region IV, tasked Dynamac Corporation to conduct a water and sediment study of Chattanooga Creek. The results of that study showed that the same areas identified during the 1980s studies were still contaminated to the same relative degree. The 1990 Dynamac report also concluded that "PAHs were most prevalent of all groups of coumpounds detected in Chattanooga Creek sediments for all three sutdies." (4). The distribution of compounds detected in 1990 was similar to the 1981 study, but there appeared to be a general improvement in the waste contaminant concentrations in the stream. Much of this improvement can be attributed to the removal of wastewater discharges from the creek; remediation of Hamill Road Dump sites #1 and #3; partial remediation of the Southern Wood Piedmont site and the installation of an infiltration collection system at the 38th Street Dump.

- The 1980 and 1990 studies show that the water quality and sediment characteristics in Chattanooga Creek downstream from Dobbs Branch have remained unchanged. The contribution of untreated raw sewage and industrial waste from the combined sewer overflow (CSO) structures located along this reach will continue to adversely influence sediment quality.

Geology and Hydrology

Chattanooga Creek is located near the intersection or point of abutment of the Ridge and Valley physiographic province to the southeast, and the Appalachian Plateau province to the northwest. The Appalachian Plateau province is comprised of flat to gently dipping carbonates and shales, which support the lower slopes of large, plateau-like ridges, which are capped with resistant sandstones. The Ridge and Valley province is comprised of generally lower-lying, less resistant lithologies, primarily limestones and shales.

The majority of the Chattanooga Creek basin appears to lie above the less resistant materials of the Ridge and Valley province at the base of Lookout Mountain. These rocks are generally Cambro-Ordovician, Ordovician or Silurian in age, but can be as young as Pennsylvanian. The creek is developed either directly on the exposed lithologies or in channels created in the relatively young alluvial deposits present in some of the broader, lower lying areas.

Ground water in the area may be found as interstitial fluid in alluvial material and weathered rock, or it may be present in solution fractures or other avenues of secondary permeability in carbonate beds, where present. In either case, ground water discharge from the alluvial material, weathered rock, or solutionized limestone is expected to occur, to some degree, over the entire length of the creek.

**SUMMARY**

The upper reach of Chattanooga Creek, from its source to the area of Hamill Road Bridge, is not significantly contaminated with organic compounds or metals. The first severe impact upon Chattanooga Creek begins at the Hamill Road Bridge where chemicals and pesticides associated with Velsicol Chemical Corporation and its predecessors in Chattanooga were detected at high concentrations.

Four major deposits of coal-tar related solids, possibly as deep as 6 to 8 feet, were identified beginning approximately 1,200-1,500 feet downstream from the Hamill Road Bridge. Sample CC-013-SD, collected from within this area, shows that the material is heavily contaminated with PAHs, polycycles and other organic compounds with coal-tar origins. The waste material is not nearly as concentrated in the channelized section of the creek (near station CC-016) to downstream from the 38th Street Bridge where the old stream continues. From approximately 300 feet downstream from the 38th Street bridge, to the lower channelized section, the sediment continues to be heavily contaminated with coal-tar compounds. The sediment in the channelized reach to the Tennessee River is also contaminated with coal-tar compounds, but not apparently as concentrated.

At the time of the study, surface water analytical data did not indicate degraded water quality as far as extractable and volatile organic compounds and metals are concerned.

Based upon the results of these studies, ESD has concluded that it was the dumping of coal-tar, on an apparently regular basis for many years, directly into or indirectly along the creek bank that has significantly contributed to the contamination of Chattanooga Creek from Hamill Road to Dobbs Branch.

contained 14 coal-tar related EOCs which were detected at concentrations ranging from 1,300J ug/kg for naphthalene to 13,000 ug/kg for anthracene. The CPAHs were detected at concentrations ranging from 1,700 ug/kg for dibenzo(a,h)-anthracene to 11,000J for chrysene. Two PCBs, PCB-1248 and PCB-1260 were detected in the sediment at concentrations of 230JN ug/kg and 290J ug/kg, respectively. No VOCs were detected in the sample. Three metals of concern, chromium (120J mg/kg), lead (110J mg/kg) and zinc (340J mg/kg) all showed an increase in concentration from station CC-023, but were still within the same range of concentrations observed in upstream samples.

Soil sample CC-024-SLL contained 9 PAHs that ranged in concentration from 2,200J ug/kg for pyrene to 20,000JN ug/kg for benzofluoranthene(not b or k). Sample CC-024-SLR had several EOCs detected, but concentrations were much lower than those in the soil from the left bank. The difference in soil concentrations for EOCs may be due to the floodplain along the left bank versus the steep embankment along the right bank. During times of high water the creek floods the left bank area, allowing sedimentation and contact with contaminated water to occur more often along the left bank. Sample CC-024-SLR had two pesticides, Alpha-BHC (11J ug/kg) and dieldrin (100J ug/kg) detected. No VOCs were detected in either soil sample. The metals of concern were similar in distribution and concentration between the sediment sample at this station and both soil samples.

Sample CC-9400 was the final sample collected during the Phase II study. The sample station was located at a point approximately 500 feet downstream from station CC-024, in a reach of the creek considerably downstream from the SWP property. Twenty-eight EOCs, all of which are associated with coal-tar, were detected at concentrations from 24,000J ug/kg for naphthalene to 1,600,000 ug/kg for anthracene. Three of the six CPAHs detected included benzo(b and/or k)fluoranthene (280,000 ug/kg), benzo(a)pyrene (150,000J ug/kg) and indeno(1,2,3-c,d)pyrene (92,000J ug/kg). The other three CPAHs had minimum detection quantitation limits of 200,000 ug/kg each. As was the case for the other two samples collected during Phase II, pesticides/PCB analysis were not conducted on this sample, however the lack of data does not indicate the presence or absence of these compounds.

Dobbs Branch to the Tennessee River

Samples CC-301-SD, CC-301-SLR and CC-301-SLL were collected from Dobbs Branch, approximately 75 yards upstream from the confluence with Chattanooga Creek. The branch resembles a slough because of the presence of backwater from the creek. Rises in the Tennessee River stage cause the lower reach of Chattanooga

Creek to back water up into Dobbs Branch, thus influencing the water quality in Dobbs Branch. The significance of these hydraulic actions has been to extend Chattanooga Creek into Dobbs Branch. Another strong factor influencing this sample is the first of several combined sewer overflow structures (CSO) located in the lower reach of Chattanooga Creek. The sediment consists of nearly three feet of organic muck. Twelve EOCs were detected in the sediment at concentrations ranging from 600J ug/kg for (3- and/or 4) methylphenol to 5,100J ug/kg for fluoranthene. All of the EOCs are coal-tar related compounds; ten of the compounds are PAHs and one heterocyle (carbazole). Five of the six CPAHs were detected in the sediment at concentrations ranging from 3,600 ug/kg for benzo(a)anthracene to 3,800J ug/kg for chrysene. One VOC, toluene was detected at a very low concentration(10J ug/kg).

The metals of concern did not show any appreciable difference from the concentrations detected in previous upstream samples. Lead (120J mg/kg) and zinc (350J mg/kg) remained in the same general concentration range.

The soil samples (CC-301-SLL and CC-301-SLR) were essentially indistinguishable from the sediment sample. The same class of PAHs and coal-tar related compounds were detected along both banks in the same concentration range as sediment sample CC-301-SD. PCB-1260 was detected at a concentration of 360 ug/kg in sample CC-301-SLL. No VOCs were detected in either sample. The metals of concern were higher in concentration in the creek bank soil than in the sediment. Lead (430J mg/kg and 410J mg/kg), and zinc (820J mg/kg and 560J mg/kg) were detected in samples CC-301-SLL and CC-301-SLR, respectively. Cadmium (4.7 mg/kg), copper (130 mg/kg) and barium (430 mg/kg) concentrations increased in sample CC-301-SLL and may reflect the influence of the CSO discharges.

Sample CC-025-SD was collected from the creek sediment approximately 2100 feet downstream from station CC-9400, between CSO #16 and the Market Street Bridge. The sediment in this reach of the creek is one to three orders of magnitude less contaminated compared to the stations located adjacent to SWP. Several of the commonly occurring coal-tar related PAHs were detected in the sediment. Five of the CPAHs were detected at concentrations ranging from 2,100J ug/kg for indeno(1,2,3-c,d)pyrene to 4,800J ug/kg for benzo(b and/or k)fluoranthene. PCB-1260 was detected in the sample at a concentration of 83J ug/kg. One VOC, carbon disulfide (650 ug/kg) and five unidentified VOCs (800J ug/kg) were detected in the sample. Metals of concern concentrations changed very little from the last upstream station. Chromium (48J mg/kg) was much lower in concentration while zinc (480J mg/kg) was detected at the highest level in all samples collected.

Sample CC-026-SD was collected approximately 225 feet downstream from CSO #15 and upstream from the Broad Street Bridge. The EOCs detected in the sediment are very similar to the ones detected in sample CC-025-SD. The concentrations ranged from 160J ug/kg for dibenzo(a,h)anthrancene to 4,400J ug/kg for benzo(b and/or k)fluoranthene including all six of the CPAHs. An EOC not previously detected, bis(2-ethylhexyl)phthalate (1,900J ug/kg) was detected in this sample. Two pesticides alpha-BHC (4.3JN ug/kg) and dieldrin (8.2J ug/kg) were also detected in the sediment. Metals of concern did not change from the upstream station (CC-025-SD). The metals concentrations were slightly lower in this sample.

Samples CC-027-SD, CC-027-SLR and CC-027-SLL were collected approximately 75 feet downstream from the Wheland Connector Bridge, approximately 1,500 feet downstream from station CC-026. The sediment characteristics remain unchanged in this portion of the creek. All of the CPAHs were detected in the sediment at concentrations ranging from 970J ug/kg for indeno(1,2,3-c,d)pyrene to 2,400J for benzo(b and/or k)fluoranthene. The metals of concern were also unchanged from the previous station.

The soil samples contained the same general group of EOCs as found in the sediment sample. Sample CC-027-SLL had 15 EOCs detected at concentrations ranging from 2,800J ug/kg for anthracene to 11,000J ug/kg for benzo(b and/or k)fluoranthene, higher than those in the other two samples at this station. Hexadecanoic acid (10,000JN ug/kg), hexadeconoic acid methyl ester (10,000JN ug/kg) and PCB-1254 (370JN ug/kg) were also detected in the soil sample. There was a noticeable increase in some of the metals of concern. Lead (380 mg/kg, 230 mg/kg) in samples CC-027SLR and CC-027-SLL, respectively and zinc increased in concentration from 390J mg/kg in sample CC-027-SD to 790J mg/kg in sample CC-027-SLR.

Samples CC-028-SD, CC-028SLR and CC-028-SLL were collected approximately 225 feet downstream from the Wheland Connector Railroad Bridge. The sediment sample (CC-028-SD) contained the same general group of coal-tar related PAHs detected in the upstream samples. The concentrations of the CPAHs detected ranged from 4,800J ug/kg for benzo(a)pyrene to 6,100J ug/kg for indeno(1,2,3-c,d)pyrene. These concentrations, along with those of other coal-tar related compounds indicate that the deeper sediment may contain higher concentrations of PAHs and substituted PAHs buried under the upper muck in this portion of the stream. PCB-1260 was detected at a concentration of 230J ug/kg in the sediment. The metals of concern detected were very much like those in the previous samples. Cadmium (2.5 mg/kg), lead (200J mg/kg) and zinc (660J mg/kg) concentrations increased from the upstream sample.

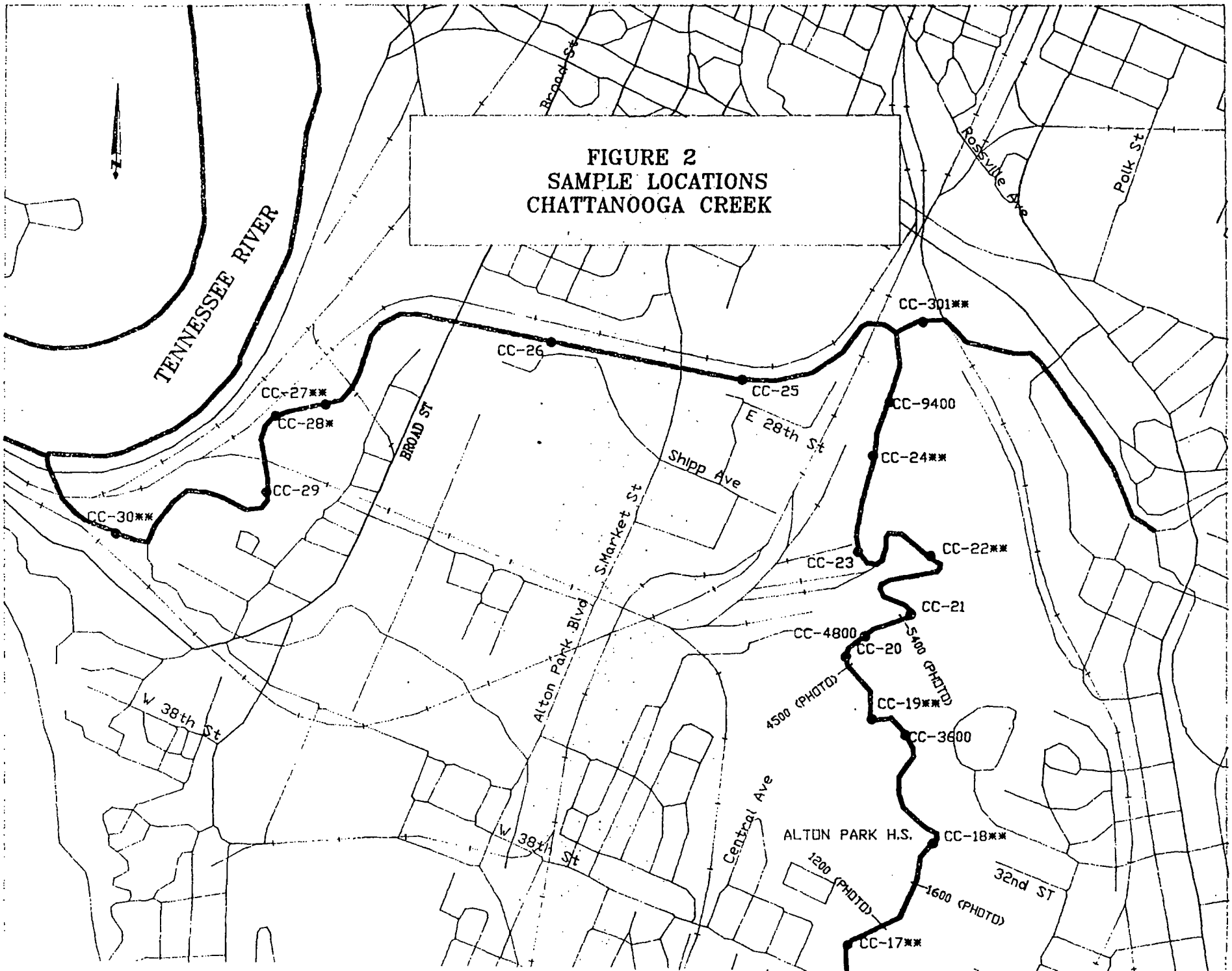


FIGURE 2
SAMPLE LOCATIONS
CHATTANOOGA CREEK
TENNESSEE RIVER
Broad St
Rossville Ave
Polk St
CC-301**
CC-26
CC-25
CC-27**
CC-28*
CC-29
CC-30**
BROAD ST
E 28th St
Shipp Ave
S.Market St
Alton Park Blvd
CC-9400
CC-24**
CC-22**
CC-23
CC-21
CC-4800
CC-20
5400 (PHOTO)
4500 (PHOTO)
CC-19**
CC-3600
W 38th St
W 38th St
Central Ave
ALTON PARK H.S.
CC-18**
1200 (PHOTO)
1600 (PHOTO)
32nd ST
CC-17**

TABLE 1 CONTINUED
CHATTANOOGA CREEK PROFILE STUDY
PHASE I & II
SAMPLING LOCATIONS/DESCRIPTIONS
CHATTANOOGA, TENNESSEE

| | | |
|---|---|---|
| CC-19 * | CC-019-SD | Southern Wood Piedmont Area |
| | CC-019-SLR | |
| | CC-019-SLL | |
| | CC-019-SW | |
| CC-20 * | CC-020-SD | Southern Wood Piedmont Area |
| CC-21 * | CC-021-SD | Southern Wood Piedmont Area |
| CC-22 * | CC-022-SD | Southern Wood Piedmont Area |
| | CC-022-SLL | |
| | CC-022-SW | |
| | CC-022-SLR | |
| CC-23 * | CC-023-SD | Southern Wood Piedmont Area |
| CC-24 * | CC-024-SD | Southern Wood Piedmont Area |
| | CC-024-SLR | |
| | CC-024-SLL | |
| | CC-024-SW | |
| CC-25 | CC-025-SD | Between CSO #16 and Market Street Bridge |
| CC-26 | CC-026-SD | Between CSO #15 and Broad Street Bridge |
| CC-27 * | CC-027-SD | Wheland Foundry Railroad Bridge |
| | CC-027-SLR | |
| | CC-027-SLL | |
| | CC-027-SW | |
| CC-28 * | CC-028-SD | Middle Street Bridge |
| | CC-028-SLR | |
| | CC-028-SLL | |
| CC-29 | CC-029-SD | Downstream Railroad Trestle |
| CC-30 * | CC-030-SD | Downstream from Gillespie Branch |
| | CC-030-SLR | |
| | CC-030-SLL | |
| | CC-030-SW | |
| CC-3600 | CC-3600 | Cross Section 3600 feet downstream from 38th St. |
| CC-4800 | CC-4800 | Cross Section 4800 feet downstream from 38th St. |
| CC-9400 | CC-9400 | Cross Section 9400 feet downstream from 38th St. |
| TRIBUTARIES | | |
| CC-101 | CC-101-SD | Borrow Pit at HEATEC Co. (inlet) |
| | CC-101-SW | |
| CC-102 | CC-102-SD | Borrow Pit at HEATEC Co. (outlet) |
| CC-301* | CC-301-SD | Dobbs Branch Upstream of Confluence |
| | CC-301-SLR | |
| | CC-301-SLL | |
| | CC-301-SW | |

TABLE 8
SOIL/SEDIMENT DATA SUMMARY TABLE
SAMPLES 101-SD THROUGH 027-SL
CHATTANOOGA CREEK SEDIMENT PROFILE STUDY
CHATTANOOGA, TENNESSEE
APRIL, 1992

| | 101-SD SEDIMENT HEATEC 04/28/92 1013 | 102-SD SEDIMENT HEATEC 04/28/92 1025 | 024-SR SEDIMENT SO.WOOD 04/29/92 1000 | 025-SD SEDIMENT CS016 04/29/92 1220 | 026-SD SEDIMENT CS015 04/29/92 1250 | 027-SD SEDIMENT WHELAND 04/29/92 1640 | 027-SR SEDIMENT RIGHT 04/29/92 1620 | 027-SL SEDIMENT LEFT 04/29/92 1630 |
|---|---|---|---|---|---|---|---|---|
| INORGANIC ELEMENTS | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG |
| SILVER | -- | -- | -- | -- | -- | -- | -- | 9.4 |
| ARSENIC | 12J | 11J | 9.8J | 5.9J | 5.4J | 5.4J | 8.2J | 8.5J |
| BARIUM | 110 | 110 | 170 | 140 | 130 | 110 | 130 | 160 |
| BERYLLIUM | 1.5 | -- | 1.6 | -- | -- | -- | -- | -- |
| COBALT | 19 | 37 | 23 | 16 | 16 | 10 | 4.5J | 15 |
| CHROMIUM | 18J | 34J | 130J | 48J | 44J | 52J | 74J | 68J |
| COPPER | -- | 13 | 53 | 74 | 61 | 56 | 76 | 100 |
| NICKEL | 13 | 16 | 57 | 36 | 36 | 36 | 32 | 45 |
| LEAD | 27 | 30 | 160J | 170J | 150J | 130J | 380 | 230 |
| VANADIUM | 28 | 45 | 38 | 33 | 31 | 19 | 16 | 28 |
| ZINC | 92J | 200J | 320J | 480J | 400J | 390J | 370J | 790J |
| MERCURY | -- | -- | .37 | .23 | .26 | -- | -- | .53 |
| ALUMINUM | 19000 | 21000 | 25000 | 22000 | 21000 | 12000 | 11000 | 14000 |
| MANGANESE | 430J | 250J | 1100J | 470J | 430J | 830J | 1800J | 580J |
| CALCIUM | 2800J | 2800J | 3900J | 24000J | 16000J | 14000J | 30000J | 15000J |
| MAGNESIUM | 1200 | 1400 | 2200 | 7200 | 5100 | 3100 | 2000 | 6000 |
| IRON | 20000J | 39000J | 30000J | 25000J | 25000J | 20000J | 24000J | 30000J |
| POTASSIUM | 1000 | 1300 | 2800 | 1900 | 2800 | -- | 1200 | 1800 |
| GENERAL INORGANIC PARAMETERS | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG | MG/KG |
| CYANIDE | -- | -- | -- | -- | -- | -- | -- | -- |
| PESTICIDE/PCB COMPOUNDS | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG |
| ALPHA-BHC | 240JC | 50J | 11J | NA | 4.3NJ | -- | NA | NA |
| BETA-BHC | 240JC | 42J | -- | NA | -- | -- | NA | NA |
| DIELDRIN | -- | -- | 100J | NA | 8.2J | -- | NA | NA |
| PCB-1242 (AROCLOR 1242) | -- | -- | -- | -- | -- | -- | -- | -- |
| PCB-1254 (AROCLOR 1254) | -- | -- | -- | -- | -- | -- | -- | 370JN |
| PCB-1248 (AROCLOR 1248) | -- | -- | -- | -- | -- | -- | -- | -- |
| PCB-1260 (AROCLOR 1260) | -- | -- | -- | 83J | -- | -- | -- | -- |
| PCB-1016 (AROCLOR 1016) | -- | -- | -- | -- | -- | -- | -- | -- |
| GAMMA-CHLORDANE /2 | -- | -- | -- | NA | 8.6NJ | -- | NA | NA |
| METHOXYCHLOR | -- | 110J | -- | NA | -- | -- | NA | NA |

TABLE 8 CONTINUED
SOIL/SEDIMENT DATA SUMMARY TABLE
SAMPLES 101-SD THROUGH 027-SL
CHATTANOOGA CREEK SEDIMENT PROFILE STUDY
CHATTANOOGA, TENNESSEE
APRIL, 1992

| | 101-SD SEDIMENT HEATEC 04/28/92 1013 | 102-SD SEDIMENT HEATEC 04/28/92 1025 | 024-SR SEDIMENT SO.WOOD 04/29/92 1000 | 025-SD SEDIMENT CS016 04/29/92 1220 | 026-SD SEDIMENT CS015 04/29/92 1250 | 027-SD SEDIMENT WHELAND 04/29/92 1640 | 027-SR SEDIMENT RIGHT 04/29/92 1620 | 027-SL SEDIMENT LEFT 04/29/92 1630 |
|---|---|---|---|---|---|---|---|---|
| EXTRACTABLE ORGANIC COMPOUNDS | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG |
| 2-METHYLNAPHTHALENE | -- | -- | 89J | -- | 120J | 160J | -- | -- |
| 1,2,4-TRICHLOROBENZENE | -- | -- | -- | -- | -- | -- | -- | -- |
| NAPHTHALENE | -- | -- | 140J | -- | 110J | 130J | -- | -- |
| ACENAPHTHYLENE | -- | -- | 98J | -- | -- | -- | -- | -- |
| ACENAPHTHENE | -- | -- | 53J | -- | 150J | 110J | -- | -- |
| DIBENZOFURAN | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-NITROANILINE | -- | -- | 1200J | -- | -- | -- | -- | -- |
| FLUORENE | -- | -- | 140J | -- | 270J | 180J | -- | -- |
| PHENANTHRENE | -- | -- | 670 | 2400J | 1700J | 860 | 1100J | 4300J |
| ANTHRACENE | -- | -- | 650 | 2200J | 1100J | 720 | -- | 2800J |
| FLUORANTHENE | -- | 76J | 2200 | 3900J | 3200J | 1400 | 2000J | 7200J |
| PYRENE | -- | 63J | 1900J | 3200J | 4200J | 1900J | 1800J | 6100J |
| BIS(2-ETHYLHEXYL) PHTHALATE | -- | -- | -- | -- | 1900J | 870J | -- | -- |
| BENZO(A)ANTHRACENE | -- | -- | 1900 | 2400J | 2200J | 1000J | 1100J | 4800J |
| CHRYSENE | -- | 59J | 3000 | 3100J | 2800J | 1500J | 1300J | 6200J |
| BENZO(B AND/OR K)FLUORANTHENE | -- | 67J | 4400 | 4800J | 4400J | 2400J | 2400J | 11000J |
| BENZO-A-PYRENE | -- | -- | 2000 | 2400J | 1800J | 1100J | 1200J | 5200J |
| INDENO (1,2,3-CD) PYRENE | -- | -- | 2500 | 2100J | 510J | 970J | 1100J | 4400J |
| DIBENZO(A,H)ANTHRACENE | -- | -- | 700 | -- | 160J | 200J | -- | -- |
| BENZO(GHI)PERYLENE | -- | -- | 1800 | 2000J | -- | -- | 1400J | 5300J |
| (3-AND/OR 4-)METHYLPHENOL | -- | -- | -- | -- | 1600J | 110J | -- | -- |
| CARBAZOLE | -- | -- | 220J | 860J | 310J | 270J | -- | -- |
| METHYLPYRENE (2 ISOMERS) | -- | -- | 700JN | -- | -- | -- | -- | -- |
| DIBENZOANTHRACENE | -- | -- | 300JN | -- | -- | -- | -- | -- |
| DIBENZOPYRENE (2 ISOMERS) | -- | -- | 800JN | -- | -- | -- | -- | -- |

TABLE 8 CONTINUED
SOIL/SEDIMENT DATA SUMMARY TABLE
SAMPLES 101-SD THROUGH 027-SL
CHATTANOOGA CREEK SEDIMENT PROFILE STUDY
CHATTANOOGA, TENNESSEE
APRIL, 1992

| | 101-SD SEDIMENT HEATEC 04/28/92 1013 | 102-SD SEDIMENT HEATEC 04/28/92 1025 | 024-SR SEDIMENT SO.WOOD 04/29/92 1000 | 025-SD SEDIMENT CS016 04/29/92 1220 | 026-SD SEDIMENT CS015 04/29/92 1250 | 027-SD SEDIMENT WHELAND 04/29/92 1640 | 027-SR SEDIMENT RIGHT 04/29/92 1620 | 027-SL SEDIMENT LEFT 04/29/92 1630 |
|---|---|---|---|---|---|---|---|---|
| EXTRACTABLE ORGANIC COMPOUNDS | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG |
| 1 UNIDENTIFIED COMPOUND | -- | -- | 500J | -- | -- | -- | -- | -- |
| 11 UNIDENTIFIED COMPOUNDS | -- | -- | -- | -- | 20000J | -- | -- | -- |
| PETROLEUM PRODUCT | N | N | N | -- | N | N | -- | N |
| 9 UNIDENTIFIED COMPOUNDS | -- | -- | -- | -- | -- | 20000J | -- | -- |
| 5 UNIDENTIFIED COMPOUNDS | 2000J | 3000J | -- | -- | -- | -- | -- | -- |
| BIS(DIMETHYLETHYL)METHYLPHENOL | -- | -- | -- | -- | -- | -- | -- | 4000JN |
| HEXADECANOIC ACID | -- | -- | -- | -- | -- | -- | -- | 10000JN |
| BENZOFLUORENE | -- | -- | -- | -- | -- | -- | -- | 6000JN |
| HEXADECANOIC ACID METHYL ESTER | -- | -- | -- | -- | -- | -- | -- | 10000JN |
| BENZOFLUORANTHENE (NOT B OR K) | -- | -- | -- | -- | -- | -- | -- | 8000JN |
| PURGEABLE ORGANIC COMPOUNDS | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG | UG/KG |
| ACETONE | -- | -- | -- | -- | -- | -- | -- | 200J |
| CARBON DISULFIDE | -- | -- | -- | 650 | 280 | -- | -- | 78J |
| METHYL ETHYL KETONE | -- | -- | -- | -- | -- | -- | -- | 36J |
| TOLUENE | -- | -- | -- | -- | -- | -- | -- | 31J |
| 5 UNIDENTIFIED COMPOUNDS | -- | -- | -- | 800J | -- | -- | -- | -- |
| 2 UNIDENTIFIED COMPOUNDS | -- | -- | -- | -- | 300J | -- | -- | -- |
| PINENE | -- | -- | -- | -- | 100JN | -- | -- | -- |
| METHYL SULFIDE | -- | -- | -- | -- | -- | -- | 20JN | -- |
| UNIDENTIFIED COMPOUNDS | -- | -- | -- | -- | -- | -- | -- | 200J |

**********
***FOOTNOTES***

NA - NOT ANALYZED
J - ESTIMATED VALUE
N - PRESUMPTIVE EVIDENCE OF PRESENCE OF MATERIAL
-- - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED
U - MATERIAL WAS ANALYZED FOR BUT NOT DETECTED. THE NUMBER IS THE MINIMUM QUANTITATION LIMIT
R - QUALITY CONTROL INDICATES THAT DATA ARE UNUSEABLE, COMPOUND MAY OR MAY NOT BE PRESENT
RESAMPLING AND REANALYSIS IS NECESSARY FOR VERIFICATION, THE VALUE IS THAT REPORTED BY THE LABORATORY
C - CONFIRMED BY GC/MS

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 19

# CHATTANOOGA CREEK SURVEY 1981-1982

water management
TENNESSEE

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

# SURVEY OF CHATTANOOGA CREEK--MOUTH TO STATE LINE
# AQUATIC FLESH, WATER QUALITY, SEDIMENT, AND BENTHIC BIOLOGY
# WITH
# DATA PRESENTATION ON HAMILL ROAD DUMP
# CHATTANOOGA, TENNESSEE

1981 and 1982

PREPARED BY:
CHATTANOOGA BASIN OFFICE OF
DIVISION OF WATER MANAGEMENT
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

JUNE 1983

AUTHORIZATION NO. 0890

CHATTANOOGA CREEK SURVEY
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CHATTANOOGA, TENNESSEE
1981 and 1982

## EXECUTIVE SUMMARY

The water of Chattanooga Creek in Chattanooga, Hamilton County, Tennessee, is heavily contaminated with bacteria from sewage and municipal wastewater originating in the City of Chattanooga and other areas of both Georgia and Tennessee. Various areas of the bottom sediments of Chattanooga Creek are contaminated with organic chemicals and metals from a variety of sources, including the Hamill Road Dump area in Chattanooga. This report describes the extent of the water and sediment contamination. Also presented are a description of the benthic biota existing in the stream and results of a limited aquatic flesh survey. Recommendations are made relative to both immediate protection of the public health and future efforts at clean up. A recommendation is made for posting the creek from its mouth to the Tennessee/Georgia state line prohibiting human contact by swimming, wading, or fishing.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 20

TN DEPT OF ENVIRONMENT & CONSERVATION
DIVISION OF SUPERFUND
PROMULGATED SITES
AS OF 08/05/93



Signed: Ken Pointer
Date: August 6, 1993

| SITEID | NAME | COUNTY | REGION |
|---|---|---|---|
| 01-504 | D.O.E OAK RIDGE | ANDERSON | K |
| 01-579 | DUPONT SMITH/ATOMIC CITY | ANDERSON | K |
| 01-580 | ANDERSON CNTY LANDFILL | ANDERSON | K |
| --- County Total 3 | | | |
| 05-501 | ALCOA SITE | BLOUNT | K |
| 05-503 | ALCOA SITE II | BLOUNT | K |
| --- County Total 2 | | | |
| 06-501 | OLIN CORPORATION SITE | BRADLEY | C |
| 06-505 | DURACELL INC. | BRADLEY | C |
| 06-509 | CLEVELAND PLASTICS | BRADLEY | C |
| 06-511 | MAGIC CHEF SITE | BRADLEY | C |
| --- County Total 4 | | | |
| 09-502 | LEWIS DANIEL FARM | CARROLL | J |
| --- County Total 1 | | | |
| 10-502 | AMERICAN BEMBURG PLANT | CARTER | K |
| 10-503 | EAST TN CHAIR CO. | CARTER | K |
| 10-504 | IVAN MILLER/ROAN MTN. | CARTER | K |
| 10-508 | OLD BEMBERG BUILDING | CARTER | K |
| --- County Total 4 | | | |
| 15-504 | ARAPAHOE/ROCK HILL LABS | COCKE | K |
| 15-505 | NEWPORT DUMP | COCKE | K |
| 15-508 | WALL TUBE & METAL PRODUCT | COCKE | K |
| --- County Total 3 | | | |
| 16-501 | BATESVILLE CASKET DUMP | COFFEE | N |
| --- County Total 1 | | | |
| 19-501 | TEXACO INC. | DAVIDSON | N |
| 19-511 | STAUFFER CHEMICAL | DAVIDSON | N |
| 19-524 | MUNICIPAL LANDFILL-LEBANON ROAD | DAVIDSON | N |
| 19-533 | JOHN P. SAAD & SON INC. | DAVIDSON | N |
| 19-549 | PAL HAWKINS SITE LANDFILL | DAVIDSON | N |

DIVISION OF SUPERFUND

PROMULGATED SITES

AS OF 08/05/93

Signed: _____

Date: August 6, 1993

| SITEID | NAME | COUNTY | REGION |
|---|---|---|---|
| 19-551 | JUNKYARD CAVE SITE | DAVIDSON | N |
| 19-553 | GENERAL ELECTRIC SHOP | DAVIDSON | N |
| 19-554 | METAL PLATE INC. | DAVIDSON | N |
| 19-559 | AIR NATIONAL GUARD - BERRY FIELD | DAVIDSON | N |
| --- County Total 9 | | | |
| 24-503 | GALLAWAY PITS | FAYETTE | M |
| 24-505 | A.R. BROOKS | FAYETTE | M |
| 24-508 | CHEMET CO | FAYETTE | M |
| --- County Total 3 | | | |
| 26-501 | AEDC SITE | FRANKLIN | N |
| 26-503 | BATESVILLE CASKET DUMP | FRANKLIN | N |
| --- County Total 2 | | | |
| 27-501 | B & H TRANSFORMER | GIBSON | J |
| 27-505 | MAAP SITE | GIBSON | J |
| --- County Total 2 | | | |
| 33-508 | SOUTHERN WOOD PIEDMONT | HAMILTON | C |
| 33-527 | VELSICOL/RESIDUE HILL | HAMILTON | C |
| 33-532 | AMNICOLA DUMP | HAMILTON | C |
| 33-540 | MONTAGUE PARK | HAMILTON | C |
| 33-541 | HAMILL ROAD DUMP (SDIR) ALTON PARK | HAMILTON | C |
| 33-542 | HAMILL ROAD DUMP #2 | HAMILTON | C |
| 33-543 | HAMILL ROAD DUMP #3 | HAMILTON | C |
| 33-547 | CHATTANOOGA COKE SITE | HAMILTON | C |
| 33-550 | NORTH HAWTHORNE DUMP | HAMILTON | C |
| 33-556 | 3M GE CERAMICS-CHATTANOOG | HAMILTON | C |
| 33-557 | USVAAP SITE | HAMILTON | C |
| 33-584 | CHATTANOOGA CREEK | HAMILTON | C |
| 33-596 | MOR FLOW /W.L. JACKSON CO | HAMILTON | C |
| 33-599 | D.M. STEWARD MANUFACTURIN | HAMILTON | C |
| 33-617 | BIRCHWOOD PIKE SITE | HAMILTON | C |
| 33-618 | MORNINGSIDE CHEMICALS | HAMILTON | C |
| 33-619 | AMERICAN PLATING | HAMILTON | C |
| 33-620 | NATIONAL MICRODYNAMICS | HAMILTON | C |
| 33-626 | MORGAN ST DEMOLITION DUMP | HAMILTON | C |
| --- County Total 19 | | | |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 21

# Potential Hazardous Waste Site

# Site Inspection Report

CHATTANOOGA COKE & CHEMICAL CO., INC.
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE
TND 071516959

---

Revision 0

Prepared By Ferman D. Miller FDM — Date 8/22/90

Reviewed By Wayne S. Everett WSE — Date 8/22/90

Tom Knox — 10/2/90

CHATTANOOGA COKE & CHEMICAL (CCC)
TND 071516959

NARRATIVE SUMMARY

## 1.0 Introduction

The Tennessee Division of Superfund has been tasked by the U.S. Environmental Protection Agency to perform a Site Inspection at the Chattanooga Coke and Chemical Company site in Chattanooga, Hamilton County, Tennessee. The purpose of this investigation is to characterize the potential hazard to public health and the environment which may result from any uncontrolled substances which may have been or may presently be onsite. The result of this inspection is the subject of this report.

## 2.0 Site Characterization

### 2.1 Site Background and History

Chattanooga Coke and Chemical occupies approximately 24 acres in the Alton Park section of Chattanooga, Tennessee. It is bordered by the Velsicol Chemical Corporation on the south and west and various small, light industries on the north. East of the site is the railroad mainline, a small wooded area, an elementary school, and the Piney Woods subdivision.

In 1913, the Chattanooga Gas and Coal Products Company built coke ovens to supply gas for the heating of homes. The company was located at East 11th Street, near the current Farmers' Market. In 1918, the company changed its name to Chattanooga Coke and Gas Company and moved to its current location at 4800 Central Avenue, Chattanooga, Tennessee. The company was purchased by Tennessee Products Corporation in 1926. In the 1920's, Reilly Tar and Chemical Corporation acquired part of the property. They began making tar products from the heavy oil by-products of the adjacent coke manufacturing operation. (Ref. #50)

In 1955, Merritt, Chapman, and Scott, a New York City conglomerate, purchased Tennessee Products. In 1964, Woodward Iron Company bought Merritt, Chapman, and Scott's interest. Later Woodward Iron merged with the Mead Corporation, a large paper company, of Dayton, Ohio. In 1974, Mead sold the plant to two former Woodward employees, Mr. Lacey and Ben Davies. Bruce McClelland, Dale Heidt, and Robert Gillow purchased Chattanooga Coke and Chemical in 1975. (Ref. #18, 25, 35, 69)

Chattanooga Coke and Chemical became Southern Coke in 1986. J. Donald Crane, is the current president of Southern Coke. He ran the plant for 11 months until Southern Coke declared bankruptcy the following year. The plant ceased operation in September, 1987. Currently, the site is being demolished. Process structures are being removed and the coke and coal remnants are being reclaimed. The brick buildings will remain. Mr. Crane's intentions are to increase the resale value of the property.

Previous RCRA violations include a $4000 civil penalty paid to the Tennessee Division of Superfund in December, 1988. From the Division of Solid Waste Management, Chattanooga Coke had received a variance from the classification of a waste under Rule 1200-1-11.01(4). The variance pertained to recycling the decanter tank tar sludge after mixing it with coke breeze and feeding the mixture into the coke ovens. During the initial cleaning and closeout phase of the site on October 19, 1987, 87 tons of the decanter tank tar sludge, waste K087, was shipped off-site by an unpermitted transporter to an unpermitted out-of-state receiver. The waste classification variance was voided once the sludge was removed from the site. Other violations included: failure to store hazardous waste in tanks or containers, failure to possess a permit to store hazardous waste for shipment offsite, failure to label the tank with the words "Hazardous Waste", failure to keep records of tank inspections, failure to assure proper employee training, and failure to develop and maintain a hazardous waste contingency plan. (Ref. #44,45)

In October, 1988, the Chattanooga-Hamilton County Air Pollution Control Bureau approved the assessment of a civil penalty in the amount of $100,000 against Southern Coke due to its many air pollution violations. (Ref. #29)

During the period of 1978 through 1985, the Division of Water Pollution Control documented numerous occasions of the discharge of contaminated surface water through the northeast and northwest tributaries to Chattanooga Creek. The contaminated surface water from the site contained significant levels of phenols, oil and grease, ammonia, metals, and at least 16 organic pollutants. The organic pollutants were constituents of coal tar, a by-product of the coke manufacturing process. The concentrations of these pollutants in the Chattanooga Creek sediments are much higher downstream of the CCC site than upstream. The Division of Water Pollution Control also documented at least two cases in which the API separator overflowed. Oily substances were discharged onto the ground and to the northeast tributary. Two Commissioner's Orders were issued against the site during the 1978 through 1985 period. The first was dropped upon the pretension that the plant would resolve their discharge problems. The second order was dismissed when the company declared bankruptcy and the site was referred to the Division of Superfund. (Ref. #24, #30, #53)

The process used coal to make coke and various by-products. These by-products included light oils containing benzene, toluene, and xylene, and coal tar which contains phenol, naphthalene, and other polynuclear aromatic hydrocarbons (PAH's). (Ref. #6)

In October, 1980, Jack McCormick of the Division of Water Quality Control received a report that the company was using two abandoned wells on its plant property to dispose of acids and light oils. (Ref. #31) At first the company was unaware of any wells on the property, but at least one well was documented from the 1956 DeBuchananne Report. (Ref.#33) The company's research indicated that three wells were drilled in the 1930's or 1940's for general water service throughout the plant. They were all abandoned in the early 1950's. Supposedly in the late 1960's or early 1970's, one of the wells was reactivated to dispose of outflow from a light oil washer column that included unknown percentages of tar, sulfuric acid and caustic. After six months in use, this operation was shut-down. (Ref. #36, #38)

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 22

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
CHATTANOOGA ENVIRONMENTAL FIELD OFFICE
540 McCALLIE AVENUE, SUITE 550
CHATTANOOGA, TENNESSEE 37402-2013
(615) 634-5745 FAX (615) 634-6389

Division of Superfund Memo

To: File #33-606

From: Don VanHook

Date: 12/3/93

Re: RCRA legislation and Solid Waste files

DV spoke with David Smith of the Tenn. Division of Solid Waste Management about regulatory history of Howard School Dump. DSWM does not currently have a file on the Dump. It was active before the creation of the state Solid Waste Division. RCRA which gives DSWM authority was not passed until 1976. No state oversight was available during the filling of Howard School Dump.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 23

State of Tennessee

DEPARTMENT OF CONSERVATION

DIVISION OF GEOLOGY

# BULLETIN 58

## PART I

# GROUND-WATER RESOURCES OF EAST TENNESSEE

By

G. D. DeBUCHANANNE

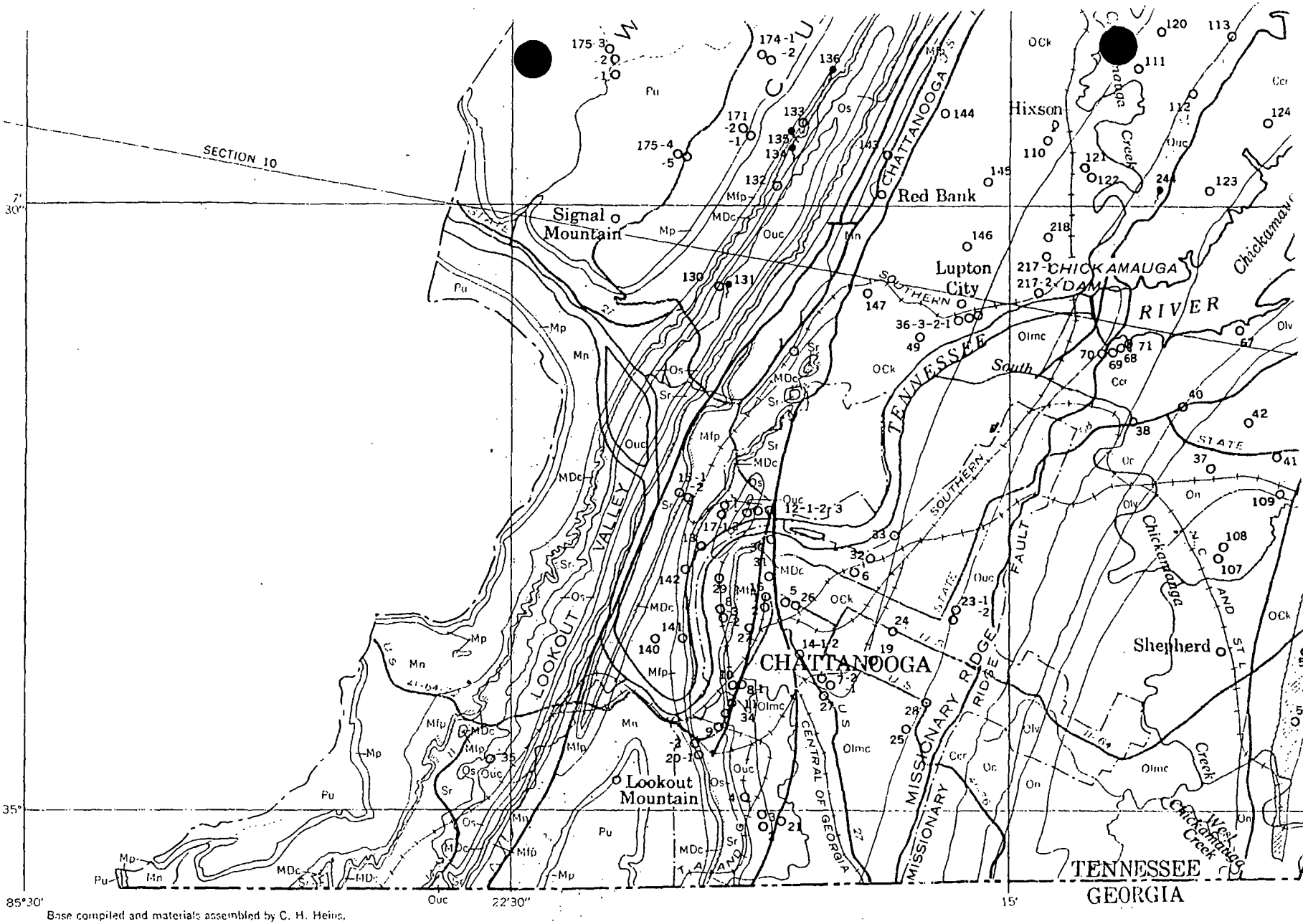
and

R. M. RICHARDSON

Prepared in cooperation with the U. S. Geological Survey

NASHVILLE, TENNESSEE

1956



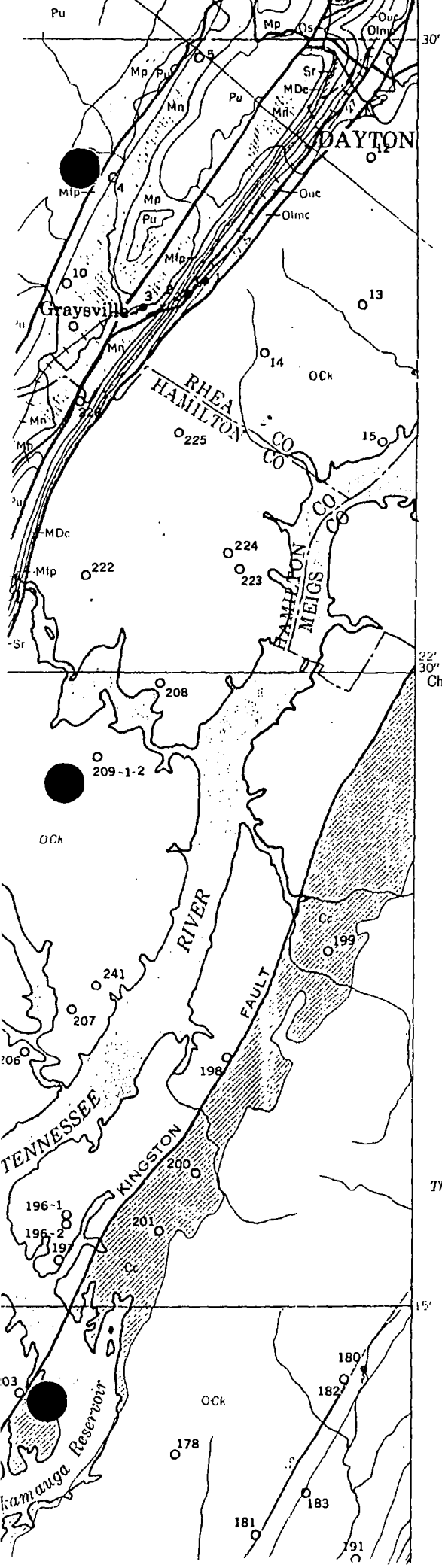

Base compiled and materials assembled by C. H. Heins, G. D. DeBuchananne and R. M. Richardson of the U. S. Geological Survey

Maps prepared for printing by N. B. Johnson, C. E. James, J. B. Canter, and others of the U. S. Geological Survey

# GEOLOGIC MAP OF EAST TENNESSEE: CHATTAN
# SHOWING LOCATION OF WELLS AND SPRIN

Scale $\frac{1}{125,000}$

1 0 5




Ouc

Upper part of Chickamauga limestone

Or

Reedsville shale

Och4

Chickamauga limestone, unit 4

Olmc

Lower and middle parts of Chickamauga limestone

OCk

Knox dolomite or group, undivided

On

Newala formation

Olv

Longview dolomite

Oc

Chepultepec dolomite

Ocn

Chepultepec, Longview, and Newala formations, undivided

Ccr

Copper Ridge dolomite

Cc

Conasauga shale or group, undivided

Crs

Sandstone-bearing member of Rome formation

Crc

Apison member of Rome formation

Contact

Fault

—?—?—

Doubtful or probable fault

191-1

Well showing location

*The first number indicates the number within the county, the second the well number in group*

137

Spring showing location

For master explanation see plate 11

beds of limestone occur. The purple shale contains more silt than the green shale. The formation weathers to a thin acid soil full of shale chips.

The one water sample collected from the Nolichucky shale was of good quality and had a hardness of 123 ppm.

*Maynardville limestone member.*—The Maynardville limestone member of the Nolichucky shale consists of 150 to 350 feet of massive blue limestone, with thin irregular layers of silty dolomite. Interbedded in the limestone are layers of oolitic limestone and some edgewise conglomerate. The member weathers to a deep orange-red or red chert-free soil.

The occurrence of water in these rocks is restricted to solution channels developed along fractures and bedding planes. Three of five scheduled springs from this member were estimated to have yields of more than 450 gpm. Springs generally appear at the base of the Maynardville limestone member, indicating that the part of the Nolichucky shale below is less permeable. Domestic water supplies from wells in this member are usually obtained in the first 150 feet of drilling. Wells of moderately large yield are developed from the lower portion of this member where it lies within 300 feet of the surface.

An analysis of water from one spring issuing from the Maynardville indicates that the water is of good chemical quality. The hardness was 105 ppm.

## Cambrian and Ordovician Systems

### Upper Cambrian and Lower Ordovician Series

#### *Knox dolomite or Knox group*

The Knox dolomite or Knox group, which underlies more of East Tennessee than any other similar unit, is the most important aquifer in the area. This unit changes from a cherty dolomite in the northwest side of the valley to an essentially chert-free limestone in the southeast side of the valley. Detailed geologic work on the dolomitic phases of the Knox has resulted in its subdivision into numerous formations (table 4). Where such work has been done the Knox is considered a group; elsewhere it is considered a formation.

The Knox, where undivided, consists of 2,500 to 3,500 feet of thick-bedded siliceous dolomite and interbedded limestone. A quartz-sandstone zone about 700 feet above the base of the formation is the boundary between Cambrian and Ordovician rocks in the Knox. The Knox weathers to produce a thick residual clay which commonly accumulates to thickness of more than 100 feet. Chert in the dolomite is resistant to weathering and is scattered through and over the clay residuum. The



The occurrence of water in the Knox dolomite is controlled by fractures that are usually enlarged by solution. The Knox is one of the most competent strata in East Tennessee and has been fractured as a result of folding and faulting. The fracture pattern of joints is usually hidden by the deep residuum overlying the formation and cannot be used as a guide in locating well sites. However, general areas that contain more fractures due to greater crustal deformation can be delineated. The yield of wells in such areas is usually large. Generally, the largest fractures are found in the first few hundred feet of drilling. Attempts to obtain larger yields by drilling excessively deep wells have usually been unsuccessful. Where wells have penetrated major thrust faults in the Knox dolomite at depths greater than 350 feet, the fault zones have been tightly cemented by secondary calcite, and little water has been obtained.

During field investigations in East Tennessee 416 springs issuing from the Knox dolomite were inventoried. Of these, 86 were estimated to yield more than 450 gpm and 82 were estimated to yield between 100 and 450 gpm. The relatively high yield of these springs and their wide geographic distribution indicate that the Knox dolomite is a good aquifer.

The yields of wells in this formation are unpredictable, as they are in many aquifers consisting of carbonate rocks. Dry wells are not unknown but are less common than wells that yield more than 100 gpm. Many industrial wells in the Knox, yielding several hundred gallons per minute, are located near permanent streams. In such locations, the temperature and chemical quality of the water indicate that many of these wells obtain water from the streams. Even in favorable locations, wells have low yields if the rocks are not fractured.

In areas characterized by many sinkholes and few surface streams, wells are generally deep. The well-developed solution pattern that drains these areas is nearly everywhere more than 100 feet below the land surface, and many domestic wells are more than 300 feet deep. In such areas, many of the inhabitants use cisterns.

The deep clay residuum overlying the Knox dolomite supplies water to many domestic dug wells. Chert in the residuum, which often accumulates in definite zones and layers, forms permeable zones. If no chert is encountered when a well is dug, the well is extended down to bedrock, where water is almost always found. In the fall, many of these wells go dry. The rapid rise of water in wells shortly after a heavy rain indicates that the recharge area of the aquifer is close by.

The quality of water from wells and springs in the Knox dolomite is similar to that from other carbonate aquifers. The hardness, which is usually the most objectionable characteristic, ranges from about 50 to 250 ppm. The hardness of water varies with the seasons. In late

summer and when ground-water recharge is low, the water contains more dissolved solids than in wet weather, when ground-water recharge is high. Water from the residuum overlying the Knox is softer than water from the bedrock and generally has a pH of less than 7.

Copper Ridge dolomite.—The Copper Ridge dolomite consists of 900 to 1,100 feet of dark crystalline, knotty dolomite interbedded with light-gray fine-grained dolomite. Asphaltic material accounts for the dark color. Limestone beds are virtually unknown, except near rocks of the Conococheague limestone to the southeast. Layers of dolomitic sandstone occur near the top and, locally in the east, near the base, but rarely in the rest of the formation. Dark chert nodules and thin layers of oolitic chert are common. Thicker layers of light-colored oolitic chert are diagnostic of the upper portion of the formation. Weathering produces a reddish-orange to dark-red clay residuum that contains much dark jagged, rough chert.

Ground water in this formation is restricted to fractures and bedding-plane openings. Sixteen of 94 springs scheduled in this formation had yields estimated at more than 450 gpm. Sixty-four springs had yields estimated at more than 10 gpm. The yields of wells in this formation are dependent upon the size and number of fractures encountered in drilling. Many domestic wells and a few low-yield industrial wells obtain water from this formation.

Hardness ranged from 24 to 396 ppm in water samples collected from 14 locations in the Copper Ridge dolomite. Most of the samples, however, had a hardness of less than 180 ppm. The water sample having a hardness of 24 ppm was from a dug well.

Conococheague limestone.—The Conococheague limestone is the eastern equivalent of the Copper Ridge dolomite. This formation is about 1,100 feet thick and consists of dark-blue-weathering limestone and thin layers of silty light-gray dolomite. Beds of crossbedded coarse-grained sandstone are found near the top and base of the formation. Dark chert nodules occur in the limestone but are more apparent in the residuum overlying the formation along with light-colored angular chert. Blocks of sandstone are found in the residuum overlying the sandstone beds. The clay residuum grades upward to a deep orange-red to dark-red soil.

Fractures control the occurrence of ground water in this formation. Only six springs were scheduled, none of which had yields estimated at more than 100 gpm. Five, however, had yields estimated at more than 10 gpm. The aquifer supplies many domestic and a few industrial wells.

Chepultepec dolomite.—The Chepultepec dolomite consists of 700 to 750 feet of light-colored well-bedded fine- to medium-grained dolomite including occasional layers of silty dolomite and dark dolomite. Sandstone layers up to 10 feet thick are usually found in the lower third of the formation. Chert nodules are common in the dolomite, especially in certain layers. Weathering of the formation produces a clay containing a porous, locally massive, light-colored and fine-grained chert of dull luster. The weathering of the basal sand members produces blocks of sandstone.



Ground water occurs in fractures in the Chepultepec dolomite and in the thicker sandstone layers in the lower third of the formation. These sandstones produce some water, but only domestic and small industrial water supplies can be developed from them. Of 30 springs scheduled in the Chepultepec dolomite, only two had discharges that were estimated in excess of 450 gpm. Twenty-three of the springs were estimated to flow less than 100 gpm. Wells drilled in this formation generally yield water supplies adequate for domestic use. Yields in excess of 100 gpm are not common.

Three water samples were collected from the Chepultepec dolomite. The hardness of these samples was 88, 103, and 151 ppm. As in waters from other formations of the Knox group, hardness is the most undesirable characteristic.

Longview dolomite.—The Longview dolomite consists of about 250 feet of well-bedded, fine- to medium-grained dolomite. In the upper half of the formation the dolomite is commonly interbedded with a light-gray to brown fine-grained limestone. Sand is common as isolated grains in some beds and, locally, forms beds a few inches thick. Weathering of the siliceous beds in the Longview dolomite produces large blocks of light-colored massive fine-grained chert that are rarely porous. This chert, which occurs in the soil and clay of the weathered Longview dolomite, is diagnostic of the formation.

As in the other formations of the Knox group, ground water occurs in fractures in the moderately soluble dolomite. Analyses were made of six samples of ground water from the Longview dolomite, which indicated a hardness of 20 to 199 ppm.

Kingsport formation.—The Kingsport formation, which lies immediately above the Longview dolomite, consists of about 200 feet of massive light-colored dolomite. Parts of the formation are slightly darker, coarser, and better bedded. Near the base is usually found about 50 feet of light-gray to brown limestone containing little dolomite except where the limestone has been altered to dolomite since deposition. The Kingsport formation weathers to form a light-tan to dark-orange residual clay containing chert. The clay grades upward to a thick cherty soil. The weathered chert is blocky and white but is usually iron stained and appears porous.

The thinness of the Kingsport, which has a narrow outcrop belt because the beds dip steeply, prevents it from being an important

aquifer. As [illegible]her carbonate rocks, water occurs in fractures. During field investigations eight springs from this formation were scheduled. Of these, two were estimated to yield more than 450 gpm. The wells scheduled were all domestic, but it may be possible to develop small industrial or municipal supplies from these rocks. Wells for industrial or municipal supplies should be located as near as practicable to permanent streams. Most wells in the Kingsport formation have to be drilled deeper than 100 feet to obtain a supply. As the size and number of fractures decrease with depth, it is usually not advisable to drill deeper than 350 feet.

Analyses of four water samples collected from the Kingsport formation indicate that the water is of good quality except for hardness. The hardness ranged from 102 to 198 ppm.

Mascot dolomite.—Where the Knox group is fully subdivided, the Mascot dolomite is the uppermost formation. The Mascot consists of 400 to 800 feet of well-bedded light-gray dolomite. The lower portion of the formation is somewhat darker in color and coarser in texture than the upper portion. Thin beds of gray limestone, which weathers blue, are quite common in the southeastern outcrops, whereas in the northwestern outcrops they occur only locally. The upper part of the formation is usually more siliceous than the lower part, but in places the lower part also is very siliceous. The Mascot dolomite weathers to a residual clay that grades upward to a light-tan to dark-orange soil. The chert produced by weathering of the siliceous members accumulates in the clay and in the surface soil. This accumulation of chert retards erosion and accounts for the scarcity of outcrops.

Ground water occurs in fractures in these rocks. Of 37 springs inventoried that issued from the Mascot dolomite, 11 had yields estimated in excess of 450 gpm. Only 10 of the springs yielded less than 10 gpm. Wells are successful only if fractures are encountered. Domestic wells usually must be drilled deeper than 100 feet to obtain an adequate water supply, but drilling deeper than 350 feet generally is not worthwhile.

In chemical analyses of four water samples collected from sources in the Mascot dolomite the hardness ranged from 101 to 280 ppm.

Newala formation.—In areas where the Kingsport formation and the Mascot dolomite have not been divided, the name Newala formation is applied to these rocks. This formation has been described as that portion of the Knox dolomite overlying the Longview dolomite. It weathers to produce a clay soil containing massive chert.

The occurrence and chemical quality of ground water in this formation are similar to those in the Mascot dolomite and Kingsport formation.



Jonesboro limestone.—The Jonesboro limestone is ab[illegible]2,000 feet thick and represents the limestone phase of the Ordovician part of the Knox group. Less work has been done in subdividing the Knox group in the southeast limestone phase than in the northwest dolomite phase. The Jonesboro limestone is a pure, massive dark-blue-weathering limestone containing thin layers of silty dolomite. Sandstone beds occur in the lower 400 feet. Thin sandstone layers also occur in the lower part of the upper third of this formation. Chert is rare, even in the residuum. The limestone weathers to a deep residual clay which forms red- to orange-colored soil. Where sandstone beds were present, weathered blocks of sandstone are found in the soil.

Ground water occurs in fractures in this formation. Of 13 springs scheduled, all had yields estimated in excess of 10 gpm, but only 4 had yields estimated in excess of 100 gpm. Most of the wells drilled in this formation furnish domestic supplies. Under favorable conditions, industrial or municipal supplies may be obtained.

Two water samples were collected from this formation. The hardness was high in both (183 and 212 ppm), but other chemical characteristics were not objectionable.

## Ordovician System

### Middle Ordovician Series

*Lower and middle parts of Chickamauga limestone*

The lower and middle parts of the Chickamauga limestone have been divided into several units in some locations. In others, they have been mapped as one unit.

These rocks consist of blue-weathering limestone, which is generally fine grained, fairly light colored, and slightly silty and which contains scattered, though locally abundant, fossils. About 100 feet below the upper part of the Chickamauga limestone are two persistent beds of altered volcanic ash a foot or more thick. Greenish chert, 1 or 2 inches thick, underlies each of the ash beds. The lower and middle parts of the Chickamauga limestone produce a rather thin rich soil through which appear pinnacles of limestone.

Ground water in these rocks is restricted to fractures that have been enlarged by solution. The presence of silty layers and shaly partings frequently provides impervious layers through which water will not percolate. Where such partings occur within the more massive limestones, bedding-plane solution cavities commonly develop. The fracturing of the limestone by folding and faulting has resulted in a more or less interconnected system of cavities. Many small springs develop

at shale-limestone contacts. Where bedding-plane solution cavities or fractures extend to the surface at topographic lows, large springs are found. The success of wells drilled into these rocks depends on the number and size of cavities encountered. Most wells yield at least a domestic supply of water. Several small industries obtain their water supply from these rocks, though it is usually necessary to drill at least two wells to obtain 100 gpm. The lower and middle parts of the Chickamauga limestone are a better aquifer than the upper part.

Water from these rocks usually has a hardness of more than 200 ppm.

*Units 1, 2, and 3 of Chickamauga limestone*

In places, the lower and middle parts of the Chickamauga limestone have been divided into three units to which formational names have not been assigned. In general, these units can be separated by means of fossil horizons or other geologic guides. The rocks consist of shale and limestone interbedded with silty nodular limestone. The soil produced by weathering is usually a thin yellow moderately rich soil containing many shale chips.

Water in these rocks is restricted to fractures and bedding-plane openings. Small springs are common, and several yielding more than 450 gpm were scheduled. The springs usually issue from or near shale-limestone contacts, indicating that bedding-plane solution cavities are well developed. Wells in these rocks usually have low yields when located on hills or other topographic highs. Wells of larger yield are usually located near permanent streams.

The quality of the water is generally good.

*Lenoir limestone and Athens shale*

The Lenoir limestone and Athens shale are of the same age. The two units grade into each other south of Knoxville.

The Lenoir limestone, which varies in character, consists of dark-bluish argillaceous nodular limestone about 500 feet thick. Locally, the lowest beds consist of a pure limestone called the Mosheim member, but in other places the lowest beds of the Lenoir are silty. This formation in its pure limestone phase weathers to a moderately rich silty clay soil that is frequently removed by erosion, exposing the underlying rock. The soil from the shaly phase is shallow and poor, with many limestone outcrops.

As in other limestones, ground water occurs in fractures. Of eight springs scheduled from this formation, three were estimated to flow more than 450 gpm. Many domestic water supplies are obtained from wells in this formation.

Analyses of eight water samples indicate that water from this formation has a hardness of less than 200 ppm. Concentration of ions other than calcium and magnesium is usually low enough not to cause any difficulty in the use of the water.



The Athens shale is about 800 to 1,000 feet thick. It is in part shaly, nodular limestone and in part bluish, yellow-weathering calcareous shale. It weathers to produce a thin acid soil containing many shale chips.

Analysis of depths of wells in Athens shale indicates that the formation behaves hydrologically as a shale rather than a limestone. In East Tennessee, calcareous shales with interbedded limestones are generally good aquifers. The solubility of both the calcareous shale and the limestone tends to make such formations quite permeable. Three springs scheduled in the Athens had yields of more than 450 gpm. Most wells produce at least domestic quantities of water.

Samples of water from 10 sources in this formation were analyzed. The hardness ranged from 46 to 404 ppm and averaged 210 ppm.

*Holston formation*

The Holston formation ranges in thickness from 200 to 500 feet and contains several different types of rock, including reddish-colored limestone and limy sandstone. The upper members are usually coarsely crystalline and contain quartz sand, whereas the lower portion is thinly bedded and contains more limy shale. In places, members of this formation may contain as much as 50 percent quartz sand. Fossils in the limestone indicate that parts of this formation were formed as reefs. The Holston formation weathers very deeply, producing a dark-red residuum. The members that have a high quartz content form a deep sandy soil with chips and blocks of ferruginous sandstone from which the calcium carbonate has been leached. This formation generally forms knobby red-colored hills.

Water in this formation is restricted to fractures. No large springs were scheduled, but one estimated to yield more than 100 gpm was recorded. The yield of wells drilled in the Holston formation is dependent upon the size and number of fractures intercepted. No large industrial water supply is known to be obtained from this formation, but it furnishes many domestic supplies.

Analyses of water from this formation indicate hardness of less than 150 ppm. The water is generally of good quality.

*Ottosee shale*

The Ottosee shale consists of about 1,000 feet of blue, yellow-weathering carbonate shale and shaly siltstone with lenses of massive crystalline limestone that becomes thin bedded at the edges. In the northwestern belt of rocks the Ottosee shale consists of a shaly nodular limestone, whereas in the southeastern belts the Ottosee is predominantly shale containing limestone lenses. The soil overlying the Ottosee

## TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY

Shown on Plates 12 and 13

Method of lift: A, air lift; B, bucket; C, centrifugal; J, jet pump; L, lift pump; P, pitcher pump; T, turbine pump.
Use of water: Ab, abandoned; D, domestic; In, industrial; Ir, irrigation; P, public supply; S, stock

| Well or spring No. | Location with reference to nearest post office | Owner or name | Driller | Topographic situation | Altitude (feet) | Depth of well (feet) | Length of casing (feet) | Diameter (inches) | Probable water-bearing beds: Character of material | Probable water-bearing beds: Geologic horizon | Depth to water level (feet) | Date of measurement | Method of lift | Yield (gallons per minute) | Temperature (°F.) | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | CHATTANOOGA | | | | | | | | | | | | | | | | |
| 1 | 2112 Dayton Blvd. | Sanders' Dairy | H. L. Carlson | Valley | 600 | 130 | 130 | 6 | Limestone | Mfp | ..... | ..... | C | 25 | 62 | In | |
| 2 | 4800 Central Ave. | Tenn. Products Corp. | E. O. Hembree | do. | 680 | 200 | 200 | 6 | do. | Ouc | 14 | ..... | C | 60 | .... | In | |
| 3 | 4608 Kirkland Ave. | Lookout Oil & Refining Co. | O'Rear | do. | 580 | 105 | 105 | 6 | do. | Ouc | ..... | ..... | L | 75 | 69 | In | |
| 4 | 4500 Highland Ave. | Chatt. Glass Co. | ..... | Slope | 710 | 285 | 285 | 6 | do. | Os | 30 | ..... | C | 150 | 70 | In | |
| 5 | 1233 Market Street | Fisherman's Headquarters | Wm. Kittle | Valley | 670 | 65 | 65 | 6 | Dolomite | O-Ꞓk | 2 | ..... | C | 28 | 68 | In | Water sample analyzed. |
| 6 | 241 Wiehl St. | Erlanger Hospital | do. | Slope | 710 | 300 | ..... | 8 | do. | O-Ꞓk | ..... | ..... | C | 150 | 64 | In | |
| 7-1 | Rossville Blv. | O. B. Andrews Co. | Grey Artesian Well Co. | Valley | 660 | 383 | ..... | 8 | do. | O-Ꞓk | ..... | ..... | C | 294 | 61 | In | |
| 7-2 | do. | do. | do. | do. | 660 | 380 | ..... | 8 | do. | O-Ꞓk | ..... | ..... | C | 150 | 61 | In | |
| 8-1 | 27th & Broad St. | Combustion Engineering Co. | ..... | do. | 660 | 100 | ..... | 6 | Shale | Sr | 25 | ..... | A | ..... | 65 | In | |
| 8-2 | 1032 W. Main | do. | ..... | do. | 660 | 398 | 398 | 8 | do. | Sr | 27 | ..... | C | 160 | 64 | In | Water used for air conditioning. |
| 8-3 | do. | do. | ..... | do. | 660 | 200 | 200 | 6 | do. | Sr | 27 | ..... | C | 160 | 64 | In | |
| 9 | Middle St. | J. H. Allison & Co. | ..... | do. | 660 | 105 | ..... | 6 | do. | Sr | 36 | ..... | C | 500 | 62 | In | Well dug to 47.5 feet, drilled to 105.5 feet. Water sample analyzed. |
| 10 | 2800 Broad S. | The Wheland Co. | Finton | do. | 660 | 216 | ..... | 6 | do. | Sr | ..... | ..... | .... | 50 | .... | Ab | |
| 11 | 3100 St. Elmo Ave. | Robert Scholz Tannery | W. W. Renshaw | do. | 660 | 100 | ..... | 8 | do. | Sr | ..... | ..... | C | 350 | 62 | In | |
| 12-1 | Maunfacturers' Rd. | Samuel Stamping & Enameling Co. | do. | do. | 660 | 250 | 50 | 8 | Limestone | Os | 30 | ..... | C | 10 | 62 | In | |
| 12-2 | do. | do. | do. | do. | 660 | 250 | 30 | 8 | Shale | Sr | 30 | ..... | C | 25 | 62 | In | Well tested with air lift for 8 hours at 40 gpm. |
| 12-3 | do. | do. | do. | do. | 660 | 300 | ..... | 8 | do. | Sr | ..... | ..... | .... | 0 | .... | Ab | Dry hole. |
| 13 | do. | Somerville Iron Works | ..... | do. | 670 | 190 | ..... | 6 | do. | MDc | ..... | ..... | C | 60 | 62 | In | |
| 14-1 | 1801 Rossville Blvd. | Chattanooga Sausage Co. | H. L. Carlson | do. | 660 | 256 | ..... | 8 | Dolomite | O-Ꞓk | 3 | ..... | C | 185 | 58 | In | |
| 14-2 | White and William St. | do. | do. | Slope | 670 | 350 | ..... | 8 | do. | O-Ꞓk | 75 | ..... | C | 135 | 62 | In | |
| 15-1 | Moccasin Bend Rd. | American Cyanamid Co. | Sullivan | do. | 660 | 210 | ..... | 12 | Shale | Sr | 7-8 | ..... | A | 62 | 60 | In | Reported drawdown of 4 feet after 1 hour pumping at 62 gpm. |
| 15-2 | do. | do. | ..... | do. | 660 | 250 | ..... | 10 | Shale | MDc | 7-8 | ..... | C | 250 | 60 | In | Reported drawdown of 4 feet after 1 hour pumping at 62 gpm. Water sample analyzed. |
| 16-1 | 1111 Chestnut St. | Brock Candy Co. | W. W. Renshaw | do. | 670 | 300 | ..... | 5 | Limestone | Olmc | 40 | ..... | A | 55 | 63 | In | Reported drawdown of 160 feet after 30 minutes pumping at 55 gpm. |
| 16-2 | do. | do. | do. | do. | 670 | 310 | ..... | 8 | do. | Olmc | 40 | ..... | C | 55 | 63 | In | Reported drawdown of 160 feet after 10 minutes pumping at 55 gpm. |
| 17-1 | Manufacturers' Rd. | Tenn. Paper Mills | ..... | do. | 660 | 170 | ..... | 16 | Shale | Sr | ..... | ..... | C | 600 | 60 | In | Yields about 600 gpm for 8 hours. After this time quantity declines appreciably. Recovers in about 24 hours. |
| 17-2 | do. | do. | ..... | do. | 660 | 257 | ..... | 10 | do. | Sr | 37 | 7/48 | .... | ..... | .... | Ab | Well too crooked to permit setting pump. |
| 18 | [illegible] Carter St. | Ross-Meehan Foundries | Wm. Kittle | do. | 670 | 190 | 110 | 6 | do. | Sr | 30 | ..... | C | 100 | 56 | In | Water used for air conditioning. |
| 19 | E. 14th St. | Tenn. Stove Co. | E. O. Hembree | do. | 670 | 300 | 30 | 8 | Limestone | Olmc | ..... | ..... | C | 50 | 60 | Ab | Well abandoned as water was muddy. |

TABLE 36.—TYPICAL WELLS AND SPRINGS IN HAMILTON COUNTY—Continued

| Well or spring No. | Location with reference to nearest post office | Owner or name | Driller | Topographic situation | Altitude (feet) | Depth of well (feet) | Length of casing (feet) | Diameter (inches) | Probable water-bearing beds: Character of material | Probable water-bearing beds: Geologic horizon | Depth to water level (feet) | Date of measurement | Method of lift | Yield (gallons per minute) | Temperature (°F.) | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20-1 | 1715 W. 38th St. | Chattanooga Medicine Co. | H. L. Carlson | Slope | 720 | 410 | ..... | 8 | Limestone | Mn | 60 | ..... | C | 225 | 62 | In | Water sample analyzed. |
| 20-2 | do. | do. | ..... | do. | 730 | 260 | ..... | 6 | do. | Mn | 60 | ..... | C | 100 | 58 | In | |
| 21 | Hooker Rd. | Wilson & Co. | H. L. Carlson | do. | 670 | 400 | ..... | 10 | do. | Olmc | ..... | ..... | C | ..... | .... | Ab | Well pumps dry in 13 minutes when pumped at 63 gpm. |
| 22 | 3744 Brainerd Rd. | Kay's Ice Cream Co. | do. | do. | 720 | 120 | ..... | 8 | Dolomite | Olv | ..... | ..... | C | 43 | 58 | In | |
| 23-1 | 460 Dodson | Chatt. Area Milk | do. | Valley | 675 | 410 | ..... | 8 | do. | Olmc | 4 | ..... | C | 40 | 56 | In | Water sample analyzed. |
| 23-2 | do. | do. | do. | do. | 675 | 250 | ..... | 8 | do. | Olmc | 4 | ..... | ..... | ..... | .... | Ab | |
| 24 | 1506 McCallie Ave. | Liggetts' Ice Cream Co. | E. O. Hembree | Slope | 690 | 402 | ..... | 8 | do. | Olmc | 30 | ..... | C | 20 | 57 | In | Well yielded 50 gpm prior to 1947. |
| 25 | 2232 E. 23rd St. | Associated Dairies | ..... | Valley | 665 | 80 | 40 | 6 | do. | Olmc | 75 | ..... | C | 15 | 56 | In | |
| 26 | 234 E. 11th | Tops Chewing Gum, Inc. | ..... | Slope | 690 | 200 | ..... | 8 | do. | O-Ꞓk | ..... | ..... | C | 25 | .... | In | |
| 27 | 2341 Rossville Blvd. | United-Morning Star Dairies | E. O. Hembree | do. | 640 | 275 | 40 | 6 | do. | Olmc | 33 | ..... | C | 60 | 58 | In | |
| 28 | 2416 E. Main St. | Chattanooga Ice Delivery Co. | J. O. Keele | Valley | 670 | 613 | ..... | 8 | do. | Olmc | 50 | ..... | .... | 60 | 58 | Ab | No appreciable quantity of water encountered below 50 feet. |
| 29 | 1021 Cross St. | W. S. Dickey Clay Mfg. Co. | ..... | Slope | 655 | 300 | ..... | 6 | Shale | Sr | 20 | ..... | A | 80 | 58 | In | |
| 30 | 100 W. 1st St. | Sherman & Riley, Inc. | ..... | do. | 650 | 205 | 30 | 6 | Dolomite | Olmc | 35 | ..... | J | 20 | 58 | In | |
| 31 | 709 Broad St. | Tivoli Theatre | E. O. Hembree | do. | 680 | 390 | ..... | 6 | do. | Olmc | 40 | ..... | C | 75 | 60 | In | Water used for air conditioning. |
| 32 | Riverside Dr. | Cumberland Case Co. | W. W. Renshaw | do. | 680 | 230 | ..... | 8 | do. | O-Ꞓk | 30 | ..... | C | 50 | 58 | In | |
| 33 | do. | Mohawk Rubber Co. | E. O. Hembree | do. | 646 | 302 | 45 | 8 | do. | O-Ꞓk | 20 | 4/45 | .... | 180 | 60 | Ab | Test well. |
| 34 | St. Elmo Ave. | King Provision Co. | ..... | Valley | 660 | 150 | ..... | 6 | Shale | Sr | ..... | ..... | .... | 50 | .... | Ab | Well abandoned as water was muddy. |
| | LOOKOUT MTN. | | | | | | | | | | | | | | | | |
| 35 | 2 mi. W. | Farmfield Dairy | Hale | Slope | 660 | 65 | 20 | 6 | Limestone | Os | ..... | ..... | J | 8 | 58 | S | |
| | LUPTON CITY | | | | | | | | | | | | | | | | |
| 36-1 | In town | Dixie Mercerizing Co. | Wm. Kittle | Valley | 680 | 101 | 90 | 8 | Dolomite | O-Ꞓk | 35 | ..... | C | 150 | 58 | In | |
| 36-2 | do. | do. | W.W.Renshaw | do. | 680 | 90 | 90 | 8 | do. | O-Ꞓk | 35 | ..... | C | 190 | 58 | In | |
| 36-3 | do. | do. | Wm. Kittle | do. | 680 | 133 | ..... | 8 | do. | O-Ꞓk | 35 | ..... | C | 150 | 58 | In | |
| | TYNER | | | | | | | | | | | | | | | | |
| 37 | 2½ mi. W. | Ray Moss Farms | do. | do. | 715 | 167 | 50 | 8 | do. | On | 50 | ..... | J | 10 | 62 | S | |
| | LUPTON CITY | | | | | | | | | | | | | | | | |
| 38 | 3 mi. SE. | Sterchi & Sons Dairy | do. | Slope | 680 | 105 | 100 | 6 | do. | Oc | 40 | ..... | C | 35 | 62 | In | Well originally yielded 65 gpm. |
| | HARRISON | | | | | | | | | | | | | | | | |
| 39 | 2½ mi. NE. | I. W. Champion | E. O. Hembree | do. | 820 | 55 | 55 | 6 | do. | O-Ꞓk | 5 | ..... | J | 5 | 65 | D,S | |
| | TYNER | | | | | | | | | | | | | | | | |
| 40 | [illegible] mi. W. | Fred Sterchi, Sr. | W.W.Renshaw | do. | 800 | 285 | ..... | 8 | do. | Oc | ..... | ..... | L | ..... | 65 | D,S | |
| 41 | 2 mi. W. | Bonny Oaks School | ..... | do. | 720 | 200 | 100 | 6 | do. | On | 40 | ..... | C | 50 | 60 | P | Water sample analyzed. |
| 42 | 2 mi. NW. | W. S. Keese | ..... | Valley | 710 | 67 | 67 | 60 | do. | On | 60 | ..... | J | 5 | 58 | D,S | |
| 43 | 1 mi. SW. | J. H. Reed | T. V. Wooten | Slope | 710 | 110 | ..... | 6 | do. | O-Ꞓk | 100 | ..... | J | 5 | 58 | D | |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 24

U.S. EPA REGION IV

# SDMS

## POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

*PLEASE CONTACT THE APPROPRIATE RECORDS CENTER TO VIEW THE MATERIAL

and
MRS 105-SE

STATE OF TENNESSEE

DEPARTMENT OF CONSERVATION

DIVISION OF GEOLOGY

William D. Hardeman, *State Geologist*

# GEOLOGIC MAP
# AND
# MINERAL RESOURCES SUMMARY
# OF THE
# CHATTANOOGA QUADRANGLE, TENNESSEE

*(Including the Tennessee Portion of the Fort Ogletborpe Quadrangle, Georgia-Tennessee)*

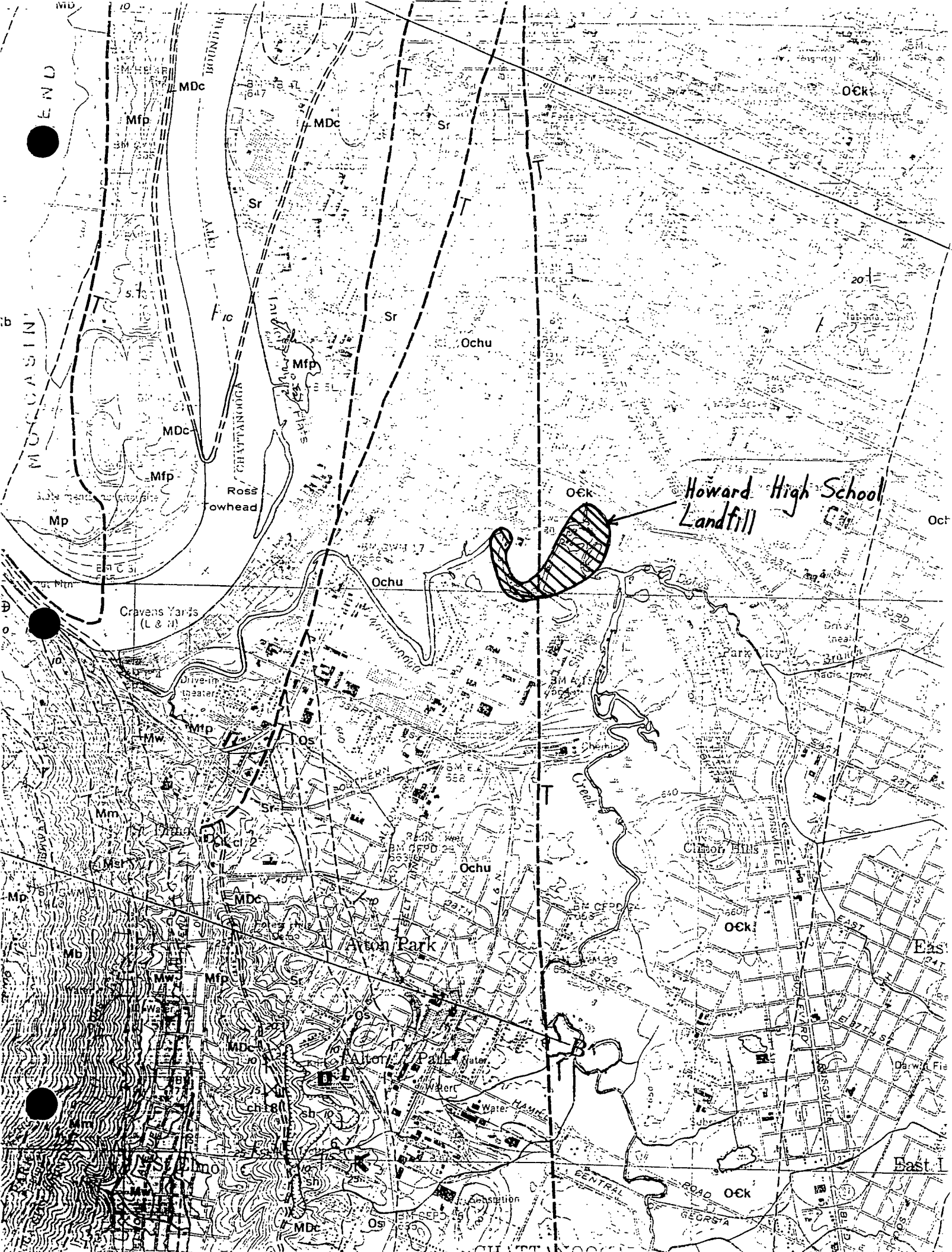
GEOLOGIC MAP
By
[illegible]

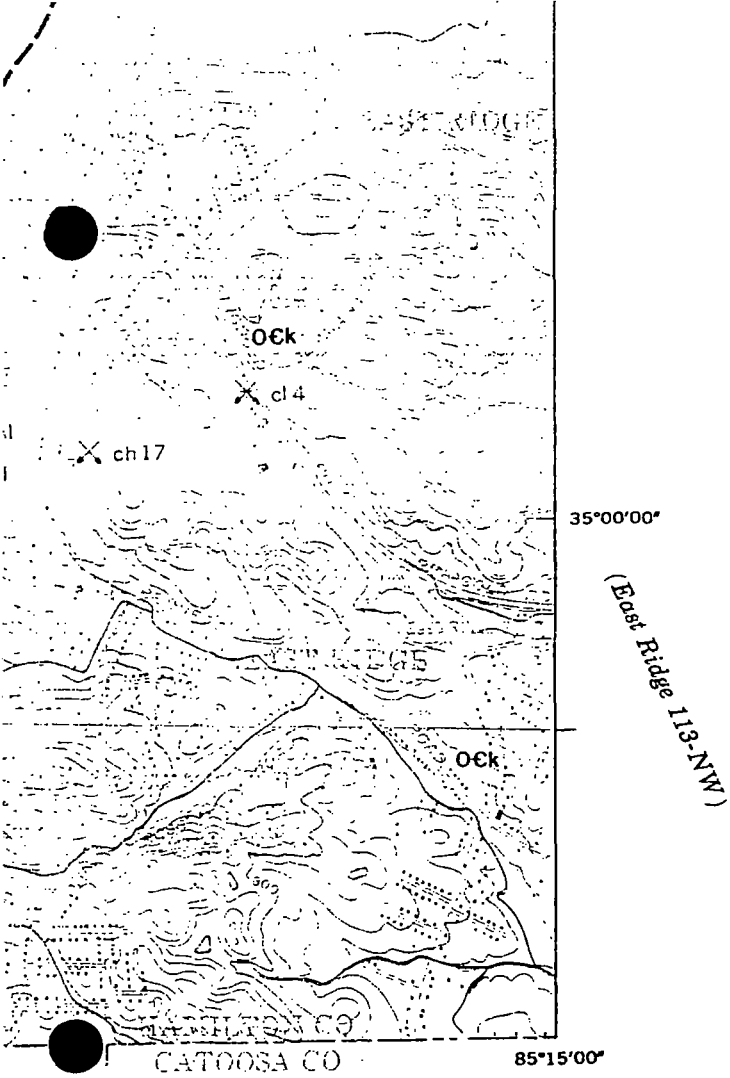
MINERAL RESOURCES SUMMARY
By
[illegible]

NASHVILLE, TENNESSEE

1964

GM 105-SE
MRS 105-SE


Howard High School Landfill
MDc
Mfp
Sr
Ochu
O€k
Ross Towhead
Mp
Cravens Yards (L & N)
Drive-in theater
Mw
Os
Mm
Mer
Mb
Anton Park
Anton Park
St. Elmo
Cliffon Hills
Creek
Water
Station
CENTRAL
ROAD
GEORGIA
EAST
East
East L




Geology by C. Pratt Finlayson, Robert H. Barnes, John M. Colvin, Jr., and Edward T. Luther, assisted by John W. Jewell and Robert H. Carpenter.
Mineral resources mapped by Robert C. Milici.
Map preparation and editing by Donald S. Fullerton and Robert J. Floyd.

PRINTED BY ARMY MAP SERVICE, CORPS OF ENGINEERS, 97800

90 to 200 feet.

**MDc**

### Chattanooga Shale

Shale, bituminous, brownish-black (weathers yellowish-orange to brown), fissile. Thickness about 20 feet.

DEVONIAN and MISSISSIPPIAN

**Sr**

### Rockwood Formation

Shale, reddish to yellowish-orange, with thin beds of siltstone and sandstone. Thin layers and lenses of hematite in upper part. Thickness about 200 feet.

SILURIAN

**Os**

### Sequatchie Formation

Limestone, typically silty and argillaceous, mottled red and green, thin- to medium-bedded. Thickness about 200 feet.

**Ochu / Ochl**

### Chickamauga Limestone

Upper part (Ochu) is limestone, light-gray to gray, fine- to medium-grained, thin- to medium-bedded, with very minor chert. Thickness about 500 feet.

Lower part (Ochl) consists of about 4 feet of bentonite at top, underlain by limestone, light-gray to gray, fine- to coarse-grained, thin- to thick-bedded, and minor dark blocky chert. Thickness about 1,000 feet.

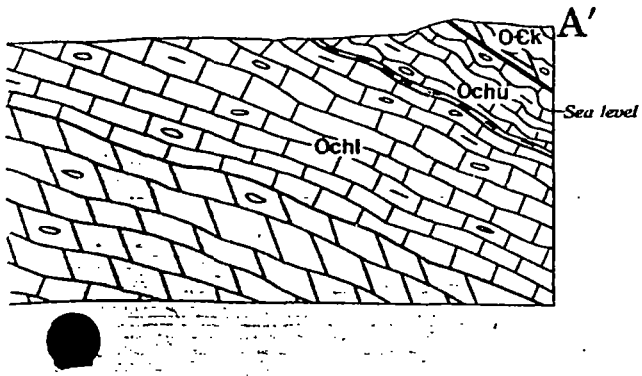
ORDOVICIAN

**O€k**

### Knox Group, Undifferentiated

Dolomite, very siliceous, light- to dark-gray, fine- to coarse-grained, thin- to very thick-bedded, weathers to cherty rubble; minor gray, fine-grained limestone, chiefly in upper part. Thickness about 2,600 feet.

CAMBRIAN and ORDOVICIAN




Contact, dashed where approximate

Fault, dashed where approximately located, on upper plate of thrust fault

Thrust fault, arrow indicates relative movement (shown in cross section only)

Klippe

Strike and dip of beds
Normal

Horizontal

Beds dipping less than 5°

Generalized strike and dip of crumpled or undulated beds

Anticline showing trace and direction of plunge of axial plane

Active pit

Abandoned pit

Abandoned quarry or pit

Abandoned quarry

Al Aluminum (Bauxite)

ch Chert

cl Clay

Fe Iron

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 25

# Soil survey of
# Hamilton County, Tennessee

By Bedford W. Jackson, Soil Conservation Service

Soils surveyed by Bedford W. Jackson, Harry C. Davis, Hershel D. Dollar
Paul L. Fulks, Jerry Hayslett, Charles E. McCroskey, William C. Moffitt
Olin L. North, Jerry L. Prater, and D. Victor Simpson
Soil Conservation Service
James I. Johnson, Hamilton County

United States Department of Agriculture, Soil Conservation Service
in cooperation with
Tennessee Agricultural Experiment Station

Hamilton County is in the southeastern part of Tennessee. It is bordered on the south by the Georgia State line, on the north by Bledsoe and Rhea Counties, on the west by Marion and Sequatchie Counties, and on the east by Meigs and Bradley Counties. Chattanooga, the county seat and principal city, is located in the southern part of the county, near the Georgia State line. Chattanooga is a leading center for manufacturing and transportation. In 1974, the population of the county was 264,700. The population is rapidly increasing.

The county is irregular in shape, measuring about 35 miles from north to south and 16 miles from east to west. It covers 587 square miles, or 375,680 acres. About 352,000 acres of this is land area and about 23,680 acres is water.

Hamilton County is divided from north to south by the Tennessee River and the Chickamauga and Nickajack Reservoirs.

Hamilton County is in two Major Land Resource Areas, the Cumberland Plateau and Mountains and the Southern Appalachian Ridges and Valleys. Soils in both of these areas formed under forest vegetation and are dominantly light in color. The soils in the Cumberland Plateau and Mountains are moderately deep over sandstone and shale bedrock. The soils in Southern Appalachian Ridges and Valley are moderately deep or deep over limestone and shale bedrock.

An older survey of Hamilton County was published in 1947 *(3)*. The present survey updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

## general nature of the survey area

The history, industry, transportation, natural resources, and climate of the county are briefly described in this section.

### history

The first known inhabitants of Hamilton County were the Cherokee and Chickamauga Indians. The first non-Indian traders in this area were Scotsmen, who made their homes among the Indians and married Indian women.

Hamilton County was formed from a part of Rhea County by an act of the General Assembly on October 25, 1819. It was named in honor of Alexander Hamilton. At that time, 821 non-Indians lived within its boundaries.

The population of Hamilton County is concentrated in or near Chattanooga. Several small towns in the county are within 35 miles of Chattanooga. Hamilton County does not have a large rural population that depends on farming for support.

About 22 percent of Hamilton County was in farms in 1969. In 1974, about 19 percent was in farms.

## industry

The industrial complex of Hamilton County is the largest in Southeast Tennessee. It includes marketing, merchandising, banking, housing, and chemical-based industries. Many large iron foundries are in Chattanooga.

More than 100 manufacturing firms operate in Hamilton County. They employ more than 50 percent of the nonagricultural workers. Many of the industrial workers are employed by a chemical company and an engineering company.

The housing industry has expanded greatly in recent years to keep pace with population growth. Residential areas have developed around downtown Chattanooga. Most of the residential units in the county are single-family houses. However, since 1970, a large number of multiple-family dwellings and high-rise apartments have been built. Prime farmland is being used very rapidly for urban development.

## transportation

Interstate Highways 75 and 24 merge in Chattanooga. In addition to a freeway system, Hamilton County has an excellent network of state and local highways. Nearly all of the county roads are paved with bituminous materials.

Transportation by water is important to Chattanooga and Hamilton County. Barge tonnage of raw materials on the Tennessee River is increasing at a steady rate. Wood products, chemicals, coal, and oil products account for the largest tonnage.

Hamilton County is served by the Southern Railway and the Louisville and Nashville Railway. Major truck terminals are located in and near Chattanooga.

## natural resources

Hamilton County has an abundant supply of timber, coal, and farmland. Tree production is a major enterprise on the slopes of the Cumberland Mountains and in areas of the valley not suited to the production of agricultural products.

Hamilton County has an abundant supply of fresh water. Streams that flow year-round are common. Water impounded behind the Nickajack Dam in Marion County on the Tennessee River backs up to Chattanooga. Water impounded behind the Chickamauga Dam, about 5 miles north of Chattanooga, backs up to the Watts Bar Dam in Rhea County.

## climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In winter, valleys in Hamilton County are very cool with occasional cold and warm spells. Upper slopes and mountaintops are generally cold. In summer, valleys are very warm and frequently hot, and mountains that are warm during the day become cool at night. Precipitation is heavy and evenly distributed throughout the year. Summer precipitation falls mainly during thunderstorms. In winter, precipitation in the valleys is mostly rain with occasional snow. Winter precipitation in the mountains is generally snow, although rains are frequent. Snow cover does not persist except at the highest elevations.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Chattanooga in the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 41 degrees F, and the average daily minimum temperature is 31 degrees. The lowest temperature on record, which occurred at Chattanooga on January 31, 1966, is -10 degrees. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Chattanooga on July 28, 1952, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 52 inches. Of this, 24 inches, or 46 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.68 inches at Chattanooga on March 16, 1973. Thunderstorms occur on about 55 days each year, and most occur in summer.

Average seasonal snowfall is 5 inches. The greatest snow depth at any one time during the period of record was 7 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 8 miles per hour, in March.

# how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles.

Soil Survey, USDA/SCS Series 1950, no. 2
4/58



TABLE 1.—*Normal temperature and precipitation at two weather stations*

CHATTANOOGA AIRPORT STATION, HAMILTON COUNTY, TENN., ELEVATION, 670 FEET

| Month | Temperature [1] | | | Precipitation [2] | | | |
|---|---|---|---|---|---|---|---|
| | Average | Absolute maximum | Absolute minimum | Average | Driest year | Wettest year | Average snowfall |
| | °F. | °F. | °F. | Inches | Inches | Inches | Inches |
| December | 42.1 | 75 | 3 | 5.31 | 4.12 | 2.89 | 1.5 |
| January | 41.6 | 76 | −7 | 5.23 | 2.58 | 5.72 | 2.5 |
| February | 44.0 | 79 | −10 | 5.11 | 2.08 | 5.83 | 2.2 |
| Winter | 42.6 | 79 | −10 | 15.65 | 8.78 | 14.44 | 6.2 |
| March | 50.7 | 89 | 2 | 6.05 | 5.81 | 10.50 | .8 |
| April | 59.7 | 92 | 23 | 4.53 | 1.67 | 6.70 | .2 |
| May | 67.7 | 95 | 37 | 4.16 | 2.76 | 12.00 | 0 |
| Spring | 59.4 | 95 | 2 | 14.74 | 10.24 | 29.50 | 1.0 |
| June | 75.8 | 100 | 39 | 4.21 | 1.92 | 4.39 | 0 |
| July | 78.3 | 104 | 56 | 5.34 | 2.09 | 3.21 | 0 |
| August | 77.8 | 101 | 54 | 3.70 | 5.03 | .45 | 0 |
| Summer | 77.1 | 104 | 39 | 13.25 | 9.04 | 8.05 | 0 |
| September | 72.5 | 104 | 38 | 2.69 | 1.07 | 5.66 | 0 |
| October | 60.8 | 92 | 26 | 3.24 | .46 | 3.12 | (3) |
| November | 49.1 | 81 | 11 | 4.03 | 3.09 | 11.60 | .3 |
| Fall | 60.8 | 104 | 11 | 9.96 | 4.62 | 20.38 | .3 |
| Year | 60.0 | 104 | −10 | 53.60 | [4] 32.68 | [5] 72.37 | 7.5 |

SEWANEE STATION, FRANKLIN COUNTY, TENN., ELEVATION, 1,910 FEET

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| December | 39.9 | 71 | −6 | 5.33 | 4.32 | 3.03 | 1.7 |
| January | 38.9 | 70 | −7 | 5.43 | 4.64 | 7.44 | 3.2 |
| February | 40.0 | 74 | −11 | 5.27 | 1.24 | 5.86 | 2.4 |
| Winter | 39.6 | 74 | −11 | 16.03 | 10.20 | 16.33 | 7.3 |
| March | 48.5 | 86 | 4 | 6.20 | 3.98 | 9.52 | 1.4 |
| April | 58.7 | 90 | 20 | 4.94 | 4.44 | 3.99 | .3 |
| May | 65.4 | 90 | 30 | 4.40 | .77 | 11.35 | 0 |
| Spring | 56.9 | 90 | 4 | 15.54 | 9.19 | 25.86 | 1.7 |
| June | 72.8 | 99 | 39 | 4.64 | 2.66 | 6.87 | 0 |
| July | 75.6 | 103 | 51 | 5.63 | 4.45 | 3.23 | 0 |
| August | 74.9 | 101 | 51 | 4.38 | 4.95 | .93 | 0 |
| Summer | 74.4 | 103 | 39 | 14.65 | 12.06 | 11.03 | 0 |
| September | 70.3 | 101 | 34 | 3.15 | .60 | 9.69 | 0 |
| October | 59.3 | 90 | 21 | 3.21 | 3.58 | 4.86 | .1 |
| November | 48.0 | 75 | 3 | 4.61 | 3.10 | 5.40 | .5 |
| Fall | 59.4 | 101 | 3 | 10.97 | 7.28 | 22.95 | .6 |
| Year | 57.6 | 103 | −11 | 57.19 | [6] 35.73 | 77.17 | 9.6 |

[1] *Chattanooga:* Average temperature based on an 18-year record, through 1955; highest and lowest temperatures on a 52-year record, through 1930. *Sewanee:* Average temperature based on a 49-year record, through 1942; highest and lowest temperatures on a 35-year record, through 1930.

[2] *Chattanooga:* Average precipitation based on a 77-year record, through 1955; wettest and driest years based on a 77-year record, in the period 1879-1955; snowfall, based on a 52-year record, through 1930. *Sewanee:* Average precipitation based on a 62-year record, through 1955; wettest and driest years based on a 56-year record, in the period 1860-1955; snowfall, based on a 33-year record, through 1930.

[3] Trace. [4] In 1904. [5] In 1929. [6] In 1941.

Sequatchie River. The Cumberland Plateau is sparsely settled.

## Transportation and Markets

Practically all parts of the valley of the Sequatchie River have hard-surfaced highways. Jasper is on State Highway no. 27 and on Federal Highways 41, 64, and 72. South Pittsburg is on Federal Highway 72. Both towns are also on a branch line of the Nashville, Chattanooga and St. Louis Railroad.

Most of the farm products not used locally are shipped or hauled by truck to Chattanooga or Nashville. Much of the coal is shipped by rail, but some is hauled by truck to nearby towns, and a large quantity is moved by barges on the Tennessee River.

In 1950, according to the Federal census, 350 farms were located 0.2 mile or less from an all-weather road, and 75 farms were at least 5 miles from the nearest all-weather road.

Many parts of the Cumberland Plateau are practically inaccessible to automobiles. Two hard-surfaced roads cross the plateau, and there are a few gravel roads. Most of the farms 5 miles or more from an all-weather road were on the plateau.

# *Agriculture*

About 26.5 percent of Marion County, or 86,015 acres, was in farms in 1950. The farms are generally small, and crops are diversified. On many farms the crops are grown mainly for home use. Dairying and the raising of beef cattle have increased. As the number of cattle has increased, better permanent pastures have been established.

The types and sizes of farms, land use, crops, livestock and livestock products, and other subjects related to agriculture are discussed in the following subsections.

## Land Use

The approximate area of Marion County is 324,480 acres. According to the 1950 Federal census, 86,015 acres, or about 26.5 percent, was land in farms. Of the 964 farms that reported, about 45 acres on each farm was improved.

The acreage of land in farms is given below, according to use.

| | Acres in 1950 |
|---|---|
| All cropland | 48,75[illegible] |
| Harvested | 25,07[illegible] |
| Used only for pasture | 13,00[illegible] |
| Not harvested and not pastured | 5,67[illegible] |
| All woodland | 37,65[illegible] |
| Pastured | 11,06[illegible] |
| Not pastured | 26,59 |
| All other land pastured | 1,[illegible] |
| Wasteland and all other land in farms not cropped, pastured, or in woodland | 3,06 |

Large holdings of forest lands are controlled by individuals or corporations for future mining and lumbering purposes.

# general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## Soil descriptions

### 1. Fullerton-Bodine

*Gently sloping to steep, well drained and somewhat excessively drained cherty soils that are more than 5 feet deep over limestone; on high hills and ridges*

The soils in this map unit are on high hills and ridges that have long, smooth slopes and narrow tops. Slopes range from 3 to 45 percent.

These soils make up about 48 percent of the county. About 38 percent of the unit is Fullerton soils, 21 percent is Bodine soils, and 41 percent is soils of minor extent.

Fullerton soils are well drained. They have a surface layer of dark grayish brown or brown cherty silt loam and a subsoil of red cherty clay.

Bodine soils are somewhat excessively drained. They have a surface layer of pale brown cherty silt loam and a subsoil of yellowish and brownish cherty or very cherty silty clay loam.

Of minor extent in this unit are the well drained Minvale soils on benches and foot slopes, the well drained Ennis soils along drainageways and in depressions, and the moderately well drained Roane soils along drainageways and on foot slopes and terraces.

About 40 percent of the acreage of this unit has been cleared. Most of the cleared areas on hillsides are used for pasture. Corn and hay crops are grown in the hollows, on the hilltops, and on the foot slopes. The uncleared acreage consists of rough, steep areas that are generally in mixed hardwoods.

The soils on hilltops and hillsides, which have been cleared, are suitable for pasture. Slope and the hazard of erosion are the main limitations. Overgrazing is a major concern of pasture management because it causes erosion. In most areas, ponds provide water for livestock. The soils are moderately permeable and cherty, and chemical treatment or compaction is required to make the ponds hold water.

The soils in this unit are moderately suited to trees, especially pines and mixed hardwoods. Productivity is medium. The steep slopes restrict the use of logging equipment, and erosion is a hazard along logging trails.

These soils are moderately to poorly suited to urban development. Slope is the main limitation.

### 2. Colbert-Talbott

*Gently sloping to moderately steep, moderately well drained and well drained loamy soils that have a clayey subsoil and depth of 5 feet or less over limestone; on uplands*

The soils in this map unit are on broad, gently sloping to moderately steep uplands. Slopes in the uplands are smooth and short. Most areas of this unit are drained by streams, and some areas are drained by underground caverns. Slopes range from 2 to 25 percent.

These soils make up about 10 percent of the county. About 40 percent of the unit is Colbert soils, 17 percent is Talbott soils, and 43 percent is soils of minor extent.

Colbert soils are moderately well drained. They have a surface layer of brown silt loam and a subsoil of yellowish brown clay that is mottled in shades of brown and gray. The depth to bedrock ranges from 40 to 60 inches.

Talbott soils are well drained. They have a surface layer of yellowish brown silt loam and a subsoil of yellowish red clay. The depth to bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are the moderately well drained Capshaw and Tupelo soils on the stream terraces and the well drained Collegedale soils on the uplands.

About 75 percent of the acreage of this unit has been cleared. Most of the cleared areas are used for hay and

pasture. The uncleared acreage consists of moderately steep areas that are generally in mixed hardwoods or eastern redcedar.

These soils are moderately suited to hay and pasture. Slope, the hazard of erosion, and the clayey subsoil are the main limitations. Ponds provide water for livestock. The soils are slowly permeable and easily hold impounded water.

The soils in this unit are poorly suited to row crops. Most row crops produce low yields and growing them is not generally feasible. Erosion is a hazard if cultivated crops are grown.

In the wooded areas the soils are generally best suited to woodland use. Hardwoods are best suited. Chestnut and hickory are the trees most extensively grown. Productivity is low because the slowly permeable clayey subsoil retards the growth of roots and the movement of water and air through the soil.

These soils are poorly suited to sanitary facilities and building site developments. The slowly permeable clayey subsoil is the main limitation.

### 3. Lily-Lonewood-Ramsey

*Gently sloping to steep, well drained loamy soils that are less than 6 feet deep over sandstone and shale; on the Cumberland Plateau*

The soils in this map unit are on broad sloping uplands and the short and steep side slopes of long ridges. They are dissected by natural drainageways. Slopes range from 2 to 45 percent.

These soils make up about 12 percent of the county. About 40 percent of the unit is Lily soils, 11 percent is Lonewood soils, and 6 percent is Ramsey soils. The rest is soils of minor extent.

Lily soils are generally in broad areas that are dissected by shallow drainageways. They have a surface layer of dark grayish brown and pale brown loam and a subsoil of yellowish brown clay loam. The depth to bedrock ranges from 20 to 40 inches.

Lonewood soils are on broad, smooth plateaus. They have a very dark grayish brown silt loam surface layer and a subsoil that is yellowish brown silt loam in the upper part and yellowish red silty clay loam in the lower part. The depth to bedrock ranges from 40 to 72 inches.

Ramsey soils are on the side slopes of ridges and drains. They have a very dark grayish brown and brown loam surface layer and a subsoil of yellowish brown loam. The depth to sandstone bedrock is less than 20 inches.

Of minor extent in this unit are the well drained Sequoia and Gilpin soils on the shale ridges and the Crossville soils on sandstone uplands.

About 5 percent of the acreage of this unit has been cleared. Most of the cleared areas are used for cultivated crops, hay, and pasture. The uncleared acreage is in mixed hardwoods or pine. Part of the uncleared acreage consists of rough, steep areas that are generally in hardwoods.

The gently sloping and sloping soils, which have been cleared, are well suited to pasture and fairly well suited to cultivated crops. Hay and pasture crops are grown extensively. A small acreage is in cultivated crops.

Erosion is a hazard if cultivated crops are grown. Ponds must be constructed to provide water for livestock, because no permanent streams flow through the area. Pond reservoir areas and embankments must be well compacted during construction to prevent seepage.

The soils in this unit are moderately suited to trees. Mixed oak and hickory are predominant on the smooth uplands. Pine is predominant on the southern exposures. Productivity is medium. There are no limitations to woodland management.

These soils are moderately suited to urban use. Depth to rock is a limitation. Placement of septic tank absorption fields is restricted by the depth to sandstone or shale.

### 4. Bouldin-Gilpin-Allen

*Gently sloping to steep, well drained loamy soils that range from 2 feet to more than 5 feet deep over sandstone, shale, and limestone; on mountainsides and foot slopes*

The soils in this map unit are on gently sloping to steep foot slopes and long, steep mountainsides dissected by steep, deep drainageways. Slopes range from 3 to 60 percent.

These soils make up about 15 percent of the county. About 25 percent of the unit is Bouldin soils, 25 percent is Gilpin soils, and 15 percent is Allen soils. The rest is soils of minor extent.

Bouldin soils generally are on the concave areas immediately below sandstone escarpments and on the side slopes of the drainageways. They have a surface layer of brown stony loam and a subsoil of strong brown and yellowish red stony clay loam. The depth to bedrock is greater than 6 feet.

Gilpin soils are generally on the convex areas of the mountainside. They have a surface layer of dark grayish brown and yellowish brown silt loam and a subsoil of strong brown shaly silt loam. The depth to bedrock ranges from 20 to 40 inches.

Allen soils are on foot slopes at the base of mountains. They have a surface of brown loam and a subsoil of yellowish red and red clay loam. The depth to bedrock is more than 5 feet.

Of minor extent in this unit are the well drained Ramsey and Sequoia soils on convex areas.

About 1 percent of the acreage of this unit has been cleared. Most of the cleared areas are on hillsides and are being used for pasture and garden crops. The uncleared acreage consists of rough, steep areas that

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing and local commercial districts.

This soil is moderately suited to agricultural use. The very slowly permeable clay subsoil retards root growth and the movement of water and air through the soil. Row crops such as corn and soybeans grow poorly on this soil. Pasture plants, such as common bermudagrass, tall fescue, and serecia lespedeza, grow fairly well.

This soil is moderately suited to use as woodland because of moderate available water capacity and the very slowly permeable clay subsoil. Trees that grow on this soil include loblolly pine and shortleaf pine. The clayey subsoil near the surface causes seedling mortality and limits the use of equipment when the soil is wet.

This soil is poorly suited to most urban uses. The very slow permeability, low strength, and high shrink-swell potential are limitations which are difficult to overcome. Engineering works and highway and street construction are limited by the low strength, high shrink-swell potential, and depth to bedrock of this soil.

This soil is in capability subclass IVe and woodland subclass 4c.

**CcD—Colbert-Rock outcrop complex, 5 to 20 percent slopes.** This map unit consists of small areas of sloping and moderately steep Colbert soils and limestone Rock outcrop so intermingled that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 3 to 25 acres in size, and individual areas of each component range from 0.1 acre to about 2 acres. Areas of Colbert soils make up from 35 to 70 percent of the map unit and average about 45 percent. Areas of Rock outcrop make up from 30 to 55 percent of the map unit and average about 40 percent.

Colbert soils are deep and moderately well drained. Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil is yellowish brown plastic clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray except in the upper 10 to 15 inches. The underlying material is olive clay which has gray and brown mottles. Limestone bedrock is at a depth of 55 inches.

Colbert soils are low in natural fertility and organic matter content. They range from slightly acid to strongly acid, except in the layers just above bedrock, which range from slightly acid to mildly alkaline. Permeability is very slow, retarding root growth and the movement of water and air through the soil. The available water capacity is only moderate because of the high clay content in the subsoil. The shrink-swell potential is high.

Rock outcrop is limestone bedrock that is exposed on the land surface. In places, the rocks are level with the surface, and in other places, the rocks extend 2 to 3 feet above the surface.

Included with this unit in mapping are numerous small areas of a soil which is less than 40 inches deep to bedrock. Also included are a few areas of a soil that is less clayey in the upper part of the subsoil. Included soils make up 10 to 15 percent of the unit.

The soils are used mostly as woodland; in a few areas they are used for unimproved pasture.

These soils are poorly suited to farming, woodland, and most engineering uses. The large number of Rock outcrops is the most limiting feature. Other limiting features are very slow permeability, and the high shrink-swell potential. Some tree species that grow on these soils are hickory, chestnut oak, and eastern redcedar.

This complex is in capability subclass VIIs. The Colbert soils are in woodland subclass 4c.

**CdC—Colbert-Urban land complex, 2 to 12 percent slopes.** This map unit consists of deep, moderately well drained, gently sloping and sloping Colbert soils, Urban land, and disturbed areas that have been altered during construction. The areas of soils and Urban land are so intricately mixed or so small that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 5 to 150 acres in size, and individual areas of each component range from 0.1 acre to about 5 acres. Colbert soils make up 25 to 45 percent of each mapped area, Urban land 25 to 45 percent, and disturbed areas 10 to 25 percent.

Typically, Colbert soils have a surface layer of brown silt loam 4 inches thick. The subsoil is yellowish brown clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray, except in the upper 10 to 15 inches. The underlying material is olive clay and has gray and brown mottles. Limestone bedrock is at 55 inches.

Colbert soils are low in natural fertility and organic matter content. They are slightly acid to strongly acid, except in the layers just above bedrock, which range to mildly alkaline. Permeability is very slow, and the available water capacity is moderate. The shrink-swell potential is high.

The Urban land part of this unit is covered by buildings, streets, parking lots, sidewalks, and other structures.

The disturbed areas have been excavated during the installation of utilities, and cut and filled during grading and shaping operations. They have been altered to the extent that individual soils cannot be identified and predictions cannot be made about their suitability for use without an onsite investigation.

Included in mapping are small areas of a soil that is less clayey in the upper part of the subsoil and areas of a somewhat poorly drained soil that has gray mottles within 10 inches of the surface layer. The somewhat poorly drained soil is on level areas and slight depressions. Also included are some areas of a Talbott soil that has limestone bedrock within 40 inches of the surface.

The Colbert soils are used for parks, open space, building sites, lawns, and gardens. They are moderately to poorly suited to lawns, gardens, trees, and shrubs; and they are poorly suited to intensive recreation developments such as football fields, baseball fields, and playgrounds. Colbert soils are poorly suited to building sites, roads, and most other engineering uses. A very slowly permeable clayey subsoil, low strength when wet, and high shrink-swell potential are the major limiting features of these soils.

The Colbert soils are in woodland subclass 4c. They are not assigned to a capability subclass.

**CoC—Collegedale silt loam, 2 to 12 percent slopes.** This deep, well drained, gently sloping and sloping soil is on upland areas in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly short and irregular. They range from 2 to 12 percent but are dominantly 4 to 12 percent. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

The soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity is moderate to high.

Included with this soil in mapping are small areas of a soil which has a silty clay loam surface layer and a brown clayey subsoil. Also included are small areas of severely eroded soils that have a clay surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management. Trees that grow on this soil include loblolly pine and Virginia pine.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of air and water through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass IVe and woodland subclass 3o.

**CoD—Collegedale silt loam, 12 to 25 percent slopes.** This deep, well drained, moderately steep soil is on uplands in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly smooth and short. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity ranges from moderate to high.

Included with this soil in mapping are soils which have a silty clay loam surface layer and a brown subsoil. Also included are small areas of a soil that has more than 10 percent fragments of chert in the surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low natural fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of water and air through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass VIe and woodland subclass 3o.

**CrB—Crossville loam, 2 to 5 percent slopes.** This moderately deep, well drained, gently sloping soil is on broad plateaus of the Cumberland Mountains. It formed in materials weathered from acid sandstone. The slopes are smooth and convex. Individual areas range from 2 to 25 acres.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 28 inches. It is brown and dark yellowish brown loam. The underlying material is yellowish brown loamy sand that is underlain by sandstone bedrock at 32 inches.

This soil is strongly acid throughout, except in areas where the surface layer has been limed. Natural fertility is low, and organic matter content is medium. Permeability is moderate, and the available water capacity is moderate. Tilth is good, and the root zone is moderately deep.

Included with this soil in mapping are small areas of a soil that has a higher clay content in the subsoil. Also included are some areas of Ramsey soil and a few areas of Rock outcrops.

This soil is used mostly for woodland and pasture, but some cultivated crops are grown.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

*Camp areas* require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

## wildlife habitat

Willis Gainer, biologist, Soil Conservation Service, helped prepare this section.

Although a large part of Hamilton County has been developed or is densely populated, the wildlife resources are still quite abundant. Good populations of dove and quail are found in the cropland and openland; squirrels are found where mast and den trees such as oaks and hickories have been retained; waterfowl are often abundant along the river and lakes; and deer occupy suitable wooded farmland. The abundance of trees and shrubs around homes and properties provides habitat for a great variety of non-game wildlife, such as songbirds.

About 71 percent, or 196,000 acres, of Hamilton County provides habitat for woodland wildlife, and about 15 percent, or 40,900 acres, of the county provides habitat for openland wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be

:ablished, improved, or maintained in most places. :derately intensive management is required for :sfactory results. A rating of *poor* indicates that itations are severe for the designated element or kind habitat. Habitat can be created, improved, or aintained in most places, but management is difficult d must be intensive. A rating of *very poor* indicates at restrictions for the element or kind of habitat are y severe and that unsatisfactory results can be pected. Creating, improving, or maintaining habitat is practical or impossible.

The elements of wildlife habitat are described in the lowing paragraphs.

*Grain and seed crops* are domestic grains and seed-ducing herbaceous plants. Soil properties and atures that affect the growth of grain and seed crops e depth of the root zone, texture of the surface layer, vailable water capacity, wetness, slope, surface oniness, and flood hazard. Soil temperature and soil oisture are also considerations. Examples of grain and eed crops are corn, wheat, oats, and soybeans.

*Grasses and legumes* are domestic perennial grasses nd herbaceous legumes. Soil properties and features at affect the growth of grasses and legumes are depth f the root zone, texture of the surface layer, available ater capacity, wetness, surface stoniness, flood hazard, nd slope. Soil temperature and soil moisture are also onsiderations. Examples of grasses and legumes are escue, orchardgrass, ryegrass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally stablished grasses and forbs, including weeds. Soil roperties and features that affect the growth of these ants are depth of the root zone, texture of the surface ayer, available water capacity, wetness, surface toniness, and flood hazard. Soil temperature and soil oisture are also considerations. Examples of wild erbaceous plants are bluestem, goldenrod, eggarweed, pokeberry, and crotons.

*Hardwood trees* and woody understory produce nuts r other fruit, buds, catkins, twigs, bark, and foliage. Soil roperties and features that affect the growth of ardwood trees and shrubs are depth of the root zone, he available water capacity, and wetness. Examples of hese plants are oak, poplar, cherry, sweetgum, apple, awthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are bush honeysuckle, autumn-olive, and crabapple.

*Coniferous plants* furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, and cedar.

*Wetland plants* are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, spikebrush, saltgrass, cordgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, mourning dove, woodpeckers, squirrels, gray fox, raccoon, and deer.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

## engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

3- [illegible]5 percent of the B horizon. In a few places, boulders as large as 10 feet across are on the surface.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 4. The fine earth fraction is loam or sandy loam.

The B1 horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. The fine earth fraction is loam or sandy loam.

The B2t horizon has hue of 5YR, 7.5YR, or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The fine earth fraction is clay loam or sandy clay loam.

## Capshaw series

The Capshaw series consists of deep, moderately well drained, gently sloping soils. These soils formed in old alluvium or in a layer of alluvium and the underlying clayey residuum on stream terraces and uplands. Slopes range from 2 to 6 percent.

Capshaw soils are on the same landscape as Colbert, Talbott, and Tupelo soils. Colbert soils have more than 60 percent clay in the upper 20 inches of the argillic horizon. Talbott soils are well drained and have a reddish subsoil. Tupelo soils are on lower positions than the Capshaw soils and are somewhat poorly drained. They have mottles of chroma of 2 or less in the upper 10 inches of the argillic horizon.

[illegible]ical pedon of Capshaw silt loam, 2 to 6 percent sl[illegible]s, 1/8 mile north of Ooltewah on Georgetown Road, 100 feet on right:

Ap—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21t—4 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; thin discontinuous clay films; strongly acid; gradual smooth boundary.

B22t—15 to 24 inches; yellowish brown (10YR 5/6) silty clay; few fine distinct light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B23t—24 to 30 inches; yellowish brown (10YR 5/6) clay; common fine and medium distinct light gray (10YR 7/2) mottles; moderate medium subangular and angular blocky structure; firm; thin continuous clay films; strongly acid; gradual wavy boundary.

B24t—30 to 45 inches; yellowish brown (10YR 5/6) clay; many fine and medium distinct yellowish brown (10YR 5/8) and light gray (10YR 7/2) mottles; moderate medium angular blocky structure; firm; thin discontinuous clay films; common fine and medium [illegible]lack and brown concretions; strongly acid; gradual wavy boundary.

C—45 to 60 inches; mottled grayish brown (2.5Y 5/2), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/4) clay; massive; very firm; many fine and medium black and brown concretions; medium acid.

The depth to limestone bedrock ranges from about 48 to 84 inches. The thickness of the solum ranges from 40 to 60 inches. Reaction is medium acid or strongly acid, except in areas where the surface layer has been limed and in the horizons just above bedrock, which are less acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The B2t horizon has hue of 7.5YR, 10YR, and 2.5Y, value of 4 or 5, and chroma of 4 to 8. The B22t, B23t, and B24t subhorizons have few to many mottles in shades of gray, brown, and red. Texture is silty clay loam, silty clay, or clay in the upper 2 feet and silty clay or clay below.

The C horizon has hue of 2.5Y, value of 5 or 6, and chroma of 0 to 4. In some pedons, it is mottled and has no dominant color. Texture is silty clay or clay.

## Colbert series

The Colbert series consists of deep, moderately well drained, gently sloping to moderately steep soils on uplands. These soils formed in residuum of argillaceous limestone. Slopes range from 2 to 20 percent.

Colbert soils are on the same landscape as Talbott, Capshaw, Collegedale, and Tupelo soils. Capshaw and Collegedale soils differ from Colbert soils mainly by having less than 60 percent clay in the upper 20 inches of the argillic horizon. Collegedale soils are more than 60 inches deep to bedrock. Talbott soils have redder hues in the subsoil. Tupelo soils have gray mottles in the upper part of the subsoil.

Typical pedon of Colbert silt loam, 2 to 12 percent slopes; Morris Hill Road 1 mile past intersection with East Brainerd Road; 50 feet on left, in field:

Ap—0 to 4 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21t—4 to 14 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous clay films; strongly acid; clear smooth boundary.

B22t—14 to 22 inches; yellowish brown (10YR 5/8) clay; common fine and medium distinct mottles of light gray (10YR 7/2) and light brownish gray (10YR 6/2); moderate medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films; strongly acid; clear smooth boundary.

B23t—22 to 45 inches; yellowish brown (10YR 5/6) clay; common fine and medium distinct strong brown (7.5YR 5/8), light gray (10YR 7/2), and light brownish gray (10YR 6/2) mottles; moderate

medium subangular blocky structure; firm; thin discontinuous clay films; few slickensides; few fine dark concretions; medium acid; clear smooth boundary.

C—45 to 55 inches; olive (5Y 5/4) clay; common medium distinct light gray (10YR 7/2), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) mottles; massive; very firm; few slickensides; many pressure faces; slightly acid.

R—55 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. Reaction ranges from slightly acid to strongly acid, except in the layers just above limestone bedrock, which range from slightly acid to mildly alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture is silt loam or silty clay loam. In eroded areas, the Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Texture is silty clay loam, silty clay, or clay.

The B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. The upper 10 inches of this horizon is free of mottles, but below this it is mottled in shades of gray and brown.

The C horizon has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 3 to 8. Mottles in shades of brown and gray are present. Some pedons have a B3 horizon which has the same colors and textures as the C horizon.

## Collegedale series

The Collegedale series consists of deep, well drained, gently sloping to moderately steep soils that formed in material weathered from limestone. Slopes range from 2 to 25 percent.

Collegedale soils are on the same landscape as the Talbott, Colbert, and Enders soils. The Talbott and Colbert soils differ from the Collegedale soils mainly by being less than 60 inches deep to limestone bedrock, and the Enders soils differ mainly in being less than 60 inches deep to shale bedrock.

Typical pedon of Collegedale silt loam, 2 to 12 percent slopes, 1 1/2 miles east of Collegedale on Talliant Road, 500 feet on left, and 50 feet east of barn:

Ap—0 to 6 inches; brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many fine roots; few fine fragments of chert less than 1 inch in diameter; strongly acid; abrupt smooth boundary.

B21t—6 to 16 inches; yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; very firm; common fine roots; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—16 to 22 inches; yellowish red (5YR 5/6) clay; few fine and medium distinct yellowish brown (10YR 5/6) and olive yellow (2.5Y 6/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; thin continuous clay skins on faces of peds; strongly acid; clear smooth boundary.

B23t—22 to 32 inches; yellowish red (5YR 5/8) clay; common medium and coarse distinct brownish yellow (10YR 6/6), olive yellow (2.5Y 6/6), and red (2.5YR 5/6) mottles; moderate medium angular blocky structure parting to moderate fine angular blocky; thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

B24t—32 to 53 inches; yellowish red (5YR 5/8) clay; many medium and coarse faint and distinct red (2.5YR 5/6), light yellowish brown (10YR 6/4), and olive yellow (2.5Y 6/6) mottles; moderate medium angular blocky structure parting to moderate fine angular blocky; very firm; thin discontinuous clay skins on faces of peds; strongly acid; gradual smooth boundary.

B25t—53 to 80 inches; mottled yellowish red (5YR 5/6), light yellowish brown (10YR 6/4), red (2.5YR 5/6), light gray (10YR 7/2), and olive yellow (2.5Y 6/6) clay; weak medium subangular blocky structure; very firm; thin discontinuous clay films on faces of peds; strongly acid.

The thickness of the solum and the depth to bedrock are greater than 60 inches. The content of chert fragments ranges from 0 to 10 percent by volume in each horizon. Most of the fragments are less than 2 inches in diameter. Reaction is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4, except in severely eroded areas, where the hue is 7.5YR, 2.5YR, and 5YR, the value is 4 or 5, and the chroma is 6. Texture is silt loam, but in severely eroded areas it ranges to silty clay loam or silty clay.

The B2t horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Some pedons also have hue of 7.5YR in the B21t horizon. Mottles in shades of brown, yellow, and olive are present. Some gray mottles are in the lower part. Texture is silty clay or clay.

## Crossville series

The Crossville series consists of moderately deep, well drained, gently sloping soils on broad plateaus of the Cumberland Mountains. These soils formed in material weathered from acid sandstone. Slopes range from 2 to 5 percent.

Crossville soils are on the same landscape as Lily and Ramsey soils. The Ramsey soils differ from the Crossville soils mainly by having bedrock within 20 inches of the surface. The Lily soils have a lighter colored A horizon and have an argillic horizon.

The thickness of the solum ranges from 60 to 80 inches, and the depth to bedrock is more than 8 feet. The content of chert ranges from 15 to 35 percent by volume in each horizon. Reaction is strongly acid or very strongly acid in each horizon. The depth to the horizon that has fragic properties ranges from 25 to 40 inches.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. The fine earth fraction of the A horizon is silt loam or loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. The fine earth fraction is silt loam, silty clay loam, or clay loam.

The B2t horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is mottled in shades of brown, gray, yellow, and red except in the B21t horizon, which has no mottles. Some subhorizons are mottled without a dominant color. The fine earth fraction is silty clay loam or clay loam except in the lower part, which is clay in some pedons.

## Staser series

The Staser series consists of deep, well drained, nearly level soils that formed in alluvium on flood plains. Slopes range from 0 to 3 percent.

Staser soils are on the same landscape as Hamblen and Sequatchie soils. Hamblen soils differ from Staser soils mainly by being moderately well drained. Sequatchie soils are on terraces and have an argillic horizon.

Typical pedon of Staser loam, 500 feet south of Moccasin Bend Psychiatric Hospital, on the west side of the Tennessee River near Interstate Highway 24:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

A12—10 to 30 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

B2—30 to 60 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; very friable; few fine roots; slightly acid.

The thickness of the mollic epipedon ranges from 24 to 40 inches. It is slightly acid or mildly alkaline. The content of chert fragments and pebbles ranges from 0 to 10 percent in the upper 40 inches and from 0 to 30 percent below.

The A horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. It is loam or fine sandy loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. Some pedons have mottles in shades of brown and gray in the lower part of the horizon. Texture is loam or fine sandy loam.

## Talbott series

The Talbott series consists of moderately deep, well drained, gently sloping to moderately steep soils that formed in materials weathered from limestone. Slopes range from 2 to 25 percent.

Talbott soils are on the same landscape as Capshaw, Colbert, and Collegedale soils. Capshaw soils differ from Talbott soils mainly by being moderately well drained and having a solum more than 40 inches thick. Colbert soils are moderately well drained, have more than 60 percent clay in the particle-size control section, and have montmorillonitic mineralogy. Collegedale soils have a solum more than 60 inches thick and low base saturation.

Typical pedon of Talbott silt loam, 2 to 12 percent slopes, 1 1/4 miles on Morris Hill Road from the intersection of East Brainerd Road and Morris Hill Road, 50 feet on left:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21t—6 to 10 inches; yellowish red (5YR 4/6) clay; few medium distinct brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; many fine roots; thick discontinuous clay films; strongly acid; gradual smooth boundary.

B22t—10 to 24 inches; yellowish red (5YR 5/8) clay; common fine and medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; firm, plastic; few fine roots; thick continuous clay films; strongly acid; gradual smooth boundary.

B23t—24 to 36 inches; yellowish brown (10YR 5/6) clay, common fine and medium distinct yellowish red (5YR 4/6) mottles; strong medium and coarse angular blocky structure; very firm, plastic; thick continuous clay films; medium acid; gradual smooth boundary.

R—36 inches; limestone bedrock.

The depth to bedrock and the thickness of the solum range from 20 to 40 inches. Reaction is medium acid or strongly acid, except in the layer near bedrock and in areas where the surface layer has been limed, which are less acid. The content of rock fragments ranges from 0 to 10 percent by volume in each horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam except in severely eroded areas, where it is silty clay loam or clay.

The B2t horizon has dominant hue of 5YR, but in some pedons it has hue of 7.5YR or 2.5YR and ranges to 10YR in the lower part. The B2t horizon has value of 4 or 5 and chroma of 4 to 8. Mottles are few to many in shades of yellow, brown, or red. Texture is clay or silty clay.

The B3 horizon, where present, has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. Few to many mottles in shades of brown, red, and gray are in the B3 horizon. Texture is silty clay or clay.

## Tupelo series

The Tupelo series consists of deep, somewhat poorly drained, nearly level and gently sloping soils that developed in clayey alluvium or in a thin layer of alluvium and the underlying clayey residuum. These soils are on stream terraces, foot slopes of ridges, and in depressions on uplands. Slopes range from 0 to 3 percent.

Tupelo soils are on the same landscape as Colbert and Capshaw soils. Colbert soils are on slightly higher elevations than Tupelo soils, are moderately well drained, and have more than 60 percent clay in the upper 20 inches of the argillic horizon. Capshaw soils are moderately well drained and do not have mottles of chroma of 2 or less in the upper 10 inches of the argillic horizon.

Typical pedon of Tupelo silt loam in an area off East Brainerd Road, 500 feet from Mackey Creek and 100 feet north of private road:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light olive brown (2.5Y 5/4) mottles; weak fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.

B1—8 to 16 inches; yellowish brown (10YR 5/6) silt loam; few fine faint light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

B21t—16 to 26 inches; light olive brown (2.5Y 5/4) silty clay; many coarse faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay films; gradual wavy boundary.

B22t—26 to 32 inches; pale olive (5Y 6/3) clay; many medium distinct light brownish gray (2.5Y 6/2) and dark brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; firm; thick continuous clay films; medium acid; gradual smooth boundary.

B23t—32 to 48 inches; light brownish gray (2.5Y 6/2) clay; many fine and medium distinct yellowish brown (10YR 5/6) and brown (7.5YR 5/4) mottles; moderate medium angular blocky structure; firm; thick continuous clay films; medium acid; gradual smooth boundary.

Cg—48 to 60 inches; gray (N 6/) clay; many medium distinct strong brown (7.5YR 5/6) mottles; massive; very firm; slightly acid.

The thickness of the solum ranges from 35 to 60 inches. The depth to limestone bedrock ranges from 40 to 70 inches or more. Reaction is slightly acid to stron acid except in horizons immediately above the limesto bedrock where it ranges to mildly alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 4 5, and chroma of 2 to 4. Texture is silt loam or silty cl loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 5 6, and chroma of 3 to 8. Texture is silt loam or silty cl loam. The B21t and B22t horizons have hue of 5Y to 10YR, value of 5 or 6, and chroma of 3 to 8 and are mottled in shades of gray, brown, and olive. Texture is clay or silty clay. The B23t horizon has colors and textures that are similar to those of the B22t. In some pedons it is dominantly gray.

The Cg horizon and B3g horizon, where present, ar dominantly gray mottled in shades of brown, olive, an yellow.

## Waynesboro series

The Waynesboro series consists of deep, well drain gently sloping to moderately steep soils that formed i thick deposits of old alluvium on high stream terraces The alluvium ranges from 4 to 10 feet in thickness an underlain by residuum of limestone or shale. Slopes range from 2 to 25 percent.

Waynesboro soils are on the same landscape as Dewey and Etowah soils. Dewey soils differ from Waynesboro soils mainly by having a clayey B horizo that contains less than 20 percent sand and has fragments of chert in the lower part. Etowah soils hav dark reddish brown A and B horizons that contain les than 35 percent clay.

Typical pedon of Waynesboro loam, 2 to 8 percent slopes; take Highway 58 to intersection of Grasshopp Road, left on Grasshopper Road 300 feet, then 250 f on left in field:

Ap—0 to 3 inches; brown (7.5YR 4/4) loam; weak fin granular structure; friable; common fine and med roots; medium acid; abrupt smooth boundary.

B1—3 to 9 inches; yellowish red (5YR 5/8) loam; wea fine subangular blocky structure; friable; commor fine roots; strongly acid; gradual smooth boundar

B21t—9 to 19 inches; red (2.5YR 5/8) clay loam; wea fine subangular blocky structure; friable; few fine roots; thin patchy clay films; strongly acid; gradua smooth boundary.

B22t—19 to 35 inches; red (2.5YR 4/6) clay; modera medium subangular blocky structure; friable; few roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B23t—35 to 60 inches; red (2.5YR 4/6) clay; few fine distinct strong brown (7.5YR 5/8) mottles; friable thin continuous clay films; strongly acid.

The depth to bedrock and the thickness of the solu are greater than 60 inches. Reaction is strongly acid,

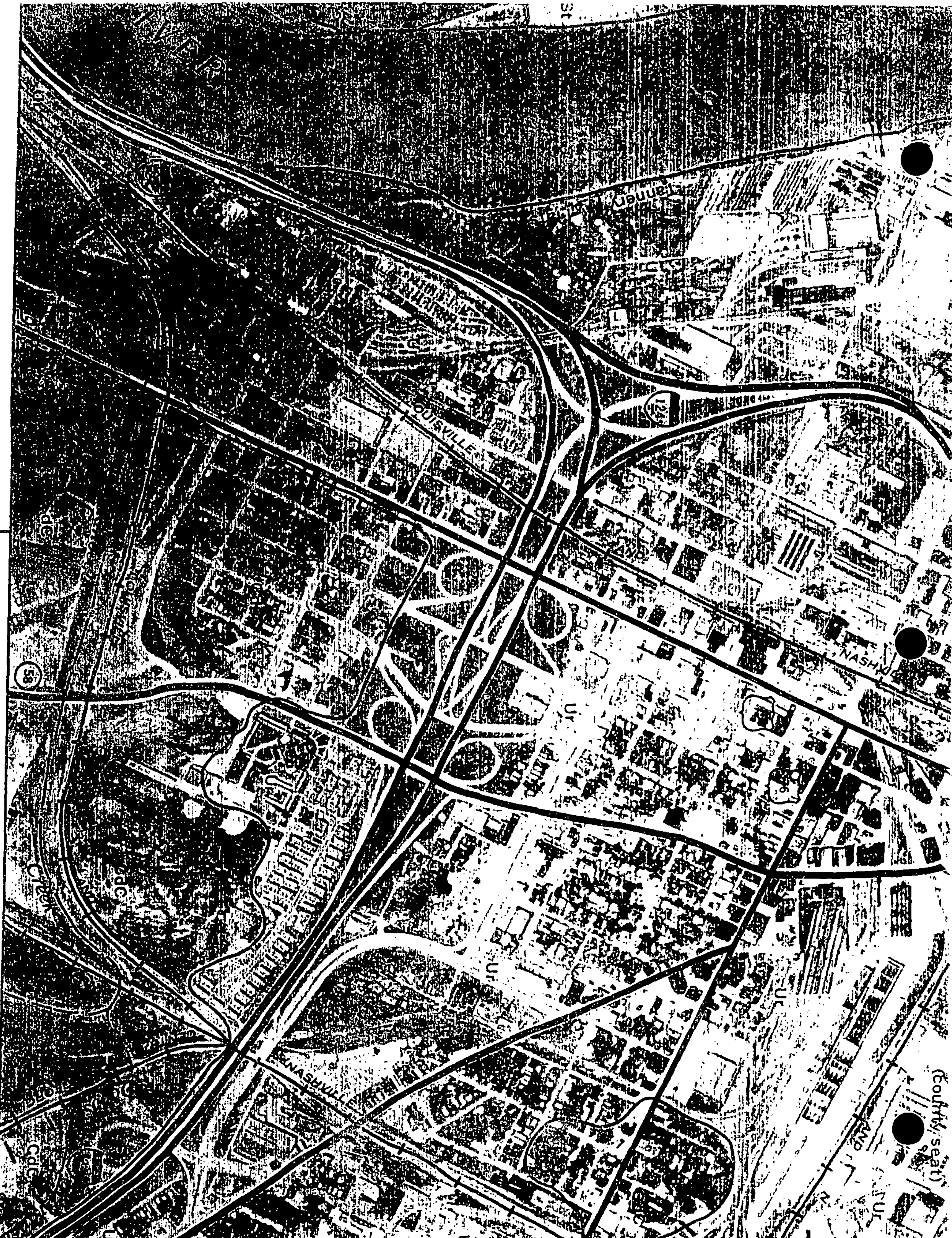
U.S. EPA REGION IV

# SDMS

## POOR LEGIBILITY

PORTIONS OF THIS DOCUMENT MAY BE UNREADABLE, DUE TO THE QUALITY OF THE ORIGINAL

*PLEASE CONTACT THE APPROPRIATE RECORDS CENTER TO VIEW THE MATERIAL


LOUISVILLE
NASHVILLE
NASHVILLE
(county seat)
124
58

# SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital only if the mapping unit is broadly defined; otherwise, it is a small letter. The third letter, if used, is always a capital and shows the slope. Symbols without slope letters are those of nearly level slopes or miscellaneous areas.

| SYMBOL | NAME |
|---|---|
| AeC | Allen loam, 3 to 12 percent slopes |
| AeD | Allen loam, 12 to 25 percent slopes |
| AeE | Allen loam, 25 to 40 percent slopes |
| ApC | Apison loam, 5 to 15 percent slopes |
| ArB | Arents, gently sloping |
| AuD | Armuchee silt loam, 10 to 25 percent slopes |
| AuE | Armuchee silt loam, 25 to 40 percent slopes |
| BaE | Barfield-Rock outcrop complex, 10 to 40 percent slopes |
| BoC | Bodine cherty silt loam, 5 to 12 percent slopes |
| BoD | Bodine cherty silt loam, 12 to 25 percent slopes |
| BoE | Bodine cherty silt loam, 25 to 45 percent slopes |
| BsD | Bodine-Shack complex, 5 to 25 percent slopes |
| BuF | Bouldin-Gilpin complex, 20 to 60 percent slopes |
| CaB | Capshaw silt loam, 2 to 6 percent slopes |
| CbC | Colbert silt loam, 2 to 12 percent slopes |
| CcD | Colbert-Rock outcrop complex, 5 to 20 percent slopes |
| CdC | Colbert-Urban land complex, 2 to 12 percent slopes |
| CoC | Collegedale silt loam, 2 to 12 percent slopes |
| CoD | Collegedale silt loam, 12 to 25 percent slopes |
| CrB | Crossville loam, 2 to 6 percent slopes |
| DeB | Dewey silt loam, 2 to 6 percent slopes |
| DeD | Dewey silt loam, 12 to 25 percent slopes |
| Du | Dunning silty clay loam |
| Ec | Emory silt loam |
| EdC | Enders silt loam, 2 to 12 percent slopes |
| EeD | Enders silty clay loam, 12 to 25 percent slopes, eroded |
| EgC | Enders gravelly loam, 2 to 12 percent slopes |
| EhC | Enders-Urban land complex, 2 to 12 percent slopes |
| En | Ennis cherty silt loam |
| EtB | Etowah silt loam, 2 to 5 percent slopes |
| EtD | Etowah silt loam, 12 to 20 percent slopes |
| FuB | Fullerton cherty silt loam, 3 to 7 percent slopes |
| FuD | Fullerton cherty silt loam, 12 to 25 percent slopes |
| FuE | Fullerton cherty silt loam, 25 to 40 percent slopes |
| FwD | Fullerton-Urban land complex, 3 to 40 percent slopes |
| GpD | Gilpin silt loam, 12 to 25 percent slopes |
| GpE | Gilpin silt loam, 25 to 40 percent slopes |
| Gu | Guthrie silt loam |

| SYMBOL | NAME |
|---|---|
| Ha | Hamblen silt loam |
| HcD | Hanceville loam, 12 to 25 percent slopes |
| HcE | Hanceville loam, 25 to 40 percent slopes |
| HoB | Holston loam, 2 to 6 percent slopes |
| HoD | Holston loam, 10 to 20 percent slopes |
| HuB | Humphreys cherty silt loam, 1 to 6 percent slopes |
| LiB | Lily loam, 2 to 7 percent slopes |
| LiD | Lily loam, 12 to 20 percent slopes |
| Lo | Lobelville cherty silt loam |
| LnB | Lonewood silt loam, 2 to 6 percent slopes |
| MnB | Minvale cherty silt loam, 3 to 12 percent slopes |
| MnD | Minvale cherty silt loam, 12 to 20 percent slopes |
| MoE | Montevallo shaly silt loam, 20 to 45 percent slopes |
| Ne | Newark silt loam |
| NsB | Nesbitt silt loam, 2 to 6 percent slopes |
| Pt | Pits, quarries |
| RaD | Ramsey loam, 8 to 25 percent slopes |
| RcF | Ramsey-Rock outcrop complex, 15 to 70 percent slopes |
| RoA | Roane cherty loam, 0 to 2 percent slopes |
| RoB | Roane cherty silt loam, 2 to 6 percent slopes |
| SaB | Sequatchie loam, 2 to 7 percent slopes |
| SfB | Sequatchie-Urban land complex, 2 to 7 percent slopes |
| SmD | Sequoia silt loam, 8 to 20 percent slopes |
| Sn | Sewanee Variant silt loam |
| St | Staser loam |
| TaC | Talbott silt loam, 2 to 12 percent slopes |
| TaD | Talbott silt loam, 12 to 25 percent slopes |
| TrD | Talbott-Rock outcrop complex, 5 to 25 percent slopes |
| Tu | Tupelo silt loam |
| UPF | Udorthents and Pits, steep |
| Ur | Urban land |
| WaB | Waynesboro loam, 2 to 8 percent slopes |
| WaD | Waynesboro loam, 12 to 25 percent slopes |
| WeB | Welchland cobbly loam, 2 to 7 percent slopes |
| Wh | Whitwell loam |
| Wo | Woodmont silt loam |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 26

Southern Wood Piedmont Company

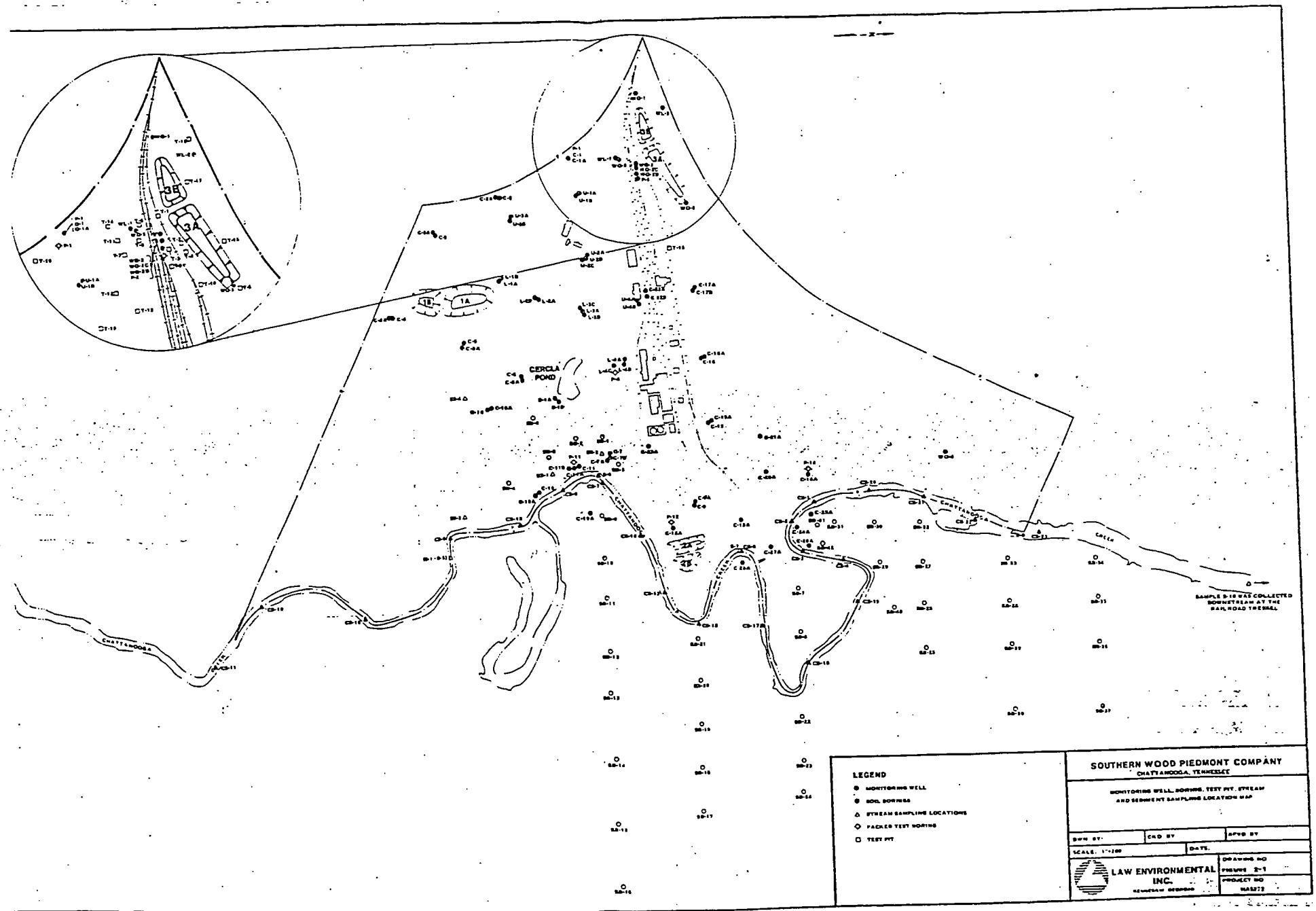
# 1987 ANNUAL GROUND-WATER QUALITY ASSESSMENT REPORT

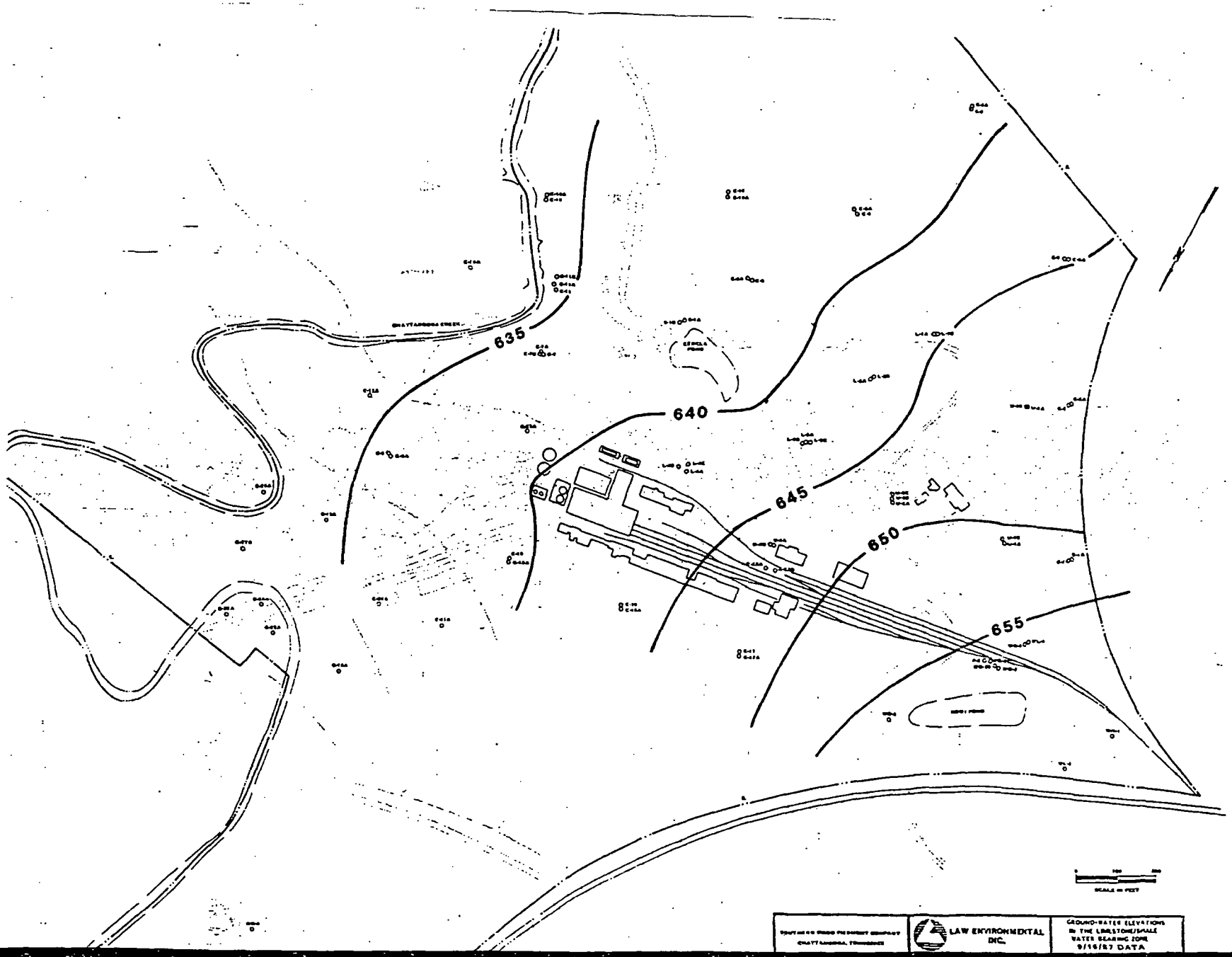
PREPARED FOR

## SOUTHERN WOOD PIEDMONT COMPANY

CHATTANOOGA, TENNESSEE FACILITY

FEBRUARY, 1988


CERCLA POND
CHATTANOOGA
CREEK
SAMPLE S-10 WAS COLLECTED DOWNSTREAM AT THE RAILROAD TRESTLE
LEGEND
MONITORING WELL
SOIL BORINGS
STREAM SAMPLING LOCATIONS
PACKER TEST BORING
TEST PIT
SOUTHERN WOOD PIEDMONT COMPANY
CHATTANOOGA, TENNESSEE
MONITORING WELL, BORING, TEST PIT, STREAM AND SEDIMENT SAMPLING LOCATION MAP
DWN BY:
CKD BY
APVD BY
SCALE: 1"=200'
DATE:
LAW ENVIRONMENTAL INC.
DRAWING NO
FIGURE 2-1
PROJECT NO


635
640
645
650
655
LAW ENVIRONMENTAL INC.
GROUND-WATER ELEVATIONS IN THE LIMESTONE/SHALE WATER BEARING ZONE 9/16/87 DATA

Datum Elevation: 638.92 ft.
Stick-up: 2.5 ft.

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | |
|---|---|---|---|---|
| 636.4 | | Soft Brown Clayey SILT with Root Fragments | | |
| 631.4 | | Very loose Gray-green, Fine SAND with Wood Fragments. Free Oil Present at Top of Rock | | |
| 626.4 | | Top of Rock | | |
| 621.4 | | Hard Gray Slightly Weathered to Fresh Limestone with Shale Streaks and Bands and Calcite Stringers | 100% HQ Rec | 54% RQD |
| 616.4 | | | | |
| 611.4 | | | 100% HQ Rec | 86% RQD |
| 606.4 | | | | |
| 601.4 | | | 100% HQ Rec | 100% RQD |
| 596.4 | | | | |

PENETRATION-BLOWS PER FOOT
0 5 10 15 20 30 40 60 80 100

REMARKS:
illed with HQ Diamond
re from 13.5 feet to 60.0'

ed with NQ Diamond
re from 60.0 feet to 90.5'

Time of Boring Water
Level on 11/07/86

DRILLED BY MA
LOGGED BY KD
CHECKED BY TW

BORING NUMBER C-24A
DATE STARTED 11/7/86
DATE COMPLETED 11/14/86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|---|
| 596.4 | | | | | |
| | | Hard Gray Slightly Weathered to Fresh Limestone with Shale Streaks and Bands and Calcite Stringers. Free Oil Noted in Core Joints | 100% HQ Rec | 97% RQD | |
| 591.4 | | | | | |
| 586.4 | | | | | |
| | | Free Oil Noted in Core Joints | 100% HQ Rec | 100% RQD | |
| 581.4 | | | | | |
| 576.4 | | | | | |
| | | | 100% NQ Rec | 97% RQD | |
| 571.4 | | | | | |
| 566.4 | | | | | |
| | | | 100% NQ Rec | 100% RQD | |
| 561.4 | | | | | |
| 556.4 | | | | | |

REMARKS: .

DRILLED BY MA
LOGGED BY KD
CHECKED BY TW

BORING NUMBER C-24A
DATE STARTED 11/7/86
DATE COMPLETED 11/14/86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|---|---|
| 556.4 | | Hard Gray Slightly Weathered to Fresh Limestone with Shale Streaks and Bands and Calcite Stringers | 100% NQ Rec | 92% RQD | | |
| 551.4 | | Free Oil Noted in Core Joints | | | | |
| 546.4 | | | | | | |
| | 90.5 | Boring Terminated at 90.5 feet | | | | |

REMARKS:

DRILLED BY MA
LOGGED BY KD
CHECKED BY TW

BORING NUMBER C-24A
DATE STARTED 11/7/86
DATE COMPLETED 11/14/86
JOB NUMBER HA5272

# TEST BORING RECORD

Stick-up: 2.9 ft.
Riser Elevation: 639.17 ft.

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 636.3 | | Soft Tan Brown Silty CLAY with Root Fragments | |
| 631.3 | 4.0 | Firm Tan Brown Clayey SILT | |
| 626.3 | 9.4 | Loose Brown Gray Fine SAND with Wood Fragments | |
| 621.3 | 14.0 | Top of Rock<br>Hard Gray Fresh to Slightly Weathered Limestone with Calcite Stringers and Free Oil on Core and in Joints | HQ REC 88% RQD 53% |
| 616.3 | | | |
| 611.3 | 24.1 | | HQ REC 94% RQD 59% |
| 606.3 | | | |
| | 32.2 | | HQ REC 100% RQD 18% |
| 601.3 | | | |
| 596.3 | | | |

PENETRATION-BLOWS PER FOOT: 0 5 10 15 20 30 40 60 80 100

REMARKS:

* Water level at time of boring on 12/15/86
Develop by bailing on 1/2/87

DRILLED BY MA
LOGGED BY MD
CHECKED BY TW

BORING NUMBER C-25A
DATE STARTED 12-15-86
DATE COMPLETED 12-19-86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 596.3 | 42.2 | Hard Gray Slightly Weathered Limestone with Calcite Stringers and Free Oil on Core | |
| 591.3 | | | HQ REC 86% RQD 60% |
| 586.3 | 52.2 | | |
| 581.3 | | | HQ REC 92% RQD *28% |
| 576.3 | 62.2 | | |
| 571.3 | | Hard Gray Limestone with Calcereous Shale Streaks and Calcite Stringers | NQ REC 100% RQD 97% |
| 566.3 | 72.2 | | |
| 561.3 | | | NQ REC 100% RQD 100% |
| 556.3 | | | |

PENETRATION-BLOWS PER FOOT: 0 5 10 15 20 30 40 60 80 100

REMARKS:
RQD not representative because hole was over [illegible]ed resulting in highly [illegible]actered rock

DRILLED BY MA
LOGGED BY KD
CHECKED BY TW

BORING NUMBER C-25A
DATE STARTED 12-15-86
DATE COMPLETED 12-19-86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|
| 556.3 | | Hard Gray Slightly Weathered to Fresh Limestone with Shale Streaks and Bonds | | |
| 551.3 | | | NQ REC 100% RQD 98% | |
| 546.3 | | | | |
| 541.3 | | | NQ REC 98% RQD 90% | |
| 536.3 | 100 | Boring Terminated at 100 feet | | |

**REMARKS:**
Augered 10" hole through soil to top of rock. Drilled with HQ diamond core from 14.1 to 62.2 feet. Drilled with NQ diamond core from 62.2 to 100.0 feet.

DRILLED BY MA
LOGGED BY KD
CHECKED BY TW

BORING NUMBER C-25A
DATE STARTED 12-15-86
DATE COMPLETED 12-19-86
JOB NUMBER HA5272

# TEST BORING RECORD

Stick-up: 2.9 ft.
Riser Elevation: 639.47 ft.

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 636.6 | | Soft Tan Brown Silty CLAY with Root Fragments | |
| 631.6 | 4.0 | Firm Tan Clayey SILT | |
| 626.6 | 9.0 | Loose Tan Slightly Clayey Fine SAND | |
| 621.6 | 14.0 | Top of Rock<br>Hard Gray Fresh to Severely Weathered, Thinly Bedded Limestone with Free Oil in Joints and on Core | HQ REC 87% RQD 65% |
| 616.6 | | | |
| 611.6 | 24.0 | | HQ REC 94% RQD 91% |
| 606.6 | | | |
| 601.6 | 34.0 | | HQ REC 100% RQD 85% |
| 596.6 | | | |

PENETRATION BLOWS PER FOOT
5 10 15 20 30 40 60 80 100

REMARKS:

* Water level measured on 1/3/87
Develop by bailing on 1/3/87 to 1/6/87

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-26A
DATE STARTED 12-19-86
DATE COMPLETED 12-30-86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 596.6 | | Hard Gray Fresh to Slightly Weathered Thinly Bedded Limestone | |
| 591.6 | 44.0 | Vertical Calcite Stringer Offset by Minor Faulting at 42.0 feet. | HQ REC 87% RQD 33% |
| 586.6 | | Oil on Core From 44.0 to 50.0 feet | HQ REC 93% RQD 65% |
| 581.6 | | | |
| 576.6 | | | |
| 571.6 | | | NQ REC 95% RQD 75% |
| 566.6 | | | |
| 561.6 | | | NQ REC 100% RQD 91% |
| 556.6 | | Hard Gray Fresh Thinly Bedded to Massive Limestone | |

PENETRATION-BLOWS PER FOOT: 0 5 10 15 20 30 40 60 80 100

REMARKS:
Augered 10" hole through soil to top of rock. Drilled with HQ diamond core from 14.0 to 60.0 ft. Drilled with NQ diamond core from 60.00 to 100.0 ft.

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-26A
DATE STARTED 12/20/86
DATE COMPLETED 12/30/86
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|---|
| 556.6 | | Hard Gray Fresh Thinly Bedded Limestone | NQ REC 100% RQD 91% | | |
| 551.6 | | | | | |
| 546.6 | | | | | |
| | | | NQ REC 99% RQD 95% | | |
| 541.6 | | | | | |
| 536.6 | | | | | |
| | | Coring Terminated at 100.0 feet | | | |

REMARKS:

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-26A
DATE STARTED 12/20/86
DATE COMPLETED 12/30/86
JOB NUMBER HA5272

# TEST BORING RECORD

Stick-up: 4.1 ft.
Riser Elevation: 641.72 ft.

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 637.6 | | Very Soft Brown Silty CLAY with Organics | |
| | 2.0 | Soft Brown-Tan Silty Fine Slightly Sandy CLAY | |
| 632.6 | | | |
| | 9.0 | Very Loose Gray Silty Fine SAND | |
| 627.6 | | | |
| | 12.0 | Loose Gray Silty Fine to Coarse SAND | |
| 622.6 | | | |
| | 16.8 | Top of Rock | |
| | | Hard, Gray, Severely Weathered (in joints) to Fresh, Thinly Bedded Limestone | REC 100% HQ RQD 53% |
| 617.6 | | | |
| 612.6 | | | |
| | 25.8 | Hard Gray Fresh Thinly Bedded Limestone | REC 100% HQ RQD 95% |
| 607.6 | | | |
| 602.6 | | | |
| | | | REC 99% HQ RQD 93% |
| 597.6 | | | |

PENETRATION-BLOWS PER FOOT
5 10 15 20 30 40 60 80 100

REMARKS:

* Water level at time of boring on 1/6/87

Developed by bailing on 1/16/87

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-27A
DATE STARTED 1-6-87
DATE COMPLETED 1-10-87
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 597.6 | 40.0 | | |
| 592.6 | | | |
| 587.6 | | | REC 97% HQ RQD 94% |
| 582.6 | | | |
| 577.6 | | | REC 100% HQ RQD 100% |
| 572.6 | | | REC 100% NQ RQD 100% |
| 567.6 | | | |
| 562.2 | | Hard Gray, Fresh, Thinly Bedded to Massive Limestone | REC 99% NQ RQD 99% |
| 557.7 | 80.0 | Oil in Joint at 79.1 Feet | |

PENETRATION-BLOWS PER FOOT: 0 5 10 15 20 30 40 60 80 100

**REMARKS:**
Augered 10" hole through soil to top of rock. Drilled with HQ diamond core from 16.8 to 60.0 ft. Drilled with NQ diamond core from 60.0 to 100.0 ft.

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-27A
DATE STARTED 1/6/87
DATE COMPLETED 1/10/87
JOB NUMBER HA527[illegible]

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | PENETRATION BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|
| 557.6 | | Abundant Oil Coming Out with Drilling Water | REC 100% | |
| | | Hard Gray Fresh, Thinly Bedded Limestone | NQ | |
| 552.6 | | | RQD 100% | |
| 547.6 | | Hard Gray Fresh, Thinly Bedded Limestone with Vertical Calcite Veins | REC 100% NQ | |
| 542.6 | | | RQD 100% | |
| 437.6 | 100 | Oil on Core | | |
| | | Coring Terminated at 100.0 ft. | | |

REMARKS:

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

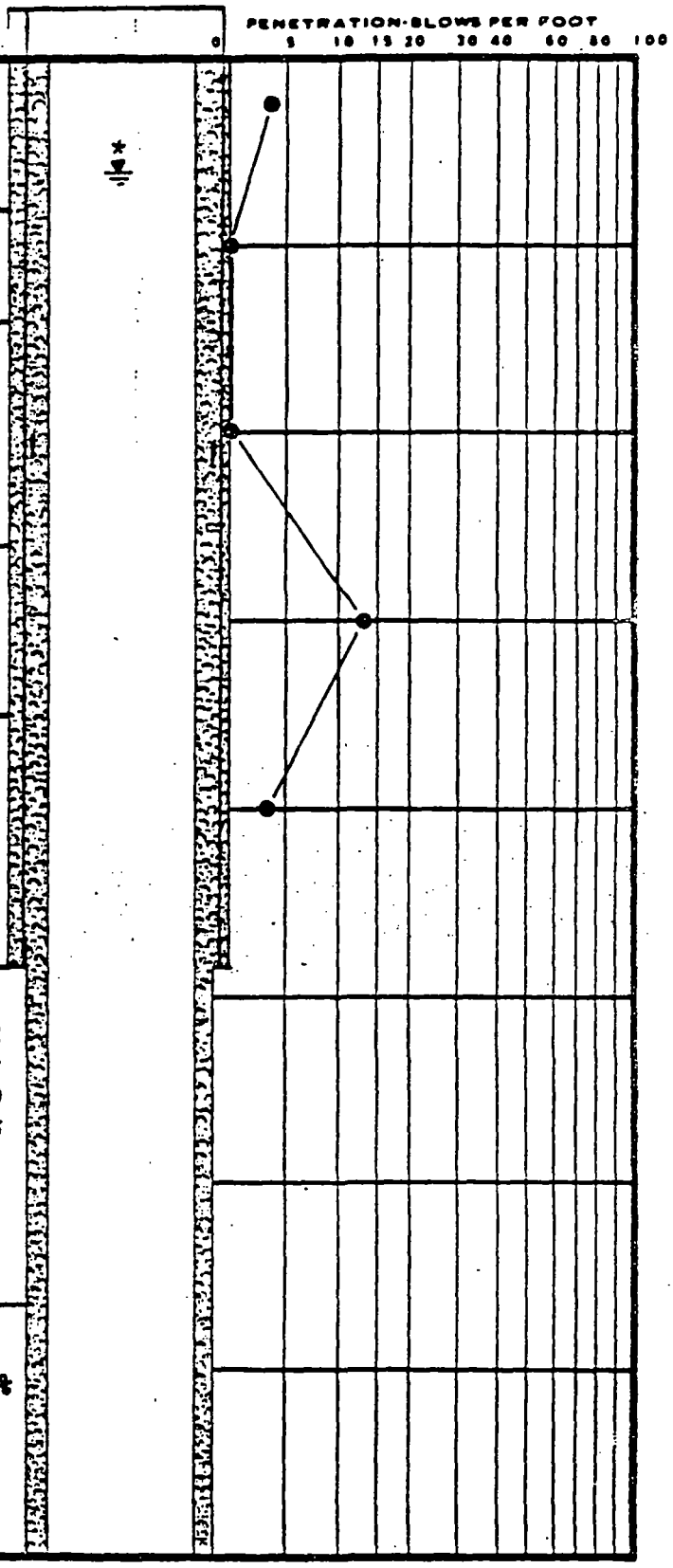
BORING NUMBER C-27A
DATE STARTED 1/6/87
DATE COMPLETED 1/10/87
JOB NUMBER HA5272

Stick-up: 2.9 ft.

# TEST BORING RECORD

Riser Elevation: 639.17 ft.

| ELEV. | DEPTH FEET | DESCRIPTION | |
|---|---|---|---|
| 636.3 | | Soft Brown Silty CLAY with Plant and Root Fragments | |
| 631.3 | 7.0 | Very Soft Gray Slightly Silty CLAY | |
| 626.3 | 13.0 | Very Loose Gray Clayey Silty Fine SAND | |
| 621.3 | 15.0 | Firm Gray Silty Fine to Medium SAND with Free Oil | |
| 616.3 | 17.0 | Loose Green Gray silty Clayey Fine to Coarse SAND with Organic Chemical Odor. | |
| 611.3 | 24.3 | Top of Rock<br>Hard Gray Fresh to Severely Weathered Thinly Bedded Limestone with an Oil Sheen | HQ REC 99% RQD 77% |
| 606.3 | | | |
| 601.3 | 33.3 | | HQ REC 100% RQD 68% |
| 596.3 | 40.0 | | |




REMARKS:

* Time of boring water level on 12/31/86

Develop by bailing on 1/6 to 1/7/87

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-28A
DATE STARTED 12-31-86
DATE COMPLETED 1-6-87
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|
| 596.3 | | Hard Gray Fresh Thinly Bedded Limestone | HQ REC 100% RQD 100% | |
| 591.3 | | | | |
| 586.3 | 49.9 | | | |
| | | | HQ REC 100% RQD 100% | |
| 581.3 | | | | |
| 576.3 | | | | |
| | 62.2 | Hard Gray Fresh Thinly Bedded to Massive Limestone | NQ REC 100% RQD 100% | |
| 571.3 | | | | |
| 566.3 | | | | |
| | 72.0 | | | |
| | | | NQ REC 100% RQD 100% | |
| 561.3 | | | | |
| 556.3 | | | | |

REMARKS:

Augered 10" hole through soil to top of rock. Drilled with HQ diamond core from 24.3 to 62.0 ft. Drilled with NQ diamond core from 62.0 to 100.0 ft.

DRILLED BY MA
LOGGED BY TW
CHECKED BY TB

BORING NUMBER C-28A
DATE STARTED 12/31/86
DATE COMPLETED 1/6/87
JOB NUMBER HA5272

# TEST BORING RECORD

| ELEV. | DEPTH FEET | DESCRIPTION | | | PENETRATION-BLOWS PER FOOT (0 5 10 15 20 30 40 60 80 100) |
|---|---|---|---|---|---|
| 556.3 | 82.0 | Hard Gray Fresh Thinly Bedded Limestone | | | |
| 551.3 | | | NQ REC 98% RQD 98% | | |
| 546.3 | | | | | |
| | 92.0 | | | | |
| 541.3 | | | NQ REC 91% RQD 85% | | |
| 536.3 | 100 | Coring Terminated at 100.0 feet | | | |

REMARKS:

DRILLED BY MA
LOGGED BY TW
CHECKED BY GR

BORING NUMBER C-28A
DATE STARTED 12/31/86
DATE COMPLETED 1/6/87
JOB NUMBER HA5272

## 3.0 HYDROGEOLOGY

### 3.1 Definition of the Uppermost Aquifer

The uppermost aquifer beneath the Southern Wood Piedmont Chattanooga facility is comprised of two interconnected ground-water bearing zones. These zones are the soil water bearing zone and the underlying weathered and highly fractured rock water bearing zone. The uppermost aquifer has been defined to be the unconsolidated water bearing materials extending from the water table down to the top of competent rock. Competent rock has been defined as having the characteristics of: 1) significantly reduced hydraulic conductivity ($10^{-5}$ to $10^{-7}$ cm/sec); 2) high rock core recovery (greater than 90%) and 3) high rock quality designation (typically greater than 80%).

The bedrock beneath the upper-most aquifer at the site includes the Chickamauga Group that is more than 1500 feet thick. The underlying Knox Group is approximately 2500 feet thick near the site. Both groups of rocks yield small quantities of water to wells. The Knox Group rocks are known to be the better water bearing unit of the two groups, but this has only been observed where the Knox outcrops (Wilson, et al 1979). Fractures and joints in the rock diminish with depth (Kellberg, 1987). Combined with the great thickness of the rock units, this would indicate little to no possibility of deep interconnected water bearing zones.

### 3.2 Hydraulic Characteristics

The soil water bearing zone is comprised primarily of residual sandy clays that result from the in-place weathering of

the parent rock underlying the site. Alluvial soils comprised of clays, silts, sands, and gravels were encountered in the Chattanooga Creek flood plain and are considered part of the soil water bearing zone. Twenty-five monitoring wells have been screened within the soil water bearing zone. Previously conducted in-situ hydraulic conductivity testing indicated coefficients of hydraulic conductivity (horizontal) within this zone range from $2 \times 10^{-3}$ cm/sec to $1 \times 10^{-6}$ cm/sec.

Fifteen monitoring wells have been screened within the highly fractured and weathered bedrock/shale water bearing zone. In-situ hydraulic conductivity tests were performed in these wells using slug test methods. Water pressure tests using packer test methods were also performed to determine the hydraulic conductivity of various zones within both fractured and competent bedrock. Packer testing was performed at wells C-20A through C-28A and coreholes designed P-2, P-4, P-11, P-12 and P-14. All packer tested coreholes were grouted after completion of testing. Hydraulic conductivity within the highly fractured and weathered bedrock water bearing zone has been found to range from $10^{-3}$ to $10^{-5}$ cm/sec. Hydraulic conductivity within the less fractured and weathered, competent bedrock range from $10^{-5}$ to $10^{-7}$ cm/sec. Six monitoring wells have been screened within the competent bedrock.

The high angle joints observed in rock beneath the flood plain near well C-27A (Wells C-24A, C-25A, C-26A) appear not to be connected. Liquid was removed from wells C-24A and C-26A on two separate occasions and ground-water elevation measurements

obtained in surrounding wells. No change in ground-water elevation was observed in any of the adjacent wells.

### 3.3 Direction and Rate of Ground-Water Flow

Ground-water elevations recorded in monitoring wells in 1987 are presented in Table 2-6. Elevations of the surface water in Chattanooga Creek have been measured at or within a few days, of ground-water elevation measurements on three occasions. Potentiometric surface maps for the soil and bedrock water bearing zones are provided on Figures 3-1 through 3-8 for the January, May, August, and September, 1987 measurement dates. Only minor fluctuations of ground-water elevations have been measured in the site monitoring wells in 1987.

Comparison of ground-water elevations measured in the residual soil monitoring wells to those of the bedrock monitoring wells indicates a general downward flow from soil to rock. An upward flow gradient from rock to soil is apparent near the southeastern portion of the plant in and adjacent to the swamp (monitoring wells L-1A, L-2A, and C-5A), and around the northwestern limits of the waste management area near the closed K001 pond (monitoring wells WQ-5 and WL-1).

Ground-water elevations in rock and soil wells in the "swampy" area of the plant have been higher than the surface water elevation for Chattanooga Creek. Ground-water elevations measured in wells C-19A and C-26A, located on the opposite side of the creek from the facility also indicate ground-water discharge into Chattanooga Creek.

Ground-water flow in both the residual soil and bedrock water bearing zones beneath the Waste Management Area flows toward Chattanooga Creek from a potentiometric high near the southwest property corner. Ground water flowing beneath the central and southern portion of the site discharges to a topographic low area in the swampy portion of the plant, south and west of the CERCLA pond and ultimately this discharged ground water reaches the Chattanooga Creek. Ground water flowing beneath the northern portion of the waste management area (north of the drip track and treating room) discharges into Chattanooga Creek along the property line.

Ground-water "troughs" shown on the Potentiometric Surface Maps (Figures 3-1 to 3-8) reflect preferential paths of ground-water flow that closely resemble the top of rock contours. This indicates that the top of rock probably controls ground-water flow in the soil water bearing zone. Flow of ground water in rock is greatly affected by the joint and fracture patterns in the rock.

The velocity of ground-water flow in the lower portion of the residual soil near the soil/rock interface is estimated using the equation V=Ki/ne, where;

V = velocity of flow (ft/yr)

K = hydraulic conductivity (62 ft/yr or $6 \times 10^{-5}$ cm/sec)

i = hydraulic gradient [(.011 ft/ft (flood plain) to .018 ft/ft (main plant) from 1987 data]

ne = effective porosity (0.10, sandy clay)

The velocity of ground-water flow is about 7 to 20 feet per year for the residual soil water bearing zone using a hydraulic conductivity near the mid-range of tested values ($6 \times 10^{-5}$ cm/sec) and the hydraulic gradients determined from the recent (1987) ground-water elevation measurements. This range in ground-water velocity for the soil water bearing zone computed with the 1987 potentiometric data is within the 1 to 27 feet per year range estimated with 1986 potentiometric data. The hydraulic gradients are typically steeper on the main plant site and flatten near the flood plain. Therefore, a range of hydraulic gradients were used when estimating ground-water flow velocities.

For the purpose of estimating ground-water flow rates in rock, the fractured rock zone was assumed to behave as a porous media. The velocity of ground-water flow in the highly weathered and fractured limestone/shale bedrock is estimated using the equation V=Ki/ne, where:

V = velocity of flow (ft/yr)

K = median hydraulic conductivity (103 ft/yr or $1 \times 10^{-4}$ cm/sec)

i = hydraulic gradient [(0.012 ft/ft (flood plain) to 0.022 ft/ft (main plant) from 1987 data]

ne = effective porosity (.05)

The ground-water velocity in the highly fractured limestone is estimated to range from about 24 feet per year to about 45 feet per year using the gradients determined from the 1987 potentiometric maps. This range in ground-water velocity for the fractured rock water bearing zone is within the 10 to 40 feet per

year range estimated with 1986 potentiometric data. Velocities in severely jointed rock or where open joints or solution channels exist are likely to be greater than the estimated range. However, predominantly filled joints rather than interconnected open joints are indicated by the drilling and hydraulic conductivity testing.

## 4.0 GROUND-WATER QUALITY

### 4.1 Data Base

Eleven monitoring wells installed along the plant side of Chattanooga Creek and one upgradient well (WQ-1) were monitored on a quarterly basis during 1987. Selection of the wells to be monitored (C-7, 7A, 7B, 10, 10A, 11, 11A, 11B, 12A, 13A, 14A and WQ-1) and the analysis parameters (40 CFR 261 Appendix VII, K001 constituents) were agreed to during a meeting between SWP, U.S. EPA and the TDHE at the site on November 10, 1986.

Starting with the third quarter sampling (September 16, 1987), analysis were performed for certain constituents previously detected at the site in addition to the analyses for K001 constituents. These additional constituents consisted of o-cresol, m+p-cresol, toluene, arsenic, barium, beryllium, lead and nickel.

Ten additional wells were sampled during the third quarter of 1987. These ten wells (S-1A, S-1B, C-4, 4A, 5, 5A, 6, 6A, 18 and 18A), combined with the other twelve wells sampled during the third quarter, provided monitoring data along and downgradient of the Point of Compliance needed to develop the corrective plans submitted in the December 21, 1987 Part B permit application.

## 4.2 Nature of Wood Preserving Constituents in Ground Water

The constituents detected at the site have been grouped into seven categories. The categories are: aliphatics, phenolics, light polynuclear aromatic hydrocarbons, heavy polynuclear aromatic hydrocarbons, single-ring aromatics, and total and dissolved metals.

During the four 1987 ground water sampling events, Appendix VII wood preserving constituents were detected at various concentrations as indicated by the laboratory analysis results on Table 2-5. Concentrations of phenolic constituents, designated as ( ) on Table 2-5 range from non detected to a total value of 5.27 mg/l and 3.12 mg/l in soil and rock, respectively. Concentrations of light polynuclear aromatic hydrocarbons, designated as < > on Table 2-5 ranged from non detected to a total value of 184.40 mg/l and 139.4 mg/l in soil and rock, respectively. Heavy polynuclear aromatic hydrocarbons, designated as [ ] on Table 2-5, ranged from non detected to a total value of 8.09 mg/l and 3.53 mg/l in soil and rock, respectively.

Water quality data, as presented on Table 2-5, indicates relatively wide variations in constituent concentrations for different sampling events at some of the wells. This wide variation in concentrations is not likely to be representative of actual ground-water quality trends at these wells. Our experience with similar data in the past is that wide variations of constituent levels is frequently caused by changes in sampling personnel and techniques even with the same general

sampling procedures. Different sampling personnel have been employed at this site.

### 4.3 Extent of Wood Preserving Constituents Detected

Subsurface contamination at the SWP facility has been delineated in three general zones (i.e., two water bearing zones and competent rock) where constituent concentrations exceed detection limits for the most recent sampling. Metals have not been included in defining the extent of contamination because they are not present in any wood preservatives used at the site. Furthermore, all metal concentrations reported in the most recent sampling are below Primary Drinking Water Standards.

Chlorinated hydrocarbons have been detected in the ground water throughout the site. These constituents are not known to be components of the wood preservative used at the site (creosote) and had not been identified prior to closure of the K001 pond in the waste stream (i.e., sludge from the K001 pond). Therefore, the chlorinated hydrocarbons have not been included in defining the extent of contamination.

#### 4.3a Residual Soil Water-Bearing Zone

The residual soil water-bearing zone consists of the soil from below ground water to the top of the fractured limestone/shale rock zone. This zone varies in depth from approximately ten to thirty feet at the site. The extent of contamination in the residual soils is shown in Figure 4-1.

K001 constituents including Phenolics, Light PAHs and Heavy PAHs, as well as single ring aromatics were detected in monitoring wells WQ-1, S-1B, C-6, C-7, C-11 and C-18 within the

residual soil water bearing zone. Two of these wells (S-1B, and C-7) show the presence of a non-aqueous phase (oil). All documented occurrences of oil at the top of rock are listed on Table 4-1.

**4.3b Contamination in Rock**

The rock is sub-divided into a fractured limestone/shale water bearing zone and a competent rock zone. The horizontal extent of contamination for all wood-preserving constituents in the two rock zones is shown on Figure 4-2. The areal extent of contamination in the rock zones is greater than in the residual soils. This indicates that contamination disperses as it moves vertically downward through the rock zone.

**4.3b(1) Extent of Contamination in the Fractured Limestone/ Shale Water Bearing Zone**

In the September 16, 1987 sampling, wood preserving constituents were detected in 6 monitoring wells screened in the fractured limestone/shale zone as shown in Table 2-5. Documented occurrences of oil in rock are presented in Table 4-1. The vertical extent of contamination in the fractured limestone/shale rock water-bearing zone is defined to extend from the residual soil/rock interface to the bottom of the fractured zone (which is also the top-of-competent rock).

**4.3b(2) Extent of Contamination in Competent Rock**

Ground-water quality has been monitored in ten monitoring wells isolated in competent rock (wells C-13A, C-20A, L-4C, C-11B, C-19A, C-28A, C-27A, C-26A, C-24A, and C-25A). Five of the ten competent rock monitoring wells (C-26A, C-27A, C-24A, C-25A,

and C-28A) are located in the rock in the separate area adjacent to Chattanooga Creek. Three of the ten competent rock monitoring wells (Wells C-13A, C-11B, and L-4C) located beneath the limestone/shale fractured rock zone have been identified as containing wood preserving constituents.

The vertical extent of contamination in the rock zone is generally confined to the uppermost aquifer. The uppermost aquifer extends to the top of competent rock. The bedrock beneath the uppermost aquifer is more than 4,000 feet thick. This includes 1,500 feet of the Chickamauga group and 2,500 feet of the Knox group. Also, the fractures and joints in the rock diminish with depth. Therefore, given the characteristics of the rock beneath the uppermost aquifer, significant dissolved constituent migration would not be expected to occur within competent rock.

**4-3c Contaminated Area Along Chattanooga Creek**

Contamination has been found approximately 100 feet off-site, under and adjacent to Chattanooga Creek east of the property boundary (Chattanooga Creek). The creek is underlain (in order of increasing depth) by approximately 10 feet of sediment, ten feet of fractured rock, and then competent bedrock.

Oil exists at the top of the rock beneath the bed of Chattanooga Creek along most of the creek adjacent to the SWP site, including upstream of any previous effluent discharge by SWP. Measured accumulation (height above bottom of hole) of heavy oil in wells installed at the top of rock is typically 0.5 feet.

The horizontal extent of the free oil at the top of rock has been determined based on the results of field explorations. Forty-two borings were advanced to the top of rock in the Chattanooga Creek floodplain. The boring locations are shown on Figure 2-1. Free oil was found only in borings SB-1 and SB-8, both of which are adjacent to the creek, with no free oil found at other test boring locations. Based on the results of this exploration, it is concluded that the free oil at the top of rock along the creek is confined to the area immediately adjacent to the creek bed.

Studies by the Tennessee Valley Authority, the Tennessee Department of Health and Environment, and SWP indicate that Chattanooga Creek sediments have significant concentrations of coal-tar derivatives from approximately creek mile 1.0 to creek mile 5.0. The locations of sediment samples collected by SWP are shown on Figure 2-1. The areas indicating where free oil was found within the creek sediments are shown on Figure 4-1. As can be seen from this figure, there exists areas upstream of the SWP facility where free oil is present within the creek sediments The SWP plant borders the creek from approximately creek mile 2.6 to creek mile 3.4. Therefore, there are likely several other contributors to creek bed contamination upstream of the past SWP discharge location, as concluded in the above studies. Six monitoring wells (C-26A, C-27A, C-24A, C-25A, C-28A, and C-14A) including five in competent rock (wells C-26A, C-24A, C-25A, C-28A, and C-27A) have been installed to determine the extent of contamination along Chattanooga Creek. Wells C-24A, C-26A, C-27A

and C-28A indicated the presence of free oil along this portion of Chattanooga Creek. This oil is considered to be from sources along Chattanooga Creek upstream of the SWP Chattanooga facility. This distinction is made because monitoring wells C-20A (competent rock) and C-21A (fractured rock) have never shown the presence of any site specific constituents. These wells are located between the designated boundaries of each of the contaminated rock areas. (Figure 4-2).

The total depth of oil penetration into the fractured rock zone or into the competent rock zone has not been determined. Transport of free oil occurs through fractures and joints in rock. The orientation of these fractures and joints in this area adjacent to the creek is generally vertical. Therefore, the migration of free oil will be limited by the depth of the fractures in rock. These fractures and joints decrease with increasing depth.

**4.3d Metal Constituents in Ground-Water**

In September 1987 analysis, no dissolved or total metals were detected above the Primary Drinking Water Standards (40 CFR 143.11). Excluding Barium, total metals were detected in only two wells (S-1A and C-6). Total lead and total nickel were detected in monitoring well S-1A, at 0.03 mg/l and 0.04 mg/l respectively. Total nickel was also detected in monitoring well C-6 at 0.01 mg/l. Similar concentrations were detected in the background well (WQ-1) in previous analyses. Therefore, these metal concentrations are considered to result from natural conditions and not due to operations at the site.

Barium (both total and dissolved) has consistently been detected in monitoring wells throughout the site. Barium was not detected above the Primary Drinking Water Standard (1.0 mg/l) for the most recent analyses for all wells (not just those sampled in September 1987). Barium is a naturally occurring element in soil. Barium, as with all other metals detected at the site, is not know to be a component of any wood preservative used at the site. Therefore, detected metals were not used to define areas of contamination.

### 4.4 Rate of Contaminant Migration

#### 4.4a Dissolved Constituents

The highest rate for migration of dissolved constituents in ground water will be through connected fractures or partially filled joints in the limestone. Hydraulic gradients within the fractured limestone have not been shown to have changed significantly in 1987 from those determined in previous years. Therefore, as stated in the 1986 annual report, the rate of migration is expected to be less than 50 feet per year.

#### 4.4b Separate Phase

The movement of free oil through the subsurface is believed to be limited by the presence of interconnected fractures or partially filled joints. Based on measured recovery rated at well C-24A after removing accumulated oil, the rate of migration of free oil into a rock well is expected to be much less than 0.1 gallons per minute. Furthermore, the vertical migration of contamination is believed to be limited by the competent rock zone as discussed in Section 4.3b.

## REFERENCES

R.L. Wilson 1979 The Stratigraphy of Exposed Rocks in Hamilton County, Tennessee in the Geology of Hamilton County Tennessee: Tenn Div Geol. Bull. 79, p.15-36.

**TENNESSEE DEPARTMENT OF CONSERVATION**

Customs House
701 Broadway
Nashville, TN 37243

October 1, 1991

Mr. Bill Arrants
Compliance and Safety Manager
Southern Wood Piedmont Company
400 West 33rd Street
Chattanooga, TN 37401

RE: Final Post-Closure Permit Issuance
Southern Wood Piedmont Company
Chattanooga, Tennessee
(Permit Number: TNHW-78)
EPA I.D. Number: TND 00 332 7400

Dear Mr. Arrants:

Enclosed is a copy of the final post-closure permit authorizing the continued post-closure care, maintenance and security of the surface impoundment, Pond 3A, at 400 West 33rd Street in Chattanooga, Tennessee. Issuance of this permit is in accordance with Rule 1200-1-11-.07(7)(i) of the rules governing Hazardous Waste Management in Tennessee, and it is effective as of the signature date: September 30, 1991.

Please note that Rule 1200-1-11-.07(7)(k) outlines the process for appeals to a final permit decision.

If you have any questions, please contact Ms. Hymelia Norris of my staff at at (615) 741-3424.

Sincerely,

Tom Tiesler

Tom Tiesler, Director
Division of Solid Waste Management

JTT/HN/F4021269 SW-102

Enclosure

cc: Mr. James Scarbrough, EPA, Region IV
Ms. Janet Dutto, DSWM, Chattanooga Field Office
Mr. Dale Ozier, DSWM, Nashville
Mr. Wes Hardegree, EPA

ATTACHMENT 6, SECTION 3

CONSTRUCTION DETAILS FOR MONITORING WELLS

## CONSTRUCTION DETAILS FOR GROUNDWATER MONITORING WELLS

Monitoring well construction data for WQ-1 and WQ-3 are presented in the table below. Drilling and well construction diagrams for these two wells are included. Monitoring well WQ-6 shall be added to this section as installation information becomes available.

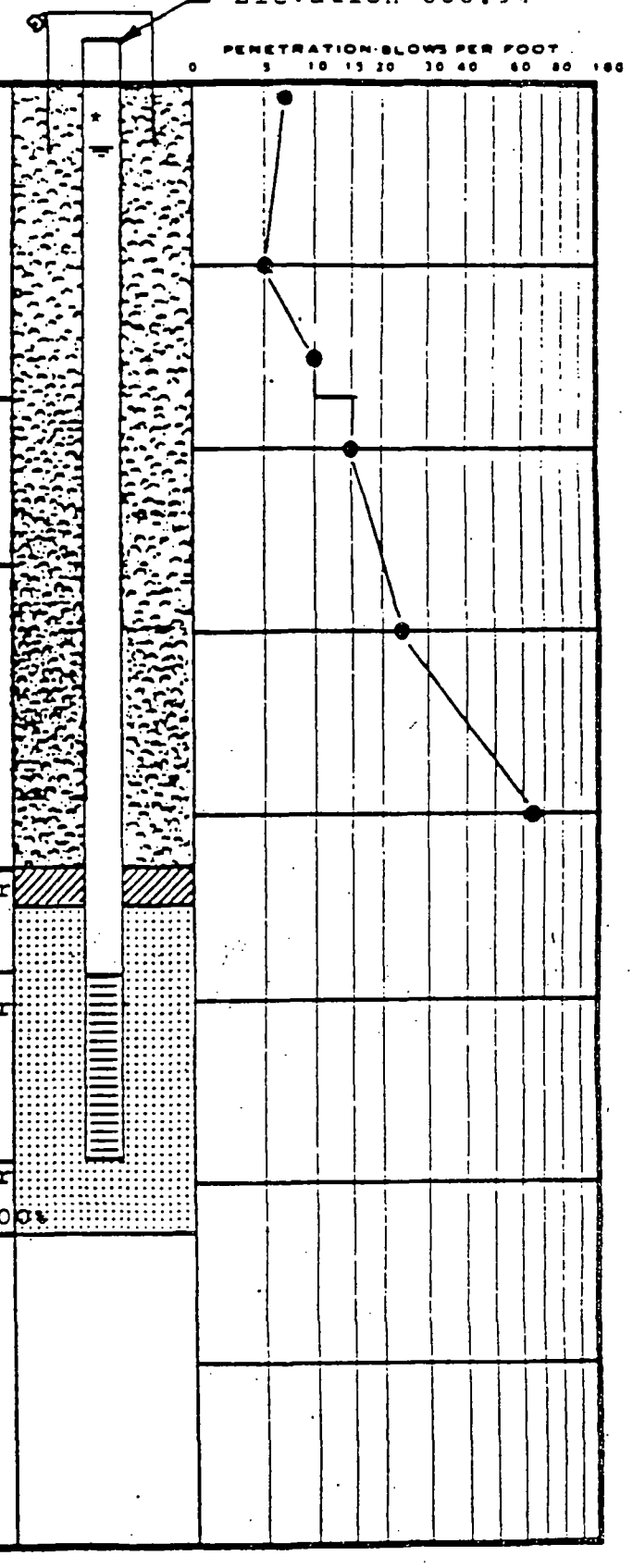
| Monitoring Well NO. | WQ-1 | WQ3 |
|---|---|---|
| Date Installed | 10-21-81 | 10-31-81 |
| Groundwater Elevation (ft) | 658.27 | 659.32 |
| Bottom of Well elevation (ft) | 626.97 | 619.32 |
| Top of Riser Pipe Elevation (ft) | 660.94 | 662.71 |
| Elevation of Screened Zone (ft) | 634.07-629.07 | 626.82-621.82 |
| Bottom of Seal Elevation (ft) | 635.87 | 628.32 |
| Material Within Screened Zone | Rock | Rock |

F2101219

# TEST BORING RECORD

Elevation-660.94'

| ELEV. | DEPTH FEET | DESCRIPTION |
|---|---|---|
| 658.3 | | Fill - Brown and gray silty CLAY with wood timbers and cinders |
| 653.3 | | |
| | 8.5 | |
| 648.3 | | Brown fine sandy silty CLAY |
| | 13.0 | |
| 643.3 | | Brown fine sandy silty CLAY with broken fragments of limestone |
| 638.3 | | Auger Refusal at 21.3' |
| | 21.3 | |
| 633.3 | | Gray LIMESTONE (fractured) — NX or NQ. Rec. 90%; NX or NQ Rec 96%; NX or NQ Rec100% |
| 628.3 | | |
| | 31.3 | Boring Terminated at 31.3' |
| 623.3 | | Type II well construction with 2-inch diameter schedule 80 threaded PVC screen and riser. Well screen is 5 feet long with 0.010-inch wide slots. Well developed by bailing. |




**REMARKS:**
Log prepared from records provided in Froehling and Robertson, Inc. report dated November 4, 1981 and survey data provided by Betts Engineering on June 6, 1985.

*Water level on 9/20/85

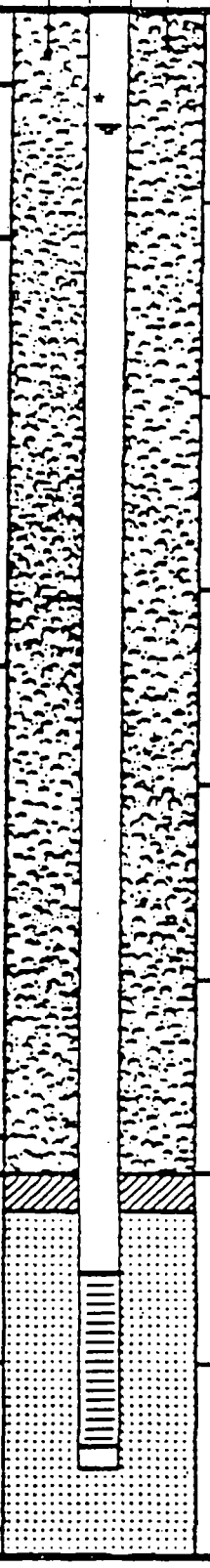
DRILLED BY F & R, Inc.
LOGGED BY N/A
CHECKED BY N/A

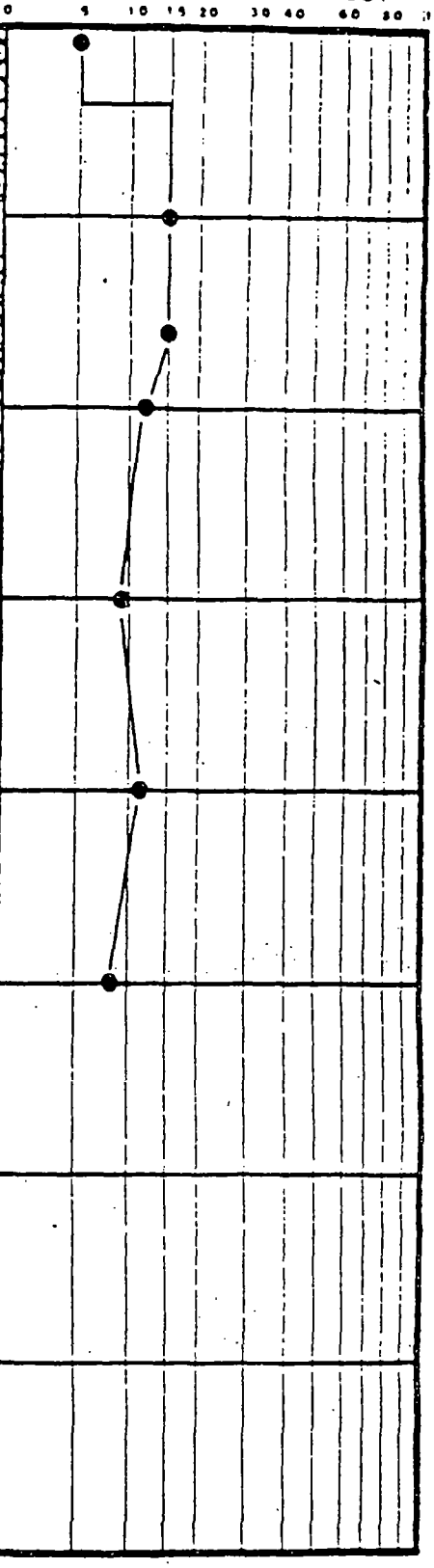
BORING NUMBER WQ-1
DATE STARTED N/A
DATE COMPLETED 10-21-81
JOB NUMBER GT-85-182

# TEST BORING RECORD

Elevation-662.71'

| ELEV. | DEPTH FEET | DESCRIPTION |
|---|---|---|
| 659.3 | | Fill - Gray and black silty CLAY with wood fragments and gravel |
| | 2.0 | Gray silty CLAY |
| 654.3 | | |
| | 6.0 | Brown fine sandy silty CLAY |
| 649.3 | | |
| 644.3 | | |
| | 17.0 | Brown fine sandy silty CLAY with fragments of broken LIMESTONE |
| 639.3 | | |
| 634.3 | | |
| | 29.0 | |
| 629.3 | 30.0 | VOID |
| | | Auger Refusal at 30.0' |
| | | Gray LIMESTONE (fractured) — NX or NQ Rec. 83% |
| 624.3 | | |
| | | NX or NQ Rec. 100% |






Boring Terminated at 40.0 feet

**REMARKS:**

1) Log prepared from records provided in Froehling and Robertson, Inc. report dated November 4, 1981 and survey data provided by Betts Engineering on June 6, 1985.

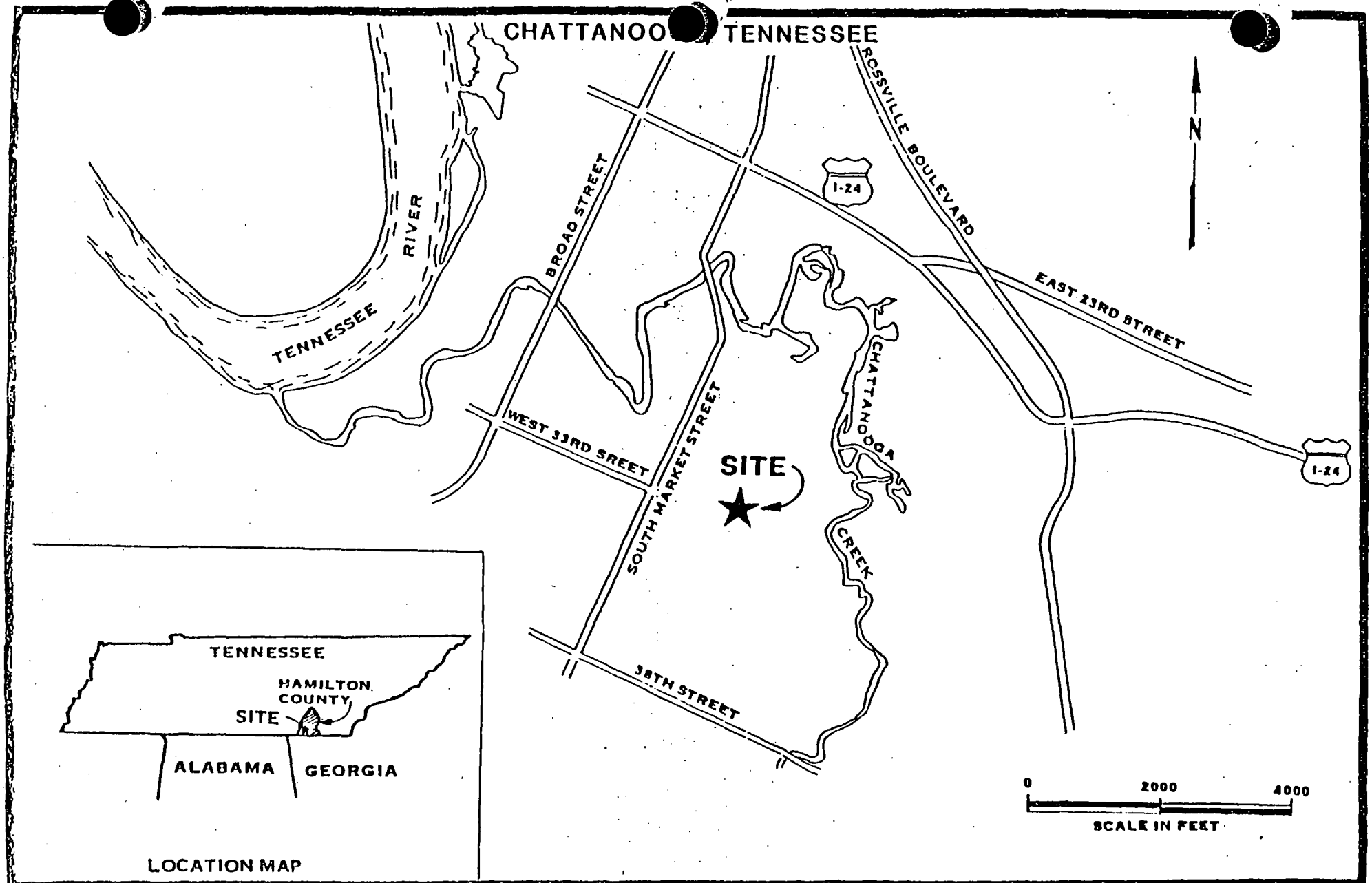
2) Type II well construction with 2-inch diameter schedule 80 threaded PVC screen and riser. Well screen is 5 feet long with 0.010-inch wide slots. Well developed by bailing.

**DRILLED BY** F & R, Inc.
**LOGGED BY** N/A
**CHECKED BY** N/A

**BORING NUMBER** TWQ-3
**DATE STARTED** N/A
**DATE COMPLETED** 10/31/81
**JOB NUMBER** GI-65-482



*Water level on 9/20/85




SOUTHERN WOOD PIEDMONT COMPANY

CHATTANOOGA, TENNESSEE

LAW ENVIRONMENTAL SERVICES

MARIETTA, GEORGIA

SITE LOCATION MAP

JOB NO. HA5272 FIGURE: 3-3

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.
5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED
SEP 17 1992
ENVIRONMENTAL AFFAIRS

LOG NO: S2-44150

Received: 26 AUG 92

Ms. Sandra Watson
Southern Wood Piedmont (CH)
P.O. BOX 5447
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN
Sampled By: Savannah Laboratories

REPORT OF RESULTS



| LOG NO | SAMPLE DESCRIPTION , LIQUID SAMPLES |
|---|---|
| 44150-11 | C-18A |
| 44150-12 | Trip Blank |
| 44150-13 | Field Blank |

| PARAMETER | 44150-11 | 44150-12 | 44150-13 |
|---|---|---|---|
| Semi Volatiles | | | |
| Phenol, mg/l | ND | ND | ND |
| 2,4-Dimethylphenol, mg/l | ND | ND | ND |
| Naphthalene, mg/l | ND | ND | ND |
| Acenaphthene, mg/l | 0.047 | ND | ND |
| Acenaphthylene, mg/l | ND | ND | ND |
| Phenanthrene, mg/l | 0.014 | ND | ND |
| Anthracene, mg/l | ND | ND | ND |
| Fluoranthene, mg/l | ND | ND | ND |
| Chrysene, mg/l | ND | ND | ND |
| Benzo(a)Anthracene, mg/l | ND | ND | ND |
| Benzo(b,k)fluoranthene, mg/l | ND | ND | ND |
| Benzo(a)pyrene, mg/l | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene, mg/l | ND | ND | ND |
| Dibenzo(a,h)anthracene, mg/l | ND | ND | ND |
| Carbazole, mg/l | ND | ND | ND |
| Cresol (ortho), mg/l | ND | ND | ND |
| Cresol m & p, mg/l | ND | ND | ND |
| Fluorene, mg/l | 0.014 | ND | ND |
| 2-Methylnaphthalene, mg/l | ND | ND | ND |
| Dibenzofuran, mg/l | ND | ND | ND |
| Pyrene, mg/l | ND | ND | ND |
| Benzyl alcohol, mg/l | ND | ND | ND |
| Dilution factor | 1 | 1 | 1 |

33-121

SEP 30 1992

P.O. Box 5447
Spartanburg, S.C. 29304
Phone: (803) 599-1070
FAX: (803) 599-1087

# Southern Wood Piedmont Company

September 28, 1992

Environmental Protection Agency
Region IV
345 Courtland Street
Atlanta, GA 30365

Attn: Regional Administrator

Dear Sir:

Attached are analytical reports for 3rd quarter 1992 groundwater monitoring at our Chattanooga, Tennessee facility. The sampling and analysis was performed by Savannah Laboratories & Environmental Services the week of August 23, 1992.

After your review of the data if you have any questions feel free to call.

Sincerely,

Sandra B. Watson

Sandra B. Watson
Environmental Chemist

5663bw

CC: M. D. Pruett w/o attachment
T. M. Davis w/o attachment
W. P. Arrants w/o attachment
J. L. Hudson w/attachment
S. E. Blevins w/o attachment
John Lank, EPA w/attachment
Janet Dutto, TN DHEC w/attachment
Bill Krispin, TN DHEC w/attachment

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED
SEP 17 1992
ENVIRONMENTAL AFFAIRS

LOG NO: S2-44150

Received: 26 AUG 92

Ms. Sandra Watson
Southern Wood Piedmont (CH)
P.O. BOX 5447
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN
Sampled By: Savannah Laboratories

REPORT OF RESULTS



| LOG NO | SAMPLE DESCRIPTION , LIQUID SAMPLES |
|---|---|
| 44150-6 | C-12A |
| 44150-7 | C-13A |
| 44150-8 | C-7 |
| 44150-9 | C-7A |
| 44150-10 | C-7B |

| PARAMETER | 44150-6 | 44150-7 | 44150-8 | 44150-9 | 44150-10 |
|---|---|---|---|---|---|
| Purgeable Aromatics (602/8020) | | | | | |
| Toluene, mg/l | ND | 0.0010 | 0.18 | 0.090 | ND |
| Benzene, mg/l | ND | 0.085 | 0.14 | 0.10 | 0.017 |
| 1,2-Dimethylbenzene, mg/l | ND | 0.0083 | 0.12 | 0.10 | 0.0016 |
| 1,3-Dimethylbenzene, mg/l | ND | 0.012 | 0.12 | 0.099 | 0.0025 |
| 1,4-Dimethylbenzene, mg/l | ND | ND | ND | ND | ND |
| Ethylbenzene, mg/l | ND | 0.053 | 0.16 | 0.13 | 0.0013 |
| Styrene, mg/l | ND | ND | ND | ND | ND |
| Acrolein, mg/l | ND | ND | ND | ND | ND |
| Field Information | | | | | |
| Date Collected | 08.26.92 | 08.26.92 | 08.26.92 | 08.26.92 | 08.26.92 |
| Water Level (casing top) ft. | 17.84 | 23.13 | 3.26 | 4.75 | 5.45 |
| Well Depth, ft. | 57.73 | 53.40 | 14.76 | 27.83 | 50.92 |
| pH (Taken in Field) | 7.15 | 7.17 | 7.00 | 7.09 | 7.34 |
| Specific Conductance (Taken in Field) | 430 | 440 | 525 | 585 | 515 |

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED
SEP 17 1992
ENVIRONMENTAL AFFAIRS

LOG NO: S2-44150

Received: 26 AUG 92

Ms. Sandra Watson
Southern Wood Piedmont (CH)
P.O. BOX 5447
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN
Sampled By: Savannah Laboratories

REPORT OF RESULTS



| LOG NO | SAMPLE DESCRIPTION , LIQUID SAMPLES |
|---|---|
| 44150-6 | C-12A |
| 44150-7 | C-13A |
| 44150-8 | C-7 |
| 44150-9 | C-7A |
| 44150-10 | C-7B |

| PARAMETER | 44150-6 | 44150-7 | 44150-8 | 44150-9 | 44150-10 |
|---|---|---|---|---|---|
| Semi Volatiles | | | | | |
| Phenol, mg/l | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol, mg/l | ND | ND | ND | ND | ND |
| Naphthalene, mg/l | ND | 0.45 | 11 | 8.4 | 0.093 |
| Acenaphthene, mg/l | ND | 0.18 | ND | 2.4 | 0.15 |
| Acenaphthylene, mg/l | ND | ND | ND | ND | ND |
| Phenanthrene, mg/l | ND | 0.063 | ND | 4.8 | 0.14 |
| Anthracene, mg/l | ND | ND | ND | ND | 0.024 |
| Fluoranthene, mg/l | ND | ND | ND | 2.7 | 0.085 |
| Chrysene, mg/l | ND | ND | ND | ND | ND |
| Benzo(a)Anthracene, mg/l | ND | ND | ND | ND | 0.013 |
| Benzo(b,k)fluoranthene, mg/l | ND | ND | ND | ND | ND |
| Benzo(a)pyrene, mg/l | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene, mg/l | ND | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene, mg/l | ND | ND | ND | ND | ND |
| Carbazole, mg/l | ND | 0.088 | ND | ND | 0.022 |
| Cresol (ortho), mg/l | ND | ND | ND | ND | ND |
| Cresol m & p, mg/l | ND | ND | ND | ND | ND |
| Fluorene, mg/l | ND | 0.088 | ND | 2.4 | 0.13 |
| 2-Methylnaphthalene, mg/l | ND | 0.33 | 1.2 | 2.9 | 0.16 |
| Dibenzofuran, mg/l | ND | 0.081 | ND | 1.7 | 0.094 |
| Pyrene, mg/l | ND | ND | ND | 1.2 | 0.064 |
| Benzyl alcohol, mg/l | ND | ND | ND | ND | ND |
| Dilution factor | 1 | 5 | 100 | 100 | 1 |

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.
LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-44150

RECEIVED
SEP 17 1992
ENVIRONMENTAL AFFAIRS

Received: 26 AUG 92

Ms. Sandra Watson
Southern Wood Piedmont (CH)
P.O. BOX 5447
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN
Sampled By: Savannah Laboratories

REPORT OF RESULTS



| LOG NO | SAMPLE DESCRIPTION , LIQUID SAMPLES |
|---|---|
| 44150-1 | WQ-1 |
| 44150-2 | C-5 |
| 44150-3 | C-5A |
| 44150-4 | C-6 |
| 44150-5 | C-6A |

| PARAMETER | 44150-1 | 44150-2 | 44150-3 | 44150-4 | 44150-5 |
|---|---|---|---|---|---|
| Purgeable Aromatics (602/8020) | | | | | |
| Toluene, mg/l | ND | ND | ND | 0.0013 | ND |
| Benzene, mg/l | ND | ND | ND | ND | ND |
| 1,2-Dimethylbenzene, mg/l | ND | ND | ND | 0.0052 | ND |
| 1,3-Dimethylbenzene, mg/l | ND | ND | ND | 0.0052 | ND |
| 1,4-Dimethylbenzene, mg/l | ND | ND | ND | ND | ND |
| Ethylbenzene, mg/l | ND | ND | ND | 0.0064 | ND |
| Styrene, mg/l | ND | ND | ND | ND | ND |
| Acrolein, mg/l | ND | ND | ND | ND | ND |
| Field Information | | | | | |
| Date Collected | 08.26.92 | 08.26.92 | 08.26.92 | 08.26.92 | 08.26.92 |
| Water Level (casing top) ft. | 2.45 | 3.24 | 0.77 | 1.93 | 0.10 |
| Well Depth, ft. | 33.52 | 16.47 | 32.01 | 20.92 | 34.40 |
| pH (Taken in Field) | 7.21 | 6.90 | 7.08 | 7.10 | 7.15 |
| Specific Conductance (Taken in Field) | 565 | 465 | 375 | 415 | 465 |

SBW
MAS

**SL SAVANNAH LABORATORIES**
**& ENVIRONMENTAL SERVICES, INC.**

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

RECEIVED
SEP 17 1992
ENVIRONMENTAL AFFAIRS

LOG NO: S2-44150

Received: 26 AUG 92

Ms. Sandra Watson
Southern Wood Piedmont (CH)
P.O. BOX 5447
Spartanburg, SC 29304

CC: Steve Blevins

Project: Chattanooga, TN
Sampled By: Savannah Laboratories

Q-3, 92

REPORT OF RESULTS



| LOG NO | SAMPLE DESCRIPTION , LIQUID SAMPLES |
|---|---|
| 44150-1 | WQ-1 |
| 44150-2 | C-5 |
| 44150-3 | C-5A |
| 44150-4 | C-6 |
| 44150-5 | C-6A |

| PARAMETER | 44150-1 | 44150-2 | 44150-3 | 44150-4 | 44150-5 |
|---|---|---|---|---|---|
| Semi Volatiles | | | | | |
| Phenol, mg/l | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol, mg/l | ND | ND | ND | ND | ND |
| Naphthalene, mg/l | ND | ND | ND | 0.55 | ND |
| Acenaphthene, mg/l | ND | ND | ND | 0.37 | 0.052 |
| Acenaphthylene, mg/l | ND | ND | ND | ND | ND |
| Phenanthrene, mg/l | ND | ND | ND | 0.25 | ND |
| Anthracene, mg/l | ND | ND | ND | ND | ND |
| Fluoranthene, mg/l | ND | ND | ND | ND | ND |
| Chrysene, mg/l | ND | ND | ND | ND | ND |
| Benzo(a)Anthracene, mg/l | ND | ND | ND | ND | ND |
| Benzo(b,k)fluoranthene, mg/l | ND | ND | ND | ND | ND |
| Benzo(a)pyrene, mg/l | ND | ND | ND | ND | ND |
| Indeno(1,2,3-cd)pyrene, mg/l | ND | ND | ND | ND | ND |
| Dibenzo(a,h)anthracene, mg/l | ND | ND | ND | ND | ND |
| Carbazole, mg/l | ND | ND | ND | 0.066 | ND |
| Cresol (ortho), mg/l | ND | ND | ND | ND | ND |
| Cresol m & p, mg/l | ND | ND | ND | ND | ND |
| Fluorene, mg/l | ND | ND | ND | 0.25 | ND |
| 2-Methylnaphthalene, mg/l | ND | ND | ND | 0.38 | ND |
| Dibenzofuran, mg/l | ND | ND | ND | 0.26 | ND |
| Pyrene, mg/l | ND | ND | ND | ND | ND |
| Benzyl alcohol, mg/l | ND | ND | ND | ND | ND |
| Dilution factor | 1 | 1 | 1 | 5 | 1 |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 27

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

DATE: November 19, 1987

TO: Ferman Miller, Division of Superfund, Chattanooga

FROM: CJS Craig Stannard, Division of Ground Water Protection, Chattanooga

SUBJECT: Information Concerning Wells in the Chattanooga Area

As per your request, wells in the Chattanooga area, south of the Tennessee River, east of Lookout Mtn., and west of Missionary Ridge are listed and described below:

1. Uniform Rental Services Inc. has one or more wells at its plant on Tennessee Avenue. Specific details are not known.

2. Velsicol Chemical Corporation has several monitoring wells at "Residue hill."

3. Southern Wood Piedmont Company at 400 East 33rd Street has at least sixteen monitoring wells of shallow depth.

4. Chattanooga Glass Company has a well at its plant facility at 401 West 45th Street. According to company officials it was drilled by Bacon Well Drilling Company in 1982 and it is approximately 325 feet deep. The well water, which is used for industrial purposes only, is reportedly of good quality and quantity.

5. Southern Cellulose Products Inc. has two wells located on 38th Street just east of Chattanooga Creek. According to company officials, the two wells were drilled in 1976 by Miller Drilling Company and are approximately 150 feet deep. Only one of the wells is currently in use. The other well is auxilliary. The water withdrawn is used for processing purposes only and the water quality and quantity are reportedly good.

6. Tennessee Truck Parts Company at 400 East Main St. has a well that is reportedly used for industrial purposes only. It is 145 feet deep and was completed in 1979.

7. Will-Wear Hosiery has a well located at or near its 2000 Stuart Street plant location. The well is reportedly 1,301 feet deep and is used for industrial processes only.

8. Chattanooga State College at 4501 Amnicola Highway has a 512 foot deep well that is used to supply water to the campus water fountain.

| FROM | DATE |
|---|---|
| | |

| TO | |
|---|---|
| | |

PH-0001
SR 3/77

9. Wheland Foundry at 2800 South Broad Street has a 61 foot deep well that is used for monitoring purposes.

10. Ledco Inc. at 3535 St. Elmo Avenue has a 250 foot deep well that provides water for the company's heat pump.

11. Gateway Hosiery Mills at 1220 East Main Street reportedly has a well that is used to provide processing water for its operations. The well is of unknown depth but is reportedly contaminated with perchloroethylene, benzene and a number of other organic chemicals at the ppm level. The well was reportedly drilled by Miller Drilling Company.

12. Alco Chemical Corporation at 909 Miller Avenue has a 600 foot deep well that provides water for industrial uses at the plant.

13. A well located at 1400 Citico Avenue, belonging to Robert Nabors, is reportedly 343 feet deep and was drilled earlier this year. It is not being used at this time.

14. A well has recently been completed for a car wash that is being built near the intersection of Wilcox Blvd. and Chamberlain Avenue. Its depth is not known but it was reportedly drilled by Miller Drilling Company. In progress ok Nov 15, 87

The wells are listed 1-14 on the enclosed location map. Well log information concerning some of the wells is also enclosed.

CJS/tdm

Enclosures

cc: Robert Powell, Division of Superfund, Nashville

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 28

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | Hamilton Co File | |
| | | |
| | | |
| | | |
| | | |

DATE: 25 November 1986

TO: SIU Files

FROM: G.S. Caruthers

SUBJECT: Details of Telecon - pertinent site information.

On 25 November 86 at 0945 a.m., G.S. Caruthers of Tenn. Superfund Division contacted Bob Burrell of Tenn. - American Water Co. by telephone regarding well use in the Chattanooga urban area.

Details of conversation:

Mr. Burrell is in charge of the cross-connection monitoring program for TAWC. He did not know of any households which were using well water for domestic purposes. There are numerous private wells in the Chattanooga urban area, according to Mr. Burrell, but they are used only for watering gardens, washing cars, etc. or are commercial or industrial process water wells. TAWC's cross-connection program actively discourages household use of well water by prohibiting interconnections between private and public water supply systems, Mr. Burrell said.

GSC/ib

| FROM | DATE |
|---|---|
| | 25 Nov |

TO

PH-00C
SR 377

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | Hamilton Co. File | |
| | | |
| | | |
| | | |
| | | |

DATE: November 26, 1986

TO: SIU Files

FROM: G. S. Caruthers

SUBJECT: Details of Telecon-pertinent site information

On November 25, 1986 at 10:15 a.m. Ed Short of Miller Drilling Company was contacted by G. S. Caruthers of TDSF/SIU by telephone regarding well usage in the Chattanooga urban area.

Details of Conversation:

Mr. Short said that Miller Drilling Company was one of the largest and most active well drilling companies in the Chattanooga area. He stated that there was abundant ground water in the Chattanooga area and that except for two particular areas, the groundwater was generally of good quality. The two exceptions are the areas of Alton Park (near Chattanooga Creek) and the area near downtown and around the Farmers Market site. Mr. Short related that in one instance they were drilling a well in the Alton Park area and struck water which was "black, smelly and highly corrosive". He said it "ate up the pump impeller" and "burned my skin when I got it on me."

Mr. Short stated that he knew of only one household in the Chattanooga urban area (that area served by TAWC) which currently uses well water for domestic purposes, that being:

J. E. Caruthers
4506 McCahill Road
Chattanooga, TN 37415

This residence is in the Red Bank section, on the north side of the Tennessee River, and not within the 3 mile radius area of any site currently under investigation by TDSF/SIU.

Mr. Short stated that there were numerous private wells in the urban area of Chattanooga but that they were not actually used for drinking except in the instance noted above. He said that a common use was as a water supply for heat exchangers, air conditioning systems, heat pumps, etc., as well as wash water, gardens, and sanitation systems.

Mr. Short stated that there are many industrial process water wells on which the using industries depend and that he was quite concerned with the severely contaminated groundwater in some parts of Chattanooga. He said that he would be glad to help TDSF/SIU in any further investigations.

GC/cw SF D-1

| FROM | DATE |
|---|---|
| | |
| TO | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PH-001
SR 37

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 29

DEC 29 1986

Tennessee-American Water Company
An American Water Works System Company

P.O. Box 6338 • Chattanooga, Tennessee 37401 • Phone 615-755-7600

Richard T. Sullivan, Vice President
Daniel R. Bailey, Business Manager
W. J. Hobbs, Operations Manager

December 19, 1986

File 130-384

Mr. Gordeon Caruthers
State Super Fund Division
Tennessee Department of Health
& Environment
Fourth Floor Customs House
701 Broadway
Nashville, TN 37219

Dear Mr. Caruthers:

We are happy to supply you with a list of the known wells that exist within the Tennessee-American Water Company system. Bob Burrell, our Cross Connection Inspector, has compiled the list based upon his knowledge from his inspections of the industries in Chattanooga and company records of residential wells:

COMMERCIAL

1) Dixie Yarns Mills
100 South Watkins Street
Two wells-Holtzclaw Avenue

2) Standard-Coosa-Thatcher Company
Mapel Street
Rossville, Georgia
Two wells-location, across street in practice field for Rossville Boys

3) Dixie Yarns
Lupton City Spinning Mill
Three wells - east of building

4) Southern Cellulose Products, Inc.
105 W. 45th Street
One well-38th Street location

5) Southern Champion Tray
200 Compress Street
One well-north of building

6) Chattanooga Paper Board Company
2101 Rossville Avenue
Two wells-west side of mill

7) Chattanooga Glass Company
401 W. 45th Street
One well-behind guard building

RESIDENTIAL

1) 4101 Cromwell Road
Uses well water for outside activities.
Not for home use.

2) 4103 Cromwell Road
Uses well water for outside activities.
Not for home use.

3) (b) (6)
4105 Caine Lane
Well is capped.
They are using water from Tennessee-American Water Company

4) (b) (6)
4022 Caine Lane
Well is capped.
Using water from Tennessee-American Water Company

5) (b) (6)
4101 Caine Lane
Well capped
Using water from Tennessee-American

6) (b) (6)
4027 Caine Lane
Well capped
Using water from Tennessee-American

7) (b) (6)
4017 Caine Lane
Well capped
Using water from Tennessee-American

8) (b) (6)
4023 Caine Lane
Well capped
Using water from Tennessee-American

9) (b) (6)
4014 Caine Lane
Well capped
Using water from Tennessee-American

10) (b) (6)
4009 Caine Lane
Well capped
Using water from Tennessee-American

We are also sending you a copy of the Tennessee Water Well Driller's Report from Kittle Drilling Company on wells that have been drilled by them in 1986. We have been in contact with another local well drilling company but have not received any response from them concerning the wells they have drilled.

If we can be of further assistance to you please do not hesitate to contact us.

Very truly yours,

W. J. Hobbs
Operations Manager

WJH:mb
Attachment

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 30

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | file | |
| | | |
| | | |
| | | |
| | | |

DATE: August 29, 1986

TO: Chattanooga Creek File

FROM: G. S. Caruthers

SUBJECT: Trip Report

On August 28, 1986, I conducted a water use survey in the Rossville, Georgia area. The area involved consists of areas of Rossville and Walker County, Georgia which lie within a 3 mile radius of several sites in the Chattanooga Creek floodplain.

Conversation with Henderson Wellborn, superintendent of the Walker Co. Water and Sewerage Authority in Flintstone, Georgia, indicates that all areas of the county outside the cities are served by that utility. Mr. Wellborn stated that their lines now run all the way to the Tennessee state line west of Rossville and meet but do not interconnect with those of the city of Rossville. The small residential area near the state line outside the city limits of Rossville is served by WCWSA, according to Mr. Wellborn. He stated that all water distributed by WCWSA comes from Crawfish Springs Lake near Chickamauga, Georgia, about 7 miles south of Rossville and well outside the three-mile radius area. Mr. Wellborn said he knew of no private wells currently in use in the affected area.

Mr. Lee Britton, superintendent of the Rossville Public Works Department, was not available, but conversation with employees at the PWD maintenance lot confirmed that all areas were covered by either the Rossville or Walker County water systems. Rossville obtains its water from Tennessee-American Water Company in Chattanooga.

The trip was concluded with a brief reconnaissance of selected sites in the Chattanooga Creek area to ascertain conditions to be encountered in conducting site inspections which will probably be scheduled in FY 1987.

GSC/djk

| FROM | DATE |
|---|---|
| | |
| TO | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PH-00
SR 37

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 31

| | MAILING NAME | | SOURCE NAME | LAT | LONG | RIVER MILE | AVERAGE PROD. (GPD) | POPULATION SERVED | TELEPHONE NUMBER |
|---|---|---|---|---|---|---|---|---|---|
| 0000474 | MORRISTOWN WATER DEPT<br>P O BOX 667<br>MORRISTOWN | 37814 | CHEROKEE LAKE | 036-15-39 | 083-17-08 | 075.5&003.5 | 035,786,000 | 023,747 | 615-586-4121 |
| | | | HAVLEY SPRING | 036-13-28 | 083-17-47 | 075.5&003.5 | | | |
| | | | WELLS | 036-13-34 | 083-17-44 | 075.5&003.5 | | | |
| | | | HAVELY SPG CK | 036-13-28 | 083-17-48 | 075.5&003.5 | | | |
| 0000476 | RINE'S TRAILER COURT<br>1580 ELLER RD.<br>MORRISTOWN | 37814 | WELL | 036-19-10 | 083-20-32 | | 000,000,000 | 000,078 | 615-581-5401 |
| 0000598 | RUSSELLVILLE WHITESBURG U D<br>P.O. BOX 127<br>RUSSELLVILLE | 37860 | MORRISTOWN WATE | 036-15-41 | 083-17-10 | | 030,539,000 | 033,263 | 615-586-2232 |
| 0000650 | SOUTH MORRISTOWN-WITT UTIL DIS<br>P O BOX 237<br>MORRISTOWN | 37814 | MORRISTOWN WATE | 036-15-41 | 083-17-10 | | 003,160,000 | 002,114 | 615-581-4895 |
| HAMILTON | | | | | | | | | |
| 0000169 | DAISY-SODDY-FALLING WATER U.D.<br>P.O. BOX 575<br>SODDY-DAISY | 37373 | SODDY CK EMB | 035-16-55 | 085-03-17 | 004.2 | 000,832,000 | 003,163 | 615-332-2427 |
| | | | SODDY WELL #1 | 035-16-58 | 085-09-14 | 004.2 | | | |
| | | | FALL WAT WELL#2 | 035-11-43 | 085-15-53 | 004.2 | | | |
| 0000219 | EASTSIDE UTILITY DISTRICT<br>PO BOX 22037<br>CHATTANOOGA | 37422 | WELL | 035-07-50 | 085-04-57 | | 000,343,000 | 023,964 | 615-892-2990 |
| | | | TN-AMERICAN | 035-03-15 | 085-17-19 | | | | |
| 0000303 | HIXSON UTILITY DISTRICT<br>5305 AUSTIN ROAD<br>HIXSON | 37343 | CAVE SPRINGS | 035-11-47 | 085-13-55 | | 003,167,000 | 043,531 | 615-877-3513 |
| 0000168 | HOWBRAY MOUNTAIN UTILITY DIST<br>1521 MONTLAKE RD.<br>SODDY-DAISY | 37379 | DAISY SODDY UD | 035-14-25 | 085-12-51 | | 000,076,000 | 001,068 | 615-332-4581 |
| 0000605 | SALE CREEK UTILITY DISTRICT<br>PO BOX 557<br>SALE CREEK | 37373 | 2 WELLS | 035-22-33 | 085-06-34 | | 000,204,000 | 000,378 | 615-332-1646 |

| | MAILING NAME | | SOURCE NAME | LAT | LONG | RIVER MILE | AVERAGE PROD. (GPD) | POPULATION SERVED | TELEPHONE NUMBER |
|---|---|---|---|---|---|---|---|---|---|
| 0000613 | SAVANNAH VALLEY U. D. | | | | | | | | |
| | 7100 SMITH ROAD | | | | | | | | |
| | ODLIEVAN | 37363 | WELL #1 | 035-14-27 | 085-00-40 | | 000,740,000 | 035,425 | 615-344-8440 |
| | | | WELL #2 | 035-14-22 | 085-00-38 | | | | |
| 0000639 | SIGNAL MOUNTAIN WATER SYSTEM | | | | | | | | |
| | 733 RIDGEWAY AVE. | | | | | | | | |
| | SIGNAL MOUNTAIN | 37377 | TENN AMERICAN | 035-03-15 | 085-17-19 | | 000,895,000 | 035,503 | 615-886-2177 |
| 0000107 | TENN-AMERICAN WATER CO. | | | | | | | | |
| | 1101 BROAD STREET | | | | | | | | |
| | CHATTANOOGA | 37402 | TENN RIVER | 035-03-15 | 085-17-19 | 465.3 | 036,810,000 | 175,142 | 615-755-5811 |
| 0000037 | UNION FORK-BAKEWELL U.D. | | | | | | | | |
| | RETRO HUGHES ROAD | | | | | | | | |
| | BAKEWELL | 37309 | 2 WELLS | 035-20-53 | 085-07-44 | | 000,192,000 | 001,756 | 615-332-9733 |
| 0000635 | WALDEN RIDGE UTILITY DISTRICT | | | | | | | | |
| | 2112 TAFT HIGHWAY | | | | | | | | |
| | SIGNAL MOUNTAIN | 37377 | TWO WELLS | 035-11-26 | 085-16-03 | | 000,466,030 | 035,096 | 615-886-2683 |
| 0000776 | WHITE OAK MOUNTAIN WATER ASSOC | | | | | | | | |
| | DRAWER U | | | | | | | | |
| | COLLEGEDALE | 37315 | EASTSIDE U. D. | - - | - - | | 000,005,800 | 000,095 | 615-396-2208 |
| HANCOCK | | | | | | | | | |
| 0000640 | SNEEDVILLE U D | | | | | | | | |
| | PO BOX 255 | | | | | | | | |
| | SNEEDVILLE | 37869 | CHARLIE GREEN S | 036-30-20 | 083-16-40 | 000000 | 000,249,000 | 001,470 | 615-733-4302 |
| | | | BRIER CREEK TRI | 036-30-48 | 083-15-31 | 000000 | | | |
| HARDEMAN | | | | | | | | | |
| 0000063 | BOLIVAR WATER SYSTEM | | | | | | | | |
| | 115 NORTH WASHINGTON STREET | | | | | | | | |
| | BOLIVAR | 38008 | WELL | 035-15-20 | 088-59-55 | | 001,312,000 | 007,975 | 901-658-2553 |
| 0000452 | CROFT UTILITIES COMPANY | | | | | | | | |
| | 2169 BRANDEMERE DRIVE | | | | | | | | |
| | GERMANTOWN | 38138 | WELL | 035-02-35 | 088-59-40 | | 000,010,000 | 000,093 | 901-755-0864 |
| 0000267 | GRAND JUNCTION WATER DEPT | | | | | | | | |
| | P.O. BOX 25, CITY HALL | | | | | | | | |
| | GRAND JUNCTION | 38039 | 2 WELLS | 035-03-00 | 089-11-00 | | 000,215,000 | 001,032 | 901-764-2971 |
| 0000451 | GRAND VALLEY LAKES WATER SYSTE | | | | | | | | |
| | P.O. BOX 11314, 175 TILMAN BLD | | | | | | | | |
| | MEMPHIS | 38111 | WELL | 035-08-30 | 089-03-30 | | 000,013,900 | 000,330 | 901-376-8413 |
| 0000312 | HORNSBY WATER DEPT | | | | | | | | |
| | P.O. BOX 40 | | | | | | | | |
| | HORNSBY | 38044 | BOLIVAR | 035-15-20 | 088-59-55 | | 000,062,000 | 0.0,999 | 901-658-2300 |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 32

Date: April 14, 1993

To: Landes Co. File #33-633

From: Craig Stannard, Geologist, CFO

Subject: Public Drinking Water, Chattanooga Area

On April 14, 1993, Gary Burris of the Tennessee Division of Drinking Water Supply, informed Craig Stannard that the entire Chattanooga area and surrounding suburbs are supplied drinking water by the Tennessee American Water Company on Amnicola Blvd. The attached form lists the essential data concerning this utility system.

# PUBLIC WATER SYSTEM DATA

Key Identification Number: 0000107

Name of Water System: TENNESSEE – AMERICAN WATER COMPANY
Mailing Address: 1101 BROAD ST.
City: CHATTANOOGA County: HAMILTON
Zip Code: 37402 Office Phone: 755-7600 Plant Phone:

| Title of Person | Time | Certification | Interviewed | Correspondence |
|---|---|---|---|---|
| VICE PRESIDENT | RICHARD SULLIVAN | | | X |
| OPERATIONS | BILL HOBBS | | X | CC |
| PRODUCTION SUPT. | DAVE SNYDER (#1515) (755-7645) | F4/D3 | X | |
| DISTRIBUTION SUPT. | CHARLIE DOWDY | | X | |
| WATER QUALITY SUPT. | SUSAN HOLMES (755-7649 LAB) | | X | |

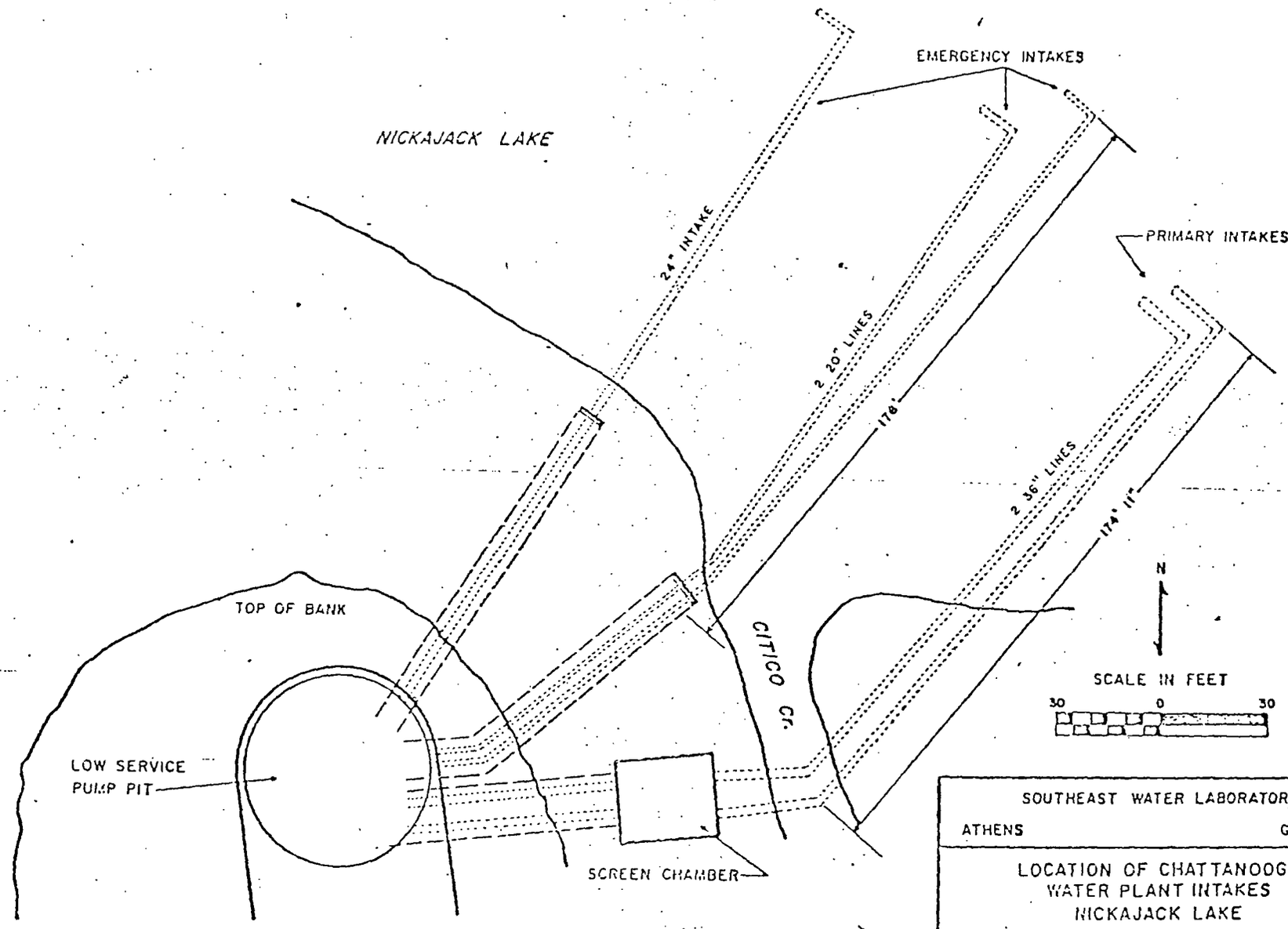
| Source No. | | Name | INTAKE LOCATION USGS Map 105 NE LATITUDE DEG | MIN | SEC | LONGITUDE DEG | MIN | SEC | MARK (ONE ONLY) SURFACE | GROUND | PURCHASED | TREATMENT AERATION | PRECHLORINATION | COAGULATION | SEDIMENTATION | FILTRATION | CORRISION CONTROL | SOFTENING | TASTE AND ODOR CONTROL | IRON REMOVAL | FLUORIDE ADJUSTMENT | DISINFECTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | R | TENNESSEE RIVER | 35 | 03 | 12 | 85 | 17 | 21 | X | | | | X | X | X | X | X | | X | | X | X |
| | A | | | | | | | | | | | | | | | | | | | | | |
| 2 | R | | | | | | | | | | | | | | | | | | | | | |
| | A | | | | | | | | | | | | | | | | | | | | | |
| 3 | R | | | | | | | | | | | | | | | | | | | | | |
| | A | | | | | | | | | | | | | | | | | | | | | |
| 4 | R | | | | | | | | | | | | | | | | | | | | | |
| | A | | | | | | | | | | | | | | | | | | | | | |

| Name of Systems served by this System | Other Systems Connected to this System |
|---|---|
| EASTSIDE U.D. | WALKER CO. U.D. (GEORGIA) |
| FT. OGLETHORPE W.S. (GEORGIA) | |
| CATOOSA U.D. (GEORGIA) | |
| HIXSON U.D. | |
| SIGNAL MTN W.S. | |

Plant Classificaiton: T-4
Distribution Classification: D-2 Date Laboratory Certified:
Design Capacity: 50,000 (gpm) Filter Area: (sq. ft.) Filter Rate: < 2.0 (gpm/ft.²)
Raw Water Pump Capacity: 75,000 (gpm) Finished Water Pump Capacity: 58,330 (gpm)
Distribution Storage, Gravity Flow: 19.4 (million gallons) Emergency Power Only: 3 DIESEL PUMPS (gal/day)
Clearwell Capacity: 5.38 (million gallons) Date Cross Connection Control Program Approved: 5-23-72
Date of Last Inorganic Chemical Analysis: 10-30-91 Date of Last Organic Chemical Analysis: 5-29-91
Date of Last Radionuclide Analysis: 10-31-91 Date Emergency Plan Approved: 10-31-89 * Last Rating: 99
Number of Wholesale Customers: 6 Number of Meters: 164,231 Date of Last Survey: 5-16-90
Ramarks: VOCs ALL OK | * REV TO EMER PLAN APPROVED 10-22-90

| Date of Survey | Number of Connections | Household Factor | Population Served | Average Daily Pumpage (million gallons) | Maximum Day Pumpage (million gallons) | Engineer | Rating | Year |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 1994 |
| | | | | | | | | 1993 |
| | | | | | | | | 1992 |
| 12-5-91 | 59787 | 2.50 | 149467 | 34.87 | 44.47 | MTD | 98 | 1991 |
| 5-16-90 | 60602 | 2.71 | 164,231 | 36.52 | 43.31 | MTD | 99 | 1990 |
| | | | | | | | | 1989 |

PH-0355 WQC-(12-88)




SOUTHEAST WATER LABORATORY
ATHENS GEORGIA

LOCATION OF CHATTANOOGA WATER PLANT INTAKES NICKAJACK LAKE

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
SOUTHEAST REGION ATLANTA, GEORGIA

Figure 15

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 33

# TRIP REPORT

**Site: #33-606, Howard High School**
**Date: August 26, 1993**

Facility Owner: City of Chattanooga
Type Facility: area in and near old landfill in previous creek meander.
County: Hamilton City: Chattanooga

Purpose of Visit: to take samples for Site Investigation
DSF Personnel Present: Craig Stannard, Ferman Miller, Don VanHook
Other Personnel Present: none

Weather Conditions: hot, muggy, 95 degrees
Samples Collected: None_____ Water 1 Soil 11 Split 0
Photos Taken: Qty Prints/Slides 11 Frames 16 - 26
Miles traveled: 8/24- 8 mi. in S3DJ73
8/25-18 mi. in S3DJ73

**Comments and Discussion**:
Drexyl Heidel of the City of Chattanooga was notified of the sampling but did not attend the activities. At Howard High, school had not yet begun for the fall. Only teachers were present in the Day Care building and school building. No one was present in the athletic fields or Nature Trail. The trio proceeded to take samples in their numerical order. See attached map for sample locations. Samples HH-SS-1,2,3,4,5,6,7,10 and -GW-01 were taken on August 24, 1993. Samples HH-SS-8,9,11 were taken on August 25, 1993.

All samples were taken according to EPA protocol. Soil samples were taken from holes dug by shovels cleansed according to EPA Standard Operating Procedures. A grab soil sample was placed in three jars for metals, extractables, and volatile analysis. The volatile sample was taken first. The one water sample was taken from a broken pipe buried in the ground. All samples were packed in coolers on ice.

**August 24, 1993**

**HH-SS-01:** Located near housing area north of baseball field. This control sample was collected by DV at 8:30 am. It was 6' in front of the fourth pole to the baseball field. The depth was 4 to 7". The material appeared to be disturbed reddish brown clay with glass and rock fragments. Photo frame #16 was taken here.

**HH-SS-02:** Located in day care center. Arrived at soil sample point at 9 am. Depth of sample was 6-12" as per instructions from Nancy Thomas. The deed was documented with photo frame #17 at 9:05 am. CJS sampled orange brown clay soil at 9:10 am. The location was 190' from the school building, 36' from the day care building, and 2' inside the day care fence.

**HH-SS-03:** Located in day care center. While digging this soil sampling hole, the post hole digger blade bent. It was discarded and excavation proceeded with a shovel. A large brick was unearthed at 4" depth. This sample was collected at approximately 4-8" depth. This point is inside the daycare center fence 61' from the building. Photo frame #18, taken by FDM, shows DV at

the point. There was a 7' high pile of woodchips nearby that Public Works personnel were using to place in the day care play area. The sample was taken by DV at 9:45 am. The soil was dark brown and appeared disturbed with much gravel, black chips, glass shards, and brick fragments. The soil was compact and hard to dig. Picture frame #19 by DV is FDM standing on pile of black tar (roofing?) material near the day care center (approx.100').

**HH-SS-04:** Located in the practice field. Arrived at sample point at 10:35. The duplicate sample was taken at this sampling point. DV dug this point 190' from the gymnasium, 38'from the practice field fence, and 141' to the north tree line. The sample was taken at a 6-12" depth. Photo frame #20 taken of DV and CJS at SS-04(SS-10). Notice gym on right. CJS collected this sample and duplicate at 10:45.

**HH-SS-05:** Located in the practice field. This sample was taken by DV at 11:15 am. It was taken at a 6" depth. Its location was 2' from a rock lined drainway, 6' from the fence on the south of the practice field, and 80' to the football stadium bleachers. Photo frame #21 taken by FDM of DV sampling at 11:15. The soil appeared to be native consisting of a dark brown top soil and red to yellow brown clay subsoil.

**HH-SS-06:** Located in the biology area nature trail. 180' from fence of daycare center. At 1:15 pm, CJS dug a hole in an area that has been producing groundwater during previous explorations. No signs of water were visible on the surface. The excavated topsoil was brown clay fill with gravel. Glass fragments and slag type material in yellow brown clay were unearthed at 1.5-2'. The soil sample was taken by DV at the 2' depth. No water had been discovered yet.

**HH-GW-01:** The hole used for HH-SS-06 was dug deeper. A 4" metal pipe was hit at 2.5' deep. Water gushed into the hole at approximately 1 gpm. It was gray and cloudy and smelled like sewage. Photo frame #23 at 2:10 pm by CJS of DV holding a tape measure 2' above water in the hole. DV sampled the water at 2:15 pm. Photo frame #24 by CJS documents this event. This is the area that the teacher obtained the water sample which was presented before Commissioner Luna. After observation of the immediate area, a vague sunken trench was discovered leading away from the excavation toward the day care center. This probably marks where the black pipe lies.

**HH-SS-07:** Located in the biology area nature trail in a group meeting area. The excavation was positioned 1' in front of a bench. It was 135' to the practice field fence and 130' to HH-SS-06. At 3 pm, dark brown soil was sampled at approximately 14" depth. Photo frame #25 by FDM is DV sampling. Photo frame #26 is looking toward practice field and stadium.

**<u>August 25, 1993</u>**

The previous days samples were taken to Greyhound for shipping at 8:00 am. CJS, FDM, and DV arrived back at the site at 8:30 am. It was hazy, humid and the temperature was in the high 80's.

**HH-SS-08:** Located on the approach pathway into the landfill from the baseball field. The access was unrestricted. It was 100' perpendicular from

the cleared baseball field area to this sample point. A sample of dry, stiff, mottled gray clay was taken at a depth of 6-12" deep. Chunks of black material were also unearthed. Photo frame #1 by CJS documented the event. The clay cap appeared to be approximately 2" thick here. The clay cap was red. The underlying material is gray.

**HH-SS-09:** Located in the landfill in a 7' diameter barren area. The distance is 400' into the landfill from SS-08 and 45° to the east of line SS-08/SS-11(see site sketch). The soil was dry and compact. Black coal-like material with a burnt smell was on the surface. Gray rubbery sludge like material was encountered at 4" depth. The sample was taken at 9:30 am at 6-8" depth. The deed was documented by FDM with a photograph of DV sampling. This was photo frame #2.

**HH-SS-10:** Located in the practice field. The duplicate was placed in an area of greater exposure. Same location as HH-SS-04. For details see proceding HH-SS-04 entry.

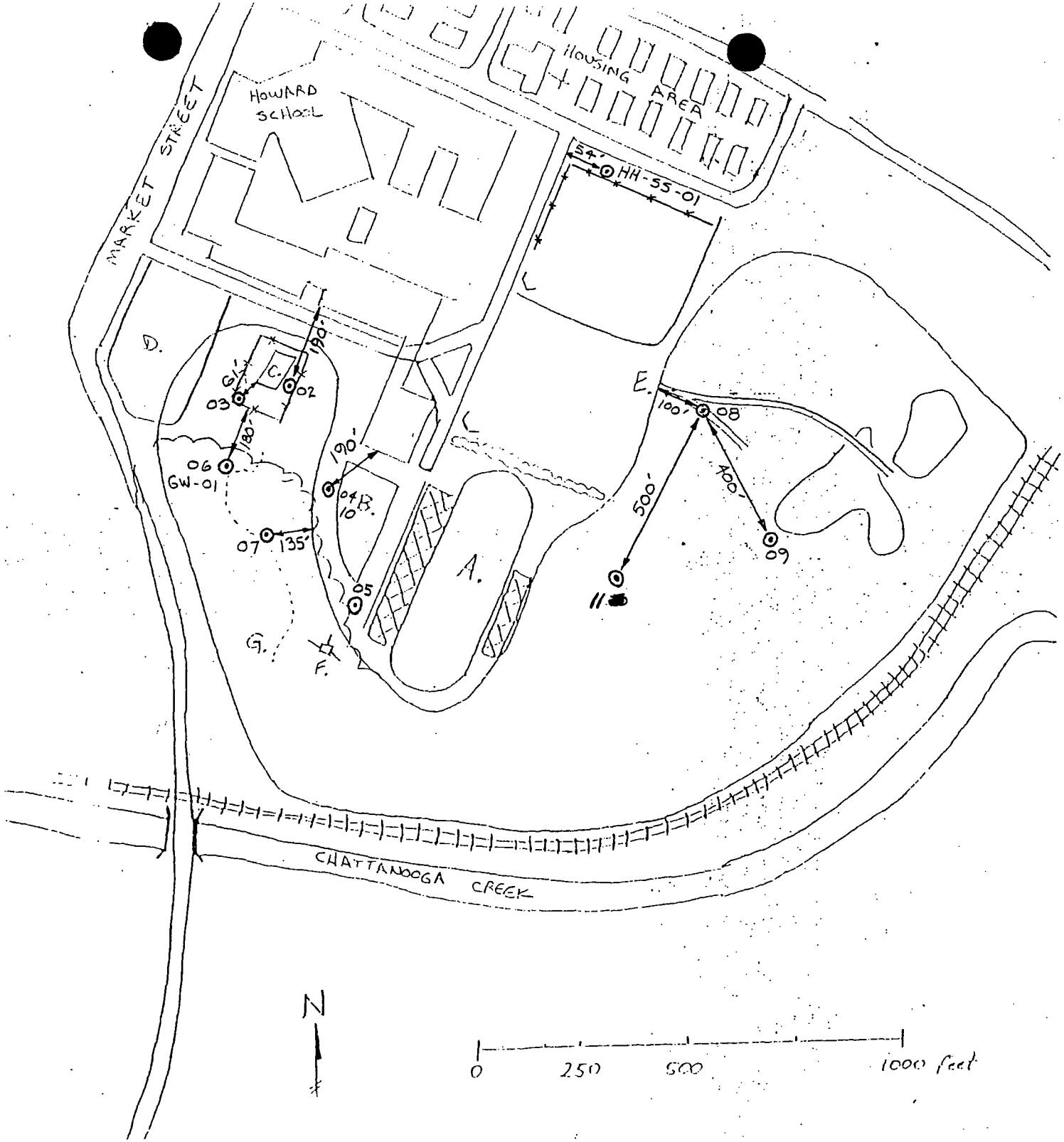
**HH-SS-11:** Located in the landfill in a grassy area near a group of small trees. 500' from HH-SS-08 in a line parallel to the open area of the Howard School baseball and football fields. Approximately 200' into the landfill from the north-east football stadium light. The soil excavated consisted of 6" of yellow-brown loam topsoil and gravely grey-brown subsoil with many wood chips and pieces of brick. The sample was taken at 10:30 am by DV at a depth of 6-10". It was hard to dig deeper because of big pieces of wood. Photo frame #3 by CJS documents the activity.

At 11:10 am, the trio visited the drain culvert in the biological area to ascertain the depth of the clay cap. Water was running in the culvert approximately five feet below. The thickness of the clay cap was undeterminable but appears shallow (<3"). Bricks and rocks were all the way to the top of the culvert slope. There were bottles and asphalt on the ground surface.

The trio returned to the office at 1:00 pm after dropping off the film and sending the days samples to the lab via Greyhound. The equipment was decontaminated using EPA protocol and replaced in the supply room.

Don Van Hook 8/26/93

Inspector's Signature,date




# HOWARD HIGH SCHOOL DUMP

Site #33-606

Sampling Locations 8/93
Site Investigation

A. FOOTBALL FIELD
B. PRACTICE FIELD
C. DAY CARE CENTER
D. PARKING AREA
E. APPROACH ROAD INTO LANDFILL FROM BASEBALL FIELD
F. DRAINAGE CULVEAT
G. NATURE TRAIL IN BIOLOGICAL AREA.

TN. Division of Superfund
Don VanHook, 8/93

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 34

**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

**DIVISION OF SUPERFUND**

**OFFICE MEMORANDUM**

DATE: September 2, 1993

TO: File #33606, Howard School

FROM: Don VanHook

SUBJECT: Mysterious pipe at sample point HH-SS-06

---

At 2:30 pm, DV telephoned Jimmy Sanders (756-2073), the Howard School custodian, about pipes on the school grounds. Mr. Sanders said the pipe encountered at sample point HH-SS-06 was most likely a grey water outflow from the gym or roof runoff. Before Chattanooga Creek was rerouted to its present location, the creek flowed close to the gym and grey water was discharged into it along with roof runoff. When the creek was filled, these pipes were not removed.

All wastewater is presently pumped to the school where it is discharged to the City sewer system. The pipe at HH-SS-06 probably failed to get plugged when wastewater was directed to the city system.

Mr. Sanders also said a drainage pipe exists approximately 10' under the school. This pipe discharges to the creek.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 35

TENNESSEE DEPARTMENT OF HEALTH

ROUTE SLIP

| FROM RLH | DATE 9-16-93 |
|---|---|
| TO GAM | 9/16/93 |
| RAW | 9-16-93 RAW |
| | |
| | |
| | |
| | |

Please review and route as indicated:

____ NBO (box on 6th)

____ SWM, Attn: Greg Luke, L&C Tower, 5th Floor

____ DOT Sampling (see attached)

____ Division of Superfund, L&C Tower, Attn.:

____ Underground Storage Tanks, L&C Tower, Attn.: Chuck Head

____ Division of Radiological Health

____ Environmental Field Office; Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn.:
Brick Church Park Drive, Nashville, TN

____ Division of Air Pollution Control, Attn.: Robert Brawner, Gary Leggett, Charles Northington

____ Division of Water Pollution Control

____ Division of Water Supply, Attn: Robert Foster, Tom Moss

____ Division of Ground Water Protection

✓ Chattanooga ~~Field Office~~; Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn: Wayne Everett
540 McCallie, Chattanooga, TN 37402

____ Jackson Branch Lab, Attn: RLM

____ Knoxville Branch Lab, Attn: EAM

____ Aquatic Biology, Basement

____ CEM, LQA, 5th floor

____ Memphis Basin/Field Office

____ Knoxville Basin/Field Office

____ Jackson Basin/Field Office

____ Johnson City Basin/Field Office

____ Other

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-GW-01
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 2:15 PM By DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hooke
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- __ Soil
- __ Tissue
- X Water
- __ Air
- __ sludge
- Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080238
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

INORGANIC ANALYS[illegible] LIQUIDS

Sample Source: Howard High School
I.D./Site No.: 33-606
County: 33 Field No.: HH-GW-01
Stream Mile: Depth:
Collected: Date 8/24/93 Time 2:15 PM By DV
Contact Hazard: Unknown
Signature of Sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

Sampling Agency: __ APC __ DOT __ DWS __ GW __ SWM __ UST __ EEP X PASI __ SF __ WPC __ other (specify):

Billing Code (required): 327.38-11

Sample Type: X Water __ Wastewater __ Air

Other:

Sample Priority: __ Emergency X Legal X Routine __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*

Laboratory Number: K308133
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: SEP 28 1993 by EAM
Reviewed by: [illegible]
Reviewed by:

| Code | * | Field Tests Only | Units | Value |
|---|---|---|---|---|
| 00094 | | conductivity | µmho | |
| 00300 | | dissolved oxygen | mg/L | |
| 00061 | | flow | CFS | |
| 00400 | | pH | Units | |
| 00545 | | residue, settleable | ml/L | |
| 00077 | | Secchi disc | M | |
| 00010 | | temperature | °C | |
| 50060 | | chlorine, residual | mg/L | |
| | | **Microbiology** | | |
| 01616 | | coliform, fecal | cfu /100 mL | |
| 31501 | | coliform, total | cfu /100 mL | |
| 31679 | | streptococci, fecal | cfu /100 mL | |
| | | **Physical Characteristics** | | |
| 00081 | | color, apparent | PtCoU | |
| 00080 | | color, true | PtCoU | |
| | | flash point | °C | |
| 00403 | | pH, lab | Units | |
| 00515 | | residue, dissolved | mg/L | |
| 00545 | | residue, settleable | ml/L | |
| 00530 | | residue, suspended | mg/L | |
| 00500 | | residue, total | mg/L | |
| 00095 | | specific cond. 25°C | µmho | |
| 00070 | | turbidity | NTU | |
| | | **Organics** | | |
| 00310 | | BOD, 5-day, 20°C | mg/L | |
| 00335 | | COD (low) | mg/L | |
| 00340 | | COD (high) | mg/L | |
| | | formaldehyde | µg | |

| Code | * | Organics | Units | Value |
|---|---|---|---|---|
| 38260 | | MBAS | mg/L | |
| 00550 | | oil and grease | mg/L | |
| | | Hydrocarbons, total | mg/L | |
| 32730 | | phenols | ug/L | |
| 00690 | | TOC | mg/L | |
| | | **Non-metallic inorganics** | | |
| 70508 | | acidity, as $CaCO_3$ | mg/L | |
| 00410 | | alkalinity, total, as $CaCO_3$ | mg/L | |
| 00415 | | alkalinity, phen., as $CaCO_3$ | mg/L | |
| 01022 | | boron | ug/L | |
| 00940 | | chloride | mg/L | |
| 50060 | | chlorine, residual | mg/L | |
| 01032 | | chromium, hexavalent | ug/L | |
| 00720 | X | cyanide | mg/L | <.02 |
| 00290 | | dissolved oxygen | mg/L | |
| 00950 | | fluoride | mg/L | |
| 00900 | | hardness, total, as $CaCO_3$ | mg/L | |
| 32395 | | hardness, Ca, as $CaCO_3$ | mg/L | |
| 00635 | | nitrogen, total kjeldahl | mg/L | |
| 00610 | | nitrogen, ammonia | mg/L | |
| 00605 | | nitrogen, total organic | mg/L | |
| 00630 | | nitrogen, $NO_3$ & $NO_2$ | mg/L | |
| 00615 | | nitrogen, nitrite | mg/L | |
| 00620 | | nitrogen, nitrate | mg/L | |
| 70507 | | orthophosphate, total | mg/L | |
| 00666 | | phosphate, dissolved | mg/L | |
| 00665 | | phosphate, total | mg/L | |
| 00955 | | silica | mg/L | |
| 00945 | | sulfate | mg/L | |
| 00745 | | sulfide, total | mg/L | |

| Code | * | Metals | Unit | Value |
|---|---|---|---|---|
| 01105 | X | aluminum, Al | ug/L | 33600 |
| 01097 | | antimony, Sb | ug/L | |
| 01002 | X | arsenic, As | ug/L | <2 |
| 01007 | X | barium, Ba | ug/L | 701 |
| 01012 | | beryllium, Be | ug/L | |
| 01027 | X | cadmium, Cd | ug/L | 3 |
| 00910 | X | calcium, Ca | mg/L | 367 |
| 01034 | X | chromium, Cr | ug/L | 367 |
| 01037 | X | cobalt, Co | ug/L | 25 |
| 01042 | X | copper, Cu | ug/L | 87 |
| 01045 | X | iron, Fe | ug/L | 82400 |
| 01051 | X | lead, Pb | ug/L | 176 |
| 00927 | X | magnesium, Mg | mg/L | 25.7 |
| 01055 | X | manganese, Mn | ug/L | 3220 |
| 71900 | X | mercury, Hg | ug/L | 0.3 |
| 01067 | X | nickel, Ni | ug/L | 46 |
| 00937 | X | potassium, K | mg/L | 13.3 |
| 01147 | X | selenium, Se | ug/L | <2 |
| 01077 | X | silver, Ag | ug/L | <10 |
| 00929 | X | sodium, Na | mg/L | 10.1 |
| 01059 | | thallium, Tl | ug/L | |
| 01102 | | tin, Sn | ug/L | |
| 01152 | | titanium, Ti | ug/L | |
| 01092 | X | zinc, Zn | ug/L | 453 |

Lab comments:

* please check tests desired

PH-3012 LAB (Rev. 7-9

TENNESSEE DEPARTMENT OF HEALTH

ROUTE SLIP

| | |
|---|---|
| FROM RLH | DATE 9-24-93 |
| TO GAM | 9-24-93 |
| RAW | 9-27-93 RAW |
| | |
| | |
| | |
| | |

Please review and route as indicated:

____ NBO (box on 6th)

____ SWM, Attn: Greg Luke, L&C Tower, 5th Floor

____ DOT Sampling (see attached)

____ Division of Superfund, L&C Tower, Attn.:

____ Underground Storage Tanks, L&C Tower, Attn.: Chuck Head

____ Division of Radiological Health

____ Environmental Field Office: Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn.:
Brick Church Park Drive, Nashville, TN

____ Division of Air Pollution Control, Attn.: Robert Brawner, Gary Leggett, Charles Northington

____ Division of Water Pollution Control

____ Division of Water Supply, Attn: Robert Foster, Tom Moss

____ Division of Ground Water Protection

✓ Chattanooga Field Office; Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn: Wayne Everett
540 McCallie, Chattanooga, TN 37402

____ Jackson Branch Lab, Attn: RLM

____ Knoxville Branch Lab, Attn: EAM

____ Aquatic Biology, Basement

____ CEM, LQA, 5th floor

____ Memphis Basin/Field Office

____ Knoxville Basin/Field Office

____ Jackson Basin/Field Office

____ Johnson City Basin/Field Office

____ Other

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Purgeables and Petroleum Hydrocarbons**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-11
Stream Mile: Depth:
Collected: Date: 8/25/93 Time: 10:30 AM By: DV
Contact Hazard: Unknown
Signature of sampler: [illegible]
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- X Soil
- __ Sediment
- __ Water
- __ Other

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*

Laboratory Number: 93080242
Date received: 8/26/93
Time received: 1200 by: LJB
Date reported: by:
Reviewed by:

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | **Other** |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments:

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-GW-01
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 2:15 PM By DV
Contact Hazard Unknown
Signature of sampler: Don Van Hook
Send Report to Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- __ Soil
- __ Sediment
- X Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number 93080239
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | **Other** |

| * | Petroleum Hydrocarbons |
|---|---|
| | Gasoline Range Organics |
| | Diesel Range Organics |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (rev. 8/92)

RDA NO. 1527

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Purgeables and Petroleum Hydrocarbons**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-09
Stream Mile: ____ Depth: ____
Collected: Date 8/25/93 Time 9:30AM By DV
Contact Hazard: Unknown
Signature of sampler: Dan Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- X Soil
- __ Sediment
- __ Water
- __ Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080241
Date received: 8/26/93
Time received: 1200 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | **Other** |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-09
Collected-Date 08/25/93 Time 09:30 By DV
Date Priority Needed / /

Laboratory Number 93-08-0241
Branch Lab Number
Received-Date 08/26/93 Time 12:00 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | * 6.2 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | PI <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

* METHYLENE CHLORIDE FOUND IN LAB BLANK(0.3ppb).

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bigaman
Date 9/13/93
Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No.: 33-606
County: 33 Field No.: HH-SS-08
Stream Mile: Depth:
Collected: Date: 8/25/93 Time: 8:45 AM By: CJS
Contact Hazard: Unknown
Signature of sampler: Craig Stanford
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

ORGANIC ANALYSIS
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number: 93080240
Date received: 8/26/93
Time received: 1200 by: LJB
Date reported: by:
Reviewed by:

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | **Other** |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments:

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWAED HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-08
Collected-Date 08/25/93 Time 08:45 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0240
Branch Lab Number - -
Received-Date 08/26/93 Time 12:00 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | * 1.4 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | PI <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

* METHYLENE CHLORIDE FOUND IN LAB BLANK (0.3ppb).

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bigsamer
Date 9/13/93

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-10
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 10:45 AM By CJS
Contact Hazard Unknown
Signature of sampler Gary Flannagan
Send Report to Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify):

Billing Code (required) 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALY
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number 93080238
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | Other |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-10
Collected-Date 08/24/93 Time 10:45 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0238
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | U <0.1 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingaman
Date 9/13/93
Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Purgeables and Petroleum Hydrocarbons**

Sample Source: Howard High School
I.D./Site No.: 33-606
County: 33 Field No.: HH-SS-07
Stream Mile: ____ Depth: ____
Collected: Date: 8/24/93 Time: 3:00 PM By: DV
Contact Hazard: Unknown
Signature of sampler: Dan Van Hook
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other ____

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only* 93080237
Laboratory Number: 93080237
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | **Other** |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | **Additives:** |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-07
Collected-Date 08/24/93 Time 15:00 By DV
Date Priority Needed / /

Laboratory Number 93-08-0237
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | U <0.1 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingaman
Date 9/13/93
Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-06
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 1:40 pm By DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number 93080235
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | Other |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | Additives: |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-06
Collected-Date 08/24/93 Time 13:40 By DV
Date Priority Needed / /

Laboratory Number 93-08-0236
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | * 1.9 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

* METHYLENE CHLORIDE FOUND IN LAB BLANK (0.3ppb).

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingaman
Date 9/13/93
Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-05
Stream Mile ____ Depth ____
Collected: Date 8/27/93 Time 11:15 AM By DV
Contact Hazard Unknown
Signature of sampler Dan Van Hook
Send Report to Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number 93080235
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | Other |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | Additives: |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33605
Sample Type: SOIL
County: 33
Field No: HH-SS-05
Collected-Date 08/24/93 Time 11:15 By DV
Date Priority Needed / /

Laboratory Number 93-08-0235
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | * 5.0 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

* METHYLENE CHLORIDE FOUND IN LAB BLANK (0.3ppb).

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingham
Date 9/13/93

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-04
Collected-Date 08/24/93 Time 10:45 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0234
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | U <0.1 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingham
Date 9/13/93

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALY**
**Purgeables and Petroleum Hydrocarbons**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-02
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 9:10 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Hammond
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- X Soil
- __ Sediment
- __ Water
- __ Other

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080232
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | Other |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | Additives: |
| | Methyl tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-02
Collected-Date 08/24/93 Time 09:10 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0232
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | * 2.0 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

* METHYLENE CHLORIDE FOUND IN LAB BLANK (0.3ppb).

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bingham
Date 9/13/93

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-01
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 8:30 AM By DV
Contact Hazard None
Signature of sampler Don Van Fleet
Send Report to Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- X Soil
- __ Sediment
- __ Water
- __ Other

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Purgeables and Petroleum Hydrocarbons

*For lab use only*

Laboratory Number 93080231
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Halogenated |
|---|---|---|
| 32104 | | bromoform |
| 32101 | | bromodichloromethane |
| 34413 | | bromomethane |
| 32102 | | carbon tetrachloride |
| 34301 | | chlorobenzene |
| 34311 | | chloroethane |
| 34576 | | 2-chloroethylvinyl ether |
| 32106 | | chloroform |
| 34418 | | chloromethane |
| 32105 | | dibromochloromethane |
| 34536 | | 1,2-dichlorobenzene |
| 34566 | | 1,3-dichlorobenzene |
| 34571 | | 1,4-dichlorobenzene |
| 34668 | | dichlorodifluoromethane |
| 34496 | | 1,1-dichloroethane |
| 34531 | | 1,2-dichloroethane |
| 34501 | | 1,1-dichloroethene |
| | | cis-1,2-dichloroethene |
| 34546 | | trans-1,2-dichloroethene |
| 34541 | | 1,2-dichloropropane |
| 34045 | | cis-1,3-dichloropropene |
| 34699 | | trans-1,3-dichloropropene |
| 34423 | | methylene chloride |
| 34516 | ✓ | 1,1,2,2-tetrachloroethane |

| | * | Halogenated |
|---|---|---|
| 34475 | | tetrachloroethene |
| 34506 | | 1,1,1-trichloroethane |
| 34511 | | 1,1,2-trichloroethane |
| 39180 | | trichloroethene |
| 39488 | | trichlorofluoromethane |
| 39715 | ✓ | vinyl chloride |

| | * | Aromatic |
|---|---|---|
| 34030 | | benzene |
| 34301 | | chlorobenzene |
| 34371 | | ethylbenzene |
| 34010 | | toluene |
| | | o-xylene |
| | | m-xylene |
| | ✓ | p-xylene |
| | | Other |

| * | Petroleum Hydrocarbons |
|---|---|
| | Volatile petroleum hydrocarbons |
| | Extractable petroleum hydrocarbons |
| | Additives: |
| | Methyl-tert-butyl ether |
| | diisopropyl ether |

* please check desired parameters

Lab Comments: ____

PH-3013 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS, PURGEABLES

Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

Sample Source: HOWARD HIGH SCHOOL
Sample Site Code: 33606
Sample Type: SOIL
County: 33
Field No: HH-SS-01
Collected-Date 08/24/93 Time 08:30 By DV
Date Priority Needed / /

Laboratory Number 93-08-0231
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11

| CODE | HALOGENATED PURGEABLES | VALUE @ |
|---|---|---|
| 32104 | BROMOFORM | U <0.1 |
| 32101 | BROMODICHLOROMETHANE | U <0.1 |
| 34413 | BROMOMETHANE | U <0.1 |
| 32102 | CARBON TETRACHLORIDE | U <0.1 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34311 | CHLOROETHANE | U <0.1 |
| 34576 | 2-CHLOROETHYLVINYL ETHER | U <0.1 |
| 32106 | CHLOROFORM | U <0.1 |
| 34418 | CHLOROMETHANE | U <0.1 |
| 32105 | DIBROMOCHLOROMETHANE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34668 | DICHLORODIFLUOROMETHANE | U <0.1 |
| 34496 | 1,1-DICHLOROETHANE | U <0.1 |
| 34531 | 1,2-DICHLOROETHANE | U <0.1 |
| 34501 | 1,1-DICHLOROETHENE | U <0.1 |
| | CIS-1,2-DICHLOROETHENE | U <0.1 |
| 34546 | TRANS-1,2-DICHLOROETHENE | U <0.1 |
| 34541 | 1,2-DICHLOROPROPANE | U <0.1 |
| 34045 | CIS-1,3-DICHLOROPROPENE | U <0.1 |
| 34699 | TRANS-1,3-DICHLOROPROPENE | U <0.1 |
| 34423 | METHYLENE CHLORIDE | U <0.1 |
| 34516 | 1,1,2,2-TETRACHLOROETHANE | U <0.1 |
| 34475 | TETRACHLOROETHENE | U <0.1 |
| 34506 | 1,1,1-TRICHLOROETHANE | U <0.1 |
| 34511 | 1,1,2-TRICHLOROETHANE | U <0.1 |
| 39180 | TRICHLOROETHENE | U <0.1 |
| 39488 | TRICHLOROFLUOROMETHANE | U <0.1 |
| 39715 | VINYL CHLORIDE | U <0.1 |

| CODE | AROMATIC PURGEABLES | VALUE @ |
|---|---|---|
| 34030 | BENZENE | U <1.0 |
| 34301 | CHLOROBENZENE | U <0.1 |
| 34536 | 1,2-DICHLOROBENZENE | U <0.1 |
| 34566 | 1,3-DICHLOROBENZENE | U <0.1 |
| 34571 | 1,4-DICHLOROBENZENE | U <0.1 |
| 34371 | ETHYL BENZENE | U <1.0 |
| 34010 | TOLUENE | U <1.0 |
| | O-XYLENE | U <1.0 |
| | M-XYLENE & P-XYLENE | U <1.0 |

OTHER PURGEABLES

Completed-Date: 08/30/93 Time:16:30 By:SDM

Unit supervisor Jerry W. Bryant
Date 9/13/93

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.
Comments:U = UNDETECTED; VALUES SPECIFIED DENOTE SAMPLE QUANTITATION LIMITS.

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg

PH-3015 LAB(rev 5/90)

TENNESSEE DEPARTMENT OF HEALTH

R[illegible]E SLIP

| FROM RLH | DATE 10-8-93 |
|---|---|
| TO GAM | 10/8/93 |
| RAW | OK 10-8-93 RAW |
| | |
| | |
| | |
| | |

Please review and route as indicated:

____ NBO (box on 6th)

____ SWM, Attn: Greg Luke, L&C Tower, 5th Floor

____ DOT Sampling (see attached)

____ Division of Superfund, L&C Tower, Attn.:

____ Underground Storage Tanks, L&C Tower, Attn.: Chuck Head

____ Division of Radiological Health

____ Environmental Field Office; Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn.:
Brick Church Park Drive, Nashville, TN

____ Division of Air Pollution Control, Attn.: Robert Brawner, Gary Leggett, Charles Northington

____ Division of Water Pollution Control

____ Division of Water Supply, Attn: Robert Foster, Tom Moss

____ Division of Ground Water Protection

✓ Chattanooga Field Office; Water Pollution, Water Supply, Superfund, Underground Storage Tanks, Attn: Wayne Everett
540 McCallie, CMattanooga, TN 37402

____ Jackson Branch Lab, Attn: RLM

____ Knoxville Branch Lab, Attn: EAM

____ Aquatic Biology, Basement

____ CEM, LQA, 5th floor

____ Memphis Basin/Field Office

____ Knoxville Basin/Field Office

____ Jackson Basin/Field Office

____ Johnson City Basin/Field Office

____ Other

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-01
Stream Mile: Depth:
Collected: Date: 8/24/93 Time: 8:30 AM By: DV
Contact Hazard: None
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other:

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*

Laboratory Number: 93080231
Date received: 8/26/93
Time received: 1130 by: LJB
Date reported: by:
Reviewed by:

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments:

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-01
Collected-Date 08/24/93 Time 08:30 By DV
Date Priority Needed / /

Laboratory Number 93-08-0231
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<330 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | U<330 |
| 39110 | DI-N-BUTYL PHTHALATE | U<330 |
| 34596 | DI-N-OCTYL PHTHALATE | U<330 |
| 34336 | DIETHYL PHTHALATE | D<700* |
| 34341 | DIMETHYL PHTHALATE | U<330 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1100 |
| 34433 | N-NITROSODIPHENYLAMINE | U<330 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<330 |
| 34408 | ISOPHORONE | U<330 |
| 34447 | NITROBENZENE | U<330 |
| 34611 | 2,4-DINITROTOLUENE | U<330 |
| [illegible] | 2,6-DINITROTOLUENE | U<330 |
| 34205 | ACENAPHTHENE | D<330 |
| 34200 | ACENAPHTHYLENE | D<330 |
| 34220 | ANTHRACENE | D<330 |
| 34526 | BENZO(a)ANTHRACENE | D_500 |
| 34247 | BENZO(a)PYRENE | D_493 |
| 34230 | BENZO(b)FLUORANTHENE | D<1400 |
| 34521 | BENZO(ghi)PERYLENE | U<700 |
| 34242 | BENZO(k)FLUORANTHENE | D<1400 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<700 |
| 34376 | FLUORANTHENE | D_480 |
| 34381 | FLUORENE | D<330 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<700 |
| 34696 | NAPHTHALENE | D<330 |
| 34461 | PHENANTHRENE | D<330 |
| 34469 | PYRENE | D_433 |
| 34320 | CHRYSENE | D_402 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<330 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<330 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<330 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<330 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<330 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<700 |
| 34391 | HEXACHLOROBUTADIENE | U<330 |
| 39700 | HEXACHLOROBENZENE | U<330 |
| 34396 | HEXACHLOROETHANE | U<330 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<330 |
| 34581 | 2-CHLORONAPHTHALENE | U<330 |
| 39330 | ALDRIN | U<7.0 |
| 39337 | ALPHA BHC | U<7.0 |
| 39338 | BETA BHC | U<14 |
| 34259 | DELTA BHC | U<14 |
| 39340 | GAMMA BHC(LINDANE) | U<7.0 |
| 39350 | CHLORDANE | U<140 |
| 38310 | 4,4 DDD | U<17 |
| 39320 | 4,4 DDE | U<14 |
| 39300 | 4,4 DDT | U<10 |
| 39380 | DIELDRIN | U<7.0 |
| 34361 | ENDOSULFAN I | U<10 |
| 34356 | ENDOSULFAN II | U<7.0 |
| 34351 | ENDOSULFAN SULFATE | U<10 |
| 39390 | ENDRIN | U<14 |
| 34366 | ENDRIN ALDEHYDE | U<7.0 |
| 39410 | HEPTACHLOR | U<7.0 |
| 39420 | HEPTACHLOR EPOXIDE | U<10 |
| 39400 | TOXAPHENE | U<510 |
| 39480 | METHOXYCHLOR | U<52 |
| | PCB 1016/1242 | U<390 |
| 39488 | PCB 1221 | U<390 |
| 39492 | PCB 1232 | U<390 |
| 39500 | PCB 1248 | U<390 |
| 39504 | PCB 1254 | U<390 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<390 |
| 81649 | PCB 1262 | U<390 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<330 |
| 34586 | 2-CHLOROPHENOL | U<330 |
| 34601 | 2,4-DICHLOROPHENOL | U<330 |
| 34606 | 2,4-DIMETHYLPHENOL | U<330 |
| 34616 | 2,4-DINITROPHENOL | U<17000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<3500 |
| 34591 | 2-NITROPHENOL | U<700 |
| 34646 | 4-NITROPHENOL | U<1400 |
| 39032 | PENTACHLOROPHENOL | U<1400 |
| 34694 | PHENOL | U<330 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<330 |

OTHERS

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-92

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-02
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 9:10 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Stannard
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080232
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

ample Type: SOIL
ample Site Code: 33606
ample Source: HOWARD HIGH SCHOOL
ounty: 33
ield No: HH-SS-02
ollected-Date 08/24/93 Time 09:10 By CJS
ate Priority Needed / /

Laboratory Number 93-08-0232
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 4292 | BUTYLBENZYL PHTHALATE | U<330 |
| 9100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<330 |
| 9110 | DI-N-BUTYL PHTHALATE | U<330 |
| 4596 | DI-N-OCTYL PHTHALATE | U<330 |
| 34336 | DIETHYL PHTHALATE | U<330 |
| 34341 | DIMETHYL PHTHALATE | U<330 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1300 |
| 34433 | N-NITROSODIPHENYLAMINE | U<330 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<330 |
| 34408 | ISOPHORONE | U<330 |
| 34447 | NITROBENZENE | U<330 |
| 3461[illegible] | 2,4-DINITROTOLUENE | U<330 |
| 346[illegible] | ,6-DINITROTOLUENE | U<330 |
| 34205 | ACENAPHTHENE | D<330 |
| 34200 | ACENAPHTHYLENE | U<330 |
| 34220 | ANTHRACENE | D<330 |
| 34526 | BENZO(a)ANTHRACENE | D<330 |
| 34247 | BENZO(a)PYRENE | D<820 |
| 34230 | BENZO(b)FLUORANTHENE | D<330 |
| 34521 | BENZO(ghi)PERYLENE | U<820 |
| 34242 | BENZO(k)FLUORANTHENE | D<330 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<820 |
| 34376 | FLUORANTHENE | D<820 |
| 34381 | FLUORENE | D<330 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<820 |
| 34696 | NAPHTHALENE | D<330 |
| 34461 | PHENANTHRENE | D<330 |
| 34469 | PYRENE | D<820 |
| 34320 | CHRYSENE | D<330 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<330 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<330 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<330 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<330 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<330 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<330 |
| 34391 | HEXACHLOROBUTADIENE | U<330 |
| 39700 | HEXACHLOROBENZENE | U<330 |
| 34396 | HEXACHLOROETHANE | U<330 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<330 |
| 34581 | 2-CHLORONAPHTHALENE | U<330 |
| 39330 | ALDRIN | U<1.6 |
| 39337 | ALPHA BHC | U<1.6 |
| 39338 | BETA BHC | U<3.3 |
| 34259 | DELTA BHC | U<3.3 |
| 39340 | GAMMA BHC(LINDANE) | U<1.6 |
| 39350 | CHLORDANE | U<33 |
| 38310 | 4,4 DDD | U<4.1 |
| 39320 | 4,4 DDE | U<3.3 |
| 39300 | 4,4 DDT | U<2.5 |
| 39380 | DIELDRIN | U<1.6 |
| 34361 | ENDOSULFAN I | U<2.5 |
| 34356 | ENDOSULFAN II | U<1.6 |
| 34351 | ENDOSULFAN SULFATE | U<2.5 |
| 39390 | ENDRIN | U<3.3 |
| 34366 | ENDRIN ALDEHYDE | U<1.6 |
| 39410 | HEPTACHLOR | U<1.6 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.5 |
| 39400 | TOXAPHENE | U<120 |
| 39480 | METHOXYCHLOR | U<12 |
| | PCB 1016/1242 | U<91 |
| 39488 | PCB 1221 | U<91 |
| 39492 | PCB 1232 | U<91 |
| 39500 | PCB 1248 | U<91 |
| 39504 | PCB 1254 | U<91 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<91 |
| 81649 | PCB 1262 | U<91 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<330 |
| 34586 | 2-CHLOROPHENOL | U<330 |
| 34601 | 2,4-DICHLOROPHENOL | U<330 |
| 34606 | 2,4-DIMETHYLPHENOL | U<330 |
| 34616 | 2,4-DINITROPHENOL | U<20000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<4100 |
| 34591 | 2-NITROPHENOL | U<820 |
| 34646 | 4-NITROPHENOL | U<1600 |
| 39032 | PENTACHLOROPHENOL | U<1600 |
| 34694 | PHENOL | U<330 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<330 |

OTHERS

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-03
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 9:45 AM By DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

Sampling Agency: __ APC __ DOT __ DWS __ GW __ SWM __ UST __ EEP X PASI __ SF __ WPC __ other (specify):

Billing Code (required): 327.38-11

Sample Type: __ Sediment X Soil __ Tissue __ Water __ Air __ sludge Other ____

Sample Priority: __ Emergency __ Legal X Routine __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080233
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-03
Collected-Date 08/24/93 Time 09:45 By DV
Date Priority Needed / /

Laboratory Number 93-08-0233
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<330 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<750 |
| 39110 | DI-N-BUTYL PHTHALATE | U<330 |
| 34596 | DI-N-OCTYL PHTHALATE | U<330 |
| 34336 | DIETHYL PHTHALATE | D<330* |
| 34341 | DIMETHYL PHTHALATE | U<330 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1200 |
| 34433 | N-NITROSODIPHENYLAMINE | U<330 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<330 |
| 34408 | ISOPHORONE | U<330 |
| 34447 | NITROBENZENE | U<330 |
| 34611 | 2,4-DINITROTOLUENE | U<330 |
| 3[illegible] | 2,6-DINITROTOLUENE | U<330 |
| 34205 | ACENAPHTHENE | D<330 |
| 34200 | ACENAPHTHYLENE | D<330 |
| 34220 | ANTHRACENE | D<330 |
| 34526 | BENZO(a)ANTHRACENE | D_696 |
| 34247 | BENZO(a)PYRENE | D_801 |
| 34230 | BENZO(b)FLUORANTHENE | D<1500 |
| 34521 | BENZO(ghi)PERYLENE | D<750 |
| 34242 | BENZO(k)FLUORANTHENE | D<750 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<750 |
| 34376 | FLUORANTHENE | D_1060 |
| 34381 | FLUORENE | U<330 |
| 34403 | INDENO(1,2,3-cd)PYRENE | D<750 |
| 34696 | NAPHTHALENE | D<330 |
| 34461 | PHENANTHRENE | D<330 |
| 34469 | PYRENE | D_911 |
| 34320 | CHRYSENE | D_644 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<330 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<330 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<330 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<330 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<330 |
| 34386 | HEXACHLORDCYCLOPENTADIENE | U<330 |
| 34391 | HEXACHLOROBUTADIENE | U<330 |
| 39700 | HEXACHLOROBENZENE | U<330 |
| 34396 | HEXACHLOROETHANE | U<330 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<330 |
| 34581 | 2-CHLORONAPHTHALENE | U<330 |
| 39330 | ALDRIN | U<3.0 |
| 39337 | ALPHA BHC | U<3.0 |
| 39338 | BETA BHC | U<13 |
| 34259 | DELTA BHC | U<6.0 |
| 39340 | GAMMA BHC(LINDANE) | U<3.7 |
| 39350 | CHLORDANE | # |
| 38310 | 4,4 DDD | U<5.2 |
| 39320 | 4,4 DDE | U<6.0 |
| 39300 | 4,4 DDT | D<8.2 |
| 39380 | DIELDRIN | U<3.0 |
| 34361 | ENDOSULFAN I | U<4.5 |
| 34356 | ENDOSULFAN II | U<3.0 |
| 34351 | ENDOSULFAN SULFATE | U<3.0 |
| 39390 | ENDRIN | U<6.7 |
| 34366 | ENDRIN ALDEHYDE | U<3.0 |
| 39410 | HEPTACHLOR | U<3.0 |
| 39420 | HEPTACHLOR EPOXIDE | U<4.5 |
| 39400 | TOXAPHENE | U<220 |
| 39480 | METHOXYCHLOR | U<22 |
| | PCB 1016/1242 | U<330 |
| 39488 | PCB 1221 | U<330 |
| 39492 | PCB 1232 | U<330 |
| 39500 | PCB 1248 | U<330 |
| 39504 | PCB 1254 | U<330 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<330 |
| 81649 | PCB 1262 | U<330 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<330 |
| 34586 | 2-CHLOROPHENOL | U<330 |
| 34601 | 2,4-DICHLOROPHENOL | U<330 |
| 34606 | 2,4-DIMETHYLPHENOL | U<330 |
| 34616 | 2,4-DINITROPHENOL | U<19000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<3700 |
| 34591 | 2-NITROPHENOL | U<750 |
| 34646 | 4-NITROPHENOL | U<1500 |
| 39032 | PENTACHLOROPHENOL | U<1500 |
| 34694 | PHENOL | D<330 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<330 |

OTHERS

| | | |
|---|---|---|
| | #GAMMA-CHLORDANE | D<4.5 |

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-04
Collected-Date 08/24/93 Time 10:45 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0234
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<330 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<330 |
| 39110 | DI-N-BUTYL PHTHALATE | U<330 |
| 34596 | DI-N-OCTYL PHTHALATE | U<330 |
| 34336 | DIETHYL PHTHALATE | D<330* |
| 34341 | DIMETHYL PHTHALATE | U<330 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1200 |
| 34433 | N-NITROSODIPHENYLAMINE | U<330 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<330 |
| 34408 | ISOPHORONE | U<330 |
| 34447 | NITROBENZENE | U<330 |
| 34611 | 2,4-DINITROTOLUENE | U<330 |
| [illegible] | 2,6-DINITROTOLUENE | U<330 |
| 34205 | ACENAPHTHENE | U<330 |
| 34200 | ACENAPHTHYLENE | U<330 |
| 34220 | ANTHRACENE | U<330 |
| 34526 | BENZO(a)ANTHRACENE | U<330 |
| 34247 | BENZO(a)PYRENE | U<330 |
| 34230 | BENZO(b)FLUORANTHENE | U<330 |
| 34521 | BENZO(ghi)PERYLENE | U<710 |
| 34242 | BENZO(k)FLUORANTHENE | U<330 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<710 |
| 34376 | FLUORANTHENE | D<330 |
| 34381 | FLUORENE | U<330 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<710 |
| 34696 | NAPHTHALENE | D<330 |
| 34461 | PHENANTHRENE | D<330 |
| 34469 | PYRENE | D<330 |
| 34320 | CHRYSENE | U<330 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<330 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<330 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<330 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<330 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<330 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<330 |
| 34391 | HEXACHLOROBUTADIENE | U<330 |
| 39700 | HEXACHLOROBENZENE | U<330 |
| 34396 | HEXACHLOROETHANE | U<330 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<330 |
| 34581 | 2-CHLORONAPHTHALENE | U<330 |
| 39330 | ALDRIN | U<1.4 |
| 39337 | ALPHA BHC | U<1.4 |
| 39338 | BETA BHC | U<2.8 |
| 34259 | DELTA BHC | U<2.8 |
| 39340 | GAMMA BHC(LINDANE) | U<1.4 |
| 39350 | CHLORDANE | U<28 |
| 38310 | 4,4 DDD | U<3.6 |
| 39320 | 4,4 DDE | U<2.8 |
| 39300 | 4,4 DDT | U<2.1 |
| 39380 | DIELDRIN | U<1.4 |
| 34361 | ENDOSULFAN I | U<2.1 |
| 34356 | ENDOSULFAN II | U<1.4 |
| 34351 | ENDOSULFAN SULFATE | U<2.1 |
| 39390 | ENDRIN | U<2.8 |
| 34366 | ENDRIN ALDEHYDE | U<1.4 |
| 39410 | HEPTACHLOR | U<1.4 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.1 |
| 39400 | TOXAPHENE | U<100 |
| 39480 | METHOXYCHLOR | U<11 |
| | PCB 1016/1242 | U<80 |
| 39488 | PCB 1221 | U<80 |
| 39492 | PCB 1232 | U<80 |
| 39500 | PCB 1248 | U<80 |
| 39504 | PCB 1254 | U<80 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<80 |
| 81649 | PCB 1262 | U<80 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<330 |
| 34586 | 2-CHLOROPHENOL | U<330 |
| 34601 | 2,4-DICHLOROPHENOL | U<330 |
| 34606 | 2,4-DIMETHYLPHENOL | U<330 |
| 34616 | 2,4-DINITROPHENOL | U<18000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<3600 |
| 34591 | 2-NITROPHENOL | U<710 |
| 34646 | 4-NITROPHENOL | U<1400 |
| 39032 | PENTACHLOROPHENOL | U<1400 |
| 34694 | PHENOL | U<330 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<330 |

OTHERS

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-05
Stream Mile: ____ Depth: ____
Collected: Date: 8/24/93 Time: 11:15 AM By: DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: 93080235
Date received: 8/26/93
Time received: 1130 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

ample Type: SOIL
ample Site Code: 33606
ample Source: HOWARD HIGH SCHOOL
ounty: 33
ield No: HH-SS-05
ollected-Date 08/24/93 Time 11:15 By DV
ate Priority Needed / /

Laboratory Number 93-08-0235
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 4292 | BUTYLBENZYL PHTHALATE | U<350 |
| 9100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<1800 |
| 9110 | DI-N-BUTYL PHTHALATE | U<350 |
| 4596 | DI-N-OCTYL PHTHALATE | U<350 |
| 4336 | DIETHYL PHTHALATE | D<350* |
| 4341 | DIMETHYL PHTHALATE | U<350 |
| 4438 | N-NITROSODIMETHYLAMINE | U<1400 |
| 4433 | N-NITROSODIPHENYLAMINE | U<350 |
| 4428 | N-NITROSO DI-N-PROPYLAMINE | U<350 |
| 4408 | ISOPHORONE | U<350 |
| 4447 | NITROBENZENE | U<350 |
| 346[illegible] | 4-DINITROTOLUENE | U<350 |
| 346[illegible] | ,6-DINITROTOLUENE | U<350 |
| 4205 | ACENAPHTHENE | U<350 |
| 4200 | ACENAPHTHYLENE | U<350 |
| 4220 | ANTHRACENE | U<350 |
| 4526 | BENZO(a)ANTHRACENE | D<350 |
| 4247 | BENZO(a)PYRENE | U<350 |
| 4230 | BENZO(b)FLUORANTHENE | D<350 |
| 4521 | BENZO(ghi)PERYLENE | U<880 |
| 4242 | BENZO(k)FLUORANTHENE | D<350 |
| 4556 | DIBENZO(a,h)ANTHRACENE | U<880 |
| 4376 | FLUORANTHENE | D<350 |
| 4381 | FLUORENE | U<350 |
| 4403 | INDENO(1,2,3-cd)PYRENE | U<880 |
| 4696 | NAPHTHALENE | D<350 |
| 4461 | PHENANTHRENE | D<350 |
| 4469 | PYRENE | D<350 |
| 4320 | CHRYSENE | U<350 |
| 4273 | BIS(2-CHLOROETHYL)ETHER | U<350 |
| 4278 | BIS(2-CHLOROETHOXY)METHANE | U<350 |
| 4283 | BIS(2-CHLOROISOPROPYL)ETHER | U<350 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 4636 | 4-BROMOPHENYLPHENYL ETHER | U<350 |
| 4641 | 4-CHLOROPHENYLPHENYL ETHER | U<350 |
| 4386 | HEXACHLOROCYCLOPENTADIENE | U<350 |
| 4391 | HEXACHLOROBUTADIENE | U<350 |
| 9700 | HEXACHLOROBENZENE | U<350 |
| 4396 | HEXACHLOROETHANE | U<350 |
| 4551 | 1,2,4-TRICHLOROBENZENE | D<350 |
| 4581 | 2-CHLORONAPHTHALENE | U<350 |
| 9330 | ALDRIN | U<8.8 |
| 9337 | ALPHA BHC | U<8.8 |
| 9338 | BETA BHC | U<18 |
| 4259 | DELTA BHC | U<18 |
| 9340 | GAMMA BHC(LINDANE) | U<8.8 |
| 9350 | CHLORDANE | # |
| 8310 | 4,4 DDD | U<22 |
| 9320 | 4,4 DDE | U<18 |
| 9300 | 4,4 DDT | D<22 |
| 9380 | DIELDRIN | U<8.8 |
| 4361 | ENDOSULFAN I | U<26 |
| 4356 | ENDOSULFAN II | U<8.8 |
| 4351 | ENDOSULFAN SULFATE | U<13 |
| 9390 | ENDRIN | U<18 |
| 4366 | ENDRIN ALDEHYDE | U<8.8 |
| 9410 | HEPTACHLOR | U<8.8 |
| 9420 | HEPTACHLOR EPOXIDE | U<13 |
| 9400 | TOXAPHENE | U<1300 |
| 9480 | METHOXYCHLOR | U<66 |
| | PCB 1016/1242 | U<1000 |
| 9488 | PCB 1221 | U<1000 |
| 9492 | PCB 1232 | U<1000 |
| 9500 | PCB 1248 | U<1000 |
| 9504 | PCB 1254 | U<1000 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 9508 | PCB 1260 | U<1000 |
| 1649 | PCB 1262 | U<1000 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 4552 | 4-CHLORO-3-METHYL PHENOL | U<350 |
| 4586 | 2-CHLOROPHENOL | U<350 |
| 4601 | 2,4-DICHLOROPHENOL | U<350 |
| 4606 | 2,4-DIMETHYLPHENOL | U<350 |
| 4616 | 2,4-DINITROPHENOL | U<22000 |
| 4657 | 2-METHYL-4,6-DINITROPHENOL | U<4400 |
| 4591 | 2-NITROPHENOL | U<880 |
| 4646 | 4-NITROPHENOL | U<1800 |
| 9032 | PENTACHLOROPHENOL | U<1800 |
| 4694 | PHENOL | U<350 |
| 4681 | 2,4,6-TRICHLOROPHENOL | U<350 |

| OTHERS | |
|---|---|
| %GAMMA-CHLORDANE | D 48.4 |
| #ALPHA-CHLORDANE | D<66 |

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-06
Stream Mile: ____ Depth: ____
Collected: Date: 8/24/93 Time: 1:40 PM By: DV
Contact Hazard: Unknown
Signature of sampler: Dan Van Hook
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

Sample Type
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: 93080236
Date received: 8/26/93
Time received: 1130 by LSB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-06
Collected-Date 08/24/93 Time 13:40 By DV
Date Priority Needed / /

Laboratory Number 93-08-0236
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<400 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | D_1170 |
| 39110 | DI-N-BUTYL PHTHALATE | U<400 |
| 34596 | DI-N-OCTYL PHTHALATE | U<400 |
| 34336 | DIETHYL PHTHALATE | D<400* |
| 34341 | DIMETHYL PHTHALATE | U<400 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1600 |
| 34433 | N-NITROSODIPHENYLAMINE | U<400 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<400 |
| 34408 | ISOPHORONE | U<400 |
| 34447 | NITROBENZENE | U<400 |
| 34[illegible] | 2,4-DINITROTOLUENE | U<400 |
| 34[illegible] | 2,6-DINITROTOLUENE | U<400 |
| 34205 | ACENAPHTHENE | D<400 |
| 34200 | ACENAPHTHYLENE | D<400 |
| 34220 | ANTHRACENE | D<400 |
| 34526 | BENZO(a)ANTHRACENE | D_1120 |
| 34247 | BENZO(a)PYRENE | D_1390 |
| 34230 | BENZO(b)FLUORANTHENE | D<2000 |
| 34521 | BENZO(ghi)PERYLENE | D<1500 |
| 34242 | BENZO(k)FLUORANTHENE | D<2000 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<990 |
| 34376 | FLUORANTHENE | D_1520 |
| 34381 | FLUORENE | D<400 |
| 34403 | INDENO(1,2,3-cd)PYRENE | D<1500 |
| 34696 | NAPHTHALENE | D<400 |
| 34461 | PHENANTHRENE | D<400 |
| 34469 | PYRENE | D_1330 |
| 34320 | CHRYSENE | D_1290 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<400 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<400 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<400 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<400 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<400 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<400 |
| 34391 | HEXACHLOROBUTADIENE | U<400 |
| 39700 | HEXACHLOROBENZENE | U<400 |
| 34396 | HEXACHLOROETHANE | U<400 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<400 |
| 34581 | 2-CHLORONAPHTHALENE | U<400 |
| 39330 | ALDRIN | U<2.0 |
| 39337 | ALPHA BHC | U<2.0 |
| 39338 | BETA BHC | D<4.0 |
| 34259 | DELTA BHC | U<4.0 |
| 39340 | GAMMA BHC(LINDANE) | U<2.0 |
| 39350 | CHLORDANE | U<4.0 |
| 38310 | 4,4 DDD | U<5.0 |
| 39320 | 4,4 DDE | D<4.0 |
| 39300 | 4,4 DDT | D<11 |
| 39380 | DIELDRIN | U<2.0 |
| 34361 | ENDOSULFAN I | U<6.0 |
| 34356 | ENDOSULFAN II | U<2.0 |
| 34351 | ENDOSULFAN SULFATE | U<3.0 |
| 39390 | ENDRIN | U<4.0 |
| 34366 | ENDRIN ALDEHYDE | U<2.0 |
| 39410 | HEPTACHLOR | U<2.0 |
| 39420 | HEPTACHLOR EPOXIDE | U<3.0 |
| 39400 | TOXAPHENE | U<290 |
| 39480 | METHOXYCHLOR | U<30 |
| | PCB 1016/1242 | U<110 |
| 39488 | PCB 1221 | U<110 |
| 39492 | PCB 1232 | U<110 |
| 39500 | PCB 1248 | U<110 |
| 39504 | PCB 1254 | U<110 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<110 |
| 81649 | PCB 1262 | U<110 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<400 |
| 34586 | 2-CHLOROPHENOL | U<400 |
| 34601 | 2,4-DICHLOROPHENOL | U<400 |
| 34606 | 2,4-DIMETHYLPHENOL | U<400 |
| 34616 | 2,4-DINITROPHENOL | U<25000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<5000 |
| 34591 | 2-NITROPHENOL | U<990 |
| 34646 | 4-NITROPHENOL | U<2000 |
| 39032 | PENTACHLOROPHENOL | U<2000 |
| 34694 | PHENOL | U<400 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<400 |

OTHERS

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-07
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 3:00 PM By DV
Contact Hazard Unknown
Signature of sampler Dan Van Hook
Send Report to Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

Sample Type
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Base/Neutral/Acid Extractables

For lab use only 93080237
Laboratory Number 93080237
Date received 8/26/93
Time received 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-07
Collected-Date 08/24/93 Time 15:00 By DV
Date Priority Needed / /

Laboratory Number 93-08-0237
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/II
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<340 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | U<340 |
| 39110 | DI-N-BUTYL PHTHALATE | U<340 |
| 34596 | DI-N-OCTYL PHTHALATE | U<340 |
| 34336 | DIETHYL PHTHALATE | D<340* |
| 34341 | DIMETHYL PHTHALATE | U<340 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1400 |
| 34433 | N-NITROSODIPHENYLAMINE | U<340 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<340 |
| 34408 | ISOPHORONE | U<340 |
| 34447 | NITROBENZENE | U<340 |
| 34611 | 2,4-DINITROTOLUENE | U<340 |
| 34[illegible] | [illegible],6-DINITROTOLUENE | U<340 |
| 34205 | ACENAPHTHENE | U<340 |
| 34200 | ACENAPHTHYLENE | U<340 |
| 34220 | ANTHRACENE | D<340 |
| 34526 | BENZO(a)ANTHRACENE | U<340 |
| 34247 | BENZO(a)PYRENE | U<340 |
| 34230 | BENZO(b)FLUORANTHENE | U<340 |
| 34521 | BENZO(ghi)PERYLENE | U<850 |
| 34242 | BENZO(k)FLUORANTHENE | U<340 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<850 |
| 34376 | FLUORANTHENE | D<340 |
| 34381 | FLUORENE | U<340 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<850 |
| 34696 | NAPHTHALENE | D<340 |
| 34461 | PHENANTHRENE | U<340 |
| 34469 | PYRENE | D<340 |
| 34320 | CHRYSENE | D<340 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<340 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<340 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<340 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<340 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<340 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<340 |
| 34391 | HEXACHLOROBUTADIENE | U<340 |
| 39700 | HEXACHLOROBENZENE | U<340 |
| 34396 | HEXACHLOROETHANE | U<340 |
| 34551 | 1,2,4-TRICHLOROBENZENE | D<340 |
| 34581 | 2-CHLORONAPHTHALENE | U<340 |
| 39330 | ALDRIN | U<1.7 |
| 39337 | ALPHA BHC | U<1.7 |
| 39338 | BETA BHC | U<3.4 |
| 34259 | DELTA BHC | U<3.4 |
| 39340 | GAMMA BHC(LINDANE) | U<1.7 |
| 39350 | CHLORDANE | U<34 |
| 38310 | 4,4 DDD | U<4.3 |
| 39320 | 4,4 DDE | U<3.4 |
| 39300 | 4,4 DDT | U<2.5 |
| 39380 | DIELDRIN | U<1.7 |
| 34361 | ENDOSULFAN I | U<2.5 |
| 34356 | ENDOSULFAN II | U<1.7 |
| 34351 | ENDOSULFAN SULFATE | U<2.5 |
| 39390 | ENDRIN | U<3.4 |
| 34366 | ENDRIN ALDEHYDE | U<1.7 |
| 39410 | HEPTACHLOR | U<1.7 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.5 |
| 39400 | TOXAPHENE | U<120 |
| 39480 | METHOXYCHLOR | U<13 |
| | PCB 1016/1242 | U<95 |
| 39488 | PCB 1221 | U<95 |
| 39492 | PCB 1232 | U<95 |
| 39500 | PCB 1248 | U<95 |
| 39504 | PCB 1254 | U<95 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<95 |
| 81649 | PCB 1262 | U<95 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<340 |
| 34586 | 2-CHLOROPHENOL | U<340 |
| 34601 | 2,4-DICHLOROPHENOL | U<340 |
| 34606 | 2,4-DIMETHYLPHENOL | U<340 |
| 34616 | 2,4-DINITROPHENOL | U<21000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<4200 |
| 34591 | 2-NITROPHENOL | U<850 |
| 34646 | 4-NITROPHENOL | U<1700 |
| 39032 | PENTACHLOROPHENOL | U<1700 |
| 34694 | PHENOL | U<340 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<340 |

OTHERS

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-08
Stream Mile ____ Depth ____
Collected: Date 8/25/93 Time 8:45 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Sloppard
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

Sample Priority
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

ORGANIC ANALYSIS
Base/Neutral/Acid Extractables

*For lab use only*

Laboratory Number 93080240
Date received 8/26/93
Time received 1200 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-08
Collected-Date 08/25/93 Time 08:45 By CJS
Date Priority Needed / /

Laboratory Number 93-08-0240
Branch Lab Number - -
Received-Date 08/26/93 Time 12:00 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<330 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<690 |
| 39110 | DI-N-BUTYL PHTHALATE | U<330 |
| 34596 | DI-N-OCTYL PHTHALATE | U<330 |
| 34336 | DIETHYL PHTHALATE | D<330* |
| 34341 | DIMETHYL PHTHALATE | U<330 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1100 |
| 34433 | N-NITROSODIPHENYLAMINE | U<330 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<330 |
| 34408 | ISOPHORONE | U<330 |
| 34447 | NITROBENZENE | U<330 |
| 34[illegible] | [illegible],4-DINITROTOLUENE | U<330 |
| 346[illegible] | [illegible]2,6-DINITROTOLUENE | U<330 |
| 34205 | ACENAPHTHENE | U<330 |
| 34200 | ACENAPHTHYLENE | U<330 |
| 34220 | ANTHRACENE | U<330 |
| 34526 | BENZO(a)ANTHRACENE | U<330 |
| 34247 | BENZO(a)PYRENE | U<330 |
| 34230 | BENZO(b)FLUORANTHENE | U<330 |
| 34521 | BENZO(ghi)PERYLENE | U<690 |
| 34242 | BENZO(k)FLUORANTHENE | U<330 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<690 |
| 34376 | FLUORANTHENE | D<330 |
| 34381 | FLUORENE | U<330 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<690 |
| 34696 | NAPHTHALENE | D<330 |
| 34461 | PHENANTHRENE | D<330 |
| 34469 | PYRENE | D<330 |
| 34320 | CHRYSENE | U<330 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<330 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<330 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<330 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<330 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<330 |
| 34386 | HEXACHLORDCYCLOPENTADIENE | U<330 |
| 34391 | HEXACHLOROBUTADIENE | U<330 |
| 39700 | HEXACHLOROBENZENE | U<330 |
| 34396 | HEXACHLOROETHANE | U<330 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<330 |
| 34581 | 2-CHLORONAPHTHALENE | U<330 |
| 39330 | ALDRIN | U<1.4 |
| 39337 | ALPHA BHC | U<1.4 |
| 39338 | BETA BHC | U<2.8 |
| 34259 | DELTA BHC | U<2.8 |
| 39340 | GAMMA BHC(LINDANE) | U<1.4 |
| 39350 | CHLORDANE | U<28 |
| 38310 | 4,4 DDD | U<3.5 |
| 39320 | 4,4 DDE | U<2.8 |
| 39300 | 4,4 DDT | U<2.1 |
| 39380 | DIELDRIN | U<1.4 |
| 34361 | ENDOSULFAN I | U<2.1 |
| 34356 | ENDOSULFAN II | U<1.4 |
| 34351 | ENDOSULFAN SULFATE | U<2.1 |
| 39390 | ENDRIN | U<2.8 |
| 34366 | ENDRIN ALDEHYDE | U<1.4 |
| 39410 | HEPTACHLOR | U<1.4 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.1 |
| 39400 | TOXAPHENE | U<100 |
| 39480 | METHOXYCHLOR | U<10 |
| | PCB 1016/1242 | U<77 |
| 39488 | PCB 1221 | U<77 |
| 39492 | PCB 1232 | U<77 |
| 39500 | PCB 1248 | U<77 |
| 39504 | PCB 1254 | U<77 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<77 |
| 81649 | PCB 1262 | U<77 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<330 |
| 34586 | 2-CHLOROPHENOL | U<330 |
| 34601 | 2,4-DICHLOROPHENOL | U<330 |
| 34606 | 2,4-DIMETHYLPHENOL | U<330 |
| 34616 | 2,4-DINITROPHENOL | U<17000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<3500 |
| 34591 | 2-NITROPHENOL | U<690 |
| 34646 | 4-NITROPHENOL | U<1400 |
| 39032 | PENTACHLOROPHENOL | U<1800 |
| 34694 | PHENOL | U<330 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<330 |

OTHERS

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-09
Stream Mile: ____ Depth: ____
Collected: Date: 8/25/93 Time: 9:30AM By: DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: 93080241
Date received: 8/26/93
Time received: 1200 by: JB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | V | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | V | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | V | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | V | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-09
Collected-Date 08/25/93 Time 09:30 By DV
Date Priority Needed / /

Laboratory Number 93-08-0241
Branch Lab Number
Received-Date 08/26/93 Time 12:00 By LJB
Sampling Agency: HWM/II
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<350 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | U<350 |
| 39110 | DI-N-BUTYL PHTHALATE | U<350 |
| 34596 | DI-N-OCTYL PHTHALATE | U<350 |
| 34336 | DIETHYL PHTHALATE | D<350* |
| 34341 | DIMETHYL PHTHALATE | U<350 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1400 |
| 34433 | N-NITROSODIPHENYLAMINE | U<350 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<350 |
| 34408 | ISOPHORONE | U<350 |
| 34447 | NITROBENZENE | U<350 |
| 34[illegible] | 2,4-DINITROTOLUENE | U<350 |
| 34[illegible] | 2,6-DINITROTOLUENE | U<350 |
| 34205 | ACENAPHTHENE | U<350 |
| 34200 | ACENAPHTHYLENE | U<350 |
| 34220 | ANTHRACENE | U<350 |
| 34526 | BENZO(a)ANTHRACENE | U<350 |
| 34247 | BENZO(a)PYRENE | U<350 |
| 34230 | BENZO(b)FLUORANTHENE | U<350 |
| 34521 | BENZO(ghi)PERYLENE | U<890 |
| 34242 | BENZO(k)FLUORANTHENE | U<350 |
| 34556 | DIBENZO(a,h)ANTHRACENE | U<890 |
| 34376 | FLUORANTHENE | D<350 |
| 34381 | FLUORENE | U<350 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<890 |
| 34696 | NAPHTHALENE | U<350 |
| 34461 | PHENANTHRENE | D<350 |
| 34469 | PYRENE | U<350 |
| 34320 | CHRYSENE | U<350 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<350 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<350 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<350 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<350 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<350 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<350 |
| 34391 | HEXACHLOROBUTADIENE | U<350 |
| 39700 | HEXACHLOROBENZENE | U<350 |
| 34396 | HEXACHLOROETHANE | U<350 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<350 |
| 34581 | 2-CHLORONAPHTHALENE | U<350 |
| 39330 | ALDRIN | U<1.8 |
| 39337 | ALPHA BHC | U<1.8 |
| 39338 | BETA BHC | U<3.6 |
| 34259 | DELTA BHC | U<3.6 |
| 39340 | GAMMA BHC(LINDANE) | U<1.8 |
| 39350 | CHLORDANE | U<36 |
| 38310 | 4,4 DDD | U<4.4 |
| 39320 | 4,4 DDE | U<3.6 |
| 39300 | 4,4 DDT | U<2.7 |
| 39380 | DIELDRIN | U<1.8 |
| 34361 | ENDOSULFAN I | U<2.7 |
| 34356 | ENDOSULFAN II | U<1.8 |
| 34351 | ENDOSULFAN SULFATE | U<2.7 |
| 39390 | ENDRIN | U<3.5 |
| 34366 | ENDRIN ALDEHYDE | U<1.8 |
| 39410 | HEPTACHLOR | U<1.8 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.7 |
| 39400 | TOXAPHENE | U<130 |
| 39480 | METHOXYCHLOR | U<13 |
| | PCB 1016/1242 | U<99 |
| 39488 | PCB 1221 | U<99 |
| 39492 | PCB 1232 | U<99 |
| 39500 | PCB 1248 | U<99 |
| 39504 | PCB 1254 | U<99 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<99 |
| 81649 | PCB 1262 | U<99 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<350 |
| 34586 | 2-CHLOROPHENOL | U<350 |
| 34601 | 2,4-DICHLOROPHENOL | U<350 |
| 34606 | 2,4-DIMETHYLPHENOL | U<350 |
| 34616 | 2,4-DINITROPHENOL | U<22000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<4400 |
| 34591 | 2-NITROPHENOL | U<890 |
| 34646 | 4-NITROPHENOL | U<1800 |
| 39032 | PENTACHLOROPHENOL | U<2200 |
| 34694 | PHENOL | U<350 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<350 |

OTHERS

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-10
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 10:45 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Sherman
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify): ____

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: 93080238
Date received: 8/26/93
Time received: 1130 by LJB
Date reported ____ by ____
Reviewed by ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | ✓ | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | ✓ | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | ✓ | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | ✓ | 2,4,6-trichlorophenol |

| | * | Herbicides |
|---|---|---|
| | | |

| | * | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

ample Type: SOIL
ample Site Code: 33606
ample Source: HOWARD HIGH SCHOOL
unty: 33
eld No: HH-SS-10
llected-Date 08/24/93 Time 10:45 By CJS
ate Priority Needed / /

Laboratory Number 93-08-0238
Branch Lab Number
Received-Date 08/26/93 Time 10:50 By LJB
Sampling Agency: HWM/II
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 4292 | BUTYLBENZYL PHTHALATE | U<350 |
| 3100 | BIS(2-ETHYLHEXYL)PHTHALATE | U<350 |
| 3110 | DI-N-BUTYL PHTHALATE | U<350 |
| 4596 | DI-N-OCTYL PHTHALATE | U<350 |
| 4336 | DIETHYL PHTHALATE | D<350* |
| 4341 | DIMETHYL PHTHALATE | U<350 |
| 4438 | N-NITROSODIMETHYLAMINE | U<1400 |
| 4433 | N-NITROSODIPHENYLAMINE | U<350 |
| 4428 | N-NITROSO DI-N-PROPYLAMINE | U<350 |
| 4408 | ISOPHORONE | U<350 |
| 4447 | NITROBENZENE | U<350 |
| 4611 | 2,4-DINITROTOLUENE | U<350 |
| 462[illegible] | -DINITROTOLUENE | U<350 |
| 4205 | ACENAPHTHENE | U<350 |
| 4200 | ACENAPHTHYLENE | U<350 |
| 4220 | ANTHRACENE | U<350 |
| 4526 | BENZO(a)ANTHRACENE | U<350 |
| 4247 | BENZO(a)PYRENE | U<350 |
| 4230 | BENZO(b)FLUORANTHENE | U<350 |
| 4521 | BENZO(ghi)PERYLENE | U<880 |
| 4242 | BENZO(k)FLUORANTHENE | U<350 |
| 4556 | DIBENZO(a,h)ANTHRACENE | U<880 |
| 4376 | FLUORANTHENE | D<350 |
| 34381 | FLUORENE | U<350 |
| 34403 | INDENO(1,2,3-cd)PYRENE | U<880 |
| 34696 | NAPHTHALENE | U<350 |
| 34461 | PHENANTHRENE | D<350 |
| 34469 | PYRENE | D<350 |
| 34320 | CHRYSENE | U<350 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<350 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<350 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<350 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<350 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<350 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<350 |
| 34391 | HEXACHLOROBUTADIENE | U<350 |
| 39700 | HEXACHLOROBENZENE | U<350 |
| 34396 | HEXACHLOROETHANE | U<350 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<350 |
| 34581 | 2-CHLORONAPHTHALENE | U<350 |
| 39330 | ALDRIN | U<1.8 |
| 39337 | ALPHA BHC | U<1.8 |
| 39338 | BETA BHC | U<3.5 |
| 34259 | DELTA BHC | U<3.5 |
| 39340 | GAMMA BHC(LINDANE) | U<1.8 |
| 39350 | CHLORDANE | U<35 |
| 38310 | 4,4 DDD | U<4.4 |
| 39320 | 4,4 DDE | U<3.5 |
| 39300 | 4,4 DDT | U<2.6 |
| 39380 | DIELDRIN | U<1.8 |
| 34361 | ENDOSULFAN I | U<2.6 |
| 34356 | ENDOSULFAN II | U<1.8 |
| 34351 | ENDOSULFAN SULFATE | U<2.6 |
| 39390 | ENDRIN | U<3.5 |
| 34366 | ENDRIN ALDEHYDE | U<1.8 |
| 39410 | HEPTACHLOR | U<1.8 |
| 39420 | HEPTACHLOR EPOXIDE | U<2.6 |
| 39400 | TOXAPHENE | U<130 |
| 39480 | METHOXYCHLOR | U<13 |
| | PCB 1016/1242 | U<99 |
| 39488 | PCB 1221 | U<99 |
| 39492 | PCB 1232 | U<99 |
| 39500 | PCB 1248 | U<99 |
| 39504 | PCB 1254 | U<99 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<99 |
| 81649 | PCB 1262 | U<99 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<350 |
| 34586 | 2-CHLOROPHENOL | U<350 |
| 34601 | 2,4-DICHLOROPHENOL | U<350 |
| 34606 | 2,4-DIMETHYLPHENOL | U<350 |
| 34616 | 2,4-DINITROPHENOL | U<22000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<4400 |
| 34591 | 2-NITROPHENOL | U<880 |
| 34646 | 4-NITROPHENOL | U<1800 |
| 39032 | PENTACHLOROPHENOL | U<1800 |
| 34694 | PHENOL | U<350 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<350 |

OTHERS

@Reporting Units, unless otherwise noted:
water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-6-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE TENNESSEE - ENVIRONMENTAL LABORATORIES

**ORGANIC ANALYSIS**
**Base/Neutral/Acid Extractables**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-11
Stream Mile: Depth:
Collected: Date: 8/25/93 Time: 10:30 AM By: DV
Contact Hazard: Unknown
Signature of sampler: Jon Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ Tissue
- __ Water
- __ Air
- __ sludge
- Other: ____

**Sample Priority**
- __ Emergency
- __ Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: 93080242
Date received: 8/26/93
Time received: 1200 by LJB
Date reported: ____ by ____
Reviewed by: ____

| | * | Base/Neutral |
|---|---|---|
| 34292 | | butylbenzylphthalate |
| 39100 | | bis(2-ethylhexyl)phthalate |
| 39110 | | di-n-butylphthalate |
| 34596 | | di-n-octylphthalate |
| 34336 | | diethylphthalate |
| 34341 | | dimethylphthalate |
| 34438 | | n-nitrosodimethylamine |
| 34433 | | n-nitrosodiphenylamine |
| 34428 | | n-nitroso di-n-propylamine |
| 34408 | | isophorone |
| 34447 | | nitrobenzene |
| 34611 | | 2,4-dinitrotoluene |
| 34626 | | 2,6-dinitrotoluene |
| 34205 | | acenaphthene |
| 34200 | | acenaphthylene |
| 34220 | | anthracene |
| 34526 | | benzo(a)anthracene |
| 34247 | | benzo(a)pyrene |
| 34230 | | benzo(b)fluoranthene |
| 34521 | | benzo(ghi)perylene |
| 34242 | | benzo(k)fluoranthene |
| 34320 | | chrysene |
| 34556 | | dibenzo(a,h)anthracene |
| 34376 | | fluoranthene |
| 34381 | | fluorene |
| 34403 | | indeno(1,2,3-cd)pyrene |
| 34696 | | naphthalene |
| 34461 | | phenanthrene |
| 34469 | | pyrene |

| | * | Base/Neutral |
|---|---|---|
| 34273 | | bis(2-chloroethyl) ether |
| 34278 | | bis(2-chloroethoxy)methane |
| 34283 | | bis(2-chloroisopropyl) ether |
| 34636 | | 4-bromophenylphenyl ether |
| 34641 | | 4-chlorophenylphenyl ether |
| 34386 | | hexachlorocyclopentadiene |
| 34391 | | hexachlorobutadiene |
| 39700 | | hexachlorobenzene |
| 34396 | | hexachloroethane |
| 34551 | | 1,2,4-trichlorobenzene |
| 34581 | | 2-chloronaphthalene |
| 39330 | | aldrin |
| 39337 | | a-BHC |
| 39338 | | b-BHC |
| 34259 | | d-BHC |
| 39340 | | g-BHC (lindane) |
| 39350 | | chlordane |
| 38310 | | 4,4'-DDD |
| 39320 | | 4,4'-DDE |
| 39300 | | 4,4'-DDT |
| 39380 | | dieldrin |
| 34361 | | endosulfan I |
| 34356 | | endosulfan II |
| 34351 | | endosulfan sulfate |
| 39390 | | endrin |
| 34366 | | endrin aldehyde |
| 39410 | | heptachlor |
| 39420 | | heptachlor epoxide |
| 39400 | | toxaphene |

| | * | Base/Neutral |
|---|---|---|
| 39480 | | methoxychlor |
| | | PCB-1016/1242 |
| 39488 | | PCB-1221 |
| 39492 | | PCB-1232 |
| 39500 | | PCB-1248 |
| 39504 | | PCB-1254 |
| 39508 | | PCB-1260 |
| 81649 | | PCB-1262 |

| | * | Acid Extractable |
|---|---|---|
| 34552 | | 4-chloro-3-methyl phenol |
| 34586 | | 2-chlorophenol |
| 34601 | | 2,4-dichlorophenol |
| 34606 | | 2,4-dimethylphenol |
| 24616 | | 2,4-dinitrophenol |
| 34657 | | 2-methyl-4,6-dinitrophenol |
| 34591 | | 2-nitrophenol |
| 34646 | | 4-nitrophenol |
| 39032 | | pentachlorophenol |
| 34694 | | phenol |
| 34681 | | 2,4,6-trichlorophenol |

| | | Herbicides |
|---|---|---|
| | | |

| | | Other |
|---|---|---|
| | | |

* please check desired parameter

Lab Comments: ____

PH-3014 LAB (Rev. 7-91)

STATE OF TENNESSEE
ENVIRONMENTAL LABORATORIES
ORGANIC ANALYSIS,EXTRACTABLES

Sample Type: SOIL
Sample Site Code: 33606
Sample Source: HOWARD HIGH SCHOOL
County: 33
Field No: HH-SS-11
Collected-Date 08/25/93 Time 10:30 By DV
Date Priority Needed / /

Laboratory Number 93-08-0242
Branch Lab Number
Received-Date 08/26/93 Time 12:00 By LJB
Sampling Agency: HWM/11
Sample Priority:
Emergency[N]Legal[N]Routine[Y]Ambient[N]

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34292 | BUTYLBENZYL PHTHALATE | U<400 |
| 39100 | BIS(2-ETHYLHEXYL)PHTHALATE | D<2000 |
| 39110 | DI-N-BUTYL PHTHALATE | U<400 |
| 34596 | DI-N-OCTYL PHTHALATE | U<400 |
| 34336 | DIETHYL PHTHALATE | D<1000* |
| 34341 | DIMETHYL PHTHALATE | U<400 |
| 34438 | N-NITROSODIMETHYLAMINE | U<1600 |
| 34433 | N-NITROSODIPHENYLAMINE | U<400 |
| 34428 | N-NITROSO DI-N-PROPYLAMINE | U<400 |
| 34408 | ISOPHORONE | U<400 |
| 34447 | NITROBENZENE | U<400 |
| 34[illegible] | [illegible],4-DINITROTOLUENE | U<400 |
| 34[illegible] | [illegible],6-DINITROTOLUENE | U<400 |
| 34205 | ACENAPHTHENE | D<400 |
| 34200 | ACENAPHTHYLENE | D<400 |
| 34220 | ANTHRACENE | D<400 |
| 34526 | BENZO(a)ANTHRACENE | D_1400 |
| 34247 | BENZO(a)PYRENE | D_1770 |
| 34230 | BENZO(b)FLUORANTHENE | D<1000 |
| 34521 | BENZO(ghi)PERYLENE | D_1350 |
| 34242 | BENZO(k)FLUORANTHENE | D<1000 |
| 34556 | DIBENZO(a,h)ANTHRACENE | D<1000 |
| 34376 | FLUORANTHENE | D_2480 |
| 34381 | FLUORENE | D<400 |
| 34403 | INDENO(1,2,3-cd)PYRENE | D_2190 |
| 34696 | NAPHTHALENE | D<400 |
| 34461 | PHENANTHRENE | D<400 |
| 34469 | PYRENE | D_2160 |
| 34320 | CHRYSENE | D_1370 |
| 34273 | BIS(2-CHLOROETHYL)ETHER | U<400 |
| 34278 | BIS(2-CHLOROETHOXY)METHANE | U<400 |
| 34283 | BIS(2-CHLOROISOPROPYL)ETHER | U<400 |

| CODE | BASE/NEUTRAL EXTRACTABLES | VALUE @ |
|---|---|---|
| 34636 | 4-BROMOPHENYLPHENYL ETHER | U<400 |
| 34641 | 4-CHLOROPHENYLPHENYL ETHER | U<400 |
| 34386 | HEXACHLOROCYCLOPENTADIENE | U<400 |
| 34391 | HEXACHLOROBUTADIENE | U<400 |
| 39700 | HEXACHLOROBENZENE | U<400 |
| 34396 | HEXACHLOROETHANE | U<400 |
| 34551 | 1,2,4-TRICHLOROBENZENE | U<400 |
| 34581 | 2-CHLORONAPHTHALENE | U<400 |
| 39330 | ALDRIN | U<10 |
| 39337 | ALPHA BHC | U<10 |
| 39338 | BETA BHC | U<20 |
| 34259 | DELTA BHC | U<20 |
| 39340 | GAMMA BHC(LINDANE) | U<10 |
| 39350 | CHLORDANE | # |
| 38310 | 4,4 DDD | U<15 |
| 39320 | 4,4 DDE | U<20 |
| 39300 | 4,4 DDT | U<25 |
| 39380 | DIELDRIN | U<10 |
| 34361 | ENDOSULFAN I | U<30 |
| 34356 | ENDOSULFAN II | U<10 |
| 34351 | ENDOSULFAN SULFATE | U<15 |
| 39390 | ENDRIN | U<20 |
| 34366 | ENDRIN ALDEHYDE | U<10 |
| 39410 | HEPTACHLOR | U<10 |
| 39420 | HEPTACHLOR EPOXIDE | U<15 |
| 39400 | TOXAPHENE | U<730 |
| 39480 | METHOXYCHLOR | U<75 |
| | PCB 1016/1242 | U<1200 |
| 39488 | PCB 1221 | U<1200 |
| 39492 | PCB 1232 | U<1200 |
| 39500 | PCB 1248 | U<1200 |
| 39504 | PCB 1254 | U<1200 |

| CODE | BASE/NEUTRAL EXTACTABLES | VALUE @ |
|---|---|---|
| 39508 | PCB 1260 | U<1200 |
| 81649 | PCB 1262 | U<1200 |

| CODE | ACID EXTRACTABLES | VALUE @ |
|---|---|---|
| 34552 | 4-CHLORO-3-METHYL PHENOL | U<400 |
| 34586 | 2-CHLOROPHENOL | U<400 |
| 34601 | 2,4-DICHLOROPHENOL | U<400 |
| 34606 | 2,4-DIMETHYLPHENOL | U<400 |
| 34616 | 2,4-DINITROPHENOL | U<25000 |
| 34657 | 2-METHYL-4,6-DINITROPHENOL | U<5000 |
| 34591 | 2-NITROPHENOL | U<1000 |
| 34646 | 4-NITROPHENOL | U<2000 |
| 39032 | PENTACHLOROPHENOL | U<2500 |
| 34694 | PHENOL | U<400 |
| 34681 | 2,4,6-TRICHLOROPHENOL | U<400 |

OTHERS

| | | |
|---|---|---|
| | #GAMMA-CHLORDANE | D<55 |

@Reporting Units, unless otherwise noted: water, ug/l; sediment,ug/kg;fish,mg/kg

Unit supervisor [signature]
Date 10-4-93

Completed-Date:09/30/93 Time: By:SBU

Signature of supervisor indicates that the work was performed in accordance with federally approved procedures where available and in compliance with current quality assurance criteria except as qualified.

Comments::U-UNDETECTED. D-DETECTED. THIS VALUE IS THE SAMPLE QUANTITATION LIMIT.
* DATA SUSPECT - THIS COMPOUND ALSO SEEN IN BLANK.

PH-3016LAB(REV 5/90)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33 606
County: 33 Field No.: HH-SS-11
Stream Mile: ____ Depth: ____
Collected: Date 8/25/93 Time 10:30 By DV
Contact Hazard: UNKNOWN
Signature of sampler: Don VanHook
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- __ Sediment
- X Soil
- __ sludge
- __ Tissue
- Other ____

Sample Priority
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: K308137
Date received: 8-26-93
Time received: 900 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrory
Reviewed by: ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 1570 |
| 01003 | | arsenic, As | mg/kg | 4.0 |
| 01008 | | barium, Ba | mg/kg | 624 |
| 01028 | | cadmium, Cd | mg/kg | 0.7 |
| 00917 | | calcium, Ca | mg/kg | 26500 |
| 01029 | | chromium, Cr | mg/kg | 14 |
| 01038 | | cobalt, Co | mg/kg | 12 |
| 01043 | | copper, Cu | mg/kg | 30.0 |
| 01170 | | iron, Fe | mg/kg | 18400 |
| 01052 | | lead, Pb | mg/kg | 353 |
| 00924 | | magnesium, Mg | mg/kg | 4700 |
| 01053 | | manganese, Mn | mg/kg | 510 |
| 71921 | | mercury, Hg | mg/kg | 6.4 |
| 01068 | | nickel, Ni | mg/kg | 17 |
| 00938 | | potassium, K | mg/kg | 1080 |
| 01148 | | selenium, Se | mg/kg | <0.2 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 132 |
| 01093 | | zinc, Zn | mg/kg | 175 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 92.7 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments ____

PH-3011 LAB(Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-09
Stream Mile: ____ Depth: ____
Collected: Date 8/25/93 Time 9:30AM By DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue

Other: ____

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: K308136
Date received: 8-26-93
Time received: 900 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by: ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 13100 |
| 01003 | | arsenic, As | mg/kg | 27.8 |
| 01008 | | barium, Ba | mg/kg | 36 |
| 01028 | | cadmium, Cd | mg/kg | 1.2 |
| 00917 | | calcium, Ca | mg/kg | 2360 |
| 01029 | | chromium, Cr | mg/kg | 9 |
| 01038 | | cobalt, Co | mg/kg | 8 |
| 01043 | | copper, Cu | mg/kg | 21.5 |
| 01170 | | iron, Fe | mg/kg | 40400 |
| 01052 | | lead, Pb | mg/kg | 20 |
| 00924 | | magnesium, Mg | mg/kg | 1590 |
| 01053 | | manganese, Mn | mg/kg | 67 |
| 71921 | | mercury, Hg | mg/kg | 1.2 |
| 01068 | | nickel, Ni | mg/kg | 15 |
| 00938 | | potassium, K | mg/kg | 4460 |
| 01148 | | selenium, Se | mg/kg | 0.5 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 120 |
| 01093 | | zinc, Zn | mg/kg | 53.3 |
| 00721 | | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 86.3 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments: ____

PH-3011 LAB(Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HA-SS-08
Stream Mile: ____ Depth: ____
Collected: Date 8/25/93 Time 8:45 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Stanford
Send Report to: Wayne Everett, CFO

Sampling Agency
- __ APC
- __ DOT
- __ DWS
- __ GW
- __ SWM
- __ UST
- __ EEP
- X PASI
- __ SF
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

Sample Type
- __ Sediment
- X Soil
- __ sludge
- __ Tissue
- Other: ____

Sample Priority
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*

Laboratory Number: K308135
Date received: 8-26-93
Time received: 900 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by: ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 11000 |
| 01003 | | arsenic, As | mg/kg | 14.4 |
| 01008 | | barium, Ba | mg/kg | 50 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 476 |
| 01029 | | chromium, Cr | mg/kg | 8 |
| 01038 | | cobalt, Co | mg/kg | 9 |
| 01043 | | copper, Cu | mg/kg | 18.7 |
| 01170 | | iron, Fe | mg/kg | 35200 |
| 01052 | | lead, Pb | mg/kg | 21 |
| 00924 | | magnesium, Mg | mg/kg | 1920 |
| 01053 | | manganese, Mn | mg/kg | 110 |
| 71921 | | mercury, Hg | mg/kg | 1.3 |
| 01068 | | nickel, Ni | mg/kg | 17 |
| 00938 | | potassium, K | mg/kg | 4420 |
| 01148 | | selenium, Se | mg/kg | 0.2 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 95 |
| 01093 | | zinc, Zn | mg/kg | 62.0 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 89.4 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments: ____

PH-3011 LAB(Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33-606
County: 33 Field No.: HH-SS-10
Stream Mile: ____ Depth: ____
Collected: Date: 8/24/93 Time: 10:45 AM By: CJS
Contact Hazard: Unknown
Signature of sampler: Craig Stamnitz
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue

Other: ____

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: K308132
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCurry
Reviewed by: ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 19000 |
| 01003 | | arsenic, As | mg/kg | 9.9 |
| 01008 | | barium, Ba | mg/kg | 76 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 699 |
| 01029 | | chromium, Cr | mg/kg | 11 |
| 01038 | | cobalt, Co | mg/kg | 13 |
| 01043 | | copper, Cu | mg/kg | 11.2 |
| 01170 | | iron, Fe | mg/kg | 30300 |
| 01052 | | lead, Pb | mg/kg | 16 |
| 00924 | | magnesium, Mg | mg/kg | 913 |
| 01053 | | manganese, Mn | mg/kg | 1070 |
| 71921 | | mercury, Hg | mg/kg | 1.1 |
| 01068 | | nickel, Ni | mg/kg | 8 |
| 00938 | | potassium, K | mg/kg | 1160 |
| 01148 | | selenium, Se | mg/kg | 0.3 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 83 |
| 01093 | | zinc, Zn | mg/kg | 33.6 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 88.8 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |

| | | Other | | |
|---|---|---|---|---|
| | | | | |

* please check tests desired

Lab Comments: ____

PH-3011 LAB(Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-07
Stream Mile: Depth:
Collected: Date 8/24/93 Time 3:00 PM By DV
Contact Hazard: Unknown
Signature of sampler: Dan Van Horn
Send Report to: Wayne Everett, CFO

Sampling Agency: __ APC __ DOT __ DWS __ GW __ SWM __ UST __ EEP X PAST __ SF __ WPC __ other (specify)

Billing Code (required): 327.38-11

Sample Type: __ Sediment X Soil __ sludge __ Tissue __ Other

Sample Priority: __ Emergency X Legal X Routine __ Ambient

Date Priority needed:

Field Comments:

For lab use only
Laboratory Number: K308131
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by:

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01106 | | aluminum, Al | mg/kg | 25400 |
| 01003 | | arsenic, As | mg/kg | 8.7 |
| 01005 | | barium, Ba | mg/kg | 164 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | * 699 |
| 01029 | | chromium, Cr | mg/kg | 108 |
| 01038 | | cobalt, Co | mg/kg | 24 |
| 01043 | | copper, Cu | mg/kg | 64.4 |
| [illegible] | | iron, Fe | mg/kg | 38900 |
| [illegible] | | lead, Pb | mg/kg | 84 |
| [illegible] | | magnesium, Mg | mg/kg | 1330 |
| [illegible] | | manganese, Mn | mg/kg | 518 |
| [illegible] | | mercury, Hg | mg/kg | 10.5 |
| 01065 | | nickel, Ni | mg/kg | 39 |
| 00937 | | potassium, K | mg/kg | 2016 |
| 01148 | | selenium, Se | mg/kg | 0.6 |
| 01078 | | silver, Ag | mg/kg | 6 |
| 00934 | | sodium, Na | mg/kg | 121 |
| 01093 | | zinc, Zn | mg/kg | 380 |
| 00721 | ✓ | cyanide, CN | mg/kg | 3.42 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 85.3 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/Kg | |
| 81660 | | iron, Fe | mg/Kg | |
| 71936 | | lead, Pb | mg/Kg | |
| 71741 | | manganese, Mn | mg/Kg | |
| 71935 | | mercury, Hg | mg/Kg | |
| 01069 | | nickel, Ni | mg/Kg | |
| 01149 | | selenium, Se | mg/Kg | |
| 81742 | | silver, Ag | mg/Kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/Kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |
| | X | Calcium, Ca | mg/kg | 17700 |

* please check tests desired

Lab Comments

PH 3011 LAB(Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-06
Stream Mile: Depth:
Collected: Date: 8/24/93 Time: 1:40PM By: DV
Contact Hazard: Unknown
Signature of sampler: Don Van Hook
Send Report to: Wayne Everett

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327-38-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue

Other:

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*
Laboratory Number: K308130
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by:

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 15100 |
| 01003 | | arsenic, As | mg/kg | 9.5 |
| 01008 | | barium, Ba | mg/kg | 80 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 3640 |
| 01029 | | chromium, Cr | mg/kg | 103 |
| 01038 | | cobalt, Co | mg/kg | 8 |
| 01043 | | copper, Cu | mg/kg | 26.3 |
| 01170 | | iron, Fe | mg/kg | 41300 |
| 01052 | | lead, Pb | mg/kg | 41 |
| 00924 | | magnesium, Mg | mg/kg | 1210 |
| 01053 | | manganese, Mn | mg/kg | 358 |
| 71921 | | mercury, Hg | mg/kg | 1.8 |
| 01068 | | nickel, Ni | mg/kg | 11 |
| 00938 | | potassium, K | mg/kg | 2220 |
| 01148 | | selenium, Se | mg/kg | 0.9 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 92 |
| 01093 | | zinc, Zn | mg/kg | 85.9 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 84.1 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments

PH-3011 LAB(Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-05
Stream Mile: Depth:
Collected: Date: 8/24/93 Time: 11:15 AM By: DV
Contact Hazard: Unknown
Signature of sampler: Dan Van Hook
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.33-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue

Other:

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*
Laboratory Number: K308129
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by:

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 30500 |
| 01003 | | arsenic, As | mg/kg | 5.5 |
| 01008 | | barium, Ba | mg/kg | 107 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 1600 |
| 01029 | | chromium, Cr | mg/kg | 22 |
| 01038 | | cobalt, Co | mg/kg | 8 |
| 01043 | | copper, Cu | mg/kg | 30.2 |
| 01170 | | iron, Fe | mg/kg | 40000 |
| 01052 | | lead, Pb | mg/kg | 86 |
| 00924 | | magnesium, Mg | mg/kg | 1870 |
| 01053 | | manganese, Mn | mg/kg | ~~1040~~ |
| 71921 | | mercury, Hg | mg/kg | 4.5 |
| 01068 | | nickel, Ni | mg/kg | 18 |
| 00938 | | potassium, K | mg/kg | 1390 |
| 01148 | | selenium, Se | mg/kg | 0.3 |
| 01078 | | silver, Ag | mg/kg | 21 |
| 00934 | | sodium, Na | mg/kg | 67 |
| 01093 | | zinc, Zn | mg/kg | 168 |
| 00721 | ✓ | cyanide, CN | mg/kg | 21 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 83.2 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |

| | | Other | | |
|---|---|---|---|---|
| | X | Manganese, Mn | mg/Kg | 492 |

* please check tests desired

Lab Comments

PH-3011 LAB(Rev. 7-91)

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-04
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 10:45 AM By CJS
Contact Hazard: Unknown
Signature of sampler: Craig Stannard
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327.38-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue
- Other ____

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number: K308128
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by: ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 38500 |
| 01003 | | arsenic, As | mg/kg | 9.3 |
| 01008 | | barium, Ba | mg/kg | 92 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 579 |
| 01029 | | chromium, Cr | mg/kg | 12 |
| 01038 | | cobalt, Co | mg/kg | 12 |
| 01043 | | copper, Cu | mg/kg | 12.4 |
| 01170 | | iron, Fe | mg/kg | 27700 |
| 01052 | | lead, Pb | mg/kg | 17 |
| 00924 | | magnesium, Mg | mg/kg | 877 |
| 01053 | | manganese, Mn | mg/kg | 1130 |
| 71921 | | mercury, Hg | mg/kg | 1.0 |
| 01068 | | nickel, Ni | mg/kg | 8 |
| 00938 | | potassium, K | mg/kg | 1200 |
| 01148 | | selenium, Se | mg/kg | 0.7 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 91 |
| 01093 | | zinc, Zn | mg/kg | 33.6 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 87.6 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments ____

PH-3011 LAB(Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-03
Stream Mile: ____ Depth: ____
Collected: Date 8/24/93 Time 9:45 AM By DV
Contact Hazard: Unknown
Signature of sampler: [illegible]
Send Report to: Wayne Everett, CFO

Sampling Agency: __ APC __ DOT __ DWS __ GW __ SWM __ UST __ EEP X PASI __ SF __ WPC __ other (specify):

Billing Code (required): 327.38-11

Sample Type: __ Sediment X Soil __ sludge __ Tissue __ Other

Sample Priority: __ Emergency X Legal X Routine __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*
Laboratory Number: X308127
Date received: 8-25-93
Time received: 1400 by CAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by:

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 26000 |
| 01003 | | arsenic, As | mg/kg | 5.0 |
| 01008 | | barium, Ba | mg/kg | 156 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 14900 |
| 01029 | | chromium, Cr | mg/kg | 25 |
| 01038 | | cobalt, Co | mg/kg | 10 |
| 01043 | | copper, Cu | mg/kg | 65.6 |
| 01170 | | iron, Fe | mg/kg | 27100 |
| 01052 | | lead, Pb | mg/kg | 190 |
| 00924 | | magnesium, Mg | mg/kg | 2560 |
| 01053 | | manganese, Mn | mg/kg | 1150 |
| 71921 | | mercury, Hg | mg/kg | 3.8 |
| 01068 | | nickel, Ni | mg/kg | 28 |
| 00938 | | potassium, K | mg/kg | 1050 |
| 01148 | | selenium, Se | mg/kg | 0.304 |
| 01078 | | silver, Ag | mg/kg | 2 |
| 00934 | | sodium, Na | mg/kg | 81 |
| 01093 | | zinc, Zn | mg/kg | 370 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 92.6 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments

PH-3011 LAB(Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

**INORGANIC ANALYSIS, SOLIDS**

Sample Source: Howard High School
I.D./Site No.: 33606
County: 33 Field No.: HH-SS-02
Stream Mile: Depth:
Collected: Date: 8/24/93 Time: 9:10 AM By: CJS
Contact Hazard: Unknown
Signature of sampler: Craig Slammard
Send Report to: Wayne Everett, CFO

**Sampling Agency**
- __ APC
- __ DWS
- __ SWM
- __ EEP
- __ SF
- __ DOT
- __ GW
- __ UST
- X PASI
- __ WPC
- __ other (specify):

Billing Code (required): 327-38-11

**Sample Type**
- __ Sediment
- X Soil
- __ sludge
- __ Tissue

Other:

**Sample Priority**
- __ Emergency
- X Legal
- X Routine
- __ Ambient

Date Priority needed:

Field Comments:

*For lab use only*
Laboratory Number: K308126
Date received: 8-25-93
Time received: 1400 by LAB
Date reported: OCT 15 1993 by EAM
Reviewed by: Edward McCrary
Reviewed by:

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 38400 |
| 01003 | | arsenic, As | mg/kg | 3.5 |
| 01008 | | barium, Ba | mg/kg | 82 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 1200 |
| 01029 | | chromium, Cr | mg/kg | 12 |
| 01038 | | cobalt, Co | mg/kg | 16 |
| 01043 | | copper, Cu | mg/kg | 9.3 |
| 01170 | | iron, Fe | mg/kg | 28200 |
| 01052 | | lead, Pb | mg/kg | 17 |
| 00924 | | magnesium, Mg | mg/kg | 973 |
| 01053 | | manganese, Mn | mg/kg | 707 |
| 71921 | | mercury, Hg | mg/kg | 1.3 |
| 01068 | | nickel, Ni | mg/kg | 6 |
| 00938 | | potassium, K | mg/kg | 683 |
| 01148 | | selenium, Se | mg/kg | 0.2 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 39 |
| 01093 | | zinc, Zn | mg/kg | 40.1 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 87.1 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |

| | | Other | | |
|---|---|---|---|---|
| | | | | |

* please check tests desired

Lab Comments

PH-3011 LAB(Rev. 7-91

STATE OF TENNESSEE - ENVIRONMENTAL LABORATORIES

INORGANIC ANALYSIS, SOLIDS

Sample Source: Howard High School
I.D./Site No. 33606
County 33 Field No. HH-SS-01
Stream Mile ____ Depth ____
Collected: Date 8/24/93 Time 8:30AM By DV
Contact Hazard None
Signature of sampler Don VanHook
Send Report to Wayne Everett, CEO

Sampling Agency
__ APC __ DOT
__ DWS __ GW
__ SWM __ UST
__ EEP X PASI
__ SF __ WPC
__ other (specify):

Billing Code (required) 327-38-11

Sample Type
__ Sediment
X Soil
__ sludge
__ Tissue
Other ____

Sample Priority
__ Emergency
X Legal
X Routine
__ Ambient
Date Priority needed: ____

Field Comments: ____

*For lab use only*
Laboratory Number K308125
Date received 8-25-93
Time received 1400 by LAB
Date reported OCT 15 1993 by EAM
Reviewed by Edward McCrary
Reviewed by ____

| code | * | Sediment | Unit | value |
|---|---|---|---|---|
| 01108 | | aluminum, Al | mg/kg | 43000 |
| 01003 | | arsenic, As | mg/kg | 3.4 |
| 01008 | | barium, Ba | mg/kg | 131 |
| 01028 | | cadmium, Cd | mg/kg | <0.2 |
| 00917 | | calcium, Ca | mg/kg | 1200 |
| 01029 | | chromium, Cr | mg/kg | 11 |
| 01038 | | cobalt, Co | mg/kg | 16 |
| 01043 | | copper, Cu | mg/kg | 17.3 |
| 01170 | | iron, Fe | mg/kg | 27500 |
| 01052 | | lead, Pb | mg/kg | 48 |
| 00924 | | magnesium, Mg | mg/kg | 1210 |
| 01053 | | manganese, Mn | mg/kg | 1380 |
| 71921 | | mercury, Hg | mg/kg | 1.7 |
| 01068 | | nickel, Ni | mg/kg | 13 |
| 00938 | | potassium, K | mg/kg | 2010 |
| 01148 | | selenium, Se | mg/kg | <0.2 |
| 01078 | | silver, Ag | mg/kg | <1 |
| 00934 | | sodium, Na | mg/kg | 63 |
| 01093 | | zinc, Zn | mg/kg | 93.4 |
| 00721 | ✓ | cyanide, CN | mg/kg | <1 |
| 01023 | | boron, B | mg/kg | |
| | | nitrogen, ammonia | mg/kg | |
| 00633 | | nitrogen, $NO_2$ & $NO_3$ | mg/kg | |
| | | nitrogen, total Kjeldahl | mg/kg | |
| 00668 | | phosphate, total | mg/kg | |
| | | oil and grease | mg/g | |
| | | hydrocarbons, total | mg/g | |
| | | percent solids | % | 88.2 |
| 32731 | | phenols | mg/kg | |

| code | * | Tissue | Unit | value |
|---|---|---|---|---|
| 01099 | | antimony, Sb | mg/Kg | |
| 01004 | | arsenic, As | mg/Kg | |
| 34252 | | beryllium, Be | mg/Kg | |
| 71940 | | cadmium, Cd | mg/Kg | |
| 71939 | | chromium, Cr | mg/Kg | |
| 81659 | | cobalt, Co | mg/Kg | |
| 71937 | | copper, Cu | mg/kg | |
| 81660 | | iron, Fe | mg/kg | |
| 71936 | | lead, Pb | mg/kg | |
| 81741 | | manganese, Mn | mg/kg | |
| 71930 | | mercury, Hg | mg/kg | |
| 01069 | | nickel, Ni | mg/kg | |
| 01149 | | selenium, Se | mg/kg | |
| 81742 | | silver, Ag | mg/kg | |
| 01073 | | thallium, Tl | mg/Kg | |
| 71938 | | zinc, Zn | mg/kg | |
| | | **Coal** | | |
| | | ash | % | |
| | | heat content | BTU | |
| | | Moisture | % | |
| | | sulfur | % | |

| code | * | TCLP | Unit | value |
|---|---|---|---|---|
| 01000 | | arsenic, As | µg/L | |
| 01005 | | barium, Ba | µg/L | |
| 01025 | | cadmium, Cd | µg/L | |
| 01030 | | chromium, Cr | µg/L | |
| 01049 | | lead, Pb | µg/L | |
| 71890 | | mercury, Hg | µg/L | |
| 01065 | | nickel, Ni | µg/L | |
| 01145 | | selenium, Se | µg/L | |
| 01075 | | silver, Ag | µg/L | |
| 00723 | | cyanide, CN | µg/L | |
| | | **Other** | | |

* please check tests desired

Lab Comments ____

PH-3011 LAB(Rev. 7-91)

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 36

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

CITY OF
**CHATTANOOGA,**
**TENNESSEE**
HAMILTON COUNTY

PANEL 20 OF 30
(SEE MAP INDEX FOR PANELS NOT PRINTED)

O.S. Pipe
[illegible]
SWP

COMMUNITY-PANEL NUMBER
470072 0020 A

EFFECTIVE DATE:
SEPTEMBER 3, 1980

U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620

APPROXIMATE SCALE

500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

CITY OF
**CHATTANOOGA, TENNESSEE**
HAMILTON COUNTY

(SEE MAP INDEX FOR PANELS NOT PRINTED)
**PANEL 21 OF 30**

**COMMUNITY-PANEL NUMBER**
**470072 0021 B**

**MAP REVISED:**
**OCTOBER 22, 1982**

Federal Emergency Management Agency

## KEY TO MAP

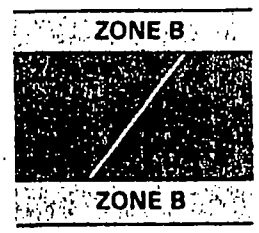
500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary




Base Flood Elevation Line With Elevation In Feet** — 513

Base Flood Elevation In Feet Where Uniform Within Zone** — (EL 987)

Elevation Reference Mark — RM7 ×

River Mile — • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

## *EXPLANATION OF ZONE DESIGNATIONS

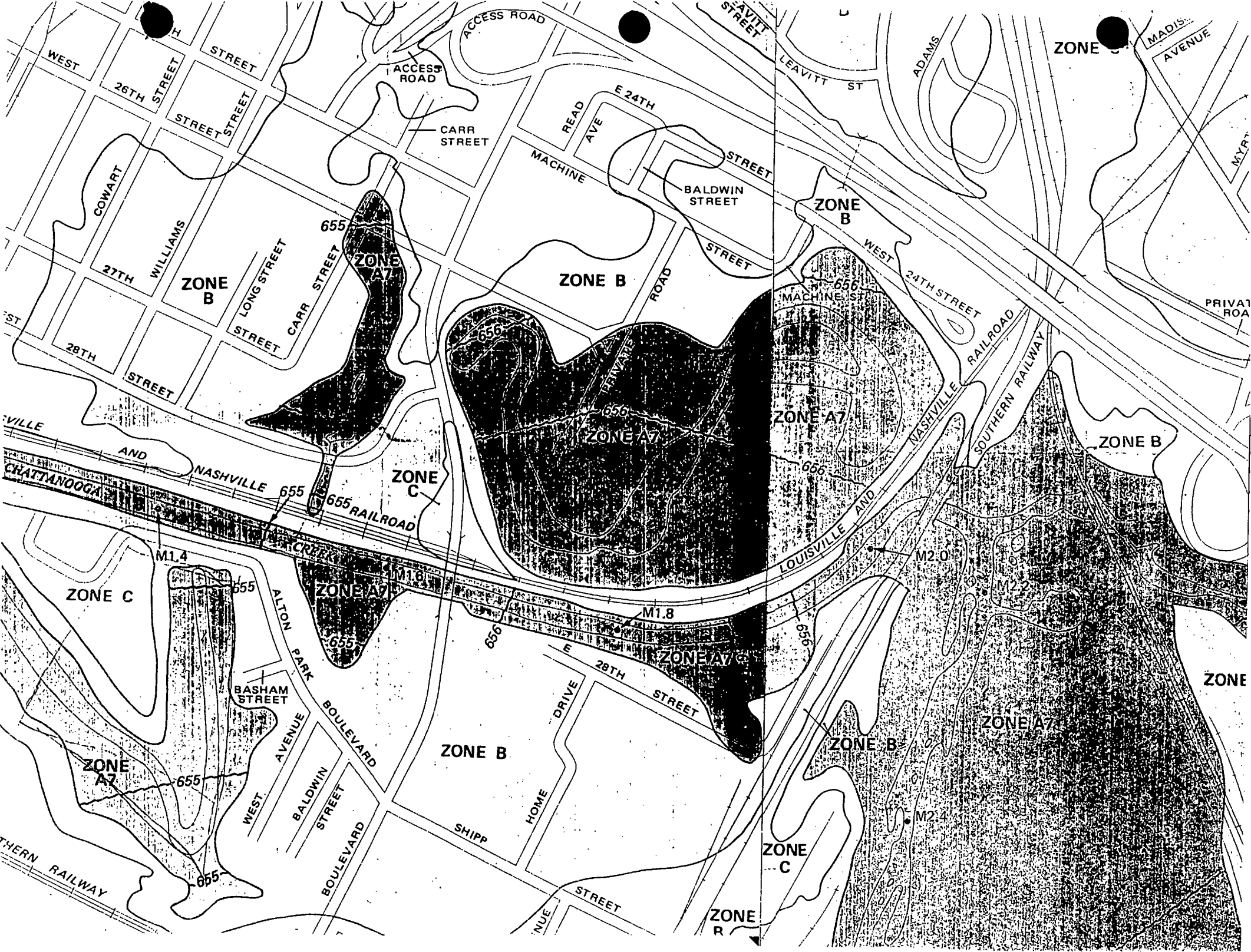
| ZONE | EXPLANATION |
|---|---|
| A | Areas of 100-year flood; base flood elevations and flood hazard factors not determined. |
| A0 | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined. |
| AH | Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined. |
| A1-A30 | Areas of 100-year flood; base flood elevations and flood hazard factors determined. |
| A99 | Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined. |
| B | Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading) |
| C | Areas of minimal flooding. (No shading) |
| D | Areas of undetermined, but possible, flood hazards. |
| V | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined. |
| V1-V30 | Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined. |

### NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

For adjoining map panels, see separately printed Index To Map Panels.


ACCESS ROAD
ACCESS ROAD
CARR STREET
READ AVE
E 24TH
MACHINE
STREET
BALDWIN STREET
STREET
LEAVITT STREET
LEAVITT ST
ADAMS
MADISON AVENUE
WEST
STREET
26TH STREET
STREET
STREET
COWART
WILLIAMS
27TH
ZONE B
LONG STREET
CARR STREET
STREET
28TH
STREET
ZONE A7
655
ZONE B
ROAD
656
656
ZONE A7
ZONE B
WEST 24TH STREET
MACHINE ST
656
ZONE A7
656
NASHVILLE RAILROAD
SOUTHERN RAILWAY
ZONE B
LOUISVILLE AND NASHVILLE RAILROAD
CHATTANOOGA
655
655
ZONE C
M1.4
M1.6
ZONE A7
M1.8
656
ZONE A7
656
M2.0
M2.2
ZONE C
655
ALTON PARK BOULEVARD
E 28TH STREET
DRIVE
BASHAM STREET
ZONE A7
ZONE B
ZONE B
ZONE A7
ZONE A7
655
WEST BALDWIN AVENUE
STREET
BOULEVARD
HOME
SHIPP
M2.4
ZONE C
655
STREET
ZONE B

Site Name: Howard High School Dump

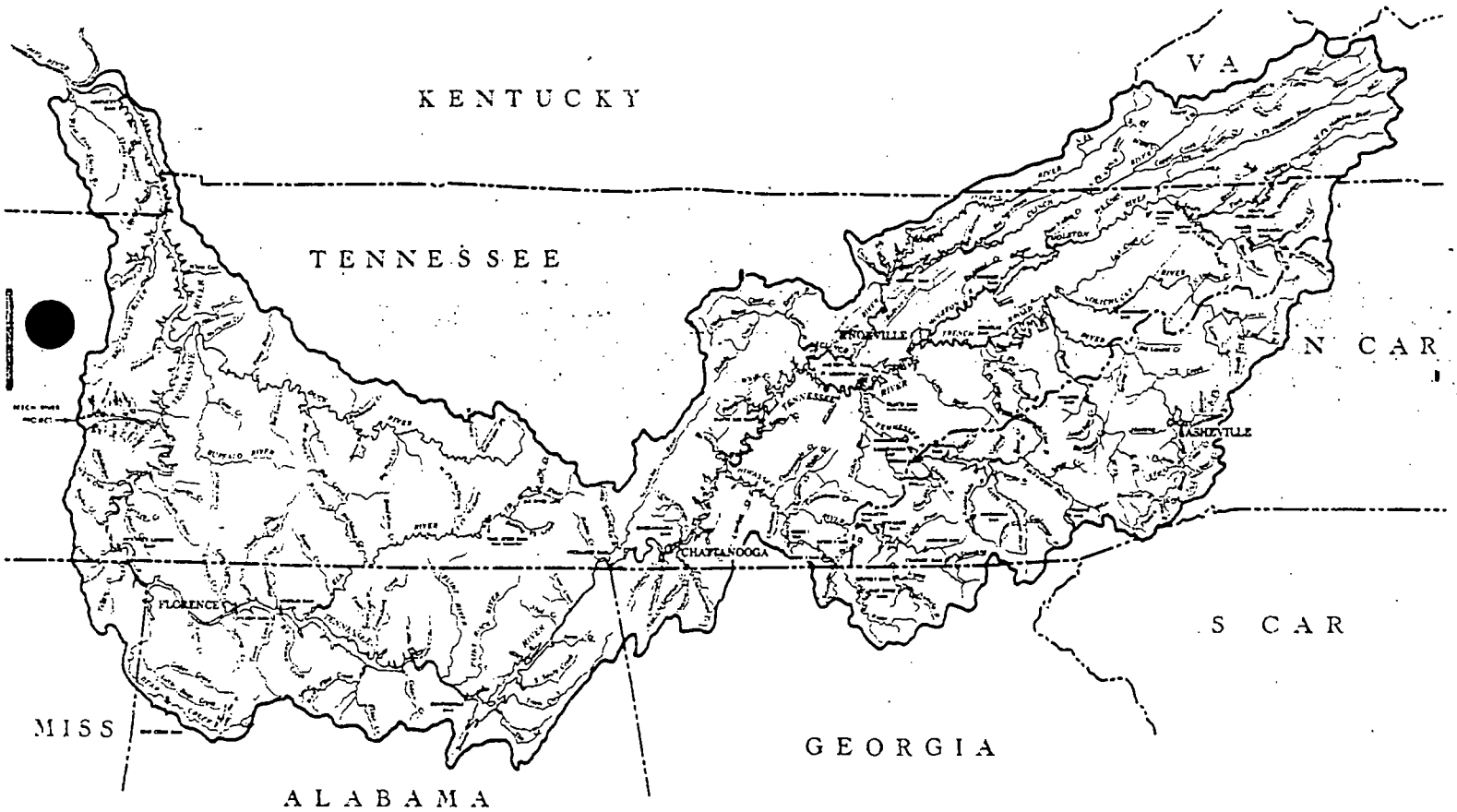
Site Number: TND 100842343

Reference Number: 37

JAN 11 1974

# DRAINAGE AREAS FOR STREAMS IN TENNESSEE RIVER BASIN

Division of Water Quality Control
Environmental Health Services
6200 Building Suite 6100
Eastgate Center
Chattanooga, Tennessee 37411




TENNESSEE VALLEY AUTHORITY

TABLE 6
DRAINAGE AREAS
MINOR TRIBUTARY STREAMS BETWEEN ELK AND HIWASSEE RIVERS

| Quad. Map | River Mile | Name of Stream | Location Reference | Drainage Area (Sq. Mi.) | Quad Map No. |
|---|---|---|---|---|---|
| 117SW | | Mill Cave Trib in Grassy Cove | USGS LFPR gage at bridge 1 mile north of Grassy Cove | 12.1 | 106NE |
| 117SW | | (Little Cove Sink) | 1.4 miles ENE of Grassy Cove | 2.09 | 106NE |
| 117SW | | (Swagerty Cove Sink) | 1.4 miles NW of Jewett | 2.33 | 106NE |
| 101NE | 0.2 | Cole City Creek | At Guntersville Reservoir 0.35 mile SE of Shellmound Station | 29.0 | 106NE |
| 101NE | 0.6 | | Bridge 0.7 mile SE of Shellmound Station | 27.1 | 106NE |
| 100SE | 0 | Running Water Creek | Mouth at Tennessee River Mile 429.7 | 21.1 | 106NW |
| 100SE | 1.5 | | Tennessee Hwy 156 across Nickajack Reservoir | 20.6 | 105SE |
| 100SE | 2.1 | | Bridge 0.9 mile east of Ladds | 19.6 | 105SE |
| 100SE | 3.7 | | L&N R.R. bridge 2.0 miles ESE of Ladds | 16.0 | 105SE |
| 106NW | 5.1 | | At Whiteside and above mouth of Murphy Hollow | 7.09 | 112SW |
| 106NW | 0 | Murphy Hollow Creek | Mouth at Running Water Creek at Whiteside | 6.89 | 112SW |
| 105SW | 0 | Suck Creek | Mouth at Tennessee River Mile 451.9 | 23.0 | 112SW |
| 105SW | 0.3 | | Tennessee Hwy 27 bridge | 22.6 | 112SW |
| 105SE | 0.1 | Middle Creek | Tennessee Hwy 27, 2.5 miles NW of Glendale | 7.68 | 112SW |
| 105SE | 0.1 | Shoal Creek | Tennessee Hwy 27, 1.7 miles west of Glendale | 2.51 | 112SW |
| 105SE | 0 | Mountain Creek | Mouth at Tennessee River Mile 455.4 | 13.3 | 112SW |
| 105SE | 0.4 | | Above Stringers Branch | 7.04 | 113NW |
| 105SE | 1.5 | | At Signal Mountain Boulevard | 6.37 | 113NW |
| 105SE | 2.4 | | At Godsey Road | 5.46 | 113NW |
| 105NE | 4.0 | | At Morrison Springs Road | 3.34 | 113NW |
| 105NE | 4.4 | Mountain Creek | At Reads Lake Road | 2.64 | 113NW |
| 105SE | 0 | Stringers Branch | Mouth at Mountain Creek | 6.21 | 113NE |
| 105SE | 0.8 | | Tennessee Hwy 27, 0.5 mile west of Valdeau | 5.90 | 113NE |
| 105SE | 1.4 | | U. S. Hwy 27 at Valdeau | 5.29 | 112SW |
| 105SE | 1.5 | | 800 feet NE of junction of Tennessee Hwy 27 and U. S. Hwy 27 | 4.73 | 112SW |
| 105SE | 2.8 | Stringers Branch | At Culver Street, White Oak | 2.82 | 112SW |
| 105SE | 4.2 | | Leawood Street, Red Bank | 1.54 | 112SW |
| 105SE | 6.2 | | Above confluence of Stringers Branch drainage ditch | 0.40 | 112SW |
| 105SE | 4.3 | Stringers Br Drainage Ditch | At Unaka Street, Red Bank, 0.1 mile above confluence | 1.09 | 112SW |
| 105NE | 5.6 | | U. S. Hwy 27, 1000 feet south of Browntown Road, 1.4 miles above confluence | 0.46 | 112SW |
| 1[illegible] | 0 | Lookout Creek | Mouth at Tennessee River Mile 459.8 | 187 | 112SW |
| 1[illegible] | 1.2 | | At U. S. Hwys 41 and 64 | 184 | 112SW |
| 106NW | 4.4 | | 0.5 mile below Tennessee-Georgia state line | 174 | 112SW |
| 106NW | 5.2 | | At Tennessee-Georgia state line | 172 | 112SW |
| 106NW | 8.8 | | Former USGS gage near Wildwood, footbridge 1 mile SE of Wildwood | 165 | 112SW |
| 106NW | 11.0 | Lookout Creek | 1.8 miles south of Wildwood (road crossing) | 163 | 113NW |
| 101SE | 20.9 | | Georgia Hwy 2, 0.8 mile SE of Trenton | 102 | 113NW |
| 102NE | 39.2 | | At bridge 0.4 mile below Sulphur Springs | 16.3 | 113NW |
| 105SE | 0 | Black Creek | Mouth at Lookout Creek Mile 2.43 | 6.43 | 113NW |
| 105SW | 0.7 | | At L&N R.R. bridge, Wauhatchie | 5.72 | 113NW |
| 106NW | 0.4 | Pope Creek | 0.4 mile above mouth at Lookout Creek, 1.5 miles south of Wildwood | 8.21 | 113NW |
| 106NW | | Squirrel Town Creek | 1 mile above mouth at Lookout Creek, bridge 0.4 mile east of New England | 9.41 | 107NE |
| 102NE | 0 | Dry Creek | 200 feet above mouth at Cloverdale | 21.9 | 106SE |
| 105SE | 0 | Chattanooga Creek | Mouth at Tennessee River Mile 460.6 | 74.7 | 106SE |
| 105SE | 0.6 | | R.R. crossing opposite West 33rd Street | 72.5 | 106SE |
| 105SE | 1.4 | Chattanooga Creek | Former USGS stream gage 1300 feet above Broad Street | 72.2 | 106SE |
| 105SE | 1.6 | | Former TVA stream gage at South Market Street ← ~120 CFS | 72.0 | 106SE |
| 105SE | 2.1 | | USGS crest gage at Southern Ry., Shipps Yards | 70.7 | 106SE |
| 105SE | 3.6 | | Former TVA stream gage at Sou. Wood Preserving Co. | 66.2 | 106SE |
| 105SE | 4.8 | | At head of Hales Bar backwater | 65.5 | 106SE |
| 105SE | 5.2 | Chattanooga Creek | Former TVA stream gage at 38th Street | 65.2 | [illegible] |
| 106NE | 6.3 | | Hamil Road | 63.9 | [illegible] |
| 106NE | 6.5 | | USGS crest gage at Central of Ga. R.R. | 63.9 | [illegible] |
| 106NE | 6.8 | | USGS crest gage at Hooker Road | 62.8 | [illegible] |
| 106NE | 7.6 | | Above Dry Creek | 55.2 | [illegible] |
| 106NE | 7.9 | Chattanooga Creek | USGS crest gage at Wilson Road | 55.1 | [illegible] |
| 106NE | 9.1 | | USGS crest gage at Burnt Mill Road | 54.1 | [illegible] |
| 106NE | 9.3 | | At Tennessee-Georgia state line | 52.0 | [illegible] |
| 106NE | 10.3 | | USGS stream gage near Flintstone 1 mile south of Tennessee-Georgia state line | 50.6 | [illegible] |
| 106NE | 11.4 | | At power line crossing 0.6 mile NE of Flintstone | 47.7 | [illegible] |
| 106NE | 12.8 | Chattanooga Creek | Georgia Hwy 349 bridge at Flintstone | 21.4 | [illegible] |
| 106NE | 15.8 | | Georgia Hwy 341 bridge 1.3 miles south of Flintstone | 18.3 | [illegible] |
| 1[illegible] | 16.8 | | Nickajack Road at Cenchat, Georgia | 15.9 | [illegible] |
| 1[illegible] | 0.4 | Dobbs Branch | At Burnett Street, Chattanooga | 4.25 | [illegible] |
| 10[illegible] | 0.8 | | At head of Nickajack Reservoir backwater, 0.1 mile SE of Park City | 3.57 | [illegible] |
| 105SE | 1.3 | Dobbs Branch | At Hickory Street, 0.6 mile east of Park City | 1.97 | [illegible] |
| 105SE | 0 | Unnamed Trib to Dobbs Br | Mouth at Dobbs Branch, 0.2 mile SE of Park City | 1.35 | [illegible] |
| 105SE | | | At 28th Street, 0.4 mile SE of Park City | 1.29 | [illegible] |
| 106NE | 0.2 | McFarland Spring Branch | At State Line Road | 1.22 | [illegible] |
| 106NE | 0.3 | | 600 feet above State Line Road, 700 feet NW of Rossville High School | 1.15 | [illegible] |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 38

1970

# Water Resources Data for Tennessee

## Part 1. Surface Water Records

## Part 2. Water Quality Records

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources; the Tennessee Valley Authority; and with other State, municipal, and Federal agencies

## 03568500 Chattanooga Creek near Flintstone, Ga.

LOCATION.--Lat 34°58'20", long 85°19'40", Walker County, on right bank 0.8 mile south of Georgia-Tennessee State line and 2.3 miles northeast of Flintstone.

DRAINAGE AREA.--50.6 sq mi.

PERIOD OF RECORD.--October 1950 to current year. Prior to December 1950 monthly discharges only, published in WSP 1726.

GAGE.--Water-stage recorder. Datum of gage is 649.18 ft above mean sea level.

AVERAGE DISCHARGE.--20 years, 82.6 cfs (22.17 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,760 cfs Dec. 31 (gage height, 9.63 ft); minimum daily, 6.2 cfs July 18-20; minimum gage height, 1.97 ft Oct. 7.
Period of record: Maximum discharge, 6,140 cfs Feb. 23, 1962; minimum, 1.0 cfs Sept. 8, 9, 1954; minimum gage height, 0.15 ft July 29, 1952.

REMARKS.--Records good except for August and September, which are fair. Some diurnal fluctuation at low flow caused by bleachery above station.

REVISIONS (WATER YEARS).--WSP 1726: 1951(M). WSP 1910: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1969 TO SEPTEMBER 1970

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5 | 19 | 17 | 286 | 91 | 56 | 411 | 112 | 17 | 13 | 16 | 17 |
| 2 | 11 | 22 | 17 | 192 | 164 | 52 | 1,160 | 93 | 22 | 12 | 15 | 18 |
| 3 | 11 | 17 | 16 | 136 | 159 | 48 | 509 | 82 | 59 | 12 | 15 | 24 |
| 4 | 10 | 14 | 16 | 107 | 128 | 77 | 275 | 71 | 74 | 11 | 17 | 30 |
| 5 | 9.8 | 13 | 15 | 86 | 109 | 86 | 204 | 60 | 75 | 9.6 | 16 | 37 |
| 6 | 9.3 | 12 | 15 | 82 | 96 | 77 | 161 | 51 | 45 | 8.5 | 16 | 30 |
| 7 | 9.5 | 11 | 87 | 72 | 85 | 70 | 130 | 43 | 34 | 8.8 | 14 | 32 |
| 8 | 13 | 10 | 85 | 55 | 77 | 65 | 109 | 38 | 26 | 8.4 | 13 | 26 |
| 9 | 10 | 10 | 54 | 43 | 77 | 60 | 96 | 33 | 22 | 8.4 | 16 | 19 |
| 10 | 10 | 10 | 65 | 40 | 67 | 52 | 84 | 30 | 19 | 8.8 | 16 | 14 |
| 11 | 9.1 | 10 | 99 | 42 | 62 | 46 | 74 | 28 | 19 | 8.4 | 17 | 12 |
| 12 | 9.5 | 11 | 72 | 45 | 56 | 59 | 66 | 26 | 17 | 7.4 | 16 | 10 |
| 13 | 9.5 | 12 | 56 | 47 | 51 | 56 | 66 | 23 | 16 | 7.1 | 17 | 8.8 |
| 14 | 10 | 12 | 47 | 46 | 47 | 50 | 60 | 22 | 17 | 7.1 | 16 | 8.8 |
| 15 | 11 | 12 | 40 | 45 | 46 | 49 | 51 | 20 | 15 | 7.4 | 15 | 7.7 |
| 16 | 9.5 | 11 | 35 | 55 | 48 | 43 | 45 | 24 | 13 | 6.8 | 14 | 7.1 |
| 17 | 9.5 | 11 | 31 | 91 | 49 | 41 | 45 | 23 | 12 | 6.5 | 20 | 6.8 |
| 18 | 9.1 | 11 | 29 | 133 | 46 | 53 | 46 | 20 | 11 | 6.2 | 24 | 6.5 |
| 19 | 9.1 | 53 | 27 | 115 | 45 | 107 | 46 | 18 | 9.5 | 6.2 | 17 | 6.9 |
| 20 | 9.1 | 58 | 25 | 100 | 40 | 381 | 198 | 17 | 27 | 6.2 | 14 | 6.8 |
| 21 | 12 | 36 | 30 | 79 | 36 | 266 | 158 | 16 | 27 | 7.1 | 12 | 11 |
| 22 | 12 | 28 | 78 | 67 | 35 | 255 | 117 | 15 | 18 | 33 | 11 | 14 |
| 23 | 11 | 24 | 66 | 64 | 36 | 207 | 97 | 14 | 15 | 298 | 13 | 10 |
| 24 | 12 | 23 | 60 | 56 | 34 | 167 | 115 | 14 | 13 | 121 | 12 | 7.7 |
| 25 | 10 | 21 | 61 | 51 | 49 | 139 | 135 | 16 | 13 | 60 | 10 | 8.8 |
| 26 | 11 | 20 | 84 | 102 | 72 | 135 | 310 | 20 | 24 | 42 | 9.6 | 9.2 |
| 27 | 11 | 18 | 81 | 98 | 65 | 119 | 443 | 14 | 32 | 31 | 9.8 | 8.4 |
| 28 | 11 | 18 | 69 | 89 | 59 | 108 | 254 | 12 | 25 | 25 | 8.8 | 8.4 |
| 29 | 10 | 17 | 74 | 91 | ------ | 110 | 181 | 13 | 19 | 22 | 16 | 7.1 |
| 30 | 10 | 17 | 380 | 112 | ------ | 98 | 140 | 19 | 15 | 20 | 20 | 6.8 |
| 31 | 10 | ------ | 998 | 99 | ------ | 89 | ------ | 18 | ------ | 18 | 19 | ------ |
| TOTAL | 313.3 | 561 | 2,829 | 2,730 | 1,929 | 3,221 | 5,785 | 1,005 | 749.6 | 847.2 | 466.2 | 419.7 |
| MEAN | 10.1 | 18.7 | 91.3 | 88.1 | 68.9 | 104 | 193 | 32.4 | 25.0 | 27.3 | 15.0 | 14.0 |
| MAX | 12 | 53 | 998 | 286 | 164 | 381 | 1,160 | 112 | 75 | 298 | 24 | 37 |
| MIN | 8.5 | 10 | 15 | 40 | 34 | 41 | 45 | 12 | 9.5 | 6.2 | 8.8 | 6.5 |
| CFSM | .20 | .37 | 1.80 | 1.74 | 1.36 | 2.06 | 3.81 | .64 | .49 | .54 | .30 | .28 |
| IN. | .23 | .41 | 2.08 | 2.01 | 1.42 | 2.37 | 4.25 | .74 | .55 | .62 | .34 | .31 |

CAL YR 1969 TOTAL 31,926.6 MEAN 87.5 MAX 3,230 MIN 4.9 CFSM 1.73 IN 23.47
WAT YR 1970 TOTAL 20,856.0 MEAN 57.1 MAX 1,160 MIN 6.2 CFSM 1.13 IN 15.33

PEAK DISCHARGE (BASE, 1,100 CFS)

| DATE | TIME | G.HT. | DISCHARGE | DATE | TIME | G.HT. | DISCHARGE |
|---|---|---|---|---|---|---|---|
| 12-31 | Unknown | 9.63 | 1,760 | 4-2 | 1330 | 9.37 | 1,580 |

APR 10 1973

Return to JRM

1971

# Water Resources Data for Tennessee

## Part 1. Surface Water Records

## Part 2. Water Quality Records

Division of Water Quality Control
Environmental Health Services
6200 Building Suite 6100
Eastgate Center
Chattanooga, Tennessee 37411

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources, the Tennessee Valley Authority and with other State, municipal, and Federal agencies

03568500 Chattanooga Creek near Flintstone, Ga.

LOCATION.--Lat 34°58'20", long 85°19'40", Walker County, on right bank 0.8 mile south of Georgia-Tennessee State line and 2.3 miles northeast of Flintstone, and at mile 10.3.

DRAINAGE AREA.--50.6 sq mi.

PERIOD OF RECORD.--October 1950 to current year. Prior to December 1950 monthly discharges only, published in WSP 1726.

GAGE.--Water-stage recorder. Datum of gage is 649.18 ft above mean sea level.

AVERAGE DISCHARGE.--21 years, 82.2 cfs (22.06 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,680 cfs Feb. 26 (gage height, 9.52 ft); minimum, 4.3 cfs Sept. 11, 13, 14.
Period of record: Maximum discharge, 6,140 cfs Feb. 23, 1962 (gage height, 13.48 ft); minimum, 1.0 cfs Sept. 8, 9, 1954; minimum gage height, 0.15 ft July 29, 1952.

REMARKS.--Records good except for June, July and August, which are fair. Some diurnal fluctuation at low flow caused by bleachery above station.

REVISIONS (WATER YEARS).--WSP 1910: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1970 TO SEPTEMBER 1971

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.7 | 30 | 18 | 72 | 110 | 258 | 178 | 49 | 11 | 19 | 50 | 5.8 |
| 2 | 6.4 | 25 | 17 | 67 | 94 | 281 | 182 | 44 | 9.8 | 17 | 37 | 10 |
| 3 | 5.8 | 22 | 16 | 67 | 89 | 753 | 152 | 39 | 9.8 | 15 | 60 | 13 |
| 4 | 4.6 | 21 | 15 | 123 | 143 | 408 | 133 | 35 | 9.4 | 14 | 49 | 9.0 |
| 5 | 6.7 | 18 | 14 | 235 | 1,020 | 277 | 117 | 32 | 8.6 | 13 | 38 | 7.8 |
| 6 | 7.0 | 16 | 14 | 153 | 469 | 228 | 129 | 33 | 7.8 | 32 | 23 | 6.8 |
| 7 | 8.2 | 14 | 13 | 111 | 276 | 198 | 141 | 33 | 9.0 | 38 | 30 | 6.5 |
| 8 | 9.0 | 12 | 12 | 90 | 214 | 135 | 133 | 34 | 11 | 44 | 22 | 6.5 |
| 9 | 9.8 | 13 | 12 | 79 | 159 | 131 | 121 | 30 | 8.6 | 32 | 19 | 6.3 |
| 10 | 9.0 | 18 | 12 | 68 | 128 | 131 | 106 | 27 | 9.4 | 24 | 19 | 5.8 |
| 11 | 7.8 | 17 | 12 | 62 | 112 | 120 | 93 | 26 | 9.4 | 20 | 17 | 5.3 |
| 12 | 9.0 | 15 | 33 | 55 | 102 | 110 | 87 | 60 | 7.8 | 18 | 15 | 5.5 |
| 13 | 9.4 | 14 | 42 | 51 | 109 | 114 | 81 | 104 | 7.4 | 17 | 14 | 5.3 |
| 14 | 11 | 14 | 32 | 76 | 90 | 115 | 74 | 83 | 7.0 | 16 | 16 | 5.5 |
| 15 | 11 | 15 | 27 | 139 | 86 | 118 | 65 | 65 | 6.5 | 18 | 14 | 5.8 |
| 16 | 11 | 13 | 44 | 125 | 79 | 107 | 61 | 57 | 8.2 | 24 | 11 | 6.3 |
| 17 | 9.8 | 13 | 55 | 106 | 73 | 95 | 55 | 46 | 17 | 21 | 9.5 | 54 |
| 18 | 10 | 13 | 48 | 88 | 67 | 86 | 51 | 39 | 51 | 18 | 11 | 57 |
| 19 | 13 | 16 | 42 | 74 | 64 | 103 | 48 | 32 | 27 | 17 | 9.0 | 21 |
| 20 | 24 | 94 | 40 | 61 | 166 | 95 | 44 | 27 | 19 | 15 | 12 | 14 |
| 21 | 21 | 88 | 41 | 55 | 206 | 86 | 40 | 24 | 17 | 16 | 10 | 18 |
| 22 | 13 | 60 | 40 | 99 | 975 | 81 | 39 | 21 | 16 | 15 | 9.0 | 15 |
| 23 | 11 | 46 | 146 | 561 | 550 | 84 | 93 | 20 | 15 | 13 | 8.0 | 12 |
| 24 | 11 | 36 | 234 | 435 | 286 | 68 | 147 | 18 | 14 | 13 | 7.5 | 11 |
| 25 | 36 | 37 | 144 | 385 | 209 | 88 | 98 | 17 | 13 | 46 | 6.4 | 9.0 |
| 26 | 33 | 28 | 97 | 280 | 735 | 372 | 80 | 16 | 12 | 61 | 6.5 | 8.2 |
| 27 | 20 | 25 | 78 | 199 | 945 | 302 | 68 | 14 | 13 | 43 | 6.3 | 7.8 |
| 28 | 16 | 22 | 64 | 155 | 343 | 264 | 72 | 13 | 21 | 36 | 5.8 | 9.0 |
| 29 | 34 | 20 | 57 | 126 | ------ | 366 | 53 | 13 | 24 | 62 | 5.8 | 9.4 |
| 30 | 78 | 19 | 51 | 122 | ------ | 324 | 55 | 12 | 18 | 88 | 5.8 | 7.8 |
| 31 | 44 | ------ | 60 | 132 | ------ | 236 | ------ | 11 | ------ | 65 | 5.5 | ------ |
| TOTAL | 506.2 | 794 | 1,530 | 4,451 | 7,899 | 6,154 | 2,796 | 1,074 | 417.7 | 890 | 552.1 | 364.4 |
| MEAN | 16.3 | 26.5 | 49.4 | 144 | 282 | 199 | 93.2 | 34.6 | 13.9 | 28.7 | 17.8 | 12.1 |
| MAX | 78 | 94 | 234 | 561 | 1,020 | 753 | 182 | 104 | 51 | 88 | 60 | 57 |
| MIN | 4.6 | 12 | 12 | 51 | 64 | 68 | 39 | 11 | 6.5 | 13 | 5.5 | 5.3 |
| CFSM | .32 | .52 | .98 | 2.85 | 5.57 | 3.93 | 1.84 | .68 | .27 | .57 | .35 | .24 |
| IN. | .37 | .58 | 1.12 | 3.27 | 5.81 | 4.52 | 2.06 | .79 | .31 | .65 | .41 | .27 |

CAL YR 1970 TOTAL 19,982.9 MEAN 54.7 MAX 1,160 MIN 4.6 CFSM 1.08 IN 14.69
WTR YR 1971 TOTAL 27,428.4 MEAN 75.1 MAX 1,020 MIN 4.6 CFSM 1.48 IN 20.16

PEAK DISCHARGE (BASE, 1,100 CFS)

| DATE | TIME | G.HT. | DISCHARGE | DATE | TIME | G.HT. | DISCHARGE |
|---|---|---|---|---|---|---|---|
| 2-5 | 1145 | 9.34 | 1,560 | 2-26 | 2115 | 9.52 | 1,680 |
| 2-22 | 1545 | 9.33 | 1,550 | | | | |

1972

# Water Resources Data for Tennessee

## Part 1. Surface Water Records

## Part 2. Water Quality Records

Division of Water Quality Control
Environmental Health Services
6200 Building Suite 6100
Eastgate Center
Chattanooga, Tennessee 37411

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources; the Tennessee Valley Authority; and with other State, municipal, and Federal agencies

TENNESSEE RIVER BASIN

03568500 Chattanooga Creek near Flintstone, Ga.

LOCATION.--Lat 34°58'20", long 85°19'40", Walker County, on right bank 0.8 mile south of Georgia-Tennessee State line and 2.3 miles northeast of Flintstone, and at mile 10.3.

DRAINAGE AREA.--50.6 sq mi.

PERIOD OF RECORD.--October 1950 to current year. Prior to December 1950 monthly discharges only, published in WSP 1726.

GAGE.--Water-stage recorder. Datum of gage is 649.18 ft above mean sea level.

AVERAGE DISCHARGE.--22 years, 82.9 cfs (22.25 inches per year).

EXTREMES.--Current year: Maximum discharge, 1,920 cfs May 14 (gage height, 9.86 ft); minimum, 5.2 cfs Oct. 4.
Period of record: Maximum discharge, 6,140 cfs Feb. 23, 1962 (gage height, 13.48 ft); minimum, 1.0 cfs Sept. 8, 9, 1954.

REMARKS.--Records good. Some diurnal fluctuation at low flow caused by bleachery above station.

REVISIONS (WATER YEARS).--WSP 1910: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1971 TO SEPTEMBER 1972

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 7.4 | 11 | 22 | 1 3 | 79 | 100 | 208 | 57 | 3[illegible] | 17 | 152 | 14 |
| 2 | 6.5 | 11 | 25 | 707 | 83 | 500 | 166 | 53 | 27 | 16 | 174 | 11 |
| 3 | 6.5 | 15 | 42 | 442 | 146 | 900 | 152 | 52 | 23 | 27 | 113 | 12 |
| 4 | 6.0 | 18 | 128 | 839 | 181 | 500 | 156 | 66 | 21 | 28 | 77 | 12 |
| 5 | 6.5 | 15 | 136 | 665 | 145 | 35[illegible] | 142 | 52 | 18 | 5[illegible] | 60 | 14 |
| 6 | 7.8 | 13 | 168 | 322 | 141 | 175 | 13[illegible] | 44 | 16 | 44 | 56 | 14 |
| 7 | 10 | 13 | 890 | 235 | 181 | 135 | 119 | 41 | 15 | 29 | 48 | 14 |
| 8 | 12 | 12 | 3[illegible]5 | 175 | 153 | 156 | 194 | 171 | 16 | 21 | 42 | 15 |
| 9 | 13 | 11 | 174 | 168 | 127 | 134 | 158 | 241 | 13 | 16 | 44 | 16 |
| 10 | 13 | 11 | 126 | 465 | 114 | 122 | 134 | 152 | 12 | 16 | 49 | 15 |
| 11 | 12 | 11 | 1[illegible]0 | 692 | 111 | 109 | 120 | 110 | 11 | 14 | 38 | 18 |
| 12 | 11 | 1[illegible] | 8[illegible] | 359 | 102 | 97 | 108 | 87 | 9.6 | 13 | 31 | 16 |
| 13 | 12 | 1[illegible] | 126 | 274 | 175 | 84 | 96 | 460 | 8.4 | 13 | 29 | 15 |
| 14 | 12 | 1[illegible] | 113 | 256 | 147 | 104 | 88 | 1,260 | 8.2 | 22 | 24 | 12 |
| 15 | 12 | 1[illegible] | 99 | 192 | 131 | 91 | 76 | 407 | 6.2 | 43 | 21 | 10 |
| 16 | 15 | 10 | 92 | 151 | 114 | 95 | 72 | 247 | 13 | 44 | 19 | 10 |
| 17 | 17 | 10 | 172 | 134 | 198 | 97 | 66 | 175 | 15 | 36 | 17 | 21 |
| 18 | 16 | 11 | 11[illegible] | 114 | 239 | 91 | 59 | 133 | 15 | 71 | 17 | 46 |
| 19 | 15 | 12 | 170 | 103 | 262 | 85 | 55 | 104 | 15 | 46 | 16 | 35 |
| 20 | 14 | 12 | 143 | 92 | 241 | 75 | 52 | 87 | 155 | 36 | 15 | 29 |
| 21 | 13 | 11 | 147 | 99 | 156 | 76 | 48 | 77 | 152 | 29 | 14 | 26 |
| 22 | 13 | 8.6 | 117 | 165 | 136 | 117 | 329 | 67 | 55 | 25 | 14 | 25 |
| 23 | 22 | 11 | 95 | 164 | 117 | 99 | 286 | 67 | 31 | 29 | 15 | 25 |
| 24 | 35 | 15 | 85 | 99 | 106 | 90 | 165 | 59 | 21 | 35 | 15 | 24 |
| 25 | 37 | 19 | 75 | 96 | 12[illegible] | 95 | 137 | 55 | 16 | 33 | 17 | 24 |
| 26 | 14 | 18 | 69 | 86 | 175 | 94 | 109 | 47 | 13 | 38 | 15 | 24 |
| 27 | 12 | 20 | 62 | 83 | 225 | 124 | 92 | 40 | 24 | 55 | 14 | 27 |
| 28 | 11 | 23 | 57 | 86 | 150 | 411 | 80 | 36 | 20 | 276 | 12 | 39 |
| 29 | 11 | 26 | 52 | 84 | 125 | 549 | 72 | 34 | 28 | 300 | 12 | 36 |
| 30 | 11 | 25 | 62 | 87 | ------ | 355 | 64 | 31 | 19 | 254 | 11 | 72 |
| 31 | 10 | ------ | 117 | 83 | ------ | 262 | ------ | 31 | ------ | 261 | 12 | ------ |
| TOTAL | 413.7 | 412.6 | 4,074 | 7,414 | 4,346 | 6,274 | 3,751 | 4,553 | 622.4 | 1,948 | 1,187 | 671 |
| MEAN | 13.3 | 13.[illegible] | 131 | 239 | 150 | 202 | 125 | 147 | 27.4 | 62.8 | 38.3 | 22.4 |
| MAX | 37 | 26 | 890 | 839 | 262 | 900 | 329 | 1,260 | 155 | 300 | 174 | 72 |
| MIN | 6.0 | 8.6 | 20 | 83 | 79 | 75 | 48 | 31 | 8.2 | 13 | 11 | 10 |
| CFSM | .26 | .27 | 2.59 | 4.72 | 2.96 | 3.99 | 2.47 | 2.91 | .54 | 1.24 | .76 | .44 |
| IN. | .30 | .30 | 3.00 | 5.45 | 3.20 | 4.61 | 2.76 | 3.35 | .4[illegible] | 1.43 | .87 | .49 |

CAL YR 1971 TOTAL 29,498.5 MEAN 80.8 MAX 1,020 MIN 5.3 CFSM 1.60 IN 21.69
WTR YR 1972 TOTAL 35,876.7 MEAN 98.0 MAX 1,260 MIN 8.0 CFSM 1.94 IN 26.39

PEAK DISCHARGE (BASE, 1,100 CFS)

| DATE | TIME | G.HT. | DISCHARGE | DATE | TIME | G.HT. | DISCHARGE |
|---|---|---|---|---|---|---|---|
| 12-7 | 0930 | 8.89 | 1,270 | 1-4 | 1715 | 9.06 | 1,370 |
| 1-2 | 1515 | 8.61 | 1,100 | 5-14 | 0145 | 9.86 | 1,920 |

Division of Water Quality Control
Environmental Health Services
6200 Building Suite 6100
Eastgate Center
Chattanooga, Tennessee 37411

1973

# Water Resources Data for Tennessee

## Part 1. Surface Water Records

## Part 2. Water Quality Records

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources; the Tennessee Valley Authority; and with other State, municipal, and Federal agencies

## 03568500 Chattanooga Creek near Flintstone, Ga.

LOCATION.--Lat 34°58'20", long 85°19'40", Walker County, on right bank 0.8 mile (1.3 km) south of Georgia-Tennessee State line and 2.3 miles (3.7 km) northeast of Flintstone, and at mile 10.3 (16.6 km).

DRAINAGE AREA.--50.6 sq mi (131.0 sq km).

PERIOD OF RECORD.--October 1950 to current year. Prior to December 1950 monthly discharges only, published in WSP 1726.

GAGE.--Water-stage recorder. Datum of gage is 649.18 ft (197.870 m) above mean sea level.

AVERAGE DISCHARGE.--23 years, 85.3 cfs (2.416 cu m/s), 22.69 in/yr (581 mm/yr).

EXTREMES.--Current year: Maximum discharge, 6,300 cfs (178 cu m/s) Mar. 16, gage height, 13.59 ft (4.142 m); minimum, 8.4 cfs (0.24 cu m/s) Sept. 11.
Period of record: Maximum discharge, 6,300 cfs (178 cu m/s) Mar. 16, 1973, gage height, 13.59 ft (4.142 m); minimum, 1.0 cfs (0.028 cu m/s) Sept. 8, 9, 1954.

REMARKS.--Records good. Some diurnal fluctuation at low flow caused by bleachery above station. Records of chemical analyses for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1910: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 28 | 39 | 76 | 362 | 151 | 50 | 307 | 163 | 109 | 31 | 46 | 13 |
| 2 | 16 | 35 | 70 | 235 | 279 | 81 | 220 | 136 | 92 | 31 | 39 | 12 |
| 3 | 12 | 56 | 65 | 216 | 233 | 203 | 180 | 120 | 78 | 30 | 35 | 11 |
| 4 | 15 | 49 | 61 | 263 | 187 | 161 | 154 | 103 | 68 | 24 | 32 | 11 |
| 5 | 55 | 42 | 58 | 219 | 159 | 159 | 125 | 87 | 60 | 23 | 29 | 10 |
| 6 | 32 | 36 | 161 | 202 | 159 | 140 | 108 | 77 | 100 | 21 | 30 | 9.5 |
| 7 | 21 | 48 | 180 | 181 | 148 | 227 | 205 | 70 | 120 | 18 | 30 | 9.0 |
| 8 | 17 | 119 | 136 | 241 | 229 | 215 | 281 | 128 | 100 | 24 | 28 | 8.6 |
| 9 | 15 | 84 | 162 | 207 | 295 | 639 | 206 | 122 | 81 | 22 | 26 | 8.6 |
| 10 | 13 | 66 | 290 | 172 | 225 | 580 | 170 | 84 | 71 | 21 | 33 | 8.5 |
| 11 | 12 | 55 | 441 | 148 | 179 | 742 | 140 | 75 | 70 | 27 | 48 | 8.4 |
| 12 | 12 | 46 | 272 | 127 | 147 | 870 | 123 | 77 | 70 | 22 | 37 | 9.7 |
| 13 | 14 | 41 | 206 | 108 | 131 | 367 | 106 | 65 | 62 | 19 | 35 | 65 |
| 14 | 15 | 65 | 198 | 100 | 397 | 262 | 92 | 57 | 67 | 20 | 31 | 54 |
| 15 | 18 | 61 | 471 | 104 | 381 | 267 | 83 | 51 | 82 | 21 | 27 | 30 |
| 16 | 20 | 55 | 456 | 104 | 258 | 4,760 | 78 | 46 | 135 | 19 | 24 | 23 |
| 17 | 21 | 49 | 259 | 103 | 200 | 2,080 | 74 | 43 | 101 | 44 | 21 | 20 |
| 18 | 59 | 43 | 192 | 101 | 166 | 979 | 82 | 40 | 78 | 38 | 21 | 41 |
| 19 | 80 | 90 | 157 | 247 | 141 | 406 | 104 | 42 | 64 | 27 | 19 | 30 |
| 20 | 40 | 172 | 139 | 241 | 121 | 271 | 91 | 184 | 85 | 23 | 18 | 23 |
| 21 | 28 | 120 | 240 | 191 | 104 | 220 | 83 | 100 | 68 | 21 | 24 | 20 |
| 22 | 22 | 96 | 363 | 406 | 93 | 174 | 77 | 71 | 81 | 20 | 18 | 52 |
| 23 | 21 | 74 | 250 | 295 | 85 | 146 | 74 | 60 | 68 | 19 | 16 | 116 |
| 24 | 21 | 62 | 200 | 217 | 75 | 127 | 74 | 185 | 56 | 24 | 15 | 43 |
| 25 | 17 | 65 | 175 | 173 | 67 | 143 | 190 | 147 | 49 | 119 | 14 | 33 |
| 26 | 15 | 86 | 150 | 182 | 63 | 138 | 524 | 111 | 43 | 306 | 14 | 28 |
| 27 | 18 | 79 | 125 | 296 | 59 | 120 | 1,170 | 113 | 40 | 115 | 13 | 25 |
| 28 | 118 | 74 | 93 | 242 | 54 | 109 | 459 | 522 | 42 | 69 | 13 | 23 |
| 29 | 82 | 68 | 81 | 211 | ------ | 103 | 273 | 263 | 43 | 52 | 13 | 22 |
| 30 | 56 | 75 | 74 | 174 | ------ | 98 | 204 | 175 | 34 | 44 | 13 | 26 |
| 31 | 46 | ------ | 505 | 152 | ------ | 299 | ------ | 130 | ------ | 53 | 13 | ------ |
| TOTAL | 959 | 2,050 | 6,306 | 6,220 | 4,786 | 15,136 | 6,057 | 3,647 | 2,217 | 1,347 | 775 | 793.3 |
| MEAN | 30.9 | 68.3 | 203 | 201 | 171 | 488 | 202 | 118 | 73.9 | 43.5 | 25.0 | 26.4 |
| MAX | 118 | 172 | 505 | 406 | 397 | 4,760 | 1,170 | 522 | 135 | 306 | 48 | 116 |
| MIN | 12 | 35 | 58 | 100 | 54 | 50 | 74 | 40 | 34 | 18 | 13 | 8.4 |
| CFSM | .61 | 1.35 | 4.01 | 3.97 | 3.38 | 9.64 | 3.99 | 2.33 | 1.46 | .86 | .49 | .52 |
| IN. | .71 | 1.51 | 4.64 | 4.57 | 3.52 | 11.13 | 4.45 | 2.68 | 1.63 | .99 | .57 | .58 |

CAL YR 1972 TOTAL 40,291.4 MEAN 110 MAX 1,260 MIN 8.2 CFSM 2.17 IN 29.62
WTR YR 1973 TOTAL 50,293.3 MEAN 138 MAX 4,760 MIN 8.4 CFSM 2.73 IN 36.97

PEAK DISCHARGE (BASE, 1,100 CFS)

| DATE | TIME | G.HT. | DISCHARGE | DATE | TIME | G.HT. | DISCHARGE |
|---|---|---|---|---|---|---|---|
| 03-09 | 1900 | 8.68 | 1,140 | 03-16 | 1945 | 13.59 | 6,300 |
| 03-11 | 2130 | 9.30 | 1,530 | 04-27 | 0130 | 9.18 | 1,450 |

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

TENNESSEE RIVER BASIN

| DATE | TIME | DIS-CHARGE (CFS) | DIS-SOLVED SILICA (SIO2) (MG/L) | TOTAL IRON (FE) (UG/L) | DIS-SOLVED CAL-CIUM (CA) (MG/L) | DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) | DIS-SOLVED SODIUM (NA) (MG/L) | DIS-SOLVED PO-TAS-SIUM (K) (MG/L) | TOTAL ALUM-INUM (AL) (UG/L) | BICAR-BONATE (HCO3) (MG/L) | DIS-SOLVED SULFATE (SO4) (MG/L) | DIS-SOLVED CHLO-RIDE (CL) (MG/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03568500 - CHATTANOOGA CREEK NEAR FLINTSTONE, GA (LAT 34 58 20 LONG 085 19 40) B/ | | | | | | | | | | | | |
| NOV., 1972 | | | | | | | | | | | | |
| 22... | 1325 | 86 | 5.1 | 110 | 16 | 3.1 | 2.7 | 1.5 | -- | 48 | 13 | 4.5 |
| JAN., 1973 | | | | | | | | | | | | |
| 16... | 0955 | 103 | 5.0 | 20 | 19 | 3.2 | 3.3 | 1.2 | -- | 54 | 18 | 4.0 |
| MAR. | | | | | | | | | | | | |
| 29... | 1350 | 102 | 4.7 | 100 | 20 | 4.0 | 1.7 | .9 | -- | 57 | 17 | 3.0 |
| JULY | | | | | | | | | | | | |
| 16... | 0940 | 18 | 5.2 | 100 | 30 | 6.4 | 4.0 | 1.9 | <200 | 110 | 19 | 4.0 |
| SEP. | | | | | | | | | | | | |
| 11... | 0830 | 9.0 | 6.0 | <50 | 35 | 8.0 | 7.0 | 1.9 | <200 | 130 | 10 | 5.0 |

| DATE | DIS-SOLVED URANIUM (U) (UG/L) | DIS-SOLVED RA-226 (RADON METHOD) (PC/L) | DIS-SOLVED GROSS ALPHA AS U-NAT. (UG/L) | DIS-SOLVED GROSS ALPHA AS U-NAT. (PC/L) | DIS-SOLVED GROSS BETA AS SR90 /Y90 (PC/L) | DIS-SOLVED GROSS BETA AS CS-137 (PC/L) |
|---|---|---|---|---|---|---|
| 03571850 - TENNESSEE RIVER AT SOUTH PITTSBURG, TN. (LAT 35 00 41 LONG 085 41 51) A/ | | | | | | |
| OCT. | | | | | | |
| 19... | .04 | -- | <1.7 | <.6 | 3.0 | 3.6 |
| NOV. | | | | | | |
| 16... | .11 | .03 | 1.7 | .6 | 3.1 | 4.0 |
| DEC. | | | | | | |
| 20... | .05 | .03 | <.9 | -- | 3.8 | 4.8 |
| JAN. | | | | | | |
| 22... | .05 | .03 | .9 | -- | 2.1 | 2.6 |
| FEB. | | | | | | |
| 22... | .09 | .02 | 4.3 | -- | 4.1 | 5.2 |
| MAR. | | | | | | |
| 27... | .03 | .03 | <1.1 | -- | 2.6 | 3.2 |
| APR. | | | | | | |
| 19... | .15 | .03 | 1.2 | -- | 2.7 | 3.4 |
| MAY | | | | | | |
| 21... | .08 | .03 | <1.1 | -- | 2.8 | 3.6 |
| JUNE | | | | | | |
| 21... | .06 | .01 | 1.1 | -- | 7.6 | 9.5 |
| JULY | | | | | | |
| 24... | .07 | .03 | <.8 | -- | 5.8 | 7.3 |
| AUG. | | | | | | |
| 21... | .08 | .02 | <1.3 | -- | 2.9 | 3.6 |
| SEP. | | | | | | |
| 21... | .17 | .02 | 3.2 | -- | 2.8 | 3.6 |

| DATE | TIME | DIS-CHARGE (CFS) | DIS-SOLVED SILICA (SIO2) (MG/L) | TOTAL IRON (FE) (UG/L) | DIS-SOLVED CAL-CIUM (CA) (MG/L) | DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) | DIS-SOLVED SODIUM (NA) (MG/L) | DIS-SOLVED PO-TAS-SIUM (K) (MG/L) | TOTAL ALUM-INUM (AL) (UG/L) | BICAR-BONATE (HCO3) (MG/L) | DIS-SOLVED SULFATE (SO4) (MG/L) | DIS-SOLVED CHLO-RIDE (CL) (MG/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03594422 - BEECH RIVER AT ST HWY 104, NR LEXINGTON TN (TVA) (LAT 35 37 44 LONG 088 23 11) B/ | | | | | | | | | | | | |
| NOV., 1972 | | | | | | | | | | | | |
| 27... | 0920 | 60 | 7.8 | 500 | 4.4 | 1.3 | 2.7 | 1.0 | -- | 17 | 5.6 | 4.5 |
| JAN., 1973 | | | | | | | | | | | | |
| 17... | 1300 | 56 | 5.0 | 470 | 4.2 | 1.4 | 3.4 | 1.3 | -- | 14 | 7.0 | 4.5 |
| MAR. | | | | | | | | | | | | |
| 28... | 1425 | 72 | 58 | 580 | 3.6 | 1.4 | 2.6 | 1.1 | -- | 16 | 4.3 | 3.0 |
| MAY | | | | | | | | | | | | |
| 18... | 1040 | 25 | 7.8 | 230 | 4.0 | 1.2 | 2.6 | 1.2 | <200 | 17 | 4.0 | 4.0 |
| JULY | | | | | | | | | | | | |
| 26... | 1300 | 370 | 5.8 | 1400 | 6.0 | 1.7 | 2.3 | 2.7 | <200 | 22 | 2.0 | 3.0 |
| SEP. | | | | | | | | | | | | |
| 12... | 1130 | -- | 9.3 | 820 | 3.0 | 1.5 | 3.3 | 1.6 | <200 | 17 | 5.0 | 4.0 |

A/ Analyses by U. S. Geological Survey

B/ Analyses furnished by Tennessee Valley Authority

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1972 TO SEPTEMBER 1973

TENNESSEE RIVER BASIN

03568500 - CHATTANOOGA CREEK NEAR FLINTSTONE, GA (LAT 34 58 20 LONG 085 19 40) B/

| DATE | DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) | HARD-NESS (CA,MG) (MG/L) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH (UNITS) | TEMPER-ATURE (DEG C) | COLOR (PLAT-INUM-COBALT UNITS) | ALKA-LINITY AS CACO3 (MG/L) | PHOS-PHATE (PO4) (MG/L) | ORGANIC NITRO-GEN (N) (MG/L) | DIS-SOLVED AMMONIA NITRO-GEN (N) (MG/L) | DIS-SOLVED NITRITE (N) (MG/L) | DIS-SOLVED NITRATE (N) (MG/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NOV., 1972 | | | | | | | | | | | | |
| 22... | 77 | 53 | 118 | 7.2 | 8.5 | 5 | 39 | .04 | .17 | .01 | <.01 | .50 |
| JAN., 1973 | | | | | | | | | | | | |
| 16... | 78 | 60 | 137 | 7.3 | 9.0 | 5 | 44 | .29 | <.01 | <.01 | <.01 | .30 |
| MAR. | | | | | | | | | | | | |
| 29... | 78 | 66 | 147 | 7.6 | 12.0 | 3 | 47 | .03 | <.03 | .02 | <.01 | .30 |
| JULY | | | | | | | | | | | | |
| 16... | 130 | 100 | 220 | 7.5 | 21.5 | 10 | 90 | .26 | .21 | .07 | <.01 | .30 |
| SEP. | | | | | | | | | | | | |
| 11... | 150 | 120 | 26 | 7.5 | 21.5 | 5 | 107 | .57 | .16 | .04 | <.01 | .30 |

03571850 - TENNESSEE RIVER AT SOUTH PITTSBURG, TN. (LAT 35 00 41 LONG 085 41 51) A/

| DATE | TOTAL FILT-RABLE RESIDUE (MG/L) | SUS-PENDED GROSS ALPHA AS U-NAT. (UG/L) | SUS-PENDED GROSS ALPHA AS U-NAT. (PC/L) | SUS-PENDED GROSS BETA AS SR90 /Y90 (PC/L) | SUS-PENDED GROSS BETA AS CS-137 (PC/L) | TOTAL NON-FILT-RABLE RESIDUE (MG/L) |
|---|---|---|---|---|---|---|
| OCT. | | | | | | |
| 19... | 150 | 1.9 | .6 | 1.0 | 1.2 | 23 |
| NOV. | | | | | | |
| 16... | 110 | .7 | .2 | <.4 | .4 | 10 |
| DEC. | | | | | | |
| 20... | 87 | 2.1 | -- | 2.3 | 2.7 | 40 |
| JAN. | | | | | | |
| 22... | 87 | 1.4 | -- | 1.0 | 1.2 | 26 |
| FEB. | | | | | | |
| 22... | 78 | .5 | -- | <.4 | <.4 | 8 |
| MAR. | | | | | | |
| 27... | 82 | 2.9 | -- | 2.1 | 2.4 | 36 |
| APR. | | | | | | |
| 19... | 79 | <.4 | -- | <.5 | <.5 | 7 |
| MAY | | | | | | |
| 21... | 85 | .6 | -- | 1.0 | 1.1 | 17 |
| JUNE | | | | | | |
| 21... | 85 | 1.1 | -- | .7 | .8 | 14 |
| JULY | | | | | | |
| 24... | 85 | .4 | -- | .5 | .5 | 8 |
| AUG. | | | | | | |
| 21... | 88 | .4 | -- | <.4 | .4 | 8 |
| SEP. | | | | | | |
| 21... | 110 | <.4 | -- | <.4 | <.4 | 4 |

03594422 - BEECH RIVER AT ST HWY 104, NR LEXINGTON TN (TVA) (LAT 35 37 44 LONG 088 23 11) B/

| DATE | DIS-SOLVED SOLIDS (RESI-DUE AT 180 C) (MG/L) | HARD-NESS (CA,MG) (MG/L) | SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) | PH (UNITS) | TEMPER-ATURE (DEG C) | COLOR (PLAT-INUM-COBALT UNITS) | ALKA-LINITY AS CACO3 (MG/L) | PHOS-PHATE (PO4) (MG/L) | ORGANIC NITRO-GEN (N) (MG/L) | DIS-SOLVED AMMONIA NITRO-GEN (N) (MG/L) | DIS-SOLVED NITRITE (N) (MG/L) | DIS-SOLVED NITRATE (N) (MG/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NOV., 1972 | | | | | | | | | | | | |
| 27... | 44 | 16 | 56 | 6.9 | 8.0 | 5 | 14 | .27 | .26 | .09 | .01 | .30 |
| JAN., 1973 | | | | | | | | | | | | |
| 17... | 38 | 16 | 57 | 6.1 | 8.0 | 7 | 11 | 1.0 | .47 | .30 | <.10 | .30 |
| MAR. | | | | | | | | | | | | |
| 28... | 33 | 15 | 47 | 6.3 | 16.5 | 10 | 13 | .20 | .21 | .03 | <.01 | .30 |
| MAY | | | | | | | | | | | | |
| 18... | 30 | 15 | 51 | 6.8 | 16.5 | 15 | 14 | .15 | .21 | .03 | <.01 | .40 |
| JULY | | | | | | | | | | | | |
| 26... | 20 | 22 | 55 | 6.3 | 24.0 | 25 | 18 | .24 | .18 | .66 | <.01 | .10 |
| SEP. | | | | | | | | | | | | |
| 12... | 40 | 14 | 53 | 6.7 | 23.0 | 35 | 14 | .51 | .27 | .03 | <.01 | .40 |

A/ Analyses by U. S. Geological Survey

B/ Analyses furnished by Tennessee Valley Authority

MAY 30 1975

Division of Water Quality Control
Environmental Health Services
6200 Building Suite 6100
Eastgate Center
Chattanooga, Tennessee 37411

1974

# Water Resources Data for Tennessee

## Part 1. Surface Water Records

## Part 2. Water Quality Records

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Prepared in cooperation with the Tennessee Department of Conservation, Division of Water Resources, the Tennessee Valley Authority, and with other State, municipal, and Federal agencies

## 03568500 Chattanooga Creek near Flintstone, Ga.

LOCATION.--Lat 34°58'20", long 85°19'40", Walker County, on right bank 0.8 mile (1.3 km) south of Georgia-Tennessee State line and 2.3 miles (3.7 km) northeast of Flintstone, and at mile 10.3 (16.6 km).

DRAINAGE AREA.--50.6 sq mi (131.0 sq km).

PERIOD OF RECORD.--October 1950 to September 1974 (discontinued). Prior to December 1950 monthly discharges only, published in WSP 1726.

GAGE.--Water-stage recorder. Datum of gage is 649.18 ft (197.870 m) above mean sea level.

AVERAGE DISCHARGE.--24 years, 86.5 cfs (2.450 cu m/s), 23.21 in/yr (590 mm/yr).

EXTREMES.--Current year: Maximum discharge, 3,950 cfs (112 cu m/s) Nov. 28, gage height, 11.85 ft (3.612 m); minimum, unknown.
Period of record: Maximum discharge, 6,300 cfs (178 cu m/s) Mar. 16, 1973, gage height, 13.59 ft (4.142 m); minimum, 1.0 cfs (0.028 cu m/s) Sept. 8, 9, 1954.

REMARKS.--Records fair. Some diurnal fluctuation at low flow caused by bleachery above station. Records of periodic water temperatures for the current year are published in Part 2 of this report.

REVISIONS (WATER YEARS).--WSP 1910: 1951.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

| DAY | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 129 | 33 | 199 | 633 | 181 | 117 | 110 | 40 | 134 | 16 | 11 | 8.0 |
| 2 | 106 | 26 | 158 | 339 | 285 | 106 | 229 | 40 | 119 | 15 | 10 | 8.0 |
| 3 | 66 | 21 | 131 | 331 | 365 | 97 | 226 | 42 | 89 | 14 | 11 | 8.0 |
| 4 | 47 | 20 | 134 | 313 | 278 | 89 | 223 | 36 | 73 | 13 | 16 | 8.0 |
| 5 | 39 | 20 | 350 | 283 | 221 | 83 | 189 | 35 | 63 | 15 | 13 | 8.0 |
| 6 | 36 | 18 | 250 | 243 | 202 | 79 | 158 | 37 | 61 | 35 | 10 | 9.0 |
| 7 | 42 | 16 | 200 | 251 | 245 | 67 | 135 | 32 | 59 | 25 | 9.8 | 9.5 |
| 8 | 44 | 18 | 150 | 214 | 260 | 60 | 130 | 29 | 54 | 20 | 13 | 8.0 |
| 9 | 42 | 23 | 125 | 519 | 216 | 60 | 118 | 28 | 48 | 19 | 15 | 8.0 |
| 10 | 21 | 21 | 110 | 678 | 182 | 55 | 100 | 35 | 42 | 17 | 13 | 8.0 |
| 11 | 18 | 19 | 94 | 751 | 159 | 55 | 89 | 32 | 37 | 16 | 22 | 9.0 |
| 12 | 15 | 19 | 84 | 606 | 138 | 50 | 90 | 77 | 34 | 16 | 45 | 9.0 |
| 13 | 14 | 18 | 96 | 330 | 124 | 50 | 371 | 53 | 32 | 16 | 28 | 9.0 |
| 14 | 14 | 16 | 95 | 278 | 177 | 50 | 274 | 43 | 29 | 14 | 20 | 12 |
| 15 | 14 | 18 | 84 | 327 | 310 | 50 | 204 | 47 | 27 | 15 | 17 | 9.0 |
| 16 | 14 | 21 | 78 | 276 | 712 | 50 | 161 | 57 | 27 | 16 | 12 | 8.0 |
| 17 | 13 | 19 | 73 | 233 | 527 | 50 | 137 | 47 | 24 | 14 | 10 | 8.0 |
| 18 | 13 | 17 | 67 | 196 | 307 | 45 | 117 | 38 | 22 | 11 | 10 | 7.5 |
| 19 | 13 | 15 | 63 | 169 | 247 | 50 | 104 | 33 | 21 | 12 | 9.5 | 7.5 |
| 20 | 13 | 12 | 117 | 154 | 196 | 55 | 91 | 33 | 19 | 11 | 9.0 | 7.5 |
| 21 | 12 | 340 | 198 | 155 | 165 | 250 | 82 | 28 | 18 | 11 | 8.5 | 7.0 |
| 22 | 12 | 303 | 160 | 136 | 534 | 150 | 76 | 27 | 18 | 10 | 8.0 | 7.0 |
| 23 | 12 | 143 | 138 | 142 | 329 | 100 | 74 | 109 | 20 | 11 | 8.0 | 7.0 |
| 24 | 12 | 100 | 120 | 186 | 247 | 80 | 64 | 86 | 22 | 12 | 8.0 | 7.0 |
| 25 | 12 | 98 | 126 | 200 | 196 | 70 | 58 | 59 | 20 | 13 | 7.5 | 7.0 |
| 26 | 11 | 124 | 1,980 | 256 | 165 | 65 | 53 | 95 | 20 | 63 | 8.5 | 7.0 |
| 27 | 11 | 205 | 1,050 | 350 | 145 | 60 | 50 | 392 | 19 | 46 | 8.0 | 7.0 |
| 28 | 15 | 2,360 | 391 | 322 | 129 | 100 | 46 | 192 | 18 | 22 | 8.0 | 8.0 |
| 29 | 35 | 588 | 278 | 366 | ------ | 150 | 42 | 120 | 17 | 16 | 9.0 | 7.0 |
| 30 | 27 | 277 | 241 | 275 | ------ | 200 | 40 | 87 | 17 | 14 | 8.0 | 7.0 |
| 31 | 21 | ------ | 330 | 217 | ------ | 120 | ------ | 78 | ------ | 12 | 8.0 | ------ |
| TOTAL | 893 | 4,930 | 7,670 | 9,729 | 7,242 | 2,643 | 3,841 | 2,087 | 1,208 | 560 | 393.8 | 240.0 |
| MEAN | 28.8 | 164 | 247 | 314 | 259 | 85.9 | 128 | 67.3 | 40.3 | 18.1 | 12.7 | 8.00 |
| MAX | 129 | 2,360 | 1,980 | 751 | 712 | 250 | 371 | 392 | 139 | 63 | 45 | 12 |
| MIN | 11 | 12 | 63 | 136 | 124 | 45 | 40 | 27 | 17 | 10 | 7.5 | 7.0 |
| CFSM | .57 | 3.24 | 4.88 | 6.21 | 5.12 | 1.70 | 2.53 | 1.33 | .80 | .36 | .25 | .16 |
| IN. | .66 | 3.62 | 5.64 | 7.15 | 5.32 | 1.96 | 2.82 | 1.53 | .89 | .41 | .29 | .18 |

CAL YR 1973 TOTAL 54,471.3 MEAN 149 MAX 4,760 MIN 8.4 CFSM 2.94 IN 40.05
WTR YR 1974 TOTAL 41,456.8 MEAN 114 MAX 2,360 MIN 7.0 CFSM 2.25 IN 30.48

PEAK DISCHARGE (BASE, 1,100 CFS)

| DATE | TIME | G.HT. | DISCHARGE | DATE | TIME | G.HT. | DISCHARGE |
|---|---|---|---|---|---|---|---|
| 11-28 | 0630 | 11.85 | 3,950 | 01-11 | 1730 | 8.73 | 1,160 |
| 12-26 | 1615 | 11.22 | 3,240 | 02-16 | 1545 | 8.63 | 1,110 |

NOTE.--No gage-height record Aug. 16 to Sept. 30

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 39

(Rule 1200—4—4—.01, continued)

(7) Lower Tennessee River Basin (Including Conasauga Basin)

| STREAM | DESCRIPTION | DOM | IND | FISH | REC | IRR | LW&W | NAV |
|---|---|---|---|---|---|---|---|---|
| Tennessee River | Tenn-Ala State Line (Mile 416.5) to the POT Light (Mile 448.0) | X | X | X | X | X | X | X |
| Unnamed Tributary | At Tenn. River Mile 417.5; Mile 0.0 to Origin | | | X | X | X | X | |
| Battle Creek | Mile 0.0 to Origin | X | X | X | X | X | X | |
| Big Fiery Gizzard | Mile 0.0 to Origin | | | X | X | X | X | |
| Little Fiery Gizzard | Mile 0.0 to Origin | | | X | X | X | X | |
| Unnamed Tributary | At Little Fiery Gizzard Mile 0.6; Mile 0.0 to Origin | | | X | X | X | X | |
| Sequatchie River | Mile 0.0 to 3.5 | X | X | X | X | X | X | X |
| Sequatchie River | Mile 3.5 to 41.0 | X | X | X | X | X | X | |
| Little Sequatchie River | Mile 0.0 to Origin | | | X | X | X | X | |
| Clifty Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Sewanee Creek | Mile 0.0 to 4.0 | | | X | X | X | X | |
| Sewanee Creek | Mile 4.0 to Origin | X | | X | X | X | X | |
| Holywater Creek | Mile 0.0 to Origin | X | | X | X | X | X | |
| Scott Creek | Mile 0.0 to Origin | X | | X | X | X | X | |
| Sequatchie River | Mile 41.0 to 43.9 | | | X | X | X | X | |
| Sequatchie River | Mile 43.9 to 74.0 | X | X | X | X | X | X | |
| Sequatchie River | Mile 74.0 to 78.4 | | | X | X | X | X | |
| Sequatchie River | Mile 78.4 to Origin | X | X | X | X | X | X | |
| Coops Creek | Mile 0.0 to 0.8 | | | X | X | X | X | |
| Coops Creek | Mile 0.8 to Origin | | | X | X | X | X | |
| Tennessee River | Mile 448.0 to 460.6 (Chattanooga Creek) | | X | X | X | X | X | X |
| Shoal Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Unnamed Tributary | At Tenn. River Mile 458.7; Mile 0.0 to Origin | | | X | X | X | X | |
| Lookout Creek | Mile 0.0 to Georgia-Tenn State Line | | X | X | X | X | X | |
| Black Creek | Mile 0.0 to 1.6 | | | X | X | X | X | |
| Black Creek | Mile 1.6 to Origin | | | X | X | X | X | |
| Chattanooga Creek | Mile 0.0 to Georgia-Tenn State Line | | X | X | X | X | X | |
| Tennessee River | Mile 460.6 to 499.4 (Hiwassee) | X | X | X | X | X | X | X |
| Citico Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| South Chickamauga Creek | Mile 0.0 to Georgia-Tenn State Line | | X | X | X | X | X | |
| Friar Branch | Mile 0.0 to Origin | | | X | X | X | X | |
| West Chickamauga Creek | Mile 0.0 to Georgia-Tenn State Line | | X | X | X | X | X | |
| Spring Creek | Mile 0.0 to Georgia-Tenn State Line | | X | X | X | X | X | |
| Mackey Branch | Mile 0.0 to Origin | | | X | X | X | X | |
| Ryall Springs Branch | Mile 0.0 to Origin | | | X | X | X | X | |
| Unnamed Tributary | At Tenn. River Mile 469.2; Mile 0.0 to 1.5 | | | X | X | X | X | |
| Unnamed Tributary | Mile 1.5 to Origin | | | X | X | X | X | |
| North Chickamauga Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Unnamed Tributary | At N. Chickamauga Creek Mile 0.7; Mile 0.0 to 0.3 | | | X | X | X | X | |
| Unnamed Tributary | Mile 0.3 to Origin | | | X | X | X | X | |
| Unnamed Tributary | Mile 1.0 to Origin | | | X | X | X | X | |
| Wolftever Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Sale Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Roaring Creek | Mile 0.0 to Origin | | | X | X | X | X | |
| Brush Creek | Mile 0.0 to 2.5 | | | X | X | X | X | |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 40

Date: April 15, 1993

To: Landes Co. File #33-633

From: Craig Stannard, Geologist, CFO

Subject: Chattanooga Creek

On April 15, 1993, Joe Hartman with the Tennessee Division of Water Pollution Control (TDWPC), stated to Craig Stannard that the TDWPC had actual photographic evidence that people fish in Chattanooga Creek. He also stated that he has personally witnessed people fishing in the creek.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 41

Rick-
Because of the Superfund sites in the watershed, I thought that you might want to see this.
RMS 7/2
JOK 7/3
WSE

**TENNESSEE DEPARTMENT OF CONSERVATION**

**MEMO**

**DATE:** June 28, 1991

**TO:** Phil Stewart

**FROM:** Greg Denton

**SUBJECT:** Chattanooga Creek fish data

On June 27, I received the results of the organic contaminant analyses of fish from Chattanooga Creek. (I had previously received the results from the metals analyses which did not indicate problems for arsenic, cadmium, chromium, copper, lead, and mercury.) Following are certain organic parameter results: (All are composited fillet samples)

| TYPE SAMPLE | DIELDRIN | CHLORDANE | PCBS | DDT |
|---|---|---|---|---|
| Channel catfish | **8.184** | **0.314** | **1.43** | 0.636 |
| Largemouth bass | 0.086 | 0.028 | 0.12 | 0.051 |
| Common carp | 0.120 | **0.160** | **1.14** | 0.263 |

The numbers that are bolded are those that exceed FDA Action Levels or trigger points used by the Division. The dieldrin number for the catfish sample seems especially high. (I have a call in to the lab to confirm the value.) If correct, dieldrin level in that sample is 27 times the FDA level (0.3 ppm). Chlordane and PCBs also appear high.

While Chattanooga Creek is already posted, according to Dale Rector who collected the samples, there is an encampment of homeless people in this area of the creek and Dale saw them fishing. It is possible that we need to recon this area again and determine the need to take additional measures such as posting more signs, or talking to fishermen about the hazards of consuming these fish, or collecting more fish. Please advise.

cc. Garland Wiggins

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 42

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

December 19, 1985

Mr. Gordon Caruthers
Solid Waste Management Division
Department of Health & Environment
701 Broadway
Nashville, TN 37219

Dear Gordon:

In response to your call of December 19, I am happy to enclose descriptions of critical wildlife habitat of Tennessee, as designated by the U.S. Fish and Wildlife Service.

Please advise if I can be of further assistance.

Sincerely,

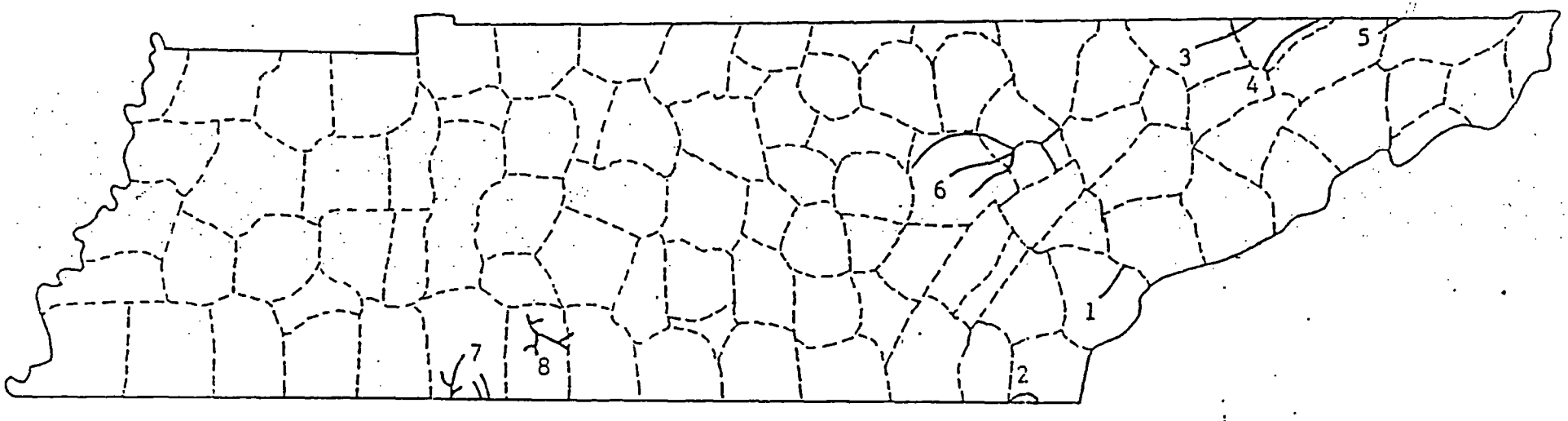
TENNESSEE WILDLIFE RESOURCES AGENCY

Robert M. Hatcher, Coordinator
Nongame/Endangered Species

RMH/ch
enc.

OVER-VIEW OF CRITICAL HABITATS

IN TENNESSEE




1. smokey madtom
2. amber darter, Conasauga logperch, trispot darter
3. yellowfin madtom, slender chub
4. slender chub
5. spotfin chub
6. spotfin chub
7. slackwater darter
8. slackwater darter

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 48

STATE OF TENNESSEE

# FAX TRANSMITTAL MEMO

TO: Don Vanhook
DSF

FAX NUMBER: 615-634-6389

FROM: Andy Binford
DSF

SUBJECT: Howard School 33-606

DATE: 8-11-93

NUMBER OF PAGES INCLUDING THIS ONE: 4

IF YOU DO NOT RECEIVE THIS ENTIRE DOCUMENT OR HAVE ANY QUESTIONS, CALL Andy Binford

TELEPHONE NO. 615-532-0911

MESSAGE:

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

MEMORANDUM

**DATE:** August 11, 1993

**TO:** Don Vanhook

**FROM:** Andy Binford *Andy Binford 8-11-93*

**SUBJECT:** Howard School 33-606
Suggested Sampling Locations

Attached is a map with locations marked. Conversations with Nancy Thomas revealed that each sample should be a grab sample instead of compositing samples from several different locations. Conversations with Bonnie Basher indicated that this plan should yield the data required to evaluate exposure to the school children, if soil contamination is detected. However, note this sampling plan does not address children who may play along Chattanooga Creek at the Howard School site. It is hoped this exposure will be addressed with Chattanooga Creek. Suggested samples include:

1. One surface soil sample in the south eastern part of the day care play yard. This sample must be within the fenced area.

2. One surface soil sample 190 feet from the Howard School building in the landfill area. This sample should also be within 200 feet of the day care fence, if possible.

3. One surface soil sample about 190 feet southeast of the day care fence. (May want to avoid area of current dumping).

4. One surface soil sample on the practice field on the end toward the school. This sample should be collected on the west side of the field within 200 feet of the school building, if possible.

5. One surface soil sample on the southwest end of the practice field. Verify the location of the sampling point in relation to the storm drain.

6. One surface soil sample in the field area near the entrance to the biological area.

7. One surface soil sample should be collected along with the shallow ground water sample.

8. One surface soil sample near the drain located near the biological area.

9. One more surface soil sample in the biological area at a location to be determined. (If not otherwise determined, the location shall be in the vicinity of the bench and man made pool).

10. Two or three surface soil samples east or northeast of the football stadium in the play area. Location to be determined in the field. These sampling locations should be on the old landfill. Default sample locations shall be chosen to form a triangle 500 feet or so on a side so that an area can be calculated. All three sampling locations should be in the old landfill.

11. One surface soil background sample.

12. One duplicate surface soil sample.

13. One water sample of the shallow, possibly perched water.

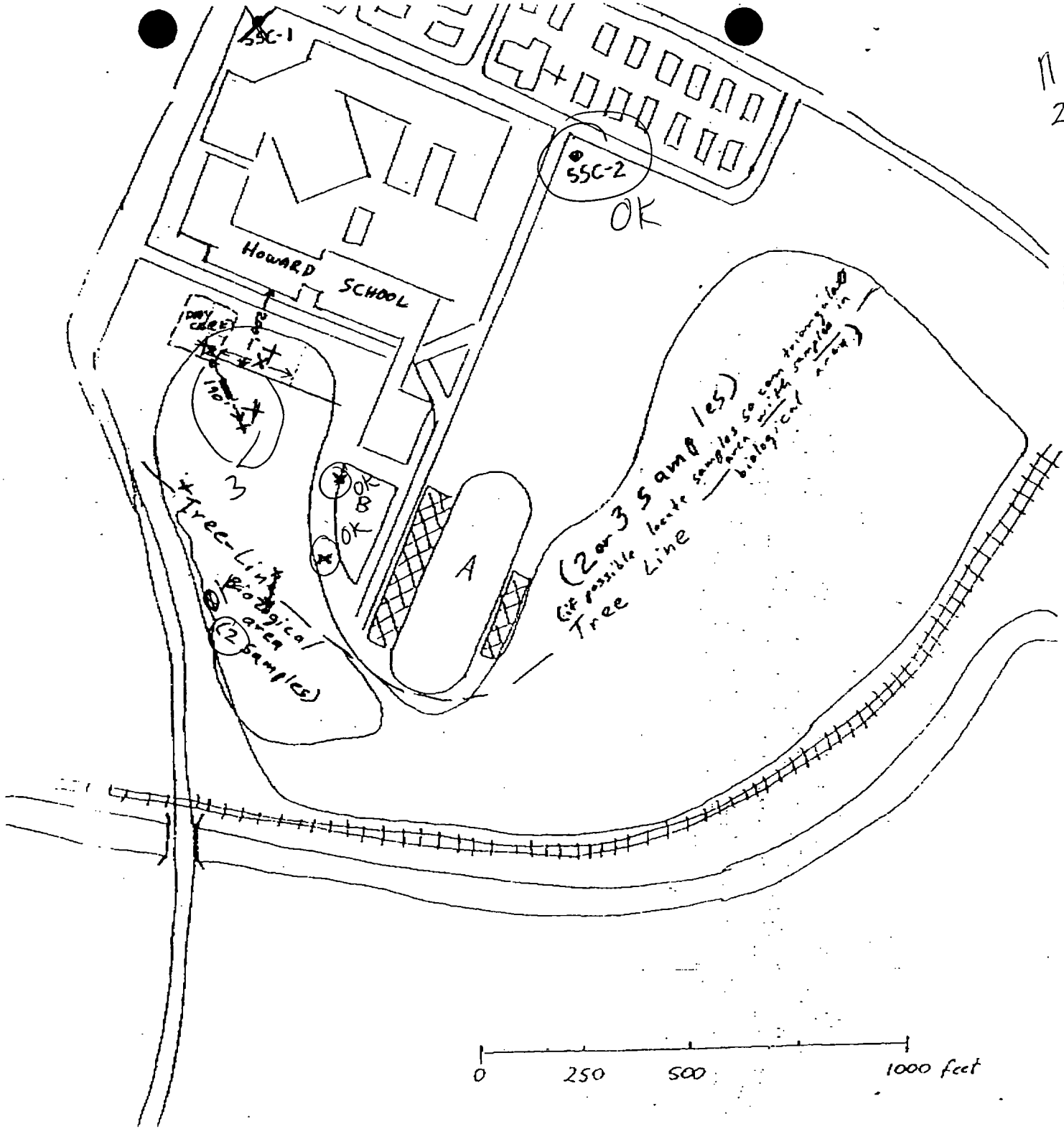
14. One leachate sample if possible.

Note: These samples locations are subject to change based on actual measurements in the field or field observations, RAB 8-11-93

Note: EPA would like photos of children playing on the school playgrounds and day care playground. If attainable, photos of children using the biological area should also be included.

AB/svw

Attachments




11 soil
2 water

HOWARD HIGH SCHOOL DUMP

Figure 3

• SSC-1,2 surface soil control samples

(May want to only collect one surface soil background)

Biological area
* one soil sample at culvert inlet (observed release to surface water)

Get photos of children on playgrounds and day care center.

Take a sample of leachate at the leachate drain point identified by FDM on 9/29/87 if possible, or other leachate if found.

Note: EPA has Chattanooga Creek identified as a fishery.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 49

# STUDY PLAN

## SITE INVESTIGATION PRIORITIZATION (SIP)

| | |
|---|---|
| Site name: | HOWARD HIGH SCHOOL DUMP |
| Site location: | CHATTANOOGA, TN |
| EPA ID # | TND100842343 |
| TN-DSF FILE # | 33-606 |

Prepared for the Tennessee
Division of Superfund

June 23,1993

| Prepared by: | Reviewed by: | Approved by: |
|---|---|---|
| A. Kolodziejski 6/23/93 | 6/24/93 | |

TABLE OF CONTENTS: 

1 SAMPLING PLAN

1.1 Objectives..... 4

1.2 Background..... 4

1.3 Phase I Sampling..... 5

1.4 Phase II Sampling..... 5

1.5 Determination of sample types..... 5

1.6 Determination of samples location and frequency 5

1.7 Sample Coding..... 6

1.8 Quality Assurance / Quality Control..... 6

1.9 Sampling Equipment and Supplies..... 6,7

1.10 Sampling and Analysis Requirements..... 7

1.11 Schedule / Personnel..... 7

2 HEALTH AND SAFETY PLAN

2.1 Purpose..... 9

2.2 Hazard Evaluation..... 9

2.3 Levels of Protection..... 9

2.5 Decontamination..... 9

2.6 Emergency Information..... 10

3 Figures

Figure 1 Site Location Map

Figure 2,3 Site sketch with location of the surface soil and ground-water sampling points

# SAMPLING PLAN

# 1 SAMPLING PLAN

## 1.1 Objectives

To analyze surface soil and ground-water, to determine the location and concentration of contamination.

## 1.2 Background

### 1.2.1 Site Location, Description, and History

The Howard High School Landfill is located at 2500 South Market Street behind Howard High School. The site occupies approximately 55 acres of low land adjacent to Chattanooga Creek. The site was formerly a portion of Chattanooga Creek that was filled in as a part of a land reclamation project in the 1960's. The elevation of the low land was to be built up by disposing brush and demolition waste only. Prior to the filling of the area, a drainage culvert was placed in a low area running under the landfill, and underneath the railroad embankment and discharging into Chattanooga Creek. There is a potential for leachate migration to the soil and groundwater from leaking culvert. Due to the fact that the landfill was not regulated during its active period, the potential exists for hazardous substances existing on-site and off-site migration of hazardous substances.

### 1.2.2 Geology / Hydrogeology

Surface soils in the area are primarily silty clay of low permeability. A thrust fault runs through the center of the landfill and could act as a pathway for direct migration to the groundwater. Underlying bedrock is highly fractured limestone and dolomite of the Knox geologic group. There is a little surface drainage from the site.
There are no drinking water wells in the vicinity of the site and all drinking water in the area is supplied by the Tennessee American Water Company (TAWC).

1.2.3 Contamination Present or Suspected

It is believed that some industrial sludges were deposited at the Howard High School Landfill Site. The amount and composition of the alleged sludge materials are unknown, but if any hazardous substances are present at the site there is a potential for migration off site.

There is no substantial information that hazardous substances are or were ever present on site.

1.2.4 Environmental Impact

A group of Howard School students complained that while playing football on the "practicing " field they had some skin irritation problems.

1.3 Phase I Sampling

The soil-gas sampling will be performed by Division of Superfund Chattanooga Field Office (CFO) and Nashville Central Office (NCO) personnel. The result of this sampling will influence the selection of Phase II sampling points and selection of the protective equipment for Phase II sampling.
On site soil-gas indicators will be used.

1.4 Phase II Sampling

Surface soil and ground-water sampling will be performed by CFO - Superfund personnel. The result of this sampling will indicate the extent and concentration of contamination.

1.5 Determination of Sample Types

Surface soil samples ( less then two feet deep ) and ground water samples will be taken.
Surface water is not present on the site and consequently, surface water samples will not be taken.

1.6 Sample location and frequency

Surface soil and ground-water samples will be taken.
A total of 11 on-site samples and 1 control sample will be taken.
The samples to be taken will indicate the priority pollutant concentration.
The location of sampling points will be based on the results of Phase I soil-gas sampling and/or field observation.
Samples will be taken once.

## 1.7 Sample Coding

The sample codes will be the following:

HH-SS 1-11 - surface soil samples.*
HH-GW 1 - shallow ground-water samples.

## 1.8 Quality Assurance/Quality Control

### 1.8.1 QA/QC Objectives

The objectives of QA/QC is to obtain data sufficiently complete and accurate to meet the objectives of the sampling plan.

### 1.8.2 Measuring Equipment and Analytical Procedures

Measuring Equipment and Analytical Procedures are to be selected to best provide the data and data accuracy required.

### 1.8.3 Sampling Personnel

Sampling Personnel are to be proficient in sampling according to the specifications. All sampling records will be checked for completeness and accuracy.
The field team leader will be responsible for the field QA/QC program.

## 1.9 Sampling Equipment and Supplies for Phase II Sampling

### 1.9.1 Sampling Equipment

30 disposable gloves
3 pair of outer rubber boots
10 8 oz aluminum scoops

### 1.9.2 Sampling Containers

| Analysis | Surface Soil | Ground-water |
|---|---|---|
| Ext. Organics | 8 oz widemouth glass jar | 1 liter amber glass (2 per sample) |
| Vol. Organics | 4 oz glass jar with Teflon liner | 40 ml amber vial. (4 per sample) |
| Metals | 8 oz widemouth glass jar w/Teflon liner (1 per sample) | 1 liter plastic bottle |
| Mercury | some as above | 500 ml glass |
| Cyanide | some as above | 1 liter plastic bottle |

* SS-1 will serve as a control for surface soil

1.9.3 Field Instrumentation

1 pocket calculator
1 tape measure
soil-gas sampling devices ( for Phase I sampling )

1.9.4 Record Materials

2 log books (Phase I and Phase II sampling)
10 preprinted labels
10 preprinted seals
2 preprinted analysis request forms
2 permanent markers
2 indelible pens

1.9.5 Packing Equipment

2 styrofoam coolers
2 bags of ice
1 box of zip-lock bags

1.9.6 Additional equipment

one of each: hand auger, shovel, machete, bug protection spray

1.10 Sampling and Analysis Requirements

The sampling investigation will include the collection of samples from surface soil and ground-water. The full scan laboratory tests will be requested. All sampling will be performed as per EPA specifications in EPA's Environmental Compliance Branch Standard Operating Procedures, Feb.1991. Sampling and testing will adhere to all EPA standards, including Chain-of-Custody and duplicates.

1.11 Schedule / Personnel

TDSF will obtain permission from the City of Chattanooga to enter, sample , and photograph the site. Field work will begin in August 1993. Sampling is expected to take:
Phase I Sampling - 2-3 days,
Phase II Sampling - 2-3 days
The project team is
Craig Stannard - Geologist.
Don VanHook - Environmental Specialist

# HEALTH AND SAFETY PLAN

## 2.1 Purpose

The purpose of this safety plan is to assign responsibilities, establish personnel protection standards, and establish mandatory safety operating procedures. All employees who perform field work during the project will be required to read this plan.

## 2.2 Hazard Evaluation

There is no indication that any air or groundwater monitoring has been done at this site.
The hazard evaluation will be based on soil-gas sampling and field observation.

## 2.3 Levels of Protection

The levels of protection required will be based on hazard evaluation. The level of required protection for Phase I soil-gas sampling is expected to be lower than level B. Personal Protective Equipment (PPE) is required by OSHA regulations and protects workers from:

- chemical contact with skin and eyes,
- noise,
- temperature,
- respiratory hazard.

### 2.3.1 Level C includes :

- full- or half-face air purifying respirator (APR),
- hooded, chemical-resistent clothing,
- inner and outer chemical-resistent gloves,
- chemical proof boots with steel toe and shank.

### 2.3.2 Level D includes :

- coveralls,
- chemical proof boots with steel toe and shank.

## 2.4 Decontamination

All sampling equipment must be deconned. Equipment used are to be wiped, washed with detergent solution and rinsed with water as appropriate.
The decon substances are as follows: deionized water, ALCONOX soap, isopropyl alcohol, and tap water.
Contaminated disposable materials (gloves, outer boots) are to be placed in plastic bags.

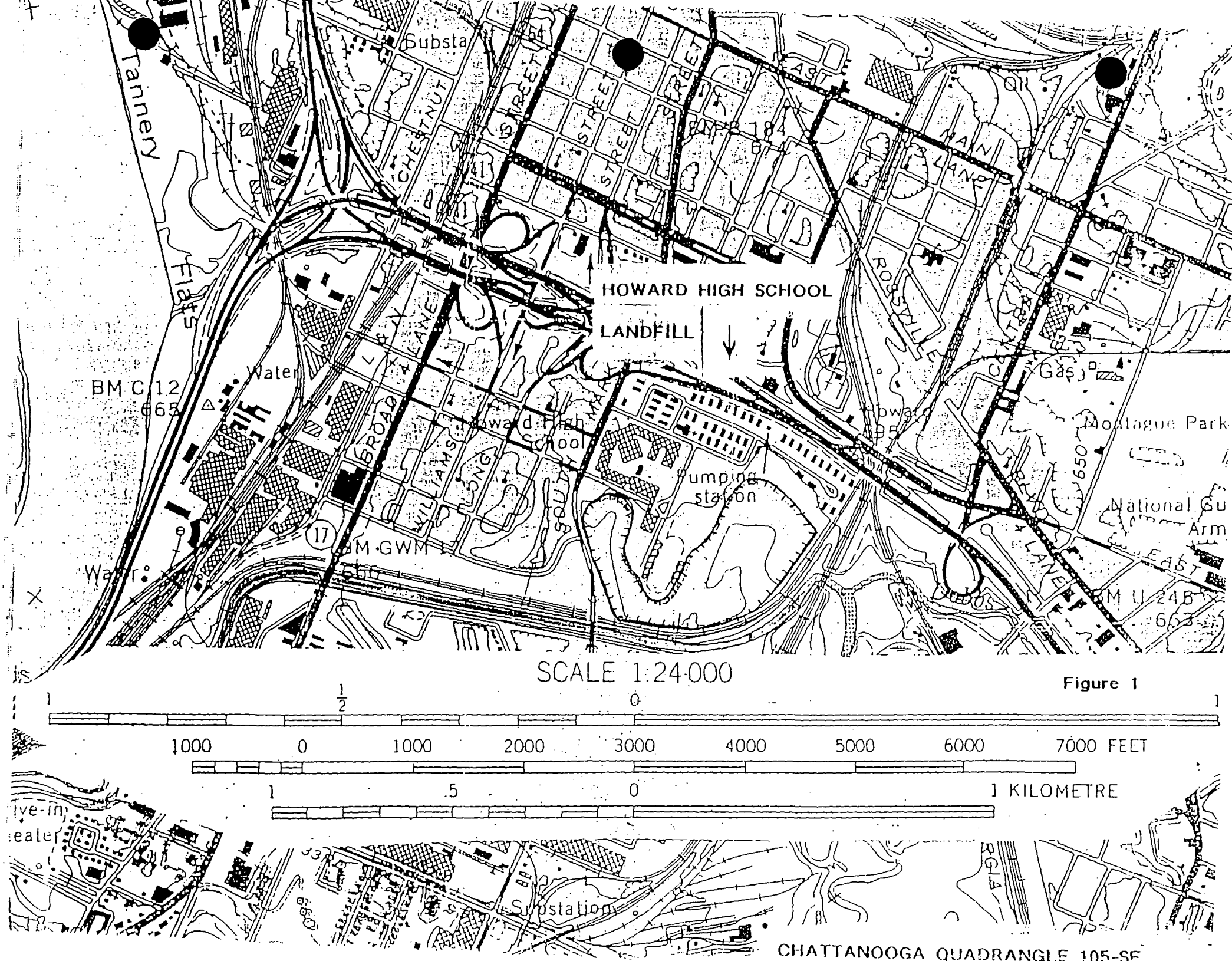
## 2.5 Emergency Information

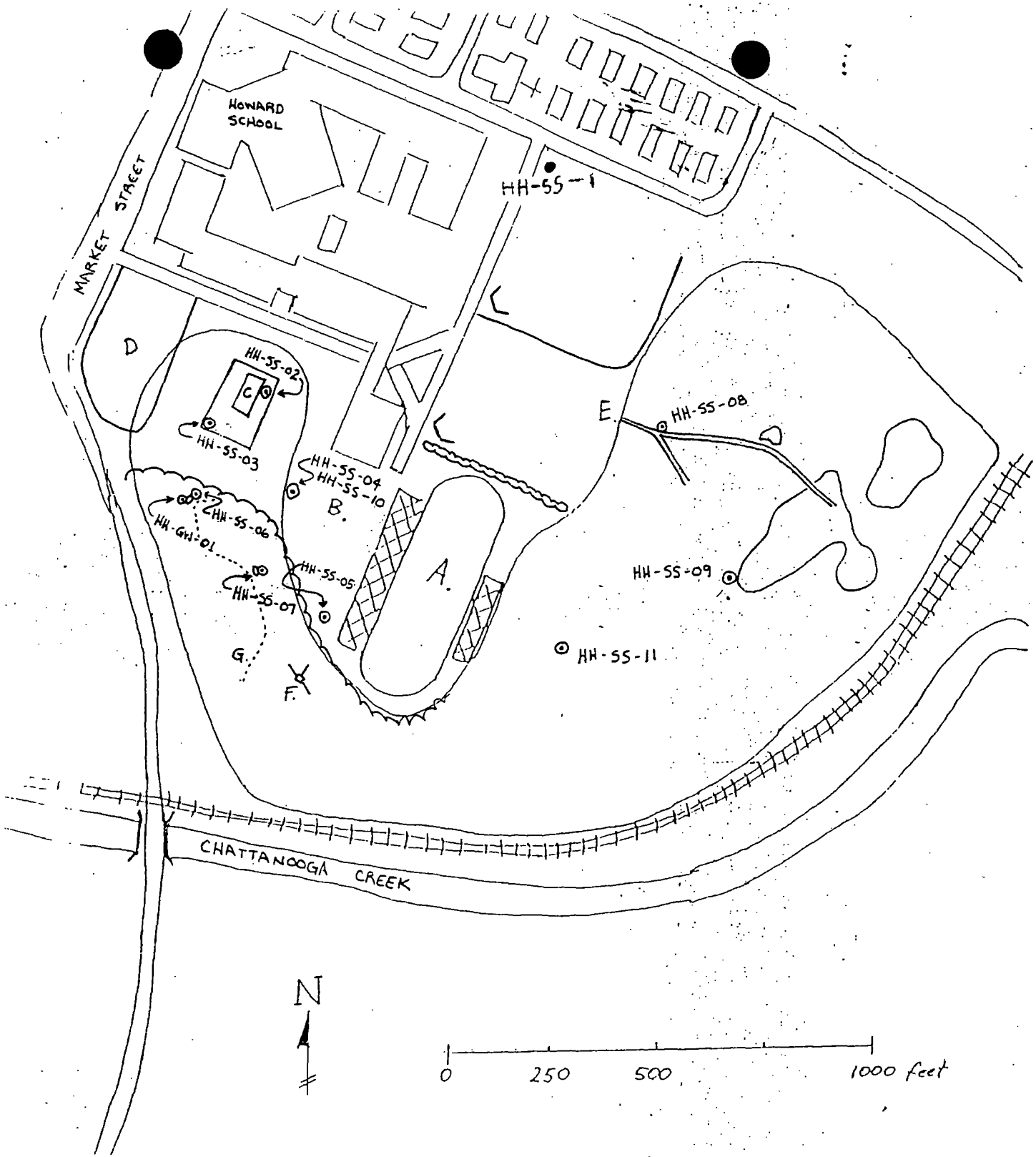
### 2.5.1 Telephone numbers:

| | | |
|---|---|---|
| Ambulance | Hamilton County | 911 |
| Fire | Hamilton County | 911 |
| Hospital | Downtown General Hosp. | 266-7721 |
| Police | City of Chattanooga | 757-2340 |

### 2.5.2 Route to hospital

The nearest hospital, in the case of emergency is:
Downtown General Hospital - 709 Walnut St.
Route to Downtown General Hospital: north on Market St. to 8th St. Turn right on 8th St. to Walnut St.
Distance to the hospital: 3 miles
Travel time from the site: 5-10 minutes.


HOWARD HIGH SCHOOL
LANDFILL
Tannery
Flats
Substa
CHESTNUT
STREET
MAIN
LANE
ROSSVILLE
BROAD
WILLIAMS
LONG
SOUTH
Howard High School
Pumping station
Water
BM C 12
665
BM GWM
660
Gas
Montague Park
National Gu
Arm
EAST
BM U 245
663
650
Substation
SCALE 1:24 000
Figure 1
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETRE
CHATTANOOGA QUADRANGLE 105-SE



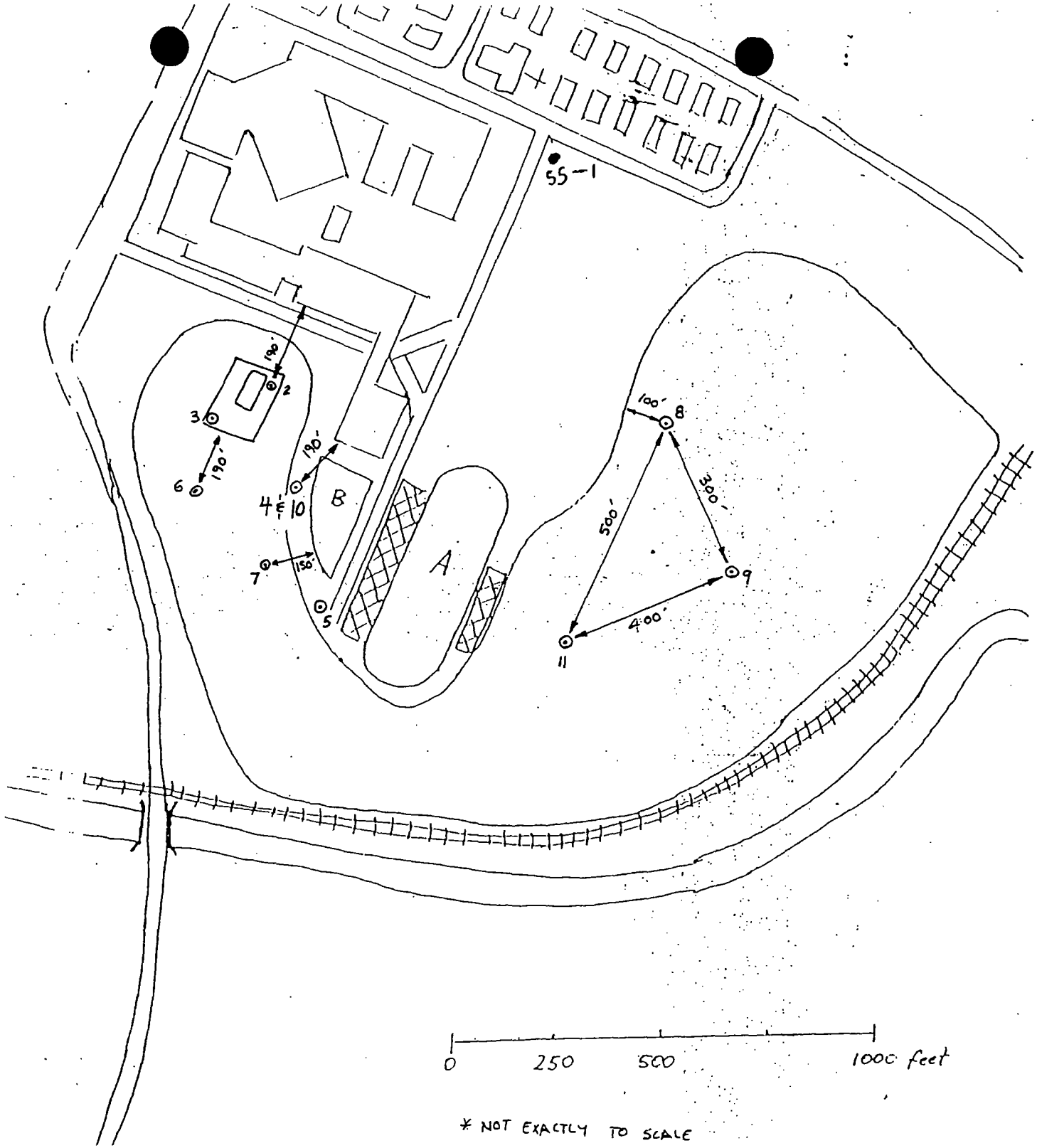

# HOWARD HIGH SCHOOL DUMP
## SAMPLING LOCATIONS

Figure 2

- HH-SS-01 surface soil control sample
- HH-SS-02 : SURFACE SOIL SAMPLE

HH-SS-03 "
HH-SS-04 "
HH-SS-05 "
HH-SS-06 "
HH-SS-07 "
HH-SS-08 "
HH-SS-09 "
HH-SS-10 : SURFACE SOIL SAMPLE DUPLICATE
HH-SS-11 : SURFACE SOIL SAMPLE
HH-GW-01 : PERCHED WATER SAMPLE

A : FOOTBALL FIELD
B : PRACTICE FIELD
C : DAY CARE CENTER
D : PARKING AREA
E : APPROACH ROAD INTO LANDFILL FROM BASEBALL FIELD
F : DRAINAGE CULVERT
G : NATURE TRAIL IN BIOLOGICAL AREA




HOWARD HIGH SCHOOL DUMP
SAMPLING LOCATIONS

Figure 3

• 55 -1 surface soil control samples

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 50

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF SUPERFUND

OFFICE MEMORANDUM

DATE: 12-3-93

TO: File #33-606

FROM: Don VanHook

SUBJECT: Howard School Dump Risk Assessment Update

---

Andy Shivas, NCO, called DV at 11 am. He and Andy Binford have been talking with Bonnie Basher about the threat to area populations from the PAH levels that were found near the school. Bonnie doesn't seem to think it is a problem. The dermal exposure threat doesn't appear great. AS also obtained population data from DV for the school and surrounding 1 mile residences.

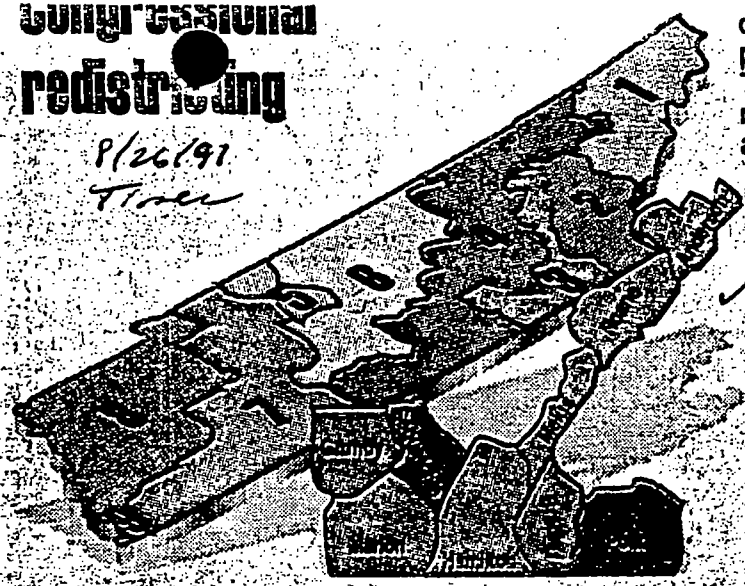
Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 51

# Congressional redistricting

8/26/91
Times



districts will be redrawn next year to reflect population changes indicated by the 1990 census. The 3rd District will have to include nearly 21,000 more voters. One proposal includes adding Polk and Sequatchie counties.

| | | Population | Changes |
|---|---|---|---|
| District 1 | Jimmy Quillen (R) | 531,349 | +10,560 |
| District 2 | John J. Duncan Jr. (R) | 539,540 | +2,369 |
| District 3 | Marilyn Lloyd (D) | 520,980 | +20,929 |
| District 4 | Jim Cooper (D) | 534,488 | +7,421 |
| District 5 | Bob Clement (D) | 552,278 | -10,369 |
| District 6 | Bart Gordon (D) | 607,038 | -65,124 |
| District 7 | Don Sundquist (R) | 628,167 | -88,258 |
| District 8 | John S. Tanner (D) | 501,605 | +40,304 |
| District 9 | Harold E. Ford (D) | 461,745 | -180,164 |

—Beck Towery/The Chattanooga Times

cluding Bradley County. Members of Congress are generally loath to discuss publicly the prospect of losing counties in redistricting, fearing to alienate voters in counties they may not actually lose.

State lawmakers will tackle redistricting — also called reapportionment — early next year. New lines will be drawn for state legislative and congressional districts that will influence election outcomes for the next 10

Please see DISTRICTS, A5

## Inside

### Drugs and crime

Violent offenders as well as those committing property crimes often are motivated by their need to obtain illegal drugs, the Justice Department said Sunday. (Page A5)

### Emmy winners

*Cheers* was the toast of Sunday's Emmy Awards, picking up four prizes for best comedy series, actress, supporting actress and director. (Page B3)

## Index


| | Page | | Page |
|---|---|---|---|
| Dave Barry | B4 | Horoscope | B4 |
| Bridge | B4 | Metro | B1-2 |
| Business | B6 | Obituaries | A6 |
| Classified | C6, D1-6 | People | A2 |
| Comics | B5 | Puzzles | B4 |
| Editorials | A4 | Sports | C1-5 |
| Entertainment | B3 | TV | B3 |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 52

3012 PROGRAM

NEW SITE DISCOVERY INFORMATION

Site Name: Howard High School Landfill County Hamilton

Site Address: South Market Street City Chattanooga

Latitude: 35/01/25.7 Size of Site: 40 acres
Longitude: 085/18/24.3 Quadrangle: Chattanooga
(Attach a copy of the topo map with site marked)

General description of site:
Site is presently a large field and high school athletic area. Cover appears good with no erosion. Closure appears to have been good. Site is underlain by a storm sewer.

Site Status ____ active ✓ inactive RCRA Facility ____ Yes ✓ No

Years of Operation prior to 1972 TO 1976 (?)

Waste believed present and quantities:
The landfill was to have been operated as a brush and debris landfill only. A 1972 memo concerning certification of compliance indicated that restrictions as to wastes received at this site were not being observed and that metal drums were being deposited here. Div. of Water Management has photo documentation that implies industrial sludges and other wastes were put here in violation of restrictions

Brief description of potential hazard: A 1972 geological report outlines several problems with this site which would make it unsuitable for all but inert wastes. This include several low relief and swampy areas, shallow water tables, surface connections to Chattanooga Creek, location in a floodplain, nearby sinkholes suggesting extensive solutional cavities, and a mapped thrust fault through the center of the site. The underlying storm drain system may be functioning as a leachate collection system.

§3012 PROGRAM

NEW SITE DISCOVERY INFORMATION

Site Owner: City of Chattanooga
Address:
City
Phone: ( )

Site Operator:
Address:
City:
Phone: ( )

Other resp. parties:
Address:
City:
Phone: ( )

Address:
City:
Phone: ( )

DSWM Contact Michael J. Higgs Phone: (615) 741-6287

Site Contact
Address:
City:
Phone: ( )

COMMENTS:

Please attach a copy of the topo map with the site clearly marked. Return this to the §3012 Program - Superfund Section - Central Office.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 53

Tennessee Department of Environment and Conservation
Inter-Office Memo

Date: 5 November 93

To: Don Vanhook, Craig Stannard

From: Ferman Miller FDM

Subject: Howard High SI-#33-606

Wayne and I talked with Andy Binford on 11/4/93 about this site and the benzo-pyrene lab results. Wayne talked about the creek dredging activities, railroad and I-24 construction, and landfilling to make useable land (school, housing, recreation areas) from floodplains. Intertwined with discussions about Howard High was the Montague Park.

FDM said that it is not surprising to find 2 ppm pyrene at the school if the fill was 500 ppm pyrene from the creek sediment. Even the Howard soil control showed .5 ppm pyrene. My experience has been that a good site control sample reveals N.D. for all organics. This could be checked by researching other control samples from sites near Howard High (such as Montague, Southern Wood Piedmont, Morgan Street, Chattanooga Coke, and Morningside), or taking fresh samples from the area closer in and around Howard (I-24 and So. Market St.).

Wayne referred to the aerial phots that Artur K. had and which are probably in the Montague file. We talked about the Montague pond (blue hole) and a limestone quarry at Montague.

Mr. Binford asked if the school and daycare operated in summer. Number of children involved is important. WSE said the site was maxed out using the HRS-2 back of the envelope approach.

We are planning on a site visit when the weather is better and more time is available. (We had a big MorFlo meeting this date. That FS review lasted 3 hours.)

FDM/HowH1105.Doc

Site Name: Howard High School Dump

Site Number: TND 100842343

Appendix B. 4-Mile Site Radius Map

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 43

STATE OF TENNESSEE
DEPARTMENT OF CONSERVATION

ECOLOGICAL SERVICES DIVISION

WILLIAM M. CHRISTIE
DATA BASE MANAGER/
REMOTE SENSING SPECIALIST
PHONE: 615/742-6550

CUSTOMS HOUSE
701 BROADWAY
NASHVILLE, TN 37219-5237

2 PD
CJS
FSC - Vest

INP SPECIES
HAML CO
1/31/89

## HEADINGS AND TERMS ON THE PRINTOUT

| | |
|---|---|
| Scientific Name: | Genus and species |
| Common Name: | Common name as used by the State |
| Element Code: | A 10-digit identification code with an attached occurrence number, "P" denotes Plant, "A" Animal, "I" Invertebrate |
| Federal Status: | See attached Status definition summary |
| State Status: | See attached Status definition summary |
| ESD Status: | See attached Status definition summary |
| Last Observed: | Date at which the element was last observed extant at the site |
| First Observed: | The year at which the element occurrence was first reported from the site |
| Quadrangle Name: | The standard U. S. Geological Survey 7.5' Topographic Quadrangle |
| County: | The Tennessee County, prefixed by the "TN" designation followed by the first four letters of the county name |
| Latitude: | Degrees, minutes, seconds North |
| Longitude: | Degrees, minutes, seconds West |
| Directions: | Exact location of the element, and local access |
| General Description: | Site description of where the element occurs and other biotic communities found at the location |
| Element Data: | Data on the element on the site; size, numbers, condition, etc. |
| Comments: | Other information, not recorded by other fields but worth recording |
| Best Source: | The single best source of information on the element occurrence on the site |

# EXPLANATION OF FEDERAL STATUS DESIGNATIONS

## FEDERAL STATUS, DETERMINED BY THE U. S. FISH AND WILDLIFE SERVICE[1]

LE - Taxa formally listed as endangered

LT - Taxa formally listed as threatened

PE - Taxa proposed to be formally listed as endangered

PT - Taxa proposed to be formally listed as threatened

S - Synonyms

C 1 - Taxa for which the Service has on file substantial information on biological vulnerability and threat(s) to support the appropriateness to list them as endangered or threatened species. Included are those taxa whose status in recent past is known, but may have already become extinct. Such possibly extinct taxa are indicated by an asterisk (*). Double asterisk (**) indicate taxa believed to be extinct in the wild, but known to be extant in cultivation.

C 2 - Taxa for which information now in possession of the Service indicated proposing to list them as endangered or threatened is appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support a proposed rule. Such possibly extinct taxa are indicated by an asterisk (*). Double asterisk (**) indicate taxa believed to be extinct in the wild, but kno to be extant in cultivation.

C 3 - Taxa that are no longer being considered for listing as threatened or endangered species. The following subcategories are used to further indicate the reason(s) for removal from consideration.

3A - Taxa for which the Service has persuasive evidence of extinction of being destroyed. If rediscovered, such taxa might acquire high priority for listing.

3B - Names that on the basis of current taxonomic understanding do not represent taxa meeting the Acts definition of "species." Such proposed taxa could be reevaluated in the future on the basis of subsequent research.

3C - Taxa that have proven to be more abundant or widespread than was previously believed and/or those that are not subject to any identifiable threat.

NOTE: The taxa listed in Categories 1 or 2 may be considered candidates for addition to the list of Endangered and Threatened plants, and, as such, consideration should be given them in environmental planning.

*1. Federal Register, 50 (188), September 18, 1985, pp. 37958-37959, and September 27, 1985, pp. 39526-39527.

## DEFINITIONS OF STATUS FOR THE OFFICIAL LIST OF TENNESSEE'S RARE PLANTS[1]

E - ENDANGERED, Species now in danger of becoming extinct in Tennessee because of:

(a) their rarity throughout their range, or

(b) their rarity in Tennessee as a result of sensitive habitat destruction or restricted area of distribution.

T - THREATENED, Species likely to become endangered in the immediately foreseeable future as a result of rapid habitat destruction or commercial exploitation.

S - SPECIAL CONCERN, Species requiring special concern because of:

(a) their rarity of distinctive in Tennessee because the State represents the limit or near-limit of their geographic range, or

(b) their status is undetermined because of insufficient information.

P - POSSIBLY EXTIRPATED, Species that have not been seen in Tennessee within the past 20 years.

*1. Adapted from the Committee for Tennessee Rare Plants. 1978. The rare and vascular plants of Tennessee. J. Tenn. Acad. Sci. 53(4):128-133.

# STATUS OF TENNESSEE'S RARE WILDLIFE

## STATUS DESIGNATIONS

E-P - Endangered, Possibly extirpated

E - Endangered

T - Threatened

S - Special Concern

I - Inactive

D - Deemed in Need of Management

* - Species Proposed for Federal Protection

THESE SPECIES ARE FOUND TO OCCUR IN HAMILTON COUNTY, TENNESSEE
TN DEPARTMENT OF CONSERVATION
Ecological Services Division
January 31, 1989

| | SCIENTIFIC / COMMON NAME | STATUS: FEDERAL | STATE | ESD |
|---|---|---|---|---|
| 1 | GYRINOPHILUS PALLEUCUS<br>TENNESSEE CAVE SALAMANDER | C2 | T | T |
| 2 | IXOBRYCHUS EXILIS<br>LEAST BITTERN | | D | D |
| 3 | NYCTICORAX VIOLACEUS<br>YELLOW-CROWNED NIGHT-HERON | | | |
| 4 | CATHARTES AURA<br>TURKEY VULTURE | | D | D |
| 5 | HALIAEETUS LEUCOCEPHALUS<br>BALD EAGLE | Listed endangered threat<br>LELT | E | E |
| 6 | BUTEO LINEATUS<br>RED-SHOULDERED HAWK | | D | D |
| 7 | FALCO PEREGRINUS<br>PEREGRINE FALCON | LE | E | E |
| 8 | RALLUS ELEGANS<br>KING RAIL | | | |
| 9 | RALLUS LIMICOLA<br>VIRGINIA RAIL | | | |
| 10 | TYTO ALBA<br>COMMON BARN-OWL | | D | D |
| 11 | THRYOMANES BEWICKII<br>BEWICK'S WREN | | T | T |
| 12 | LIMNOTHLYPIS SWAINSONII<br>SWAINSON'S WARBLER | | D | D |
| 13 | AIMOPHILA AESTIVALIS<br>BACHMAN'S SPARROW | C2 | E | E |
| 14 | AMMODRAMUS SAVANNARUM<br>GRASSHOPPER SPARROW | | T | T |

Hamilton Co.

| SCIENTIFIC / COMMON NAME | STATUS: FEDERAL | STATE | ESD |
|---|---|---|---|
| PERCINA TANASI<br>15 SNAIL DARTER | LT | T | T |
| NEOTOMA FLORIDANA<br>16 EASTERN WOODRAT | | D | D |
| TRACHEMYS SCRIPTA TROOSTII<br>17 CUMBERLAND SLIDER | | | |
| ANOLIS CAROLINENSIS<br>18 GREEN ANOLE | | D | D |
| CNEMIDOPHORUS SEXLINEATUS<br>19 SIX-LINED RACERUNNER | | D | D |
| CAMBARUS EXTRANEUS<br>20 CHICKAMAUGA CRAYFISH | C2 | | |
| DROMUS DROMAS<br>21 DROMEDARY PEARLYMUSSEL | LE | E | E |
| 22 EPIOBLASMA TORULOSA | | E | E |
| LAMPSILIS ABRUPTA<br>23 PINK MUCKET | LE | E | E |
| PLETHOBASUS COOPERIANUS<br>24 ORANGE-FOOT PIMPLEBACK | LE | E | E |
| QUADRULA INTERMEDIA<br>25 CUMBERLAND MONKEYFACE | LE | E | E |
| LITHASIA GENICULATA<br>26 ORNATE ROCKSNAIL | C2 | | |
| LITHASIA VERRUCOSA<br>27 VARICOSE ROCKSNAIL | C2 | | |
| ACER LEUCODERME<br>28 CHALK MAPLE | | S | S |
| POLYMNIA LAEVIGATA<br>29 TENNESSEE LEAFCUP | C2 | S | S |
| SILPHIUM LACINIATUM<br>30 COMPASS PLANT | | T | T |
| DIERVILLA RIVULARIS<br>31 MOUNTAIN BUSH-HONEYSUCKLE | | T | T |

Hamilton Co.

| | SCIENTIFIC / COMMON NAME | STATUS: FEDERAL | STATE | ESD |
|---|---|---|---|---|
| 32 | LONICERA FLAVA<br>YELLOW HONEYSUCKLE | | S | S |
| 33 | DIAMORPHA SMALLII<br>SMALL'S STONECROP | | | |
| 34 | SCUTELLARIA MONTANA<br>LARGE-FLOWERED SKULLCAP | LE | E | E |
| 35 | GELSEMIUM SEMPERVIRENS<br>YELLOW JESSAMINE | | S | S |
| 36 | TALINUM TERETIFOLIUM<br>ROUNDLEAF FAMEFLOWER | | T | T |
| 37 | LYSIMACHIA FRASERI<br>FRASER LOOSESTRIFE | | E | E |
| 38 | DELPHINIUM EXALTATUM<br>TALL LARKSPUR | | E | E |
| 39 | SAXIFRAGA CAREYANA<br>CAREY SAXIFRAGE | C2 | S | S |
| 40 | VIOLA TRIPARTITA VAR TRIPARTITA | | S | S |
| 41 | SAGITTARIA PLATYPHYLLA<br>OVATE-LEAVED ARROWHEAD | | S | S |
| 42 | LILIUM PHILADELPHICUM<br>WOOD LILY | | E | E |
| 43 | TRILLIUM LANCIFOLIUM<br>NARROW-LEAVED TRILLIUM | | E | E |
| 44 | TRILLIUM RUGELII | | E | E |
| 45 | TRITELEIA CROCEA<br>YELLOW TRITELELIA | | | |

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 44

1991

# TWRA
# STATEWIDE
# SUMMARY OF CREEL CLERK EFFORT

| RESERVOIR | ESTIMATED HOURS | ESTIMATED HOURS PER ACRE | ESTIMATED TRIPS | ESTIMATED TRIPS PER ACRE |
|---|---|---|---|---|
| BOONE | 206,463 | 46.71 | 56,304 | 12.81 |
| CENTER HILL | 452,750 | 24.85 | 192,447 | 10.56 |
| CHEROKEE | 668,916 | 22.08 | 186,184 | 6.14 |
| CHICKAMAUGA | 1,545,738 | 43.66 | 539,578 | 15.24 |
| DALE HOLLOW | 558,219 | 23.86 | 207,484 | 8.87 |
| DOUGLAS | 845,219 | 27.81 | 308,549 | 10.15 |
| GUNTERSVILLE | 140,624 | 28.12 | 58,430 | 11.69 |
| KENTUCKY | 1,572,259 | 14.27 | 486,887 | 4.42 |
| NICKAJACK | 264,054 | 25.46 | 89,516 | 8.63 |
| NORMANDY | 157,394 | 48.73 | 55,502 | 17.18 |
| NORRIS | 456,563 | 13.35 | 152,425 | 4.46 |
| OLD HICKORY | 185,127 | 8.23 | 71,916 | 3.21 |
| PERCY PRIEST | 179,039 | 12.61 | 65,013 | 4.58 |
| REELFOOT | 202,790 | 20.28 | 57,744 | 5.77 |
| SOUTH HOLSTON | 350,424 | 57.64 | 102,759 | 16.91 |
| WATTS BAR | 856,299 | 21.96 | 321,137 | 8.23 |
| WOODS | 173,587 | 44.41 | 65,833 | 16.84 |

NOTE: OLD HICKORY AND PERCY PRIEST RESERVOIRS WERE NOT CREELED FOR THE ENTIRE YEAR

ANNUAL SUMMARY OF CREEL DATA FOR ALL ANGLERS BY RESERVOIR-1991

RESERVOIR=NICKAJACK

| COMMON NAME | ESTIMATED NUMBER CAUGHT | ESTIMATED NUMBER HARVESTED | NUMBER CAUGHT PER HOUR | NUMBER HARVESTED PER HOUR | MEAN WEIGHT | PERCENT HARVESTED | NUMBER CREELED |
|---|---|---|---|---|---|---|---|
| GOLDEN SHINER | 280.74 | 280.74 | 0.00 | 0.00 | 0.28 | 100.00 | 6 |
| FLATHEAD CATFISH | 374.33 | 374.33 | 0.00 | 0.00 | 2.25 | 100.00 | 8 |
| BLUE CATFISH | 8609.49 | 8094.79 | 0.03 | 0.03 | 3.27 | 94.02 | 184 |
| CHANNEL CATFISH | 23301.77 | 21944.84 | 0.09 | 0.08 | 2.00 | 94.18 | 498 |
| BULLHEAD | 421.12 | 421.12 | 0.00 | 0.00 | 2.34 | 100.00 | 9 |
| FRESHWATER DRUM | 3649.68 | 1263.35 | 0.01 | 0.00 | 8.53 | 34.62 | 78 |
| WHITE BASS | 3509.30 | 2994.61 | 0.01 | 0.01 | 0.78 | 85.33 | 75 |
| YELLOW BASS | 5942.42 | 4257.95 | 0.02 | 0.02 | 0.36 | 71.65 | 127 |
| YELLOW PERCH | 3930.42 | 3415.72 | 0.01 | 0.01 | 0.37 | 86.90 | 84 |
| LARGEMOUTH BASS | 59985.69 | 6691.07 | 0.23 | 0.03 | 2.26 | 11.15 | 1282 |
| SMALLMOUTH BASS | 1216.56 | 140.37 | 0.00 | 0.00 | 2.50 | 11.54 | 26 |
| SPOTTED BASS | 1122.98 | 655.07 | 0.00 | 0.00 | 1.07 | 58.33 | 24 |
| WHITE CRAPPIE | 2901.02 | 2433.12 | 0.01 | 0.01 | 0.61 | 83.87 | 62 |
| BLACK CRAPPIE | 4959.82 | 4538.70 | 0.02 | 0.02 | 0.66 | 91.51 | 106 |
| UNIDENTIFIED SUNFISH | 1450.51 | 1310.14 | 0.01 | 0.00 | 0.39 | 90.32 | 31 |

ANNUAL SUMMARY OF CREEL DATA FOR ALL ANGLERS BY RESERVOIR-1991

RESERVOIR=NICKAJACK

| COMMON NAME | ESTIMATED NUMBER CAUGHT | ESTIMATED NUMBER HARVESTED | NUMBER CAUGHT PER HOUR | NUMBER HARVESTED PER HOUR | MEAN WEIGHT | PERCENT HARVESTED | NUMBER CREELED |
|---|---|---|---|---|---|---|---|
| BLUEGILL | 67986.90 | 60640.76 | 0.26 | 0.23 | 0.34 | 89.19 | 1453 |
| REDEAR SUNFISH | 5708.47 | 5380.93 | 0.02 | 0.02 | 0.38 | 94.26 | 122 |
| WARMOUTH | 93.58 | 93.58 | 0.00 | 0.00 | 0.35 | 100.00 | 2 |

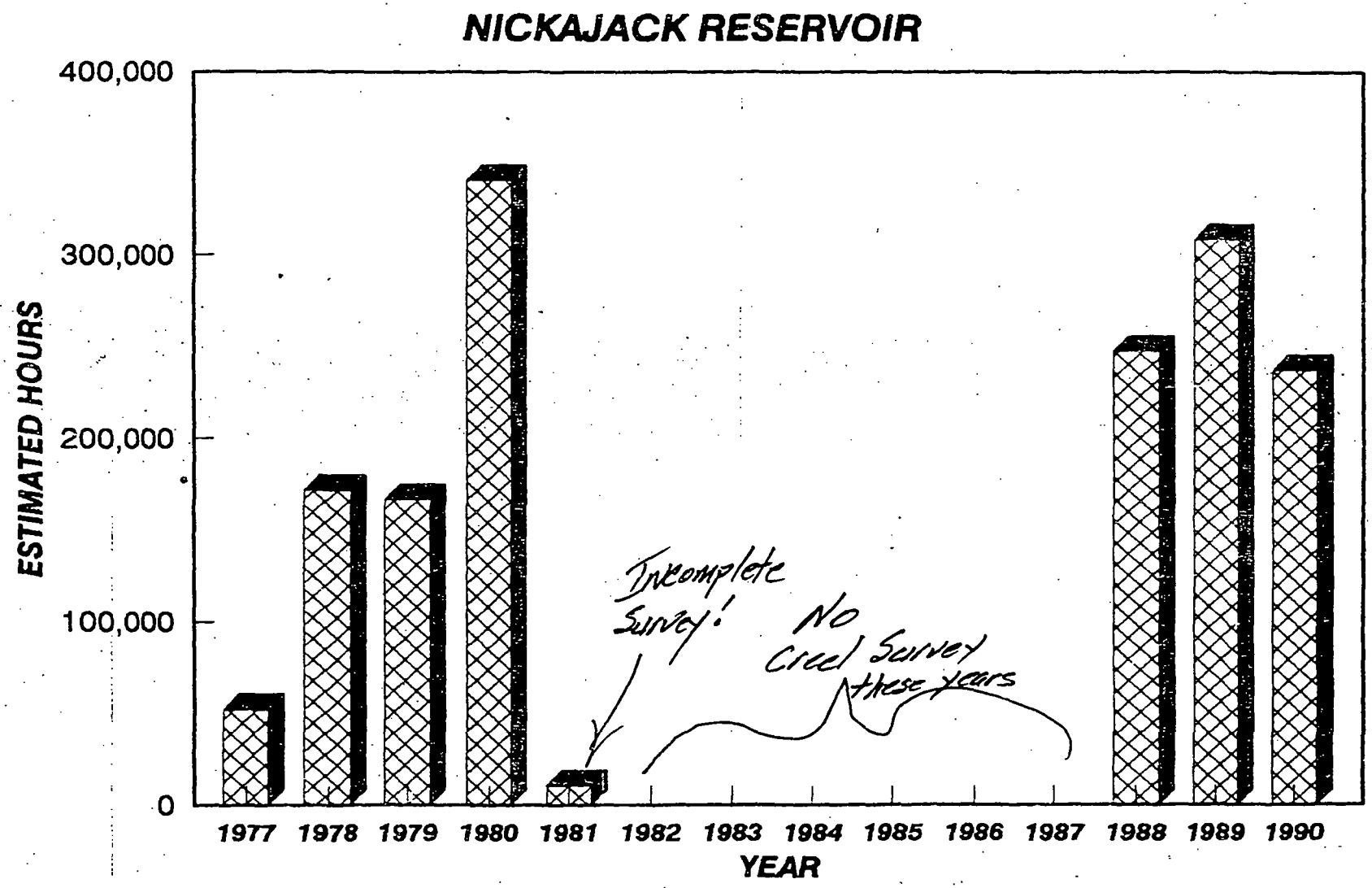
#/YEAR TOTAL =

ANNUAL ESTIMATE OF ANGLING EFFORT FOR ALL ANGLERS
PERIOD OF RECORD:1977-1990

RESERVOIR=NICKAJACK

| YEAR | ESTIMATED HOURS | ESTIMATED HOURS PER ACRE | ESTIMATED TRIPS | ESTIMATED TRIPS PER ACRE |
|---|---|---|---|---|
| 77 | 52131 | 5.02 | 14471 | 1.39 |
| 78 | 171872 | 16.57 | 45474 | 4.38 |
| 79 | 166623 | 16.06 | 46996 | 4.53 |
| 80 | 340699 | 32.85 | 71224 | 6.86 |
| 81 | 10588 | 1.02 | 2624 | 0.25 |
| 88 | 247536 | 23.87 | 80085 | 7.72 |
| 89 | 308135 | 29.71 | 66773 | 6.43 |
| 90 | 237117 | 22.86 | 56991 | 5.49 |
| 91 | 264,054 | 25.46 | 89,516 | 8.63 |
| TOTAL | 1534701 | | 384638 | |

# ANNUAL ESTIMATED ANGLING EFFORT



Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 45

**TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION**

**DIVISION OF SUPERFUND**

**OFFICE MEMORANDUM**

DATE: November 19, 1993

TO: File #33606, Howard School

FROM: Don VanHook

SUBJECT: Area Population Values

---

10:30 am: DV telephoned Joy Smith of the Leasing Division of the Chattanooga Housing Authority (752-4827). She gave the following population values:

Maurice Potts Homes: 192 units, 150 current residents
Mary Walker Towers: 160 units, 138 current residents

10:45 am: DV telephoned Shirley Deems of the Superintendents Office, Chattanooga Board of Education (825-7348). She gave the following student populations:

Howard Elementary (K-5): 417 current students
Howard High (9-12): 1074 current students
Calvin Donelson (K-5): 355 current students
Bell school closed in 1989.

11:30 am: DV telephoned John Bridger with the Chattanooga Planning Commission. He gave the following 1990 population values:

Alton Park/ Piney Woods area (Tract 19): 5331
S. Chattanooga, I-24 to creek (Tract 20): 1071
Main St. to I-24 (Tract 21): 732
Clifton Hills area (Tract 23): 1466
Montague Park area (Tract 26): 1441

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 46

TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF SUPERFUND

OFFICE MEMORANDUM

DATE: 11/22/93

TO: File #33-606, Howard School Landfill

FROM: Don VanHook

SUBJECT: Howard population values

---

At 11:30 am DV telephoned Mr. Bryant, superintendent of the high school (757-4970). Mr. Bryant stated that there are 65 teachers in grades 9-12.

DV then called the elementary school at Howard (757-4746). There are 27 teachers in grades K-4.

Next, DV called Melanie Chambers with the Maurice Kirby Child Care Center (757-0034). She stated that the Day Care Center that the TDSF Site Investigation collected samples at was opened last year. It was originally located in Howard school. The day care is open year round from 6:30 am to 3:30 pm. The kids usually leave at 2:30 pm. The day care is operated for students and teachers. A student child development learning center is also operated at the day care for Howard students. During the school year, there are 55 children and 15 teachers on average. During the summer, there are 6 children and 5 teachers on average.

Site Name: Howard High School Dump

Site Number: TND 100842343

Reference Number: 47

CFO File
# 33-606

Date: 8/20/93

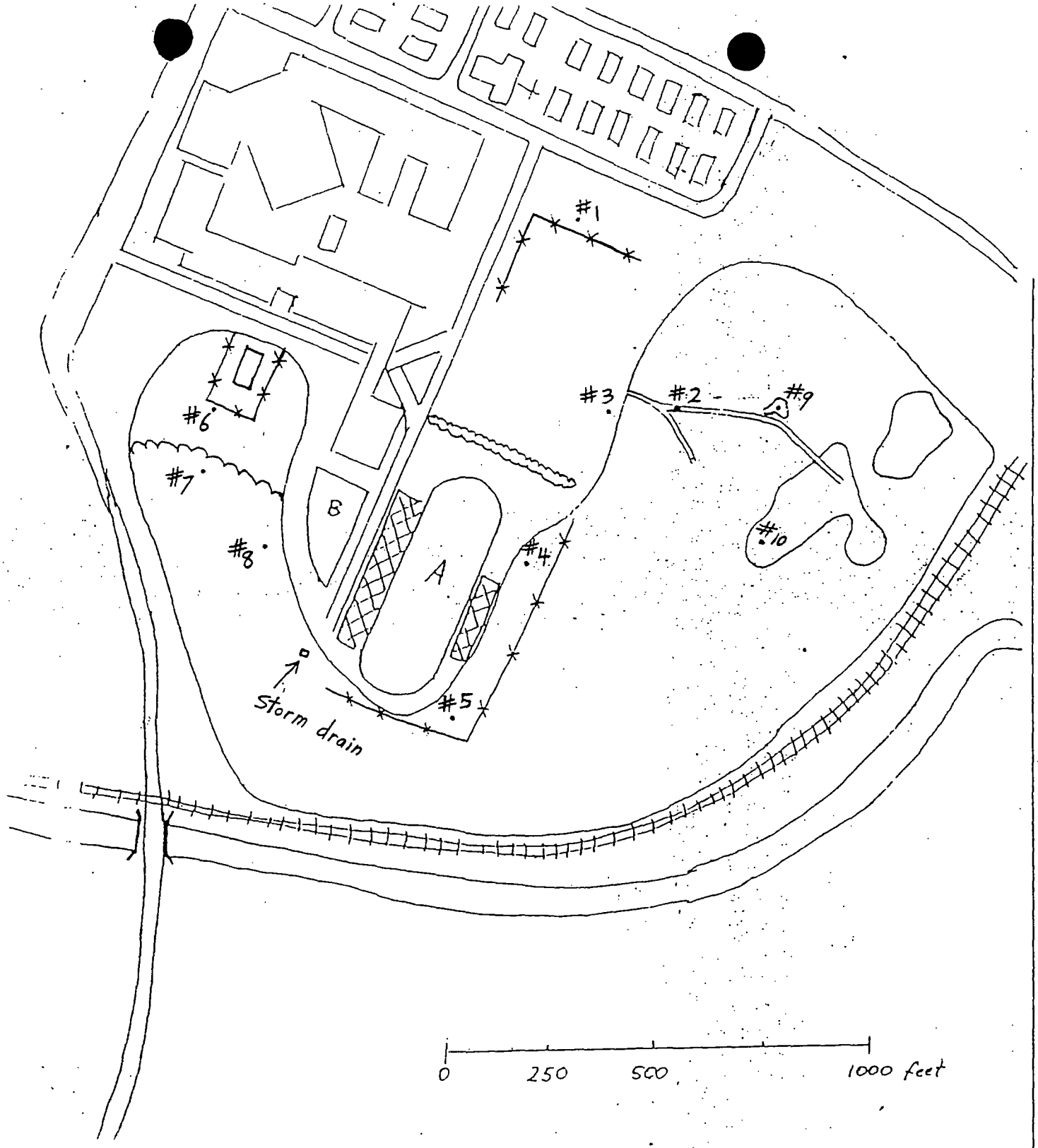
To: Howard High School File # 33-606

From: Craig Stannard, Geologist, DSF

Subject: Soil/Gas Survey

DSF personnel Craig Stannard, Don Vanhook, Andy Shivas, and Andy Binford arrived at the Howard High School site at 8:00 AM on 8/16/93 to conduct a soil/gas survey. The weather was hazy, calm, and in the 70s. The temperature later climbed into the upper 90s. The survey was conducted as indicated on the attached site sketch. The first survey point, control point # 1, was located in a grassy area 5 feet north of a chain-link fence and 52 feet east of the school access road. A half inch galvanized pipe was advanced into the ground 1 and 1/2 feet and, at 8:30 AM, several readings were taken with the OVA. The readings varied between 0.8 and 1.0 ppm. At approximately 10 AM, DSF/CFO manager, Wayne Everett, arrived at the site and joined the survey team. At 10:20 AM, the DSF team moved to survey point # 2 located in the center of an old landfill access road and approximately 73 feet east of the edge of the school baseball field. The same proceedures used at control point # 1 were followed at survey point # 2. The OVA readings at survey point # 2 were greater than 2,000 ppm. The identity of the gas was not determined but was suspected to be methane. Readings taken with a Scott oxygen meter indicated an oxygen level of 2.1 % and an LEL level of 27 %. An HnU meter was used but registered nothing. At 11:15 AM, survey point # 3 was located at the edge of the baseball field, 9 feet from the landfill tree line, and 24 feet south of the landfill access road. The OVA reading was 1 ppm. At 11:45 AM, survey point # 4 was established at the eastern edge of the football field, 12 feet west of the chain-link fence, and directly east of the fourth wooden light pole from the south. The OVA reading at point # 4 was 2.3 ppm. The oxygen reading was 10.6 % and the LEL level was 0 %. The HnU meter registered nothing. At 12:30 PM, survey point # 5 was located at the southeast corner of the football field, approximately 6 feet inside the southeast corner of the chain-link fence. The OVA reading here was 2.7 ppm. The Scott oxygen meter registered 12.2 % oxygen and 0 % LEL. At 2:00 PM, survey point # 6 was established 5 feet east of the southwest corner of the daycare fence and 1 foot south of the fence. The highest OVA reading here was 72 ppm. The oxygen meter registered 14.5 % oxygen and 0 % LEL. At 2:50 PM, survey point # 7 was located at the edge of the nature trail approximately 60 feet from its starting point. The hole at survey point # 7 filled with water. The OVA reading was greater than 1000 ppm. The NnU meter registered nothing. At 3:30 PM, survey point # 8 was located next to the black plastic pool on the nature trail. The highest of the OVA readings was 390 ppm. The Scott oxygen meter registered 17 to 18 % oxygen and 1 % LEL. The DSF team visited the storm drain located in the landfill near the southwest corner of the practice field. The Scott oxygen meter registered 20 % oxygen and 0 % LEL near the water's surface. At 4:30 PM, survey point # 9 was established on a bald spot in the landfill, 5 feet north of a landfill access road and approximately 378 feet to the east of survey point # 2. The OVA reading at point # 9 was greater than 1000 ppm. The Scott oxygen meter registered 7.7 % oxygen and 43 % LEL. At approximately 5:00 PM, survey point # 10 was established in a bald spot approximately 382 feet southeast of point # 9. The OVA reading here was approximately 400 ppm and the Scott oxygen meter registered 3.7 % oxygen and 10 % LEL. The soil/gas survey was concluded at approximately 5:30 PM and the DSF team returned to the CFO.

The DSF team photographed the days activities. All of the holes were filled with bentonite.




HOWARD HIGH SCHOOL DUMP

Soil/Gas Survey

NPL Characteristics Data Collection Form
Howard High Landfill - 01/03/94

## Record Information

1. Site Name: Howard High Landfill
   (as entered in CERCLIS)
2. Site CERCLIS Number: TND100842343
3. Site Reviewer: Don VanWook and Craig Stannard
4. Date: December 1993
5. Site Location: Chattanooga/Hamilton, Tennessee
   (City/County,State)
6. Congressional District: 3
7. Site Coordinates: Single

   Latitude: 35 01'25. Longitude: 085 18'24.

FOIA EXEMPTION 5
Deliberative Official
3/20/95
Date

## Site Description

1. Setting: Urban
2. Current Owner: Municipal
3. Current Site Status: Inactive
4. Years of Operation: Inactive Site,from and to dates: 1972 to 1976
5. How Initially Identified: State/Local Program
6. Entity Responsible for Waste Genera
   - Landfill
7. Site Activities/Waste Deposition:
   - Municipal Landfill

Howard High School Dump
Hamilton County, Tennessee
TND 100842343
PRESCORE

## Waste Description

8. Wastes Deposited or Detected Onsite:

- Organic Chemicals
- Metals
- Construction Waste

## Response Actions

9. Response/Removal Actions:

## RCRA Information

10. For All Active Facilities, RCRA Site Status:

    - Not Applicable

## Demographic Information

11. Workers Present Onsite: Yes
12. Distance to Nearest Non-Worker Individual: Onsite
13. Residential Population Within 1 Mile: 8500.0
14. Residential Population Within 4 Miles: 78538.0

## Water Use Information

15. Local Drinking Water Supply Source:

    - No Water Withdrawals Within Target Distance Limits

16. Total Population Served by Local Drinking Water Supply Source: Not Applic
17. Drinking Water Supply System Type for Local Drinking Water Supply Sources:

    - Not Applicable

18. Surface Water Adjacent to/Draining Site:

    - Contaminated Stream

HRS DOCUMENTATION RECORD
Howard High Landfill - 01/03/94

1. Site Name: Howard High Landfill
   (as entered in CERCLIS)

2. Site CERCLIS Number: TND100842343

3. Site Reviewer: Don VanHook and Craig Stannard

4. Date: December 1993

5. Site Location: Chattanooga/Hamilton, Tennessee
   (City/County,State)

6. Congressional District: 3

7. Site Coordinates: Single

   Latitude: 35 01'25. Longitude: 085 18'24.

| | Score |
|---|---|
| Ground Water Migration Pathway Score (Sgw) | 0.00 |
| Surface Water Migration Pathway Score (Ssw) | 0.00 |
| Soil Exposure Pathway Score (Ss) | 73.58 |
| Air Migration Pathway Score (Sa) | 1.05 |

| | |
|---|---|
| Site Score | 36.79 |

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

GROUND WATER MIGRATION PATHWAY SCORESHEET
Howard High Landfill - 01/03/94

| GROUND WATER MIGRATION PATHWAY Factor Categories & Factors | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release to an Aquifer<br>Aquifer: Knox | | |
| 1. Observed Release | 550 | 0 |
| 2. Potential to Release | | |
| 2a. Containment | 10 | 10 |
| 2b. Net Precipitation | 10 | 10 |
| 2c. Depth to Aquifer | 5 | 5 |
| 2d. Travel Time | 35 | 35 |
| 2e. Potential to Release [lines 2a(2b+2c+2d)] | 500 | 500 |
| 3. Likelihood of Release | 550 | 500 |
| Waste Characteristics | | |
| 4. Toxicity/Mobility | * | 1.00E+04 |
| 5. Hazardous Waste Quantity | * | 100 |
| 6. Waste Characteristics | 100 | 32 |
| Targets | | |
| 7. Nearest Well | 50 | 0.00E+00 |
| 8. Population | | |
| 8a. Level I Concentrations | ** | 0.00E+00 |
| 8b. Level II Concentrations | ** | 0.00E+00 |
| 8c. Potential Contamination | ** | 0.00E+00 |
| 8d. Population (lines 8a+8b+8c) | ** | 0.00E+00 |
| 9. Resources | 5 | 0.00E+00 |
| 10. Wellhead Protection Area | 20 | 0.00E+00 |
| 11. Targets (lines 7+8d+9+10) | ** | 0.00E+00 |
| 12. Targets (including overlaying aquifers) | ** | 0.00E+00 |
| 13. Aquifer Score | 100 | 0.00 |
| GROUND WATER MIGRATION PATHWAY SCORE (Sgw) | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT<br>Factor Categories & Factors<br>DRINKING WATER THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 1. Observed Release | 550 | 0 |
| 2. Potential to Release by Overland Flow | | |
| 2a. Containment | 10 | 10 |
| 2b. Runoff | 25 | 25 |
| 2c. Distance to Surface Water | 25 | 20 |
| 2d. Potential to Release by Overland Flow [lines 2a(2b+2c)] | 500 | 450 |
| 3. Potential to Release by Flood | | |
| 3a. Containment (Flood) | 10 | 10 |
| 3b. Flood Frequency | 50 | 25 |
| 3c. Potential to Release by Flood (lines 3a x 3b) | 500 | 250 |
| 4. Potential to Release (lines 2d+3c) | 500 | 500 |
| 5. Likelihood of Release | 550 | 500 |
| Waste Characteristics | | |
| 6. Toxicity/Persistence | * | 1.00E+04 |
| 7. Hazardous Waste Quantity | * | 100 |
| 8. Waste Characteristics | 100 | 32 |
| Targets | | |
| 9. Nearest Intake | 50 | 0.00E+00 |
| 10. Population | | |
| 10a. Level I Concentrations | ** | 0.00E+00 |
| 10b. Level II Concentrations | ** | 0.00E+00 |
| 10c. Potential Contamination | ** | 0.00E+00 |
| 10d. Population (lines 10a+10b+10c) | ** | 0.00E+00 |
| 11. Resources | 5 | 0.00E+00 |
| 12. Targets (lines 9+10d+11) | ** | 0.00E+00 |
| 13. DRINKING WATER THREAT SCORE | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT<br>Factor Categories & Factors<br>HUMAN FOOD CHAIN THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 14. Likelihood of Release (same as line 5) | 550 | 500 |
| Waste Characteristics | | |
| 15. Toxicity/Persistence/Bioaccumulation | * | 5.00E+08 |
| 16. Hazardous Waste Quantity | * | 100 |
| 17. Waste Characteristics | 1000 | 320 |
| Targets | | |
| 18. Food Chain Individual | 50 | 0.00E+00 |
| 19. Population | | |
| 19a. Level I Concentrations | ** | 0.00E+00 |
| 19b. Level II Concentrations | ** | 0.00E+00 |
| 19c. Pot. Human Food Chain Contamination | ** | 3.30E-05 |
| 19d. Population (lines 19a+19b+19c) | ** | 3.30E-05 |
| 20. Targets (lines 18+19d) | ** | 3.30E-05 |
| 21. HUMAN FOOD CHAIN THREAT SCORE | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT<br>Factor Categories & Factors<br>ENVIRONMENTAL THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 22. Likelihood of Release (same as line 5) | 550 | 500 |
| Waste Characteristics | | |
| 23. Ecosystem Toxicity/Persistence/Bioacc. | * | 5.00E+08 |
| 24. Hazardous Waste Quantity | * | 100 |
| 25. Waste Characteristics | 1000 | 320 |
| Targets | | |
| 26. Sensitive Environments | | |
| 26a. Level I Concentrations | ** | 0.00E+00 |
| 26b. Level II Concentrations | ** | 0.00E+00 |
| 26c. Potential Contamination | ** | 0.00E+00 |
| 26d. Sensitive Environments (lines 26a+26b+26c) | ** | 0.00E+00 |
| 27. Targets (line 26d) | ** | 0.00E+00 |
| 28. ENVIRONMENTAL THREAT SCORE | 60 | 0.00 |
| 29. WATERSHED SCORE | 100 | 0.00 |
| 30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof) | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT<br>Factor Categories & Factors<br>DRINKING WATER THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release to Aquifer<br>Aquifer: Knox | | |
| 1. Observed Release | 550 | 0 |
| 2. Potential to Release | | |
| 2a. Containment | 10 | 10 |
| 2b. Net Precipitation | 10 | 10 |
| 2c. Depth to Aquifer | 5 | 5 |
| 2d. Travel Time | 35 | 35 |
| 2e. Potential to Release [lines 2a(2b+2c+2d)] | 500 | 500 |
| 3. Likelihood of Release | 550 | 500 |
| Waste Characteristics | | |
| 4. Toxicity/Mobility/Persistence | * | 1.00E+04 |
| 5. Hazardous Waste Quantity | * | 100 |
| 6. Waste Characteristics | 100 | 32 |
| Targets | | |
| 7. Nearest Intake | 50 | 0.00E+00 |
| 8. Population | | |
| 8a. Level I Concentrations | ** | 0.00E+00 |
| 8b. Level II Concentrations | ** | 0.00E+00 |
| 8c. Potential Contamination | ** | 0.00E+00 |
| 8d. Population (lines 8a+8b+8c) | ** | 0.00E+00 |
| 9. Resources | 5 | 0.00E+00 |
| 10. Targets (lines 7+8d+9) | ** | 0.00E+00 |
| 11. DRINKING WATER THREAT SCORE | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT<br>Factor Categories & Factors<br>HUMAN FOOD CHAIN THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 12. Likelihood of Release (same as line 3) | 550 | 500 |
| Waste Characteristics | | |
| 13. Toxicity/Mobility/Persistence/Bioacc. | * | 5.00E+04 |
| 14. Hazardous Waste Quantity | * | 100 |
| 15. Waste Characteristics | 1000 | 32 |
| Targets | | |
| 16. Food Chain Individual | 50 | 0.00E+00 |
| 17. Population | | |
| 17a. Level I Concentrations | ** | 0.00E+00 |
| 17b. Level II Concentrations | ** | 0.00E+00 |
| 17c. Pot. Human Food Chain Contamination | ** | 0.00E+00 |
| 17d. Population (lines 17a+17b+17c) | ** | 0.00E+00 |
| 18. Targets (lines 16+17d) | ** | 0.00E+00 |
| 19. HUMAN FOOD CHAIN THREAT SCORE | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
Howard High Landfill - 01/03/94

| GROUND WATER TO SURFACE WATER MIGRATION COMPONENT<br>Factor Categories & Factors<br>ENVIRONMENTAL THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 20. Likelihood of Release (same as line 3) | 550 | 500 |
| Waste Characteristics | | |
| 21. Ecosystem Tox./Mobility/Persist./Bioacc. | * | 1.00E+05 |
| 22. Hazardous Waste Quantity | * | 100 |
| 23. Waste Characteristics | 1000 | 56 |
| Targets | | |
| 24. Sensitive Environments | | |
| 24a. Level I Concentrations | ** | 0.00E+00 |
| 24b. Level II Concentrations | ** | 0.00E+00 |
| 24c. Potential Contamination | ** | 0.00E+00 |
| 24d. Sensitive Environments (lines 24a+24b+24c) | ** | 0.00E+00 |
| 25. Targets (line 24d) | ** | 0.00E+00 |
| 26. ENVIRONMENTAL THREAT SCORE | 60 | 0.00 |
| 27. WATERSHED SCORE | 100 | 0.00 |
| 28. SW: GW to SW COMPONENT SCORE (Sgs) | 100 | 0.00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SOIL EXPOSURE PATHWAY SCORESHEET
Howard High Landfill - 01/03/94

| SOIL EXPOSURE PATHWAY<br>Factor Categories & Factors<br>RESIDENT POPULATION THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Exposure | | |
| 1. Likelihood of Exposure | 550 | 550 |
| Waste Characteristics | | |
| 2. Toxicity | * | 1.00E+04 |
| 3. Hazardous Waste Quantity | * | 10 |
| 4. Waste Characteristics | 100 | 18 |
| Targets | | |
| 5. Resident Individual | 50 | 5.00E+01 |
| 6. Resident Population | | |
| 6a. Level I Concentrations | ** | 5.50E+02 |
| 6b. Level II Concentrations | ** | 0.00E+00 |
| 6c. Resident Population (lines 6a+6b) | ** | 5.50E+02 |
| 7. Workers | 15 | 5.00E+00 |
| 8. Resources | 5 | 0.00E+00 |
| 9. Terrestrial Sensitive Environments | *** | 0.00E+00 |
| 10. Targets (lines 5+6c+7+8+9) | ** | 6.05E+02 |
| 11. RESIDENT POPULATION THREAT SCORE | ** | 5.99E+06 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SOIL EXPOSURE PATHWAY SCORESHEET
Howard High Landfill - 01/03/94

| SOIL EXPOSURE PATHWAY<br>Factor Categories & Factors<br>NEARBY POPULATION THREAT | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Exposure | | |
| 12. Attractiveness/Accessibility | 100 | 7.50E+01 |
| 13. Area of Contamination | 100 | 1.00E+02 |
| 14. Likelihood of Exposure | 500 | 5.00E+02 |
| Waste Characteristics | | |
| 15. Toxicity | * | 1.00E+04 |
| 16. Hazardous Waste Quantity | * | 10 |
| 17. Waste Characteristics | 100 | 18 |
| Targets | | |
| 18. Nearby Individual | 1 | 0.00E+00 |
| 19. Population Within 1 Mile | ** | 9.00E+00 |
| 20. Targets (lines 18+19) | ** | 9.00E+00 |
| 21. NEARBY POPULATION THREAT SCORE | ** | 8.10E+04 |
| SOIL EXPOSURE PATHWAY SCORE (Ss) | 100 | 73.58 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

AIR PATHWAY SCORESHEET
Howard High Landfill - 01/03/94

| AIR MIGRATION PATHWAY<br>Factor Categories & Factors | Maximum Value | Value Assigned |
|---|---|---|
| Likelihood of Release | | |
| 1. Observed Release | 550 | 0 |
| 2. Potential to Release | | |
| 2a. Gas Potential to Release | 500 | 170 |
| 2b. Particulate Potential to Release | 500 | 280 |
| 2c. Potential to Release | 500 | 280 |
| 3. Likelihood of Release | 550 | 280 |
| Waste Characteristics | | |
| 4. Toxicity/Mobility | * | 2.00E+00 |
| 5. Hazardous Waste Quantity | * | 100 |
| 6. Waste Characteristics | 100 | 3 |
| Targets | | |
| 7. Nearest Individual | 50 | 2.00E+01 |
| 8. Population | | |
| 8a. Level I Concentrations | ** | 0.00E+00 |
| 8b. Level II Concentrations | ** | 0.00E+00 |
| 8c. Potential Contamination | ** | 8.30E+01 |
| 8d. Population (lines 8a+8b+8c) | ** | 8.30E+01 |
| 9. Resources | 5 | 0.00E+00 |
| 10. Sensitive Environments | | |
| 10a. Actual Contamination | *** | 0.00E+00 |
| 10b. Potential Contamination | *** | 5.10E-02 |
| 10c. Sens. Environments(lines 10a+10b) | *** | 5.10E-02 |
| 11. Targets (lines 7+8d+9+10c) | ** | 1.03E+02 |
| AIR MIGRATION PATHWAY SCORE (Sa) | 100 | 1.05E+00 |

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

WASTE QUANTITY

Howard High Landfill - 01/03/94

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: Landfill

| | |
|---|---|
| a. Wastestream ID | |
| b. Hazardous Constituent Quantity (C) (lbs.) | 0.00 |
| c. Data Complete? | NO |
| d. Hazardous Wastestream Quantity (W) (lbs.) | 0.00 |
| e. Data Complete? | NO |
| f. Wastestream Quantity Value (W/5,000) | 0.00E+00 |

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

| | | |
|---|---|---|
| a. Source ID | Landfill | |
| b. Source Type | Landfill | |
| c. Secondary Source Type | N.A. | |
| d. Source Vol.(yd3/gal) \| Source Area (ft2) | 0.00 | 2000000.00 |
| e. Source Volume/Area Value | 5.88E+02 | |
| f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b) | 0.00E+00 | |
| g. Data Complete? | NO | |
| h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f) | 0.00E+00 | |
| i. Data Complete? | NO | |
| k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h) | 5.88E+02 | |

| Source Hazardous Substances | Depth (feet) | Liquid | Concent. | Units |
|---|---|---|---|---|
| Benzo(a)pyrene | < 2 | NO | 1.8E+00 | ppm |
| Bis (2-ethylhexyl) phthalate | < 2 | NO | 1.2E+00 | ppm |
| Chromium | < 2 | NO | 1.1E+02 | ppm |
| Lead | < 2 | NO | 3.5E+02 | ppm |
| Pyrene | < 2 | NO | 2.2E+00 | ppm |

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE:

| | |
|---|---|
| a. Wastestream ID | |
| b. Hazardous Constituent Quantity (C) (lbs.) | 0.00 |
| c. Data Complete? | NO |
| d. Hazardous Wastestream Quantity (W) (lbs.) | 0.00 |
| e. Data Complete? | NO |
| f. Wastestream Quantity Value (W/5,000) | 0.00E+00 |

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

| | | |
|---|---|---|
| a. Source ID | | |
| b. Source Type | Drums | |
| c. Secondary Source Type | N.A. | |
| d. Source Vol.(yd3/gal) \| Source Area (ft2) | 0.00 | 0.00 |
| e. Source Volume/Area Value | 0.00E+00 | |
| f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b) | 0.00E+00 | |
| g. Data Complete? | NO | |
| h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f) | 0.00E+00 | |
| i. Data Complete? | NO | |
| k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h) | 0.00E+00 | |

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

| No. | Source ID | Migration Pathways | Vol. or Area Value (2e) | Constituent or Wastestream Value (2f,2h) | Hazardous Waste Qty. Value (2k) |
|---|---|---|---|---|---|
| 1 | Landfill | GW-SW-SE-A | 5.88E+02 | 0.00E+00 | 5.88E+02 |
| 2 | | | 0.00E+00 | 0.00E+00 | 0.00E+00 |

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

| Migration Pathway | Contaminant Values | | HWQVs* | WCVs** |
|---|---|---|---|---|
| Ground Water | Toxicity/Mobility | 1.00E+04 | 100 | 32 |
| SW: Overland Flow, DW | Tox./Persistence | 1.00E+04 | 100 | 32 |
| SW: Overland Flow, HFC | Tox./Persis./Bioacc. | 5.00E+08 | 100 | 320 |
| SW: Overland Flow, Env | Etox./Persis./Bioacc. | 5.00E+08 | 100 | 320 |
| SW: GW to SW, DW | Tox./Persistence | 1.00E+04 | 100 | 32 |
| SW: GW to SW, HFC | Tox./Persis./Bioacc. | 5.00E+04 | 100 | 32 |
| SW: GW to SW, Env | Etox./Persis./Bioacc. | 1.00E+05 | 100 | 56 |
| Soil Exposure:Resident | Toxicity | 1.00E+04 | 10 | 18 |
| Soil Exposure: Nearby | Toxicity | 1.00E+04 | 10 | 18 |
| Air | Toxicity/Mobility | 2.00E+00 | 100 | 3 |

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

GROUND WATER PATHWAY AQUIFER SUMMARY
Howard High Landfill - 01/03/94

| No. | Aquifer ID | Type | Overlaying No. | Inter-Connected with | Likelihood of Release | Targets |
|---|---|---|---|---|---|---|
| 1 | Knox | Karst | 0 | 0 | 500 | 0.00E+00 |

Containment

| No. | Source ID | HWQ Value | Containment Value |
|---|---|---|---|
| 1 | Landfill | 5.88E+02 | 10 |
| | | Containment Factor | 10 |

Net Precipitation

Net Precipitation (inches) 52

GROUND WATER PATHWAY LIKELIHOOD OF RELEASE Knox AQUIFER
Howard High Landfill - 01/03/94

Aquifer: Knox

Type of Aquifer: Karst

Overlaying Aquifer: 0

Interconnected with: 0

OBSERVED RELEASE

| No. | Well ID | Well Type | Distance (miles) | Level of Contamination |
|---|---|---|---|---|

- N/A and/or data not specified

==========

Observed Release Factor 0

POTENTIAL TO RELEASE

Containment

| | | |
|---|---|---|
| Containment Factor | 10 | |

Net Precipitation

| | | |
|---|---|---|
| Net Precipitation Factor | 10 | |

Depth to Aquifer

| | | |
|---|---|---|
| A. Depth of Hazardous Substances | 20.00 | feet |
| B. Depth to Aquifer from Surface | 21.00 | feet |
| C. Depth to Aquifer (B - A) | 1.00 | feet |
| Depth to Aquifer Factor | 5 | |

Travel Time

| | | |
|---|---|---|
| Are All Layers Karst? | YES | |
| Thickness of Layer(s) with Lowest Conductivity | 2000.00 | feet |
| Hydraulic Conductivity (cm/sec) | 1.0E-06 | |
| Travel Time Factor | 35 | |

==========

Potential to Release Factor 500

GROUND WATER PATHWAY WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Value | Mobility Value | Toxicity/ Mobility Value |
|---|---|---|---|
| Benzo(a)pyrene | 10000 | 2.00E-05 | 2.00E-01 |
| Bis (2-ethylhexyl) phthalate | 100 | 2.00E-03 | 2.00E-01 |
| Chromium | 10000 | 1.00E+00 | 1.00E+04 |
| Lead | 10000 | 2.00E-03 | 2.00E+01 |
| Pyrene | 100 | 2.00E-05 | 2.00E-03 |

Hazardous Substances Found in an Observed Release

| Well No. | Observed Release Hazardous Substance | Toxicity Value | Mobility Value | Toxicity/ Mobility Value |
|---|---|---|---|---|

- N/A and/or data not specified

GROUND WATER PATHWAY WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity/Mobility Value from Source Hazardous Substances: | 1.00E+04 |
| Toxicity/Mobility Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Mobility Factor: | 1.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 32 |

Population by Well

| No. | Well ID | Sample Type | Distance (miles) | Level of Contamination | Population |
|---|---|---|---|---|---|

- N/A and/or data not specified

Level I Population Factor: 0.00

Level II Population Factor: 0.00

## Potential Contamination by Distance Category

| Distance Category (miles) | Population | Value |
|---|---|---|
| > 0 to 1/4 | 0.0 | 0.00E+00 |
| > 1/4 to 1/2 | 0.0 | 0.00E+00 |
| > 1/2 to 1 | 0.0 | 0.00E+00 |
| > 1 to 2 | 0.0 | 0.00E+00 |
| > 2 to 3 | 0.0 | 0.00E+00 |
| > 3 to 4 | 0.0 | 0.00E+00 |

Potential Contamination Factor: 0.000

## Nearest Well

Level of Contamination: N.A.

Nearest Well Factor: 0.00E+00

## Resources

Resource Use: NO

Resource Factor: 0.00E+00

## Wellhead Protection Area

No wellhead protection area

Wellhead Protection Area Factor: 0.00E+00

SURFACE WATER PATHWAY SEGMENT SUMMARY
Howard High Landfill - 01/03/94

| No. | Segment ID | Segment Type | Water Type | Start Point (mi) | End Point (mi) | Average Flow (cfs) |
|---|---|---|---|---|---|---|
| 1 | Chattanooga Creek | River | Fresh | 0.00 | 2.00 | 120 |
| 2 | Tennessee River | River | Fresh | 2.00 | 15.00 | 36650 |

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

OBSERVED RELEASE

| No. | Sample ID | Sample Type | Distance (miles) | Level of Contamination DW | HFC | Env |
|---|---|---|---|---|---|---|

- N/A and/or data not specified

==========

Observed Release Factor 0

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

| No. | Source ID | HWQ Value | Containment Value |
|---|---|---|---|
| 1 | Landfill | 5.88E+02 | 10 |

Containment Factor: 10

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

## Distance to Surface Water

| | |
|---|---|
| Distance to Surface Water: | 100.0 feet |
| Distance to Surface Water Factor: | 20 |

## Runoff

| | |
|---|---|
| A. Drainage Area: | 46080.0 acres |
| B. 2-year, 24-hour Rainfall: | 3.7 inches |
| C. Soil Group: | D |
| Fine-textured soils with very low infiltration rates | |
| Runoff Factor: | 25 |

==========

| | |
|---|---|
| Potential to Release by Overland Flow Factor: | 450 |

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE

Howard High Landfill - 01/03/94

Potential to Release by Flood

| No. | Source ID | HWQ Value | Flood Containment Value | Flood Frequency Value | Potential to Release by Flood |
|---|---|---|---|---|---|
| 1 | Landfill | 5.88E+02 | 10 | 25 | 250 |

Potential to Release by Flood Factor: 250

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Value | Persistence Value | Toxicity/ Persistence Value |
|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 1.00E+04 |
| Bis (2-ethylhexyl) phthalate | 100 | 1.00E+00 | 1.00E+02 |
| Chromium | 10000 | 1.00E+00 | 1.00E+04 |
| Lead | 10000 | 1.00E+00 | 1.00E+04 |
| Pyrene | 100 | 1.00E+00 | 1.00E+02 |

Hazardous Substances Found in an Observed Release

| Sample No. | Observed Release Hazardous Substance | Toxicity Value | Persistence Value | Toxicity/ Persistence Value |
|---|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: OVERLAND/FLOOD DRINKING WATER THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity/Persistence Value from Source Hazardous Substances: | 1.00E+04 |
| Toxicity/Persistence Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Persistence Factor: | 1.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 32 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Howard High Landfill - 01/03/94

Level I Concentrations
---

| Intake | Distance Along the In-water Segment from the Probable Point of Entry (miles) | Population |
|---|---|---|
| - N/A and/or data not specified | | |

==========

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Howard High Landfill - 01/03/94

Level II Concentrations

| Intake | Distance Along the In-water Segment from the Probable Point of Entry (miles) | Population |
|---|---|---|
| - N/A and/or data not specified | | |

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
Howard High Landfill - 01/03/94

Potential Contamination
---

| Intake ID | Average Annual Flow (cfs) | Population Served |
|---|---|---|
| - N/A and/or data not specified | | |

| Type of Surface Water Body | Total Population | Dilution-Weighted Population |
|---|---|---|
| - N/A and/or data not specified | | |

==========

Dilution-Weighted Population Served
by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake
---

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources
---

Resource Use: NO

Resource Value: 0.00E+00

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Value | Persistence Value | Bio-accum. Value | Toxicity/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 5.00E+04 | 5.00E+08 |
| Bis (2-ethylhexyl) phthalate | 100 | 1.00E+00 | 5.00E+02 | 5.00E+04 |
| Chromium | 10000 | 1.00E+00 | 5.00E+00 | 5.00E+04 |
| Lead | 10000 | 1.00E+00 | 5.00E+01 | 5.00E+05 |
| Pyrene | 100 | 1.00E+00 | 5.00E+01 | 5.00E+03 |

Hazardous Substances Found in an Observed Release

| Sample No. | Observed Release Hazardous Substance | Toxicity Value | Persistence Value | Bio-accum. Value | Toxicity/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances: | 5.00E+08 |
| Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Persistence/Bioaccumulation Factor: | 5.00E+08 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 320 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

Level I Concentrations

| Fishery | Annual Production (pounds) | Human Food Chain Population Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

Level II Concentrations
---

| Fishery | Annual Production (pounds) | Human Food Chain Population Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
Howard High Landfill - 01/03/94

Potential Contamination

| Fishery | Annnual Production (pounds) | Type of Surface Water Body | Average Annual Flow (cfs) | Pop. Value (Pi) | Dilution Weight (Di) | Pi*Di |
|---|---|---|---|---|---|---|
| 1 Chattanooga Creek | 5.0 | River | 120 | 0.0 | 1.00E-02 | 3.00E-04 |
| 2 Tennessee River | 500.0 | River | 36650 | 0.3 | 1.00E-04 | 3.00E-05 |

Sum of (Pi*Di): 3.30E-04

Potential Human Food Chain Contamination Factor: 3.30E-05

Food Chain Individual

Location of Nearest Fishery: Chattanooga Creek
Distance from the Probable Point of Entry: 0.00 miles
Type of Surface Water Body: River
Dilution Weight: 0.0100000
Level of Contamination: Potential

Food Chain Individual Factor: 0.00

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Eco-toxicity Value | Persistence Value | Bio-accum. Value | Ecotoxicity/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 5.00E+04 | 5.00E+08 |
| Bis (2-ethylhexyl) phthalate | 1000 | 1.00E+00 | 5.00E+04 | 5.00E+07 |
| Chromium | 10000 | 1.00E+00 | 5.00E+00 | 5.00E+04 |
| Lead | 1000 | 1.00E+00 | 5.00E+03 | 5.00E+06 |
| Pyrene | 0 | 1.00E+00 | 5.00E+01 | 0.00E+00 |

Hazardous Substances Found in an Observed Release

| Sample No. | Observed Release Hazardous Substance | Eco-toxicity Value | Persistence Value | Bio-accum. Value | Ecotoxicity/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|---|

- N/A and/or data not specified

| | |
|---|---|
| Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances: | 5.00E+08 |
| Ecotoxicity/Persistence/Bioaccummulation Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Ecotoxicity/Persistence/Bioaccummulation Factor: | 5.00E+08 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 320 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

Level I Concentrations

| Sensitive Environment | Distance from Probable Point of Entry to Sensitive Env. (miles) | Sensitive Environment Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Sensitive Environments Values: 0

Wetlands

| Wetland | Distance from Probable Point of Entry to Wetland (miles) | Wetlands Frontage (miles) |
|---|---|---|
| - N/A and/or data not specified | | |

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

Level II Concentrations

| Sensitive Environment | Distance from Probable Point of Entry to Sensitive Env. (miles) | Sensitive Environment Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Sensitive Environments Values: 0

Wetlands

| Wetland | Distance from Probable Point of Entry to Wetland (miles) | Wetlands Frontage (miles) |
|---|---|---|
| - N/A and/or data not specified | | |

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

## Potential Contamination

## Sensitive Environments

| Type of Surface Water Body | Sensitive Environment | Sensitive Environment Value |
|---|---|---|

## Wetlands

| Type of Surface Water Body | Sensitive Environment | Wetlands Frontage | Wetlands Value |
|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

| Type of Surface Water Body | Sum of Sens. Environment Values(Sj) | Sum of Wetland Frontage Values(Wj) | Dilution Weight (Dj) | Dj(Wj+Sj) |
|---|---|---|---|---|

- N/A and/or data not specified

Sum of Dj(Wj+Sj): 0.00E+00
Sum of Dj(Wj+Sj)/10: 0.00E+00

==========

Potential Contamination Sensitive Environment Factor: 0.00E+00

SURFACE WATER PATHWAY GW TO SW CONTAINMENT SUMMARY
Howard High Landfill - 01/03/94

## Containment

| No. | Source ID | HWQ Value | Containment Value |
|---|---|---|---|
| 1 | Landfill | 5.88E+02 | 10 |

Containment Factor 10

## Net Precipitation

Net Precipitation (inches) 0.00

SURFACE WATER PATHWAY GW TO SW COMPONENT LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

Aquifer: Knox

Type of Aquifer: Karst

Overlaying Aquifer: 0

Interconnected with: 0

OBSERVED RELEASE

| No. | Well ID | Well Type | Distance (miles) | Level of Contamination |
|---|---|---|---|---|

- N/A and/or data not specified

==========

Observed Release Factor 0

POTENTIAL TO RELEASE

Ground Water to Surface Water Angle

| | | |
|---|---|---|
| Probable Point of Entry | 0.00 | miles |
| Angle Theta | 0 | |

Containment

| | | |
|---|---|---|
| Containment Factor | 10 | |

Net Precipitation

| | | |
|---|---|---|
| Net Precipitation Factor | 10 | |

Depth to Aquifer

| | | |
|---|---|---|
| A. Depth of Hazardous Substances | 20.00 | feet |
| B. Depth to Aquifer from Surface | 21.00 | feet |
| C. Depth to Aquifer (B - A) | 1.00 | feet |
| Depth to Aquifer Factor | 5 | |

Travel Time

| | | |
|---|---|---|
| Are All Layers Karst? | YES | |
| Thickness of Layer(s) with Lowest Conductivity | 2000.00 | feet |
| Hydraulic Conductivity (cm/sec) | 1.0E-06 | |
| Travel Time Factor | 35 | |

SURFACE WATER PATHWAY GW TO SW COMPONENT LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

==========

Potential to Release Factor 500

GW PATHWAY: GW TO SW COMPONENT DRINKING WATER THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Factor Value | Persist. Value | Mobility Value | Toxicity/ Mobililty/ Persistence |
|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 2.00E-05 | 2.00E-01 |
| Bis (2-ethylhexyl) phthalate | 100 | 1.00E+00 | 2.00E-03 | 2.00E-01 |
| Chromium | 10000 | 1.00E+00 | 1.00E+00 | 1.00E+04 |
| Lead | 10000 | 1.00E+00 | 2.00E-03 | 2.00E+01 |
| Pyrene | 100 | 1.00E+00 | 2.00E-05 | 2.00E-03 |

SW PATHWAY: GW TO SW COMPONENT DRINKING WATER THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Hazardous Substances Found in an Observed Release

| Observed Release Hazardous Substance | Toxicity Factor Value | Persist. Value | Toxicity/ Persistence |
|---|---|---|---|

- N/A and/or data not specified

| | |
|---|---|
| Toxicity/Mobility/Persistence Value from Source Hazardous Substances: | 1.00E+04 |
| Toxicity/Mobility/Persistence Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Mobility/Persistence Factor: | 1.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 32 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

Level I Concentrations
---

| Intake | Distance Along the In-water Segment from the Probable Point of Entry (miles) | Population |
|---|---|---|
| - N/A and/or data not specified | | |

==========

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

Level II Concentrations
---

| Intake | Distance Along the In-water Segment from the Probable Point of Entry (miles) | Population |
|---|---|---|

- N/A and/or data not specified

==========

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

Potential Contamination

| Intake ID | Average Annual Flow (cfs) | Population Served |
|---|---|---|
| - N/A and/or data not specified | | |

| Type of Surface Water Body | Total Population | Dilution-Weighted Population |
|---|---|---|
| - N/A and/or data not specified | | |

Dilution-Weighted Population Served
by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: NO

Resource Value: 0.00E+00

PATHWAY: GW TO SW COMPONENT HUMAM FOOD CHAIN THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Value | Persist. Value | Mobility Value | Bio-accum. Value | Tox./Mobil./ Persistence/ Bioaccum. Value |
|---|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 2.00E-05 | 5.00E+04 | 1.00E+04 |
| Bis (2-ethylhexyl) phthalate | 100 | 1.00E+00 | 2.00E-03 | 5.00E+02 | 1.00E+02 |
| Chromium | 10000 | 1.00E+00 | 1.00E+00 | 5.00E+00 | 5.00E+04 |
| Lead | 10000 | 1.00E+00 | 2.00E-03 | 5.00E+01 | 1.00E+03 |
| Pyrene | 100 | 1.00E+00 | 2.00E-05 | 5.00E+01 | 1.00E-01 |

PATHWAY: GW TO SW COMPONENT HUMAM FOOD CHAIN THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Hazardous Substances Found in an Observed Release

| Observed Release Hazardous Substance | Toxicity Value | Persist. Value | Bio-accum. Value | Toxicity/ Persistence Bioaccum. Value |
|---|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: GW TO SW COMPONENT HUMAM FOOD CHAIN THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity/Mobility/Persistence/Bioaccumulation Value from Source Hazardous Substances: | 5.00E+04 |
| Toxicity/Mobility/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Mobility/Persistence/Bioaccumulation Factor: | 5.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 32 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

Level I Concentrations
---

| Fishery | Annual Production (pounds) | Human Food Chain Population Value |
|---|---|---|

- N/A and/or data not specified

==========

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

Level II Concentrations

| Fishery | Annual Production (pounds) | Human Food Chain Population Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: GW TO SW COMPONENT HUMAN FOOD CHAIN THREAT TARGETS
Howard High Landfill - 01/03/94

Potential Contamination

| Fishery | Annnual Production (pounds) | Type of Surface Water Body | Average Annual Flow (cfs) | Pop. Value (Pi) | Dilution Weight (Di) | Pi*Di |
|---|---|---|---|---|---|---|
| 1 Chattanooga Creek | 5.0 | River | 120 | 0.0 | 0.00E+00 | 0.00E+00 |
| 2 Tennessee River | 500.0 | River | 36650 | 0.3 | 0.00E+00 | 0.00E+00 |

Sum of (Pi*Di): 0.00E+00

Potential Human Food Chain Contamination Factor: 0.00E+00

Food Chain Individual

Location of Nearest Fishery: Chattanooga Creek
Distance from the Probable Point of Entry: 0.00 miles
Type of Surface Water Body: River
Dilution Weight: 0.0000000
Level of Contamination: Potential

Food Chain Individual Factor: 0.00

GW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Eco-toxicity Value | Persist. Value | Mob. Value | Bio-accum. Value | Ecotoxicity/ Mobility/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 1.00E+00 | 2.00E-05 | 5.00E+04 | 1.00E+04 |
| Bis (2-ethylhexyl) phthalate | 1000 | 1.00E+00 | 2.00E-03 | 5.00E+04 | 1.00E+05 |
| Chromium | 10000 | 1.00E+00 | 1.00E+00 | 5.00E+00 | 5.00E+04 |
| Lead | 1000 | 1.00E+00 | 2.00E-03 | 5.00E+03 | 1.00E+04 |
| Pyrene | 0 | 1.00E+00 | 2.00E-05 | 5.00E+01 | 0.00E+00 |

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Hazardous Substances Found in an Observed Release

| Observed Release Hazardous Substance | Eco-toxicity Value | Persist. Value | Bio-accum. Value | Ecotoxicity/ Persistence/ Bioaccum. Value |
|---|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Ecotoxicity/Mobility/Persistence/Bioaccummulation Value from Source Substances: | 1.00E+05 |
| Ecotoxicity/Mobility/Persistence/Bioaccummulation Value from Observed Hazardous Substances: | 0.00E+00 |
| Ecotoxicity/Mobility/Persistence/Bioaccummulation Factor: | 1.00E+05 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 56 |

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample
---

- N/A and/or data not specified

Most Distant Level II Sample
---

- N/A and/or data not specified

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

Level I Concentrations

| Sensitive Environment | Distance from Probable Point of Entry to Sensitive Env. (miles) | Sensitive Environment Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Sensitive Environments Values: 0

Wetlands

| Wetland | Distance from Probable Point of Entry to Wetland (miles) | Wetlands Frontage (miles) |
|---|---|---|
| - N/A and/or data not specified | | |

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

Level II Concentrations

| Sensitive Environment | Distance from Probable Point of Entry to Sensitive Env. (miles) | Sensitive Environment Value |
|---|---|---|
| - N/A and/or data not specified | | |

Sum of Sensitive Environments Values: 0

Wetlands

| Wetland | Distance from Probable Point of Entry to Wetland (miles) | Wetlands Frontage (miles) |
|---|---|---|
| - N/A and/or data not specified | | |

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

## Potential Contamination

## Sensitive Environments

| Type of Surface Water Body | Sensitive Environment | Sensitive Environment Value |
|---|---|---|

## Wetlands

| Type of Surface Water Body | Sensitive Environment | Wetlands Frontage | Wetlands Value |
|---|---|---|---|

- N/A and/or data not specified

SW PATHWAY: GW TO SW COMPONENT ENVIRONMENTAL THREAT TARGETS
Howard High Landfill - 01/03/94

| Type of Surface Water Body | Sum of Sens. Environment Values(Sj) | Sum of Wetland Frontage Values(Wj) | Dilution Weight (Dj) | Dj(Wj+Sj) |
|---|---|---|---|---|

- N/A and/or data not specified

Sum of Dj(Wj+Sj): 0.00E+00
Sum of Dj(Wj+Sj)/10: 0.00E+00

==========

Potential Contamination Sensitive Environment Factor: 0.00E+00

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT LIKELIHOOD OF EXPOSURE
Howard High Landfill - 01/03/94

Likelihood of Exposure

| No. | Source ID | Level of Contamination |
|---|---|---|
| 1 | Landfill | Level I |

Likelihood of Exposure Factor: 550

| Source No. | Hazardous Substance | Depth (ft.) | Concent. | Cancer | RFD | Units |
|---|---|---|---|---|---|---|
| 1 | Benzo(a)pyrene | < 2 | 1.8E+00 | 8.0E-02 | 0.0E+00 | ppm |
| 1 | Bis (2-ethylhexyl) phthalate | < 2 | 1.2E+00 | 4.2E+01 | 1.2E+04 | ppm |
| 1 | Chromium | < 2 | 1.1E+02 | 0.0E+00 | 2.9E+03 | ppm |
| 1 | Lead | < 2 | 3.5E+02 | 0.0E+00 | 0.0E+00 | ppm |
| 1 | Pyrene | < 2 | 2.2E+00 | 0.0E+00 | 1.7E+04 | ppm |

SS-11

SS-11

1100 ppm? what sample wrong

wrong

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 58.82

| Hazardous Substance | Toxicity Value |
|---|---|
| Benzo(a)pyrene | 10000 |
| Bis (2-ethylhexyl) phthalate | 100 |
| Chromium | 10000 |
| Lead | 10000 |
| Pyrene | 100 |

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity Factor: | 1.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+01 |
| Hazardous Waste Quantity Factor: | 10 |
| Waste Characteristics Factor Category: | 18 |

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT TARGETS
Howard High Landfill - 01/03/94

Targets
---

| | | | |
|---|---|---|---|
| Level I Population: | 55.0 | Value: | 550.00 |
| Level II Population: | 0.0 | Value: | 0.00 |
| Workers: | 15.0 | Value: | 5.00 |
| Resident Individual: | Level I | Value: | 50.00 |
| Resources: | NO | Value: | 0.00 |

| Terrestial Sensitive Environment | Value |
|---|---|
| - N/A and/or data not specified | |

Terrestrial Sensitive Environments Factor: 0.00

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
Howard High Landfill - 01/03/94

Likelihood of Exposure

| No. | Source ID | Level of Contamination | Attractiveness/ Accessibility | Area of Contam. (sq. feet) |
|---|---|---|---|---|
| 1 | Landfill | Level I | 75 | 2000000 |

Highest Attractiveness/Accessibility Value: 75
Sum of Eligible Areas Of Contamination (sq. feet): 2000000
Area of Contamination Value: 100

Likelihood of Exposure Factor Category: 500

| Source No. | Hazardous Substance | Depth (ft.) | Concent. | Cancer | RFD | Units |
|---|---|---|---|---|---|---|
| 1 | Benzo(a)pyrene | < 2 | 1.8E+00 | 8.0E-02 | 0.0E+00 | ppm |
| 1 | Bis (2-ethylhexyl) phthalate | < 2 | 1.2E+00 | 4.2E+01 | 1.2E+04 | ppm |
| 1 | Chromium | < 2 | 1.1E+02 | 0.0E+00 | 2.9E+03 | ppm |
| 1 | Lead | < 2 | 3.5E+02 | 0.0E+00 | 0.0E+00 | ppm |
| 1 | Pyrene | < 2 | 2.2E+00 | 0.0E+00 | 1.7E+04 | ppm |

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 58.82

| Hazardous Substance | Toxicity Value |
|---|---|
| Benzo(a)pyrene | 10000 |
| Bis (2-ethylhexyl) phthalate | 100 |
| Chromium | 10000 |
| Lead | 10000 |
| Pyrene | 100 |

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity Factor: | 1.00E+04 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+01 |
| Hazardous Waste Quantity Factor: | 10 |
| Waste Characteristics Factor Category: | 18 |

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT TARGETS
Howard High Landfill - 01/03/94

## Nearby Individual

Population within 1/4 mile: 2200.0

Nearby Individual Value: 0.0

## Population Within 1 Mile

| Travel Distance Category | Number of People | Value |
|---|---|---|
| > 0 to 1/4 mile | 2200.0 | 4.1 |
| > 1/4 to 1/2 mile | 1300.0 | 2.0 |
| > 1/2 to 1 mile | 6500.0 | 3.3 |

Population Within 1 Mile Factor: 9.0

AIR PATHWAY LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

OBSERVED RELEASE

| No. | Sample ID | Distance (miles) | Level of Contamination |
|---|---|---|---|

- N/A and/or data not specified

Observed Release Factor: 0

AIR PATHWAY LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

Gas Migration Potential

GAS POTENTIAL TO RELEASE

| Source ID | Source Type | Gas Contain. Value (A) | Gas Source Type Value (B) | Gas Migrtn. Potent. Value (C) | Sum (B+C) | Gas Potential to Rel. Value A(B+C) |
|---|---|---|---|---|---|---|
| Landfill | Landfill | 10 | 11 | 6 | 17 | 170 |

Gas Potential to Release Factor: 170

AIR PATHWAY LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

Source: Landfill

| Gaseous Hazardous Substance | Hazardous Substance Gas Migration Potential Value |
|---|---|
| Benzo(a)pyrene | 6 |
| Bis (2-ethylhexyl) phthalate | 6 |
| Pyrene | 6 |

Average of Gas Migration Potential Value for 3 Hazardous Substances: 6.000

Gas Migration Potential Value From Table 6-7: 6

AIR PATHWAY LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

Source:

| Gaseous Hazardous Substance | Hazardous Substance Gas Migration Potential Value |
|---|---|

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

AIR PATHWAY LIKELIHOOD OF RELEASE
Howard High Landfill - 01/03/94

Particulate Migration Potential

PARTICULATE POTENTIAL TO RELEASE

| Source ID | Source Type | Partic. Contain. Value (A) | Partic. Source Type Value (B) | Partic. Migrtn. Potent. Value (C) | Sum (B+C) | Partic. Potential to Rel. Value A(B+C) |
|---|---|---|---|---|---|---|
| Landfill | Landfill | 10 | 22 | 6 | 28 | 280 |

Particulate Potential to Release Factor: 280

Source: Landfill

| Particulate Hazardous Substance |
| --- |
| Benzo(a)pyrene |
| Bis (2-ethylhexyl) phthalate |
| Chromium |
| Lead |
| Pyrene |

Source:

Particulate Hazardous Substance
---

AIR PATHWAY WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Source: 1 Landfill

Source Hazardous Waste Quantity Value: 588.24

| Hazardous Substance | Toxicity Value | Gas Mobility Value | Particulate Mobility Value | Toxicity/ Mobility Value |
|---|---|---|---|---|
| Benzo(a)pyrene | 10000 | 2.00E-04 | 8.00E-05 | 2.00E+00 |
| Bis (2-ethylhexyl) phthalate | 100 | 2.00E-03 | 8.00E-05 | 2.00E-01 |
| Chromium | 10000 | NA | 8.00E-05 | 8.00E-01 |
| Lead | 10000 | NA | 8.00E-05 | 8.00E-01 |
| Pyrene | 100 | 2.00E-03 | 8.00E-05 | 2.00E-01 |

AIR PATHWAY WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

Hazardous Substances Found in an Observed Release

| Sample ID | Observed Release Hazardous Substance | Particulate Toxicity/ Mobility Value | Gas Toxicity/ Mobility Value |
|---|---|---|---|

- N/A and/or data not specified

AIR PATHWAY WASTE CHARACTERISTICS
Howard High Landfill - 01/03/94

| | |
|---|---|
| Toxicity/Mobility Value from Source Hazardous Substances: | 2.00E+00 |
| Toxicity/Mobility Value from Observed Release Hazardous Substances: | 0.00E+00 |
| Toxicity/Mobility Factor: | 2.00E+00 |
| Sum of Source Hazardous Waste Quantity Values: | 5.88E+02 |
| Hazardous Waste Quantity Factor: | 100 |
| Waste Characteristics Factor Category: | 3 |

AIR PATHWAY TARGETS
Howard High Landfill - 01/03/94

Actual Contamination

| No. | Sample ID | Distance (miles) | Level of Contamination |
|---|---|---|---|

- N/A and/or data not specified

Potential Contamination

| Distance Categories Subject to Potential Contamination | Population | Value |
|---|---|---|
| Onsite | 55.0 | 5.3000 |
| > 0 to 1/4 mile | 2200.0 | 40.8000 |
| > 1/4 to 1/2 mile | 1300.0 | 8.8000 |
| > 1/2 to 1 mile | 6500.0 | 8.3000 |
| > 1 to 2 miles | 16502.0 | 8.3000 |
| > 2 to 3 miles | 21433.0 | 3.8000 |
| > 3 to 4 miles | 32103.0 | 7.3000 |

Potential Contaminantion Factor: 83.0000

Nearest Individual Factor
---

Level of Contamination: Potential
Distance in miles: 0 to 1/8

Nearest Individual Value: 20

Resources
---

Resource Use: NO

Resource Value: 0

Actual Contamination, Sensitive Environments

| Sensitive Environment | Distance (miles) | Sensitive Environment Value |
|---|---|---|
| - N/A and/or data not specified | | |

Actual Contamination, Wetlands

| Distance Category | Wetland Acreage | Wetland Acreage Value |
|---|---|---|
| - N/A and/or data not specified | | |

==========
Sensitive Environments Actual Contamination Factor: 0.000
(Sum of Sensitive Environments + Wetlands Values)

Potential Contamination, Sensitive Environments

| Sensitive Environment | Distance (miles) | Sensitive Environment Value | Distance Weight | Weighted Value/10 |
|---|---|---|---|---|
| Lookout Mtn/Natl.P | 2.000 | 100 | 0.0051 | 0.051 |
| Sum of Sensitive Environments Weighted Values/10: | | | | 0.051 |

Potential Contamination, Wetlands

| Distance Category | Wetland Acreage | Wetland Acreage Value | Distance Weight | Weighted Value/10 |
|---|---|---|---|---|
| - N/A and/or data not specified | | | | |

Sensitive Environment Potential Contamination Factor: 0.051

REFERENCES

Howard High Landfill - 01/03/94

1800

# Potential Hazardous Waste Site

# Site Inspection Report

HOWARD HIGH SCHOOL LANDFILL 33606
TND 100842343
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

---

*Revision* 1

*Prepared By* Anthony Damiano *Date* August 29, 1988

*Reviewed By* Wayne S. Everett *Date* August 31, 1988

HOWARD HIGH SCHOOL LANDFILL

TND 100842343

TABLE OF CONTENTS

EXECUTIVE SUMMARY

REGULATORY SUMMARY

NARRATIVE SUMMARY

1.0 Introduction

2.0 Site Characterization

3.0 Target Analysis

4.0 Field Investigation

5.0 Summary

HOWARD HIGH SCHOOL LANDFILL

TND 110842343

REGULATORY SUMMARY

The Howard High School Landfill, also known as the South Market Street Landfill or the 28th Street Landfill, was in operation during the period from 1972 to 1976. During this time period there was no formal state permitting process for the strict regulation of landfills designated to be used for brush and demolition debris.

GSC/ib

HOWARD HIGH SCHOOL LANDFILL

TND 100842343

EXECUTIVE SUMMARY

## A. Site History/Description

The Howard High School Landfill is located on 2500 South Market Street and contains approximately 40 acres of low land remaining after the rechannelization of the Chattanooga Creek in the 1960's. The landfill was intended to be used as a land reclamation project. The elevation was to be built up by disposing brush and demolition debris only. It was alleged that some industrial sludges were dumped on site. The amount and composition of alleged waste is unknown, since the landfil was not closely regulated.

## B. Geologic Setting

The site is 2 miles south of Lookout Mountain and 2.5 miles west of Missionary Ridge.

The site is underlain by highly fractured limestone and dolomite from the Knox geologic formation. Surface soils in the area are primarily silty clay of low permeability. Surface and groundwater contamination from migration is possible if hazardous substances are present.

## C. Targets Affected

The Marice Poss Homes, A multiple-family housing development, and Howard High School are located within 1/2 mile radius of the site.

There are no drinking water wells in the vicinity of the site and all drinking water is supplied by the Tennessee American Water Company. The Tennessee American Water intake is more than 5 river miles upstream from the site and the nearest water intake is greater than 15 miles downstream.

## D. Recommendations

There is no evidence that past waste handling at the landfill are affecting the population or the environment. The Howard High Landfill site should be given a low priority due to the fact of very low preliminary HRS scores and no surface or ground water receptors, and the site is located adjacent to the Chattanooga Creek, a historic industrially polluted creek. With these facts known, any further work on the site is properly done at the State level.

HOWARD HIGH SCHOOL LANDFILL

TND 100842343

NARRATIVE SUMMARY

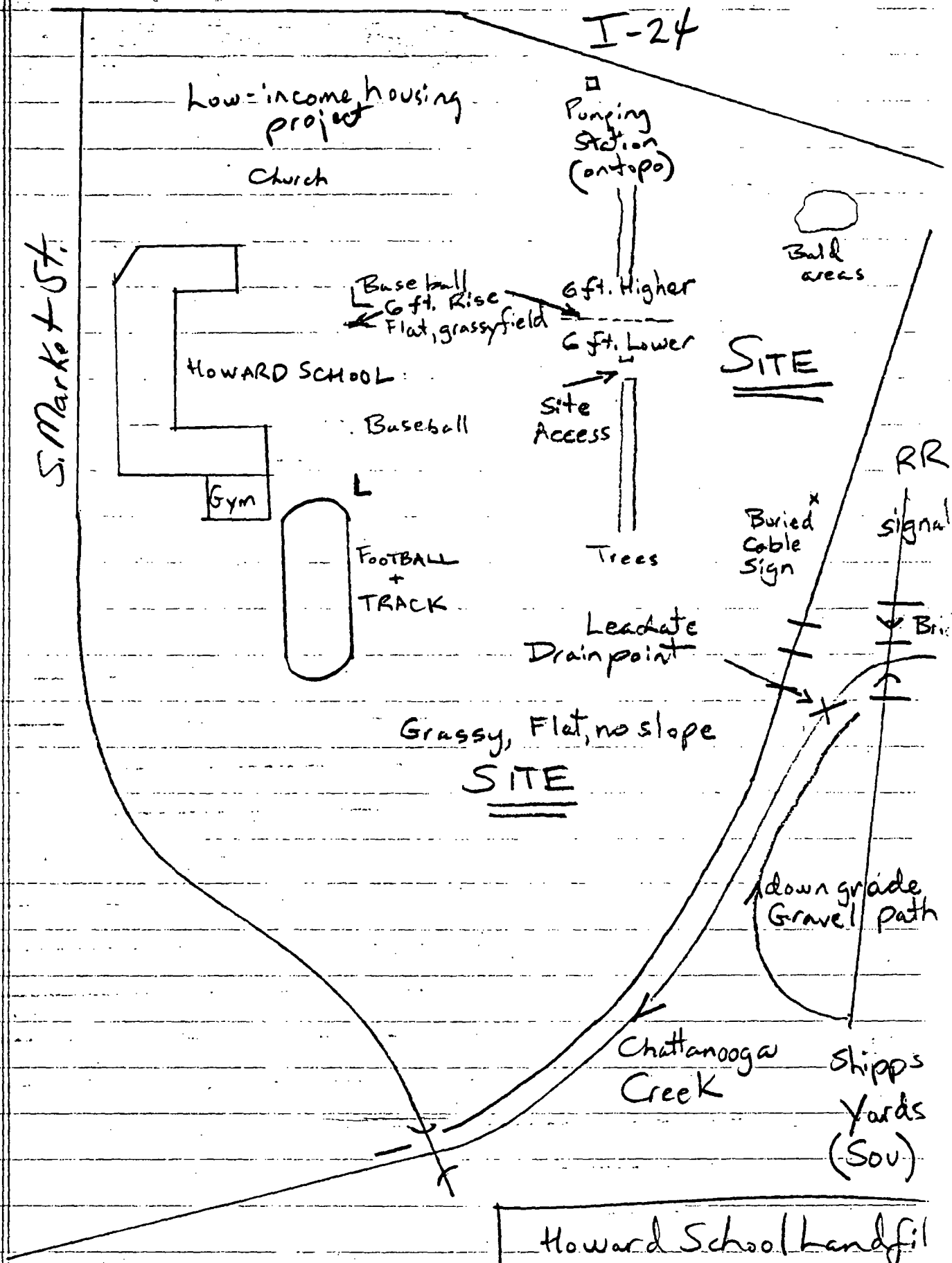
## 1.0 Introduction

A screening Site Investigation was performed by the Chattanooga Superfund Office on 29 September 1987. It is alleged that some industrial sludges were deposited at the Howard High School landfill site. There is no evidence to substantiate this allegation, however due to the fact that the landfill was not closely regulated during it's active period the potential exists for migration off-site if hazardous substances are present.

## 2.0 Site Characterization

### 2.1 Site Background and History

The Howard High School Landfill is located on 2500 South Market Street behind the Howard High Scool. The site contains approximately 40 acres of low-lying land remaining after the rechannelization of the Chattanooga Creek during the late 1960's due to a railroad track relocation. The landfill was intended to be used as a land reclamation project. The elevation of the low land was to be built up by disposing brush and demolition waste only (Ref. 3). Prior to the filling of the area, a drainage culvert was placed in the low area running underneath the railroad embankment and discharging into the Chattanooga Creek.




Howard School Landfil
#33606
9/29/87 FDM

## 2.2 Site Description

The landfill's operation during its active period was not closely regulated to the type of waste actually dumped on site. It is alleged by personnel from the Division of Water Management (TDWM) that some industrial sludges were dumped at the landfill. A photograph of two drums, alleged to be industrial sludge dumped on site , is in the possession of TDWM. The above referenced photograph was viewed and determined not be sufficient proof alone to definitively prove the existence of industrial sludge dumping on site. The amount and composition of the alleged sludge materials are unknown, but if any hazardous substances are present at the site there is a potential for migration off site.

Note-- see attached site sketch on next page.

The close proximity of the landfill to the Chattanooga Creek and the presence of an underground drainage system to the creek could contribute to surface and subsurface migration pathways. The site is surrounded on three sides by an elevated railroad embankment and one side by thick underbrush that borders Howard High's practice baseball field and football field.

## 2.3 Environmental/Regional Setting

The site lies between Lookout Mountain to the south, the Tennesee River to the west, Missionary Ridge to the east, and the city of Chattanooga to the north.

The Marice Poss Homes, a multiple family housing development is adjacent and located to the north of the site. Howard High School is adjacent and located to the west of the site (Ref. 14). The site is easily accessed by foot or 4WD vehicle. Entrance can be made through a break in the thick underbrush along the outfield of Howard High's practice baseball field.

The site is located in a highly urban/ industrial area of Chattanooga.

## 2.4 Geology/Hydrogeology

The one year, 24 hour rainfall is 3.0 inches. The mean annual precipitation is 58 inches.

There is little surface drainage from the site. Water tends to pool in depression areas and evaporate as opposed to draining from the site.

Surface soils in the area are primarily silty clay of low permeability. A thrust fault runs through the center of the landfill and could act as a pathway for direct migration to the groundwater. Underlying bedrock is highly fractured limestone and dolomite of the Knox geologic group (Ref. 13).

There are no drinking water wells in the vicinity of the site and all drinking water in the area is supplied by the Tennessee American Water Company (TAWC) (Ref. 12) The TAWC intake is located at River Mile 465.3, the Chattanooga Creek empties into the Tennessee River at River Mile 460.8, and the site is approximately 1.25 miles (creek miles) from the creek's outfall point on the river. The City of Chattanooga water

intake is in excess of five river miles upstream from the site (Ref. 14).

## 3.0 Target Analysis

Population potentially affected by this site are as follows:

3.1 Surface Water: None identified within 15 miles downstream.

3.2 Ground water: None identified within a 4 mile radius.

3.3 Air route: None identified- no air release potential evaluated.

3.4 On-site Exposure: The potential for on-site exposure via direct contact exists due to the location of the Marice Poss Homes, a multiple family housing development.

Surface target analysis was based on recreational use only of waters within 15 miles downstream. No identified water intakes located within 15 miles downstream and no population exposed via drinking water. Ground water target analysis was based on drilling records, documentation from the Tennessee American Water Company, and demographic investigation. The affected radius for ground water is serviced by municipal water, however there always exists the potential for undiscovered holdouts from the municipal water system. Air route was not evaluated as a migration pathway since little potential exists for an air release. There is a housing development bordering the northern side of the site; therefore a potential exists for on-site exposure.

## 4.0 Field Investigation

The field investigation for this site was conducted on 29 September 1987. No evidence of hazardous substances were found on-site, and no visible signs of leachate or other potential migration pathways were noted. Due to the presence of an intact cap over the filled area, no soil augering was attempted and no soil samples were taken. The only potential pathway for leachate migration would be the culvert passing under the landfill and discharging into the Chattanooga Creek. Since The culvert outfall at the creek was approximately two feet below the surface and the creek is already documented as being heavily polluted with heavy metals and organics, it was thought not feasible to collect samples from this outfall (Ref. 1).

## 5.0 Summary

Field investigations of the Howard High School Landfill revealed that no receptors via groundwater migration route are affected since municipal water supply covers the 4 mile radius from the site.

Examination of the surface water migration route downgradient from the site has identified no human exposure targets or sensitive environments within 15 miles.

Field investigation for the potential of direct contact revealed a possibility for direct contact; however, there is no substantiated information that hazardous substances are or were ever present on site.

It is the conclusion of this investigation that the Howard High School Landfill presents little to no significant hazard to the public health and the environment via groundwater, surface water, or direct contact.

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 1 - SITE LOCATION AND INSPECTION INFORMATION

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

**II. SITE NAME AND LOCATION**

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER |
|---|---|
| Howard High School Landfill | 2500 South Market Street |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 COUNTY | 07 COUNTY CODE | 08 CONG DIST |
|---|---|---|---|---|---|
| Chattanooga | TN | 37402 | Hamilton | 33 | 03 |

| 09 COORDINATES LATITUDE | LONGITUDE | 10 TYPE OF OWNERSHIP (Check one) |
|---|---|---|
| 35° 01' 25".N | 85° 18' 24".W | ☐ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN |

**III. INSPECTION INFORMATION**

| 01 DATE OF INSPECTION (Month Day Year) | 02 SITE STATUS | 03 YEARS OF OPERATION |
|---|---|---|
| 9 29 87 | ☐ ACTIVE ☒ INACTIVE | 1972 / 1976 (Beginning Year / Ending Year) ___ UNKNOWN |

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR (Name of firm) ☒ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR (Name of firm)
☒ E. STATE ☐ F. STATE CONTRACTOR TDSF (Name of firm) ☐ G. OTHER (Specify)

| 05 CHIEF INSPECTOR | 06 TITLE | 07 ORGANIZATION | 08 TELEPHONE NO. |
|---|---|---|---|
| Anthony P. Damiano, Jr. | Environmental Spec. II | TDSF | (615) 624-9921 |

| 09 OTHER INSPECTORS | 10 TITLE | 11 ORGANIZATION | 12 TELEPHONE NO. |
|---|---|---|---|
| Ferman D. Miller | Environmental Engineer II | TDSF | (615) 624-9921 |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |

| 13 SITE REPRESENTATIVES INTERVIEWED | 14 TITLE | 15 ADDRESS | 16 TELEPHONE NO. |
|---|---|---|---|
| Pat Janardanan | Engineer City of Chatt. | Dept. Public Works Rm. 209 | (615) 757-5450 |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | ( ) |
| | | | |

| 17 ACCESS GAINED BY (Check one) | 18 TIME OF INSPECTION | 19 WEATHER CONDITIONS |
|---|---|---|
| ☒ PERMISSION ☐ WARRANT | 2:00 pm (EDT) | Cloudy and Warm Temp. mid 70's |

**IV. INFORMATION AVAILABLE FROM**

| 01 CONTACT | 02 OF (Agency/Organization) | 03 TELEPHONE NO. |
|---|---|---|
| Pat Janardanan | City of Chattanooga, Public Works Dept. | (615) 757-5450 |

| 04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NO. | 08 DATE |
|---|---|---|---|---|
| Anthony P. Damiano | TDHE | DSF | (615) 624-9921 | 11 5 87 (Month Day Year) |

EPA FORM 2070-13 (7-81)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
## PART 2 - WASTE INFORMATION

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| TN | D 100842343 |

## II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

**01 PHYSICAL STATES** (Check all that apply)

- [X] A SOLID
- [ ] B POWDER, FINES
- [X] C SLUDGE
- [ ] D OTHER _____ (Specify)
- [ ] E SLURRY
- [ ] 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)

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

Unknown

## III. WASTE TYPE

| CATEGORY | SUBSTANCE NAME | 01 GROSS AMOUNT | 02 UNIT OF MEASURE | 03 COMMENTS |
|---|---|---|---|---|
| SLU | SLUDGE | | | |
| OLW | OILY WASTE | | | |
| SOL | SOLVENTS | | | |
| PSD | PESTICIDES | | | |
| OOC | OTHER ORGANIC CHEMICALS | unknown | | Alleged industrial sludge disposal |
| IOC | INORGANIC CHEMICALS | | | at site, but no existence of |
| ACD | ACIDS | | | supporting documentation. Ref. 2 |
| BAS | BASES | | | |
| MES | HEAVY METALS | unknown | | |

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

| 01 CATEGORY | 02 SUBSTANCE NAME | 03 CAS NUMBER | 04 STORAGE/DISPOSAL METHOD | 05 CONCENTRATION | 06 MEASURE OF CONCENTRATION |
|---|---|---|---|---|---|
| | Unknown | | Unlined Landfill | Unknown | -- |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

## 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)

Memo to the TDSF which documents the rationale for using heavy metal and organic pollutants in the site investigation package. (Ref. 2)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☐ OBSERVED (DATE _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unknown — 04 NARRATIVE DESCRIPTION
The area has a shallow water table and ground water contamination is possible through leaching, if hazardous substances are present. No domestic use of ground water is known within 3 miles.

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☐ OBSERVED (DATE _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION
The site lies adjacent to, and in the flood plain of Chattanooga Creek and has a storm sewer drain that empties into the Chattanooga Creek. No surface water intakes are downgradient of the site within 3 miles. Population estimate reflects persons exposed via fishing and water contact. (1 mile radius population.)

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
No odors were smelled.

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
Not evaluated.

01 ☒ E. DIRECT CONTACT — 02 ☐ OBSERVED (DATE: _____) — ☒ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION
Accessible to the public. Population estimate reflects number of persons living within 1 mile.

01 ☒ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE _____) — ☒ POTENTIAL — ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: 40 (ACRES) — 04 NARRATIVE DESCRIPTION
The site is an old municipal landfill and if hazardous substances were dumped at the site, then soil contamination is possible.

01 ☐ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 0 — 04 NARRATIVE DESCRIPTION
N/A The city is on a public water supply which is drawn from the Tennessee River upstream from Chattanooga Creek.

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
N/A

01 ☐ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ — 04 NARRATIVE DESCRIPTION
N/A

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

II. HAZARDOUS CONDITIONS AND INCIDENTS (continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Some bald spots on site. Appear to be due to low nutrient/moisture content rather than toxicity to vegetation.

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (include names of species)

None known.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

Chattanooga Creek is used for fishing and harvesting of frogs and turtles, presumably to be used for food.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 6000 — 04 NARRATIVE DESCRIPTION

No liner or containment structure present.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

None known.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

N/A

01 ☒ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☒ ALLEGED
04 NARRATIVE DESCRIPTION

Discussions with past city officials indicated industrial waste being dumped at the site. No record exists to reveal the type or quantity of potentially hazardous waste dumped on site.

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

Chattanooga Creek is heavily polluted with organic chemicals and toxic metals from industrial discharges and numerous waste disposal sites. Chattanooga Creek is used for recreation (fishing, etc.).

III. TOTAL POPULATION POTENTIALLY AFFECTED: 6000

IV. COMMENTS

It is not certain whether the landfill ever received hazardous waste or not. Site conditions are such that, if hazardous wastes are present, they could easily leach from the site.

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

Preliminary Assessment - Charlie Rush 29 September 86

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION
### PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION
01 STATE: TN
02 SITE NUMBER: D 100842343

## II. PERMIT INFORMATION

| 01 TYPE OF PERMIT ISSUED (Check all that apply) | 02 PERMIT NUMBER | 03 DATE ISSUED | 04 EXPIRATION DATE | 05 COMMENTS |
|---|---|---|---|---|
| ☐ A. NPDES No | | | | |
| ☐ B. UIC | | | | |
| ☐ C. AIR | | | | |
| ☐ D. RCRA No | | | | Site has underground leachate |
| ☐ E. RCRA INTERIM STATUS | | | | collection system discharging |
| ☐ F. SPCC PLAN | | | | to the creek. |
| ☐ G. STATE (Specify) | | | | |
| ☐ H. LOCAL (Specify) | | | | |
| ☐ I. OTHER (Specify) | | | | |
| ☐ J. NONE | | | | |

## III. SITE DESCRIPTION

| 01 STORAGE/DISPOSAL (Check all that apply) | 02 AMOUNT | 03 UNIT OF MEASURE | 04 TREATMENT (Check all that apply) |
|---|---|---|---|
| ☐ A. SURFACE IMPOUNDMENT | | | ☐ A. INCENERATION |
| ☐ B. PILES | | | ☐ B. UNDERGROUND INJECTION |
| ☐ C. DRUMS, ABOVE GROUND | | | ☐ C. CHEMICAL/PHYSICAL |
| ☐ D. TANK, ABOVE GROUND | | | ☐ D. BIOLOGICAL |
| ☐ E. TANK, BELOW GROUND | | | ☐ E. WASTE OIL PROCESSING |
| ☒ F. LANDFILL | unknown | | ☐ F. SOLVENT RECOVERY |
| ☐ G. LANDFARM | | | ☐ G. OTHER RECYCLING/RECOVERY |
| ☐ H. OPEN DUMP | | | ☐ H. OTHER (Specify) |
| ☐ I. OTHER (Specify) | | | |

05 OTHER
☐ A. BUILDINGS ON SITE
None

06 AREA OF SITE
40 (Acres)

07 COMMENTS

## IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)
☐ A. ADEQUATE, SECURE ☒ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

The railroad bed to the south and east of the site is elevated forming some containment. No liner was used.

## V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE ☐ YES ☒ NO
02 COMMENTS

The site is not capped, but it does have a hard surface. No waste visible or accessible.

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

W. Smith (WPC)
S. Baxter (SWM)

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
## PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as appropriate)

| | SURFACE | WELL |
|---|---|---|
| COMMUNITY | A. ☒ | B. ☐ |
| NON-COMMUNITY | C. ☐ | D. ☐ |

02 STATUS

| | ENDANGERED | AFFECTED | MONITORED |
|---|---|---|---|
| COMMUNITY | A ☐ | B ☐ | C ☐ |
| NON-COMMUNITY | D ☐ | E. ☐ | F ☐ |

03 DISTANCE TO SITE

A. upstream (mi)
B. _____ (mi)

## III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (no other major sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL unknown (mi)

| 04 DEPTH TO GROUNDWATER | 05 DIRECTION OF GROUNDWATER FLOW | 06 DEPTH TO AQUIFER OF CONCERN | 07 POTENTIAL YIELD OF AQUIFER | 08 SOLE SOURCE AQUIFER |
|---|---|---|---|---|
| 10-30 (ft) | to South & West | 20 (ft) | - (gpd) | ☐ YES ☒ NO |

09 DESCRIPTION OF WELLS (including usage, depth, and location relative to population and buildings)

No private drinking water wells in a three mile radius have been identified. Several industrial wells have been identified, (Ref. #12, 14.)

10 RECHARGE AREA
☐ YES
☒ NO
COMMENTS

11 DISCHARGE AREA
☒ YES
☐ NO
COMMENTS Site is along Chattanooga Creek

## IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☒ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

| NAME: | AFFECTED | DISTANCE TO SITE |
|---|---|---|
| Chattanooga Creek | ☐ | 3200 ft (mi) |
| Tennessee River | ☐ | 1.0 (mi) |
| | ☐ | (mi) |

## V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

| ONE (1) MILE OF SITE | TWO (2) MILES OF SITE | THREE (3) MILES OF SITE |
|---|---|---|
| A. >5,000 NO. OF PERSONS | B. >20,000 NO. OF PERSONS | C. >70,000 NO. OF PERSONS |

02 DISTANCE TO NEAREST POPULATION <0.5 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE >1,000

04 DISTANCE TO NEAREST OFF-SITE BUILDING <0.5 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site (e.g., total, residential, density, industrial, urban, agricultural))

The site is in a high density mix of urban/industrial area. The population figure is a rough estimate taken from the Chattanooga census in 1980.

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
TN | D 100842343

## VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A $10^{-6} - 10^{-8}$ cm/sec ☒ B $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D GREATER THAN $10^{-3}$ cm sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A IMPERMEABLE (Less than $10^{-6}$ cm/sec) ☐ B RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☒ C RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D VERY PERMEABLE (Greater than $10^{-2}$ cm/sec)

| 03 DEPTH TO BEDROCK | 04 DEPTH OF CONTAMINATED SOIL ZONE | 05 SOIL pH |
|---|---|---|
| 30-50 (ft) | 20 ft. (ft) | Fill Material |

| 06 NET PRECIPITATION | 07 ONE YEAR 24 HOUR RAINFALL | 08 SLOPE: SITE SLOPE | DIRECTION OF SITE SLOPE | TERRAIN AVERAGE SLOPE |
|---|---|---|---|---|
| 14.9 (in) | 3.1 (in) | 0-3 % | to S & E | < 2 % |

09 FLOOD POTENTIAL
SITE IS IN 10 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)
ESTUARINE A. N/A (mi) OTHER B. N/A (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)
_____ (mi)
ENDANGERED SPECIES: N/A

13 LAND USE IN VICINITY
DISTANCE TO:

| COMMERCIAL/INDUSTRIAL | RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES | AGRICULTURAL LANDS: PRIME AG LAND | AG LAND |
|---|---|---|---|
| A. 0.2 (mi) | B. 0.3 (mi) | C. _____ (mi) | D. _____ (mi) |

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The site is in a low-lying area surrounded on three sides by elevated railroad tracks. The railroad tracks act like an earthen berm preventing proper water drainage. There are signs that water pools in irregular depressions located on the site. (Ref. 1, 3, 4)

## VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling results, reports)

Soil Survey of Hamilton County; Hazard Ranking System User's Manual, the 1980 Population Census of Chattanooga, U.S.G.S. topographic and geologic maps and Preliminary Geological Report (Ref. 13).

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. SAMPLES TAKEN

| SAMPLE TYPE | 01 NUMBER OF SAMPLES TAKEN | 02 SAMPLES SENT TO | 03 ESTIMATED DATE RESULTS AVAILABLE |
|---|---|---|---|
| GROUNDWATER | | None taken. | |
| SURFACE WATER | | | |
| WASTE | | | |
| AIR | | | |
| RUNOFF | | | |
| SPILL | | | |
| SOIL | | | |
| VEGETATION | | | |
| OTHER | | | |

## III. FIELD MEASUREMENTS TAKEN

| 01 TYPE | 02 COMMENTS |
|---|---|
| | |
| | |
| | |
| | |
| | |

## IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF TDSF Chattanooga Field Office
(Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS TDSF Chattanooga Field Office

## V. OTHER FIELD DATA COLLECTED (Provide narrative description)

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

Site Inspection by TDSF on 29 September 87

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 7 - OWNER INFORMATION

II. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

**II. CURRENT OWNER(S)**

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| City of Chattanooga | | City Hall - 10th St. & Lindsay | | Chattanooga | TN | 37406 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**PARENT COMPANY** (If applicable)

| 08 NAME | 09 D+B NUMBER | 10 STREET ADDRESS (P.O. Box, RFD #, etc.) | 11 SIC CODE | 12 CITY | 13 STATE | 14 ZIP CODE |
|---|---|---|---|---|---|---|
| N/A | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**III. PREVIOUS OWNER(S)** (List most recent first)

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| N/A | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**IV. REALTY OWNER(S)** (If applicable, list most recent first)

| 01 NAME | 02 D+B NUMBER | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|---|
| N/A | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

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

Office of the Register of Deeds for Hamilton County, Tennessee

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

**II. CURRENT OPERATOR** (Provide if different from owner) | **OPERATOR'S PARENT COMPANY** (If applicable)

| | | | |
|---|---|---|---|
| 01 NAME | 02 D+B NUMBER | 10 NAME<br>N/A | 11 D+B NUMBER |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
| 05 CITY / 06 STATE | 07 ZIP CODE | 14 CITY / 15 STATE | 16 ZIP CODE |
| 08 YEARS OF OPERATION | 09 NAME OF OWNER | | |

**III. PREVIOUS OPERATOR(S)** (List most recent first; provide only if different from owner) | **PREVIOUS OPERATORS' PARENT COMPANIES** (If applicable)

| | | | |
|---|---|---|---|
| 01 NAME<br>City of Chattanooga | 02 D+B NUMBER | 10 NAME<br>N/A | 11 D+B NUMBER |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.)<br>City Hall-10th St. & Lindsay | 04 SIC CODE | 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
| 05 CITY<br>Chattanooga / 06 STATE<br>TN | 07 ZIP CODE<br>37406 | 14 CITY / 15 STATE | 16 ZIP CODE |
| 08 YEARS OF OPERATION<br>15 | 09 NAME OF OWNER DURING THIS PERIOD | | |
| 01 NAME | 02 D+B NUMBER | 10 NAME | 11 D+B NUMBER |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
| 05 CITY / 06 STATE | 07 ZIP CODE | 14 CITY / 15 STATE | 16 ZIP CODE |
| 08 YEARS OF OPERATION | 09 NAME OF OWNER DURING THIS PERIOD | | |
| 01 NAME | 02 D+B NUMBER | 10 NAME | 11 D+B NUMBER |
| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 12 STREET ADDRESS (P.O. Box, RFD #, etc.) | 13 SIC CODE |
| 05 CITY / 06 STATE | 07 ZIP CODE | 14 CITY / 15 STATE | 16 ZIP CODE |
| 08 YEARS OF OPERATION | 09 NAME OF OWNER DURING THIS PERIOD | | |

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

Site Inspection by TDSF on 29 September 87

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. ON-SITE GENERATOR

| 01 NAME | 02 D+B NUMBER |
|---|---|
| N/A | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|
| | |

| 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|
| | | |

Dump was used for brush, demolition debris, and probably numerous other types of waste from numerous sources.

## III. OFF-SITE GENERATOR(S)

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| Unknown | | | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|---|---|
| | | | |

| 05 CITY | 06 STATE | 07 ZIP CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|
| | | | | | |

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| | | | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|---|---|
| | | | |

| 05 CITY | 06 STATE | 07 ZIP CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|
| | | | | | |

## IV. TRANSPORTER(S)

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| City of Chattanooga | | | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|---|---|
| City Hall - 10th & Lindsay St. | | | |

| 05 CITY | 06 STATE | 07 ZIP CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|
| Chattanooga | TN | 37406 | | | |

| 01 NAME | 02 D+B NUMBER | 01 NAME | 02 D+B NUMBER |
|---|---|---|---|
| | | | |

| 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE | 03 STREET ADDRESS (P.O. Box, RFD #, etc.) | 04 SIC CODE |
|---|---|---|---|
| | | | |

| 05 CITY | 06 STATE | 07 ZIP CODE | 05 CITY | 06 STATE | 07 ZIP CODE |
|---|---|---|---|---|---|
| | | | | | |

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

Site Inspection by TDSF on 29 September 87

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## SITE INSPECTION REPORT
### PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

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

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION

| C1 STATE | C2 SITE NUMBER |
|---|---|
| TN | D 100842343 |

## II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☐ YES ☒ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

*None known.*

## III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling evaluation, reports)

TND 100842343

Facility name: Howard High School Landfill

Location: 2500 South Market Street

EPA Region: IV

Person(s) in charge of the facility: P. Janardanan, Engineer

Chattanooga Department of Public Works

Chattanooga, Tennessee

Name of Reviewer: Anthony P. Damiano Date: November 6, 1987

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The site was classified an old municipal demolition and debris landfill and not a sanitary landfill because of geological and hydrologic considerations. The site was unlined and improperly capped with available backfill material. Industrial sludge waste was allegedly dumped, but no documentation exists to confirm the allegation. There is the possibility of a leachate problem if hazardous substances are present in the landfill.

Scores: $S_M$ = 4.2 ($S_{gw}$ = 3.6 $S_{sw}$ = 6.4 $S_a$ = 0.0 )

$S_{FE}$ = Not Rated

$S_{DC}$ = Not Rated

**FIGURE 1**
**HRS COVER SHEET**

Howard High School Landfill
TND 100842343

## Ground Water Route Work Sheet

| Rating Factor | Assigned Value (Circle One) | Multiplier | Score | Max. Score | Ref. (Section) |
|---|---|---|---|---|---|
| 1 Observed Release | (0) 45 | 1 | 0 | 45 | 3.1 |
| If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 3.2 |
| Depth to Aquifer of Concern | 0 1 2 (3) | 2 | 6 | 6 | |
| Net Precipitation | 0 1 (2) 3 | 1 | 2 | 3 | |
| Permeability of the Unsaturated Zone | 0 (1) 2 3 | 1 | 1 | 3 | |
| Physical State | 0 1 2 (3) | 1 | 3 | 3 | |
| Total Route Characteristics Score | | | 12 | 15 | |
| 3 Containment | 0 1 2 (3) | 1 | 3 | 3 | 3.3 |
| 4 Waste Characteristics | | | | | 3.4 |
| Toxicity/Persistence | 0 3 6 9 12 15 (18) | 1 | 18 | 18 | |
| Hazardous Waste Quantity | 0 (1) 2 3 4 5 6 7 8 | 1 | 1 | 8 | |
| Total Waste Characteristics Score | | | 19 | 26 | |
| 5 Targets | | | | | 3.5 |
| Ground Water Use | 0 (1) 2 3 | 3 | 3 | 9 | |
| Distance to Nearest Well/Population Served | (0) 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40 | 1 | 0 | 40 | |
| Total Targets Score | | | 3 | 49 | |
| 6 If line 1 is 45, multiply 2 x 3 x 4 x 5; If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | 2,052 | 57,330 | |
| 7 Divide line 6 by 57,330 and multiply by 100 | $S_{gw}$ = 3.6 | | | | |

$S_{gw}$ = 4.47 %OR

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Howard High School Landfill
TND 100842343

| Surface Water Route Work Sheet | | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multi-plier | Score | Max. Score | Ref. (Section) |
| 1 Observed Release | (0) 45 | 1 | 0 | 45 | 4.1 |
| If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2. | | | | | |
| 2 Route Characteristics | | | | | 4.2 |
| Facility Slope and Intervening Terrain | (0) 1 2 3 | 1 | 0 | 3 | |
| 1-yr. 24-hr. Rainfall | 0 1 2 (3) | 1 | 3 | 3 | |
| Distance to Nearest Surface Water | 0 1 2 (3) | 2 | 6 | 6 | |
| Physical State | 0 1 2 (3) | 1 | 3 | 3 | |
| Total Route Characteristics Score | | | 12 | 15 | |
| 3 Containment | 0 1 2 (3) | 1 | 3 | 3 | 4.3 |
| 4 Waste Characteristics | | | | | 4.4 |
| Toxicity/Persistence | 0 3 6 9 12 15 (18) | 1 | 18 | 18 | |
| Hazardous Waste Quantity | 0 (1) 2 3 4 5 6 7 8 | 1 | 1 | 8 | |
| Total Waste Characteristics Score | | | 19 | 26 | |
| 5 Targets | | | | | 4.5 |
| Surface Water Use | 0 1 (2) 3 | 3 | 6 | 9 | |
| Distance to a Sensitive Environment | (0) 1 2 3 | 2 | 0 | 6 | |
| Population Served/Distance to Water Intake Downstream | (0) 4 6 8 10<br>12 16 18 20<br>24 30 32 35 40 | 1 | 0 | 40 | |
| Total Targets Score | | | 6 | 55 | |
| 5 If line 1 is 45, multiply 1 x 4 x 5<br>If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | 4,104 | 64,350 | |
| 7 Divide line 6 by 64,350 and multiply by 100 | | $S_{sw}$ = 6.4 | | | |

$S_{sw}$ = 7.97 %R

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

| | S | $S^2$ |
|---|---|---|
| Groundwater Route Score ($S_{gw}$) | 3.6 | 12.96 |
| Surface Water Route Score ($S_{sw}$) | 6.4 | 40.96 |
| Air Route Score ($S_a$) | 0.0 | 0.00 |
| $S_{gw}^2 + S_{sw}^2 + S_a^2$ | | 53.92 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$ | | 7.343 |
| $\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$ | | 4.2 |

**FIGURE 10**
**WORKSHEET FOR COMPUTING $S_M$**

## Air Route Work Sheet

| Rating Factor | Assigned Value (Circle One) | Multi-plier | Score | Max. Score | Ref. (Section) |
|---|---|---|---|---|---|
| 1 Observed Release | 0 45 | 1 | | 45 | 5.1 |
| Date and Location: | | | | | |
| Sampling Protocol: | | | | | |
| If line 1 is 0, the $S_a$ = 0. Enter on line 5. If line 1 is 45, then proceed to line 2. | | | | | |
| 2 Waste Characteristics | | | | | 5.2 |
| Reactivity and Incompatibility | 0 1 2 3 | 1 | | 3 | |
| Toxicity | 0 1 2 3 | 3 | | 9 | |
| Hazardous Waste Quantity | 0 1 2 3 4 5 6 7 8 | 1 | | 8 | |
| | Total Waste Characteristics Score | | | 20 | |
| 3 Targets | | | | | 5.3 |
| Population Within 4-Mile Radius | 0 9 12 15 18 21 24 27 30 | 1 | | 30 | |
| Distance to Sensitive Environment | 0 1 2 3 | 2 | | 6 | |
| Land Use | 0 1 2 3 | 1 | | 3 | |
| | Total Targets Score | | | 39 | |
| 4 Multiply 1 x 2 x 3 | | | | 35,100 | |
| 5 Divide line 4 by 35,100 and multiply by 100 | | $S_a$ = *Not Rated* | | | |

**FIGURE 9**
**AIR ROUTE WORK SHEET**

NOT RATED

| Fire and Explosion Work Sheet | Howard High School Landfill TND 100842343 | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multi-plier | Score | Max. Score | Ref. (Section) |
| 1 Containment | 1 3 | 1 | | 3 | 7.1 |
| 2 Waste Characteristics | | | | | 7.2 |
| Direct Evidence | 0 3 | 1 | | 3 | |
| Ignitability | 0 1 2 3 | 1 | | 3 | |
| Reactivity | 0 1 2 3 | 1 | | 3 | |
| Incompatibility | 0 1 2 3 | 1 | | 3 | |
| Hazardous Waste Quantity | 0 1 2 3 4 5 6 7 8 | 1 | | 8 | |
| Total Waste Characteristics Score | | | | 20 | |
| 3 Targets | | | | | 7.3 |
| Distance to Nearest Population | 0 1 2 3 4 5 | 1 | | 5 | |
| Distance to Nearest Building | 0 1 2 3 | 1 | | 3 | |
| Distance to Sensitive Environment | 0 1 2 3 | 1 | | 3 | |
| Land Use | 0 1 2 3 | 1 | | 3 | |
| Population Within 2-Mile Radius | 0 1 2 3 4 5 | 1 | | 5 | |
| Buildings Within 2-Mile Radius | 0 1 2 3 4 5 | 1 | | 5 | |
| Total Targets Score | | | | 24 | |
| 4 Multiply 1 x 2 x 3 | | | | 1,440 | |
| 5 Divide line 4 by 1,440 and multiply by 100 | | | $S_{FE}$ = Not Rated | | |

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

NOT RATED

| Direct Contact Work Sheet | Howard High School Landfill TND 100842343 | | | | |
|---|---|---|---|---|---|
| Rating Factor | Assigned Value (Circle One) | Multi-plier | Score | Max. Score | Ref. (Section) |
| 1 Observed Incident | 0 45 | 1 | | 45 | 8.1 |
| If line 1 is 45, proceed to line 4<br>If line 1 is 0, proceed to line 2 | | | | | |
| 2 Accessibility | 0 1 2 3 | 1 | | 3 | 8.2 |
| 3 Containment | 0 15 | 1 | | 15 | 8.3 |
| 4 Waste Characteristics Toxicity | 0 1 2 3 | 5 | | 15 | 8.4 |
| 5 Targets | | | | | 8.5 |
| Population Within a 1-Mile Radius | 0 1 2 3 4 5 | 4 | | 20 | |
| Distance to a Critical Habitat | 0 1 2 3 | 4 | | 12 | |
| Total Targets Score | | | | 32 | |
| 6 If line 1 is 45, multiply 1 x 4 x 5<br>If line 1 is 0, multiply 2 x 3 x 4 x 5 | | | | 21,600 | |
| 7 Divide line 6 by 21,600 and multiply by 100 | | | $S_{DC}$ = Not Rated | | |

FIGURE 12
DIRECT CONTACT WORK SHEET

TND 100842343

# DOCUMENTATION RECORDS
# FOR
# HAZARD RANKING SYSTEM

**FACILITY NAME:** Howard High School Landfill

**FACILITY DESCRIPTION:** Municipal Demolition Debris Landfill

**LOCATION:** Chattanooga, Hamilton County, Tennessee

**DATE SCORED:** November 6, 1987

**PERSON SCORING:** Anthony P. Damiano, Jr.

**PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):**

State Superfund Files; Site Inspection on 29 Sept 87 by TDSF

**FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:**

Air Route, Fire and Explosion, Direct Contact

**COMMENTS OR QUALIFICATIONS:**

Site is in Chattanooga Creek basin. The entire area (Chattanooga Creek sites) has elevated levels of heavy metals and several chemicals from various industries and dumps in the area.

# GROUND WATER ROUTE

## 1 OBSERVED RELEASE

**Contaminants detected (5 maximum):**

None indicated

**Rationale for attributing the contaminants to the facility:**

N/A

## 2 ROUTE CHARACTERISTICS

### Depth to Aquifer of Concern

**Name/description of aquifer(s) of concern:**

Knox dolomite and Chickamauga limestone, faulted and fractured and folded with solution channels among formations, acting as one aquifer. (Ref. 3, 13, 17)

**Depth(s) from the ground surface to the highest seasonal level of the saturated zone (water table(s)) of the aquifer of concern:**

At the surface--portion of the site in a marshy area. (Ref. 3, 4 and 13)

**Depth from the ground surface to the lowest point of waste disposal/storage:**

20 ft.--1972 proposal for site recommended inert fill material until up to an elevation of 660 feet. (Ref. 3)

### Net Precipitation

**Mean annual or seasonal precipitation (list months for seasonal):**

52 inches (Ref. 5) Ref 15

**Mean annual lake or seasonal evaporation (list months for seasonal):**

37 inches (Ref. 5) Ref 15

**Net precipitation (subtract the above figures):**

15 inches

Permeability of Unsaturated Zone

**Soil type in unsaturated zone:**

Silt loam, clay-like subsoil (Ref. 6)

**Permeability associated with soil type:**

$10^{-5}$ to $10^{-7}$ cm/sec (silty loam, clay loam) (Ref. 5)

Physical State

**Physical state of substances at time of disposal (or at present time for generated gases):**

Sludge (Ref. 2)

* * *

## 3 CONTAINMENT

Containment

**Method(s) of waste or leachate containment evaluated:**

Unlined, improperly capped landfill in previously marshy area designated for demolition debris and inert material. (Ref. 3 and 8)

**Method with highest score:**

Unlined landfill (Ref. 5)

## 4 WASTE CHARACTERISTICS

Toxicity and Persistence

**Compound(s) evaluated:**

Plating wastes containing chromium and nickel have been found in numerous dump sites in the area. Lacking specific analytical results for this site, chromium and nickel are assumed as worst-case. (Ref. 2)

**Compound with highest score:**

Chromium:
toxicity 3 (Ref. 5)
persistence 3 (Ref. 5)

Hazardous Waste Quantity

**Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):**

Assume two drums minimum. (Ref. 2, 4)

**Basis of estimating and/or computing waste quantity:**

Presence of industrial wastes containing various toxic metals and organic chemicals must be assumed based on investigation of several other dump sites in the area and the history of this particular site. Since it was not practical to sample the site and available evidence documents only two drums onsite, this figure was used for waste quantity. (Ref. 2, 4)

## 5 TARGETS

Ground Water Use

**Use(s) and aquifer(s) of concern within a 3-mile radius of the facility:**

Commercial and industrial with an alternate unthreatened source available (Ref. 9, 10, 11, and 12)

Distance to Nearest Well

**Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:**

No private well usage identified. Some industrial wells in use. (Ref. 9, 10, 11, and 12)

**Distance to above well or building:**

Approx. 2.5 miles to industrial well. (Ref. 9, 10, 11, and 12)

in Ref 12 —
What do residences use industrial well water for?

Population Served by Ground Water Wells Within a 3-Mile Radius

**Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:**

None identified. (Ref. 9, 10, and 11)

**Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):**

None identified. (Ref. 9, 10, 11, and 12)

**Total population served by ground water within a 3-mile radius:**

None identified. (Ref. 9, 10, 11, and 12)

# SURFACE WATER ROUTE

## 1 OBSERVED RELEASE

**Contaminants detected in surface water at the facility or downhill from it (5 maximum):**

None identified

**Rationale for attributing the contaminants to the facility:**

Not applicable

* * *

## 2 ROUTE CHARACTERISTICS

**Facility Slope and Intervening Terrain**

**Average slope of facility in percent:**

0-3% (Ref. 13)

**Name/description of nearest downslope surface water:**

Chattanooga Creek
Primarily used for Recreation (Ref. 13, 14)

**Average slope of terrain between facility and above-cited surface water body in percent:**

0-3% (Ref. 13, 14)

**Is the facility located either totally or partially in surface water?**

No (Ref. 3, 14)

**Is the facility completely surrounded by areas of higher elevation?**

Yes, the site is presently surrounded on three sides by railroad tracks raised on an earthen berm. See photographs in log book. (Ref. 1)

1-Year 24-Hour Rainfall in Inches

3.1 inches (Ref. 5)

Distance to Nearest Downslope Surface Water

Less than 0.25 mile (Ref. 1 and 14)

Physical State of Waste

Allegation - Sludge (Ref. 2)

* * *

## 3 CONTAINMENT

Containment

**Method(s) of waste or leachate containment evaluated:**

Landfill with no liner, not adequately covered, with unsound diversion system. (Ref. 1, 7, 13)

**Method with highest score:**

Landfill; not adequate covered and unsound diversion system. (Ref. 5)

## 4 WASTE CHARACTERISTICS

Toxicity and Persistence

**Compound(s) evaluated:**

Plating wastes containing chromium and nickel have been found in numerous dump sites in the area. Lacking specific analytical results for this site, chromium and nickel are assumed as worst-case. (Ref. 2)

**Compound with highest score:**

Chromium:
toxicity 3 (Ref. 5)
persistence 3 (Ref. 5)

Hazardous Waste Quantity

**Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):**

Assume 2 drums

(Ref. 4)

**Basis of estimating and/or computing waste quantity:**

Presence of industrial wastes containing various toxic metals and organic chemicals must be assumed based on investigation of several other dump sites in the area and the history of this particular site. Since it was not practical to sample the site and available evidence documents only two drums onsite, this figure was used for waste quantity. (Ref. 2, 4)

## 5 TARGETS

Surface Water Use

**Use(s) of surface water within 3 miles downstream of the hazardous substance:**

Recreation - fishing, wading, harvesting of frogs and turtles, etc. (Ref. 18)

**Is there tidal influence?**

No (Ref. 14)

Distance to a Sensitive Environment

**Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:**

None identified (Ref. 14)

**Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:**

None identified (Ref. 14)

**Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:**

None identified (Ref. 14)

## Population Served by Surface Water

**Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:**

None identified. Chattanooga's water supply is drawn from TN River mile 465.3, near Citico Creek on the TN River. The intake is upstream from the site and Chattanooga Creek outfall point. (Ref. 12 and 14)

**Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):**

Not applicable

**Total population served:**

None identified

**Name/description of nearest of above water bodies:**

Chattanooga Creek, Tennessee River (Ref. 14)

**Distance to above-cited intakes, measured in stream miles:**

Not applicable

AIR ROUTE
NOT RATED

1 OBSERVED RELEASE

Contaminants detected:

Date and Location of detection of contaminants:

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

# FIRE AND EXPLOSION
# NOT RATED

## 1 CONTAINMENT

Hazardous substances present:

Type of containment, if applicable:

* * *

## 2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Reactivity

Most reactive compound:

Incompatibility

Most incompatible pair of compounds:

* * *

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Distance to Nearest Population

Distance to Nearest Building

Distance to Sensitive Environment

Distance to wetlands:

Distance to critical habitat:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Population Within 2-Mile Radius

Buildings Within 2-Mile Radius

# DIRECT CONTACT
# NOT RATED

## 1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

* * *

## 2 ACCESSIBILITY

Describe type of barrier(s):

* * *

## 3 CONTAINMENT

Type of containment, if applicable:

* * *

## 4 WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Compound with highest score:

* * *

## 5 TARGETS

Population within one-mile radius

Distance to critical habitat (of endangered species)

Disc--Higgs/GrndW1

HOWARD HIGH SCHOOL LANDFILL

TND 100842343

REFERENCE LIST


1. Field logbook of Site Investigation activities, 9-29-87, TDSF.

2. Memo to demonstrate the reasoning for using the alleged industrial sludge waste as a proven fact in the documentation record and the HRS scoring sheets, 11-06-87, A. Damiano, Chattanooga Superfund Office.

3. Letter from James Templeton (City Chatt.) to Jack McCormick (TDWQC), Subject: Request for Certification of Compliance for proposed South Market Landfill Project with State Water Quality Standards, 9-28-72.

4. Memo from Charles A. Steele to Wayne McCoy (TDPH), 11-61-72, Subject: Certification of Compliance for City of Chattanooga 28th Street Dump.

5. Uncontrolled Hazardous Waste Site Ranking System, A User's Manual (HW-10), EPA 1984.

6. Soil Survey - Hamilton County, Tennessee, USDA/Soil Conservation Service, May 1982.

7. Trip Report of Site Inspection with site sketch, by F. Miller (TDSF), 9-29-87.

8. Telephone Memo with James Templeton (former employee for City of Chattanooga

Public Works Department, Subject: Old Demolition Landfills in the Chattanooga Creek basin, 9-28-87.

9. Telephone Memo of Gordon Caruthers and Ed Short (Miller Drilling Co.) Subject: Well information for the Chattanooga urban area, 11-26-86.

10. Memo from Gordon Caruthers (TDSF) and Bob Burrell (TN Amer. Water Co.), Subject: Well information from the Chattanooga urban area, 11-25-86.

11. Trip Report - Gordon Caruthers (TDSF), Subject: Well water survey in Rossville, GA as connected with Chattanooga Creek sites, 8-29-86.

12. Document listing known Industrial and private well usage, source: TN American Water Company, 12-19-86.

13. Preliminary Geologic Review of Howard High Dump site, source: TN Department of Public Health, 8-18-72.

14. USGS Topographic Map #105 S.E. Chattanooga Date: 1976.

15. Chattanooga (Hamilton County), TN Climatological Data.

16. Public Water Supplies, Hamilton County, TN.

17. Memo; R. L. Powell of TDSF to file 33606; Geologic Assessment of the Howard High School Dump Site; 20 Nov 1987.

18. Chattanooga Creek Survey, 1981-1982; by Tennessee Department of Health and Environment, Division of Water Management; 1983.

GSC/lag SF#7

Site No. TND 100842343

Ref. No. 1

# Site Inspection Log

Site Name: Howard High School Landfill

Site Address: 2500 S. Market St.
Chattanooga, TN

Site ID#: 33606
TND 1008423 43

Date of Inspection: 2pm 9/29/87
-3pm

Weather: Cldy, Warm

# Field Notes

* Rich native vegetation (weeds, ragweed, sage, goldenrod)
* Locust trees, mimosa-type
* Knee-high GRASS
* 90-95% covered over site
* Bald areas foundry sand, crushed masonry bricks

* Flat site, no slope

* Earlier visit, 2 pit bull terriers were seen chained down.

* Some indication from types of vegetation that water stands in some of the depression on the site

Photo Log Date 9/29/87

| No. | Time | Comments |
|---|---|---|
| 1 | 2:10pm | Shot looking SW at outfall from RR tracks + bridge over Chatta Creek |
| 2 | 2:20 | Closeup of drainage outfall from gravel path looking |
| 3 | 2:25 | NE Corner of Dump looking towards School from near RR tracks |
| 4 | 2:25 | middle of Dump towards football stadium from near RR tracks |
| 5 | 2:30 | Picture of bald area from near RR track |
| 6 | " | " |
| 7 | 2:35 | Buried cable post |
| 8 | 2:40 | Looking SW to Lookout Mtn. w/ Bridge |
| 9 | " | " to School & Middump |
| 10 | " | " to Downtown |

# Photo Log

11 2:45pm Closeup bald spot, NE corner of dump, with machete as scale

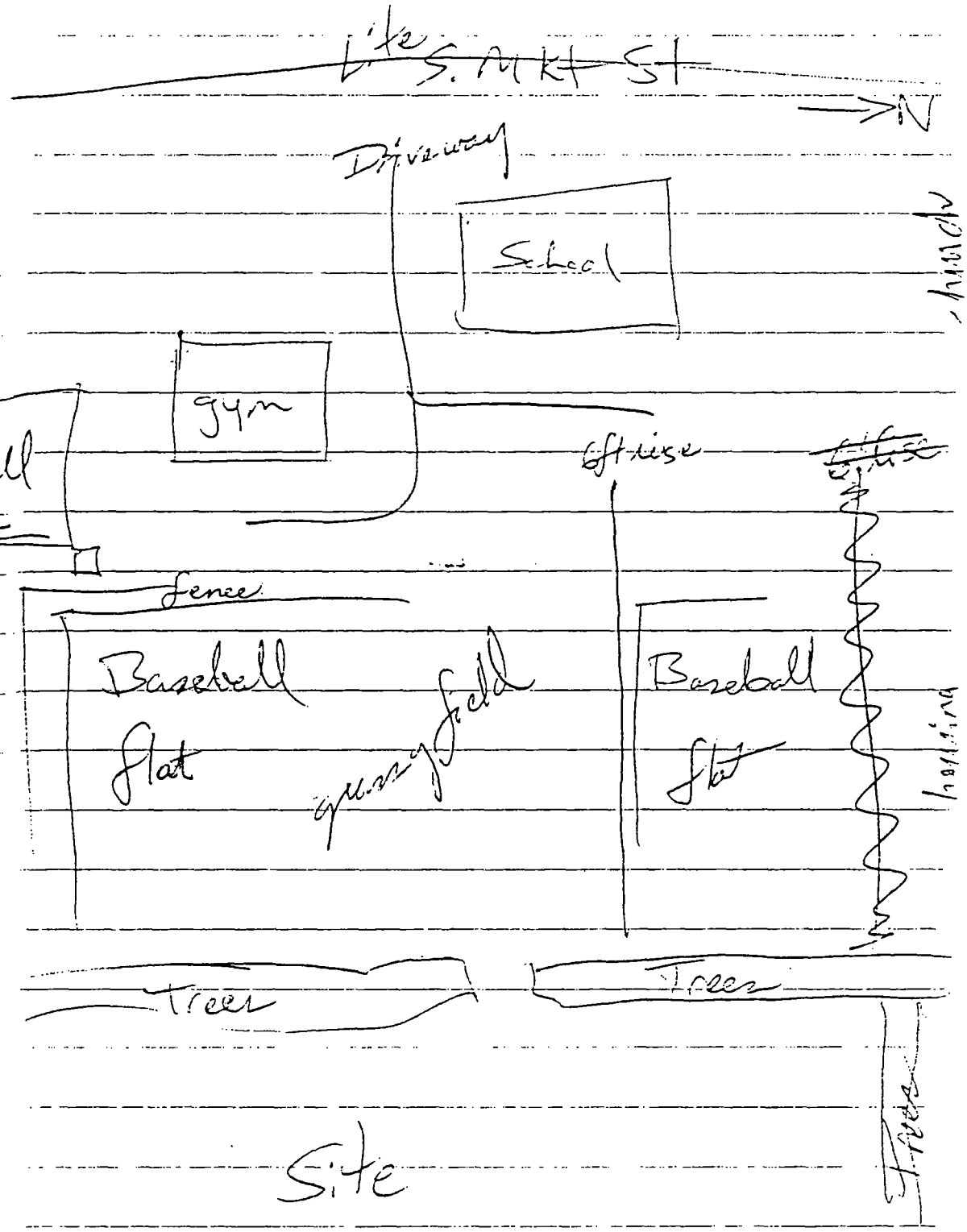
12 2:55 Entry point to site behind baseball fields' outfields.

Sampling Log Date

No. Time Desc. of Activity

No samples taken at the Howard High school Dump, because of possible cap put over the site during the post-closure period of the landfill. Another reason for no sampling was the discover that the drainage pipe orginating under the landfill and ends in the Chattanooga Creek was 2' under water. The location of the drainage pipe on the Chatt. Creek was found by the concrete flange around the pipe, which is above the water level.

Site Sketch


Like S. Mkt St
N
Driveway
School
gym
Football Track
Office
Fence
Baseball Flat
grass field
Baseball Flat
Trees
Trees
Site
Trees

Bldg
☐ housing?

→ N

Bald area

Barrel table
X sign

Chatta Creek

dirt gravel path

semi-paved

Bridge

DATE/TIME OF PHOTO 29 Sept 87, 2:10pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Damiano

REMARKS #1 Photograph looking S.W. at drainage outfall from R.R. tracks and bridge over Chattanooga Creek.

SIGNATURE: APD

000062

DATE/TIME OF PHOTO 29 Sept. 87, 2:20pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High School Dump

PERSONS PRESENT A.P. Damiano

REMARKS #2 Closeup of drainage outfall looking from gravel path.

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept. 87; 2:25 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Damiano

REMARKS #3 N.E. corner of dump looking towards Howard High School from near R.R. tracks.

SIGNATURE APD

00063

DATE/TIME OF PHOTO 29 Sept 87, 2:25 pm

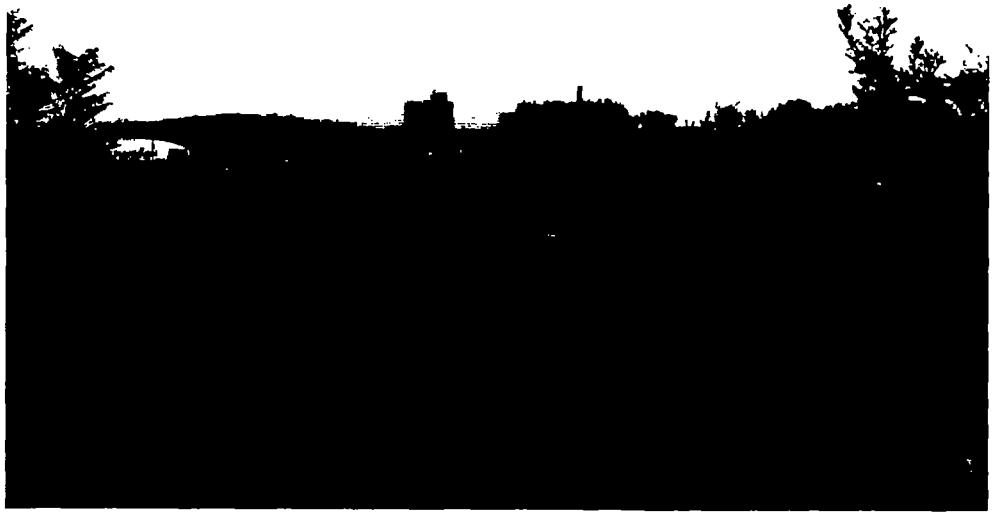
PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Damiano

REMARKS #4 Middle of dump looking toward football field taken from R.R. tracks.

SIGNATURE: APD



DATE/TIME OF PHOTO 29 Sept. 87, 2:30 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga Howard High Dump

PERSONS PRESENT A.D. Damiano

REMARKS #5 Picture of bald area looking school taken from RR tracks.

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept. 87 2:30 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Damiano

REMARKS #6 Picture of bald area looking towards school taken from R.R. tracks

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept 87 2:35 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Dominado

REMARKS #7 Picture of buried cable post along side R.R. tracks.

SIGNATURE: APD

00065

DATE/TIME OF PHOTO 29 Sept. 87 2:40 pm

PHOTO TAKEN BY E.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. Damiano

REMARKS #8 Picture of dump looking S.W. toward Lookout Mountain w/ South Market Street bridge.

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept. 87 2:40 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. DAMIANO

REMARKS #9 Picture of the dump looking S.W. at the school

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept. 87, 2:40 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. DAMIANO

REMARKS #10 Picture of N.E. corner of dump looking toward downtown Chattanooga, taken from R.R. tracks.

SIGNATURE: APD

00056

DATE/TIME OF PHOTO 29 Sept 87, 2:45 pm

PHOTO TAKEN BY F.D. Miller

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. D'Amiano

REMARKS #11 Closeup of bald spot, N.E. corner of the dump, machete as relative scale.

SIGNATURE APD

DATE/TIME OF PHOTO 29 Sept. 87, 2:55 pm

PHOTO TAKEN BY A.P. DAMIANO

LOCATION/NAME Chattanooga, Howard High Dump

PERSONS PRESENT A.P. DAMIANO & F.D. Miller

REMARKS #12 Picture of entry point to site, behind baseball outfields

SIGNATURE APD

Site No. TND 100842343

Ref. No. 2

TO: Howard High School File -- # 33606

FROM: Anthony P. Damiano, Jr. - Environmental Specialist II (TDSF)

DATE: November 6, 1987

SUBJECT: Documentation to show the reason for using the alleged unauthorized industrial dumping as a proven fact.

It is a historical fact that most municipal landfills designated for brush and demolition debris in the 1950's, 1960's, and early 1970's ; especially the landfills in the Chattanooga Creek basin, had no mechanism (reporting system) for recording the type of waste actually being placed in the landfill. It had been reported by personnel from the TN Division of Water Quality that alleged dumping of industrial sludge was taking plac at the landfill against operating restrictions. There is a high probability that some industrial dumping took place, since no enforceable regulations existed. The reason for using industrial sludge containing organics and heavy metals in the site investigation package was based on past findings (sampling results and professional judgements) at other landfills with similar histories and operational practices.

A.P.D.

APD

Site No. TND 100842343

Ref. No. 3

OCT 4 1972

OCT 2 - 1972

CLO
KHM
TMT
SB
JB
JN
WL
DLN
WGM
RCD
LC
JTV
WEB
MCJ
FWS
FILES

# City of Chattanooga

DEPARTMENT OF
PUBLIC WORKS, STREETS AND AIRPORTS
Chattanooga, Tennessee 37402

CHARLES A. ROSE
COMMISSIONER

ELLIS L. SPENCER
CITY ENGINEER

September 28, 1972

Mr. Jack McCormack
Division of Water Quality Control
6200 Building, Suite 6100
Chattanooga, Tenn. 37411

Dear Mr. McCormack:

We wish to request from the Division of Water Quality Control a Certificate of Complinace with State Water Quality Standards for the following project proposed by our Department:

Description: A land reclamation-refuse disposal project involving the deposit of approximately 20 feet of fill material over a 40-acre tract.

Location: East of South Market Street and north of Chattanooga Creek approximately 2 miles upstream of Mile 460 of the Tennessee River.

Two copies of plans describing the general design of the project, two copies of a map showing its location, together with two copies of a report of the anticipated environmental consequences resulting from the proposed project are attached. We are also including a copy of a report previously submitted to the Tennessee Division of Solid Waste Management describing operational procedures for the project.

We have submitted similar plans to the TVA for approval under Section 26a of the 1933 TVA Act. Please request your Nashville office to forward a copy of the required certificate directly to the following office:

~~Mr. Robert D. Brown~~
~~Land Use Agent, Central District~~
~~Division of Reservior Properties~~
~~516 N. Madison Avenue~~
~~Athens, Tennessee 37303~~

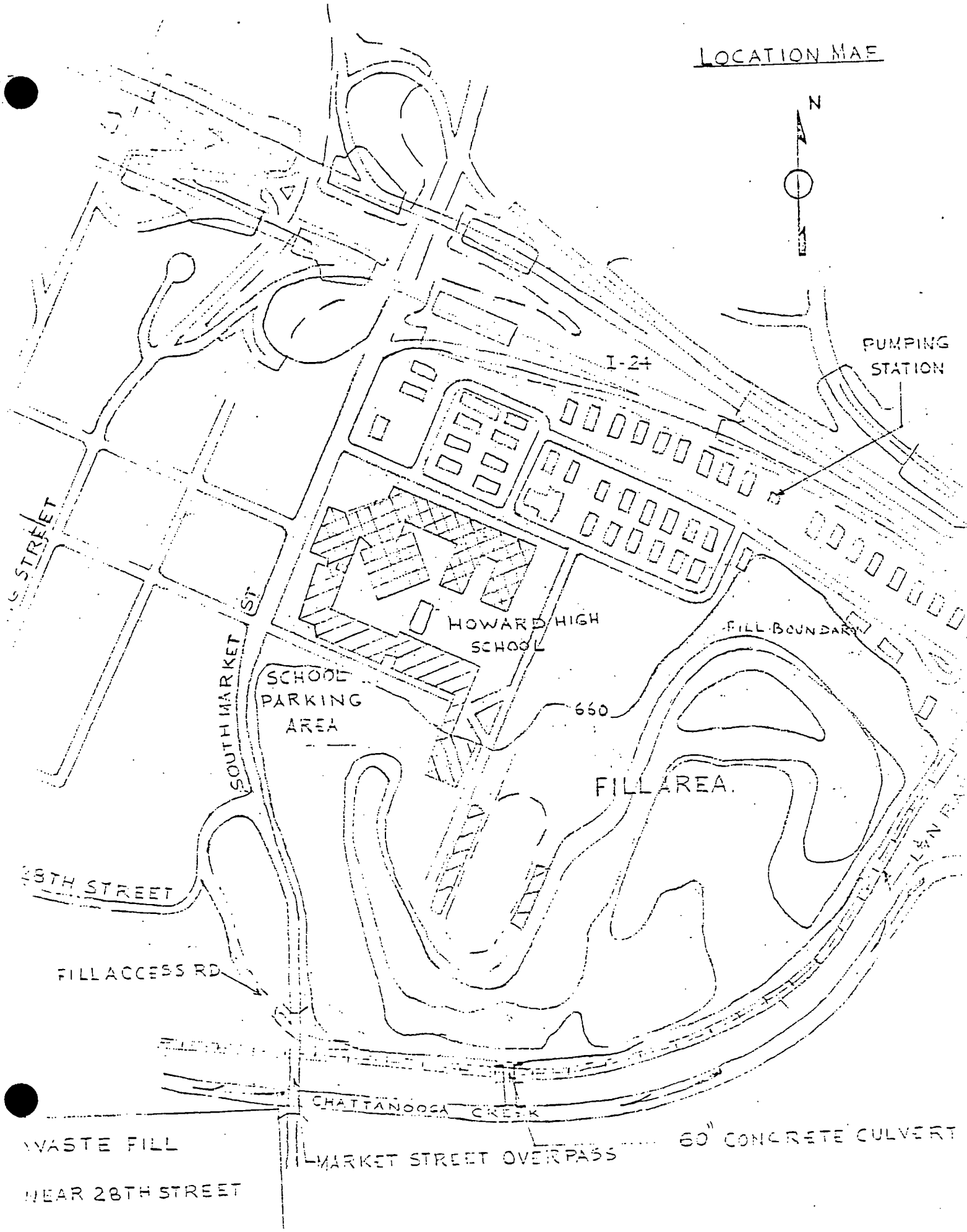
Mr. Fred Massengill
553 New Sprankle Bl.
500 Union Av.
Knoxville, Tenn. 37902

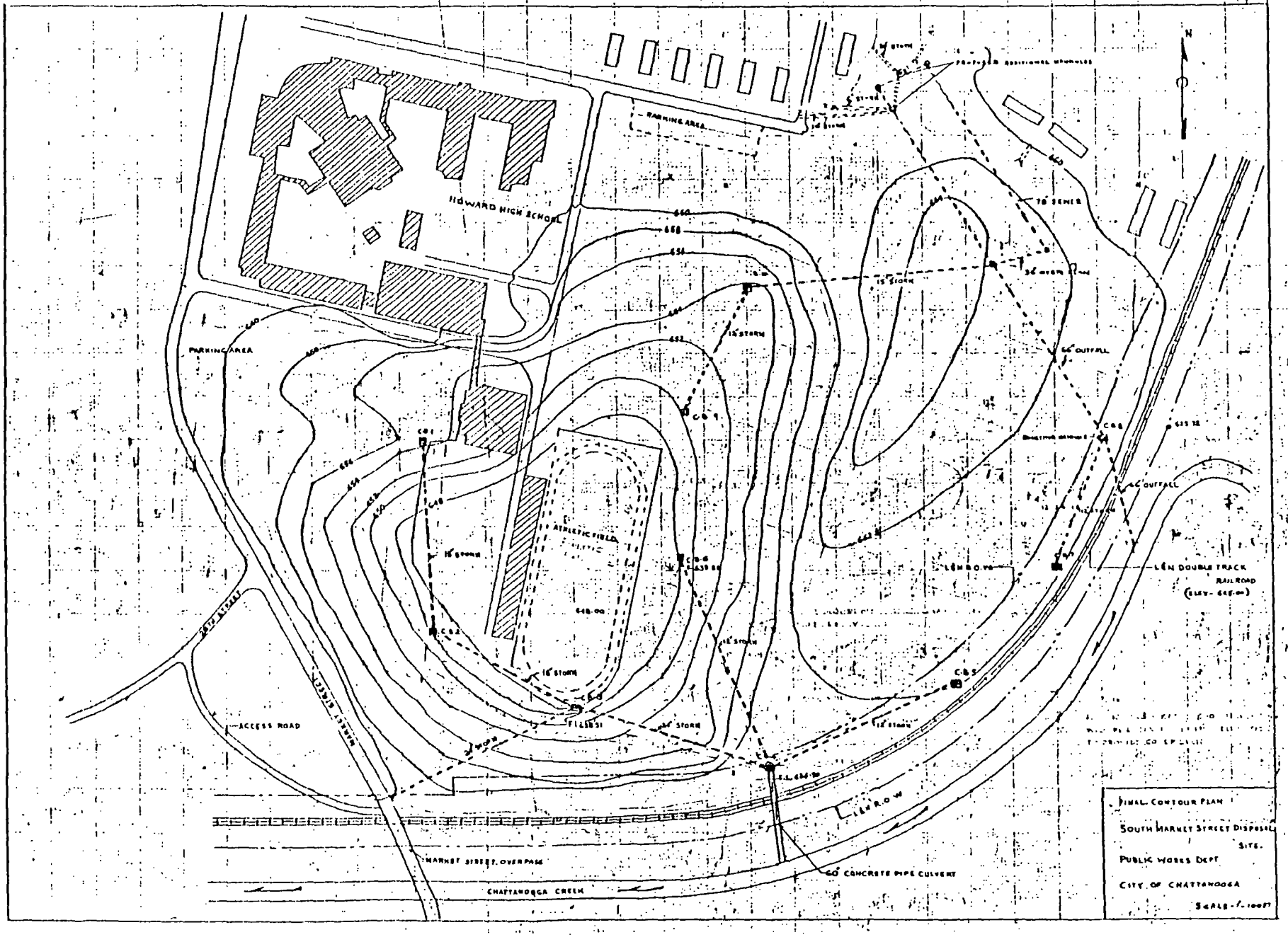
Please call us if you have any questions about the enclosed documents.

Sincerely,

James H. Templeton

James H. Templeton
General Superintendent


LOCATION MAP
N
PUMPING STATION
I-24
HOWARD HIGH SCHOOL
FILL BOUNDARY
SCHOOL PARKING AREA
660
FILL AREA
SOUTH MARKET ST
28TH STREET
FILL ACCESS RD
CHATTANOOGA CREEK
WASTE FILL
NEAR 28TH STREET
MARKET STREET OVERPASS
60" CONCRETE CULVERT


HOWARD HIGH SCHOOL
PARKING AREA
PARKING AREA
ATHLETIC FIELD
ACCESS ROAD
MARKET STREET
MARKET STREET OVERPASS
CHATTANOOGA CREEK
LEN DOUBLE TRACK RAILROAD
60" CONCRETE PIPE CULVERT
60" OUTFALL
60" OUTFALL
76" SEWER
15" STORM
N
FINAL CONTOUR PLAN
SOUTH MARKET STREET DISPOSAL SITE.
PUBLIC WORKS DEPT
CITY OF CHATTANOOGA

# ANTICIPATED ENVIRONMENTAL CONSEQUENCES OF LAND RECLAMATION-REFUSE DISPOSAL PROJECT

1. Environmental Impact

The project will be of significant benefit to the immediate neighborhood by reclaiming some 40 acres of low, overgrown property to a uniform and usable elevation. Breeding grounds for vermin due to the ponding of surface runoff from surrounding property will be eliminated. Proper contouring during and after construction together with a network of catch basins and subsurface drains will insure improvement of existing drainage in the area.

2. Probable Adverse Effects

None. Refuse is restricted to those materials which will not pollute surface or subsurface water. Waste materials are covered and compacted daily in accordance with state-approved landfilling techniques.

3. Alternatives to Proposed Project

None. The selective and carefully-supervised deposit of refuse materials as fill provides the only method for physical improvement of an area of this size.

4. Relationship Between Long and Short-term Use

There is no use for the proposed fill area in its present condition. An average fill of 20 feet to the 660-foot elevation will provide 40 acres of land adjacent to a high-density residential project and to a large school for use as open space and for recreation facilities. Such features, properly planned and landscaped, will enhance the quality of life and the aesthetic appeal of the neighborhood.

5. Irreversible Committment of Resources

None, other than the municipal funds required to carry out the filling and reclamation project in an environmentally satisfactory manner.

Exhibit 3

CERTIFICATE OF COMPLIANCE WITH STATE WATER QUALITY STANDARDS

The plans of the City of Chattanooga, hereinafter called "Applicant," for construction and operation of a Brush and Demolition Refuse Disposal Site on land bordering the Chattanooga Creek in Hamilton County, Tennessee, 2 miles upstream of the Tennessee River, Mile 460, which plans involve surface drainage only into Chattanooga Creek, have been duly examined and reviewed by the responsible officials of the

Division of Water Quality Control

hereinafter called "Agency." The undersigned hereby certifies that Agency has determined, in accordance with section 21(b) of the Federal Water Pollution Control Act, as amended, that there is reasonable assurance that construction and operation of the proposed facilities in accordance with the aforesaid plans submitted by the Applicant and reviewed by this office will be conducted in a manner which will not violate applicable water quality standards of the State of Tennessee.

_____
(State agency responsible for water quality control)

Date_____ By_____

Title_____

August 17, 1972

# SOUTH MARKET STREET TRASH DISPOSAL SITE

## A. Background

In developing adequate disposal facilities for its solid waste, the City of Chattanooga faces a difficult task in identifying sites which are both environmentally acceptable and convenient to the sources of waste generation. Improvement and registration of the Summitt sanitary landfill has greatly enhanced the City's disposal system. However, there remain large amounts of waste which either are inert or decompose slowly and with little negative environmental effects. For these materials a metropolitan disposal site is highly desirable so as to avoid the excessive public and private costs of transfer to the Summitt landfill.

These materials do not pose the threat to water quality of residential garbage and highly soluble commercial and industrial waste. They do not provide sustenance for rodents or insects, and they are not the source of odors or fires due to organic decomposition and spontaneous combustion. Precautions are necessary in their handling, but locational and operational requirements are somewhat less stringent than those pertaining to more noxious wastes.

An area surrounding the old creekbed of the now diverted Chattanooga Creek has been identified which is thought not only to comply with solid waste regulations but to offer the possibility of significant land reclamation as well. In the following sections operational procedures will be outlined which will assure that disposal at this site conforms to all State Standards.

## B. Existing Practice

At present two municipal locations exist for the disposal of dry trash and demolition waste. One of these is off Amnicola Highway just east of the Tennessee River. This site is strictly supervised and receives mainly excavation dirt, stone, lumber, and brush. An air-curtain destructor is maintained on the site for the incineration of lumber and wood. Leaves and stumps which cannot be burned are covered and compacted.

The second location now receiving assorted trash is the 38th Street disposal site. Dry refuse of various descriptions is received here but is often mixed in the same load or in other deliveries with refuse of a biodegradable nature which is unacceptable for disposal in such close proximity to Chattanooga Creek which flows to the west of the fill.

In accordance with State and federal directives, both of these sites are being closed to further waste disposal and will be covered, compacted, seeded and abandoned by the end of September, 1972. August 19 is presently

scheduled as the last day for public use of either of the above sites. It is imperative, therefore, that an acceptable alternative be designated for disposal of the municipal trash constantly being generated within the City of Chattanooga.

C. Site Description

The site is located in South Chattanooga east of South Market Street and 1/2 mile south of I-24, thus making it easily accessible from all parts of the City. It consists of some 44 acres of low land remaining after diversion of Chattanooga Creek in 1969 in a railroad relocation project. The new Louisville and Nashville Railroad embankment at an elevation of 665 feet forms the southern and eastern boundary of the proposed fill area. The Maurice Poss Homes, a multiple-family housing development, and Howard School, an elementary through high school facility, lie north of the fill.

The entire 44 acres of the site are under City ownership. However, a restriction on 10 acres conveyed to the City in 1971 requires that this portion of the property be used within five years for recreational purposes. This requirement was a major factor in the City's decision to reclaim the low-lying property to a usable condition and accounts for the high priority attached to the project. Accordingly, much of the operational plan is designed to prepare the site for final use as a recreational facility.

Original soil in the fill area of the former creekbed is silty soil of the Lindside-Melvin-Philo classification. Available records indicate that the old creekbed was filled to a level of 635 feet with a variety of shaly soil after diversion was completed. An open drainage-way was left and is connected with Chattanooga Creek to the south by a 60-inch pipe beneath the railroad embankment.

D. Proposed Operational Procedures

1. Waste Restrictions

The Department of Public Works is well aware of the potential for both water pollution and adverse public reaction from improperly operated disposal sites. Proper usage and correct operation are mandatory for the success of the South Market Street project. Consequently, the key element in plans for the site is the committment of all necessary personnel and resources to regulate the flow of waste into the site and to assure that no inappropriate or harmful materials are permitted.

Operation of the trash site is integrally related to operation of other components of Chattanooga's waste management system and is critical to the acceptability thereof. In order to afford a clear definition of the function of the South Market Street site, as full as possible a listing is given below of those materials which will and will not be permitted for disposal:

## Materials Permitted*

Demolition materials:

a. Stone and masonry
b. Concrete
c. Asphalt
d. Timber
e. Roofing material
f. Structural steel

Trees, limbs, and stumps
Brush and yard trimmings

Leaves
Stone
Dirt
[redacted]
[redacted]
[redacted]
Street sweepings
Glass and ceramics
Tires
Wood products, pallets, and crates

## Prohibited Materials*

a. Furniture
b. Appliances
c. Bulky Machine Parts
d. Wire and Screen
e. Leather
f. Textiles and rugs
g. Paper and cardboard
h. Rubber and plastic materials
i. Garbage
j. Liquids

2. Site Capacity

With an average fill of 20 feet in the 44-acre depression, some 1.25 million cubic yards of compacted waste can be received by the site. At a liberally estimated rate of 2000 cubic yards of waste per day, the site would have a utilization life of approximately 2 1/4 years.

*As amended August 22, 1972.

3. Survey Procedures

The existing and final site plans submitted with this report are taken from TVA Flood Control maps of 1 inch to 100 foot scale. Some extrapolation was necessary to account for contour changes subsequent to the diversion of Chattanooga Creek from the proposed fill area. Preliminary survey work verified the elevations of existing drainage structures and of the surrounding rail and school facilities.

Elevations will be set throughout the construction period to indicate to operating personnel the required level of fill and necessary slopes. Periodic checks will be made to assure full utilization of fill capacity and proper drainage grades.

4. Access: Roads and Fencing

Access shall be via an all-weather road from a point on 28th Street 225 fee west of South Market Street some 800 feet to and under the Market Street viaduct and into the fill depression. This route will avoid the problems of heavy traffic passing in the vicinity of the school and housing project.

From the end of the paved access road, a compacted roadway will be prepared to respective fill areas. This road will be gravelled if necessary to withstand wet weather and will be sprinkled in dry weather to eliminate dust.

The site is presently enclosed on all sides either by fence or creek and railroad tracks and is thus inaccessible with the exception of this one road. One gate with padlock will be installed at the entrance from 28th Street and another at the viaduct itself which will completely restrict ingress.

5. Filling and Cover

Filling will begin in the western section (A) of the depression south of the Howard School parking lot and will proceed to an intersection with the 60-inch railroad drain. Work will then begin in the eastern section (B) south of Maurice Poss Homes and move to the south and west.

Two 8 to 10 foot lifts are expected to bring the entire depression to the desired elevation. The entire fill area will be divided into 3 to 4 acre divisions with the two lifts being constructed sequentially in each division before filling is begun on the next division.

In each working division waste will be deposited by delivery vehicles at the toe of a 200-foot working face. Waste will then be compacted by a dozer working upwards on a 3:1 slope. Excavation dirt and stone will be stockpiled

or cover at the end of each working day. Normal disposal of dirt is expected to provide sufficient soil for at least partial daily cover. Complete cover will be provided once weekly with any additional dirt that may be necessary being hauled in from a nearby source by City vehicles.

Odors are not expected to be a problem at the site as no putrescible waste will be accepted. Daily and weekly cover will, therefore, be primarily designed to prevent fire and unsightliness.

6. Drainage

With ultimate recreation use under consideration, surface drains are deemed inappropriate for the site. A system of catch basins and underground conduits has therefore been designed to carry off surface water from the fill area.

An initial problem lies in the need to provide for drainage from the school parking lot and gymnasium into Section A of the fill area and to intercept five surface drains presently emptying into Section B. In Section A catch basin I will receive surface drainage from school property into a 15-inch pipe which will in turn connect with the 60-inch railroad drain. In addition, catch basins 2 and 3 will collect surface runoff from the fill itself into the 15-inch pipe. Catch basin 4 near the 60-inch railroad drain will collect water from the southern portion of the fill. Basins 5 and 6 in section B also connect via 12-inch pipes to the 60-inch drain.

The five storm sewers in the northern portion of Section B will be connected with a 66-inch overflow line presently crossing the site. Catch basins 7, 8, 9 and 10 will tie in to this line to provide surface drainage from the sides of the fill in Section B.

The fill in Section A will be sloped from the west to east and south while Section B will be sloped from a north-south ridge line to both east and west. The fill in Section B will connect with the railroad embankment some 5 to 6 feet below its top and will adjoin Howard School playing fields at varying elevations and at 1 to 4% slopes. Section B will have a slight north to south slope as well.

7. Air-Curtain Destructor

The air-curtain destructor now located at the Amnicola brush dump will be transfered to the South Market Street site. It will be installed in the southern portion of the depression the greatest possible distance from both the Poss Homes and Market Street. By keeping this installation a sufficient distance from the working area of the trash fill, the two operations will remain separate in the mind of the public and of those who use the site.

This unit will afford a significant volume reduction for lumber, wood products, and brush which are delivered to the site. The destructor and burning pit will be constructed and operated in conformity with guidelines of the Chattanooga-Hamilton County Air Pollution Bureau.

8. Supervision and Administration

The Department of Public Works shall supervise and administer the site. Personnel involved in the daily operation will include two watchmen, two operators, one spotter, and one foreman. Watchmen will be on duty from 7 A. M. to 11 P.M. The day watchman will be charged with controlling access and will assist the spotter in directing vehicle movement. The night watchman will collect any blowing litter from the day's operation and will prevent any trespassing or illegal dumping. The foreman will help regulate access and will have on-site responsibility for filling and cover operations and for enforcing disposal regulations.

9. Equipment

One TD-15 and one TD-20 dozer will be used for movement, cover, and compaction of the waste. A Bucyrus Erie crane will be utilized to convey flammable wood products into the air-curtain burning pit for incineration.

10. Signs

A prominant sign at the gate will set forth disposal hours and regulations Limitations on the material permissible at the site will be clearly spelled out. Vehicles bearing wastes other than those listed in Paragraph 1 above will be directed to deliver these materials either to a transfer station or directly to the sanitary landfill, depending upon volume and composition of the load.

11. Communications

Telephone connections will be installed at the site for ready communication with Public Works and Police Department offices in the event of any emergency or any attempted violation of disposal regulations.

12. Employee Facilities

A shelter will be provided for City personnel employed at the site.

13. Public Education

Public announcement of the regulations governing this site will be made upon its opening to inform contractors, businesses, and the community at large of the requirements for disposal. Pre-segregation of waste will be encouraged to allow for disposal at the proper facilities with a minimum of inconvenience for both waste generators and City supervisory personnel. A permit system for haulers of large amounts of demolition waste may be instituted if judged to facilitate better regulation.

It shall be made clear to the public that scavenging, trespassing, setting fires, littering, and disposing of unauthorized waste will not be tolerated. Strict enforcement of these regulations and arrest and assessment of the maximum fine for any violations thereof will give further weight to the educational effort.

14. Final Use

As each division of the fill is completed and brought to final contours, it will be graded and seeded to give the reclamation project a more attractive appearance. Hedges will also be planted where needed to screen the working area from public view.

Upon completion of the fill, a large area will become available as open space and a passive recreation facility. Discussions have already been held between City recreation personnel and school officials and local residents concerning recreation needs in the area. Picnic tables, barbeque pits, athletic fields, and a children's playground are among the possible uses which aroused the most interest. An expansion of the school parking facilitie on the fill in Section A also seems highly desirable.

September 1, 1972

## Addenda

### 1. Fill Progression Description

The accompanying Fill Progression Plan illustrates the sequence of filling for the estimated 118-week life of the South Market (28th) Street Disposal Site. Initial activity will be devoted to preparation of a 120 by 2000 foot access road constructed on eight feet of compacted and covered refuse. This phase of the operation, represented by the diagonally-lined Section C on the Fill Plan, is expected to take six weeks.

When the access road reaches the northeast corner of Section B, cell construction will begin in north to south progression. Each cell throughout the fill will be 300 by 175 by 8 to 10 feet in dimension and will contain the refuse of two weeks. The 175-foot working face of each cell shall be given a six-inch cover at the end of each day and the entire cell shall receive an intermediate one-foot cover upon completion.

Two lifts will be required throughout the fill area to reach the desired elevation. With one exception the first lift of cells will be completed throughout Sections A and B before the second lift is begun. This will allow for additional compaction through movement of vehicles and equipment and some settlement prior to construction of the second layer of fill. The exception to this sequence will be in the area of the four northernmost cells in Section B. Here the first and second lifts shall be constructed successively. A final two-foot cover shall then be applied, graded and seeded. This will be done to remove the working area of the fill some distance from the adjacent dwelling units and to demonstrate to the local residents the anticipated appearance of the finished fill.

Throughout the remainder of Section B, construction of the first lift will occupy weeks 23 through 46 while the second lift will proceed from week 47 through week 87. In Section A, 15 weeks will be required for the completion of the first lift and 16 for the second.

During filling, more easily compacted refuse such as brush and tree limbs will be deposited at the foot of the working face and worked into the fill by upward passage of a dozer. Heavier items such as masonry and large timbers will be deposited on the upper edge of the working face and compacted downward. Such items are difficult to work up a slope with a dozer and serve the function, when deposited on looser refuse from above, of providing natural compaction by their own weight.

Throughout construction of the first lift, the intermediate surface shall be kept sloped to collection points to the underlying drainage pipe network in the same conformity as the proposed final contours.

The above fill plan represents a revision of the sequence submitted in our August 17 report wherein work was to commence at the north end of Section A and move later to Section B. It is now felt that it would be best to fill that portion of the depression nearest the residential area and to bring it to completed form as soon as possible. Also a change in site designation from South Market Street to 28th Street is considered desirable.

2. Drainage

Measures for control of the drainage from Howard High School and parking lot are detailed in Section 6, paragraph 2 on Page 5 of the report submitted on August 17.

3. Air Curtain Destructor

A new location is being sought for the air curtain destructor formerly operated at the Amnicola brush disposal site. A burning pit lined with brick or steel sheet pilings will be constructed in conformity with Air Pollution Control Bureau guidelines and the Division of Sanitation and Solid Waste Management will be appraised of operational procedures.

4. Fencing

As mentioned in Section 4, Paragraph 3 of the earlier report, the disposal site is fenced along the northern perimeter bounding Howard High School. It is not felt that further fencing is justified on sides of the fill away from the school as site attendants have been charged with prohibiting ingress from these quarters.

5. Material Restrictions

The foreman at the disposal site has been directing private and commercial vehicles bearing prohibited wastes to proceed to the Summitt Landfill. Haulers delivering mixed loads are advised to segregate their waste items to permit continued use of the 28th Street Site. Compliance has been obtained from regular haulers of unacceptable waste and is currently being sought with occasional and smaller-scale haulers previously accustomed to the use of a municipal dump.

Site No. TND 100842343

Ref. No. 4

OFFICE MEMORANDUM

C/S 11/16
JRM 11/16
JAC 11/17

F. 12
Chattanooga and Hamilton County Dumps

DATE: November 16, 1972

TO: V. Wayne McCoy

FROM: Charles A. Steele

SUBJECT: Certificate of Compliance for City of Chattanooga's 28th Street Dump

On November 13, 1972 I inspected the dump operated by the City of Chattanooga near 28th and South Market Streets. The site is a low-lying swampy area which was one of the meanders of Chattanooga Creek prior to its channelization. In its present condition the land is little more than a mosquito hole. I concur with the environmental statement attached to the city's request.

The restrictions in subsection 1 of Section D were not being observed in early November. Large piles of paper, largely corrugated paper cartons, appeared to have been dumped from compactor equipment. There were metal drums and small amounts of household garbage in evidence.

Granting of the certificate is recommended. The Division of Sanitation and Solid Waste Management will have the greater voice in the matter.

C.A.S.

CAS:ft

Attachments

Site No. TND 100842343

Ref. No. 5

# Uncontrolled Hazardous Waste Site Ranking System

## A Users Manual

(HW-10)

Originally Published in
the July 16, 1982, *Federal Register*

United States
Environmental Protection
Agency

1984

Site No. TND 100842343

Ref. No. 6

# Soil survey of
# Hamilton County, Tennessee

By Bedford W. Jackson, Soil Conservation Service

Soils surveyed by Bedford W. Jackson, Harry C. Davis, Hershel D. Dollar
Paul L. Fulks, Jerry Hayslett, Charles E. McCroskey, William C. Moffitt
Olin L. North, Jerry L. Prater, and D. Victor Simpson
Soil Conservation Service
James I. Johnson, Hamilton County

United States Department of Agriculture, Soil Conservation Service
in cooperation with
Tennessee Agricultural Experiment Station

Hamilton County is in the southeastern part of Tennessee. It is bordered on the south by the Georgia State line, on the north by Bledsoe and Rhea Counties, on the west by Marion and Sequatchie Counties, and on the east by Meigs and Bradley Counties. Chattanooga, the county seat and principal city, is located in the southern part of the county, near the Georgia State line. Chattanooga is a leading center for manufacturing and transportation. In 1974, the population of the county was 264,700. The population is rapidly increasing.

The county is irregular in shape, measuring about 35 miles from north to south and 16 miles from east to west. It covers 587 square miles, or 375,680 acres. About 352,000 acres of this is land area and about 23,680 acres is water.

Hamilton County is divided from north to south by the Tennessee River and the Chickamauga and Nickajack Reservoirs.

Hamilton County is in two Major Land Resource Areas, the Cumberland Plateau and Mountains and the Southern Appalachian Ridges and Valleys. Soils in both of these areas formed under forest vegetation and are dominantly light in color. The soils in the Cumberland Plateau and Mountains are moderately deep over sandstone and shale bedrock. The soils in Southern Appalachian Ridges and Valley are moderately deep or deep over limestone and shale bedrock.

An older survey of Hamilton County was published in 1947 *(3)*. The present survey updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

## general nature of the survey area

The history, industry, transportation, natural resources, and climate of the county are briefly described in this section.

### history

The first known inhabitants of Hamilton County were the Cherokee and Chickamauga Indians. The first non-Indian traders in this area were Scotsmen, who made their homes among the Indians and married Indian women.

Hamilton County was formed from a part of Rhea County by an act of the General Assembly on October 25, 1819. It was named in honor of Alexander Hamilton. At that time, 821 non-Indians lived within its boundaries.

The population of Hamilton County is concentrated in or near Chattanooga. Several small towns in the county are within 35 miles of Chattanooga. Hamilton County does not have a large rural population that depends on farming for support.

About 22 percent of Hamilton County was in farms in 1969. In 1974, about 19 percent was in farms.

## industry

The industrial complex of Hamilton County is the largest in Southeast Tennessee. It includes marketing, merchandising, banking, housing, and chemical-based industries. Many large iron foundries are in Chattanooga.

More than 100 manufacturing firms operate in Hamilton County. They employ more than 50 percent of the nonagricultural workers. Many of the industrial workers are employed by a chemical company and an engineering company.

The housing industry has expanded greatly in recent years to keep pace with population growth. Residential areas have developed around downtown Chattanooga. Most of the residential units in the county are single-family houses. However, since 1970, a large number of multiple-family dwellings and high-rise apartments have been built. Prime farmland is being used very rapidly for urban development.

## transportation

Interstate Highways 75 and 24 merge in Chattanooga. In addition to a freeway system, Hamilton County has an excellent network of state and local highways. Nearly all of the county roads are paved with bituminous materials.

Transportation by water is important to Chattanooga and Hamilton County. Barge tonnage of raw materials on the Tennessee River is increasing at a steady rate. Wood products, chemicals, coal, and oil products account for the largest tonnage.

Hamilton County is served by the Southern Railway and the Louisville and Nashville Railway. Major truck terminals are located in and near Chattanooga.

## natural resources

Hamilton County has an abundant supply of timber, coal, and farmland. Tree production is a major enterprise on the slopes of the Cumberland Mountains and in areas of the valley not suited to the production of agricultural products.

Hamilton County has an abundant supply of fresh water. Streams that flow year-round are common. Water impounded behind the Nickajack Dam in Marion County on the Tennessee River backs up to Chattanooga. Water impounded behind the Chickamauga Dam, about 5 miles north of Chattanooga, backs up to the Watts Bar Dam in Rhea County.

## climate

Prepared by the National Climatic Center, Asheville, North Carolina.

In winter, valleys in Hamilton County are very cool with occasional cold and warm spells. Upper slopes and mountaintops are generally cold. In summer, valleys are very warm and frequently hot, and mountains that are warm during the day become cool at night. Precipitation is heavy and evenly distributed throughout the year. Summer precipitation falls mainly during thunderstorms. In winter, precipitation in the valleys is mostly rain with occasional snow. Winter precipitation in the mountains is generally snow, although rains are frequent. Snow cover does not persist except at the highest elevations.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Chattanooga in the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 41 degrees F, and the average daily minimum temperature is 31 degrees. The lowest temperature on record, which occurred at Chattanooga on January 31, 1966, is -10 degrees. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Chattanooga on July 28, 1952, is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 52 inches. Of this, 24 inches, or 46 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.68 inches at Chattanooga on March 16, 1973. Thunderstorms occur on about 55 days each year, and most occur in summer.

Average seasonal snowfall is 5 inches. The greatest snow depth at any one time during the period of record was 7 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 65 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 8 miles per hour, in March.

# how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles.

TABLE 1.—*Normal temperature and precipitation at two weather stations*

CHATTANOOGA AIRPORT STATION, HAMILTON COUNTY, TENN., ELEVATION, 670 FEET

| Month | Temperature [1] | | | Precipitation [2] | | | |
|---|---|---|---|---|---|---|---|
| | Average | Absolute maximum | Absolute minimum | Average | Driest year | Wettest year | Average snowfall |
| | °F. | °F. | °F. | Inches | Inches | Inches | Inches |
| December | 42.1 | 75 | 3 | 5.31 | 4.12 | 2.89 | 1.5 |
| January | 41.6 | 76 | −7 | 5.23 | 2.58 | 5.72 | 2.5 |
| February | 44.0 | 79 | −10 | 5.11 | 2.08 | 5.83 | 2.2 |
| Winter | 42.6 | 79 | −10 | 15.65 | 8.78 | 14.44 | 6.2 |
| March | 50.7 | 89 | 2 | 6.05 | 5.81 | 10.80 | .8 |
| April | 59.7 | 92 | 25 | 4.53 | 1.67 | 6.70 | .2 |
| May | 67.7 | 95 | 37 | 4.16 | 2.76 | 12.00 | 0 |
| Spring | 59.4 | 95 | 2 | 14.74 | 10.24 | 29.50 | 1.0 |
| June | 75.8 | 100 | 39 | 4.21 | 1.92 | 4.39 | 0 |
| July | 78.3 | 104 | 56 | 5.34 | 2.09 | 3.21 | 0 |
| August | 77.3 | 101 | 54 | 3.70 | 5.03 | .45 | 0 |
| Summer | 77.1 | 104 | 39 | 13.25 | 9.04 | 8.05 | 0 |
| September | 72.5 | 104 | 38 | 2.69 | 1.07 | 5.66 | 0 |
| October | 60.8 | 92 | 26 | 3.24 | .46 | 3.12 | (3) |
| November | 49.1 | 81 | 11 | 4.03 | 3.09 | 11.60 | .3 |
| Fall | 60.8 | 104 | 11 | 9.96 | 4.62 | 20.38 | .3 |
| Year | 60.0 | 104 | −10 | 53.60 | [4] 32.68 | [5] 72.37 | 7.5 |

SEWANEE STATION, FRANKLIN COUNTY, TENN., ELEVATION, 1,910 FEET

| Month | Average | Absolute maximum | Absolute minimum | Average | Driest year | Wettest year | Average snowfall |
|---|---|---|---|---|---|---|---|
| December | 39.9 | 71 | −6 | 5.33 | 4.32 | 3.03 | 1.7 |
| January | 38.9 | 70 | −7 | 5.43 | 4.64 | 7.44 | 3.2 |
| February | 40.0 | 74 | −11 | 5.27 | 1.24 | 5.86 | 2.4 |
| Winter | 39.6 | 74 | −11 | 16.03 | 10.20 | 16.33 | 7.3 |
| March | 48.5 | 86 | 4 | 6.20 | 3.98 | 9.52 | 1.4 |
| April | 56.7 | 90 | 20 | 4.94 | 4.44 | 5.99 | .3 |
| May | 65.4 | 90 | 30 | 4.40 | .77 | 11.35 | 0 |
| Spring | 56.9 | 90 | 4 | 15.54 | 9.19 | 26.86 | 1.7 |
| June | 72.8 | 99 | 39 | 4.64 | 2.66 | 6.87 | 0 |
| July | 75.6 | 103 | 51 | 5.63 | 4.45 | 3.23 | 0 |
| August | 74.9 | 101 | 51 | 4.38 | 4.95 | .93 | 0 |
| Summer | 74.4 | 103 | 39 | 14.65 | 12.06 | 11.03 | 0 |
| September | 70.3 | 101 | 34 | 3.15 | .60 | 9.69 | 0 |
| October | 59.8 | 90 | 21 | 3.21 | 3.58 | 4.86 | .1 |
| November | 48.0 | 78 | 3 | 4.61 | 3.10 | 8.40 | .5 |
| Fall | 59.4 | 101 | 3 | 10.97 | 7.28 | 22.95 | .6 |
| Year | 57.6 | 103 | −11 | 57.19 | [6] 35.73 | 77.17 | 9.6 |

[1] *Chattanooga:* Average temperature based on an 18-year record, through 1955; highest and lowest temperatures on a 52-year record, through 1930. *Sewanee:* Average temperature based on a 49-year record, through 1942; highest and lowest temperatures on a 35-year record, through 1930.

[2] *Chattanooga:* Average precipitation based on a 77-year record, through 1955; wettest and driest years based on a 77-year record, in the period 1879-1955; snowfall, based on a 52-year record, through 1930. *Sewanee:* Average precipitation based on a 62-year record, through 1955; wettest and driest years based on a 56-year record, in the period 1860-1955; snowfall, based on a 38-year record, through 1930.

[3] Trace. [4] In 1904. [5] In 1929. [6] In 1941.

Sequatchie River. The Cumberland Plateau is sparsely settled.

## Transportation and Markets

Practically all parts of the valley of the Sequatchie River have hard-surfaced highways. Jasper is on State Highway no. 27 and on Federal Highways 41, 64, and 72. South Pittsburg is on Federal Highway 72. Both towns are also on a branch line of the Nashville, Chattanooga and St. Louis Railroad.

Most of the farm products not used locally are shipped or hauled by truck to Chattanooga or Nashville. Much of the coal is shipped by rail, but some is hauled by truck to nearby towns, and a large quantity is moved by barges on the Tennessee River.

In 1950, according to the Federal census, 350 farms were located 0.2 mile or less from an all-weather road, and 75 farms were at least 5 miles from the nearest all-weather road.

Many parts of the Cumberland Plateau are practically inaccessible to automobiles. Two hard-surfaced roads cross the plateau, and there are a few gravel roads. Most of the farms 5 miles or more from an all-weather road were on the plateau.

# *Agriculture*

About 26.5 percent of Marion County, or 86,015 acres, was in farms in 1950. The farms are generally small, and crops are diversified. On many farms the crops are grown mainly for home use. Dairying and the raising of beef cattle have increased. As the number of cattle has increased, better permanent pastures have been established.

The types and sizes of farms, land use, crops, livestock and livestock products, and other subjects related to agriculture are discussed in the following subsections.

## Land Use

The approximate area of Marion County is 324,480 acres. According to the 1950 Federal census, 86,015 acres, or about 26.5 percent, was land in farms. Of the 964 farms that reported, about 45 acres on each farm was improved.

The acreage of land in farms is given below, according to use.

| | Acres in 1949 |
|---|---|
| All cropland | 43,750 |
| Harvested | 25,075 |
| Used only for pasture | 13,001 |
| Not harvested and not pastured | 5,674 |
| All woodland | 37,656 |
| Pastured | 11,063 |
| Not pastured | 26,593 |
| All other land pastured | 1,551 |
| Wasteland and all other land in farms not cropped, pastured, or in woodland | 3,058 |

Large holdings of forest lands are controlled by individuals or corporations for future mining and lumbering purposes.

# general soil map units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## soil descriptions

### 1. Fullerton-Bodine

*Gently sloping to steep, well drained and somewhat excessively drained cherty soils that are more than 5 feet deep over limestone; on high hills and ridges*

The soils in this map unit are on high hills and ridges that have long, smooth slopes and narrow tops. Slopes range from 3 to 45 percent.

These soils make up about 48 percent of the county. About 38 percent of the unit is Fullerton soils, 21 percent is Bodine soils, and 41 percent is soils of minor extent.

Fullerton soils are well drained. They have a surface layer of dark grayish brown or brown cherty silt loam and a subsoil of red cherty clay.

Bodine soils are somewhat excessively drained. They have a surface layer of pale brown cherty silt loam and a subsoil of yellowish and brownish cherty or very cherty silty clay loam.

Of minor extent in this unit are the well drained Minvale soils on benches and foot slopes, the well drained Ennis soils along drainageways and in depressions, and the moderately well drained Roane soils along drainageways and on foot slopes and terraces.

About 40 percent of the acreage of this unit has been cleared. Most of the cleared areas on hillsides are used for pasture. Corn and hay crops are grown in the hollows, on the hilltops, and on the foot slopes. The uncleared acreage consists of rough, steep areas that are generally in mixed hardwoods.

The soils on hilltops and hillsides, which have been cleared, are suitable for pasture. Slope and the hazard of erosion are the main limitations. Overgrazing is a major concern of pasture management because it causes erosion. In most areas, ponds provide water for livestock. The soils are moderately permeable and cherty, and chemical treatment or compaction is required to make the ponds hold water.

The soils in this unit are moderately suited to trees, especially pines and mixed hardwoods. Productivity is medium. The steep slopes restrict the use of logging equipment, and erosion is a hazard along logging trails.

These soils are moderately to poorly suited to urban development. Slope is the main limitation.

### 2. Colbert-Talbott

*Gently sloping to moderately steep, moderately well drained and well drained loamy soils that have a clayey subsoil and depth of 5 feet or less over limestone; on uplands*

The soils in this map unit are on broad, gently sloping to moderately steep uplands. Slopes in the uplands are smooth and short. Most areas of this unit are drained by streams, and some areas are drained by underground caverns. Slopes range from 2 to 25 percent.

These soils make up about 10 percent of the county. About 40 percent of the unit is Colbert soils, 17 percent is Talbott soils, and 43 percent is soils of minor extent.

Colbert soils are moderately well drained. They have a surface layer of brown silt loam and a subsoil of yellowish brown clay that is mottled in shades of brown and gray. The depth to bedrock ranges from 40 to 60 inches.

Talbott soils are well drained. They have a surface layer of yellowish brown silt loam and a subsoil of yellowish red clay. The depth to bedrock ranges from 20 to 40 inches.

Of minor extent in this unit are the moderately well drained Capshaw and Tupelo soils on the stream terraces and the well drained Collegedale soils on the uplands.

About 75 percent of the acreage of this unit has been cleared. Most of the cleared areas are used for hay and

pasture. The uncleared acreage consists of moderately steep areas that are generally in mixed hardwoods or eastern redcedar.

These soils are moderately suited to hay and pasture. Slope, the hazard of erosion, and the clayey subsoil are the main limitations. Ponds provide water for livestock. The soils are slowly permeable and easily hold impounded water.

The soils in this unit are poorly suited to row crops. Most row crops produce low yields and growing them is not generally feasible. Erosion is a hazard if cultivated crops are grown.

In the wooded areas the soils are generally best suited to woodland use. Hardwoods are best suited. Chestnut and hickory are the trees most extensively grown. Productivity is low because the slowly permeable clayey subsoil retards the growth of roots and the movement of water and air through the soil.

These soils are poorly suited to sanitary facilities and building site developments. The slowly permeable clayey subsoil is the main limitation.

### 3. Lily-Lonewood-Ramsey

*Gently sloping to steep, well drained loamy soils that are less than 6 feet deep over sandstone and shale; on the Cumberland Plateau*

The soils in this map unit are on broad sloping uplands and the short and steep side slopes of long ridges. They are dissected by natural drainageways. Slopes range from 2 to 45 percent.

These soils make up about 12 percent of the county. About 40 percent of the unit is Lily soils, 11 percent is Lonewood soils, and 6 percent is Ramsey soils. The rest is soils of minor extent.

Lily soils are generally in broad areas that are dissected by shallow drainageways. They have a surface layer of dark grayish brown and pale brown loam and a subsoil of yellowish brown clay loam. The depth to bedrock ranges from 20 to 40 inches.

Lonewood soils are on broad, smooth plateaus. They have a very dark grayish brown silt loam surface layer and a subsoil that is yellowish brown silt loam in the upper part and yellowish red silty clay loam in the lower part. The depth to bedrock ranges from 40 to 72 inches.

Ramsey soils are on the side slopes of ridges and drains. They have a very dark grayish brown and brown loam surface layer and a subsoil of yellowish brown loam. The depth to sandstone bedrock is less than 20 inches.

Of minor extent in this unit are the well drained Sequoia and Gilpin soils on the shale ridges and the Crossville soils on sandstone uplands.

About 5 percent of the acreage of this unit has been cleared. Most of the cleared areas are used for cultivated crops, hay, and pasture. The uncleared acreage is in mixed hardwoods or pine. Part of the uncleared acreage consists of rough, steep areas that are generally in hardwoods.

The gently sloping and sloping soils, which have been cleared, are well suited to pasture and fairly well suited to cultivated crops. Hay and pasture crops are grown extensively. A small acreage is in cultivated crops.

Erosion is a hazard if cultivated crops are grown. Ponds must be constructed to provide water for livestock, because no permanent streams flow through the area. Pond reservoir areas and embankments must be well compacted during construction to prevent seepage.

The soils in this unit are moderately suited to trees. Mixed oak and hickory are predominant on the smooth uplands. Pine is predominant on the southern exposures. Productivity is medium. There are no limitations to woodland management.

These soils are moderately suited to urban use. Depth to rock is a limitation. Placement of septic tank absorption fields is restricted by the depth to sandstone or shale.

### 4. Bouldin-Gilpin-Allen

*Gently sloping to steep, well drained loamy soils that range from 2 feet to more than 5 feet deep over sandstone, shale, and limestone; on mountainsides and foot slopes*

The soils in this map unit are on gently sloping to steep foot slopes and long, steep mountainsides dissected by steep, deep drainageways. Slopes range from 3 to 60 percent.

These soils make up about 15 percent of the county. About 25 percent of the unit is Bouldin soils, 25 percent is Gilpin soils, and 15 percent is Allen soils. The rest is soils of minor extent.

Bouldin soils generally are on the concave areas immediately below sandstone escarpments and on the side slopes of the drainageways. They have a surface layer of brown stony loam and a subsoil of strong brown and yellowish red stony clay loam. The depth to bedrock is greater than 6 feet.

Gilpin soils are generally on the convex areas of the mountainside. They have a surface layer of dark grayish brown and yellowish brown silt loam and a subsoil of strong brown shaly silt loam. The depth to bedrock ranges from 20 to 40 inches.

Allen soils are on foot slopes at the base of mountains. They have a surface of brown loam and a subsoil of yellowish red and red clay loam. The depth to bedrock is more than 5 feet.

Of minor extent in this unit are the well drained Ramsey and Sequoia soils on convex areas.

About 1 percent of the acreage of this unit has been cleared. Most of the cleared areas are on hillsides and are being used for pasture and garden crops. The uncleared acreage consists of rough, steep areas that

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing and local commercial districts.

This soil is moderately suited to agricultural use. The very slowly permeable clay subsoil retards root growth and the movement of water and air through the soil. Row crops such as corn and soybeans grow poorly on this soil. Pasture plants, such as common bermudagrass, tall fescue, and serecia lespedeza, grow fairly well.

This soil is moderately suited to use as woodland because of moderate available water capacity and the very slowly permeable clay subsoil. Trees that grow on this soil include loblolly pine and shortleaf pine. The clayey subsoil near the surface causes seedling mortality and limits the use of equipment when the soil is wet.

This soil is poorly suited to most urban uses. The very slow permeability, low strength, and high shrink-swell potential are limitations which are difficult to overcome. Engineering works and highway and street construction are limited by the low strength, high shrink-swell potential, and depth to bedrock of this soil.

This soil is in capability subclass IVe and woodland subclass 4c.

**CcD—Colbert-Rock outcrop complex, 5 to 20 percent slopes.** This map unit consists of small areas of sloping and moderately steep Colbert soils and limestone Rock outcrop so intermingled that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 3 to 25 acres in size, and individual areas of each component range from 0.1 acre to about 2 acres. Areas of Colbert soils make up from 35 to 70 percent of the map unit and average about 45 percent. Areas of Rock outcrop make up from 30 to 55 percent of the map unit and average about 40 percent.

Colbert soils are deep and moderately well drained. Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil is yellowish brown plastic clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray except in the upper 10 to 15 inches. The underlying material is olive clay which has gray and brown mottles. Limestone bedrock is at a depth of 55 inches.

Colbert soils are low in natural fertility and organic matter content. They range from slightly acid to strongly acid, except in the layers just above bedrock, which range from slightly acid to mildly alkaline. Permeability is very slow, retarding root growth and the movement of water and air through the soil. The available water capacity is only moderate because of the high clay content in the subsoil. The shrink-swell potential is high.

Rock outcrop is limestone bedrock that is exposed on the land surface. In places, the rocks are level with the surface, and in other places, the rocks extend 2 to 3 feet above the surface.

Included with this unit in mapping are numerous small areas of a soil which is less than 40 inches deep to bedrock. Also included are a few areas of a soil that is less clayey in the upper part of the subsoil. Included soils make up 10 to 15 percent of the unit.

The soils are used mostly as woodland; in a few areas they are used for unimproved pasture.

These soils are poorly suited to farming, woodland, and most engineering uses. The large number of Rock outcrops is the most limiting feature. Other limiting features are very slow permeability, and the high shrink-swell potential. Some tree species that grow on these soils are hickory, chestnut oak, and eastern redcedar.

This complex is in capability subclass VIIs. The Colbert soils are in woodland subclass 4c.

**CdC—Colbert-Urban land complex, 2 to 12 percent slopes.** This map unit consists of deep, moderately well drained, gently sloping and sloping Colbert soils, Urban land, and disturbed areas that have been altered during construction. The areas of soils and Urban land are so intricately mixed or so small that they could not be separated at the scale selected for mapping. Areas of this map unit range from about 5 to 150 acres in size, and individual areas of each component range from 0.1 acre to about 5 acres. Colbert soils make up 25 to 45 percent of each mapped area, Urban land 25 to 45 percent, and disturbed areas 10 to 25 percent.

Typically, Colbert soils have a surface layer of brown silt loam 4 inches thick. The subsoil is yellowish brown clay that extends to a depth of 45 inches. It is mottled in shades of brown and gray, except in the upper 10 to 15 inches. The underlying material is olive clay and has gray and brown mottles. Limestone bedrock is at 55 inches.

Colbert soils are low in natural fertility and organic matter content. They are slightly acid to strongly acid, except in the layers just above bedrock, which range to mildly alkaline. Permeability is very slow, and the available water capacity is moderate. The shrink-swell potential is high.

The Urban land part of this unit is covered by buildings, streets, parking lots, sidewalks, and other structures.

The disturbed areas have been excavated during the installation of utilities, and cut and filled during grading and shaping operations. They have been altered to the extent that individual soils cannot be identified and predictions cannot be made about their suitability for use without an onsite investigation.

Included in mapping are small areas of a soil that is less clayey in the upper part of the subsoil and areas of a somewhat poorly drained soil that has gray mottles within 10 inches of the surface layer. The somewhat poorly drained soil is on level areas and slight depressions. Also included are some areas of a Talbott soil that has limestone bedrock within 40 inches of the surface.

The Colbert soils are used for parks, open space, building sites, lawns, and gardens. They are moderately to poorly suited to lawns, gardens, trees, and shrubs; and they are poorly suited to intensive recreation developments such as football fields, baseball fields, and playgrounds. Colbert soils are poorly suited to building sites, roads, and most other engineering uses. A very slowly permeable clayey subsoil, low strength when wet, and high shrink-swell potential are the major limiting features of these soils.

The Colbert soils are in woodland subclass 4c. They are not assigned to a capability subclass.

**CoC—Collegedale silt loam, 2 to 12 percent slopes.** This deep, well drained, gently sloping and sloping soil is on upland areas in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly short and irregular. They range from 2 to 12 percent but are dominantly 4 to 12 percent. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

The soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity is moderate to high.

Included with this soil in mapping are small areas of a soil which has a silty clay loam surface layer and a brown clayey subsoil. Also included are small areas of severely eroded soils that have a clay surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management. Trees that grow on this soil include loblolly pine and Virginia pine.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of air and water through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass IVe and woodland subclass 3o.

**CoD—Collegedale silt loam, 12 to 25 percent slopes.** This deep, well drained, moderately steep soil is on uplands in the valleys underlain by limestone. It formed in residuum of limestone or limestone interbedded with shale. Slopes are commonly smooth and short. Individual areas range from 2 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil extends to a depth of 80 inches or more. It is yellowish red clay and has mottles in shades of brown and yellow.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed. Permeability is moderately slow, and the available water capacity ranges from moderate to high.

Included with this soil in mapping are soils which have a silty clay loam surface layer and a brown subsoil. Also included are small areas of a soil that has more than 10 percent fragments of chert in the surface layer.

This soil is used mostly for woodland, hay, and pasture. Some areas are used for urban housing.

This soil is only moderately suited to use as woodland because of low natural fertility and the plastic clayey subsoil, which retards root growth. It has no significant limitations to woodland management.

This soil is poorly suited to cultivated crops and moderately suited to hay and pasture. Slope and the plastic clayey subsoil are the major limitations. The clayey subsoil retards root growth and the movement of water and air through the soil. Erosion is a hazard if cultivated crops are grown.

This soil is poorly suited to most urban uses because it has moderately slow permeability and low strength when wet.

This soil is in capability subclass VIe and woodland subclass 3o.

**CrB—Crossville loam, 2 to 5 percent slopes.** This moderately deep, well drained, gently sloping soil is on broad plateaus of the Cumberland Mountains. It formed in materials weathered from acid sandstone. The slopes are smooth and convex. Individual areas range from 2 to 25 acres.

Typically, the surface layer is very dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 28 inches. It is brown and dark yellowish brown loam. The underlying material is yellowish brown loamy sand that is underlain by sandstone bedrock at 32 inches.

This soil is strongly acid throughout, except in areas where the surface layer has been limed. Natural fertility is low, and organic matter content is medium. Permeability is moderate, and the available water capacity is moderate. Tilth is good, and the root zone is moderately deep.

Included with this soil in mapping are small areas of a soil that has a higher clay content in the subsoil. Also included are some areas of Ramsey soil and a few areas of Rock outcrops.

This soil is used mostly for woodland and pasture, but some cultivated crops are grown.

The soils of the survey area are rated in table 7 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

*Camp areas* require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

*Playgrounds* require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

*Paths and trails* for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

*Golf fairways* are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

## wildlife habitat

Willis Gainer, biologist, Soil Conservation Service, helped prepare this section.

Although a large part of Hamilton County has been developed or is densely populated, the wildlife resources are still quite abundant. Good populations of dove and quail are found in the cropland and openland; squirrels are found where mast and den trees such as oaks and hickories have been retained; waterfowl are often abundant along the river and lakes; and deer occupy suitable wooded farmland. The abundance of trees and shrubs around homes and properties provides habitat for a great variety of non-game wildlife, such as songbirds.

About 71 percent, or 196,000 acres, of Hamilton County provides habitat for woodland wildlife, and about 15 percent, or 40,900 acres, of the county provides habitat for openland wildlife.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be

:ablished, improved, or maintained in most places. ›derately intensive management is required for :isfactory results. A rating of *poor* indicates that ›itations are severe for the designated element or kind habitat. Habitat can be created, improved, or aintained in most places, but management is difficult d must be intensive. A rating of *very poor* indicates at restrictions for the element or kind of habitat are ry severe and that unsatisfactory results can be pected. Creating, improving, or maintaining habitat is practical or impossible.

The elements of wildlife habitat are described in the llowing paragraphs.

*Grain and seed crops* are domestic grains and seed-›ducing herbaceous plants. Soil properties and atures that affect the growth of grain and seed crops e depth of the root zone, texture of the surface layer, vailable water capacity, wetness, slope, surface :oniness, and flood hazard. Soil temperature and soil ›oisture are also considerations. Examples of grain and eed crops are corn, wheat, oats, and soybeans.

*Grasses and legumes* are domestic perennial grasses nd herbaceous legumes. Soil properties and features at affect the growth of grasses and legumes are depth f the root zone, texture of the surface layer, available ater capacity, wetness, surface stoniness, flood hazard, nd slope. Soil temperature and soil moisture are also onsiderations. Examples of grasses and legumes are escue, orchardgrass, ryegrass, clover, and alfalfa.

*Wild herbaceous plants* are native or naturally stablished grasses and forbs, including weeds. Soil roperties and features that affect the growth of these lants are depth of the root zone, texture of the surface ayer, available water capacity, wetness, surface :oniness, and flood hazard. Soil temperature and soil oisture are also considerations. Examples of wild erbaceous plants are bluestem, goldenrod, eggarweed, pokeberry, and crotons.

*Hardwood trees* and woody understory produce nuts r other fruit, buds, catkins, twigs, bark, and foliage. Soil roperties and features that affect the growth of ardwood trees and shrubs are depth of the root zone, e available water capacity, and wetness. Examples of ese plants are oak, poplar, cherry, sweetgum, apple, awthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for lanting on soils rated *good* are bush honeysuckle, utumn-olive, and crabapple.

*Coniferous plants* furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, and cedar.

*tland plants* are annual and perennial wild baceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, spikebrush, saltgrass, cordgrass, rushes, sedges, and reeds.

*Shallow water areas* have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

*Habitat for openland wildlife* consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

*Habitat for woodland wildlife* consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, mourning dove, woodpeckers, squirrels, gray fox, raccoon, and deer.

*Habitat for wetland wildlife* consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, shore birds, muskrat, mink, and beaver.

## engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

*Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.*

*The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.*

65 percent of the B horizon. In a few places, boulders as large as 10 feet across are on the surface.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1 to 4. The fine earth fraction is loam or sandy loam.

The B1 horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. The fine earth fraction is loam or sandy loam.

The B2t horizon has hue of 5YR, 7.5YR, or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The fine earth fraction is clay loam or sandy clay loam.

## Capshaw series

The Capshaw series consists of deep, moderately well drained, gently sloping soils. These soils formed in old alluvium or in a layer of alluvium and the underlying clayey residuum on stream terraces and uplands. Slopes range from 2 to 6 percent.

Capshaw soils are on the same landscape as Colbert, Talbott, and Tupelo soils. Colbert soils have more than 60 percent clay in the upper 20 inches of the argillic horizon. Talbott soils are well drained and have a reddish subsoil. Tupelo soils are on lower positions than the Capshaw soils and are somewhat poorly drained. They have mottles of chroma of 2 or less in the upper 10 inches of the argillic horizon.

Typical pedon of Capshaw silt loam, 2 to 6 percent slopes, 1/8 mile north of Ooltewah on Georgetown Road, 100 feet on right:

Ap—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; moderate medium granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

B21t—4 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; thin discontinuous clay films; strongly acid; gradual smooth boundary.

B22t—15 to 24 inches; yellowish brown (10YR 5/6) silty clay; few fine distinct light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B23t—24 to 30 inches; yellowish brown (10YR 5/6) clay; common fine and medium distinct light gray (10YR 7/2) mottles; moderate medium subangular and angular blocky structure; firm; thin continuous clay films; strongly acid; gradual wavy boundary.

B24t—30 to 45 inches; yellowish brown (10YR 5/6) clay; many fine and medium distinct yellowish brown (10YR 5/8) and light gray (10YR 7/2) mottles; moderate medium angular blocky structure; firm; thin discontinuous clay films; common fine and medium black and brown concretions; strongly acid; gradual wavy boundary.

C—45 to 60 inches; mottled grayish brown (2.5Y 5/2), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/4) clay; massive; very firm; many fine and medium black and brown concretions; medium acid.

The depth to limestone bedrock ranges from about 48 to 84 inches. The thickness of the solum ranges from 40 to 60 inches. Reaction is medium acid or strongly acid, except in areas where the surface layer has been limed and in the horizons just above bedrock, which are less acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The B2t horizon has hue of 7.5YR, 10YR, and 2.5Y, value of 4 or 5, and chroma of 4 to 8. The B22t, B23t, and B24t subhorizons have few to many mottles in shades of gray, brown, and red. Texture is silty clay loam, silty clay, or clay in the upper 2 feet and silty clay or clay below.

The C horizon has hue of 2.5Y, value of 5 or 6, and chroma of 0 to 4. In some pedons, it is mottled and has no dominant color. Texture is silty clay or clay.

## Colbert series

The Colbert series consists of deep, moderately well drained, gently sloping to moderately steep soils on uplands. These soils formed in residuum of argillaceous limestone. Slopes range from 2 to 20 percent.

Colbert soils are on the same landscape as Talbott, Capshaw, Collegedale, and Tupelo soils. Capshaw and Collegedale soils differ from Colbert soils mainly by having less than 60 percent clay in the upper 20 inches of the argillic horizon. Collegedale soils are more than 60 inches deep to bedrock. Talbott soils have redder hues in the subsoil. Tupelo soils have gray mottles in the upper part of the subsoil.

Typical pedon of Colbert silt loam, 2 to 12 percent slopes; Morris Hill Road 1 mile past intersection with East Brainerd Road; 50 feet on left, in filed:

Ap—0 to 4 inches; brown (10YR 4/3) silt loam; moderate medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21t—4 to 14 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; few fine roots; thin discontinuous clay films; strongly acid; clear smooth boundary.

B22t—14 to 22 inches; yellowish brown (10YR 5/8) clay; common fine and medium distinct mottles of light gray (10YR 7/2) and light brownish gray (10YR 6/2); moderate medium subangular blocky structure; firm; few fine roots; thick discontinuous clay films; strongly acid; clear smooth boundary.

B23t—22 to 45 inches; yellowish brown (10YR 5/6) clay; common fine and medium distinct strong brown (7.5YR 5/8), light gray (10YR 7/2), and light brownish gray (10YR 6/2) mottles; moderate

medium subangular blocky structure; firm; thin discontinuous clay films; few slickensides; few fine dark concretions; medium acid; clear smooth boundary.

C—45 to 55 inches; olive (5Y 5/4) clay; common medium distinct light gray (10YR 7/2), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) mottles; massive; very firm; few slickensides; many pressure faces; slightly acid.

R—55 inches; limestone bedrock.

The thickness of the solum and the depth to bedrock range from 40 to 60 inches. Reaction ranges from slightly acid to strongly acid, except in the layers just above limestone bedrock, which range from slightly acid to mildly alkaline.

The Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture is silt loam or silty clay loam. In eroded areas, the Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 to 6. Texture is silty clay loam, silty clay, or clay.

The B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8. The upper 10 inches of this horizon is free of mottles, but below this it is mottled in shades of gray and brown.

The C horizon has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 3 to 8. Mottles in shades of brown and gray are present. Some pedons have a B3 horizon which has the same colors and textures as the C horizon.

## Collegedale series

The Collegedale series consists of deep, well drained, gently sloping to moderately steep soils that formed in material weathered from limestone. Slopes range from 2 to 25 percent.

Collegedale soils are on the same landscape as the Talbott, Colbert, and Enders soils. The Talbott and Colbert soils differ from the Collegedale soils mainly by being less than 60 inches deep to limestone bedrock, and the Enders soils differ mainly in being less than 60 inches deep to shale bedrock.

Typical pedon of Collegedale silt loam, 2 to 12 percent slopes, 1 1/2 miles east of Collegedale on Tallant Road, 500 feet on left, and 50 feet east of barn:

Ap—0 to 6 inches; brown (7.5YR 4/4) silt loam; moderate medium granular structure; friable; many fine roots; few fine fragments of chert less than 1 inch in diameter; strongly acid; abrupt smooth boundary.

B21t—6 to 16 inches; yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; very firm; common fine roots; thin continuous clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—16 to 22 inches; yellowish red (5YR 5/6) clay; few fine and medium distinct yellowish brown (10YR 5/6) and olive yellow (2.5Y 6/6) mottles; moderate medium subangular blocky structure; very firm; few fine roots; thin continuous clay skins on faces of peds; strongly acid; clear smooth boundary.

B23t—22 to 32 inches; yellowish red (5YR 5/8) clay; common medium and coarse distinct brownish yellow (10YR 6/6), olive yellow (2.5Y 6/6), and red (2.5YR 5/6) mottles; moderate medium angular blocky structure parting to moderate fine angular blocky; thin discontinuous clay films on faces of peds; strongly acid; gradual smooth boundary.

B24t—32 to 53 inches; yellowish red (5YR 5/8) clay; many medium and coarse faint and distinct red (2.5YR 5/6), light yellowish brown (10YR 6/4), and olive yellow (2.5Y 6/6) mottles; moderate medium angular blocky structure parting to moderate fine angular blocky; very firm; thin discontinuous clay skins on faces of peds; strongly acid; gradual smooth boundary.

B25t—53 to 80 inches; mottled yellowish red (5YR 5/6), light yellowish brown (10YR 6/4), red (2.5YR 5/6), light gray (10YR 7/2), and olive yellow (2.5Y 6/6) clay; weak medium subangular blocky structure; very firm; thin discontinuous clay films on faces of peds; strongly acid.

The thickness of the solum and the depth to bedrock are greater than 60 inches. The content of chert fragments ranges from 0 to 10 percent by volume in each horizon. Most of the fragments are less than 2 inches in diameter. Reaction is strongly acid or very strongly acid throughout, except in areas where the surface layer has been limed.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4, except in severely eroded areas, where the hue is 7.5YR, 2.5YR, and 5YR, the value is 4 or 5, and the chroma is 6. Texture is silt loam, but in severely eroded areas it ranges to silty clay loam or silty clay.

The B2t horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. Some pedons also have hue of 7.5YR in the B21t horizon. Mottles in shades of brown, yellow, and olive are present. Some gray mottles are in the lower part. Texture is silty clay or clay.

## Crossville series

The Crossville series consists of moderately deep, well drained, gently sloping soils on broad plateaus of the Cumberland Mountains. These soils formed in material weathered from acid sandstone. Slopes range from 2 to 5 percent.

Crossville soils are on the same landscape as Lily and Ramsey soils. The Ramsey soils differ from the Crossville soils mainly by having bedrock within 20 inches of the surface. The Lily soils have a lighter colored A horizon and have an argillic horizon.

The thickness of the solum ranges from 60 to 80 inches, and the depth to bedrock is more than 8 feet. The content of chert ranges from 15 to 35 percent by volume in each horizon. Reaction is strongly acid or very strongly acid in each horizon. The depth to the horizon that has fragic properties ranges from 25 to 40 inches.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 3. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. The fine earth fraction of the A horizon is silt loam or loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. The fine earth fraction is silt loam, silty clay loam, or clay loam.

The B2t horizon has hue of 10YR, 7.5YR, or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is mottled in shades of brown, gray, yellow, and red except in the B21t horizon, which has no mottles. Some subhorizons are mottled without a dominant color. The fine earth fraction is silty clay loam or clay loam except in the lower part, which is clay in some pedons.

## Staser series

The Staser series consists of deep, well drained, nearly level soils that formed in alluvium on flood plains. Slopes range from 0 to 3 percent.

Staser soils are on the same landscape as Hamblen and Sequatchie soils. Hamblen soils differ from Staser soils mainly by being moderately well drained. Sequatchie soils are on terraces and have an argillic horizon.

Typical pedon of Staser loam, 500 feet south of Moccasin Bend Psychiatric Hospital, on the west side of the Tennessee River near Interstate Highway 24:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) loam; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

A12—10 to 30 inches; dark brown (10YR 3/3) loam; moderate medium granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

B2—30 to 60 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; very friable; few fine roots; slightly acid.

The thickness of the mollic epipedon ranges from 24 to 40 inches. It is slightly acid or mildly alkaline. The content of chert fragments and pebbles ranges from 0 to 10 percent in the upper 40 inches and from 0 to 30 percent below.

The A horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3. It is loam or fine sandy loam.

The B2 horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 3 or 4. Some pedons have mottles in shades of brown and gray in the lower part of the horizon. Texture is loam or fine sandy loam.

## Talbott series

The Talbott series consists of moderately deep, well drained, gently sloping to moderately steep soils that formed in materials weathered from limestone. Slopes range from 2 to 25 percent.

Talbott soils are on the same landscape as Capshaw, Colbert, and Collegedale soils. Capshaw soils differ from Talbott soils mainly by being moderately well drained and having a solum more than 40 inches thick. Colbert soils are moderately well drained, have more than 60 percent clay in the particle-size control section, and have montmorillonitic mineralogy. Collegedale soils have a solum more than 60 inches thick and low base saturation.

Typical pedon of Talbott silt loam, 2 to 12 percent slopes, 1 1/4 miles on Morris Hill Road from the intersection of East Brainerd Road and Morris Hill Road, 50 feet on left:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; moderate fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B21t—6 to 10 inches; yellowish red (5YR 4/6) clay; few medium distinct brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; firm; many fine roots; thick discontinuous clay films; strongly acid; gradual smooth boundary.

B22t—10 to 24 inches; yellowish red (5YR 5/8) clay; common fine and medium distinct yellowish brown (10YR 5/4) mottles; moderate medium angular blocky structure; firm, plastic; few fine roots; thick continuous clay films; strongly acid; gradual smooth boundary.

B23t—24 to 36 inches; yellowish brown (10YR 5/6) clay, common fine and medium distinct yellowish red (5YR 4/6) mottles; strong medium and coarse angular blocky structure; very firm, plastic; thick continuous clay films; medium acid; gradual smooth boundary.

R—36 inches; limestone bedrock.

The depth to bedrock and the thickness of the solum range from 20 to 40 inches. Reaction is medium acid or strongly acid, except in the layer near bedrock and in areas where the surface layer has been limed, which are less acid. The content of rock fragments ranges from 0 to 10 percent by volume in each horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 6. Texture is silt loam except in severely eroded areas, where it is silty clay loam or clay.

The B2t horizon has dominant hue of 5YR, but in some pedons it has hue of 7.5YR or 2.5YR and ranges to 10YR in the lower part. The B2t horizon has value of 4 or 5 and chroma of 4 to 8. Mottles are few to many in shades of yellow, brown, or red. Texture is clay or silty clay.

The B3 horizon, where present, has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. Few to many mottles in shades of brown, red, and gray are in the B3 horizon. Texture is silty clay or clay.

## Tupelo series

The Tupelo series consists of deep, somewhat poorly drained, nearly level and gently sloping soils that developed in clayey alluvium or in a thin layer of alluvium and the underlying clayey residuum. These soils are on stream terraces, foot slopes of ridges, and in depressions on uplands. Slopes range from 0 to 3 percent.

Tupelo soils are on the same landscape as Colbert and Capshaw soils. Colbert soils are on slightly higher elevations than Tupelo soils, are moderately well drained, and have more than 60 percent clay in the upper 20 inches of the argillic horizon. Capshaw soils are moderately well drained and do not have mottles of chroma of 2 or less in the upper 10 inches of the argillic horizon.

Typical pedon of Tupelo silt loam in an area off East Brainerd Road, 500 feet from Mackey Creek and 100 feet north of private road:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light olive brown (2.5Y 5/4) mottles; weak fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.

B1—8 to 16 inches; yellowish brown (10YR 5/6) silt loam; few fine faint light olive brown (2.5Y 5/4) mottles; moderate medium subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

B21t—16 to 26 inches; light olive brown (2.5Y 5/4) silty clay; many coarse faint yellowish brown (10YR 5/6) and common fine distinct light brownish gray (2.5Y 6/2) mottles; moderate medium subangular blocky structure; firm; few fine roots; thin continuous clay films; gradual wavy boundary.

B22t—26 to 32 inches; pale olive (5Y 6/3) clay; many medium distinct light brownish gray (2.5Y 6/2) and dark brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; firm; thick continuous clay films; medium acid; gradual smooth boundary.

B23t—32 to 48 inches; light brownish gray (2.5Y 6/2) clay; many fine and medium distinct yellowish brown (10YR 5/6) and brown (7.5YR 5/4) mottles; moderate medium angular blocky structure; firm; thick continuous clay films; medium acid; gradual smooth boundary.

Cg—48 to 60 inches; gray (N 6/) clay; many medium distinct strong brown (7.5YR 5/6) mottles; massive; very firm; slightly acid.

The thickness of the solum ranges from 35 to 60 inches. The depth to limestone bedrock ranges from 40 to 70 inches or more. Reaction is slightly acid to strongly acid except in horizons immediately above the limestone bedrock where it ranges to mildly alkaline.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Texture is silt loam or silty clay loam.

The B1 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. Texture is silt loam or silty clay loam. The B21t and B22t horizons have hue of 5Y to 10YR, value of 5 or 6, and chroma of 3 to 8 and are mottled in shades of gray, brown, and olive. Texture is clay or silty clay. The B23t horizon has colors and textures that are similar to those of the B22t. In some pedons it is dominantly gray.

The Cg horizon and B3g horizon, where present, are dominantly gray mottled in shades of brown, olive, and yellow.

## Waynesboro series

The Waynesboro series consists of deep, well drained, gently sloping to moderately steep soils that formed in thick deposits of old alluvium on high stream terraces. The alluvium ranges from 4 to 10 feet in thickness and is underlain by residuum of limestone or shale. Slopes range from 2 to 25 percent.

Waynesboro soils are on the same landscape as Dewey and Etowah soils. Dewey soils differ from Waynesboro soils mainly by having a clayey B horizon that contains less than 20 percent sand and has fragments of chert in the lower part. Etowah soils have dark reddish brown A and B horizons that contain less than 35 percent clay.

Typical pedon of Waynesboro loam, 2 to 8 percent slopes; take Highway 58 to intersection of Grasshopper Road, left on Grasshopper Road 300 feet, then 250 feet on left in field:

Ap—0 to 3 inches; brown (7.5YR 4/4) loam; weak fine granular structure; friable; common fine and medium roots; medium acid; abrupt smooth boundary.

B1—3 to 9 inches; yellowish red (5YR 5/8) loam; weak fine subangular blocky structure; friable; common fine roots; strongly acid; gradual smooth boundary.

B21t—9 to 19 inches; red (2.5YR 5/8) clay loam; weak fine subangular blocky structure; friable; few fine roots; thin patchy clay films; strongly acid; gradual smooth boundary.

B22t—19 to 35 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B23t—35 to 60 inches; red (2.5YR 4/6) clay; few fine distinct strong brown (7.5YR 5/8) mottles; friable; thin continuous clay films; strongly acid.

The depth to bedrock and the thickness of the solum are greater than 60 inches. Reaction is strongly acid,

Site No. TND 100842343

Ref. No. 7

DIVISION OF SOLID WASTE MANAGEMENT - SUPERFUND SECTION
SOUTHEAST Tennessee Divisions
Trip Report

OWNER/FACILITY Howard High School Landfill (City of Chattanooga)

TYPE FACILITY Landfill, Public School ACCT. # 33606

COUNTY Hamilton CITY Chattanooga DATE 9-29-87

PURPOSE OF VISIT

INDIVIDUALS CONTACTED Mr. Pat Janardanan (City Engineer's Office) telephone number: 757-5450

OTHER DSWM PERSONNEL PRESENT Tony Damiano

WEATHER CONDITIONS Warm 75°, cloudy

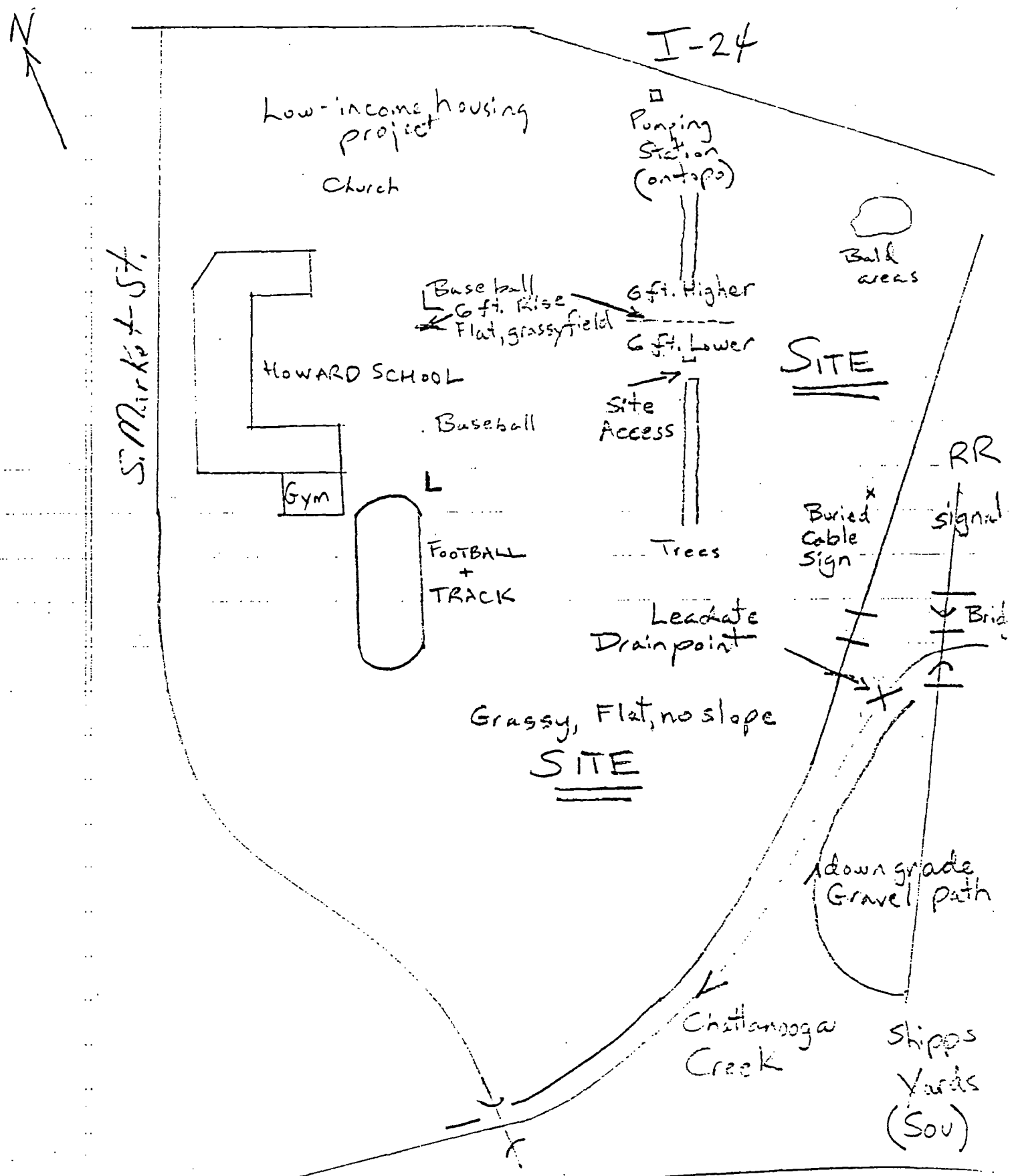
SAMPLES COLLECTED YES ____ NO XX
PHOTOS TAKEN YES XX NO ____

COMMENTS AND DISCUSSION: The site is primarily east of the present school complex, which was built around 1959. The site may or may not include parts of the land where sports is played or the school itself. To the east and south of the site are railroad tracks. North of the site is Highway I-24.

Mr. Janardanan had given implied consent to Caruthers and Damiano earlier for access since the site is mainly behind the school and not directly adjacent and is not fenced off to the public. Dr. Hendrix's office was called twice without FDM reaching him; he is the acting superintendent of city schools.

The site is essentially flat with a 95% vegetative cover and 5% bald areas. The total area is 40 acres. Vegetation is mostly grass, weeds, and flowers, with some trees and bushes.

INSPECTOR'S SIGNATURE F.D. Miller
DATE 10/13/87




Howard School Landfill
#35606
9/29/87 FDM

Site No. TND 100842343

Ref. No. 8

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | | DATE |
|---|---|---|
| | | |

DATE: October 5, 1987

TO: SIU Files

FROM: Ferman D. Miller

SUBJECT: Details of Telecon - pertinent site information

On 9-28-87 at 3:00 a.m./p.m. James H. Templeton (1) of Chattanooga Public Works(retired) contacted/was contacted by Ferman D. Miller of TN Division of Superfund by telephone regarding city dumps.

Details of conversation:
Wayne S. Everett said G.S. Caruthers had called Mr. Templeton earlier. Mr. Templeton indicated to FDM that there had been some confusion about the Old Walker Dump location. He remembered Old Walker or Astec as operating in the 30's or early 40's for garbage only. He did not know anything about the Chattanooga Glass Dump. The Howard High Dump was operating around 1965-70 receiving demolition debrish & brush. As a referral on this subject, Mike Apple (DSWM) Nashville and his predecessor were named.

| FROM | DATE |
|---|---|
| TO | |

(1) Telephone number: 344-4089 (in Harrison, Highway 58 area)

Site No. TND 100842343

Ref. No. 9

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | Hamilton Co. File | |
| | | |
| | | |
| | | |
| | | |

DATE: November 26, 1986

TO: SIU Files

FROM: G. S. Caruthers

SUBJECT: Details of Telecon-pertinent site information

On November 25, 1986 at 10:15 a.m. Ed Short of Miller Drilling Company was contacted by G. S. Caruthers of TDSF/SIU by telephone regarding well usage in the Chattanooga urban area.

Details of Conversation:

Mr. Short said that Miller Drilling Company was one of the largest and most active well drilling companies in the Chattanooga area. He stated that there was abundant ground water in the Chattanooga area and that except for two particular areas, the groundwater was generally of good quality. The two exceptions are the areas of Alton Park (near Chattanooga Creek) and the area near downtown and around the Farmers Market site. Mr. Short related that in one instance they were drilling a well in the Alton Park area and struck water which was "black, smelly and highly corrosive". He said it "ate up the pump impeller" and "burned my skin when I got it on me."

Mr. Short stated that he knew of only one household in the Chattanooga urban area (that area served by TAWC) which currently uses well water for domestic purposes, that being:

J. E. Caruthers
4506 McCahill Road
Chattanooga, TN 37415

This residence is in the Red Bank section, on the north side of the Tennessee River, and not within the 3 mile radius area of any site currently under investigation by TDSF/SIU.

Mr. Short stated that there were numerous private wells in the urban area of Chattanooga but that they were not actually used for drinking except in the instance noted above. He said that a common use was as a water supply for heat exchangers, air conditioning systems, heat pumps, etc., as well as wash water, gardens, and sanitation systems.

Mr. Short stated that there are many industrial process water wells on which the using industries depend and that he was quite concerned with the severely contaminated groundwater in some parts of Chattanooga. He said that he would be glad to help TDSF/SIU in any further investigations.

GC/cw SF D-1

| FROM | DATE |
|---|---|
| | 8/26 |
| TO | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PH-000
SR 377

Site No. TND 100842343

Ref. No. 10

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | Hamilton Co File | |
| | | |
| | | |
| | | |
| | | |

DATE: 25 November 1986

TO: SIU Files

FROM: G.S. Caruthers

SUBJECT: Details of Telecon - pertinent site information.

On 25 November 86 at 0945 a.m., G.S. Caruthers of Tenn. Superfund Division contacted Bob Burrell of Tenn. - American Water Co. by telephone regarding well use in the Chattanooga urban area.

Details of conversation:

Mr. Burrell is in charge of the cross-connection monitoring program for TAWC. He did not know of any households which were using well water for domestic purposes. There are numerous private wells in the Chattanooga urban area, according to Mr. Burrell, but they are used only for watering gardens, washing cars, etc. or are commercial or industrial process water wells. TAWC's cross-connection program actively discourages household use of well water by prohibiting interconnections between private and public water supply systems, Mr. Burrell said.

GSC/ib

| FROM | DATE |
|---|---|
| | 26 Nov |

TO

| | |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PH-000
SR 377

Site No. TND 100842343

Ref. No. 11

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| SIU | file | |
| | | |
| | | |
| | | |
| | | |

DATE: August 29, 1986

TO: Chattanooga Creek File

FROM: G. S. Caruthers

SUBJECT: Trip Report

On August 28, 1986, I conducted a water use survey in the Rossville, Georgia area. The area involved consists of areas of Rossville and Walker County, Georgia which lie within a 3 mile radius of several sites in the Chattanooga Creek floodplain.

Conversation with Henderson Wellborn, superintendent of the Walker Co. Water and Sewerage Authority in Flintstone, Georgia, indicates that all areas of the county outside the cities are served by that utility. Mr. Wellborn stated that their lines now run all the way to the Tennessee state line west of Rossville and meet but do not interconnect with those of the city of Rossville. The small residential area near the state line outside the city limits of Rossville is served by WCWSA, according to Mr. Wellborn. He stated that all water distributed by WCWSA comes from Crawfish Springs Lake near Chickamauga, Georgia, about 7 miles south of Rossville and well outside the three-mile radius area. Mr. Wellborn said he knew of no private wells currently in use in the affected area.

Mr. Lee Britton, superintendent of the Rossville Public Works Department, was not available, but conversation with employees at the PWD maintenance lot confirmed that all areas were covered by either the Rossville or Walker County water systems. Rossville obtains its water from Tennessee-American Water Company in Chattanooga.

The trip was concluded with a brief reconnaissance of selected sites in the Chattanooga Creek area to ascertain conditions to be encountered in conducting site inspections which will probably be scheduled in FY 1987.

GSC/djk

| FROM | DATE |
|---|---|
| | |
| TO | |

Site No. TND 100842343

Ref. No. 12

DEC 29 1986

Tennessee-American Water Company
An American Water Works System Company

P.O. Box 6338 • Chattanooga, Tennessee 37401 • Phone 615-755-7600

Richard T. Sullivan, Vice President
Daniel R. Bailey, Business Manager
W. J. Hobbs, Operations Manager

December 19, 1986

File 130-384

Mr. Gordeon Caruthers
State Super Fund Division
Tennessee Department of Health
& Environment
Fourth Floor Customs House
701 Broadway
Nashville, TN 37219

Dear Mr. Caruthers:

We are happy to supply you with a list of the known wells that exist within the Tennessee-American Water Company system. Bob Burrell, our Cross Connection Inspector, has compiled the list based upon his knowledge from his inspections of the industries in Chattanooga and company records of residential wells:

COMMERCIAL

1) Dixie Yarns Mills
100 South Watkins Street
Two wells-Holtzclaw Avenue

2) Standard-Coosa-Thatcher Company
Mapel Street
Rossville, Georgia
Two wells-location, across street in practice field for Rossville Boys

3) Dixie Yarns
Lupton City Spinning Mill
Three wells - east of building

4) Southern Cellulose Products, Inc.
105 W. 45th Street
One well-38th Street location

5) Southern Champion Tray
200 Compress Street
One well-north of building

6) Chattanooga Paper Board Company
2101 Rossville Avenue
Two wells-west side of mill

7) Chattanooga Glass Company
401 W. 45th Street
One well-behind guard building

RESIDENTIAL

1) 4101 Cromwell Road
Uses well water for outside activities.
Not for home use.

2) 4103 Cromwell Road
Uses well water for outside activities.
Not for home use.

3) (b) (6)
4105 Caine Lane
Well is capped.
They are using water from Tennessee-American Water Company

4) (b) (6)
4022 Caine Lane
Well is capped.
Using water from Tennessee-American Water Company

5) (b) (6)
4101 Caine Lane
Well capped
Using water from Tennessee-American

6) (b) (6)
4027 Caine Lane
Well capped
Using water from Tennessee-American

7) (b) (6)
4017 Caine Lane
Well capped
Using water from Tennessee-American

8) (b) (6)
4023 Caine Lane
Well capped
Using water from Tennessee-American

9) (b) (6)
4014 Caine Lane
Well capped
Using water from Tennessee-American

10) (b) (6)
4009 Caine Lane
Well capped
Using water from Tennessee-American

We are also sending you a copy of the Tennessee Water Well Driller's Report from Kittle Drilling Company on wells that have been drilled by them in 1986. We have been in contact with another local well drilling company but have not received any response from them concerning the wells they have drilled.

If we can be of further assistance to you please do not hesitate to contact us.

Very truly yours,

W. J. Hobbs
Operations Manager

WJH:mb
Attachment

Site No. TND 100842343

Ref. No. 13

Sites 25?, 26, 35, 36 + 3

WINFIELD DUNN
GOVERNOR

Eugene W. Fowinkle, M.D., M.P.H.
Commissioner

STATE OF TENNESSEE
DEPARTMENT OF PUBLIC HEALTH
NASHVILLE 37219

August 18, 1972

Subject: Preliminary geologic review of trash sites, City of Chattanooga, (visited July 7, 1972).

Site #1: Howard High School Site ~~26~~ 33606

Location: Chattanooga Quad (105-SE). Southeast of the intersection of South Market Street and Interstate.

Topography: In and near an old meander bend of Chattanooga Creek. About 25 to 30 feet maximum relief. The straightening of Chattanooga Creek and partial filling of the low portions has eliminated most of the standing water shown on the topographic map. Marshy or swampy conditions (willows and cattails) now prevail in the lower portions.

Bedrock: The Geologic Map of the Chattanooga Quadrangle, 1964, by Finlaupon, and others, indicates that the Knox Group, undifferentiated, underlies the eastern half of the proposed area. A thrust fault extends north-south through the center of the site. The Knox Group (Dolomite) has been thrusted up and over younger Ordovician strata that underlie the western half of the site. The upper part of the Chickamauga Limestone, which occurs in the western sector, consists of fine to medium-grained, thin to medium-bedded limestone with very minor chert. The bedrock of both formations is probably extensively fractured by the faulting. Solution cavities in these carbonates are likely. Numerous large sinkholes occur in a half mile radius of the site. The closest one is present across South Market Street from Howard High School.

Unknown thicknesses of alluvium deposited by Chattanooga Creek probably occur over the Knox and Chickamauga units.

Weathering: Extent: The extent of weathering of the bedrock at this site is not known. No outcrops were observed.

Geometry: May be highly irregular since these limestone and dolomite units commonly weather into cutter and pinnacle development. The presence of numerous sinkholes in the vicinity of the site suggest that extensive systems of solutional cavities exist in the bedrock.

Composition: Probably cherty clay over both units; more chert in residuum above the Knox Group. The nature of the unconsolidated alluvium is not known. Gravel and boulders of chert, sandstone, and other resistent types of rock probably occur in the old meander bend of Chickamauga Creek.

Hydrology: Surface: Generally poorly drained floodplain. Marshy conditions present. A connection of the old meander to Chattanooga Creek exists, but its location is uncertain at this time. Apparently the straightening and channeling of the creek has lowered the water level at the site.

Subsurface: Water levels in Chattanooga Creek and those below the site are probably similar. Straightening of the creek may have lowered the water table slightly. However, rise of the present water course (Chattanooga Creek) may correspond to similar rise of the water table in the site. The effect of the fill material (shale) upon water levels is not known.

Floodplain: According to Floods on Tennessee River, Chattanooga and Dry Creeks and Stringers Branch, Vicinity of Chattanooga, Tennessee, 1959, by T.V.A., the site is subject to flooding. However, the straightening of Chattanooga Creek may have changed the flood profile here. Additional information is required to determine the potential for overflow of the creek into this area.

Recommendations: It is my understanding that only inert materials (brush, wood, rock (demolition materials), and not putrescible items, such as garbage, paper, and other types of refuse, stoves, car bodies, etc.) will be allowed in this site. The use of the site for these materials is dependent upon data that indicates the old meander of Chattanooga Creek is not subject to flooding. Also, rise of the water table corresponding to high levels of the creek may make the site undesirable for landfilling of these materials. No wastes should be placed in water. It is absoutely vital that tight control of the type of solid wastes be exercised here. If other types of wastes are allowed, then resultant leachate could enter Chattanooga Creek via surface connections or by subsurface flow in the ground water table. Conditions similar to other dumps along naviagable streams in the vicinity of Chattanooga could very easily result if proper control is not exercised.

Periodic covering of the combustible wastes (wood, brush, etc.) will require soil or residuum. The source of these here is questionable.

The marshy areas should be avoided, if possible. Perhaps only dirt and rock could be placed here. But, there should be no paper, garbage, etc. placed in these areas. These should be directed to a registered sanitary landfill.

Three other properties proposed for "trash" were investigated. These were found to be less suitable than Howard High School (Site #1). A brief summary of these will now follow.

Site #2: Evans Property

Location: Chattanooga Quad. East of Williams Street, South of 33rd and North

Site No. TND 100842343

Ref. No. 14

U.S. EPA REGION IV

# SDMS

## Unscannable Material Target Sheet

DocID: 10086045 Site ID: IND 100 824 2343

Site Name: Howard High School Dump

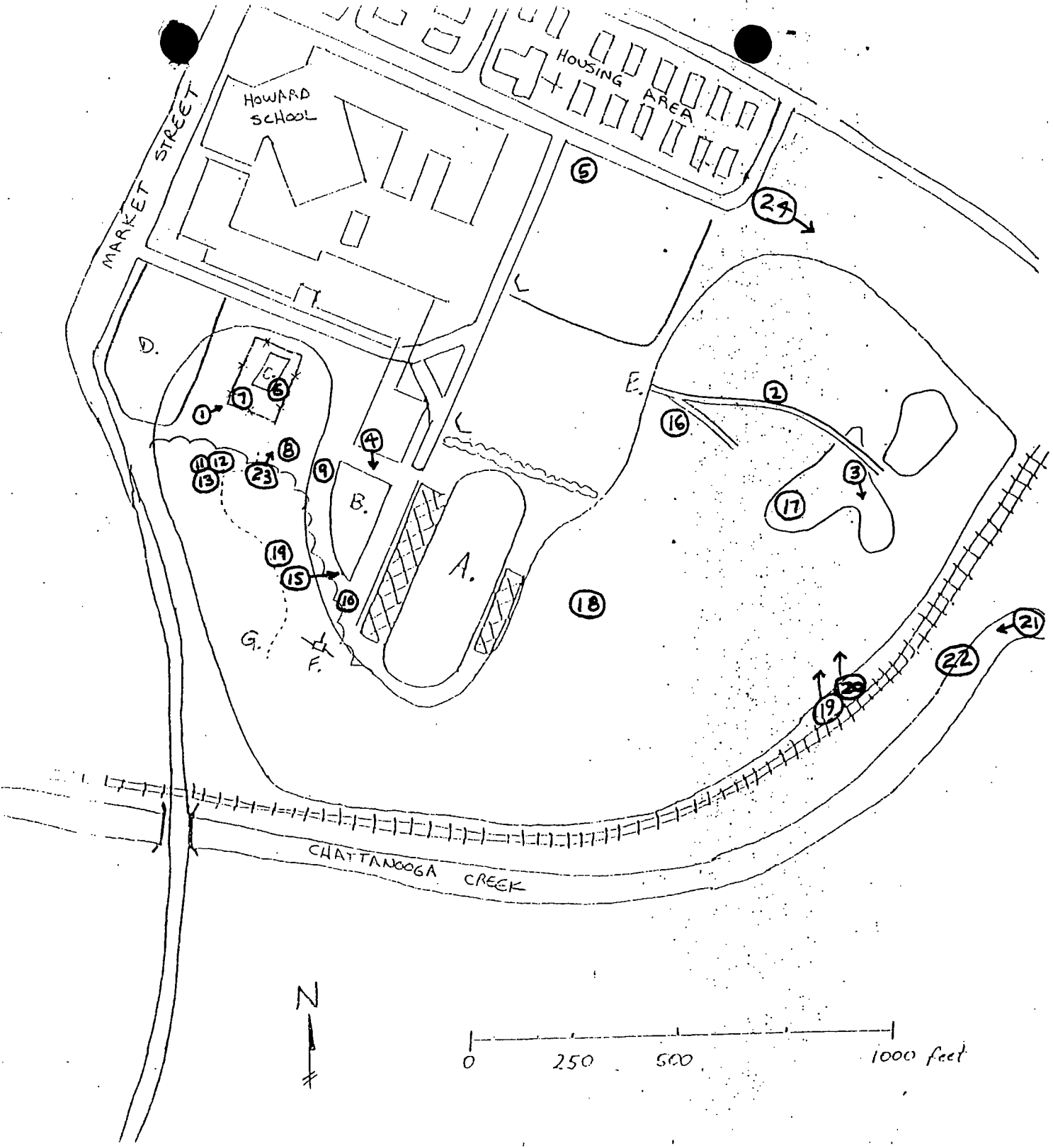
**Nature of Material:**

| | | | |
|---|---|---|---|
| Map: | ✓ | Computer Disks: | |
| Photos: | | CD-ROM: | |
| Blueprints: | | Oversized Report: | |
| Slides: | | Log Book: | |

Other (describe):

Amount of material: 2 Maps

***Please contact the appropriate Records Center to view the material.***




# HOWARD HIGH SCHOOL DUMP

*Photo view locations*

A. FOOTBALL FIELD

B. PRACTICE FIELD

C. DAY CARE CENTER

D. PARKING AREA

E. APPROACH ROAD INTO LANDFILL FROM BASEBALL FIELD

F. DRAINAGE CULVERT

G. NATURE TRAIL IN BIOLOGICAL AREA.

U.S. EPA REGION IV

# SDMS

## Unscannable Material Target Sheet

DocID: 10086045 Site ID: TND100842343

Site Name: Howard High School Dump

**Nature of Material:**

| | | | |
|---|---|---|---|
| Map: | | Computer Disks: | |
| Photos: | | CD-ROM: | |
| Blueprints: | | Oversized Report: | |
| Slides: | | Log Book: | |

Other (describe): 4-Mile Radius site Map

Amount of material:

***Please contact the appropriate Records Center to view the material.***

**Site Name:** Howard High School Dump

**Site Number:** TND 100842343

Appendix C. Site Photographs

U.S. EPA REGION IV

# SDMS

## Unscannable Material Target Sheet

DocID: 10086045 Site ID: TND 100842343

Site Name: Howard High School Dump

**Nature of Material:**

| | | | |
|---|---|---|---|
| Map: | | Computer Disks: | |
| Photos: | ✓ | CD-ROM: | |
| Blueprints: | | Oversized Report: | |
| Slides: | | Log Book: | |

Other (describe):

Amount of material: 24 Photos

***Please contact the appropriate Records Center to view the material.***

## M.2 - SITE MAINTENANCE FORM

ACTION: _

EPA ID : TND100842343

SITE NAME: HOWARD HIGH SCHOOL LANDFILL SOURCE: T

STREET : 2500 S MARKET ST CONG DIST: 03

CITY : CHATTANOOGA ZIP: 37408

CNTY NAME: HAMILTON CNTY CODE : 065

LATITUDE : 35/01/25.7 LONGITUDE : 085/18/24.0

LL-SOURCE: R LL-ACCURACY:

SMSA : 1560 HYDRO UNIT: 06020001

INVENTORY IND: Y REMEDIAL IND: Y REMOVAL IND: N FED FAC IND: N

NPL IND: N NPL LISTING DATE: NPL DELISTING DATE:

SITE/SPILL IDS:

RPM NAME: RPM PHONE: - -

SITE CLASSIFICATION: SITE APPROACH:

DIOXIN TIER: REG FLD1: REG FLD2:

RESP TERM: PENDING ( ) NO FURTHER ACTION ( ) PENDING (_) NO FURTHER ACTION (_)

ENF DISP: NO VIABLE RESP PARTY ( ) VOLUNTARY RESPONSE ( )
ENFORCED RESPONSE ( ) COST RECOVERY ( )

SITE DESCRIPTION:

00154

M.2 - PROGRAM MAINTENANCE FORM

SITE: HOWARD HIGH SCHOOL LANDFILL

EPA ID: TND100842343 PROGRAM CODE: H01 PROGRAM TYPE:

PROGRAM QUALIFIER: ALIAS LINK :

PROGRAM NAME: SITE EVALUATION

DESCRIPTION:

ACTION:

001155

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: HOWARD HIGH SCHOOL LANDFILL
PROGRAM: SITE EVALUATION

EPA ID: TND100842343 PROGRAM CODE: H01 EVENT TYPE: DS1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: E * _ ___ _ *

EVENT NAME: DISCOVERY STATUS: * _____ _ *

DESCRIPTION:

* _____ *
* _____ *
* _____ *
* _____ *

| ORIGINAL | CURRENT | ACTUAL | | | |
|---|---|---|---|---|---|
| START: | START: | START: | __/__/__ | __/__/__ | __/__/__ |
| COMP : | COMP : | COMP : 05/01/84 | __/__/__ | __/__/__ | __/__/__ |

HQ COMMENT:

* _____ *

RG COMMENT:

* _____ *

| COOP AGR # | AMENDMENT # | STATUS | STATE % |
|---|---|---|---|
| | | | 0 |

* _____ _____ ___ ___ *

M.2 - EVENT MAINTENANCE FORM

* ACTION: _ *

SITE: HOWARD HIGH SCHOOL LANDFILL
PROGRAM: SITE EVALUATION

EPA ID: TND100842343 PROGRAM CODE: H01 EVENT TYPE: PA1

FMS CODE: EVENT QUALIFIER : EVENT LEAD: S * _ ___ _ *

EVENT NAME: PRELIMINARY ASSESSMENT STATUS: * _____ _ *

DESCRIPTION:

THIS SITE HAS NO TARGET POPULATION THE SITE INSPECTION *
SHOULD BE FUNDED BY THE STATE. *

| ORIGINAL | CURRENT | ACTUAL | | | |
|---|---|---|---|---|---|
| START: | START: | START: | __/__/__ | __/__/__ | __/__/__ |
| COMP : | COMP : | COMP : 11/05/86 | __/__/__ | __/__/__ | __/__/__ |

HQ COMMENT:

RG COMMENT:

| COOP AGR # | AMENDMENT # | STATUS | STATE % |
|---|---|---|---|
| | | | 0 |

00157

## M.2 - REGIONAL UTILITY MAINTENANCE FORM

SITE: HOWARD HIGH SCHOOL LANDFILL

EPA ID: TND100842343

REG CODE: HSCM-01 * ACTION: _ *

DESCRIPTION: MIXED MUNCIPAL WASTE * _____ *

* _____ *

DATE1: * __/__/__ *

DATE2: * __/__/__ *

DATE3: * __/__/__ *

FREE FIELD: * _____ *

REG CODE: OSIL-01 * ACTION: _ *

DESCRIPTION: LANDFILL * _____ *

* _____ *

DATE1: * __/__/__ *

DATE2: * __/__/__ *

DATE3: * __/__/__ *

FREE FIELD: * _____ *

REG CODE: 4NFA-01 * ACTION: _ *

DESCRIPTION: NO FURTHER ACTION * _____ *

* _____ *

DATE1: * __/__/__ *

DATE2: * __/__/__ *

DATE3: * __/__/__ *

FREE FIELD: * _____ *

00158

# Potential Hazardous Waste Site

## PRELIMINARY ASSESSMENT

HOWARD HIGH SCHOOL LANDFILL CHATTANOOGA, TENNESSEE TND 100842343

PRELIMINARY ASSESSMENT

HOWARD HIGH SCHOOL LANDFILL

CHATTANOOGA, HAMILTON COUNTY, TENNESSEE

TND 100842343

## I. HISTORY OF SITE

The Howard High School Landfill is located on South Market Street, ½ mile south of Interstate 24 behind Howard High School. It consists of some 40 acres of low land remaining after Division of Chattanooga Creek in 1969 during a railroad relocation project. The new Louisville and Nashville Railroad embankment at an elevation of 665 feet forms the southern and eastern boundary of the landfill. The Marice Poss Homes, a multiple-family housing development, and Howard School facility, lie north of the landfill. The landfill was to be used to reclaim the land left by the Creek Diversion and was to be used as a brush and demolition refuse disposal site only but photo documentation by the Division of Water Management shows that industrial sludges were disposed of, out of regulation at the landfill.

## II. NATURE OF HAZARDOUS MATERIALS

Amount and composition of the sludges are unknown but it any hazardous substances are present since the site lies in an old diverged area of Chattanooga Creek and a fault runs through the site and any migration of contaminates could follow the fault to groundwater. The close proximity of the site to Chattanooga Creek and the drainage system under the site could contribute to surface migration of any hazardous substances than may be at the landfill.

## III. DESCRIPTION OF HAZARDOUS CONDITIONS, INCIDENTS AND PERMIT VIOLATIONS.

In a new site discovery form by Michael J. Higgs he states that the Division of Water Management has photo documentation of industrial sludges dumped at the landfill. Also according to an office memo sent by Mr. Charles A. Steele to Mr. V. Wayne McCoy he states that paper cartons, household garbage, and metal drums had been dumped at the landfill. All of the above substances are contained on the prohibited materials list contained in the certificate of compliance with State Water Quality Standards issued to the landfill.

## IV. ROUTES OF CONTAMINATION

The Landfill lies adjacent to Chattanooga Creek and is underlain by a storm drainage system that empties into Chattanooga Creek, any leachate from the landfill could be carried to the Creek by either surface run-off or by the storm drainage system. A thrust fault runs through the center of the landfill and could act as a route for direct migration to groundwater if vertical migration of any possible hazardous substances occurs.

## V. POSSIBLE AFFECTED POPULATION AND RESOURCES

Possible surface and groundwater contamination from migration if hazardous substances are present. No drinking wells are in the vicinity and all drinking water is supplied by Chattanooga Municipal Utilities Service which has its source at River Mile 465.3 which is 3 miles upstream from the mouth of Chattanooga Creek. The immediate area is an urban residential area of Chattanooga, Tennessee. The population of Hamilton County in the 1980 Census was 287,740.

## VI. RECOMMENDATIONS AND JUSTIFICATIONS

There is no evidence that past waste handling practices at the landfill are affecting the population or environment. However due to the observed dumping of prohibited materials and the unknown composition of the waste a low priority is given to the landfill and should be sampled on a time available basis.

## VII. REFERENCE TO SUPPORTING DATA SOURCES


1. New site discovery information, Nashville Central Superfund file.

2. Preliminary geologic review of trash sites, City of Chattanooga, Nashville Central Superfund files.

3. Office memorandum from Charles A. Steele to V. Wayne McCoy, Nashville Central Superfund fils.

4. Certificate of compliance with water quality standards, Nashville Central Superfund files.

5. Field notes of Michael J. Higgs and Margaret E. Dew dated 1-25-84, Nashville Central Superfund files.

6. Chattanooga, Tennessee 7½ minute quadrangle topographic map (1969)

7. Fort Oglethorpe, GA - Tennessee 7½ minute Quadrangle Topographic Map (1982).

EPA

# POTENTIAL HAZARDOUS WASTE SITE
## PRELIMINARY ASSESSMENT
### PART 1 - SITE INFORMATION AND ASSESSMENT

**I. IDENTIFICATION**

| 01 STATE | 02 SITE NUMBER |
|---|---|
| TN | D 100842343 |

**II. SITE NAME AND LOCATION**

| 01 SITE NAME (Legal, common, or descriptive name of site) | 02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER |
|---|---|
| Howard High School Landfill | South Market Street |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 COUNTY | 07 COUNTY CODE | 08 CONG DIST |
|---|---|---|---|---|---|
| Chattanooga | TN | 37402 | Hamilton | 33 | 3 |

| 09 COORDINATES LATITUDE | LONGITUDE |
|---|---|
| 35° 01' 25.7" | 85° 18' 24.3" |

10 DIRECTIONS TO SITE (Starting from nearest public road)

Southeast of the intersection of South Market Street and Interstate 24.

**III. RESPONSIBLE PARTIES**

| 01 OWNER (If known) | 02 STREET (Business, mailing, residential) |
|---|---|
| City of Chattanooga | |

| 03 CITY | 04 STATE | 05 ZIP CODE | 06 TELEPHONE NUMBER |
|---|---|---|---|
| Chattanooga | | | ( ) |

| 07 OPERATOR (If known and different from owner) | 08 STREET (Business, mailing, residential) |
|---|---|
| Same | |

| 09 CITY | 10 STATE | 11 ZIP CODE | 12 TELEPHONE NUMBER |
|---|---|---|---|
| | | | ( ) |

13 TYPE OF OWNERSHIP (Check one)

☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☒ E. MUNICIPAL

☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)

☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ C. NONE

**IV. CHARACTERIZATION OF POTENTIAL HAZARD**

01 ON SITE INSPECTION

☐ YES DATE ___/___/___ (MONTH DAY YEAR)
☒ NO

BY (Check all that apply)

☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)

CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)

☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN

03 YEARS OF OPERATION

1972 (BEGINNING YEAR) | 1976? (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED

Site was to be operated as a brush and debris landfill only, but the Division of Water Management has photo documentation that industrial sludges and other wastes were put there in violation of restrictions.

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION

The site was described in a 1972 geologic report as being low and swampy, shallow water table, surface connections to Chattanooga Creek, probably underlain by solution cavities, underlain by a thrust fault, and suitable for inert waste only.

**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) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect 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 |
|---|---|---|
| Phil Stewart | Division of Water Management | (615) 624-9921 |

| 04 PERSON RESPONSIBLE FOR ASSESSMENT | 05 AGENCY | 06 ORGANIZATION | 07 TELEPHONE NUMBER | 08 DATE |
|---|---|---|---|---|
| Charles R. Rush | TDH&E | Superfund | (615) 741-6287 | 9 / 29 / 86 (MONTH DAY YEAR) |

EPA

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

| I. IDENTIFICATION | |
|---|---|
| 01 STATE | 02 SITE NUMBER |
| TN | D 100842343 |

**II. HAZARDOUS CONDITIONS AND INCIDENTS**

01 [X] A. GROUNDWATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unidentified — 04 NARRATIVE DESCRIPTION
Area has a shallow water table and ground water contamination is possible by leaching if hazardous waste is present.

01 [X] B. SURFACE WATER CONTAMINATION — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 POPULATION POTENTIALLY AFFECTED: unidentified — 04 NARRATIVE DESCRIPTION
Site lies adjacent to, and in the flood plain of Chattanooga Creek and has storm drains that empty into Chattanooga Creek.

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 [ ] F. CONTAMINATION OF SOIL — 02 [ ] OBSERVED (DATE _____) — [X] POTENTIAL — [ ] ALLEGED
03 AREA POTENTIALLY AFFECTED: 40 (Acres) — 04 NARRATIVE DESCRIPTION
The site is an old landfill and if hazardous waste was dumped at the site, then soil contamination is probable.

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

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

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

3012 PROGRAM

NEW SITE DISCOVERY INFORMATION

Site Name: Howard High School Landfill County Hamilton

Site Address: South Market Street City Chattanooga

Latitude: 35/01/25.7
Longitude: 085/18/24.3

Size of Site: 40 acres
Quadrangle: Chattanooga
(Attach a copy of the topo map with site marked)

General description of site:
Site is presently a large field and high school athletic area. Cover appears good with no erosion. Closure appears to have been good. Site is underlain by a storm sewer.

Site Status ____ active ✓ inactive RCRA Facility ____ Yes ✓ No

Years of Operation prior to 1972 TO 1976 (?)

Waste believed present and quantities:
The landfill was to have been operated as a brush and debris landfill only. A 1972 memo concerning certification of compliance indicated that restrictions as to wastes received at this site were not being observed and that metal drums were being deposited here. Div. of Water Management has photodocumentation that implies industrial sludges and other wastes were put here in violation of restrictions

Brief description of potential hazard: A 1972 geological report outlines several problems with this site which would make it unsuitable for all but inert wastes. This include general low relief and swampy areas, shallow water tables surface connections to Chattanooga Creek, location in a flood plain, nearby sinkholes suggesting extensive solutional cavities, and a mapped thrustfault through the center of the site. The underlying storm drain system may be functioning as a leachate collection system.

§3012 PROGRAM

NEW SITE DISCOVERY INFORMATION

Site Owner: City of Chattanooga
Address:
City
Phone: ( )

Site Operator:
Address:
City:
Phone: ( )

Other resp. parties:
Address:
City:
Phone: ( )

Address:
City:
Phone: ( )

DSWM Contact Michael J. Higgs Phone: (615) 741-6287

Site Contact
Address:
City:
Phone: ( )

COMMENTS:

Please attach a copy of the topo map with the site clearly marked. Return this to the §3012 Program - Superfund Section - Central Office.

Sites 25?, 26, 35, 36, + 37

WINFIELD DUNN
GOVERNOR

Eugene W. Fowinkle, M.D., M.P.H.
Commissioner

STATE OF TENNESSEE
DEPARTMENT OF PUBLIC HEALTH
NASHVILLE 37219

August 18, 1972

Subject: Preliminary geologic review of trash sites, City of Chattanooga, (visited July 7, 1972).

Site #1: Howard High School Site ~~26~~ 33

Location: Chattanooga Quad (105-SE). Southeast of the intersection of South Market Street and Interstate.

Topography: In and near an old meander bend of Chattanooga Creek. About 25 to 30 feet maximum relief. The straightening of Chattanooga Creek and partial filling of the low portions has eliminated most of the standing water shown on the topographic map. Marshy or swampy conditions (willows and cattails) now prevail in the lower portions.

Bedrock: The Geologic Map of the Chattanooga Quadrangle, 1964, by Finlaupon, and others, indicates that the Knox Group, undifferentiated, underlies the eastern half of the proposed area. A thrust fault extends north-south through the center of the site. The Knox Group (Dolomite) has been thrusted up and over younger Ordovician strata that underlie the western half of the site. The upper part of the Chickamauga Limestone, which occurs in the western sector, consists of fine to medium-grained, thin to medium-bedded limestone with very minor chert. The bedrock of both formations is probably extensively fractured by the faulting. Solution cavities in these carbonates are likely. Numerous large sinkholes occur in a half mile radius of the site. The closest one is present across South Market Street from Howard High School.

Unknown thicknesses of alluvium deposited by Chattanooga Creek probably occur over the Knox and Chickamauga units.

Weathering: Extent: The extent of weathering of the bedrock at this site is not known. No outcrops were observed.

Geometry: May be highly irregular since these limestone and dolomite units commonly weather into cutter and pinnacle development. The presence of numerous sinkholes in the vicinity of the site suggest that extensive systems of solutional cavities exist in the bedrock.

Composition: Probably cherty clay over both units; more chert in residuum above the Knox Group. The nature of the unconsolidated alluvium is not known. Gravel and boulders of chert, sandstone, and other resistent types of rock probably occur in the old meander bend of Chickamauga Creek.

Hydrology: Surface: Generally poorly drained floodplain. Marshy conditions present. A connection of the old meander to Chattanooga Creek exists, but its location is uncertain at this time. Apparently the straightening and channeling of the creek has lowered the water level at the site.

Subsurface: Water levels in Chattanooga Creek and those below the site are probably similar. Straightening of the creek may have lowered the water table slightly. However, rise of the present water course (Chattanooga Creek) may correspond to similar rise of the water table in the site. The effect of the fill material (shale) upon water levels is not known.

Floodplain: According to Floods on Tennessee River, Chattanooga and Dry Creeks and Stringers Branch, Vicinity of Chattanooga, Tennessee, 1959, by T.V.A., the site is subject to flooding. However, the straightening of Chattanooga Creek may have changed the flood profile here. Additional information is required to determine the potential for overflow of the creek into this area.

Recommendations: It is my understanding that only inert materials (brush, wood, rock (demolition materials), and not putrescible items, such as garbage, paper, and other types of refuse, stoves, car bodies, etc.) will be allowed in this site. The use of the site for these materials is dependent upon data that indicates the old meander of Chattanooga Creek is not subject to flooding. Also, rise of the water table corresponding to high levels of the creek may make the site undesirable for landfilling of these materials. No wastes should be placed in water. It is absoutely vital that tight control of the type of solid wastes be exercised here. If other types of wastes are allowed, then resultant leachate could enter Chattanooga Creek via surface connections or by subsurface flow in the ground water table. Conditions similar to other dumps along naviagable streams in the vicinity of Chattanooga could very easily result if proper control is not exercised.

Periodic covering of the combustible wastes (wood, brush, etc.) will require soil or residuum. The source of these here is questionable.

The marshy areas should be avoided, if possible. Perhaps only dirt and rock could be placed here. But, there should be no paper, garbage, etc. placed in these areas. These should be directed to a registered sanitary landfill.

Three other properties proposed for "trash" were investigated. These were found to be less suitable than Howard High School (Site #1). A brief summary of these will now follow.

Site #2: Evans Property

Location: Chattanooga Quad. East of Williams Street, South of 33rd and North

OFFICE MEMORANDUM

CA 11/16
JRM 11/16
JAC 11/17

File
Chattanooga and Hamilton County Dumps

DATE: November 16, 1972

TO: V. Wayne McCoy

FROM: Charles A. Steele

SUBJECT: Certificate of Compliance for City of Chattanooga's 28th Street Dump

On November 13, 1972 I inspected the dump operated by the City of Chattanooga near 28th and South Market Streets. The site is a low-lying swampy area which was one of the meanders of Chattanooga Creek prior to its channelization. In its present condition the land is little more than a mosquito hole. I concur with the environmental statement attached to the city's request.

The restrictions in subsection 1 of Section D were not being observed in early November. Large piles of paper, largely corrugated paper cartons, appeared to have been dumped from compactor equipment. There were metal drums and small amounts of household garbage in evidence.

Granting of the certificate is recommended. The Division of Sanitation and Solid Waste Management will have the greater voice in the matter.

CS

C.A.S.

CAS:ft

Attachments

Exhibit 3

CERTIFICATE OF COMPLIANCE WITH STATE WATER QUALITY STANDARDS

The plans of the City of Chattanooga, hereinafter called "Applicant," for construction and operation of a Brush and Demolition Refuse Disposal Site on land bordering the Chattanooga Creek in Hamilton County, Tennessee, 2 miles upstream of the Tennessee River, Mile 460, which plans involve surface drainage only into Chattanooga Creek, have been duly examined and reviewed by the responsible officials of the

Division of Water Quality Control

hereinafter called "Agency." The undersigned hereby certifies that Agency has determined, in accordance with section 21(b) of the Federal Water Pollution Control Act, as amended, that there is reasonable assurance that construction and operation of the proposed facilities in accordance with the aforesaid plans submitted by the Applicant and reviewed by this office will be conducted in a manner which will not violate applicable water quality standards of the State of Tennessee.

_____
(State agency responsible for water quality control)

Date_____ By_____

Title_____

## Materials Permitted*

Demolition materials:

a. Stone and masonry
b. Concrete
c. Asphalt
d. Timber
e. Roofing material
f. Structural steel

Trees, limbs, and stumps
Brush and yard trimmings

Leaves
Stone
Dirt
Ash
Cinders
Foundry sand
Street sweepings
Glass and ceramics
Tires
Wood products, pallets, and crates

## Prohibited Materials*

a. Furniture
b. Appliances
c. Bulky Machine Parts
d. Wire and Screen
e. Leather
f. Textiles and rugs
g. Paper and cardboard
h. Rubber and plastic materials
i. Garbage
j. Liquids

2. Site Capacity

With an average fill of 20 feet in the 44-acre depression, some 1.25 million cubic yards of compacted waste can be received by the site. At a liberally estimated rate of 2000 cubic yards of waste per day, the site would have a utilization life of approximately 2 1/4 years.

*As amended August 22, 1972.

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

DATE: JANUARY 25, 1984

TO: FILES

FROM: MICHAEL J. HIGGS & MARGARET E. DEW

SUBJECT: Field Notes on January 25, 1984, cursory inspection on the Chattanooga Creek Basin

SITE # 33
HOWARD HIGH SCHOOL LANDFILL
CITY OF CHATTANOOGA - INACTIVE

Very large closed landfill operated by the city. Area has been graded and vegetation appears adequate. Apparently accepted all types of wastes. No reported problems. A storm sewer system runs under the site and discharges directly to the creek. This could be a leachate collection system in essence and serve as a good sampling point. Area is innunadated during floods of Chattanooga creek.

| FROM | DATE |
|---|---|
| | |

| TO | |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| | |

PERSONNEL IN ATTENDANCE:

Michael J. Higgs - DSWM
Margaret E. Dew - DSWM
Ken Davis - DSWM
Barry Brawley - DSWM
Skip Wrightson - DSWM
Jim Childress - DSWM
Phil Stewart - DWM
Joe Hartman - DWM

PH-0001
SR 3/77

CHATTANOOGA, TENN.
1969
HOWARD HIGH SCHOOL LANDFILL
TND 981014889
TENNESSEE
RIVER
MOCCASIN
BEND
Highland Park
Oak Grove
Lookout Mountain
CHATTANOOGA
FORT OGLETHORPE, GA.-TEN
1982

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

May 6, 1994

MEMORANDUM

SUBJECT: Site Document Review

FROM: Elmer W. Akin, Chief
Office of Health Assessment

TO: Susan Deihl
Remedial Project Manager

I concur with the attached review comments provided by the onsite ESAT contractor, Reginald Rogers on the **Ecological Risk Assessment** for the **Howard High School Landfill.**

MANTECH

May 6, 1994

MEMORANDUM

SUBJECT: Ecological review Howard High School Landfill
Chattanooga, Hamilton County, Tennessee

From: Reginald Rogers
ESAT Contractor

To: Elmer Akin, Chief
Office of Health Assessment

As per your request I have reviewed the subject material for ecological risk assessment. The present-day landfill site is wooded with trees, shrubs and other understory growth that provide many niches for small animal populations. Surface soils at the site are contaminated with PAHs and metals. The concentrations of PAHs present can impact the whole range of organisms from fungi to mammals. Birds, mammals and other organisms can suffer reduced viability through dermal contact with these contaminant concentrations.

Through surface runoff and groundwater movement to the creek these contaminants may impair the aquatic biota. While the fish sampled from the creek have high burdens of pesticides and PCBs the source of these contaminants is undetermined.

Although the impacts to organisms discussed above should exist, it remains to be determined if these organisms are in fact impaired. For a more complete understanding of the ecological risk at this site a field survey to determine the full range of species present is appropriate. Toxicity testing is also appropriate for a more complete understanding of the ecological risk.

RRogers:rr:4WD-OHA:1586:5/3/94:A:\HOWARDLN.DOC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

May 6, 1994

MEMORANDUM

SUBJECT: Site Document Review

FROM: Elmer W. Akin, Chief
Office of Health Assessment

TO: Susan Deihl
Remedial Project Manager

I concur with the attached review comments provided by the onsite ESAT contractor, Ted Simon on the **Site Investigation Prioritization Document** for the **Howard High School Landfill**.

MANTECH

May 6, 1994

4WD-OHA

MEMORANDUM

SUBJECT: Risk review comments human health aspects, Howard High School Landfill, Chattanooga, TN

FROM: Ted W. Simon
Toxicologist, ESAT Contractor

TO: Elmer W. Akin, Chief
Office of Health Assessment

REFERENCE: TID 04-9404-451
ESAT-4R-5324
WUD #94-1835
Account # 4TFA04D9WP
Susan Deihl, Chief, Site Assessment Section
WPB

Per your request, I have reviewed the **Site Investigation Prioritization** document for the referenced site. My comments provided below are divided into two sections, i.e., (1) comments addressed specifically to the RPM and (2) comments that, if you and the Site Assessment Section Chief concur, can be conveyed verbatim to the party responsible for preparation of the document. To facilitate the verbatim conveyance, I will be pleased to provide on request a copy of this memo via cc:mail.

It is the policy of the EPA Region IV Office of Health Assessment to require written responses to review comments provided through this office. If a meeting with the PRP is needed to discuss these comments, it is requested that any risk assessment comments received from the State or any other source be provided to the Office of Health Assessment for our site file. If risk comments from sources other than this office are forwarded to the PRP contractor, the source should be clearly identified unless concurrence of this office is sought. In this case, we should formally review these comments and provide you with our response before they are forwarded.

**Adequacy of the Ground Water Sample**

The sample taken is not believed to be representative of ground water. The sample was taken as the infiltration of a two foot deep hole and probably represents either landfill leachate or a ruptured field line from the high school. In this sample, chromium was present at 367 μg/L above the drinking water MCL of 100 μg/L; lead was present at 176 μg/L above its action level of 15 μg/L; and manganese was present at 3220 μg/L above its proposed MCL of 200 μg/L.

To determine the true extent of ground water impaction from the site, actual monitoring wells should be used. Based on the data presented in the report, nothing is known about the contaminants in ground water.

**Determination of Risk Levels present at the day care center**

Several PAHs were present in the landfill soil near the day care center. Benzo(a)pyrene was chosen as the example compound as it is the most carcinogenic.

Benzo(a)pyrene was present at four locations at levels considerably above a risk-based level for a future residential scenario. However, this scenario may not be appropriate for the day care center.

Manganese was also present in soil at levels above those considered acceptable for a future resident.

| | | |
|---|---|---|
| $C_{soil}$ | = Concentration in soil | |
| EF | = Exposure Frequency | = 250 days/yr |
| ED | = Exposure Duration | = 6 years |
| $IR_{soil}$ | = Daily Soil Ingestion | = 200 mg/day |
| BW | = Body Weight | = 15 Kg |
| AT | = Averaging Time | = 25550 days for carcinogens |
| | | = 2190 days for non-carcinogens |
| $CSF_o$ | = Oral Cancer Slope Factor | = 7.3E+0 for Benzo(a)Pyrene |
| $RfD_o$ | = Oral Reference Dose | = 1.4E-01 for manganese |

These exposure assumptions are based on a child receptor present at the day care center 5 days a week from the ages of 0 to 6 years old.

Using the equations shown below and the exposure assumptions shown above, the cancer risk due to benzo(a)pyrene is 5E-06. The non-cancer hazard index due to manganese is 0.08. These are both well within the risk range considered acceptable by the EPA, and, hence, the site does not appear to pose an immediate risk to human health.

However, if these exposure assumptions are shown to be unjustified, then this estimate of risk at the site may not be accurate.

$$Risk = \frac{EF \times ED \times FI \times CSF_o \times IR_{Soil} \times 10^{-6} \frac{Kg}{mg}}{BW \times AT} \quad (1)$$

Equation 1 provides the risk level for soil concentrations of carcinogens.

$$Hazard = \frac{EF \times ED \times FI \times \frac{1}{RfD_o} \times IR_{Soil} \times 10^{-6} \frac{Kg}{mg}}{BW \times AT} \quad (2)$$

Equation 2 provides the hazard quotient for soil concentrations of non-carcinogens.

**Adequacy of Soil Sampling**

Ten soil samples including background is probably not enough to characterize a 44 acre site with sufficient detail. A combination of random and biased sampling should be used. *Guidance for Data Useability in Risk Assessment (Part A) Final*, OERR 9285.7-09A, 1992 should be consulted in this regard.

If the landfill becomes an NPL site, it should be considered for the presumptive remedy for a municipal landfill. This presumptive remedy consists of:

- Landfill cap
- Source area ground water control
- Leachate collection and treatment
- Landfill gas collection and treatment
- Institutional controls as appropriate

Therefore, future sampling efforts should be directed to determining whether contaminant migration off-site has occurred and characterization of the appropriate locations.

Note that sampling of the landfill contents as opposed to the soil itself is not necessary. The assumption underlying this sampling strategy is based on the presumptive remedy is that the landfill will be capped and its contents isolated. Guidance in this regard is attached.

Please let me know if I can be of any further help.

Attachment
*Presumptive Remedy for CERCLA Municipal Landfill Sites*, Superfund Publication 9355.0-49FS, June 1993

T.W. Simon/tws:4WD-OHA:1586/05/06/94/A:\DISK_3\MAY94\HOWARDHS.DOC

| RECORD OF COMMUNICATION | ☑ PHONE CALL ☐ DISCUSSION ☐ FIELD TRIP ☐ CONFERENCE ☐ OTHER (SPECIFY) (Record of item checked above) | |
|---|---|---|
| TO: File: Howard HS Landfill FND 100842343 Chattanooga, Hamilton Co., TN | FROM: Lafter Carr EPA SAM | DATE 4/25/94 TIME 11:14 |

SUBJECT Howard High School Landfill.

SUMMARY OF COMMUNICATION

TDEC, DSF, CFO, - Asked Bonnie Basher, Tenn Dept of Health to do Risk Analysis for making a decision to determine if there needed to be an immediate Action. B. Basher is doing Risk Analysis thru ATSDR - sent it in to ATSDR Draft, + comment. Steve Kinsler. 404 639-6360
Bonnie Basher TD Health (615) 532-2208.

CONCLUSIONS, ACTION TAKEN OR REQUIRED

- call left message with SAFAY + Kinsler
- BOB SAFAY called back - He will check with Kinsler + Basher and get back to me also get me a copy of the work done so far (4/25/94 11:23 am)

INFORMATION COPIES
TO:

EPA Form 1300-6 (7-72) REPLACES EPA HQ FORM 5300-3 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

**MEMORANDUM**

DATE: July 15, 1993

SUBJECT: Review of Draft Fact Sheet: "Presumptive Remedy for CERCLA Municipal Landfill Sites"

FROM: Pamela J. Langston Scully, P.E.
South Superfund Remedial Branch
Region IV

TO: Andrea McLaughlin
Hazardous Site Control Division

On behalf of the South Superfund Remedial Branch, Region IV, Atlanta, Ga., I have reviewed the draft fact sheet entitled "Presumptive Remedy for CERCLA Municipal Landfill Sites". Although the fact sheet was generally well organized, I have two comments which are provided below.

- Discussion on streamlining the risk assessment for the source areas at the bottom of page 4 and top of page 5 is unclear. It appeared that the presumptive remedy for CERCLA municipal landfill sites involved restricting access to the site to ensure the continued integrity of the containment. Then a statement was made that use of the facility for recreational activities may be appropriate.

- Principal threat wastes should be defined or referenced in the section concerning treatment of hot spots.

Thank you for providing the region the opportunity to review this document. If you need to discuss these comments, I can be reached at (404) 347-2643.

cc: Elmer Akin, Risk Assessment

Printed on Recycled Paper

[60] From: DMundric 7/8/93 9:17AM (1278 bytes: 18 ln)
To: EAkin, RJourdan
cc: DGreen, PScully, JMcguire
Subject: Re: Presumptive remedy
---------- Message Contents ----------

You have or will soon receive a Longest memo with draft fact sheet for Presumptive Remedy for CERCLA Municipal Landfill Sites. I worked with Andrea McLaughlin and the Workgroup on this and feel fairly comfortable with the risk assessment aspects. You may want to have your Section Chiefs review it from their perspective. I would like to know of any Branchs' responses to hdg on the fact sheet (due by 7/14). We work with a number of RPMs that have landfill sites in the RI/FS pipeline and they often have questions of us on how to proceed, particularly in this interim before the Fact Sheet is finalized.

Also, do either of you have a response to my recent cc mail on the future of region iv RPM joint meetings?

Thanks for the site/document priority update.
Elmer...I've asked Pam Scully to review this and send comments to HQ. I'll ask her to send you a copy...Doug

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

JUN 16 1993

**MEMORANDUM**

SUBJECT: Review of Draft Fact Sheet: "Presumptive Remedy for CERCLA Municipal Landfill Sites"

FROM: Henry L. Longest II, Director
Office of Emergency and Remedial Response

TO: Addressees

Attached is a draft fact sheet entitled "Presumptive Remedy for CERCLA Municipal Landfill Sites," for your review and comment. This fact sheet establishes containment as the presumptive remedy for CERCLA municipal landfills and the streamlining manual "Conducting Remedial Investigations/ Feasibility Studies for CERCLA Municipal Landfill Sites" as the framework for implementation of the presumptive remedy.

The fact sheet also provides guidance on issues that were identified during the four municipal landfill pilots as requiring further clarification. Specifically, the fact sheet provides criteria to help determine when characterization and/or remediation of hot spots is appropriate, and the degree to which risk assessments can be streamlined for the source area of landfills.

Please provide your comments by July 14, 1993, to Andrea McLaughlin, Hazardous Site Control Division, 5203G, 703-603-8793.

Addressees

Waste Management Division Directors
Regions I, IV, V, VII
Emergency and Remedial Response Division Director
Region II
Hazardous Waste Management Division Directors
Regions III, VI, VIII, IX
Hazardous Waste Division Director
Region X
Superfund Branch Chiefs
Regions I-X
Debbie Dietrich, ERD
Larry Reed, HSED
Sally Mansbach, CED
Earl Salo, OGC

cc: Tim Fields, SRO
Bruce Diamond, OWPE
Walt Kovalick, OSWER

United States Environmental Protection Agency
Office of Solid Waste and Emergency Response
Superfund Publication 9355.0-49FS
June 1993

EPA

# Presumptive Remedy for CERCLA Municipal Landfill Sites

DRAFT

Office of Emergency and Remedial Response
Hazardous Site Control Division 5203G

Quick Reference Fact Sheet

Since Superfund's inception in 1980, the remedial and removal programs have identified categories of sites with similar characteristics, such as types of contaminants present, past disposal practices, or the ways environmental media are affected. Based on the wealth of information acquired from evaluating and cleaning up these sites, Superfund is undertaking an initiative to develop **presumptive remedies** for specific types of sites that are designed to accelerate the Superfund clean-up process. The presumptive remedy selection process is one tool of acceleration within the **Superfund Accelerated Cleanup Model (SACM)**.

The objective of the presumptive remedies initiative is to draw upon past experience to streamline site investigations and speed up selection of clean-up actions. The Agency has developed a presumption that particular technologies are appropriate for certain types of sites. This presumption is based on a review of technologies that have been selected consistently for these sites. The presumption may be rebutted on a site-specific basis as warranted by technical information or local and state concerns.

This fact sheet establishes containment as the presumptive remedy for CERCLA municipal landfills. The framework for the presumptive remedy for these sites is presented in a streamlining manual entitled *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, February 1991(OSWER Directive 9355. 3-11). This fact sheet highlights and emphasizes the importance of certain streamlining principles related to the scoping (planning) stages of the RI/FS that were identified in the manual. The fact sheet also provides clarification of and additional guidance in the following areas: (1) the level of detail appropriate for risk assessment of source areas at municipal landfills and (2) the characterization of hot spots.

## BACKGROUND

Superfund has conducted pilot projects at four municipal landfill sites on the National Priorities List (NPL) to evaluate the effectiveness of the manual *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites* (hereafter referred to as "the manual") as a streamlining tool and as the framework for the municipal landfill presumptive remedy. EPA's expectation was that containment technologies would generally be appropriate for municipal landfill waste because the volume and heterogeneity of the waste make treatment impracticable. The results of the pilots support this expectation and demonstrate that the manual is very effective in guiding the user through a streamlined RI/FS process for municipal landfills.

Since the manual's development, the expectation to contain wastes at municipal landfills has evolved into a presumptive remedy for these sites.[1] Implementation of the presumptive remedy at the four pilot sites helped to highlight issues requiring further clarification, such as characterization and remediation of hot spots, and the degree to which risk assessments can be streamlined for source areas. The pilots also demonstrated the value of focusing streamlining efforts at the scoping stage, recognizing that the biggest savings in time and money can be realized if streamlining is incorporated at the beginning of the RI/FS process. Accordingly, this fact sheet addresses those issues identified during the pilots and highlights streamlining opportunities to be considered during the scoping component of the RI/FS.

Finally, while the primary focus of the municipal landfill manual is on streamlining the RI/FS, Superfund's goal under SACM is to accelerate the entire clean-up process. Other guidance issued under the municipal landfill presumptive remedy initiative identifies design data that may be collected during the RI/FS to streamline the overall remedial process for these sites (see Publication No. 9355.3-18 FS "Presumptive Remedies: CERCLA Landfill Caps Data Collection Guide").

[1]See SACM Bulletins, "Presumptive Remedies for Municipal Landfill Sites," April 1992, Vol. 1, No. 1, and February 1993, Vol. 2, No.1, and SACM Bulletin "Presumptive Remedies," August 1992, Vol.1, No. 3.

## CONTAINMENT AS A PRESUMPTIVE REMEDY

The preamble to the National Contingency Plan (NCP) identifies municipal landfills as a type of site where treatment of the waste may be impracticable because of the size and heterogeneity of the contents. Because treatment is impracticable, EPA considers containment to be the appropriate response action, or the "presumptive remedy," for the source areas of municipal landfill sites. Highlight 1 identifies the components of the presumptive remedy. These components address all pathways potentially affected by a landfill. Remedies selected for individual sites will include only those components that are necessary, based on site-specific conditions.

**Highlight 1: Components of the Presumptive Remedy** DRAFT

- Landfill cap;
- Source area ground-water control;
- Leachate collection and treatment;
- Landfill gas collection and treatment; and/or
- Institutional controls to supplement engineering controls.

The site manager will make the initial decision of whether a particular site is suitable for the containment presumptive remedy or whether a more definitive RI/FS is required. The community, state, and PRP(s) should be notified that a presumptive remedy is being considered for the site upon completion of the RI/FS work plan. The notification may take the form of a fact sheet, a notice in a local newspaper, and/or a public meeting.

Interested parties may rebut the presumption; however, because the containment remedy has been proven effective at other municipal landfill sites, the burden of demonstrating the effectiveness of an alternative remedy rests upon the interested party. A discussion of the demonstration that must be made to rebut implementation of the presumptive remedy (e.g., data showing that the effectiveness of the alternative remedy is equal to or exceeds the presumptive remedy) is contained in "Presumptive Remedies: Policy and Procedures," Publication No. XXXXXXX, 1993.

Use of the presumptive remedy eliminates the need for the initial identification and screening of alternatives during the FS. Section 300.430(e)(1) of the NCP states that the lead agency shall include an alternatives screening step when needed (emphasis added) to select a reasonable number of alternatives for detailed analysis.

EPA conducted an analysis of potentially available technologies for municipal landfills and found that certain technologies are routinely and appropriately screened out on the basis of effectiveness, feasibility, or excessive costs (NCP Section 300.430[e][7]). This analysis serves as a "national feasibility study" for municipal landfill sites (see "National Feasibility Study for CERCLA Municipal Landfills," OSWER Directive No. XXXXX, July 1993). The national feasibility study allows the universe of alternatives that will be analyzed in detail to be limited to the components of the containment remedy identified in Highlight 1 unless site-specific conditions dictate otherwise. The national feasibility study document, together with this fact sheet, must be included in the administrative record for each presumptive remedy site to support elimination of the initial alternatives screening step.

Remedial alternatives must then be evaluated against the nine criteria identified in Section 300.430(e)(9) of the NCP. Table 5-1 of the municipal landfill manual streamlines the site manager's evaluation by summarizing how components of the containment presumptive remedy (e.g., capping; ground-water control) can be considered with respect to the five balancing criteria. Evaluation under some of the criteria may require less analysis. For example, a cap does not reduce toxicity, mobility, or volume through treatment, so the evaluation of a cap under this criterion does not require any effort, regardless of the site.

## EARLY ACTION AT MUNICIPAL LANDFILLS

EPA has identified the presumptive remedy site categories as good candidates for early action under SACM. At municipal landfills, the upfront knowledge that contamination associated with the source area will be contained may facilitate such early actions as installation of a landfill cap or a ground-water containment system. Early actions may be accomplished using either removal authority (i.e., non-time-critical removals) or remedial authority, although there may be some limitation on the use of removal authority depending on the scope of O&M. A discussion of factors affecting whether a specific response action would best be accomplished as a removal or remedial action is contained in "Early Action Update," OSWER Directive XXXXX, ____ 1993.

## SCOPING A STREAMLINED RI/FS UNDER THE PRESUMPTIVE REMEDY FRAMEWORK

The broad project goals for an RI/FS are to provide the information necessary to (1) adequately characterize the site; (2) define site dynamics; (3) define risks; and (4) develop the remedial action. As discussed in the following sections, the process for achieving each of these goals can be streamlined for municipal landfill sites because of the upfront presumption that landfill contents will be contained. The strategy for streamlining each of these areas should be developed early, i.e., during the scoping phase of the RI/FS.

DRAFT

### 1. Characterizing the Site

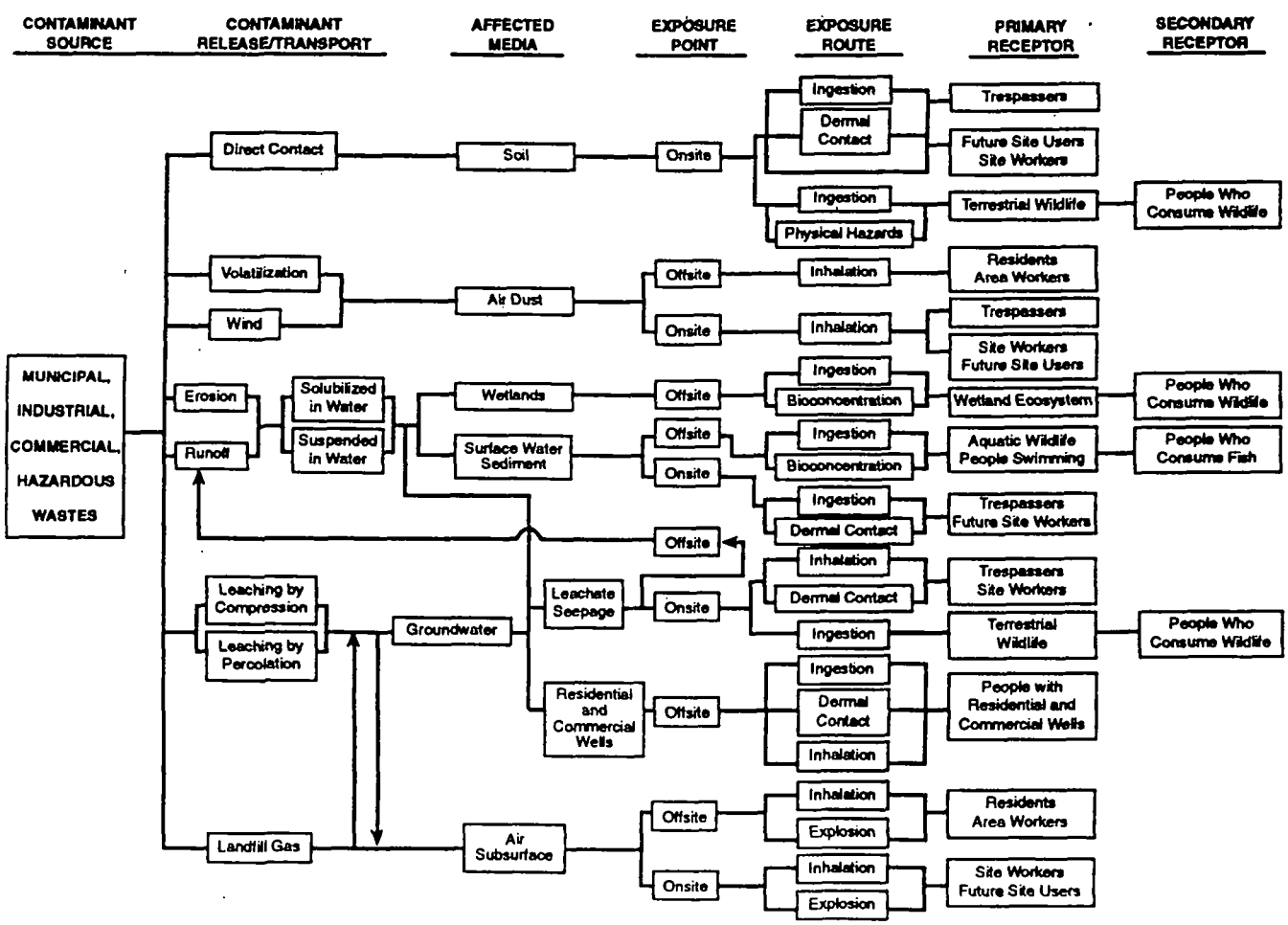
The use of existing data is especially important in conducting a streamlined RI/FS for municipal landfills. Characterization of a landfill's contents is not necessary or appropriate for selecting a remedy for these sites except in limited cases; rather, existing data are used to determine whether the containment presumption is appropriate. Subsequent sampling efforts should focus on characterizing areas where contaminant migration is suspected, such as leachate discharge areas or areas where surface water runoff has caused erosion. It is important to note that the decision to characterize hot spots should also be based on existing information, such as documentation and/or physical evidence.

Sources of information of particular interest during scoping include records of previous ownership, state files, closure plans, etc., which may help to determine types and sources of hazardous materials present. Specific information to be collected is provided in Sections 2.1 through 2.4 of the municipal landfill manual.

### 2. Defining Site Dynamics

The data collected are used to develop a conceptual site model, which is the key component of a streamlined RI/FS. The conceptual site model is an effective tool for defining the site dynamics, streamlining the risk evaluation, and developing the remedial action. Highlight 2 presents a generic conceptual site model for municipal

**Highlight 2: Generic Conceptual Site Model**



**Treatment of Hot Spots**

Waste in CERCLA municipal landfills usually is present in large volumes and is a heterogeneous mixture of municipal waste frequently co-disposed with industrial and/or hazardous waste. It is impossible to fully characterize, excavate, and/or treat the source area of these sites, so uncertainty about the landfill contents is expected. Containment remedies for municipal landfill sites must be designed to account for this uncertainty because, even if individual hot spots are identified and characterized, it can be assumed that other hot spots are present. The presumptive remedy must be relied upon to contain landfill contents and prevent migration of contaminants. This is accomplished by measures such as a landfill cap, which minimizes infiltration and, thus, the generation of leachate. Monitoring will further ensure the continued effectiveness of the remedy.

DRAFT

While it is natural to desire a thorough understanding of municipal landfill sites, rigorous searches for hot spots generally are not appropriate because of the volume of the waste, its heterogeneity, and problems associated with excavating through refuse. Highlight 5 lists questions that should be answered before making the decision to characterize and/or treat hot spots. All of the questions listed should be answered in the affirmative to support characterization of hot spots. It is only when all of these factors are present that the benefits of characterizing and/or treating hot spots outweigh the potential problems associated with remediating landfill contents.

**Highlight 5: Characterization of Hot Spots**

All of the following questions should be answered in the affirmative to support characterization and/or treatment of hot spots:

1. Does evidence exist to indicate the presence and approximate location of waste?
2. Is the hot spot considered principal threat waste?
3. Is the waste in a discrete, accessible part of the landfill?
4. Is the hot spot large enough that its remediation will significantly reduce the threat posed by the overall site but small enough that it is reasonable to consider removal (e.g., 100,000 cubic yards or less)?
5. Is the combination of the waste's physical and chemical characteristics and volume such that the integrity of the containment system will be threatened if the waste is left in place?

The following examples illustrate site-specific decision making and show how these factors affect the decision whether to characterize and/or treat hot spots.

## Examples of Site-Specific Decision Making Concerning Hot Spot Characterization/ Treatment

### *Site A*

Plumes of ground-water contamination are emanating from two locations of soil contamination outside the 4-acre landfill source area. Drums were removed from these locations during an earlier removal action, but high concentrations of toxic compounds remain in the soil. There is no plume of ground-water contamination associated with the landfill itself, although ground water was encountered 3 feet below the ground surface. The remedy includes treatment of the two areas of contaminated soil (estimated to be approximately 1,800 cubic yards of soil), consolidation of treatment residuals in the landfill, a landfill cap, and ground-water treatment.

Treatment is supported at this site on the following basis (refer to the five questions in Highlight 5): (1) evidence exists of the presence and location of the hot spots from the earlier removal action; (2) the waste is considered principal threat waste since it is acting as a reservoir for migration of contamination to ground water; (3) the waste is in two discrete, accessible locations of the site; (4) the hot spots are large enough with respect to the landfill itself such that their remediation will reduce the threat posed by the overall site but small enough to treat practicably; and (5) site-specific factors affected the decision concerning whether the volume and characteristics of the waste would affect the integrity of the containment system. In this case, it was determined that the combination of highly permeable soils beneath the site together with the high water table and mobile contaminants supported treatment of what was considered principal threat waste.

### *Site B*

There is anecdotal information that approximately 175 drums of hazardous waste were disposed of at this 70-acre former municipal landfill, but their location and contents are unknown. The remedy includes a landfill cap and ground-water and landfill gas treatment.

A search for and characterization of hot spots is not supported at Site B because all of the questions in Highlight 5 cannot be answered in the affirmative: (1) no evidence exists to verify the presence of the waste or its location; (2) the determination of whether the waste is principal threat waste cannot be made since it is unknown whether the waste, if present, is acting as a reservoir for migration of

contaminants; (3) since the location of the waste is unknown, the determination of whether the waste is in a discrete accessible location cannot be made; (4) in this case, the presence of 175 drums in a 70-acre landfill is not considered to significantly affect the threat posed by the overall site; and (5) the waste, if present, is not considered a threat to the integrity of the containment system because of its relatively small volume with respect to the rest of the landfill.

-DRAFT-

### *Site C*

Approximately 35,000 drums, many containing hazardous wastes, were disposed of in two drum disposal units at this privately owned 80-acre inactive landfill, which was licensed to receive general refuse. The site is divided into two operable units. The remedy for Operable Unit 1 (OU 1) is on-site incineration of drummed wastes in the two drum disposal units. The remedy for Operable Unit 2 consists of treatment of contaminated ground water and leachate and containment of treatment residuals (from OU 1) and remaining landfill contents, including passive gas collection and flaring.

Treatment of landfill contents is supported at Site C because all of the questions in Highlight 5 can be answered in the affirmative: (1) existing evidence from previous magnetometer investigations and sampling conducted by the state (prior to the RI) indicated the presence and approximate location of wastes; (2) the wastes were considered principal threat wastes because they were liquids and (based on sampling) were believed to contain contaminants of concern; (3) the waste is located in discrete accessible parts of the landfill; (4) the waste volume is large enough that its remediation will significantly reduce the threat posed by the overall site; and (5) the combination of the waste's physical and chemical characteristics and volume is a threat to the effectiveness of the containment system without treatment.

-DRAFT-

NOTICE: The policies set out in this memorandum are not final Agency action but are intended solely as guidance. They are not intended, nor can they be relied upon, to create any rights enforceable by any party in litigation with the United States. EPA offices may decide to follow the guidance provided in this memorandum or to act at variance with the guidance based on an analysis of specific site circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

REC'D.
JUN 3 1994

MEMORANDUM

Date: May 23, 1994

To: Andy Binford
Technical Section Manager
Division of Superfund
Tennessee Department of Environment and Conservation

From: Epidemiologist, EEP, TDH

Subject: Health Consultation on Howard School
Through: Director, DHAC, ATSDR (E32) HE
Acting Chief, ERCB, DHAC, ATSDR (E57) EJL
Acting Chief, TSS, ERCB, DHAC, ATSDR (E57) KGO

**BACKGROUND AND STATEMENT OF ISSUES**

Andy Binford of the Division of Superfund asked for a health consultation concerning possible exposures to polyaromatic hydrocarbons (PAHs) in the soil at Howard School in Chattanooga, Tennessee. The specific questions asked are as follows:

> Do the levels of PAHs measured at the site pose an acute or chronic risk to the children at the daycare center, the children at the high school, or the teachers or staff at the daycare center or high school?
>
> If a risk is present, please quantify the risk.

Howard School is in the Alton park section of Chattanooga. A former, unregulated landfill occupies a large portion of the school property. The former landfill is on land that was once a part of the channel of Chattanooga Creek; the creek bed was moved in the 1960's and the original channel became a landfill. A daycare center is on school property and sits on the former landfill. A football practice field, soccer field, and baseball field are bounded on one side by the former landfill. The biology classes have a biology study area near the daycare center that extends a short distance into the former landfill. A road into the landfill provides access from the baseball field [1]. See Figure 1.

The elementary school has 417 students and 27 teachers; the high school (grades 9 - 12) has 1,074 students and 65 teachers; the daycare center has 55 children and 15 teachers. Only 6 children attend the daycare center in the summer. A public housing project across Machine Street from the school has 192 units and 150 residents. Within 1/4 mile of the school, the population is approximately 2,200.

Anecdotal information indicates that football players have experienced skin rashes after practicing football on the practice field. Biology classes have taken samples of water from the biology study area that are black and smell bad [2]. Environmental personnel believe that this water is gray water that flows from the school showers through tile fields, seeping out to the surface [3]. This gray water is accessible to the public.

The residents of the Alton Park section have been concerned about pollution from Chattanooga Creek, area industries, and area Superfund sites for many years. There are 42 known or suspected hazardous waste sites near the creek; several of these are State Promulgated Superfund sites and several are being considered/investigated for inclusion on EPA's National Priorities List (NPL) [4].

The Tennessee Division of Water Pollution Control (DWPC) thoroughly sampled Chattanooga Creek in 1981-82. Contamination was found to primarily consist of PAHs from coke and coal tar derivatives and creosoting operations and of bacteria from sewer overflows. As a result of this sampling, the DWPC posted the 7 1/2 miles of the creek in Tennessee to prevent fishing and body contact activities. In 1990 the EPA repeated the sampling done by the State, confirming the presence of PAHs, bacteria, and the decision to post the creek. The EPA has now added a portion of Chattanooga Creek and the surrounding area (Tennessee Products Site) to the NPL.

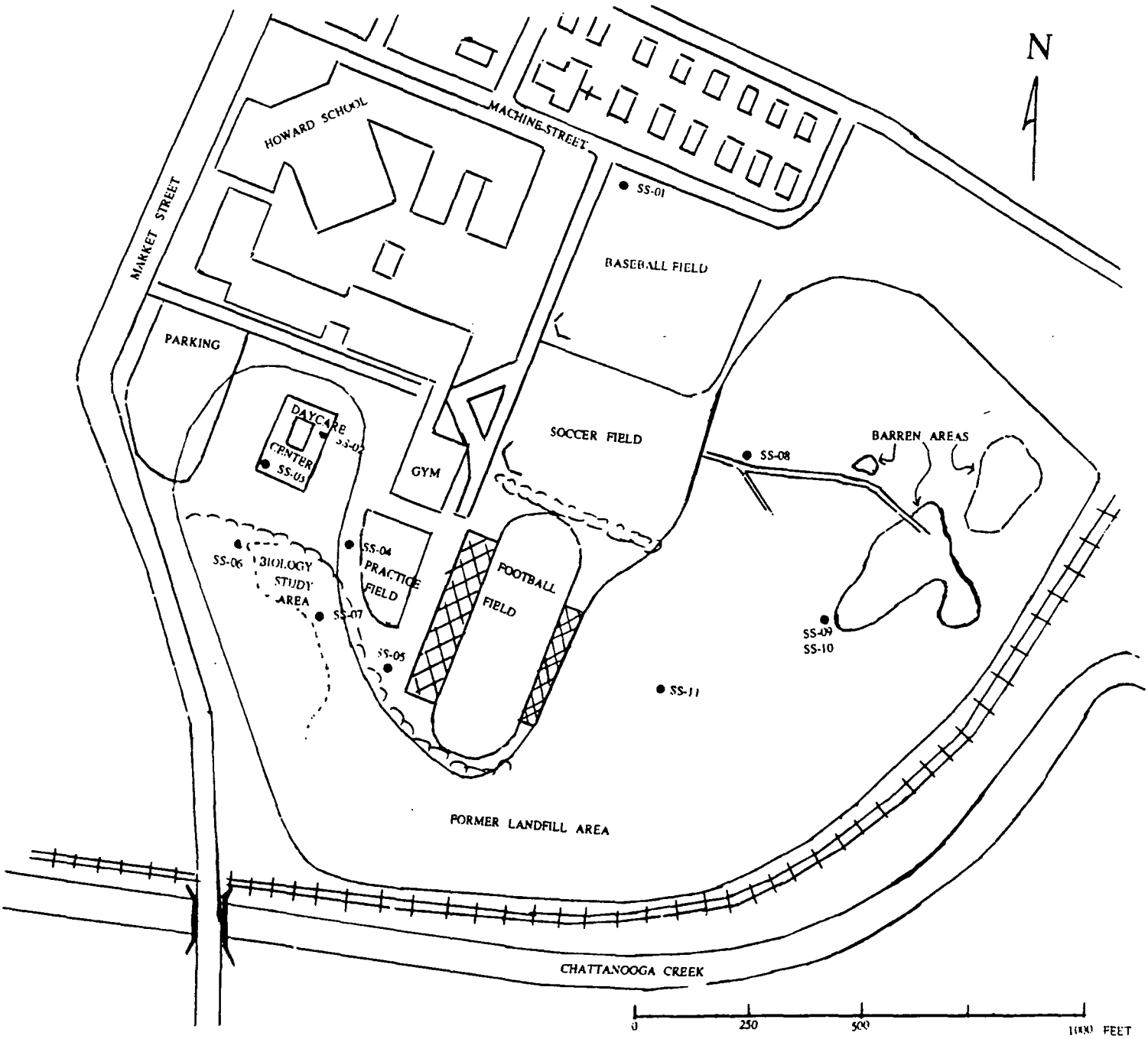
In 1992, the Agency for Toxic Substances and Disease Registry (ATSDR) began a petitioned public health assessment of Chattanooga Creek. The brown cover edition, for public comment, was released on November 29, 1993. It states that Chattanooga Creek is a public health hazard because of past, present and future human exposure by residents of south Chattanooga to chemical contaminants in sediments, surface water, and fish and to bacterial contaminants in Chattanooga Creek. ATSDR has begun providing ongoing environmental health education for local health care providers at the Alton Park Health Center and other area clinics to assist the health professionals in assessing possible adverse health outcomes associated with exposure to hazardous substances. ATSDR has also begun providing environmental health education for the community to assist residents in mitigating exposure to hazardous substances in Chattanooga Creek surface water, sediments, and fish.

The Howard School site is being investigated for inclusion on the NPL; a Site Inspection Prioritization (SIP) is in progress. Sampling results from the SIP in progress were used for this health consultation [3].

Sampling results provided to the Division of Environmental Epidemiology (EEP) are for base/neutral and acid extractables, in accordance with federally approved procedures and in compliance with current quality assurance criteria. PAHs were the only extractables detected. Sampling results for PAHs are summarized in Table 1. Samples were composites of soil taken to a depth of 1 foot, in accordance with standard EPA protocol. For public health purposes, surface soil samples are usually considered to be from 0 - 3 inches in depth because the public would most likely be exposed to just the surface of the soil (0 - 3 inches) and not to soil that is below the surface.

Sample 1 is a background sample taken on school property at the corner of the driveway and Machine Street. Samples 2 and 3 are from the yard at the daycare center; the yard is covered by grass. Samples 4 and 5 are on the football practice field. Samples 6 and 7 are from the biology study area. Samples 8, 9, and 10 are on the landfill area near the access road. Samples 9 and 10 are duplicates. Sample 11 is from a wooded portion of the landfill area that is not readily accessible to the public.

FIGURE 1
HOWARD SCHOOL
ALTON PARK, CHATTANOOGA, TENNESSEE



# TABLE 1
# SAMPLING RESULTS, HOWARD SCHOOL
# ALTON PARK, CHATTANOOGA, TENNESSEE

| Polyaromatic hydrocarbons | Concentration, µg/kg | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SS-1 | SS-2 | SS-3 | SS-4 | SS-5 | SS-6 | SS-7 | SS-8 | SS-9 | SS-10 | SS-11 |
| acenaphthene | <330 | <330 | <330 | U | U | <400 | U | U | U | U | <400 |
| acenaphthylene | <330 | U | <330 | U | U | <400 | U | U | U | U | <400 |
| anthracene | <330 | <330 | <330 | U | U | <400 | <340 | U | U | U | <400 |
| benzo(a)anthracene | 500 | <330 | 696 | U | <350 | 1120 | U | U | U | U | 1400 |
| benzo(a)pyrene | 493 | <820 | 801 | U | U | 1390 | U | U | U | U | 1770 |
| benzo(b)fluoranthene | <1400 | <330 | <1500 | U | <350 | <2000 | U | U | U | U | <1000 |
| benzo(ghi)perylene | U | U | <750 | U | U | <1500 | U | U | U | U | 1350 |
| benzo(k)fluoranthene | <1400 | <330 | <750 | U | <350 | <2000 | U | U | U | U | <1000 |
| dibenzo(a,h,)anthracene | U | U | U | U | U | U | U | U | U | U | <1000 |
| fluoranthene | 480 | <820 | 1060 | <330 | <350 | 1520 | <340 | <330 | <350 | <350 | 2480 |
| fluorene | <330 | <330 | U | U | U | <400 | U | U | U | U | <400 |
| indeno(1,2,3-cd)pyrene | U | U | <750 | U | U | <1500 | U | U | U | U | 2190 |
| naphthalene | <330 | <330 | <330 | <330 | <350 | <400 | <340 | <330 | U | U | <400 |
| phenanthrene | <330 | <330 | <330 | <330 | <350 | <400 | U | <330 | <350 | <350 | <400 |
| pyrene | 433 | <820 | 911 | <330 | <350 | 1300 | <340 | <330 | U | <3350 | 2160 |
| chrysene | 402 | <330 | 644 | U | U | 1290 | <340 | U | U | U | 1370 |

## DISCUSSION

There were generally 2 samples taken for each area of the site. The surface samples were taken from 0 - 1 foot in depth. This may be appropriate if risks for an entire lifetime at one site are being considered; if a person lives or works at one site for thirty years or more, he may be exposed to soil up to 1 foot in depth. However, it may not be appropriate for estimating current potential health risks to people exposed to PAHs in the surface soil (0 - 3 inches) on an incidental, short-term basis.

PAHs are hydrocarbons found in coal, coke, coal tar, and creosote; they are formed as by-products of ordinary combustion and are ubiquitous. PAHs are comprised of complex mixtures of different compounds with widely varying toxicities. Some of the PAHs may be carcinogenic. To account for the varying strengths of the carcinogenicity potentials for the PAHs that may be carcinogenic, the concentrations of those PAHs may be multiplied by a benzo(a)pyrene toxicity equivalency factor and added together to give an adjusted concentration of potentially carcinogenic PAHs. See Table 2 for the Toxicity Equivalent Factors (TEFs) used by the EPA Region IV [5]. The benzo(a)pyrene adjusted concentrations for each sample and each area, calculated using the TEFs, are given in Table 3. If an area had more than one sample, then the adjusted benzo(a)pyrene equivalent concentrations were averaged; if an area had only one sample, then the adjusted benzo(a)pyrene equivalent concentration for that one sample was used.

TABLE 2
EPA BENZO(A)PYRENE TOXICITY EQUIVALENCY FACTORS

| Carcinogenic Polyaromatic Hydrocarbon | Toxicity Equivalency Factor |
|---|---|
| Benzo(a)pyrene | 1 |
| Benzo(a)anthracene | 0.1 |
| Benzo(b)fluoranthene | 0.1 |
| Benzo(k)fluoranthene | 0.1 |
| Chrysene | 0.01 |
| Dibenzo(a,h)anthracene | 1 |
| Indeno(1,2,3-c,d)pyrene | 0.1 |

TABLE 3
BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS FOR EACH AREA

| Area | Sample # | Adjusted concentration, mg/kg | Sample # | Adjusted concentration, mg/kg | Average adjusted concentration, mg/kg |
|---|---|---|---|---|---|
| Background | 1 | 0.827 | NA | | 0.827 |
| Daycare center | 2 | 0.922 | 3 | 1.177 | 1.05 |
| Football practice field | 4 | ND | 5 | 0.105 | 0.05 |
| Biology study area | 6 | 2.065 | 7 | 0.003 | 1.034 |
| Accessible landfill | 8 | ND | 9,10 | ND | ND |
| Nonaccessible landfill | 11 | 3.343 | NA | NA | 3.343 |

At the daycare center it was assumed that the children weighed 18 kg, the mean weight for 3-5 year old children, that the surface area exposed was 61% of the total body surface area (accounting for head, arms, hands, and legs) or 4459 $cm^2$, the 50th percentile for children aged 4 - 5 [6], that the exposure frequency was 100 days per year or 200 events per year (2 outside play times per day), and that the exposure duration was 6 years. It was assumed that children playing outside would get dirt on their heads, arms, hands, and legs. It was assumed that the ingestion rate for soil was 200 mg/day. A pica child might eat 5000 mg of soil per day; however, the yard at the daycare center is covered with grass, making the soil less accessible. Estimated cancer risks due to ingestion and dermal exposure at the daycare center are less than 1 in a million.

At the biology study area, it was assumed that the students weighed 61 kg, the mean for boys and girls aged 15 < 18, that the surface area was 39% of the total body surface area (accounting for hands and legs) or 6825 $cm^2$ [6], that the exposure frequency was 90 days per year or 90 events per year, and the exposure duration was 4 years. It was assumed that teenagers taking samples might be exposed on their hand and legs, but not their arms or heads. Estimated cancer risks due to ingestion and dermal exposure at the biology study area less than 1 in a million.

Samples on the football practice field showed less PAHs than the background sample. The concentrations on the football practice field were approximately one-tenth of those at the daycare center. Any risks from oral or dermal exposure should be negligible. It is not expected that this level of PAHs in soil would cause the rashes experienced by the football players.

PAHs were not detected along the road from the baseball field into the landfill area. The only sample taken in the more inaccessible, wooded portion of the landfill showed the highest concentrations of PAH equivalents, 3.343 mg/kg. It is unlikely that children from the daycare center, the school, or people from the community would access that area on a regular basis. However, 3.343 ppm of PAH equivalents could be of concern if frequent and regular exposure occurred over a lifetime.

## CONCLUSIONS

Based on the information reviewed, the Tennessee Department of Health concludes the following:

1. The available information from sampling at Howard School does not indicate a current public health hazard to students, teachers, or area residents from exposure to soil on school property.

2. The available sampling is limited; therefore, additional environmental data may be needed to adequately determine whether or not the landfill area poses a chronic public health problem. Surface soil sampling (0 -3 inches) would allow a more accurate interpretation of current potential health hazards.

3. Exposure to gray water from leaking tile fields may be occurring; the area is accessible and has not been adequately sampled.

## RECOMMENDATIONS

1. Sample and analyze surface soil in areas where exposures are most likely to occur.

2. Sample and analyze gray water in areas where exposures are most likely to occur.

If further clarification is required or if additional information becomes available, please do not hesitate to call this office at (615) 741-5683.

Bonnie S. Bashor

Bonnie S. Bashor

## REFERENCES

[1] Personal communication from Andy Shivas, Division of Superfund, Central Office, Tennessee Department of Environment and Conservation.

[2] Report from Alton Park residents to the Conservation and Environment Committee of the Tennessee House of Representative, March 31, 1993.

[3] Personal communication from Andy Shivas, Division of Superfund, Central Office, Tennessee Department of Environment and Conservation, and Don VanHook, Division of Superfund, Chattanooga Office, Tennessee Department of Environment and Conservation.

[4] ATSDR. Petitioned Public Health Assessment Chattanooga Creek Tar Deposit (a/k/a Chattanooga Creek), Chattanooga, Hamilton County, Tennessee, CERCLIS No. TN982119489. Brown Cover, for Public Comment. November 29, 1993.

[5] New Interim Region IV Guidance, Elmer Akin, Chief, Office of Health Assessment, USEPA, Region IV, February 11, 1992.

[6] USEPA. Exposure Factors Handbook. EPA/600/8-89/043. March, 1990.

## SUPERFUND SITE SPILL ID REQUEST

DATE OF REQUEST: 4/25/94 SAM! RPM/OSC: Lofton Carr

PHONE NUMBER: _____

SITE NAME: Howard High School Landfill INCLUDE ALL ALIASES

ADDRESS: _____ (STREET, TOWNSHIP,

(NO P.O. BOXES) _____ NEAREST INTERSECTION)

COUNTY: _____ CITY/STATE: Hamilton, TN

ZIP CODE: _____

LONGITUDE: _____ LATITUDE: _____

LEAD: (CIRCLE ONE OF THE FOLLOWING: U.S. COAST GUARD, EPA FUND-FINANCED, STATE FUND-FINANCED, STATE NO FUND MONEY, RESPONSIBLE PARTY, MIXED FUNDING-FED/RP, FEDERAL ENFORCEMENT, STATE ENFORCEMENT, FEDERAL FACILITY, PRP LEAD UNDER STATE, PRP RESPONSE UNDER STATE, EPA IN-HOUSE)

SPILL ID: WP LAN REF #: 3826

EPA ID (DUNN & BRADSTREET): TND100842343

SITE HISTORY: (PRE-REMOVAL, REMOVAL DATE, PRE-NPL, NPL RANKING, ETC.)

_____

_____

_____

### FMS ACTION

| | | |
|---|---|---|
| _ | TFA04D7 | GENERAL SUPPORT/MGMT (7) |
| _ | TFA04D8 | REMOVAL ACTIVITIES (8) |
| | | REMOVAL CONTRACT (E, Y) |
| 4 | TFA04D9 WP | REMEDIAL ACTIVITIES (9) |
| | | REMEDIAL CONTRACT (L,N,P,R,H) |
| | | FEDERAL FACILITY (4) |
| 4 | TFA04DU WP | LAB ANALYSIS (U) |
| 4 | TGB04D 4 + 5 WP | ENFORCEMENT (4, 5, 6) |
| _ | TGB04DP | RP OVERSIGHT (P) |
| 4 | TJB04D 5 WP | REGIONAL COUNSEL (4, 5, 6) |

DATE SUBMITTED: 4/25/94 SIGNATURE: A.M. Stevens, PTMU

SF ADMIN STAFF REVIEW: ORIGINATOR ____ STAFF ____ TEAM LEADER ____

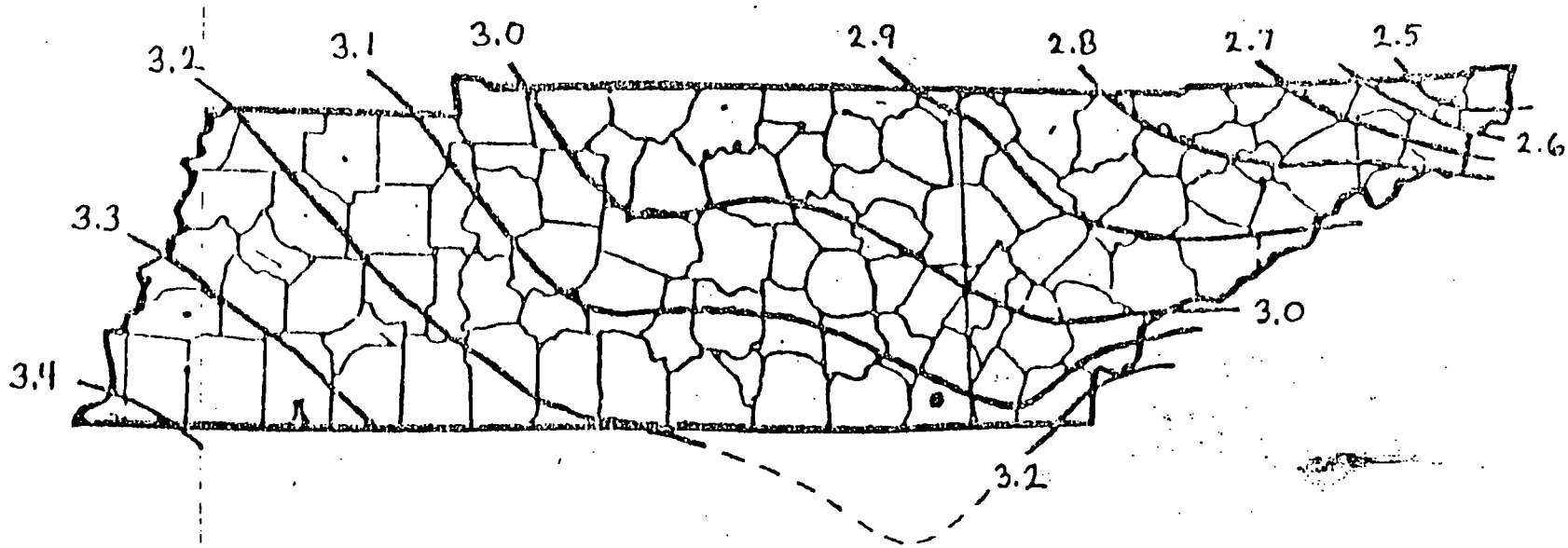
SAL ID DATABASE: _____ (DATE/INITIALS)

WASTELAN ACTION: ADDED SITE ( ) ADDED SPILL ID ( )

CC: WILLIAMS, STEVENS, SAL FILE, BUDGET REVISED 1/94

Site No. TND 100842343

Ref. No. 15




1-YEAR 24-HOUR RAINFALL (INCHES)

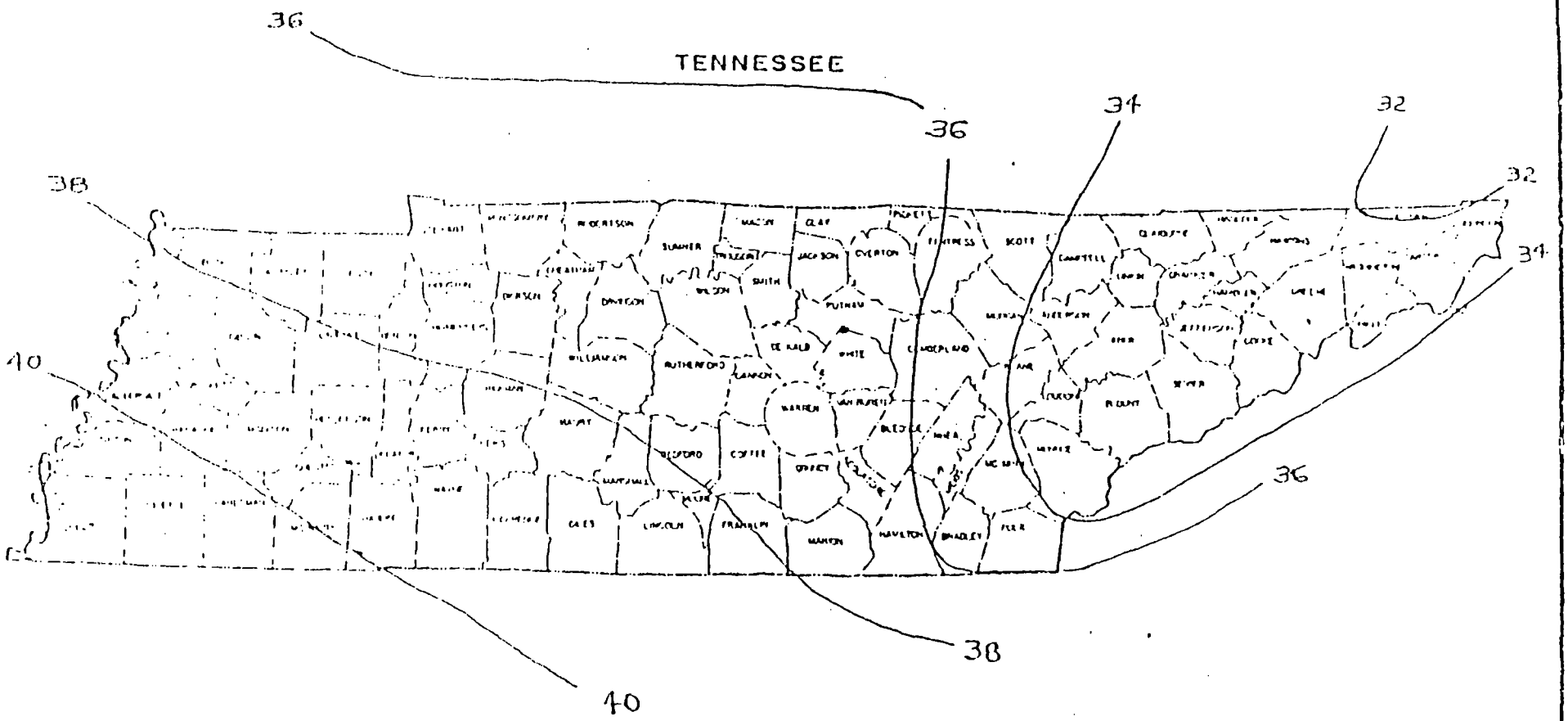



FIGURE 4
**MEAN ANNUAL LAKE EVAPORATION**
**(IN INCHES)**

TENNESSEE

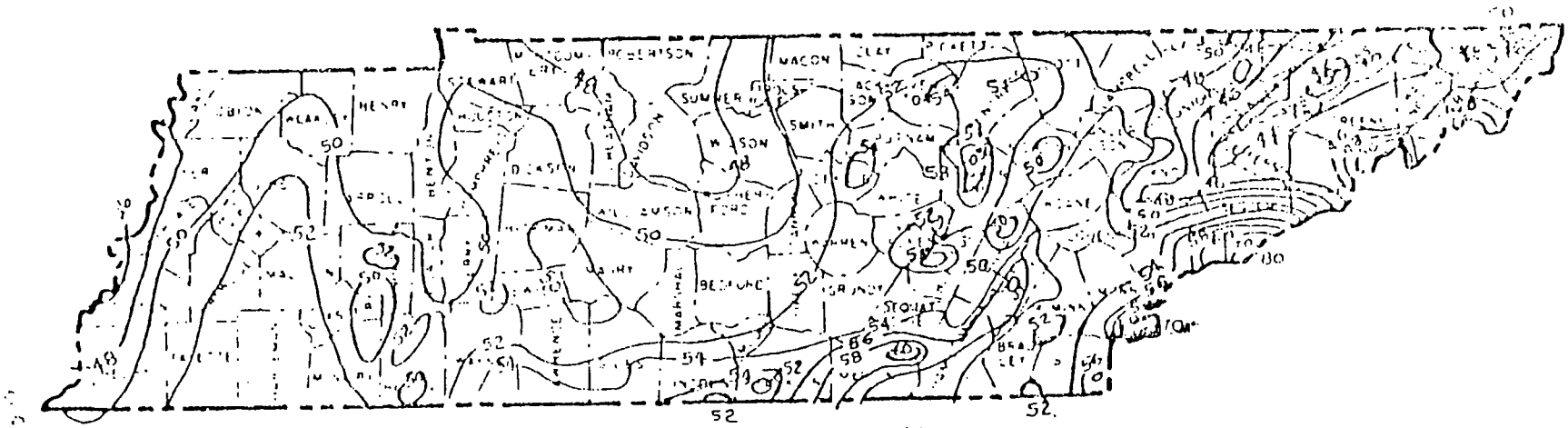



FIGURE 5
AVERAGE ANNUAL PRECIPITATION, IN INCHES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-75 at Chattanooga, Tenn.]

| Month | Temperature[1] | | | | | | Precipitation[1] | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Average daily maximum | Average daily minimum | Average daily | 2 years in 10 will have-- Maximum temperature higher than-- | 2 years in 10 will have-- Minimum temperature lower than-- | Average number of growing degree days[1] | Average | 2 years in 10 will have-- Less than-- | 2 years in 10 will have-- More than-- | Average number of days with 0.10 inch or more | Average snowfall |
| | °F | °F | °F | °F | °F | Units | In | In | In | | In |
| January---- | 49.4 | 30.0 | 39.7 | 73 | 5 | 31 | 5.30 | 3.28 | 7.12 | 9 | 1.8 |
| February--- | 53.0 | 31.7 | 42.4 | 74 | 9 | 48 | 5.16 | 2.97 | 6.94 | 8 | 1.3 |
| March------ | 60.6 | 38.3 | 49.5 | 82 | 19 | 121 | 5.99 | 3.24 | 8.23 | 9 | .7 |
| April------ | 72.5 | 47.4 | 60.0 | 89 | 29 | 306 | 4.40 | 2.47 | 5.96 | 7 | .0 |
| May-------- | 80.2 | 55.5 | 67.9 | 93 | 37 | 555 | 3.76 | 2.25 | 5.10 | 7 | .0 |
| June------- | 86.5 | 63.7 | 75.2 | 97 | 48 | 756 | 3.32 | 1.78 | 4.57 | 7 | .0 |
| July------- | 89.1 | 67.8 | 78.5 | 99 | 56 | 894 | 4.64 | 2.13 | 6.69 | 8 | .0 |
| August----- | 88.6 | 67.1 | 77.9 | 98 | 56 | 865 | 3.51 | 1.99 | 4.75 | 7 | .0 |
| September-- | 83.1 | 61.0 | 72.1 | 97 | 43 | 663 | 3.89 | 1.76 | 5.62 | 6 | .0 |
| October---- | 72.8 | 48.0 | 60.4 | 88 | 28 | 332 | 2.94 | 1.27 | 4.28 | 5 | .0 |
| November--- | 60.3 | 37.0 | 48.7 | 79 | 19 | 58 | 3.97 | 2.39 | 5.38 | 7 | .0 |
| December--- | 51.3 | 31.8 | 41.6 | 73 | 10 | 33 | 5.45 | 3.07 | 7.39 | 8 | .8 |
| Year----- | 70.6 | 48.3 | 59.5 | 100 | 3 | 4,652 | 52.33 | 45.16 | 59.23 | 98 | 4.6 |

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50° F).

Site No. TND 1008 42343

Ref. No. 16

| | MAILING NAME | | SOURCE NAME | LAT | LONG | RIVER MILE | AVERAGE PROD. (GPD) | POPULATION SERVED | TELEPHONE NUMBER |
|---|---|---|---|---|---|---|---|---|---|
| 0000474 | MORRISTOWN WATER DEPT<br>P O BOX 667<br>MORRISTOWN | 37814 | CHEROKEE LAKE | 036-15-39 | 083-17-08 | 075.5R003.5 | 005,786,000 | 029,747 | 615-586-4121 |
| | | | HAVLEY SPRING | 036-13-28 | 083-17-47 | 075.5R003.5 | | | |
| | | | WELLS | 036-13-34 | 083-17-44 | 075.5R003.5 | | | |
| | | | HAVELY SPG CK | 036-13-29 | 083-17-48 | 075.5R003.5 | | | |
| 0000476 | RIVE'S TRAILER COURT<br>1590 ELLER RD.<br>MORRISTOWN | 37814 | WELL | 036-10-10 | 083-20-32 | | 000,000,000 | 000,078 | 615-581-5401 |
| 0000598 | RUSSELLVILLE WHITESBURG U D<br>P.O. BOX 127<br>RUSSELLVILLE | 37860 | MORRISTOWN WATE | 036-15-41 | 083-17-10 | | 000,539,000 | 003,263 | 615-586-2232 |
| 0000650 | SOUTH MORRISTOWN-WITT UTIL DIS<br>P O BOX 237<br>MORRISTOWN | 37814 | MORRISTOWN WATE | 036-15-41 | 083-17-10 | | 003,160,000 | 002,114 | 615-581-4895 |
| HAMILTON | | | | | | | | | |
| 0000169 | DAISY-SODDY-FALLING WATER U.D.<br>P.O. BOX 575<br>SODDY-DAISY | 37379 | SODDY CK EMB | 035-16-55 | 085-03-17 | 004.2 | 000,832,000 | 003,163 | 615-332-2427 |
| | | | SODDY WELL #1 | 035-16-58 | 085-09-14 | 004.2 | | | |
| | | | FALL WAT WELL#2 | 035-11-43 | 085-15-53 | 004.2 | | | |
| 0000219 | EASTSIDE UTILITY DISTRICT<br>PO BOX 22037<br>CHATTANOOGA | 37422 | WELL | 035-07-50 | 085-04-57 | | 000,348,000 | 023,984 | 615-892-2890 |
| | | | TN-AMERICAN | 035-03-15 | 085-17-19 | | | | |
| 0000303 | HIXSON UTILITY DISTRICT<br>5305 AUSTIN ROAD<br>HIXSON | 37343 | CAVE SPRINGS | 035-11-47 | 085-13-55 | | 003,167,000 | 013,631 | 615-877-3513 |
| 0000168 | MOWBRAY MOUNTAIN UTILITY DIST<br>1321 MONTLAKE RD.<br>SODDY-DAISY | 37379 | DAISY SODDY UD | 035-14-25 | 085-12-51 | | 000,975,000 | 001,068 | 615-332-4581 |
| 0000605 | SALE CREEK UTILITY DISTRICT<br>PO BOX 557<br>SALE CREEK | 37373 | 2 WELLS | 035-22-38 | 085-05-34 | | 000,204,000 | 000,978 | 615-332-1646 |

| | MAILING NAME | | SOURCE NAME | LAT | LONG | RIVER MILE | AVERAGE PROD. (GPD) | POPULATION SERVED | TELEPHONE NUMBER |
|---|---|---|---|---|---|---|---|---|---|
| 0000613 | SAVANNAH VALLEY U. D. | | | | | | | | |
| | 7104 SMITH ROAD | | | | | | | | |
| | COLTEWAH | 37363 | WELL #1 | 035-14-27 | 085-00-40 | | 000,748,000 | 035,425 | 615-344-3440 |
| | | | WELL #2 | 035-14-22 | 085-00-38 | | | | |
| 0000634 | SIGNAL MOUNTAIN WATER SYSTEM | | | | | | | | |
| | 733 RIDGEWAY AVE. | | | | | | | | |
| | SIGNAL MOUNTAIN | 37377 | TENN AMERICAN | 035-03-15 | 085-17-19 | | 000,895,000 | 035,583 | 615-885-2177 |
| 0000107 | TENN-AMERICAN WATER CO. | | | | | | | | |
| | 1101 BROAD STREET | | | | | | | | |
| | CHATTANOOGA | 37402 | TENN RIVER | 035-03-15 | 085-17-19 | 465.3 | 036,810,000 | 175,142 | 615-755-5811 |
| 0000037 | UNION FORK-BAKEWELL U.D. | | | | | | | | |
| | RETRO HUGHES ROAD | | | | | | | | |
| | BAKEWELL | 37304 | 2 WELLS | 035-20-53 | 085-07-44 | | 000,192,000 | 001,756 | 615-332-9733 |
| 0000635 | WALDEN RIDGE UTILITY DISTRICT | | | | | | | | |
| | 2112 TAFT HIGHWAY | | | | | | | | |
| | SIGNAL MOUNTAIN | 37377 | TWO WELLS | 035-11-26 | 085-16-03 | | 000,466,030 | 035,096 | 615-886-2683 |
| 0000776 | WHITE OAK MOUNTAIN WATER ASSOC | | | | | | | | |
| | DRAWER U | | | | | | | | |
| | COLLEGEDALE | 37315 | EASTSIDE U. D. | - - | - - | | 000,005,000 | 000,095 | 615-396-2208 |
| HANCOCK | | | | | | | | | |
| 0000640 | SNEEDVILLE U D | | | | | | | | |
| | PO BOX 255 | | | | | | | | |
| | SNEEDVILLE | 37869 | CHARLIE GREEN S | 036-30-20 | 083-10-40 | 000000 | 000,248,000 | 001,470 | 615-733-4382 |
| | | | BRIER CREEK TRI | 036-30-48 | 083-15-31 | 000000 | | | |
| HARDEMAN | | | | | | | | | |
| 0000063 | BOLIVAR WATER SYSTEM | | | | | | | | |
| | 115 NORTH WASHINGTON STREET | | | | | | | | |
| | BOLIVAR | 38008 | WELL | 035-15-20 | 088-59-55 | | 001,312,000 | 007,975 | 901-658-2553 |
| 0000452 | CROFT UTILITIES COMPANY | | | | | | | | |
| | 2469 BRANDEMERE DRIVE | | | | | | | | |
| | GERMANTOWN | 38138 | WELL | 035-02-35 | 089-59-40 | | 000,010,000 | 000,093 | 901-756-0864 |
| 0000267 | GRAND JUNCTION WATER DEPT | | | | | | | | |
| | P.O. BOX 25, CITY HALL | | | | | | | | |
| | GRAND JUNCTION | 38039 | 2 WELLS | 035-03-00 | 089-11-00 | | 000,213,000 | 001,032 | 901-764-2971 |
| 0000451 | GRAND VALLEY LAKES WATER SYSTE | | | | | | | | |
| | P.O. BOX 11314, 175 TILMAN BLD | | | | | | | | |
| | MEMPHIS | 38111 | WELL | 035-08-30 | 089-03-30 | | 000,013,900 | 000,330 | 901-376-8413 |
| 0000312 | HORNSBY WATER DEPT | | | | | | | | |
| | P.O. BOX 40 | | | | | | | | |
| | HORNSBY | 38044 | BOLIVAR | 035-15-20 | 088-59-55 | | 000,062,000 | 000,999 | 901-658-2300 |

Site No. TND 100842343

Ref. No. 17

TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

OFFICE CORRESPONDENCE

| FROM | TO | DATE |
|---|---|---|
| RLP | GSC | |
| | | |
| | | |
| | | |
| | | |

DATE: November 20, 1987

TO: Howard High School Dump File Site # 33-606

FROM: Robert L. Powell

SUBJECT: Geologic Assessment of the Howard High School Dump Site

LOCATION

The Howard High School Dump Site is located behind Howard High School on South Market Street just north of the Alton Park section of Chattanooga. The I-75 Expressway system is just to the north of the site. Chattanooga Creek borders the site on the south and east sides of the site. (Ref. #1)

TOPOGRAPHY

The site lies in an area of low relief very near the floodplain of the Tennessee River which is less that 1 mile to the west of the site. The area appears to be karst based on the number of depressions surrounding the site. (Ref. #1) In the immediate site vicinity the relief appears to be between 30 to 40 feet above Chattanooga Creek. (ref. #1)

GEOLOGY

This site is underlain by two distinct mappable groups of rocks that are separated by a major thrust fault. In the west half of the site the rocks are known as the Chickamauga Supergroup, Undifferentiated. This group is described as a limestone, gray, mostly fine- to medium-grained, thin- to thick-bedded, in part shaly and nodular. Locally, it contains beds of crystalline limestone, and reddish silty limestone. It's thickness is between 1500 to 1800 feet thick. In the east the site is underlain by the Knox Group, Undifferentiated. This group is described as a dolomite and minor limestone, very siliceous, light to dark-gray, fine to coarse-grained, thin- to thick-bedded, and weathers to a cherty rubble. The thickness is about 2600 feet thick. The structure of the rocks in the vicinity is very complex. The Chickamauga outcrop is controlled by the thrust fault known as the Chattanooga Fault, and an associated fault that splays off of it. Between these faults the Chickamauga Supergroup is thrust up forming a wedge of rocks that is not expressed at the surface less that a mile north of the site. (Ref. #2) As mentioned above the Chattanooga Fault dissects the site in half creating complex conditions for groundwater migration routes.

| FROM | DATE |
|---|---|
| | |

TO

HYDROLOGY; SURFACE:

The site is bordered on the east and south by Chattanooga Creek. All surface drainages and tributaries enter Chattanooga Creek and it flows west between 1 and 1.5 miles and enters the Tennessee River in the Moccasin Bend Area. (Ref #1)

PH-0001
SR 377

HYDROLOGY; - SUBSURFACE:

The prominent unconsolidated material at the site is alluvium. It is not known to be an important source of groundwater due to its thin nature. Some residuum blankets the bedrock in the site vicinity. Where present its thickness varies from 30 to 50 feet thick in this area. Where the residuum overlies limestones of the Chickamauga Supergroup it generally has very low permeability and low water yield. However, where it overlies the Knox it contains larger angular fragments (mostly chert), and normally will yield water sufficient for most domestic purposes. The most productive zone appears to be at the contact of the residuum-bedrock. (ref.#2)

The amount of water produced from bedrock aquifers is largely dependent on the amount of fracturing and solutionally enlarged zones that are encountered in the bedrock. (ref. #3) However, from well history data some general statements can be made concerning the yields from specific geologic horizons. Wells drilled in the Nashville Group, the upper formations of the Chickamauga Supergroup, in general yield small amounts of water. Therefore these are considered poor aquifers. Also many wells contain traces of hydrogen sulfide. Wells drilled into the Stones River Group, the lower formations of the Chickamauga Supergroup, yield moderate amounts of water if solution cavaties of fractures are penetrated. The Knox Group produces the best aquifers in the area. Water yields are high and springs are numerous in this geologic horizon. (ref. #2, p. 119-121)

SITE DESCRIPTION:

For a description of the site as to its specific conditions relating to Superfund see the Site Investigations Package for the Howard High School Dump.

## REFERENCES


1. (1976) Chattanooga Quadrangle Topographic Map 105-SE.

2. Edward T. Luther (1979): Geology of Hamilton County, TN Bulletin 79, Tennessee Division of Geology, p. 119.

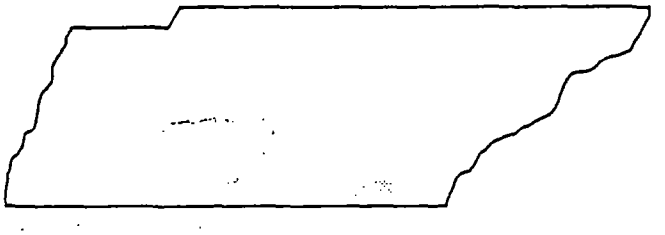
3. G. D. DeBuchananne and R.M. Richardson (a956): Groundwater Resources of East Tennessee, Bulletin 58, Tennessee Division of Geology, p. 186.

Site No. TND 100842343

Ref. No. 18

# CHATTANOOGA CREEK SURVEY 1981-1982

water management
TENNESSEE



TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

# SURVEY OF CHATTANOOGA CREEK--MOUTH TO STATE LINE
# AQUATIC FLESH, WATER QUALITY, SEDIMENT, AND BENTHIC BIOLOGY
# WITH
# DATA PRESENTATION ON HAMILL ROAD DUMP
# CHATTANOOGA, TENNESSEE

1981 and 1982

PREPARED BY:
CHATTANOOGA BASIN OFFICE OF
DIVISION OF WATER MANAGEMENT
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT

JUNE 1983

AUTHORIZATION NO. 0890

CHATTANOOGA CREEK SURVEY
TENNESSEE DEPARTMENT OF HEALTH AND ENVIRONMENT
CHATTANOOGA, TENNESSEE
1981 and 1982

## EXECUTIVE SUMMARY

The water of Chattanooga Creek in Chattanooga, Hamilton County, Tennessee, is heavily contaminated with bacteria from sewage and municipal wastewater originating in the City of Chattanooga and other areas of both Georgia and Tennessee. Various areas of the bottom sediments of Chattanooga Creek are contaminated with organic chemicals and metals from a variety of sources, including the Hamill Road Dump area in Chattanooga. This report describes the extent of the water and sediment contamination. Also presented are a description of the benthic biota existing in the stream and results of a limited aquatic flesh survey. Recommendations are made relative to both immediate protection of the public health and future efforts at clean up. A recommendation is made for posting the creek from its mouth to the Tennessee/Georgia state line prohibiting human contact by swimming, wading, or fishing.

APPENDIX I

APR 13 1981

# TENNESSEE TOXICS PROGRAM

P.O. BOX 1422, NASHVILLE, TN 37202 • (615) 251-1110

Press Release 4/13/81

Subject: survey of school Childrens' use of Chattanooga Creek

The Chattanooga Task Force of the Tennessee Toxics Program has completed a survey which shows that a considerable number of school children play, swim, and fish in contaminated Chattanooga Creek. The cooperation of city schools in Alton Park was obtained to conduct a survey of 5th, 6th, and 7th graders. The students filled out Task Force questionnaires under the supervision of their teachers.

A tabulation of the responses of a total of 232 students, 84% of whom live within 10 blocks of the Creek, showed that:

6% swim in the creek;
11% play in the creek;
13% fish in the creek; and
6% have eaten fish from the creek.

Larger percentages of the students said they had friends who swim in the creek, fish there, and eat the fish. The youngest group sampled, the 5th graders, indicated the greatest use of the creek:

9% swim in the creek;
20% play in the creek;
23% fish in the creek; and
8% have eaten fish from the creek.

The majority of the students rated the creek as "smelly" and "irritating," however, a significant number still thought the creek was "fun".

For more information, contact:

Mary M. Walker
Coordinator, Chattanooga
Task Force
1607 Shore View Lane
Chattanooga, Tn. 37445
phone: 875-2400

March 25, 1981

To The Teachers:

This is a sampling survey to determine to what extent Chattanooga Creek is being used by some of the nearby residents. We have included a map for your use in assisting students locating creek areas. Please distribute and then collect the questionnaires and return them to your principal.

Thank you for your help.

This survey is being made by an interested citizens group cooperating with an agency of the state of Tennessee. The Chattanooga school system has agreed to permit this survey to be taken.

Date 3-25-81

CHATTANOOGA CREEK

Please Circle One Answer To These Questions:

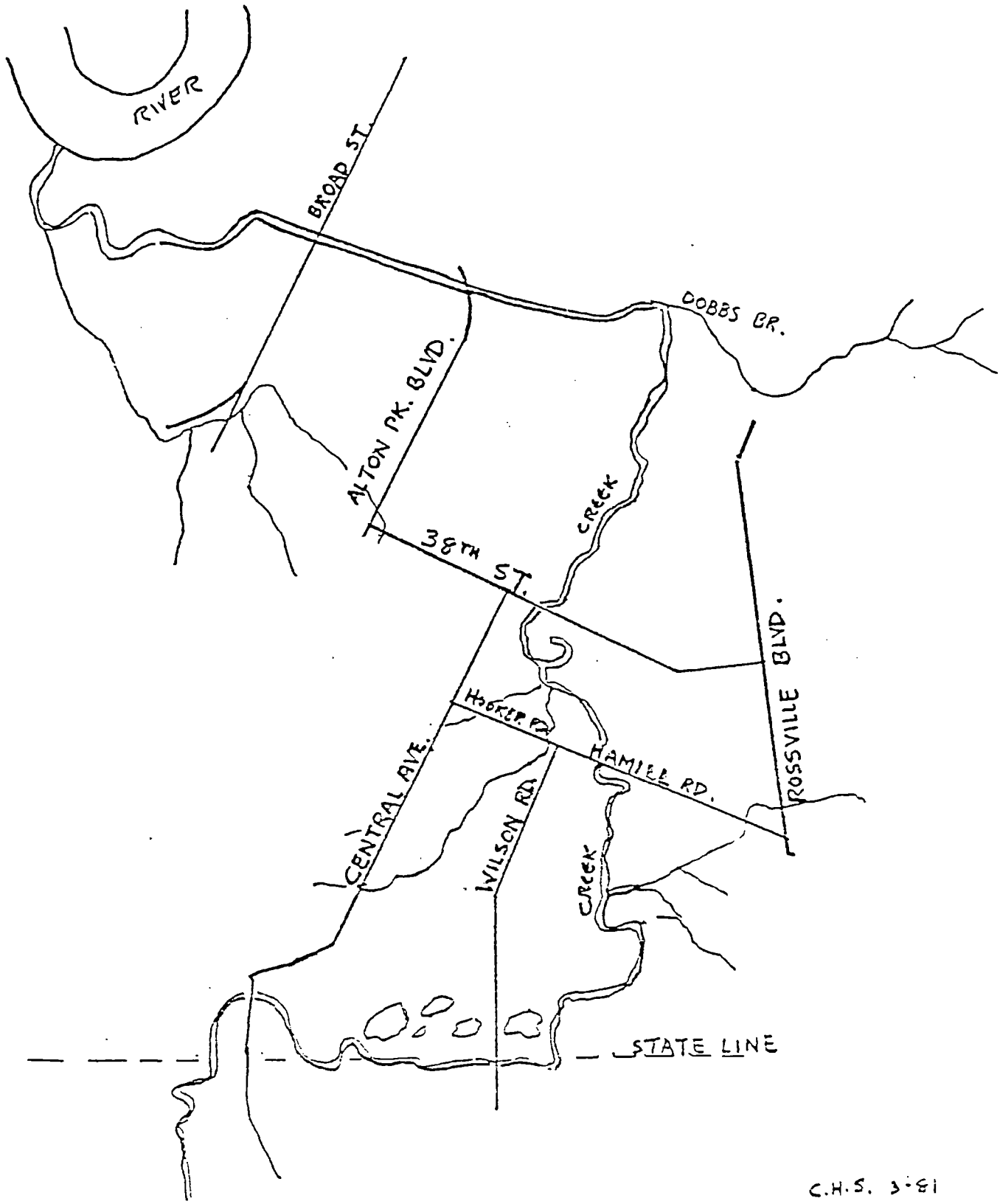
| | YES | NO |
|---|---|---|
| 1. Do you ever swim in the creek? | | |
| 2. Have any of your friends used the creek for swimming? | | |
| 3. Do you ever fish in the creek? | | |
| 4. Have any of your friends fished in the creek? | | |
| 5. Have you eaten any fish from the creek? | | |
| 6. Have any of your friends eaten fish from the creek? | | |
| 7. Do you play in the creek? | | |
| 8. Do any of your friends play in the creek. | | |
| 9. Have you seen any boating, canoeing etc. in the creek? | | |
| 10. If you don't use the creek, why not? | | |

Please Circle All Words That Fit:

1. I think the creek is fun, pretty, smelly, clean, irritating.
2. I live near the creek - 1 block, 2-3 blocks, 5 blocks, 5-10 blocks

THANK YOU VERY MUCH FOR YOUR HELP.

# CHATTANOOGA CREEK WATERS




C.H.S. 3-81

TND100842343

SITE SCREENING - PRELIMINARY SITE SCORING

FACILITY NAME Howard High School Landfill

LOCATION Chattanooga, Hamilton Co., Tenn.

PERSON(S) IN CHARGE OF FACILITY Chattanooga Board of Education
1161 W. 40th Street
Chattanooga, Tenn 37410

NAME OF REVIEWER G. S. Caruthers

DATE 5 Aug 87

COMMENTS

Closed city demolition and brush dump in operation 1972 - 1976. Not RCRA regulated. Evidence indicates some prohibited hazardous substances were placed onsite. Needs sampling to determine if migration to

PRELIMINARY SITE SCORING

SCORES: $S_m = 4.5$ ($S_{gw} = 5.3$ $S_{sw} = 5.8$)

$S_{dc}$ = Not Rated

Chattanooga Creek is ocurring. Cover & cap appear in good order.
Not a likely NPL candidate. No target population for GW or SW migration.

SITE SCREENING - PRELIMINARY SITE SCORING

PRELIMINARY GROUNDWATER SCORE

| | | | |
|---|---|---|---|
| 1) OBSERVED RELEASE<br>None reported | (0) 45 | | 0 |
| 2) ROUTE CHARACTERISTICS | | | |
| AQUIFER DEPTH<br>Unknown - assume 0-20 ft. | 0 1 2 (3) | X2 | 6 |
| NET PRECIPITATION<br>14.92 in | 0 1 (2) 3 | | 2 |
| PERMEABILITY<br>cherty clay - Karst features present | 0 1 (2) 3 | | 2 |
| PHYSICAL STATE<br>Assume liquid & sludge | 0 1 2 (3) | | 3 |
| | TOTAL ROUTE SCORE | | 13 |
| 3) CONTAINMENT<br>No liner, good cap | 0 1 2 (3) | | 3 |
| 4) WASTE CHARACTERISTICS | | | |
| TOXICITY/PERSISTENCE<br>Assume dust & ash containing toxic metals | 0 3 6 9 12 15 (18) | | 18 |
| WASTE QUANTITY<br>Assume >2500 yd³. | 0 1 2 3 4 5 6 7 (8) | | 8 |
| | TOTAL WASTE SCORE | | 26 |
| 5) TARGETS | | | |
| GROUNDWATER USE<br>Commercial/industrial alternate source available | 0 (1) 2 3 | X3 | 3 |
| WELL DISTANCE/ | (0) 4 6 8 10 12 16 18 | | |
| POPULATION SERVED<br>None identified | 20 24 30 32 35 40 | | 0 |
| | TOTAL TARGETS SCORE | | 3 |

OBSERVED RELEASE: MULTIPLY (1) X (4) X (5)
NO OBSERVED RELEASE: MULTIPLY (2) X (3) X (4) X (5) 3,042

DIVIDE BY 57330 AND MULTIPLY BY 100 $S_{gw}$ 5.3

SITE SCREENING - PRELIMINARY SITE SCORING

PRELIMINARY SURFACE WATER SCORE

| | | | |
|---|---|---|---|
| 1) OBSERVED RELEASE<br>None reported | (0) 45 | | 0 |
| 2) ROUTE CHARACTERISTICS | | | |
| TERRAIN/FACILITY SLOPE<br>Site is in flood plain of Chatt. Cr. & is occasionally flooded | 0 1 2 (3) | | 3 |
| 1yr. 24 hr. RAINFALL<br>3.1 in | 0 1 2 (3) | | 3 |
| SURFACE WATER DISTANCE<br>< 1000 ft | 0 1 2 (3) | X2 | 3 |
| PHYSICAL STATE<br>Assume liquid & sludge | 0 1 2 (3) | | 3 |
| | TOTAL ROUTE SCORE | | 12 |
| 3) CONTAINMENT<br>LF covered & capped no diversion system | 0 1 (2) 3 | | 2 |
| 4) WASTE CHARACTERISTICS | | | |
| TOXICITY/ PERSISTENCE<br>Assume dust & ash containing toxic metals | 0 3 6 9 12 15 (18) | | 18 |
| WASTE QUANTITY<br>Assume > 2500 yd³. | 0 1 2 3 4 5 6 7 (8) | | 8 |
| | TOTAL WASTE SCORE | | 26 |
| 5) TARGETS | | | |
| SURFACE WATER USE<br>fishing, boating | 0 1 (2) 3 | X3 | 6 |
| SENSITIVE ENVIRONMENT DISTANCE<br>None identified | (0) 1 2 3 | X2 | 0 |
| POPULATION SERVED/ WATER INTAKE DISTANCE<br>None identified | (0) 4 6 8 10 12 16 18<br>20 24 30 32 35 40 | | 0 |
| | TOTAL TARGETS SCORE | | 6 |

OBSERVED RELEASE: MULTIPLY (1) X (4) X (5)
NO OBSERVED RELEASE: MULTIPLY (2) X (3) X (4) X (5) 3,744

DIVIDE BY 64350 AND MULTIPLY BY 100 $S_{sw}$ 5.8

SITE SCREENING - PRELIMINARY SITE SCORING

PRELIMINARY AIR ROUTE WORK SHEET Not Rated

| | | | |
|---|---|---|---|
| 1) OBSERVED RELEASE | 0 45 | | ___ |
| 2) WASTE CHARACTERISTICS | | | |
| REACTIVITY & INCOMPATIBILITY | 0 1 2 3 | | ___ |
| TOXICITY | 0 1 2 3 | X3 | ___ |
| HAZARDOUS WASTE QUANTITY | 0 1 2 3 4 5 6 7 8 | | ___ |
| | TOTAL WASTE SCORE | | ___ |
| 3) TARGETS | | | |
| POPULATION IN 4-MILE RADIUS | 0 9 12 15 18 21 24 27 30 | | ___ |
| DISTANCE TO SENSITIVE ENVIRONMENT | 0 1 2 3 | X2 | ___ |
| LAND USE | 0 1 2 3 | | ___ |
| | TOTAL TARGETS SCORE | | ___ |

MULTIPLY (1) X (2) X (3) _____

DIVIDE BY 35,100 AND MULTIPLY BY 100 $S_a$ _____

SITE SCREENING - PRELIMINARY SITE SCORING

| | S | $S^2$ |
|---|---|---|
| GROUNDWATER ROUTE SCORE ($S_{gw}$) | 5.3 | 28.09 |
| SURFACE WATER ROUTE SCORE ($S_{sw}$) | 5.8 | 33.64 |
| AIR ROUTE SCORE ($S_a$) | 0.0 | 0.00 |

$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}/1.73 = S_M =$ 4.5

SITE SCREENING - PRELIMINARY SITE SCORING

| PRELIMINARY DIRECT CONTACT SCORE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Not Rated | | | |
| 1)OBSERVED INCIDENT | 0 | | | | 45 | | | ___ |
| 2) ACCESSIBILITY | 0 | 1 | 2 | 3 | | | | ___ |
| 3) CONTAINMENT | 0 | 1 | 2 | 3 | | | | ___ |
| 4) WASTE CHARACTERISTICS TOXICITY | 0 | 1 | 2 | 3 | | | X5 | ___ |
| 5) TARGETS POPULATION WITHIN 1 mi. RADIUS | 0 | 1 | 2 | 3 | 4 | 5 | X4 | ___ |
| DISTANCE TO CRITICAL HABITAT | 0 | 1 | 2 | 3 | | | X4 | ___ |
| | | | | | TOTAL TARGETS SCORE | | | ___ |

OBSERVED INCIDENT: MULTIPLY (1) X (4) X (5)
NO OBSERVED INCIDENT: MULTIPLY (2) X (3) X (4) X (5) ___

DIVIDE BY 21600 AND MULTIPLY BY 100 $S_{dc}$ ___

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FEB 17 1994

4WD-ERRB

Mr. Clinton Willer
Division of Superfund
Department of Environment & Conservation
4th Floor, L&C Tower
Nashville, Tennessee 37243-1538

SUBJ: Howard High School Dump, Chattanooga, Tennessee

Dear Mr. Willer:

The U.S. Environmental Protection Agency's (EPA) Emergency Response and Removal Branch (ERRB) reviewed the available information for the above referenced site to determine its eligibility for a potential removal action under the National Contingency Plan (NCP). The site information was evaluated using criteria from Section 300.415 of the NCP and current ERRB program guidance.

Based upon ERRB's review, the above site does not meet the criteria for removal eligibility. The site does not pose an immediate threat based on review of the January 1994 Site Investigation Prioritization Narrative Report prepared for the State and a site investigation on February 11, 1994, by On-Scene Coordinator, Paul Peronard. Surface soil samples collected for the site investigation do not indicate contamination at concentrations which pose an immediate threat warranting removal action. This determination does not preclude any other investigation activities or response actions by other parties which may still be appropriate for this site. Should site conditions change or additional information become available, ERRB will re-evaluate this site as necessary.

Should you have any questions concerning ERRB's determination, please contact Mr. Shane Hitchcock, Chief of Removal Operations Section, at (404) 347-3931 extension 6122.

Sincerely,

Myron D. Lair, Chief
Emergency Response and Removal
Branch

cc: Narindar Kumar, Site Assessment Section, EPA

Printed on Recycled Paper

HOWARD HIGH SCHOOL DUMP

[7] From: SSpurlin 2/15/94 11:40AM (844 bytes: 16 ln)
To: TPalmer
Subject: Howard High School
---------- Message Contents ----------

To: RAT File

From: Steve Spurlin, OSC

Date: 2-15-94

Subject: RAT assessment for Howard High School Dunp

Based on my review of the January 1994 Site Investigation Prioritization Narrative Report prepared for the State, and a 2/11/94 site visit by OSC Peronard, this Site does not pose an immediate threat. Surface soil samples collected for the SI do not indicate contamination at concentrations which pose an immediate threat warranting a removal action. I recommend that this Site be a No Further Action site, and a letter stating such be sent to the appropriate persons.

Window: 1 - 24 Lines: 20 Edit: Help: F1 End: ENTER

# SUPERFUND RECORD CENTER DOCUMENT TRANSMITTAL FORM

Date 12/10/01

Name NESTOR YOUNG

Site Name HOWARD HIGH SCHOOL LANDFILL

Site ID# TND 100842343

Please check type(s) of document below (see complete Superfund Site File Structure on back)

✓ 1.0 Pre-Remedial
____ 2.0 Removal Response
____ 3.0 Remedial Investigation (RI)
____ 4.0 Feasibility Study (FS)
____ 5.0 Record of Decision (ROD)
____ 6.0 Remedial Design (RD)
____ 7.0 Remedial Action (RA)
____ 8.0 Site Closeout
____ 9.0 State Coordination
____ 10.0 Enforcement
____ 11.0 Potentially Responsible Party (PRP)
____ 12.0 Cost Documentation
____ 13.0 Community Relations
____ 14.0 Congressional Relations
____ 15.0 Freedom of Information Act (FOIA)
____ 16.0 Natural Resource Trustee
____ 17.0 Site Management Records
____ 18.0 Initial Remedial (IRM) Records
____ 19.0 Administrative Cost Recovery
____ 20.0 Resource Conservation and Recovery Act (RCRA) Records

Other _____

Special Instruction: _____

*Record Center Use Only*

Checked in by _____ Date _____

Filed by _____ Date _____

# EPA Region IV Superfund NPL and Removal Site File Structure

**1.0 Pre-Remedial**
- 1.1 Correspondence
- 1.2 Sampling and Analysis Data
- 1.3 Scopes of Work
- 1.4 Work Plans and Progress Reports
- 1.5 Cost Reports and Invoices
- 1.6 Interagency and Cooperative Agreements
- 1.7 CERCLA Site Discovery
- 1.8 Preliminary Assessment Documents
- 1.9 Site Inspection Documents
- 1.10 Expanded Site Inspection Documents
- 1.11 Hazard Ranking System(HRS) Documents
- 1.12 Proposal of Site to the NPL

**2.0 Removal Responses**
- 2.1 Correspondence
- 2.2 Sampling and Analysis Data
- 2.3 Scopes of Work
- 2.4 Work Plans and Progress Reports
- 2.5 Cost Reports and Invoices
- 2.6 Interagency and Cooperative Agreements
- 2.7 ARARS
- 2.8 Removal Response Reports
- 2.9 Action Memoranda
- 2.10 Pollution Reports (POLREPs)
- 2.11 On-Scene Coordinator (OSC) Reports
- 2.12 On-Site Registers and Logs
- 2.13 Daily Work Reports
- 2.14 Daily Financial Reports
- 2.15 Removal Response Subcontractor Documents
- 2.16 Delivery Orders/Purchase Orders
- 2.17 CERCLA Removal Site Records

**3.0 Remedial Investigation (RI)**
- 3.1 Correspondence
- 3.2 Sampling and Analysis Data
- 3.3 Scopes of Work
- 3.4 Work Plans and Progress Reports
- 3.5 Cost Reports and Invoices
- 3.6 Interagency and Cooperative Agreements
- 3.7 ARARS
- 3.8 Interim Deliverables
- 3.9 Action and Decision Memoranda
- 3.10 Remedial Investigation(RI)Reports
- 3.11 Health Assessments
- 3.12 Endangerment Assessments

**4.0 Feasibility Study (FS)**
- 4.1 Correspondence
- 4.2 Sampling and Analysis Data
- 4.3 Scopes of Work
- 4.4 Work Plans and Progress Reports
- 4.5 Cost Reports and Invoices
- 4.6 Interagency and Cooperative Agreements
- 4.7 ARARS
- 4.8 Interim Deliverables
- 4.9 Feasibility Study(FS)Reports
- 4.10 Proposed Plans for Selected Remedial Action

**5.0 Record of Decision (ROD)**
- 5.1 Correspondence
- 5.2 Responsiveness Summary
- 5.3 Scopes of Work
- 5.4 Work Plans and Progress Reports
- 5.5 Cost Reports and Invoices
- 5.6 Interagency and Cooperative Agreements
- 5.7 ARARS
- 5.8 ROD Briefing Documents
- 5.9 Record of Decision (ROD)

**6.0 Remedial Design (RD)**
- 6.1 Correspondence
- 6.2 Sampling and Analysis Data
- 6.3 Scopes of Work
- 6.4 Work Plans and Progress Reports
- 6.5 Cost Reports and Invoices
- 6.6 Interagency and Cooperative Agreements
- 6.7 ARARS
- 6.8 Remedial Design Documents

**7.0 Remedial Action(RA)**
- 7.1 Correspondence
- 7.2 Sampling and Analysis Data
- 7.3 Scopes of Work
- 7.4 Work Plans and Progress Reports
- 7.5 Cost Reports and Invoices
- 7.6 Interagency and Cooperative Agreements
- 7.7 ARARS
- 7.8 Remedial Action Documents

**8.0 Site Closeout**
- 8.1 Correspondence
- 8.2 Deletions from NPL
- 8.3 Operations and Maintenance
- 8.4 Contractor Work Plans and Progress Reports
- 8.5 Cost Reports and Invoice
- 8.6 Long Term Response

**9.0 State Coordination**
- 9.1 Correspondence
- 9.2 Letters of Credit
- 9.3 EPA/State Contracts
- 9.4 Quarterly Progress Reports
- 9.5 Quarterly Financial Reports
- 9.6 Co-op Agreements, Special Conditions, Amendments
- 9.7 Status of State Assurances
- 9.8 State Contractor Documents
- 9.9 Audits

**10.0 Enforcement**
- 10.1 Correspondence
- 10.2 PRP Enforcement Work Plans
- 10.3 Scopes of Work
- 10.4 Work Plans and Progress Reports
- 10.5 Cost Reports and Invoices
- 10.6 State and Local Enforcement Records
- 10.7 Department of Justice (DOJ) Referral Documents
- 10.8 Litigation Support Documents
- 10.9 General Negotiations
- 10.10 PRP-Specific Negotiations
- 10.11 EPA Administrative Orders
- 10.12 EPA Consent Decrees
- 10.13 Interviews, Depositions, and Affidavits
- 10.14 Pleadings-Directly Related to Trial
- 10.15 Trial Documents
- 10.16 Enforcement Confidential
- 10.17 Enforcement Legal Research
- 10.18 Enforcement Liens

**11.0 Potentially Responsible Party(PRP)**
- 11.1 General and Contractor Related Correspondence
- 11.2 PRP Lists
- 11.3 Scopes of Work
- 11.4 Contractor Work Plans and Progress Reports
- 11.5 Cost Reports and Invoices
- 11.6 Site Level-Evidence Government Agency Documents
- 11.7 PRP Steering Committee Documents
- 11.8 Contractor Deliverables
- 11.9 PRP-Specific Correspondence
- 11.10 PRP-Specific Evidence-Government Agency Documents
- 11.11 PRP-Specific Evidence
- 11.12 PRP-Specific Non-Evidence Documents
- 11.13 PRP-Specific Financial Status Reports
- 11.14 Title Searches
- 11.15 Non-Binding Allocation of Responsibility (NBAR)

**12.0 Cost Documentation**
- 12.1 Correspondence
- 12.2 Software Package for Unique Reports (SPUR Reports)
- 12.3 State Contracts
- 12.4 Contractor Work Plans and Progress Reports
- 12.5 Contractor Cost Reports and Invoices
- 12.6 Interagency and Cooperative Agreements
- 12.7 Cost Summaries
- 12.8 Contractor Deliverables
- 12.9 EPA Travel Vouchers
- 12.10 EPA Timesheets
- 12.11 Agency Indirect Cost
- 12.12 EPA Small Purchases
- 12.13 Cost Recovery Documentation Checklists
- 12.14 Contractor Cost Information

**13.0 Community Relations**
- 13.1 Correspondence
- 13.2 Mailing Lists
- 13.3 Scopes of Work
- 13.4 Work Plans and Progress Reports
- 13.5 Cost Reports and Invoices
- 13.6 Community Relations Plans
- 13.7 News Clippings and Press Releases
- 13.8 Public Meetings
- 13.9 Fact Sheets
- 13.10 Technical Assistance Grants

**14.0 Congressional Relations**
- 14.1 Correspondence
- 14.2 Transcripts
- 14.3 Testimonies
- 14.4 Published Hearing Records

**15.0 Freedom of Information ACT (FOIA) Management**
- 15.1 Correspondence
- 15.2 Requests
- 15.3 Responses

**16.0 Natural Resource Trustee**
- 16.1 Correspondence
- 16.2 Interagency Agreements/ Memoranda of Understanding
- 16.3 Natural Resource Trustee Release
- 16.4 Trustee Notification Form and Selection Guide
- 16.5 Technical Issue Papers

**17.0 Site Management Records**
- 17.1 Correspondence
- 17.2 Access Records
- 17.3 Site Security Records
- 17.4 Site Photographs and Maps
- 17.5 Site Descriptions and Chronologies
- 17.6 Site Management Plans
- 17.7 Reference Documents
- 17.8 State and Local Technical Reports
- 17.9 Site Safety Plans

**18.0 Initial Remedial (IRM) Records**
- 18.1 Correspondence
- 18.2 Sampling and Analysis Data
- 18.3 Scopes of Work
- 18.4 Work Plans and Progress Reports
- 18.5 Cost Reports and Invoices
- 18.6 Interagency and Cooperative Agreements
- 18.7 Operations and Maintenance Records
- 18.8 Initial Remedial Measure (IRM) Reports
- 18.9 Action Memoranda

**19.0 Administrative Cost Recovery**
- 19.1 Correspondence
- 19.2 Site Description
- 19.3 PRP Documentation
- 19.4 Background Information
- 19.5 Case Development
- 19.6 Cost Documentation
- 19.7 Final Disposition

**20.0 Resource Conservation and Recovery Act (RCRA) Records**
- 20.1 Correspondence
- 20.2 Notification Form - Part A
- 20.3 Notification Form - Part B
- 20.4 RCRA Facility Inspection Reports
- 20.5 RCRA Enforcement Action Records
- 20.6 Notification of Hazardous Waste Activity

**File Structure Amendments**
- 20.10 Administrative Records
- 20.12 Deletion Docket
- 20.15 Unorganized Site Files

Update 10/5/99

## REMEDIAL SITE ASSESSMENT DECISION - EPA REGION IV

**Site Name:** Howard High School Landfill **EPA ID#:** TND100842343

**Alias Site Names:** _____

**City:** Chattanooga **County or Parish:** Hamilton **State:** TN

**Refer to Report Dated:** 5/23/94;5/6/94;5/6/94resp **Report type:** Health CnsltnHHLF; Risk Rev. Comments HHSLF; Eco Rev HHSLF,resp.

**Report developed by:** TDEC for ATSDR; Mantech for EPA, Mantech for EPA, resp

**DECISION:**

| | **1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:**

| | 1a. Site does not qualify for further remedial site assessment under CERCLA (Site Evaluation Accomplished - SEA)

| | 1b. Site may qualify for further action, but is deferred to: | | RCRA | | NRC

|X| **2. Further Assessment Needed Under CERCLA:** 2a. (optional) Priority: | | Higher |X| Lower

2b. Activity Type: | | PA | | SI |X| ESI | | HRS evaluation

| | Other: _____

**DISCUSSION/RATIONALE:** SIP found contamination on site. PAH and metals. ATSDR Health Consultation concluded based on available information that HHSLF does not indicate a public health hazard to students teachers or area residents to exposure to soil on school property. ATSDR recommends further sampling. EPA Risk Reviewconcludes that the site does not appear to pose an immediate risk to human health and recommends more sampling for more accurate estimate of risk. Eco risk review indicates PAH concentrations present can have ecological effects but it has not been determined if any organisms have been impacted. Recommend low priority for further action

**Report Reviewed and Approved by:** Loften Carr Signature: _____ Date: 3/20/95

**Site Decision Made by:** Loften Carr Signature: _____ Date: 3/20/95

EPA Form # 9100-3

REC'D.

JUN 3 1994

MEMORANDUM

Date: May 23, 1994

To: Andy Binford
Technical Section Manager
Division of Superfund
Tennessee Department of Environment and Conservation

From: Epidemiologist, EEP, TDH

Subject: Health Consultation on Howard School
Through: Director, DHAC, ATSDR (E32) HE
Acting Chief, ERCB, DHAC, ATSDR (E57)
Acting Chief, TSS, ERCB, DHAC, ATSDR (E57) Kgo

**BACKGROUND AND STATEMENT OF ISSUES**

Andy Binford of the Division of Superfund asked for a health consultation concerning possible exposures to polyaromatic hydrocarbons (PAHs) in the soil at Howard School in Chattanooga, Tennessee. The specific questions asked are as follows:

> Do the levels of PAHs measured at the site pose an acute or chronic risk to the children at the daycare center, the children at the high school, or the teachers or staff at the daycare center or high school?
>
> If a risk is present, please quantify the risk.

Howard School is in the Alton park section of Chattanooga. A former, unregulated landfill occupies a large portion of the school property. The former landfill is on land that was once a part of the channel of Chattanooga Creek; the creek bed was moved in the 1960's and the original channel became a landfill. A daycare center is on school property and sits on the former landfill. A football practice field, soccer field, and baseball field are bounded on one side by the former landfill. The biology classes have a biology study area near the daycare center that extends a short distance into the former landfill. A road into the landfill provides access from the baseball field [1]. See Figure 1.

The elementary school has 417 students and 27 teachers; the high school (grades 9 - 12) has 1,074 students and 65 teachers; the daycare center has 55 children and 15 teachers. Only 6 children attend the daycare center in the summer. A public housing project across Machine Street from the school has 192 units and 150 residents. Within 1/4 mile of the school, the population is approximately 2,200.

Anecdotal information indicates that football players have experienced skin rashes after practicing football on the practice field. Biology classes have taken samples of water from the biology study area that are black and smell bad [2]. Environmental personnel believe that this water is gray water that flows from the school showers through tile fields, seeping out to the surface [3]. This gray water is accessible to the public.

The residents of the Alton Park section have been concerned about pollution from Chattanooga Creek, area industries, and area Superfund sites for many years. There are 42 known or suspected hazardous waste sites near the creek; several of these are State Promulgated Superfund sites and several are being considered/investigated for inclusion on EPA's National Priorities List (NPL) [4].

The Tennessee Division of Water Pollution Control (DWPC) thoroughly sampled Chattanooga Creek in 1981-82. Contamination was found to primarily consist of PAHs from coke and coal tar derivatives and creosoting operations and of bacteria from sewer overflows. As a result of this sampling, the DWPC posted the 7 1/2 miles of the creek in Tennessee to prevent fishing and body contact activities. In 1990 the EPA repeated the sampling done by the State, confirming the presence of PAHs, bacteria, and the decision to post the creek. The EPA has now added a portion of Chattanooga Creek and the surrounding area (Tennessee Products Site) to the NPL.

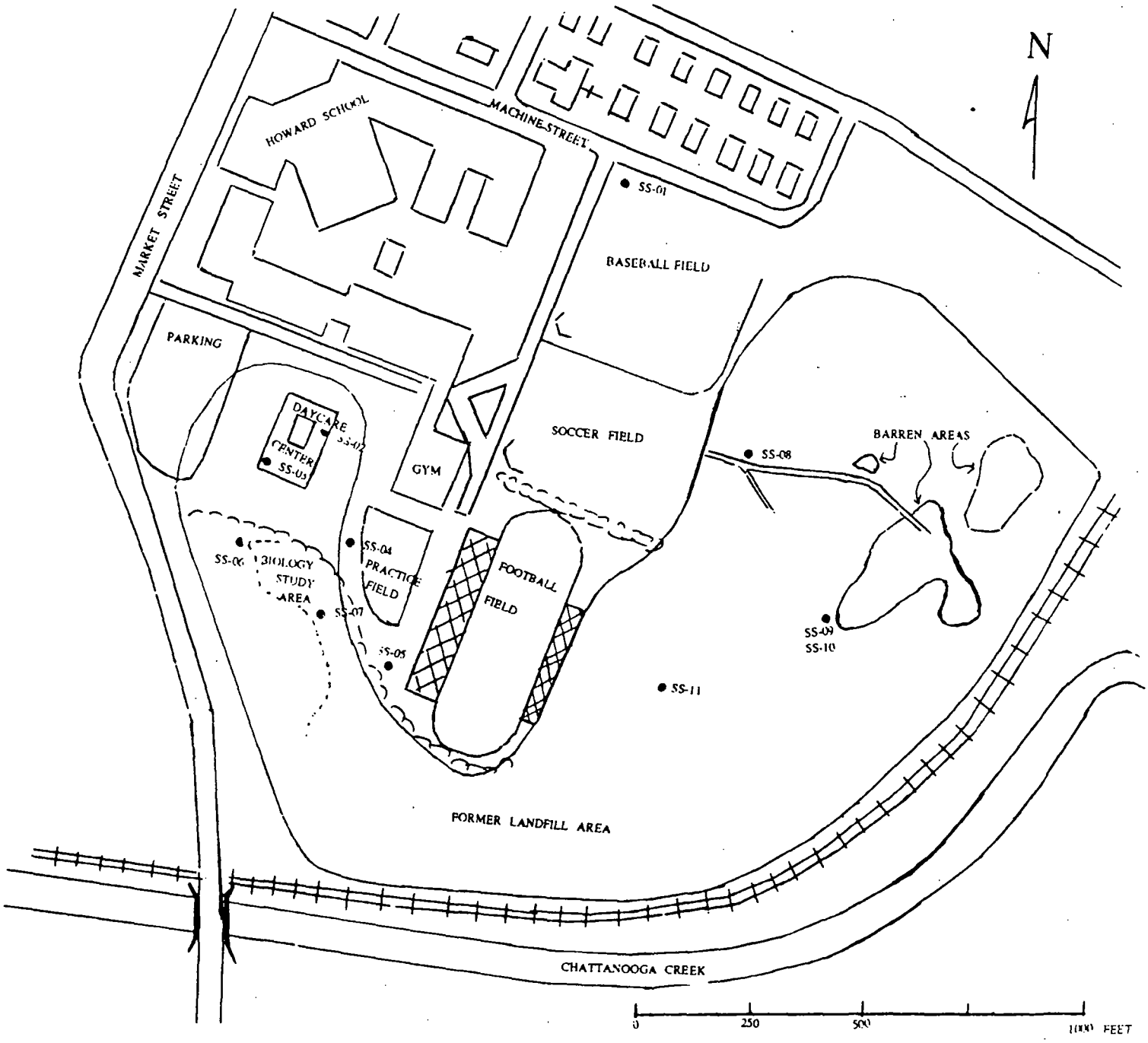
In 1992, the Agency for Toxic Substances and Disease Registry (ATSDR) began a petitioned public health assessment of Chattanooga Creek. The brown cover edition, for public comment, was released on November 29, 1993. It states that Chattanooga Creek is a public health hazard because of past, present and future human exposure by residents of south Chattanooga to chemical contaminants in sediments, surface water, and fish and to bacterial contaminants in Chattanooga Creek. ATSDR has begun providing ongoing environmental health education for local health care providers at the Alton Park Health Center and other area clinics to assist the health professionals in assessing possible adverse health outcomes associated with exposure to hazardous substances. ATSDR has also begun providing environmental health education for the community to assist residents in mitigating exposure to hazardous substances in Chattanooga Creek surface water, sediments, and fish.

The Howard School site is being investigated for inclusion on the NPL; a Site Inspection Prioritization (SIP) is in progress. Sampling results from the SIP in progress were used for this health consultation [3].

Sampling results provided to the Division of Environmental Epidemiology (EEP) are for base/neutral and acid extractables, in accordance with federally approved procedures and in compliance with current quality assurance criteria. PAHs were the only extractables detected. Sampling results for PAHs are summarized in Table 1. Samples were composites of soil taken to a depth of 1 foot, in accordance with standard EPA protocol. For public health purposes, surface soil samples are usually considered to be from 0 - 3 inches in depth because the public would most likely be exposed to just the surface of the soil (0 - 3 inches) and not to soil that is below the surface.

Sample 1 is a background sample taken on school property at the corner of the driveway and Machine Street. Samples 2 and 3 are from the yard at the daycare center; the yard is covered by grass. Samples 4 and 5 are on the football practice field. Samples 6 and 7 are from the biology study area. Samples 8, 9, and 10 are on the landfill area near the access road. Samples 9 and 10 are duplicates. Sample 11 is from a wooded portion of the landfill area that is not readily accessible to the public.

FIGURE 1
HOWARD SCHOOL
ALTON PARK, CHATTANOOGA, TENNESSEE



# TABLE 1
## SAMPLING RESULTS, HOWARD SCHOOL
## ALTON PARK, CHATTANOOGA, TENNESSEE

| Polyaromatic hydrocarbons | Concentration, µg/kg | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | SS-1 | SS-2 | SS-3 | SS-4 | SS-5 | SS-6 | SS-7 | SS-8 | SS-9 | SS-10 | SS-11 |
| acenaphthene | <330 | <330 | <330 | U | U | <400 | U | U | U | U | <400 |
| acenaphthylene | <330 | U | <330 | U | U | <400 | U | U | U | U | <400 |
| anthracene | <330 | <330 | <330 | U | U | <400 | <340 | U | U | U | <400 |
| benzo(a)anthracene | 500 | <330 | 696 | U | <350 | 1120 | U | U | U | U | 1400 |
| benzo(a)pyrene | 493 | <820 | 801 | U | U | 1390 | U | U | U | U | 1770 |
| benzo(b)fluoranthene | <1400 | <330 | <1500 | U | <350 | <2000 | U | U | U | U | <1000 |
| benzo(ghi)perylene | U | U | <750 | U | U | <1500 | U | U | U | U | 1350 |
| benzo(k)fluoranthene | <1400 | <330 | <750 | U | <350 | <2000 | U | U | U | U | <1000 |
| dibenzo(a,h,)anthracene | U | U | U | U | U | U | U | U | U | U | <1000 |
| fluoranthene | 480 | <820 | 1060 | <330 | <350 | 1520 | <340 | <330 | <350 | <350 | 2480 |
| fluorene | <330 | <330 | U | U | U | <400 | U | U | U | U | <400 |
| indeno(1,2,3-cd)pyrene | U | U | <750 | U | U | <1500 | U | U | U | U | 2190 |
| naphthalene | <330 | <330 | <330 | <330 | <350 | <400 | <340 | <330 | U | U | <400 |
| phenanthrene | <330 | <330 | <330 | <330 | <350 | <400 | U | <330 | <350 | <350 | <400 |
| pyrene | 433 | <820 | 911 | <330 | <350 | 1300 | <340 | <330 | U | <3350 | 2160 |
| chrysene | 402 | <330 | 644 | U | U | 1290 | <340 | U | U | U | 1370 |

## DISCUSSION

There were generally 2 samples taken for each area of the site. The surface samples were taken from 0 - 1 foot in depth. This may be appropriate if risks for an entire lifetime at one site are being considered; if a person lives or works at one site for thirty years or more, he may be exposed to soil up to 1 foot in depth. However, it may not be appropriate for estimating current potential health risks to people exposed to PAHs in the surface soil (0 - 3 inches) on an incidental, short-term basis.

PAHs are hydrocarbons found in coal, coke, coal tar, and creosote; they are formed as by-products of ordinary combustion and are ubiquitous. PAHs are comprised of complex mixtures of different compounds with widely varying toxicities. Some of the PAHs may be carcinogenic. To account for the varying strengths of the carcinogenicity potentials for the PAHs that may be carcinogenic, the concentrations of those PAHs may be multiplied by a benzo(a)pyrene toxicity equivalency factor and added together to give an adjusted concentration of potentially carcinogenic PAHs. See Table 2 for the Toxicity Equivalent Factors (TEFs) used by the EPA Region IV [5]. The benzo(a)pyrene adjusted concentrations for each sample and each area, calculated using the TEFs, are given in Table 3. If an area had more than one sample, then the adjusted benzo(a)pyrene equivalent concentrations were averaged; if an area had only one sample, then the adjusted benzo(a)pyrene equivalent concentration for that one sample was used.

TABLE 2
EPA BENZO(A)PYRENE TOXICITY EQUIVALENCY FACTORS

| Carcinogenic Polyaromatic Hydrocarbon | Toxicity Equivalency Factor |
|---|---|
| Benzo(a)pyrene | 1 |
| Benzo(a)anthracene | 0.1 |
| Benzo(b)fluoranthene | 0.1 |
| Benzo(k)fluoranthene | 0.1 |
| Chrysene | 0.01 |
| Dibenzo(a,h)anthracene | 1 |
| Indeno(1,2,3-c,d)pyrene | 0.1 |

TABLE 3
BENZO(A)PYRENE EQUIVALENT CONCENTRATIONS FOR EACH AREA

| Area | Sample # | Adjusted concentration, mg/kg | Sample # | Adjusted concentration, mg/kg | Average adjusted concentration, mg/kg |
|---|---|---|---|---|---|
| Background | 1 | 0.827 | NA | | 0.827 |
| Daycare center | 2 | 0.922 | 3 | 1.177 | 1.05 |
| Football practice field | 4 | ND | 5 | 0.105 | 0.05 |
| Biology study area | 6 | 2.065 | 7 | 0.003 | 1.034 |
| Accessible landfill | 8 | ND | 9,10 | ND | ND |
| Nonaccessible landfill | 11 | 3.343 | NA | NA | 3.343 |

At the daycare center it was assumed that the children weighed 18 kg, the mean weight for 3-5 year old children, that the surface area exposed was 61% of the total body surface area (accounting for head, arms, hands, and legs) or 4459 $cm^2$, the 50th percentile for children aged 4 - 5 [6], that the exposure frequency was 100 days per year or 200 events per year (2 outside play times per day), and that the exposure duration was 6 years. It was assumed that children playing outside would get dirt on their heads, arms, hands, and legs. It was assumed that the ingestion rate for soil was 200 mg/day. A pica child might eat 5000 mg of soil per day; however, the yard at the daycare center is covered with grass, making the soil less accessible. Estimated cancer risks due to ingestion and dermal exposure at the daycare center are less than 1 in a million.

At the biology study area, it was assumed that the students weighed 61 kg, the mean for boys and girls aged 15 < 18, that the surface area was 39% of the total body surface area (accounting for hands and legs) or 6825 $cm^2$ [6], that the exposure frequency was 90 days per year or 90 events per year, and the exposure duration was 4 years. It was assumed that teenagers taking samples might be exposed on their hand and legs, but not their arms or heads. Estimated cancer risks due to ingestion and dermal exposure at the biology study area less than 1 in a million.

Samples on the football practice field showed less PAHs than the background sample. The concentrations on the football practice field were approximately one-tenth of those at the daycare center. Any risks from oral or dermal exposure should be negligible. It is not expected that this level of PAHs in soil would cause the rashes experienced by the football players.

PAHs were not detected along the road from the baseball field into the landfill area. The only sample taken in the more inaccessible, wooded portion of the landfill showed the highest concentrations of PAH equivalents, 3.343 mg/kg. It is unlikely that children from the daycare center, the school, or people from the community would access that area on a regular basis. However, 3.343 ppm of PAH equivalents could be of concern if frequent and regular exposure occurred over a lifetime.

## CONCLUSIONS

Based on the information reviewed, the Tennessee Department of Health concludes the following:

1. The available information from sampling at Howard School does not indicate a current public health hazard to students, teachers, or area residents from exposure to soil on school property.

2. The available sampling is limited; therefore, additional environmental data may be needed to adequately determine whether or not the landfill area poses a chronic public health problem. Surface soil sampling (0 -3 inches) would allow a more accurate interpretation of current potential health hazards.

3. Exposure to gray water from leaking tile fields may be occurring; the area is accessible and has not been adequately sampled.

## RECOMMENDATIONS

1. Sample and analyze surface soil in areas where exposures are most likely to occur.

2. Sample and analyze gray water in areas where exposures are most likely to occur.

If further clarification is required or if additional information becomes available, please do not hesitate to call this office at (615) 741-5683.

Bonnie S. Bashor

Bonnie S. Bashor

## REFERENCES

[1] Personal communication from Andy Shivas, Division of Superfund, Central Office, Tennessee Department of Environment and Conservation.

[2] Report from Alton Park residents to the Conservation and Environment Committee of the Tennessee House of Representative, March 31, 1993.

[3] Personal communication from Andy Shivas, Division of Superfund, Central Office, Tennessee Department of Environment and Conservation, and Don VanHook, Division of Superfund, Chattanooga Office, Tennessee Department of Environment and Conservation.

[4] ATSDR. Petitioned Public Health Assessment Chattanooga Creek Tar Deposit (a/k/a Chattanooga Creek), Chattanooga, Hamilton County, Tennessee, CERCLIS No. TN982119489. Brown Cover, for Public Comment. November 29, 1993.

[5] New Interim Region IV Guidance, Elmer Akin, Chief, Office of Health Assessment, USEPA, Region IV, February 11, 1992.

[6] USEPA. Exposure Factors Handbook. EPA/600/8-89/043. March, 1990.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

May 6, 1994

MEMORANDUM

SUBJECT: Site Document Review

FROM: Elmer W. Akin, Chief
Office of Health Assessment

TO: Susan Deihl
Remedial Project Manager

I concur with the attached review comments provided by the onsite ESAT contractor, Reginald Rogers on the **Ecological Risk Assessment** for the **Howard High School Landfill.**

MANTECH

May 6, 1994

MEMORANDUM

SUBJECT: Ecological review Howard High School Landfill
Chattanooga, Hamilton County, Tennessee

From: Reginald Rogers
ESAT Contractor

To: Elmer Akin, Chief
Office of Health Assessment

As per your request I have reviewed the subject material for ecological risk assessment. The present-day landfill site is wooded with trees, shrubs and other understory growth that provide many niches for small animal populations. Surface soils at the site are contaminated with PAHs and metals. The concentrations of PAHs present can impact the whole range of organisms from fungi to mammals. Birds, mammals and other organisms can suffer reduced viability through dermal contact with these contaminant concentrations.

Through surface runoff and groundwater movement to the creek these contaminants may impair the aquatic biota. While the fish sampled from the creek have high burdens of pesticides and PCBs the source of these contaminants is undetermined.

Although the impacts to organisms discussed above should exist, it remains to be determined if these organisms are in fact impaired. For a more complete understanding of the ecological risk at this site a field survey to determine the full range of species present is appropriate. Toxicity testing is also appropriate for a more complete understanding of the ecological risk.

RRogers:rr:4WD-OHA:1586:5/3/94:A:\HOWARDLN.DOC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

May 6, 1994

MEMORANDUM

SUBJECT: Site Document Review

FROM: Elmer W. Akin, Chief
Office of Health Assessment

TO: Susan Deihl
Remedial Project Manager

I concur with the attached review comments provided by the onsite ESAT contractor, Ted Simon on the **Site Investigation Prioritization Document** for the **Howard High School Landfill.**

MANTECH

May 6, 1994

4WD-OHA

MEMORANDUM

SUBJECT: Risk review comments human health aspects, Howard High School Landfill, Chattanooga, TN

FROM: Ted W. Simon
Toxicologist, ESAT Contractor

TO: Elmer W. Akin, Chief
Office of Health Assessment

REFERENCE: TID 04-9404-451
ESAT-4R-5324
WUD #94-1835
Account # 4TFA04D9WP
Susan Deihl, Chief, Site Assessment Section
WPB

Per your request, I have reviewed the **Site Investigation Prioritization** document for the referenced site. My comments provided below are divided into two sections, i.e., (1) comments addressed specifically to the RPM and (2) comments that, if you and the Site Assessment Section Chief concur, can be conveyed verbatim to the party responsible for preparation of the document. To facilitate the verbatim conveyance, I will be pleased to provide on request a copy of this memo via cc:mail.

It is the policy of the EPA Region IV Office of Health Assessment to require written responses to review comments provided through this office. If a meeting with the PRP is needed to discuss these comments, it is requested that any risk assessment comments received from the State or any other source be provided to the Office of Health Assessment for our site file. If risk comments from sources other than this office are forwarded to the PRP contractor, the source should be clearly identified unless concurrence of this office is sought. In this case, we should formally review these comments and provide you with our response before they are forwarded.

**Adequacy of the Ground Water Sample**

The sample taken is not believed to be representative of ground water. The sample was taken as the infiltration of a two foot deep hole and probably represents either landfill leachate or a ruptured field line from the high school. In this sample, chromium was present at 367 μg/L above the drinking water MCL of 100 μg/L; lead was present at 176 μg/L above its action level of 15 μg/L; and manganese was present at 3220 μg/L above its proposed MCL of 200 μg/L.

To determine the true extent of ground water impaction from the site, actual monitoring wells should be used. Based on the data presented in the report, nothing is known about the contaminants in ground water.

**Determination of Risk Levels present at the day care center**

Several PAHs were present in the landfill soil near the day care center. Benzo(a)pyrene was chosen as the example compound as it is the most carcinogenic.

Benzo(a)pyrene was present at four locations at levels considerably above a risk-based level for a future residential scenario. However, this scenario may not be appropriate for the day care center.

Manganese was also present in soil at levels above those considered acceptable for a future resident.

| | | |
|---|---|---|
| $C_{soil}$ | = Concentration in soil | |
| EF | = Exposure Frequency | = 250 days/yr |
| ED | = Exposure Duration | = 6 years |
| $IR_{soil}$ | = Daily Soil Ingestion | = 200 mg/day |
| BW | = Body Weight | = 15 Kg |
| AT | = Averaging Time | = 25550 days for carcinogens |
| | | = 2190 days for non-carcinogens |
| $CSF_o$ | = Oral Cancer Slope Factor | = 7.3E+0 for Benzo(a)Pyrene |
| $RfD_o$ | = Oral Reference Dose | = 1.4E-01 for manganese |

These exposure assumptions are based on a child receptor present at the day care center 5 days a week from the ages of 0 to 6 years old.

Using the equations shown below and the exposure assumptions shown above, the cancer risk due to benzo(a)pyrene is 5E-06. The non-cancer hazard index due to manganese is 0.08. These are both well within the risk range considered acceptable by the EPA, and, hence, the site does not appear to pose an immediate risk to human health.

However, if these exposure assumptions are shown to be unjustified, then this estimate of risk at the site may not be accurate.

$$Risk = \frac{EF \times ED \times FI \times CSF_o \times IR_{Soil} \times 10^{-6} \frac{Kg}{mg}}{BW \times AT} \quad (1)$$

Equation 1 provides the risk level for soil concentrations of carcinogens.

$$Hazard = \frac{EF \times ED \times FI \times \frac{1}{RfD_o} \times IR_{Soil} \times 10^{-6} \frac{Kg}{mg}}{BW \times AT} \quad (2)$$

Equation 2 provides the hazard quotient for soil concentrations of non-carcinogens.

**Adequacy of Soil Sampling**

Ten soil samples including background is probably not enough to characterize a 44 acre site with sufficient detail. A combination of random and biased sampling should be used. *Guidance for Data Useability in Risk Assessment (Part A) Final*, OERR 9285.7-09A, 1992 should be consulted in this regard.

If the landfill becomes an NPL site, it should be considered for the presumptive remedy for a municipal landfill. This presumptive remedy consists of:

- Landfill cap
- Source area ground water control
- Leachate collection and treatment
- Landfill gas collection and treatment
- Institutional controls as appropriate

Therefore, future sampling efforts should be directed to determining whether contaminant migration off-site has occurred and characterization of the appropriate locations.

Note that sampling of the landfill contents as opposed to the soil itself is not necessary. The assumption underlying this sampling strategy is based on the presumptive remedy is that the landfill will be capped and its contents isolated. Guidance in this regard is attached.

Please let me know if I can be of any further help.

Attachment
*Presumptive Remedy for CERCLA Municipal Landfill Sites*, Superfund Publication 9355.0-49FS, June 1993

T.W. Simon/tws:4WD-OHA:1586/05/06/94/A:\DISK_3\MAY94\HOWARDHS.DOC

## REMEDIAL SITE ASSESSMENT DECISION - EPA REGION IV

**Site Name:** Howard High School Landfill **EPA ID#:** TND100842343

**Alias Site Names:** _____

**City:** Chattanooga **County or Parish:** Hamilton **State:** TN

**Refer to Report Dated:** January 1994 **Report type:** S I P

**Report developed by:** TDEC,DSF,CFO

**DECISION:**

| | **1. Further Remedial Site Assessment under CERCLA (Superfund) is not required because:**

| | 1a. Site does not qualify for further remedial site assessment under CERCLA (Site Evaluation Accomplished - SEA)

| | 1b. Site may qualify for further action, but is deferred to: | | RCRA | | NRC

|X| **2. Further Assessment Needed Under CERCLA:** 2a. (optional) Priority: |X| Higher | | Lower

2b. Activity Type: | | PA | | ESI | | SI | | HRS evaluation

|X| Other: ATSDR Health Consultation

**DISCUSSION/RATIONALE:** SIP found contamination on site. PAH and metals. Need ATSDR Health Consultation to determine further action.

**Report Reviewed and Approved by:** Loften Carr Signature: [signature] Date: 4/5/94

**Site Decision Made by:** Loften Carr Signature: [signature] Date: 4/5/94

EPA Form # 9100-3

Susan Lofton

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

FEB 17 1994

4WD-ERRB

Mr. Clinton Willer
Division of Superfund
Department of Environment & Conservation
4th Floor, L&C Tower
Nashville, Tennessee 37243-1538

SUBJ: Howard High School Dump, Chattanooga, Tennessee

Dear Mr. Willer:

The U.S. Environmental Protection Agency's (EPA) Emergency Response and Removal Branch (ERRB) reviewed the available information for the above referenced site to determine its eligibility for a potential removal action under the National Contingency Plan (NCP). The site information was evaluated using criteria from Section 300.415 of the NCP and current ERRB program guidance.

Based upon ERRB's review, the above site does not meet the criteria for removal eligibility. The site does not pose an immediate threat based on review of the January 1994 Site Investigation Prioritization Narrative Report prepared for the State and a site investigation on February 11, 1994, by On-Scene Coordinator, Paul Peronard. Surface soil samples collected for the site investigation do not indicate contamination at concentrations which pose an immediate threat warranting removal action. This determination does not preclude any other investigation activities or response actions by other parties which may still be appropriate for this site. Should site conditions change or additional information become available, ERRB will re-evaluate this site as necessary.

Should you have any questions concerning ERRB's determination, please contact Mr. Shane Hitchcock, Chief of Removal Operations Section, at (404) 347-3931 extension 6122.

Sincerely,

Myron D. Lair, Chief
Emergency Response and Removal
Branch

cc: Narindar Kumar, Site Assessment Section, EPA

Printed on Recycled Paper

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

4WD-WPB

APR 19 1994

Robert Safay
EPA Regional Representative
Agency for Toxic Substances and Disease Registry
345 Courtland Street, N.E.
Atlanta, Georgia 30365

SUBJ: Howard High School Landfill
Chattanooga, Hamilton County, Tennessee
EPA ID: TND100842343

Dear Mr. Safay:

I am writing to request a Health Consultation for the above referenced site in Chattanooga, Tennessee. The Howard High School Landfill Site is located at 2500 South Market Street in south Chattanooga in a lower income area characterized by schools, industries, businesses and residential development. The site is 44 acres in size and located adjacent to the south east side of Howard High School. The school's day care center (the Maurice Kirby Child Care Center) is located on top of the west leg of the dump and is attended by 55 children with 15 teachers. Howard High School is a combined elementary and high school. The high school is attended by 1074 students with 65 teachers and the elementary school is attended by 417 students with 27 teachers.

A Site Investigation Prioritization (SIP) was recently conducted by the Tennessee Department of Environment and Conservation, Division of Superfund for EPA in order to determine if the site is eligible for inclusion on the National Priorities List. The preliminary Hazard Ranking System evaluation indicates that the site may pose an unacceptable risk to the students and teachers associated with Howard High School. The Health Consultation is being requested to further evaluate the potential risk posed by this site.

Sincerely,

Loften Carr
Site Assessment Manager

Enclosure

cc: S. Deihl
N. Kumar
LC:mb - disk/LC/doc.A:howard - 4/18/94 - WD/WPB/SAS/NU

CARR DEIHL
4/18/94 4/18

APR 19 1994

4WD-WPB

MEMORANDUM

SUBJECT: Howard High School Landfill
Chattanooga, Hamilton County, Tennessee
EPA ID: TND100842343

FROM: Susan Deihl, Chief
Site Assessment Section, North Unit
Waste Programs Branch

TO: Elmer Akin, Chief
Office of Health Assessment

The purpose of this memo is to request a risk evaluation for the above referenced site in Chattanooga, Tennessee. The Howard High School Landfill Site is located at 2500 South Market Street in south Chattanooga in a lower income area characterized by schools, industries, businesses and residential development. The site is 44 acres in size and located adjacent to the south east side of Howard High School. The school's day care center (the Maurice Kirby Child Care Center) is located on top of the west leg of the dump and is attended by 55 children with 15 teachers. Howard High School is a combined elementary and high school. The high school is attended by 1074 students with 65 teachers and the elementary school is attended by 417 students with 27 teachers.

A Site Investigation Prioritization (SIP) (attached) was recently conducted by the Tennessee Department of Environment and Conservation, Division of Superfund for EPA in order to determine if the site is eligible for inclusion on the National Priorities List. The preliminary Hazard Ranking System evaluation indicates that the site may pose an unacceptable risk to the students and teachers associated with Howard High School. The risk evaluation is being requested to further evaluate the long term potential risk posed by this site.

If you have any questions regarding this request, please contact Loften Carr at X5059, ext.6154.

Attachment

cc: L. Carr w/o attachment
N. Kumar w/o attachment

LC:mb:04/18/94/doc:a:howard1.mem/x5059/4wd-wpb

CARR DEIHL

4/19/94