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APPENDIX C

December 29, 1989

Jack Jojokian
Project Officer
U.S. Environmental Protection Agency
401 M Street, Room 2834
Washington, D.C. 20460

PROJECT: EPA CONTRACT NO.: 68-W9-0002
DOCUMENT NO: TES5-R01009-EP-BLTS
SUBJECT: Work Assignment Number R01009
Final Report
Whyco Chromium RFA
Thomaston, Connecticut
Doc. No: TES5-R01009-FR-BLTT

Dear Mr. Jojokian:

Please find enclosed the Final RFA Report for the Whyco Chromium Co. site as partial fulfillment of the reporting requirements for this work assignment.

If you have any comments regarding this submittal, please contact Paula Fischetti of CDM Federal Programs Corp. at (617) 742-2659 within two weeks of receipt of this letter.

Sincerely,

CDM Federal Programs Corporation

John Walker
TES V Regional Manager

Enclosure

PFF/jcf

cc: Rhona Julien, EPA Primary Contact, RCRA Region I
Kathy Castagna, EPA Regional Project Officer, RCRA Region I
J. Steven Paquette, CDM Federal Programs Corporation Deputy Program Manager
Stephen Kovash, EPA Contracting Officer (letter only)

Rec'd 1/3/90

Final RFA Report
Whyco Chromium Co.
Thomaston, Connecticut

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, D.C. 20460

Work Assignment No.	:	R01009
EPA Region	:	I
Site No.	:	LTD001450154
Contract No.	:	68-W9-0002
CDM Federal Programs Corporation Doc. No.	:	TES5-R01009-FR-BLTT
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Date Prepared	:	December 29, 1989

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1.0 INTRODUCTION

CDM Federal Programs Corporation (CDM FPC) received Work Assignment No. R01009 from U.S. EPA under Contract No. 68-W9-0002 (TES V) to provide technical assistance on a Resource Conservation and Recovery Act (RCRA) Facility Assessment of the Whyco Chromium Company, Inc. facility in Thomaston, Connecticut. CDM FPC initiated work at this site under the TES III contract, work assignment R01017.

1.1 Purpose of the RCRA Facility Assessment

The 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA established broad new authorities to assist the U.S. EPA in the implementation of corrective actions under the RCRA program. The primary objective of the RCRA Corrective Action Program is to clean up releases of hazardous waste or hazardous constituents that threaten human health or the environment. The RCRA Corrective Action Program, which applies to all operating, closed or closing RCRA treatment, storage or disposal facilities, consists of three phases, as briefly described below:

Phase 1 - The RCRA Facility Assessment (RFA)
The objective of the RFA are to: 1) identify and gather information on releases or potential releases at RCRA facilities; 2) evaluate Solid Waste Management Units (SWMUs), regulated units and any other areas of concern for releases to ground water, surface water, soil, soil gas or air; 3) make preliminary determinations regarding releases of concern and determine the need for further actions including interim measures at the facility; and screen from further investigation those units which do not pose a threat to human health or the environment.

Phase 2 - The RCRA Facility Investigation (RFI)
The objective of the RFI is to fully characterize the extent of releases.

Phase 3 - Corrective Measures (CM)
During this third Phase, the need for and extent of remedial measures is assessed. This step includes the selection and implementation of appropriate remedies for all problems identified.

1.2 Procedures for Conducting the RFA

This report concerns the Phase 1 of the RCRA Corrective Action Program, the RFA. As part of the RFA, CDM FPC conducted a preliminary file review (PR), a visual site inspection (VSI) and a sampling visit (SV). All three of these steps in the RFA require the collection and analysis of data to support initial release determinations from specific waste management units located at the facility. These three steps are briefly described below:

Preliminary Review (PR) - The PR focuses primarily on evaluating existing information such as inspection reports, permit applications, SMWU responses, waste manifests, historical monitoring data, and conducting relevant personnel interviews to ascertain the occurence of potential or actual releases to all environmental media at the facility.

During the PR, CDM FPC gathered and evaluated existing information from U.S. EPA Region I and Connecticut Department of Environmental Protection (CT DEP) offices. SWMUs and other areas where wastes have been managed at the facility, were identified. CDM FPC also examined documents and other written materials to obtain information regarding the facility location, waste characteristics, evidence of past releases and potential environmental receptors.

Visual Site Inspection (VSI) - The VSI serves to confirm the existence of all SWMUs, fill in data gaps where appropriate, identify other areas of concern, discuss the RFA program with facility personnel and focus recommendations for further action.

The VSI was conducted at the Whyco facility on March 28, 1989. Both CDM FPC and EPA Region I personnel were on site.

Sampling Visit (SV) - The SV helps to fill data gaps which remain upon completion of the PR and VSI by obtaining field samples. This information is then used to determine whether a release has occurred from a waste management unit.

The SV was conducted by CDM FPC personnel at the Whyco site on April 6, 1989. Soil samples were collected to determine if soil erosion from the on-site sludge landfill has spread contaminated soils on-site and possibly off-site. A sampling visit trip report was submitted to EPA Region I on April 17, 1989.

When the RFA is completed, the investigation will have identified 1) all potential releases of concern and all solid waste management units, 2) areas that need further investigation and those where sufficient information was collected to focus these investigations, 3) releases that do not require any further investigation, areas requiring interim measures and 4) permitted releases to other authorities, as appropriate.

1.3 The RFA Report

This RFA report presents the information gathered during the three steps of the RFA process. A description of the Whyco facility operations, layout and environmental setting is given in Section 2.0. Solid Waste Management Units are discussed in Section 3.0, Areas of Concern are identified in Section 4.0 and potential migration pathways and receptors of possible releases are identified in Section 5.0. A summary of the findings from the PR, VSI and SV is given in Section 6.0.

2.0 FACILITY DESCRIPTION

The Whyco Chromium Company, Inc. (Whyco) located in Thomaston, Connecticut is a specialized metal finishing operation which has been identified as a treatment, storage and disposal (TSD) facility. The site covers approximately seven acres and the facility has been in operation since 1954. Additional pertinent information includes:

Facility Address:	Whyco Chromium Company, Inc. 670 Old Waterbury Road Thomaston, CT 06787
Telephone:	(203) 283-5826
Company President:	Mark Hyner
Environmental Manager:	Mark LaVine
EPA ID Number:	CTD 001450154

2.1 Facility Operations and Hazardous Waste Management

The Whyco Chromium Co., Inc. site is located on Old Waterbury Road in the southern portion of Thomaston, Connecticut along the eastern bank of the Naugatuck River (Figure 1). The site presently occupies approximately seven acres with the production building consisting of approximately 100,000 square feet located in the northern portion of the tract. The southern portion of the site is occupied by a series of lagoons and a sludge pile operated in conjunction with the on-site wastewater treatment system. A New York/New Haven/Hartford railroad right-of-way traverses the area between the building and Old Waterbury Road.

As a job-shop electroplater, Whyco primarily conducts barrel-type plating and operations ancillary to the electroplating process. Process lines are operated for the preparation and plating of nickel, zinc, chrome, copper and cadmium. Additional operations include cleaning, degreasing, deburring, post-plating painting and corrosion protection and stripping to recover misplated parts. These processes generate waste such as metal hydroxide sludge from plating, spent methylene chloride from degreasing and cyanide from deburring.

Since its establishment in 1954, the Whyco facility has undergone several expansions. Little information is available and no documentation survives which depicts Whyco operations in the first year following its establishment. Information which does exist is based on interviews with facility employees. During the first 18 months of operation, waste materials were disposed of in the area behind the main building. Solid and liquid wastes were disposed of, including refuse, scrap metal, solids from electroplating baths, spent plating baths and rinsewaters. Flammable materials were segregated from the other wastes and open burned.

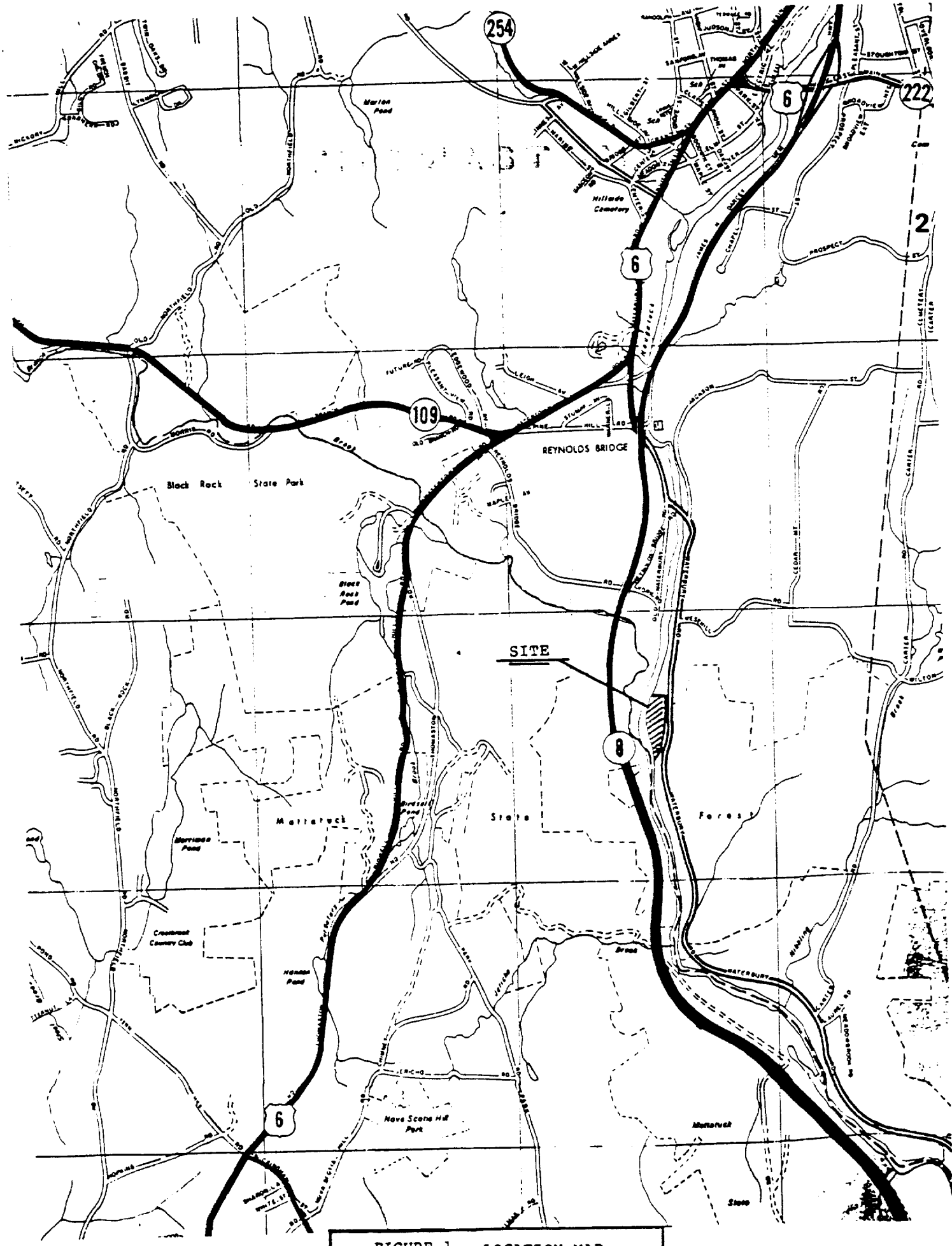


FIGURE 1 - LOCATION MAP
Whyco Chromium, Thomaston, CT

Subsequent to the flood of 1955, which completely washed out the Whyco facility, the main building was reconstructed and expanded to over three times its original size. The "rear yard" continued to be used for disposal of solid wastes, but the majority of liquid wastes were then directed to the Naugatuck River. These practices were followed until 1968 - 1969.

A number of major revisions of Whyco's waste management practices took place subsequent to the passage of the 1967 Connecticut Clean Water Act and later the Federal Clean Water Act of 1972. A wastewater treatment system was instituted consisting of a clarifier, a series of effluent recharge lagoons and sludge management units. There are three main waste streams generated by Whyco's production processes: 1) acid/alkali wastewater containing various metals, 2) cyanide bearing wastewater which also contains metals and 3) chromium containing wastewater. These streams are individually pretreated and then combined for removal of metals. Prior to 1985 the combined streams were directed to a clarifier tank for setting. This clarifier is located in what is referred to as the "pollution control room." Wastewater was then directed to the effluent recharge lagoons at the southern end of the property (see Figure 2). Here the wastewater percolated through the soil to the groundwater and eventually discharged to the Naugatuck River. The sludge from the clarifier was placed in the two hypalon-lined thickening lagoons on the eastern side of the property. This sludge was moved to the sludge drying lagoon for further drying and finally disposed of in the landfill (Sludge Pile in Figure 2). The Connecticut Department of Environmental Protection (CT DEP) had issued Whyco a permit for the discharge of non-contact cooling water and treated wastewater via seepage lagoons.

In July 1985 a rotary vacuum filter (RVF) system was put into operation to upgrade Whycos wastewater treatment. The three waste streams are still combined in the clarifier and the pH is adjusted. The wastewater is then directed to the RVF; solids are directed back into a tank for further treatment while the effluent is neutralized and discharged directly to the Naugatuck River. Sludge generated in this process is taken off-site for proper disposal. Approximately 36,000 pounds of sludge is generated every two days according to Whyco personnel.

Presently, the Whyco facility consists of general offices, a research and quality control laboratory, an emergency hospital, general support facilities, a wastewater treatment plant, former effluent recharge lagoons and an on-site sludge disposal area.

Identification and certification and waste minimization forms (EPA Form 8700-13A) were submitted by Whyco Chromium in March, 1988 which identifies the Whyco facility as a generator of hazardous waste as well as a treatment, storage and disposal facility (TSD).

Whyco also submitted EPA Form 3510-3 (Part A Permit Application) in November 1980. This form indicated that Whyco stored hazardous wastes in tanks (T01) and surface impoundments (T02). A revised Part A Permit Application Form was submitted by Whyco in July 1986. This form indicated that Whyco stores hazardous waste in a landfill. Previously, the landfill had been referred to as a "waste pile" which is considered a storage unit.

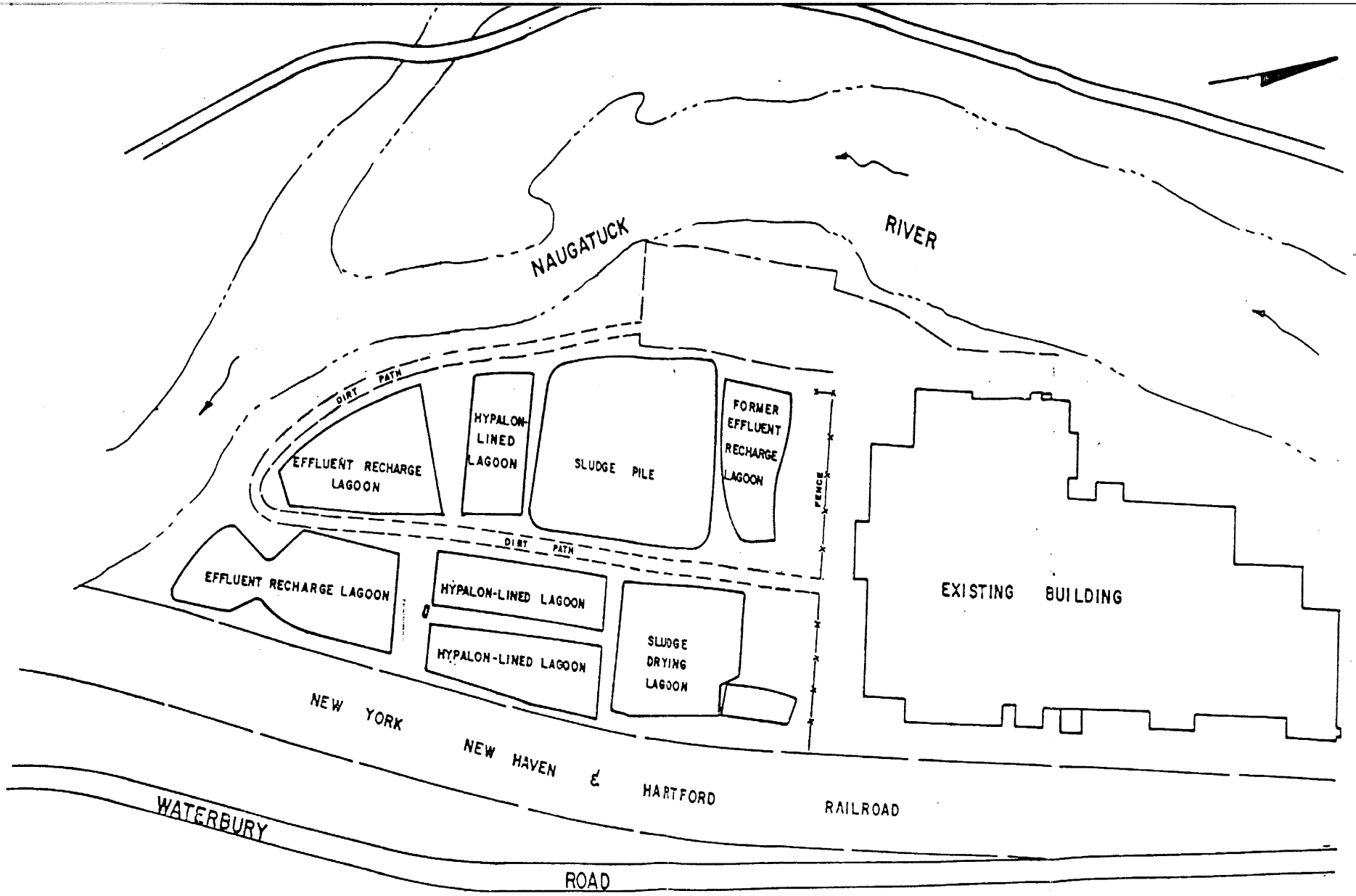


FIGURE 2 - FACILITY LAYOUT

Whyco Chromium, Thomaston, CT

From: Fuss & O'Neill, June 1989

Table 1 lists the hazardous wastes generated by Whyco as indicated on EPA Form 3510-3, Part A Permit Application. This form indicates that Whyco annually generates approximately 1,500 pounds of ignitable wastes (D001), 12.5 tons of corrosive wastes (D002), 39 tons of reactive wastes (D003), 2.7 tons of arsenic contaminated wastes (D004) and 42 tons each of cadmium, chromium and lead contaminated wastes (D006, D007 and D008, respectively). In addition, approximately 1,130 tons of hazardous wastes are generated from non-specific sources (F-type wastes which are not included under D-type wastes, i.e., F001, F002 and F006).

2.2 Facility Layout

As stated in Section 2.1, Whyco Chromium Co. consists of a central production building several former wastewater treatment lagoons and a wastewater sludge landfill. The facility layout is depicted in Figure 2. Inside the main building are several drum storage areas including waste cyanide and acid/alkali drum storage areas. In addition, there are separate liquid bulk storage areas for waste cyanide and arsenic contaminated liquids. Outside the main building is a shed designated as an ignitable drum storage area. According to plant personnel, ignitables have not been stored in this area for some time. A waste methylene chloride tank is also located outside the main building in an enclosed area.

The Naugatuck River forms the western and southwestern boundaries of the Whyco property. On the western bank of the river is a municipal wastewater treatment plant. To the west of this is Branch Brook, a tributary of the Naugatuck River, and Connecticut Route 8. The New York/New Haven/Hartford Railroad right-of-way lies along the eastern edge of the site with Waterbury Road immediately to the east of it. The Mattatuck State Forest is located on the east side of Waterbury Road opposite the Whyco site.

2.3 Environmental Setting

2.3.1 Local Hydrology

The town of Thomaston is located in the Naugatuck River Valley of the western uplands of Connecticut, which lie between the Housatonic Lowlands to the west and the Connecticut River Valley to the east. The topography of this area consists of gently rolling farmland with occasional steep valleys associated with the Naugatuck River drainage basin.
The Whyco site, on the eastern side of the Naugatuck River, is situated in a fairly level portion of the river valley 350 to 450 feet below the adjacent highlands (Figure 3). This area drains westerly toward the river. The topography to the east of Waterbury Road, within the state forest, rises sharply. This area generally drains to the west and southwest.

TABLE 1

Wastes Generated at the Whyco Chromium Co., Inc.

EPA ID Number: CTD 001450154
Source: EPA Form 3510-3/Part A Permit Application, July 1986

Waste Code	Contaminant/Hazardous Waste
D001	Non-listed ignitable waste
D002	Non-listed corrosive waste
D003	Non-listed reactive waste
D004	Arsenic contaminated waste
D006	Cadmium contaminated waste
D007	Chromium contaminated waste
D008	Lead contaminated waste
F001	Spent halogenated solvents used in degreasing, still bottoms from recovery of these solvents and spent solvent mixtures
F002	Spent halogenated solvents, still bottoms from the recovery of these solvents and spent solvent mixtures
F003	Spent non-halogenated solvents, still bottoms from the recovery of these solvents and spent solvent mixtures
F005	Spent non-halogenated solvents, still bottoms from the recovery of these solvents and spent solvent mixtures
F006	Wastewater treatment sludges from electroplating operations
F007	Spent cyanide plating bath solutions from electroplating operations
F008	Residues from the bottom of plating baths in electroplating operations where cyanides are used
F009	Spent stripping and cleaning bath solutions from electroplating operations where cyanides are used

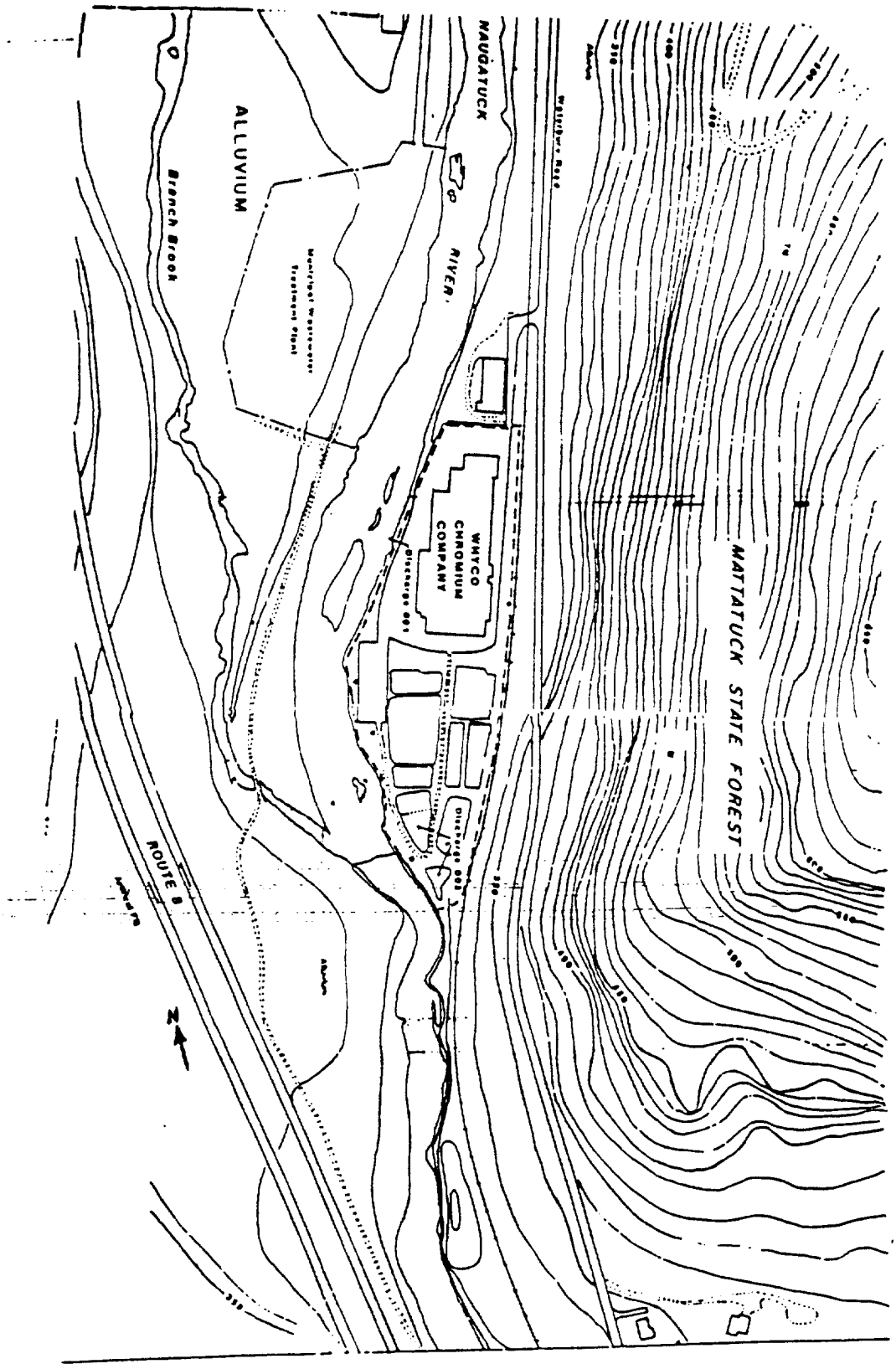


FIGURE 3 - LOCAL TOPOGRAPHY

Whyco Chromium, Thomaston, CT

2.3.2 Site Geology

In September 1986, Fuss & O'Neill, Inc. submitted a Ground Water Assessment evaluating the data collected to that date at the Whyco site. This report includes soil boring logs from January/February 1986, and monitoring well installation logs and/or details from May 1985 and January 1986. The bedrock in the vicinity of the Whyco site was found to consist predominately of hornblende/biotite-rich gneiss and schists associated with the Collinsville Formation. Bedrock mapping by the Connecticut Department of Natural Resources shows the bedding planes associated with the schists to be generally striking north-south and dipping approximately 30° to the west. Installation of bedrock monitoring well WC-1D by Fuss and O'Neill in 1986 confirmed the presence of banded biotite gneiss bedrock at 37 feet.

Whyco is situated on a small plateau approximately 10 feet above the Naugatuck River. This plateau consists primarily of stratified drift and reworked river deposits. Fuss & O'Neill had installed a total of nine monitoring wells in conjunction with their 1986 Ground Water Assessment Program. The boring logs for these wells reveal that the site is underlain by brown, fine to medium sands, fine to medium gravels with trace amounts of silt and occassional cobbles. A gray sand unit consisting of more of the finer components than the surrounding material is located in the area of wells WC-4 and WC-4D at a depth of approximately 15 feet below the surface.

2.3.3 Hydrogeology

The Whyco site is underlain by two aquifer systems, the bedrock aquifer and the unconsolidated sand and gravel aquifer overlying the bedrock. Ground water flow in the vicinity of the Whyco facility is controlled primarily by two factors: 1) recharge areas in the surrounding highlands and 2) the Naugatuck River which is the major discharge area. Fuss and O'Neill (1986) have evaluated the ground water flow direction and gradient in the unconsolidated aquifer based on water table elevations taken at each of 16 monitoring wells at three different times during the year. Depth to the ground water table was generally found to range from five to nine feet. Ground water flow beneath the site was determined to flow in a general south/southwesterly direction. The hydraulic gradient and therefore ground water flow rate will be highly influenced by seasonal and discrete recharge events in conjunction with intrinsic aquifer characteristics affecting these parameters (e.g., hydraulic conductivity and porosity). The ground water flow direction will remain relatively constant.

An apparent mounding of the ground water table was found to exist in the area of the southernmost infiltration lagoon. As a result a portion of the upgradient flow was directed toward monitoring wells WC-1A, WC-1D and WC-2. This mounding was found to decrease in 1987 and dissappeared in 1988 coincident with the discontinuation of the infiltration lagoons in June 1987 and the redirection of the NPDES regulated discharge directly to the Naugatuck River.

A bedrock well, WC-1D, was installed by Fuss and O'Neill in February 1986 to determine if the bedrock aquifer was contributing to the recharge of the overlying unconsolidated aquifer. Water table elevations were taken at well WC-1D and adjacent overburden well WC-1A. The well, in bedrock or overburden, exhibiting the greater water level elevation is considered to be the aquifer with a greater hydraulic head, and therefore the initiator of ground water flow. These measurements revealed very little difference in water table elevation implying a small vertical component of flow (i.e., predominantly lateral flow).

An expansion on the bedrock aquifer assessment was proposed by Fuss and O'Neill in November 1987. This plan called for the installation of additional bedrock wells to further define the quality of the bedrock aquifer. In March 1988, a deep bedrock well MW-1BD and three shallow bedrock wells MW-3BD, MW-4BD and MW-7BD were installed.

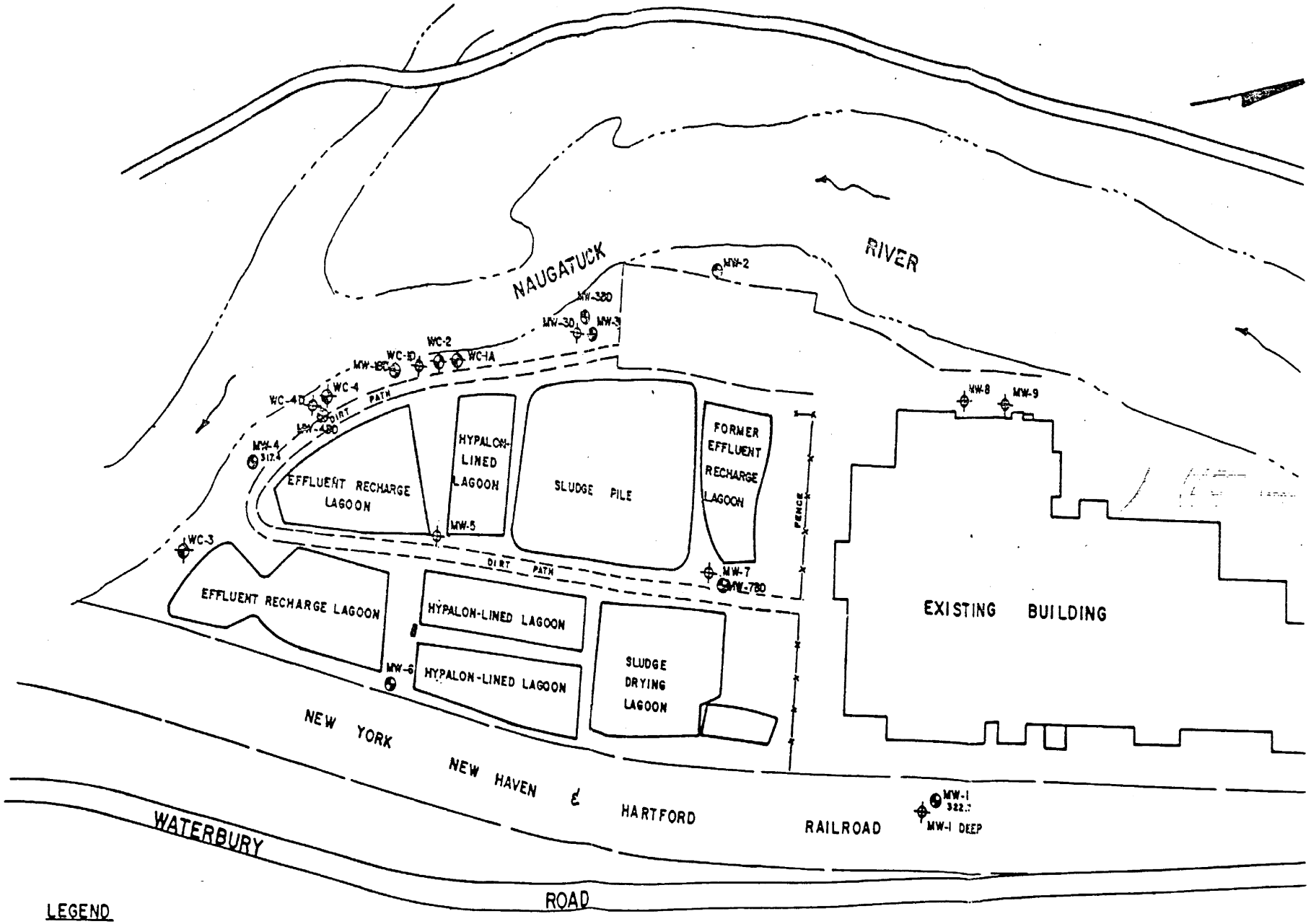
Water level measurements taken at these wells suggested a potentiometric surface sloping southwesterly, with ground water flow occurring in this direction. However due to the crystalline nature of the bedrock, ground water flow will generally occur in discrete fractures within the rock. As a result, flow direction may vary locally depending on the orientation and extent of the fractures.

As these wells were installed using air rotary drilling techniques, no core samples could be collected. However, five three-foot cores were taken during the previous installation of well WC-1D. The bedrock was found to be a medium grained light gray biotite-rich gneiss with a few zones of amphibolite. The upper five feet was fractured and weathered in comparison to the lower 10 feet. This characteristic was identified during the installation of the 1988 bedrock wells. Wells MW-1BD, MW-3BD and MW-4BD, drilled 72 to 100 feet into the bedrock had yields of 0.25 to 3 gpm, suggesting that the deeper bedrock is not highly fractured. In addition, only the upper 9 to 10 feet was determined to be relatively fractured and weathered as observed during the installation of well MW-7BD. A majority of the fractures were found to run parallel to the regional foliation of the bedrock which strikes northerly and dips westerly. A few fractures were found to run almost vertical.

Comparison to the hydraulic head in the bedrock aquifer to that of the unconsolidated aquifer, reveals a slight decrease in head moving from the bedrock to the unconsolidated deposits. This would result in some discharge from the bedrock to the overlying unconsolidated aquifer.

2.3.4 Ground Water Monitoring

A detection monitoring system was initially approved and implemented at the Whyco facility in January 1983. All monitoring well locations are shown in Figure 4. One upgradient (MW-1) and three downgradient (MW-2, MW-3, MW-4) wells were initially installed. However, MW-4 has historically not yielded an adequate ground water volume for sampling and is essentially dry. The first annual report for this ground water monitoring program, submitted in August 1984 by YWC, Inc., found downgradient water samples (wells MW-2, MW-3) with elevated metals



LEGEND

MW-1BD EXISTING MONITOR WELL

FIGURE 4 - MONITORING WELL LOCATIONS

Whyco Chromium, Thomaston, CT

From: Fuss & O'Neill, June 1989

concentrations (see Table 2). This was apparently a result of infiltration from the recharge lagoons operated in conjunction with the wastewater treatment system. Use of the northern recharge lagoon was subsequently eliminated.

In 1985, four additional downgradient wells were installed (WC-1A, WC-2, WC-3 and WC-4) in an attempt to determine the effect of the regulated units on ground water quality. A plume of contamination was identified in September of 1985. Fuss & O'Neill proposed to further expand the monitoring program. Nine wells were installed in February 1986, eight completed at medium to deep intervals: MW-1D, MW-3D, WC-4D, MW-5, MW-6, MW-7, MW-8 and MW-9; and one completed in bedrock: WC-1D. This program was designed to track the plume vertically as well as laterally.

In their September 1986 Ground Water Assessment Report, Fuss & O'Neill concluded ground water contamination was widespread at the Whyco site, but highest in the deep overburden and shallow bedrock aquifers in the vicinity of wells WC-1A and WC-1D (see Table 2). Further evaluation of the bedrock aquifer quality and potential vertical migration of contaminants was proposed by Fuss & O'Neill. In March 1988 four additional bedrock wells were installed - three shallow bedrock wells (MW-3BD, MW-4BD and MW-7BD) and one deep bedrock well (MW-1BD).

The parameters presently monitored for under the quarterly assessment program include: cadmium, chromium (total and hexavalent), cobalt, copper, iron, lead, nickel, tin, zinc, cyanide, fluoride, total organic carbon, total organic halogens, pH and specific conductivity. Quarterly analytical data up through 1988 have been reviewed for this report. Included in this review are results by YWC, Inc. in August 1984 for sampling events in September and October 1983 and January and May 1984. Fuss & O'Neill subsequently conducted quarterly sampling and reporting since October 1984. Annual Ground Water Summary Reports submitted by Fuss & O'Neill for the first three years of their monitoring program and the quarterly reports for 1988 have also been reviewed. Table 2 summarizes the analytical results for each parameter at each well exceeding drinking water standards for sampling events since September 1983.

Review of the ground water monitoring data reveals moderate to high concentrations of cadmium, chromium, copper, nickel, cyanide and fluoride in samples obtained from the unconsolidated aquifer. The highest concentrations of the heavy metals have been consistently detected southwest of the sludge landfill at wells WC-1A and WC-2 with detection to a lesser extent at well cluster MW-3 (refer to Table 2). Stratification of the heavy metals contamination in this aquifer has varied over time. Monitoring up through 1986 revealed greater levels of contamination in the deeper aquifer (seen in well WC-1A), frequently in the range of 50 to 300 times drinking water quality standards. Shallow ground water monitoring (particularly well WC-2, which is at the water table) revealed concentrations on the order of 1 to 50 times drinking water standards. Review of analytical data subsequent to 1986 (and the discontinuation of the effluent lagoons) found an overall decreasing trend in heavy metal contamination beneath the site. Stratification was found to be eliminated or occasionally reversed with higher heavy metals concentrations in the shallower ground water.