5.2 Field Investigation Program Design and Rationale

See Section 2.0 (Field Investigation Plan).

5.3 Projected Sampling Program

As discussed in Section 2.1, we do not anticipate a need for additional groundwater or surface water sampling as part of this field investigation. The need for subsurface soil and/or drum content sampling will depend on the result of this subsurface investigation (excavation) program. If sampling is required, the full Hazardous Substance List scan will be performed. The details of this program are outlined in Table 5-1. Subsequent sections of this chapter describe the protocol for analyzing any samples and for quality control, field measurements, preservation, and shipment related to any sampling activities.

5.3.1 Sampling/QC

A designated HART team member will be responsible for maintenance of a chain-of-custody on all samples

TABLE 5-1

PROJECTED SAMPLING PROGRAM

Parameter	Number of Samples	Sample Matrix	Analytical Method Reference	Sample Preservation	Holding Time
Hazardous Substance Volatiles		Aqueous	EPA Method 624	Cool, 4°C Sodium Thiosulfat	14 days
Hazardous Substance Base Neutrals/Acid Extractables		Aqueous	EPA Method 625	Cool, 4°C	7 days
Hazardous Substance Pesticides and PCBs		Aqueous	EPA Method 608	Cool, 4°C	7 days
Priority Pollutant Metals		Aqueous	Ref. 1	Filter ground water samples on-site, acidify all samples with HNO_3 to pH LT 2	6 mo.
Hazardous Substance Volatiles		Soils	Modified EPA Method 624	Cool, 4°C	None
Hazardous Substance Base Neutrals/Acid Extractables		Soils	Modified EPA Method 625	Cool, 4°C	None
Hazardous Substance Pesticides and PCBs		Soils	Modified EPA Method 608	Cool, 4°C	None
Priority Pollutant Metals		Soils	Ref 2	None	None

1 "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020, March, 1979

2 "Interim Methods of Sampling and Analysis of Priority Pollutants in Sediment Fish Tissue," EPA-600/4-81-055, October 1980.

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collected. Verification with sampling team personnel of sampling techniques and quality control procedures before every on-site activity will be completed.

5.3.2 Laboratory Analyses/QC

YWC Inc. will be responsible for all sample analyses, quality control procedures, and QC checks for this project.

5.3.3 Data Processing Activities/QC

YWC will schedule and log the movement of each sample by computer from the time the sampling program begins until the final analytical data are assembled in a report. Test result reports and data management reports will be assembled by computer and will include the following: results, quality control data, the chain-of-custody, the appropriate chromatogram and spectra, and any historical data.

5.4 Data Quality Requirements and Assessment

The data quality requirements for all samples and

additional information regarding QA can be found in the Standard Operating Procedures by YWC submitted under separate cover.

5.4.1 Data Comparability

All aqueous sample data will be reported in ug/1 (ppb). All soil samples will be reported in ug/kg (ppb). Sampling protocol will be strictly followed.

5.4.2 Data Completeness

Less than 100 percent of the samples may be collected due to well accessibility problems and poor recovery of subsurface soils in split spoons (geologic data). The valid data required from the laboratory will be 90 percent of the samples submitted.

5.5 Sample Custody Procedures

Sampling team personnel will perform all sampling and will retain custody until shipment to the laboratory. One chain-of-custody form will be used for each sample kit shipped to YWC for analysis.

Figure 5-1 provides a sample of a chain-of-custody form.

The field activities will be recorded daily in a serialized field logbook. The following information will be recorded in the logbook.

- The exact location from where each sample was taken.
- Person(s) who collected each sample and any others present.
- The date and time when each sample was collected.
- Each sample number and seal number.
- All sampling conditions, i.e., type of material, type of sampling container and any preparation thereof, description of sampling procedure, sample preservation and shipping, and weather conditions at the time each sample was collected.
- All field measurements of pH, temperature, specific conductance, volumes and characteristics of water removed during the development and flushing of wells, diameter of casing and riser pipe, distance from top of casing to bottom of well screen, distance from tip of casing to water table, and pumping rate.

YWC will provide the field personnel with sample kits containing all sample containers. Each lot of

FIGURE 5-1

CHAIN OF CUSTODY RECORD

CLIENT _____

JOB No. _____

SAMPLE IDENTIFICATION

Sample No.	Sample Description	Condition	Comments

CHAIN OF CUSTODY CHRONICLE:

COLLECTED BY:

1 NAME: _____ DATE: _____

SIGNATURE: _____ SEALS PLACED ON CONTAINERS ? ☐ YES ☐ NO

CUSTODY TRANSFERRED TO: _____

2 NAME: _____ DATE: _____ TIME: _____

SIGNATURE: _____ ARE SEALS INTACT ? ☐ YES ☐ NO ☐ N/A

CUSTODY TRANSFERRED TO:

3 NAME: _____ DATE: _____ TIME: _____

SIGNATURE: _____ ARE SEALS INTACT ? ☐ YES ☐ NO ☐ N/A

RECEIVED IN LABORATORY BY:

4 NAME: _____ DATE: _____ TIME: _____

SIGNATURE: _____ ARE SEALS INTACT ? ☐ YES ☐ NO ☐ N/A

WERE ANY SAMPLES SPLIT WITH ANOTHER PARTY ? ☐ YES ☐ NO

IF YES, IDENTIFY _____

sample containers are checked for cleanliness by the laboratory and closed to prevent contamination. Each bottle will be labeled to indicate sample number and type of analyses to be performed on the sample and packaged to prevent breakage. Field blanks, preservatives, etc., will be added as required by the analytical procedures.

5.6 Calibration Procedures, Preventive Maintenance, and Decontamination

A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. The program will be administered by the Quality Assurance Officer and the team members. The Quality Assurance Officer performs the scheduled monthly and annual calibration and maintenance, while trained team members perform field calibrations, checks, and instrument maintenance prior to use.

The HART team members are familiar with the field calibration, operation, and maintenance of all equipment. They will maintain proficiency, and will perform the prescribed field operating procedures outlined in the Operation and Field Manuals

accompanying the respective instruments. Additionally, records of all field instrument calibrations and field checks will be kept in the logbooks. Should any on-site monitoring equipment fail, the Site Safety Officer will be contacted immediately. He/she will either provide replacement equipment or have the malfunction repaired as soon as possible.

5.7 Documentation, Data Reduction, and Reporting

All field data will be entered into bound serialized notebooks. Field notebooks, chain-of-custody forms, field data sheets, and lab reports will be filed and stored at HART offices, 296 Washington Ave Extension, Albany, NY. These documents are tracked by periodically conducting inventories using the HART Document Control Sheet (Figure 5-2), which is submitted as part of the QA/QC report.

5.7.1 Data Reduction and Reporting

Data reduction at the laboratory level has already been described in Section 5.3.3, Data Processing Activities/QC. Data reduction will be affected by providing to the Quality Assurance Officer periodically

FIGURE 5-2

DOCUMENT CONTROL SHEET

PROJECT NO.

HART DOCUMENT CONTROL SHEET
SITE:
LOCATION:

Document No.	Title	In Custody Of	Date	Comments
1				
2				
3				
4				
5				
6				
7				

updated summary tables with the following headings:

Collection Date	Sample I.D. Number	Sample Descrip.	Lab. No.	Para-meter	Conc.	Ana. Date

Data will be reported in the Remedial Investigation Report prepared by HART.

5.8 Data Validation

The precision of the data submitted to HART by YWC will be checked against the analytical results of the replicate field samples. The data validity also will be assessed by the comparison of field blank and background samples with downgradient and on-site samples. The laboratories will critique their own analytical program using spike addition recoveries, establishing detection limits for each matrix and precision and accuracy control chart, and keeping accurate records of instrument calibrations. The laboratories establish average recoveries for surrogates over time, standard deviations, control and warning limits. When a sample recovery is outside the control limit, the sample analysis is repeated. If upon repetition the sample recovery is outside the

control limits, the sample will be deemed unsuitable for the method and no further analysis will be conducted on the sample. Data validation will be the responsibility of the HART QA/QC officer in conjunction with the laboratories' QA officers. Using field blanks and replicates, a data quality assessment will be incorporated into the final report.

5.9 Performance Audits

YWC has analyzed recent performance evaluation samples from a number of agencies. The dates, source of the performance evaluation samples, and parameters analyzed for are as follows:

Contracts No. and Source	Date	Parameters
PH-0497, Connecticut DOH	1/85	Organic Chemicals, gross hydrocarbons, purgeable hydrocarbons
46410 NJDEP	----	Drinking water parameters, water pollutants.

Corrective actions for laboratory analyses will be handled by consultation between the YWC QA/QC Officers and the HART QA/QC Officer. The Project Director will

make immediate decisions on new protocols to be followed. All changes in laboratory procedures will be documented and reported in the final report.

ATTACHMENT #1
SITE SAFETY PLAN

(posted on site and discussed with all field personnel)

A. GENERAL INFORMATION

Site : Higganum #25 Project No. A045

Street/City/State: Candlewood Hill Rd. Middlewood County, CT.

Plan Prepared by: L. Toffenetti,P. Sheridan Date: November 26, 1985

Approved by : Brian Jacot Date: November 26, 1985

Project Objective(s): Remedial Investigation

Proposed Date(s) of Investigation: October-November, 1985

Previous Site Characterization for safety purposes:

Inadequate ____ Adequate ____ Complete X

Overall Hazard Assessment:
Serious ____ Moderate X Low ____ Unknown ____

B. SITE/WASTE CHARACTERISTICS

Waste Type(s): Liquid ____ Solid ____ Sludge ____ Gas/Vapor ____

Characteristic(s): Corrosive ____ Ignitable ____ Radioactive ____
Volatile ____ Toxic ____ Reactive ____ Unknown X

Other Characteristics: ____

Chemical Name(s): ____

Facility Description: Site is used as a repair garage with a small dump/landfill area.

Principal Disposal Method (type & Location): Landfill

Unusual Features (dike integrity, power lines, terrain, etc.) None

Status: (active, inactive, unknown) Active

History: (worker or non-worker injury; complaints from public, previous agency action): In previous site reports it stated that there is possible contamination of wells, which are located down gradient.

C. HAZARD EVALUATION

(toxic effects, reactivity, flammability, stability, operational hazards from sampling and decontaminating)

The potential hazards associated with buried drum excavation have to be considered at this site. Indications are that the extent of drum burial is limited and that any sampling and decontamination procedures should be able to be performed in level D or level C

Overall hazard assessment is considered to be moderate.

D. SITE SAFETY WORK PLAN

Perimeter Establishment: Map/sketch attached Yes Site Secured? No

Perimeter Identified? Yes Zone(s) of Contamination Identified? NO

Personal Protection: Level of Protection A ____ B ____ C ____ D XX

Modifications: Site operations will commence with Level D with the option to move to level C, depending on the contamination hazard encountered. Continuous monitoring will take place during on site activities.

Surveillance Equipment, Clothing, and Materials: Ambient air monitoring equipment will include one or more of the following: OVA, HnU, PhotoVac Tip, Explosimeter, O_2 Meter Draeger Tubes.

Decontamination and Disposal Procedures

Decontamination (of personnel, surfaces, materials, instruments, equipment, etc.) All equipment will be washed with detergent and water and then rinsed with clean water. A "hot" line will be established and closely monitored during excavation activities.

Disposal (of contaminated equipment, supplies, washwater) Decontamination water will be wasted on site, or drummed and disposed of in accordance with Connecticut DEC procedures. Disposable clothing will also be drummed.

Site Entry Procedures: Special entry procedures are not required

Team Member (authorized to enter site?)	Responsibility
Hydrogeologist (Team Leader)	Supervise all field activities
~~Geologist/Environmental~~ Anal.	~~Documentation,~~ Assist in all field activities.
Environmental Analyst (Site Safety Officer)	Continuous ambient monitoring sample mgt., decontamination Responsible for overall safety.

Work Limitations (time of day, etc.): Daylight Hours

E. EMERGENCY INFORMATION

Local Resources

Ambulance : 537-3411

Hospital Emergency Room: 347-9471 Middlesex Hospital

Poison Control Center: 674-3456

Police: 374-4333

Fire Department: 267-9679

Airport: 566-7037 Brainard Airport

Explosives Unit: 238-6046 Bureau of State Fire Marshall (Hazardous Materials Unit)

Site Resources

Water Supply : Not Available on-site

Telephone: Not Available on-site

Radio: Not Available on-site

Other:

Emergency Contacts (if appropriate)

Corporate Health and Safety Director: Larry Kaufman (202) 223-5621

Office Safety Director: Brian Jacot (518) 869-6192

Project Manager: Brian Jacot (518) 869-6192

Client Contact: Ken Daly (203) 566-4272

EPA Site Manager: N/A

State Site Manager: N/A

Chemtrec (Chemical Emergencies 24 hours) 1-800-424-9300

Lifestar 1-800-437-4378

F. EMERGENCY PROCEDURES

1. If person exposed to hazardous material via:

Skin Waste characteristics will be identified at the site.

Inhalation First aid will be administered by trained personnel.

Ingestion Depending on the nature of the exposure, the ambulance or hospital will be notified for assistance.

1. If person injured:

First aid will be administered by trained personnel. Depending on the nature of the injury, the ambulance or hospital may be notified for assistance.

3. If potential or actual fire or explosion:

Fire Department and Explosive Unit will be notified immediately and all personnel will move to a place of safety.

4. If radiation exposure: N/A

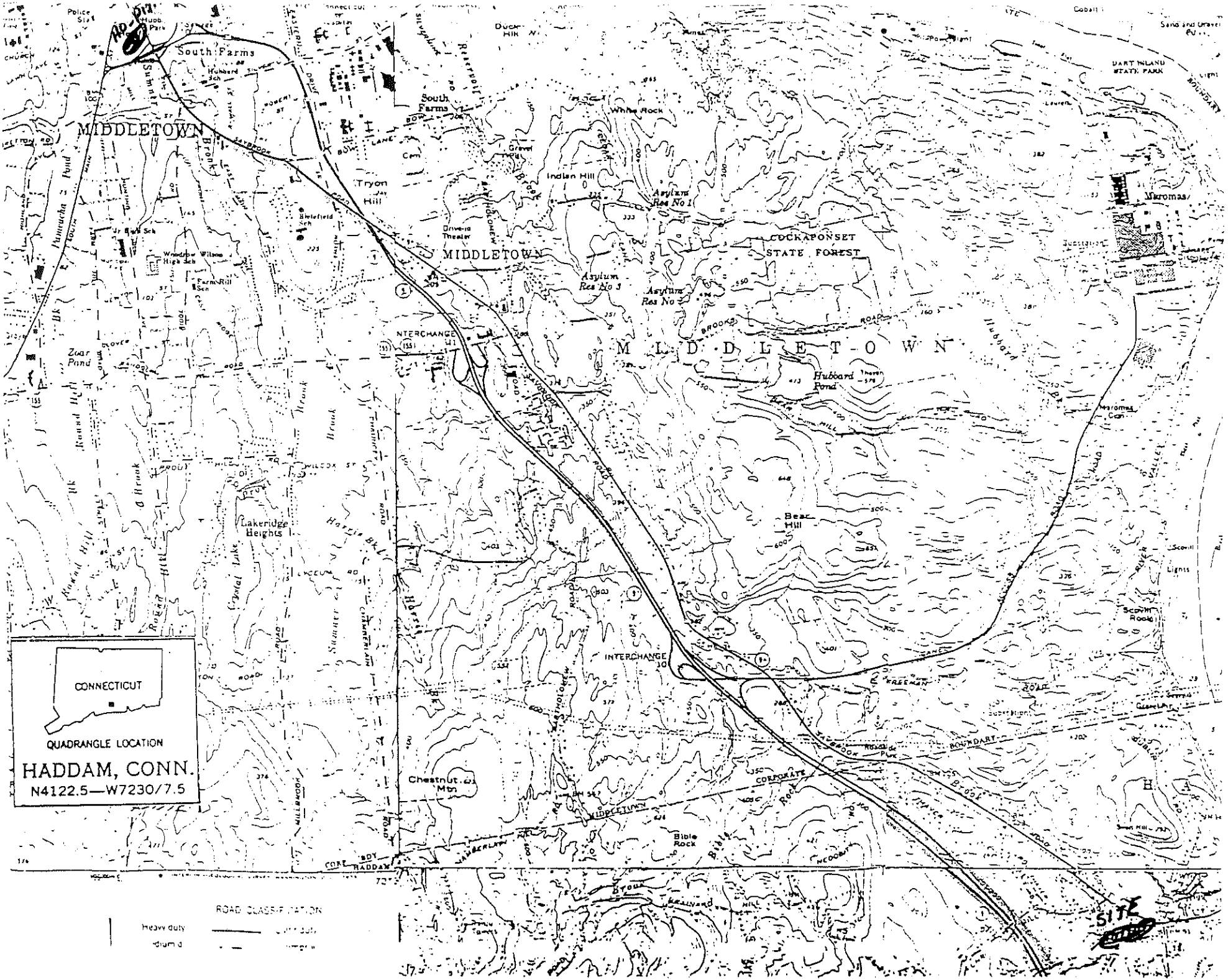
5. If contaminant spreads beyond site: N/A

G. EMERGENCY ROUTES
(Give road or other directions; attach map)

Hospital: Middlesex Hospital

Take Rt. 66 West Middletown cross the Connecticut River bridge to Main Street, south and follow Main Street ½ mile. The hospital is just past YMCA on Cresant St. (on the right)

Other:


MIDDLETOWN
South Farms
Tryon Hill
Indian Hill
White Rock
Asylum Res No 1
Asylum Res No 2
Asylum Res No 3
COCKAPONSET STATE FOREST
Hubbard Pond
Bear Hill
Lakeridge Heights
Chestnut Cr Mtn
Bible Rock
Meromas
INTERCHANGE 10
INTERCHANGE 16
CONNECTICUT
QUADRANGLE LOCATION
HADDAM, CONN.
N4122.5—W7230/7.5
ROAD CLASSIFICATION
Heavy duty
SITE

SUPPLEMENT TO:

"FIELD INVESTIGATION WORK PLAN FOR THE HIGGANUM SITE #25 HIGGANUM, CONNECTICUT"

Prepared by

Fred C. Hart Associates, Inc.
Albany, New York
and
Meriden, Connecticut

for

Connecticut Department of Transportation
24 Wolcott Hill Road
Wethersfield, Connecticut 06109

June 1986

INTRODUCTION

This document contains a proposed groundwater investigation plan to be performed at the Connecticut Department of Transportation (DOT) site #25 in Higganum, Connecticut. This plan is intended to supplement Section 2 of the document titled "Field Investigation Work Plan for the Higganum Site #25, Higganum, Connecticut", as submitted to the DOT by Fred C. Hart Associates, Inc. (HART) on November 26, 1985. As such, this plan will become Section 2.4 of the original document.

The need to conduct a groundwater investigation at this site became apparent when information, which was unavailable at the time the work plan was prepared, became available. All the background information and descriptions of procedures provided in the original work plan are applicable to the following supplemental section.

2.4 Groundwater Investigation

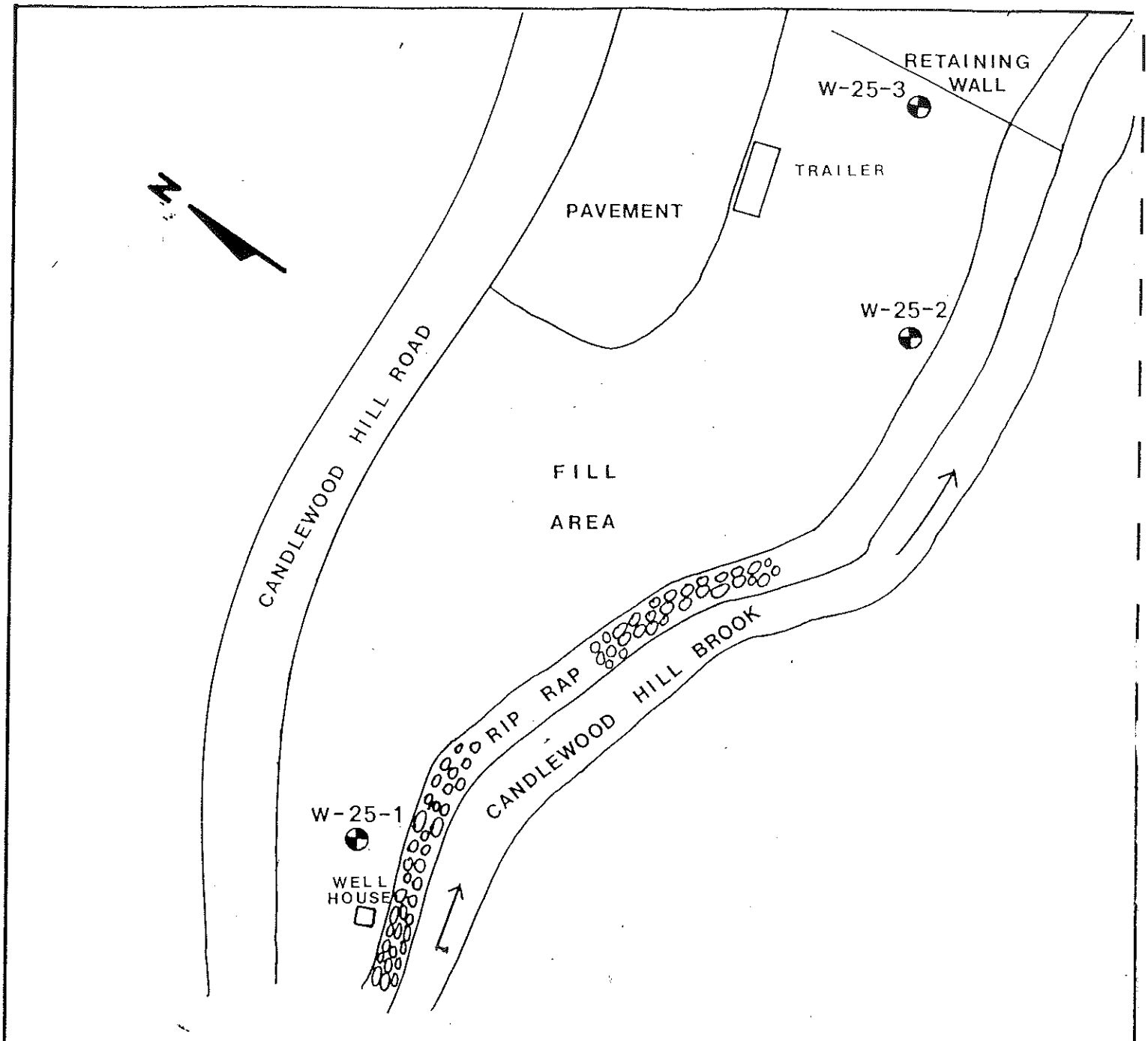
2.4.1 Purpose/Approach

A groundwater investigation will be conducted at the Higganum site to determine if past land disposal practices have affected the quality of shallow groundwater in the area. If the results of this proposed investigation indicate that the local shallow groundwater has been adversely affected by past waste disposal activity, it may be necessary to conduct a more extensive hydrogeologic investigation to fully characterize the nature and extent of the problem. If further investigation is necessary, an addendum to this work plan will be prepared and submitted for review.

The proposed groundwater investigation will consist of the drilling of test borings and the installation of approximately four groundwater monitor wells at up to three locations. The monitor wells will be installed at locations which are believed to be hydraulically upgradient and downgradient of the fill area.

Groundwater samples will be collected from monitor wells to determine if the disposal area is affecting the local shallow groundwater quality. An evaluation of the measured groundwater elevations in the monitor wells will be used to determine the direction of shallow groundwater flow.

The approximate locations of the proposed monitor wells are shown on Figure 2-2. At location W-25-1, an attempt will be made to install a well nest consisting of two monitor wells. This will be accomplished only if the combined saturated thickness of the unconsolidated and weathered portion of the bedrock aquifers is sufficient (greater than 15 feet) for the placement of two screens. Any effects the nearby water-supply well is having on local groundwater gradients may be identified by placement of



LEGEND

NOT TO SCALE

◓ PROPOSED MONITOR WELL LOCATION

FIGURE 2-2
SITE NO. 25- HIGGANUM
(CANDLEWOOD HILL RD.)
MONITOR WELL LOCATION MAP
CONNECTICUT DEPT. OF TRANSPORTATION
HAZARDOUS WASTE DISPOSAL SITE
INVESTIGATION

FRED C. HART ASSOCIATES, INC.

this well nest. If only a single shallow monitor well can be installed at this location, then sampling of the the water supply well itself will be considered.

In addition to monitoring the possible effects of the water supply well, the monitor wells at the W-25-1 location are also intended to serve as background sampling locations for groundwater quality purposes. Since it is located west-northwest of the site, this location is believed to be hydraulically upgradient of the waste disposal area and capable of providing background groundwater quality data.

Because the direction of shallow groundwater flow beneath the site is expected to be in an east-southeast direction, the two downgradient locations have been selected as shown on Figure 2-2. Location W-25-2 lies southeast of the site along the southern edge of the site plateau adjacent to Candlewood Hill Brook. Location W-25-3 lies directly east of the site.

The drilling at location W-25-2 is expected to occur through fill materials, which may necessitate the relocation of that well. It is possible that a well installed by Metcalf & Eddy in the vicinity of proposed location W-25-3 will be adequate for the purpose of this investigation. If this proves to be the case, well W-25-3 may not be needed.

The final number of wells, their precise locations, and screen settings will be determined in the field by HART's on-site hydrogeologist at the time of drilling.

2.4.2 Procedures

2.4.2.1 Geophysical Surveys

At the downgradient monitor well locations, a limited metal detection and magnetometry survey will be performed prior to the commencement of drilling. Earlier reports on waste disposal practices suggest that large metal objects, including truck parts, may be present in the fill. Because it is not possible to install a well between the brook and the fill without drilling through the fill, the geophysical surveys are intended to identify areas of possible scrap metal burial so these areas can be avoided during the drilling program. The proposed drilling locations may be adjusted as a result of the geophysical survey findings.

2.4.2.2 Test Boring Program

A single test boring will be drilled at each monitor well location prior to monitor well installation. At the background location, the test boring will extend at least 20 feet below the water table or to competent bedrock, whichever comes first. If well nests are installed, a test boring will only be drilled for the deeper of the two wells. At the remaining two well locations, the test borings are expected to extend about 10 feet below the water table.

Drilling will be accomplished using hollow stem augers. Soil samples will be collected with a split-spoon sampler at five-foot intervals in advance of drilling. Additional soil samples may be obtained at changes in lithology or at the discretion of HART's on-site hydrogeologist. When test borings are drilled through fill materials, continuous split-spoon sampling will begin at 10 feet below grade to allow for precise identification of both the base of the fill and the location of the water table. If the water table is found to occur within the fill, special

precautions will be taken to ensure that waste materials are not introduced into areas of natural geologic materials.

Based on field observations and visual inspection of soil samples, HART may decide that chemical analysis of selected soil samples is necessary. Any sample that is selected for chemical analysis will be carefully carved from the center of the split-spoon sampler. This technique will ensure that the soil sample to be analyzed has not been contaminated by direct contact with the sampler. The samples saved for analysis will be placed into laboratory-supplied jars. In addition, the split-spoon sampler will be cleaned between uses. All soil samples will be carefully described and geologic logs will be prepared. The remainder of the sample material will be saved in labelled, screw-top glass jars.

If the water table is at or near the bedrock surface, the borehole may be advanced into bedrock by rotary-core drilling. Any bedrock cores collected will be logged in detail and retained in wooden core boxes for future reference.

Based on the data gathered during drilling, it may be necessary to utilized alternate drilling methods to isolate the fill materials from the underlying native sediments or bedrock. Such drilling methods may include inserting a temporary steel casing inside the auger-drilled borehole to retain the fill, and then advancing a smaller-diameter borehole into the underlying native sediments or bedrock. The need for such measures and the exact methods to be employed will be determined in the field.

2.4.2.3 Monitor Well Installation/Construction

One groundwater monitor well will be installed in each test borehole. As dicussed, one additional well may also be installed as part of a nested

pair. Wells will be constructed of two-inch diameter, threaded, flush-joint, schedule 40 PVC riser pipe, with a 10 or 20-slot manufactured well screen (Figure 2-3). The well screen will be five or ten feet in length and the top of the screen will be set close to the water table. The actual depth of screen settings will be determined in the field by HART's hydrogeologist based on information obtained during the test boring program.

A sand pack will be placed around the screen and will extend one to two feet above the top of the screen. A bentonite pellet layer, approximately one to two feet thick, will be placed above the sand pack. This bentonite layer will prevent grout material from infiltrating the sand pack and reaching the screen. The annular space above the bentonite pellet layer will then be filled with a bentonite/cement grout slurry to within two feet of the surface. Grouting of the annular space shall be by tremie or by another method approved by HART. A cement cap will be placed in the top two feet of the annulus and will extend above the ground level. This cap will be mounded to direct surface water away from the well.

A protective steel casing with locking cover will be set into the cement cap. The top of the steel casing will extend one to two feet above the ground level, resting within two inches of the top of the PVC riser pipe (Figure 2-3).

At boreholes which require rotary-core drilling into bedrock, an attempt will be made to complete the monitor wells in the coreholes as described above. If the core holes are unstable, alternate drilling methods or well construction methods may be necessary.

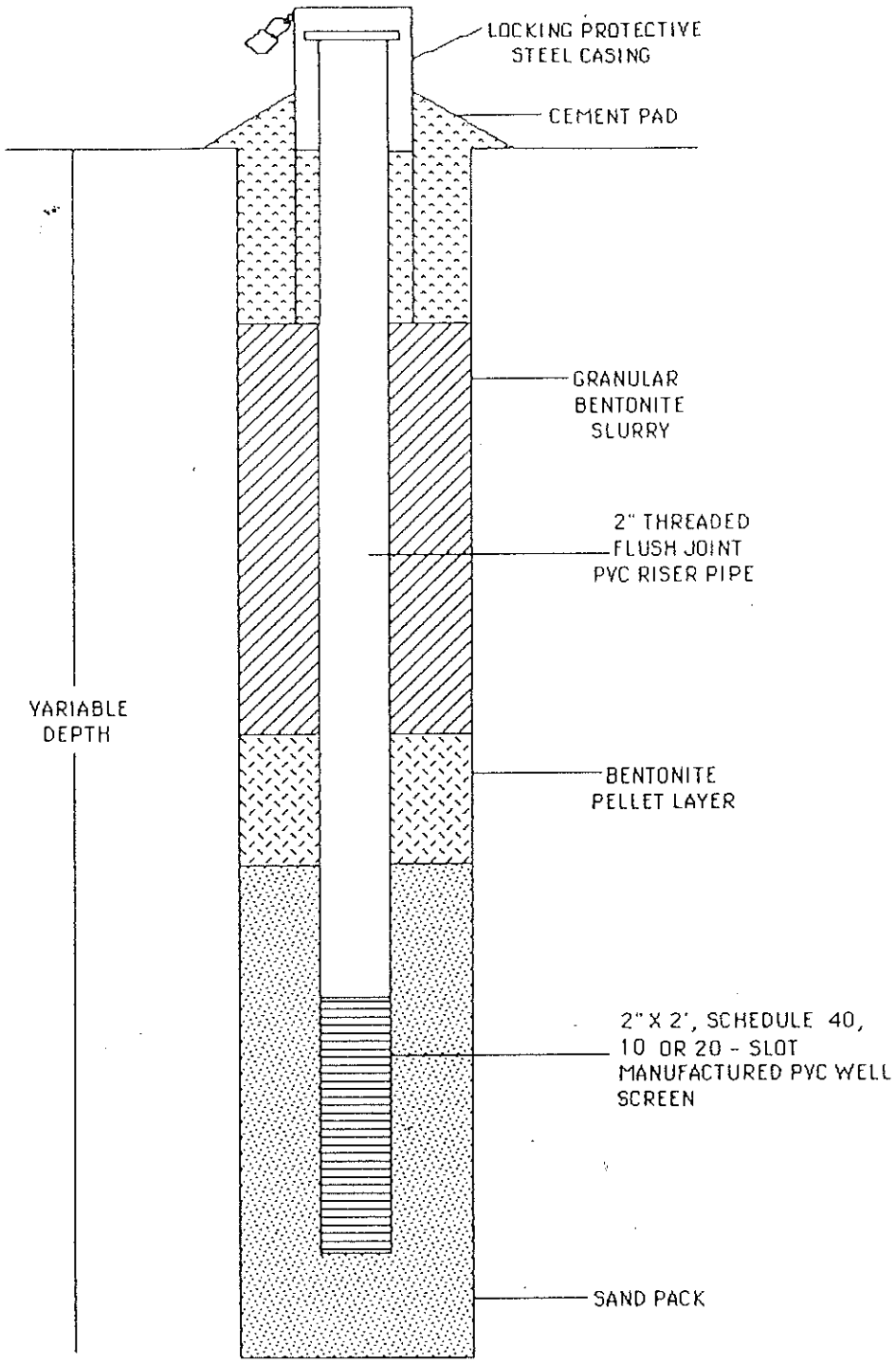


FIGURE 2-3
PROPOSED MONITOR WELL
CONSTRUCTION SITE NO. 25
HIGGANAUM
CONNECTICUT DEPT. OF TRANSPORTATION
HAZARDOUS WASTE DISPOSAL SITE
INVESTIGATION

FRED C. HART ASSOCIATES, INC.

All groundwater monitoring wells will be developed by the driller subsequent to installation. Development will be accomplished by bailing, surging, pumping, or other methods approved by HART's hydrogeologist. If possible, development will continue until an adequate flow of relatively particle-free water is produced.

2.4.2.4 Groundwater Sample Collection

Prior to collecting samples from monitor wells, the depth to water in each well will be measured and the total volume of standing water present in the well will be calculated. An attempt will then be made to evacuate three to five times the volume of standing water in the well. If the well goes dry before this is accomplished, the sample will be collected once the well has sufficiently recovered. Well evacuation will be done to ensure that the groundwater sample collected is representative of water present in the aquifer, and not water standing in the well casing.

A bottom loading stainless-steel bailer with a teflon check valve will be used to collect groundwater samples from the monitor wells. The bailer will be solvent-cleaned and allowed to dry prior to use. The bailer will be lowered into the well with a clean length of nylon cord. Care will be taken not to agitate the sample when transferring it from the bailer to the sample container.

2.4.2.5 Field Documentation of Groundwater Investigative Activities

Detailed records of all drilling operations, monitor well construction, and sampling activities will be kept by HART personnel.

Documentation will include the following:

1. Dates and times of monitor well construction and sampling activities, and persons present.
2. Types and amounts of drilling and construction equipment used.
3. Accurate geologic logs including detailed descriptions of all soil and sediment samples obtained and depths at which changes in lithology were encountered.
4. Measurements of total depth of monitor well, depth to water, lengths of screen and riser pipe, and extent of sand pack, bentonite layer, and grout.
5. Depth to groundwater, volume of water present in monitor well, and volume evacuated prior to sample collection.
6. Procedures for monitor well development, monitor well evacuation, and groundwater, surface water, soil, and sediment sampling (including sample appearance, weather conditions, and other pertinent information).

All records will be written in ink in bound notebooks, with pages consecutively numbered.

At the completion of all field activities the locations of all such activities, including the elevation of the monitor well, will be surveyed by a licensed surveyor. Where appropriate, this information will be added to the surveyed base map.