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OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

In 1936, Centredale Worsted Mills sold the property on which Centredale Manor is located (Lot 250) to Olneyville Wool Combing Company. In 1940, the Olneyville Wool Combing Company sold Lot 250 to three individuals (H. Sweet, W. Clark, and M. Sweet). In April 1943, these three individuals sold Lot 250 to two different individuals (H. Bonino, and J. Buonanno), who owned it for three months before transferring it to Centredale Enterprises, Inc., in July of 1943. Centredale Enterprises, Inc. held title to Lot 250 until 1971, when it was sold to two individuals (J. Buonanno and E. Ricci) and one business entity (Centredale Properties Corporation). Centredale Properties Corporation sold its interest in Lot 250 to J. Buonanno and E. Ricci in 1979. They held title until 1982, when Lot 250 was sold to Centredale Manor Associates. Centredale Manor Associates sold Lot 250 to the Cornerstone Corporation in 1995 [9].

No information regarding the types of textile activities conducted on the property by either the Centredale Worsted Mill or the Olneyville Wool Combing Company was found in available file information. These companies operated on the property during the 1930s through the mid-1940s [1, p. 5].

A chemical manufacturing facility (Atlantic Chemical Company, Inc., which changed its name in 1953 to Metro-Atlantic, Inc.) and a drum recycling facility (New England Container Co., Inc.) reportedly operated at the property between 1943 and 1971. Additional information regarding operations at these facilities is currently being sought by EPA. In the mid-1970s, the existing buildings at the property were demolished. Further information regarding the demolition of the buildings is also being sought by EPA [9].

In October and November 1977, the Rhode Island Department of Health (RI DOH) conducted several investigations at the Centredale Manor property in response to complaints of odors and fumes at the property. Approximately 60 55-gallon drums were found on the property in a swampy area near the Woonasquatucket River. A bluish-white smoke was observed in association with an unknown number of ruptured drums, reportedly containing sulfuric acid. On 10 November 1977, Acme Services removed 10 drums which reportedly contained sulfuric acid from the swampy area. No information regarding where the drums were transported and/or disposed of was available. The remaining drums were reportedly left on the property [1, p. 5].

From December 1979 to March 1981, RI DEM periodically inspected the property. During these inspections, RI DEM observed and inventoried approximately 400 drums. The drums were reported to be in various stages of deterioration. An unknown number of drums were found to contain residual solid and liquid material. Legible drum labels and visual inspection of residual materials indicated that caustics, halogenated solvents, polychlorinated biphenyls (PCBs), and ink wastes (potentially containing heavy metals) may have been contained in the drums. During the inspections, approximately 150 drums (of the 400 drums) were observed scattered along the bank of the Woonasquatucket River [1, p. 5].

In 1981, Marshall Contractors, Inc. (Marshall) and Robinson, Green and Beretta, Inc. performed a feasibility study of the property for the property owners, J. Buonanno and E. Ricci. The

feasibility study was conducted to investigate the potential commercial development of the property as an apartment complex. In October 1981, Marshall reportedly discovered a smoking drum of sulfuric acid. On 16 October 1981, Jet-Line Services manifested, removed, and transported the drum of sulfuric acid to an approved disposal facility. The Jet-Line Services drum removal activities were supervised by Marshall and RI DEM [1, p. 5].

On 23 November 1981, a Notice of Violation and Order (Order) was issued by RI DEM to the property owners, J. Buonanno and E. Ricci, for violations of the State Hazardous Waste Management Act [1, p. 6]. The Order indicates that various State rules and regulations, including the following, were violated:

- Hazardous Waste Management Facility Operating Permit Rules and Regulations-Landfills
- Hazardous Waste Generator Rules and Regulations
- Hazardous Waste Treatment and Storage Rules and Regulations
- Hazardous Waste Operating Permit Rules and Regulations-Landfills

The 1981 Order required that the owners of the property, J. Buonanno and E. Ricci, complete the following activities: 1) identify all hazardous materials on site by sampling and chemical analysis; 2) repackage and properly manifest and dispose of all hazardous wastes on site; 3) comply with items 1 and 2 immediately [9].

In February 1982, Marshall oversaw the characterization of soils at the Centredale Manor property with supervision by RI DEM. On 2 February 1982, Guild Drilling collected two composite soil samples from 10 soil borings advanced in the proposed apartment building construction area. The samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and eight extraction procedure for toxicity (EP TOX) metals to determine if soils in the construction area would be considered hazardous waste. Analyses of soil samples indicated the presence of chloroform, toluene, trichloroethylene, bis(2-ethylhexyl)phthalate, and barium at concentrations below the then current (1982) RI DEM regulatory levels. Ultimately, 6,000 cubic yards of excavated soil were removed and disposed of as non-hazardous solid waste [1, p. 6].

On 22 February 1982, C. Pezza and Sons, Inc. excavated and staged approximately 400 drums on the property under the supervision of RI DEM. Drums which were verified to be empty were crushed and sent to a solid waste facility for disposal as non-hazardous waste. Approximately 30 drums with residual materials were stockpiled on the property [1, p. 6].

On 27 February 1982, Goldberg, Zoino & Associates, Inc. (GZA), under contract to Marshall and being supervised by RI DEM, collected eight composite samples from stockpiled drums which contained chemical residues. The drums were categorized, separated, and composited for sampling based on similar contents. Samples were analyzed for VOCs and eight EP TOX metals. Analyses of the drum samples indicated the presence of xylene, toluene, ethyl benzene, cadmium, chromium, lead, and silver at concentrations ranging from 0.21 parts per million (ppm) to 47,000 ppm. Based on these analyses, eight of the 30 drums with residual materials were reported to contain hazardous materials. On 2 June 1982, Jet-Line Services transported the eight drums off

site for disposal at an approved facility. The remaining drums were disposed of as non-hazardous solid waste [1, p. 6].

In 1982, construction of the Centredale Manor complex was completed. A Fresh Water Wetland Applicability Determination, required for the construction of the complex, concluded that the construction of Centredale Manor represented an insignificant alteration of the nearby fresh water wetland located on the western side of the property adjacent to the Woonasquatucket River [1, p. 6].

In 1986, RI DEM received information from the Providence Journal which indicated that several 5,000-gallon USTs used to store hazardous waste were buried on the Centredale Manor property. A ground-penetrating radar survey was conducted by Geo-Centers, Inc. on 24 March 1986, to locate the alleged buried USTs. The survey concluded that there were no buried USTs on the property; however, other metallic debris, possibly buried drums, were potentially present along the western edge of the property [1, p. 6].

On 21 August 1986, NUS/FIT completed an EPA PA of the Centredale Manor property. Based on the previous history of the property, NUS/FIT concluded that groundwater, surface water, soil, and sediment at the property were potentially impacted. Based on the findings of the PA, an SSI was recommended [1, p. 7].

On 15 October 1990, an EPA SSI for Centredale Manor property was completed by NUS/FIT. As part of this investigation, on 27 March 1990, NUS/FIT collected 10 soil samples, including one trip blank, one duplicate/replicate, and one reference sample from the Centredale Manor property. The soil samples were analyzed through the EPA Contract Laboratory Program (CLP) for VOCs, SVOCs, pesticide/PCB, and metals analyses. The trip blank was analyzed for VOCs only. A total of six VOCs and 29 SVOCs were detected, including the compound 4-chloroaniline at a concentration of 32,000 parts per billion (ppb) in the samples submitted for analysis. 4-Chloroaniline is commonly found in dyes used in textile mill operations and may be related to the mills which occupied the property in the 1930s and 1940s. Four pesticides, two PCB congeners (Aroclors 1242 and 1254), and six inorganic elements were also detected in the NUS/FIT soil samples [1, p. 7].

On 10 September 1994, RI DEM collected surface water samples from the Woonasquatucket River. These samples were collected to determine the impact of a cyanide spill which occurred upstream of the property. One sample was collected from the Woonasquatucket River adjacent to the Centredale Manor property. Laboratory analyses detected elevated concentrations of cadmium, copper, cyanide, lead, and nickel at concentrations ranging from 8 ppb and 250 ppb. No known reference or quality assurance/quality control (QA/QC) samples were collected [1, p. 7]. RI DEM did not conduct dioxin analysis on these samples [9].

Approximately ten deteriorated empty 55-gallon drums were observed on 4 October 1995 during the WESTON on-site reconnaissance of the property which was conducted as part of the EPA SIP investigation of the property. The drums were located along the Woonasquatucket River and in the southern wooded area within 200 feet of the building [1, p. 7].

As part of the EPA SIP, WESTON personnel collected sediment samples on 27 March 1996. Nine sediment samples, including three reference samples, were collected from eight locations associated with the property. The sediment samples were analyzed through EPA CLP for VOCs, SVOCs, pesticide/PCB, total metals, and cyanide analyses. Three sediment samples were collected from the Woonasquatucket River and six sediment samples were collected from wetlands along the drainage channel [1, p. 7].

Analytical results of 1996 WESTON sediment samples indicated the presence of several VOCs, SVOCs, and inorganic elements at concentrations greater than or equal to three times the reference sample concentrations. No pesticides or PCBs were detected in the sediment samples [1, pp. 19 - 21]. WESTON did not conduct dioxin analysis of these samples as part of this EPA SIP [9].

Two VOCs were detected in samples collected from wetlands located on the southeast portion of the property along the drainage channel. 2-Butanone and chlorobenzene were detected at 21 ppb and 11 ppb, respectively. Thirteen SVOCs were detected in sediment samples ranging from 350 ppb to 8,500 ppb. The SVOCs detected in WESTON sediment samples were primarily polynuclear aromatic hydrocarbons (PAHs) [1, p. 21].

Ten inorganic elements were also detected in sediment samples ranging from 1.7 ppm to 20,000 ppm. Many of the elements and compounds detected in sediment samples were also previously detected in NUS/FIT soil samples above reference concentrations and in samples collected from drums removed from the property in 1982. This indicates that previous on-site disposal practices may have impacted the surface water quality downstream of the Centredale Manor property [1, p. 22].

In June 1996, fish were collected from the Woonasquatucket River and fish tissue samples were analyzed by EPA Narragansett Laboratory and Providence Urban Initiative personnel. The fish tissue samples were analyzed for cadmium, copper, chromium, nickel, lead, zinc, mercury, PCB congeners, hexachlorobenzene, DDE, DDD, DDT, lindane, chlordane, nonachlor, and dioxin homologues [2, Appendix B]. Based on elevated dioxin levels detected in fish tissue samples, a fish consumption advisory was issued by RI DOH [2, p. 1].

In January 1997, the EPA Office of Ecosystem Protection and the Rhode Island State Program requested assistance from the EPA Office of Environmental Measurement and Evaluation (OEME) to examine and evaluate ambient sediment quality in the Woonasquatucket River and to identify sources that may have caused the elevated concentrations of contaminants in fish tissue [2, p. 1].

In October 1997, OEME personnel conducted water and sediment sampling. Sediment and water column measurements were collected at seven dam locations along the Woonasquatucket River. The area investigated extended from the Esmond Dam area of North Providence, to just upstream of the Valley Street Bridge in Providence (Figure 1). Dioxin contamination was detected at all seven sampling locations. Dioxin levels in the sediment samples at two dams, Allendale Dam and Lymansville Dam, were significantly higher than at the other sediment sampling locations [2, p. 2].

According to the 1997 OEME report, numerous PAHs, chlorinated pesticides, PCBs, and inorganic elements were also detected at all seven locations at concentrations that may pose a chronic risk to the benthic community as well as upper food chain receptors. In addition, because of the biomagnification potential of dioxin and, based on New York Department of Environmental Conservation sediment guidelines that take into consideration upper food chain impacts, as well as the total organic carbon (TOC) values present in the river, the possibility of acute effects to piscivorus (fish consumers) is also present [2, pp. 2-3].

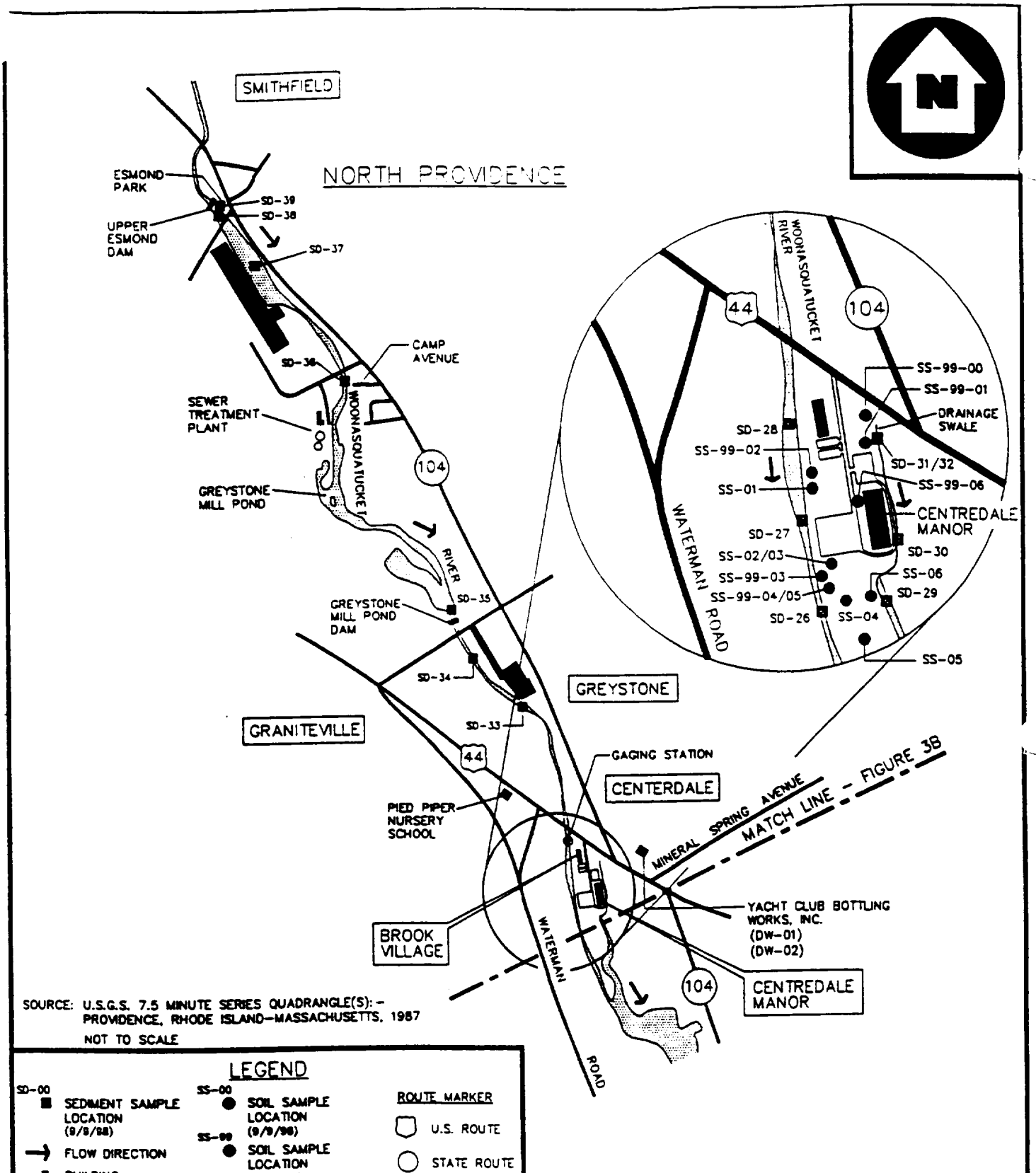
In June 1998, START initiated an ESI of the Centredale Manor Site under direction of EPA. The ESI was initiated to assess: the presence of dioxin/furan and hexachloroxanthene (HCX) contamination on the Centredale Manor property; the extent of contamination in areas of potential human exposure; and potential source areas located upstream of the Centredale Manor property. No prior analysis for the presence of dioxin and HCX had been performed on the Centredale Manor property.

On 31 July 1998, START personnel performed an on-site reconnaissance to identify soil and sediment sampling locations on the Centredale Manor and Brook Village properties and along the Woonasquatucket River between the Esmond Dam area of North Providence, to Waterplace Park in Providence. The investigation covers an area of approximately 10.0 stream miles along the Woonasquatucket River [3].

On 9 September 1998, START personnel collected five soil samples from the Centredale Manor property, one soil sample from the Brook Village property, 35 sediment samples from the Woonasquatucket River, and four sediment samples from the drainage channel. All sampling activities were conducted in accordance with the EPA approved Task Work Plan, dated 31 August 1998. The soil and sediment samples were submitted to the EPA Region VII laboratory for dioxin and HCX analyses, to an EPA CLP laboratory for SVOC and pesticide/PCB analyses, and to a Delivery of Analytical Services (DAS) laboratory for TOC analysis. Sample locations are depicted on Figures 3A, 3B, and 3C and described in Table 1.

Complete analytical results of START soil samples including quantitation and detection limits are presented in Attachment A (for SVOCs and pesticides/PCBs), Attachment B (for dioxins and hexachloroxanthene), and Attachment C (for TOCs). Sample results quantified with a "J" on analytical tables are considered approximate because of limitations identified during CLP and DAS data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Results for soil samples collected from the Centredale Manor Site which exceed the RI DEM (1996) Residential Direct Exposure Criteria (RI DEC) values are summarized in Table 2. Substances for which no RI DEC values have been established (i.e. carbazole, endosulfan sulfate, 4-methylphenol, isophrone, di-n-butylphthalate, dibenzofuran, butylbenzylphthalate, 4,4'-DDD, 4,4'-DDE, beta-BHC, and heptachlor) are not included in Table 2, but are presented in Attachment A [10]. For comparative purposes, dioxin results are compared to the EPA Region I Dioxin Residential Action Level of 1 ppb. In addition, HCX results are listed; however, no benchmark value is available.



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S):- PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

- SD-00 ■ SEDIMENT SAMPLE LOCATION (9/9/98)
- → FLOW DIRECTION
- ▬ BUILDING
- SS-00 ● SOIL SAMPLE LOCATION (9/9/98)
- SS-99 ● SOIL SAMPLE LOCATION (1/15/99)

ROUTE MARKER

- U.S. ROUTE
- STATE ROUTE

SAMPLE LOCATION MAP

WOONASQUATUCKET RIVER (NORTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

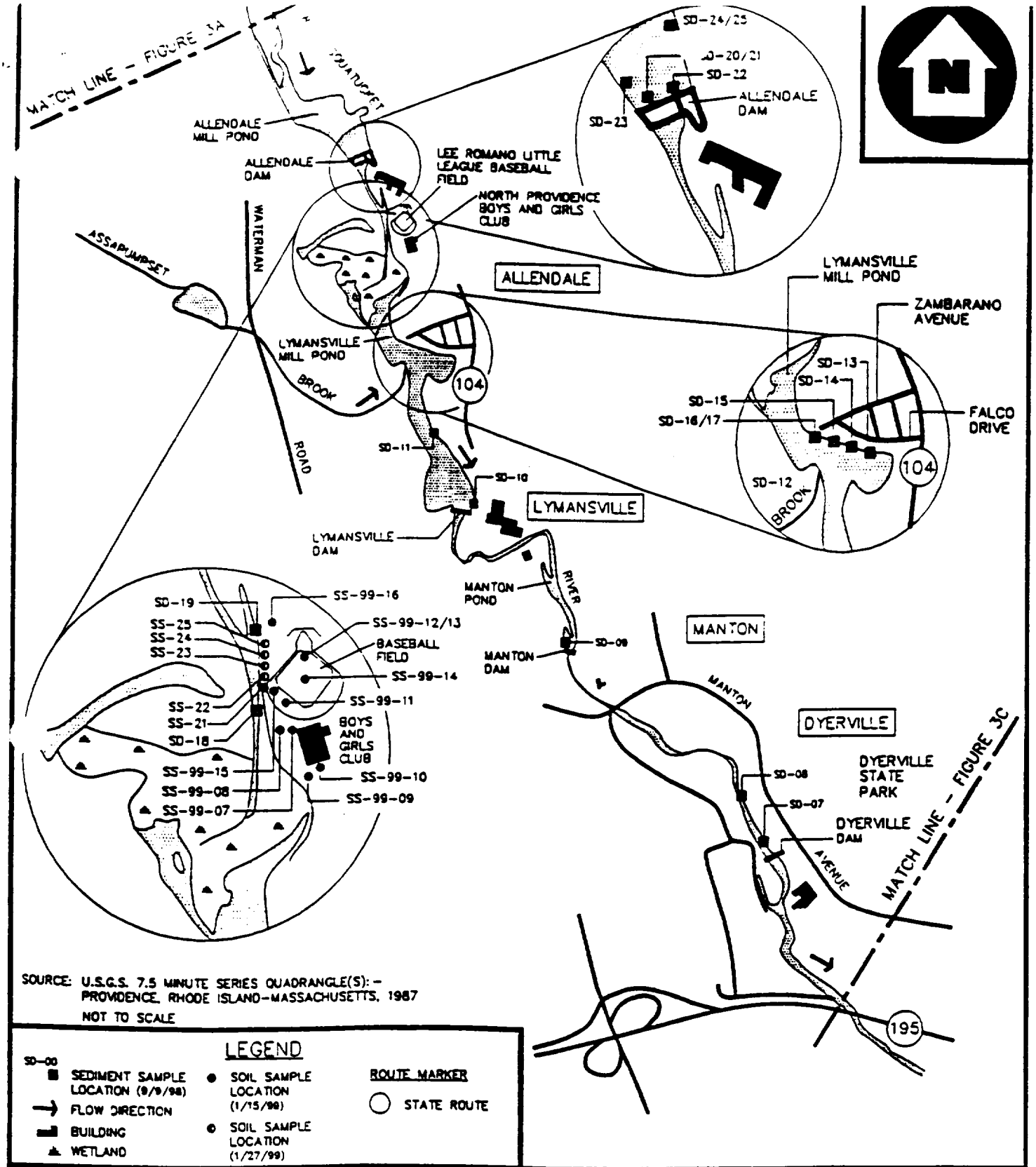
WESTON® MANAGERS DESIGNERS/CONSULTANTS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
98-06-0017	W. SHAW	8/14/98

FILE NAME: S:\98060017\FIG1CX

FIGURE 3A



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S): - PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

SD-00 SEDIMENT SAMPLE LOCATION (9/9/98)

FLOW DIRECTION

BUILDING

WETLAND

SOIL SAMPLE LOCATION (1/15/99)

SOIL SAMPLE LOCATION (1/27/99)

ROUTE MARKER

STATE ROUTE

SAMPLE LOCATION MAP

WOONASQUATUCKET RIVER (CENTRAL)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

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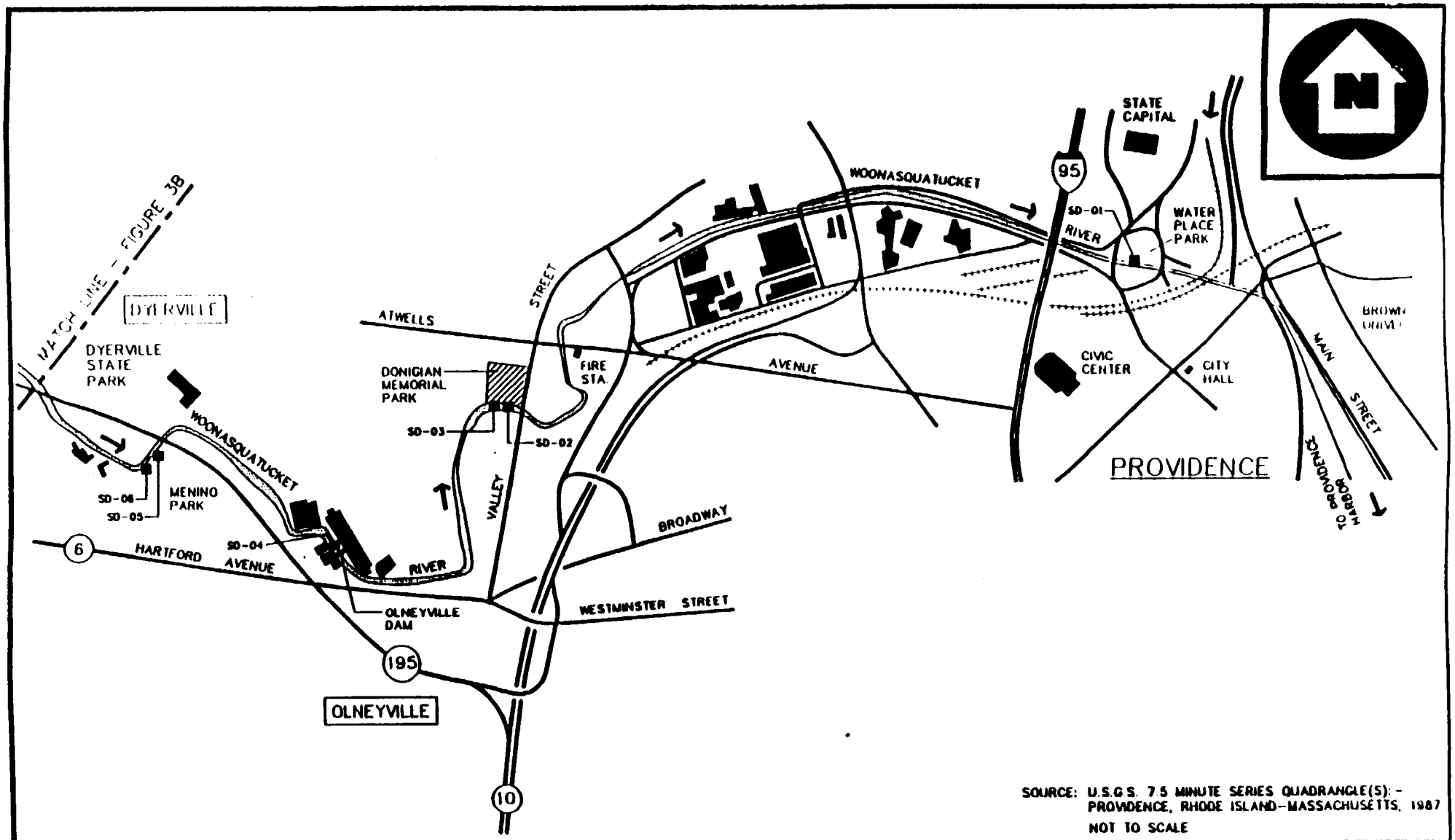
FILE NAME:	
S:\98060017\FIG1BX	FIGURE 3B



SOURCE: U.S.G.S. 7.5 MINUTE SERIES QUADRANGLE(S): - PROVIDENCE, RHODE ISLAND-MASSACHUSETTS, 1987

NOT TO SCALE

LEGEND

SD-00 SEDIMENT SAMPLE LOCATION (9/9/98)

FLOW DIRECTION

BUILDING

RAILROAD TRACKS

ROUTE MARKER

INTERSTATE HIGHWAY

STATE ROUTE

SAMPLE LOCATION MAP

WOONASQUATUCKET RIVER (SOUTH)
CENTREDALE MANOR SITE
2074 SMITH STREET
NORTH PROVIDENCE, RHODE ISLAND

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FIGURE 3C

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