

Harding Lawson Associates



November 21, 1995

29872 12.4

VIA FACSIMILE TRANSMITTAL

Ms. Sherrel Taylor-Domville
United States Environmental Protection Agency
Region II
Emergency and Remedial Response Division
290 Broadway
New York, New York 10007-1866

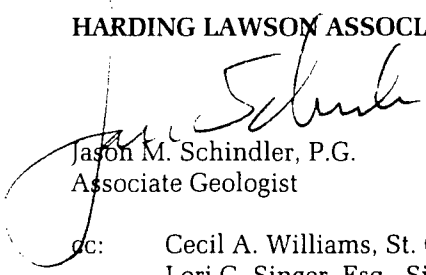
**Draft Phase II Work Plan
Remedial Investigation
VICHEM Site
St. Croix, U.S. Virgin Islands**

Dear Ms. Taylor-Domville:

Enclosed please find nine (9) copies of the subject document. Please contact me if you have any questions.

Yours very truly,

HARDING LAWSON ASSOCIATES


Jason M. Schindler, P.G.
Associate Geologist

cc: Cecil A. Williams, St. Croix Department of Planning and Natural Resources
Lori G. Singer, Esq., Sills, Cummis, Zuckerman, Radin, Tischman, Epstein & Gross
Edward A. Nemecek, Harding Lawson Associates

SKB/jmc/JMS
G:\WORK\29872\WPL9511-01.DOC

302142

DRAFT

**Draft Phase II Remedial Investigation Work Plan
Virgin Island Chemical Site
Remedial Investigation
St. Croix, U.S. Virgin Islands**

Prepared for

Island Chemical Company

HLA Project No. 29872 12.4

Jason M. Schindler, P.G.
Associate Geologist

Edward A. Nemecek, R.G., CPG
Principal Hydrogeologist

November 21, 1995



Harding Lawson Associates
Engineering and Environmental Services
131 North Third Street
Philadelphia, PA 19106 - (215) 627-4505

302143

CONTENTS

1.0	BACKGROUND	1
1.1	Introduction.....	1
1.2	Site Description	1
1.2.1	Site Location	1
1.2.2	Site Structures.....	1
1.2.3	Site Setting.....	2
1.3	Previous Activities and Data Needs.....	2
1.4	Objectives.....	3
2.0	WORK PLAN APPROACH.....	4
3.0	PHASE II REMEDIAL INVESTIGATION TASKS.....	5
3.1	Supplemental Background Investigation	5
3.1.1	Evaluation of Metals Data	5
3.2	Field Sampling Program	5
3.2.1	Surface Soil Sampling Program.....	5
3.2.2	Groundwater Monitoring Well Installation	6
3.2.3	Survey.....	6
3.2.4	Groundwater Sampling	6
3.2.5	Groundwater Elevation Monitoring.....	6
3.3	Data Validation	7
3.4	Data Evaluation	7
3.5	Update/Track ARARs.....	7
3.6	Project Planning and Reporting	7
3.6.1	Meetings with EPA.....	7
3.6.2	Monthly Progress Reports	7
3.6.3	Revised Data Summary Report.....	7
3.7	Management of Investigation-Derived Waste	7
4.0	PROJECT ORGANIZATION.....	8
5.0	ANTICIPATED SCHEDULE.....	9

FIGURES

1-1	Site Location Map
1-2	Site Map
1-3	Regional Geologic Map
3-1	Areas of Potential Concern and Sampling Locations
5-1	Work Plan Implementation Schedule

DISTRIBUTION

1.0 BACKGROUND

1.1 Introduction

As specified in our letter dated October 20, 1995, Harding Lawson Associates (HLA) has prepared this Draft *Phase II Remedial Investigation Work Plan* (Phase II Work Plan) on behalf of Island Chemical Company (ICC) as part of the Remedial Investigation (RI) of the former Virgin Island Chemical (VICHEM) property (site) located on Route 66 (Melvin Evans Highway) near the intersection with Route 64 in St. Croix, U.S. Virgin Islands. This Phase II Work Plan is intended to address issues discussed during the meeting on October 6, 1995, with the U.S. Environmental Protection Agency Region II (EPA) following submittal of the *Draft Data Summary Report* (DSR) for this site, dated August 15, 1995. The work described in this document will be performed in accordance with the project *Sampling and Analysis Plan* (SAP), *Health and Safety Plan* (HASP), and *Quality Assurance Project Plan* (QAPP) provided with the *Remedial Investigation Work Plan* (Phase I Work Plan), dated March 17, 1994 and revised August 5, 1994.

1.2 Site Description

1.2.1 Site Location

The site occupies approximately 3 acres in south central St. Croix, U.S. Virgin Islands (Figure 1-1). The site is located on Melvin Evans Highway (Route 66), approximately 1,500 feet north of the Alexander Hamilton Airport. The property is located on Plot 13Q of Estate Bethlehem Middle Works at 17°42'35" north latitude, 64°47'26" west longitude.

The site is bordered to the northeast and southeast by an intermittent stream identified as River Gut. It is bordered to the west by an undeveloped lot and to the southwest by Route 66. A concrete batch plant, an asphalt paving company, and two automobile repair shops are located to the east of the site, across River Gut.

1.2.2 Site Structures

The facility is abandoned. The current layout of the facility is shown in Figure 1-2. Major onsite structures include the following:

- Laboratory and Warehouse Building
- Maintenance Building
- Aboveground Storage Tank (AST) Farm
- Concrete Pads Adjacent to AST Farm (former AST locations)
- Loading Dock
- Concrete Storage Pad
- Centrifuge and Dryer Building
- Reactor Process Area
- Former Process Pit (filled during previous work at this site)

302145

- Generator Building
- Pump Building
- 250,000-Gallon Fire Water AST

1.2.3 Site Setting

The site is located in a valley. Surface elevations at the site range from approximately 30 to 40 feet above mean sea level (MSL). Land to the southwest (approximately 200 feet) and to the east (approximately 1,000 feet) of the site slopes steeply upward to roughly 150 to 200 feet above MSL.

The surface slopes gently across the site from southwest to northeast. Ground surface just beyond the northern and eastern fence lines slopes steeply downward approximately 12 to 15 feet. An earthen berm partially separates the AST farm in the western part of the facility from the remainder of the site. On the western side of the berm, runoff drains from southwest to northeast. Surface drainage on the eastern portion of the site is controlled by the buildings, concrete paved areas, and two storm drains that channel runoff along the southeastern site boundary. Flow in River Gut is intermittent and generally occurs only during the rainy season, between September and December. The Caribbean Sea is located approximately 4,500 feet south of the site.

Soils beneath the site consist of alluvium. The geology and hydrogeology of St. Croix were discussed in the Project Work Plan. Figure 1-3 presents a generalized geologic map of the island.

1.3 Previous Activities and Data Needs

Between September 1984 and March 1986, Enviro-Science, Inc. (ESI) performed a series of investigations of selected portions of the site. In September 1985 and March 1986, EPA collected several samples from the site. Between March 1989 and April 1991, EPA performed a preliminary assessment and drum removal. In February 1991, NUS Corporation (NUS) collected groundwater, soil and sediment samples as part of a Preliminary Assessment/Site Investigation, performed on behalf of EPA. Data generated during these activities were summarized in the Phase I Work Plan.

From October 1994 to August 1995, HLA implemented the EPA-approved Phase I Work Plan. Results of work performed to date were summarized in the *Draft Data Summary Report* (DSR), dated August 15, 1995. Following agency review of the DSR, HLA and representatives of ICC met with EPA on October 6, 1995, to discuss the status of the investigation. During the investigation and the meeting with EPA, EPA requested data pertaining to the following:

- Potential, if any, for metals at the site to impact the environment
- Potential for conditions at the site to have affected coastal regions
- Extent of affected soil identified in the AST area
- Groundwater conditions near the center of the site
- Potential for site to act as an ongoing source of groundwater contamination
- Primary direction of groundwater flow
- Possible influences on shallow groundwater flow

302146

- Extent of communication between the shallow and deep portions in the underlying aquifer

1.4 Objectives

The objectives of this phase of the RI are:

- To generate data necessary to fulfill the objectives of the Phase I Work Plan
- To address the data needs identified in Section 1.3, above

The Phase II RI tasks described in Section 3 of this Phase II Work Plan are designed to achieve these objectives. Following completion of the Phase II RI tasks, the DSR will be revised.

2.0 WORK PLAN APPROACH

The tasks outlined in Section 3 of this Phase II Work Plan were developed to satisfy the data needs identified in Section 1.3. This Phase II Work Plan was developed based on:

- The RI results to date, presented in the DSR
- The October 6, 1995, meeting with EPA

The tasks to be completed are as follows:

1. Research historical metals use at the site and perform statistical analysis of existing USGS data and data collected during previous investigations to confirm background metals concentrations. This work will be performed to evaluate the potential, if any, for metals at the site to impact the environment.
2. Identify locations between the site and the Caribbean Sea. Results of this work will be used in conjunction with additional site characterization activities to assess the potential for conditions at the site to have affected coastal regions.
3. Collect 12 surface soil samples at Area B to determine the extent of affected soil identified in the AST area.
4. Install one monitoring well at Area C to assess groundwater conditions near the center of the site.
5. Collect two additional rounds of groundwater samples from the existing and new monitoring wells. These data will be used to evaluate the potential for the site to act as an ongoing source of groundwater contamination.
6. Install continuous water level recorders in two additional well locations to evaluate the primary direction of groundwater flow. These data will be used in conjunction with information generated to date to identify possible influences on shallow groundwater flow.
7. Measure depth to water in former pumping wells (P-1 and P-2) during quarterly groundwater sampling activities. Calculated water levels will be compared to data from the shallow wells to further assess the extent of communication between the shallow and deeper zones in the underlying aquifer.
8. Validate data
9. Continue to update ARARs
10. Project planning and management
11. Meetings, progress reports, and presentations to EPA
12. Update DSR
13. Manage and dispose of investigation-derived wastes

302148

3.0 PHASE II REMEDIAL INVESTIGATION TASKS

The tasks to be completed during Phase II of the RI are outlined below. Specifics of well locations, wells to be sampled, soil sample locations, analytical parameters, and other activities may need to be modified based on the findings of various tasks. EPA will be notified of any substantive changes, prior to implementation. Work will be conducted following procedures outlined in the FSP, HASP, and QAPP. These documents were included as Appendices to the Phase I Work Plan.

3.1 Supplemental Background Investigation

HLA will perform a detailed evaluation of metals used at the site, including the following activities:

1. Identify analytical methods used by USGS in its island-wide sampling program.
2. Evaluate results of soil and sediment samples collected by HLA, EPA, NUS, and other previous contractors.

Because the coverage provided by the sediments samples previously collected appears to be sufficient to characterize the site, no further sediment sampling is proposed at this time.

3.2 Field Sampling Program

3.2.1 Surface Soil Sampling Program

In January 1995, one boring (SBB1) was installed in the AST area (Area B) to investigate soil quality in the area. Petroleum-related volatile organic compounds (benzene, toluene, ethylbenzene, and xylene) were detected in soil samples collected from boring SBB1.

A soil sampling program will be conducted to investigate the surficial extent of impact in Area B. The proposed locations for the 12 surface soil samples are shown in Figure 3-1.

Surface soil samples will be collected using decontaminated shovels and stainless steel trowels. Samples will be collected from the 18- to 24-inch interval below ground surface.

Samples will be placed directly into laboratory-prepared sample containers. Additional sample volume will be collected into resealable plastic bags and screened in the field using a photoionization detector (PID) according to procedures described in the FSP. Procedures for sample handling, management, and shipping are described in the FSP and QAPP.

Surface soil samples will be analyzed for BTEX compounds using Method SW-846 5030A/8020 (modified). The modified method analyzes for low concentrations (1 to 5 micrograms per kilogram ($\mu\text{g/kg}$) detection limits). Results will be reported in Contract Laboratory Program (CLP)-type format..

3.2.2 Groundwater Monitoring Well Installation

With EPA approval, planned monitoring well MW-2 was not completed during the January 1995 field program. As discussed with EPA, an area of low permeability was encountered above the water table in SBC1. The possibility that well installation might provide a conduit for contaminants to reach groundwater was a concern at the time. However, analytical results of soil samples collected from SBC1 indicated that soils above the water table were not contaminated in this area. Therefore, MW-2 will be installed in Area C, as specified in the Phase I Work Plan. This well will be used to evaluate groundwater at the center of the site and to provide additional water level control.

The well will be installed and developed as described in the FSP. Development water will be placed in 55-gallon drums and staged onsite pending disposal.

3.2.3 Survey

The location and elevation of MW-2 will be surveyed as specified in the Phase I Work Plan. The horizontal position will be surveyed with respect to the Puerto Rican/Virgin Islands plane coordinate system (North American Datum of 1983, or NAD 83) and existing monitoring wells to the nearest tenth of a foot. The well location will be converted from plane coordinates to latitude and longitude. The conversion shall be performed to an accuracy of one hundredth of a second of latitude and longitude.

The vertical position of MW-2 will be surveyed with respect to Mean Sea Level (MSL) to the nearest hundredth of a foot. Well elevations to be surveyed include the top of inner casing, top of outer casing, and adjacent ground surface. The location of the inner casing elevation measurement will be permanently marked for future water level measurements.

3.2.4 Groundwater Sampling

Three rounds of groundwater samples have been collected from the four existing monitoring wells at the site (February 1995, May 1995, and August 1995). After installation of MW-2, two additional rounds of groundwater samples will be collected from all five onsite monitoring wells. The groundwater sampling round scheduled for November 1995 will be postponed until after installation of MW-2.

The additional groundwater sampling will be conducted in order to further evaluate groundwater quality at the site. Specifically, objectives of the groundwater sampling are to investigate whether (1) the site is an ongoing source of groundwater contamination, and (2) groundwater near the center of the site has been affected. The first groundwater sampling round will be conducted approximately 2 weeks after installation and development of MW-2 has been completed. The second sampling round will be conducted 3 months after the first round.

Groundwater sampling procedures are described in the SAP. Groundwater samples will be analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), and total and dissolved Target Analyte List (TAL) inorganics. Samples to be analyzed for dissolved TAL inorganics will be filtered in the field in accordance with the Phase I Work Plan.

3.2.5 Groundwater Elevation Monitoring

Groundwater elevations have been monitored at the site using two continuous water level recorders. Water level measurements have also been collected prior to each groundwater sampling event. In order to further evaluate groundwater flow at the site, HLA will conduct additional groundwater elevation monitoring activities.

Specifically, the objectives of the additional groundwater elevation monitoring are to evaluate (1) whether existing well locations are adequate to characterize site groundwater conditions, (2) the primary direction of groundwater flow, (3) the possible influences on shallow groundwater flow, and (4) the extent of communication between the shallow and deep zones in the underlying aquifer.

Two additional continuous water level recorders will be installed in selected wells onsite. Since there are already two such recorders functioning onsite, the additional recorders will allow four of the five shallow monitoring wells to be monitored continuously.

302150

Water levels will be measured in wells P-1 and P-2 during the sampling events. These water levels will be compared to shallow well data and historical data to evaluate possible communication between the shallow and deeper zones.

Prior to each groundwater sampling event, water levels will be measured in all of the wells onsite. Water level measurements will be collected in accordance with the SAP. Groundwater elevations will be calculated by subtracting the measured depth to water from the surveyed top of inner casing reference elevation. Groundwater contour maps will be prepared using the water table elevations.

3.3 Data Validation

All laboratory data generated for investigative samples will be validated as discussed in the QAPP.

3.4 Data Evaluation

The data generated during the Phase II RI will be evaluated in conjunction with the data previously generated and reported in the DSR. An objective of the data evaluation will be to investigate the potential site-related chemicals and sources of ecological and human health concern, if any.

3.5 Update/Track ARARs

The list of Applicable or Relevant and Appropriate Requirements (ARARs) will continue to be refined, developed, and revised, as needed, throughout completion of the RI activities to take into consideration additional chemical data, site conditions, and potential remedial actions. Further, state and federal registers will continue to be reviewed periodically to identify changes to the ARARs that have already been identified.

3.6 Project Planning and Reporting

3.6.1 Meetings with EPA

One meeting with EPA will be requested following receipt, interpretation, and validation of data generated during the implementation of the Phase II Work Plan and prior to preparation of the DSR. At that time, the findings will be discussed along with the format for the DSR. Additional meetings with EPA will be conducted as needed or upon request.

3.6.2 Monthly Progress Reports

Monthly progress reports will continue to be submitted to EPA on the 15th day of each month. The monthly progress reports will be prepared in accordance with the Administrative Order on Consent and the Phase I Work Plan.

3.6.3 Revised Data Summary Report

Following completion of Phase II RI activities, the draft DSR will be revised and submitted to EPA. The revised report will include data generated during Phase I and II activities.

3.7 Management of Investigation-Derived Waste

Investigation-derived waste (IDW) will be managed in accordance with procedures outlined in the Phase I Work Plan.

4.0 PROJECT ORGANIZATION

HLA, as a contractor to ICC, has responsibility for designing the sampling and analysis programs necessary to achieve the project objectives. HLA's project management structure is described in the Phase I Work Plan.

HLA will provide project management, perform and/or observe field investigations, and prepare and submit project deliverables to EPA. To achieve these goals, HLA will retain experienced subcontractors in the specific disciplines necessary. Subcontractors will be selected and managed as described in the Phase I Work Plan.

5.0 ANTICIPATED SCHEDULE

The anticipated implementation schedule is presented as Figure 5-1. It has been prepared based on the number of weeks from receipt of EPA approval of the Phase II Work Plan. The proposed schedule is based on the following assumptions:

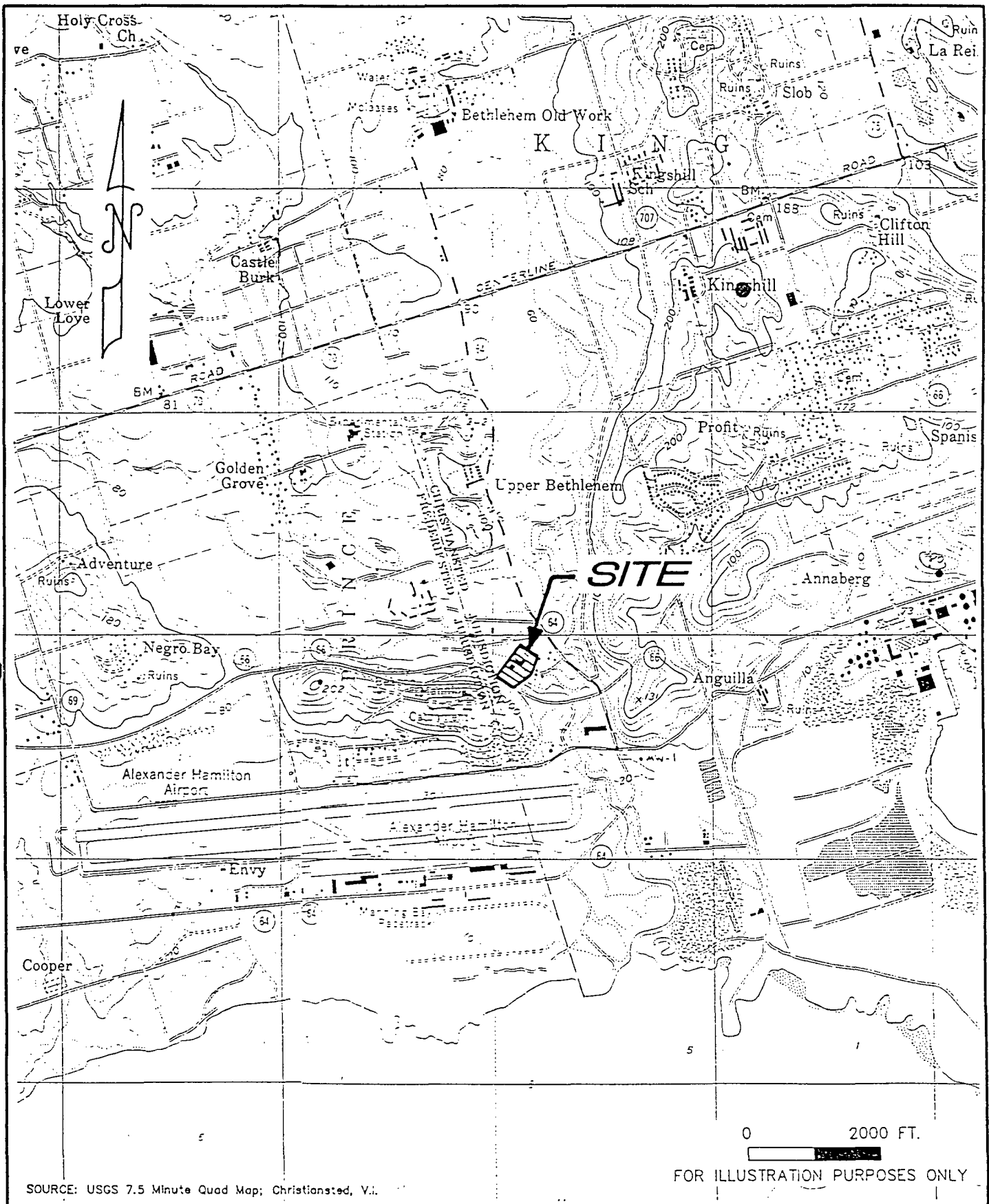
- The existing access agreements for locations of all field activities remain effective.
- Inclement weather conditions will not delay field activities by more than one week.
- The economic and physical conditions of St. Croix have been restored since hurricane Marilyn struck to a degree that Phase II RI activities may be carried out.

302153

DRAFT

FIGURES

302154



SOURCE: USGS 7.5 Minute Quad Map; Christiansted, V.I.

FOR ILLUSTRATION PURPOSES ONLY



Harding Lawson Associates
 Engineering and
 Environmental Services
 131 North Third Street
 Philadelphia, PA 19106
 215-627-4505
 DRAWN
 JSW

JOB NUMBER
 29872.13.2

SITE LOCATION MAP

VIRGIN ISLAND CHEMICAL SITE
 ST. CROIX, U.S. VIRGIN ISLANDS

APPROVED

FILE
 S-BASE

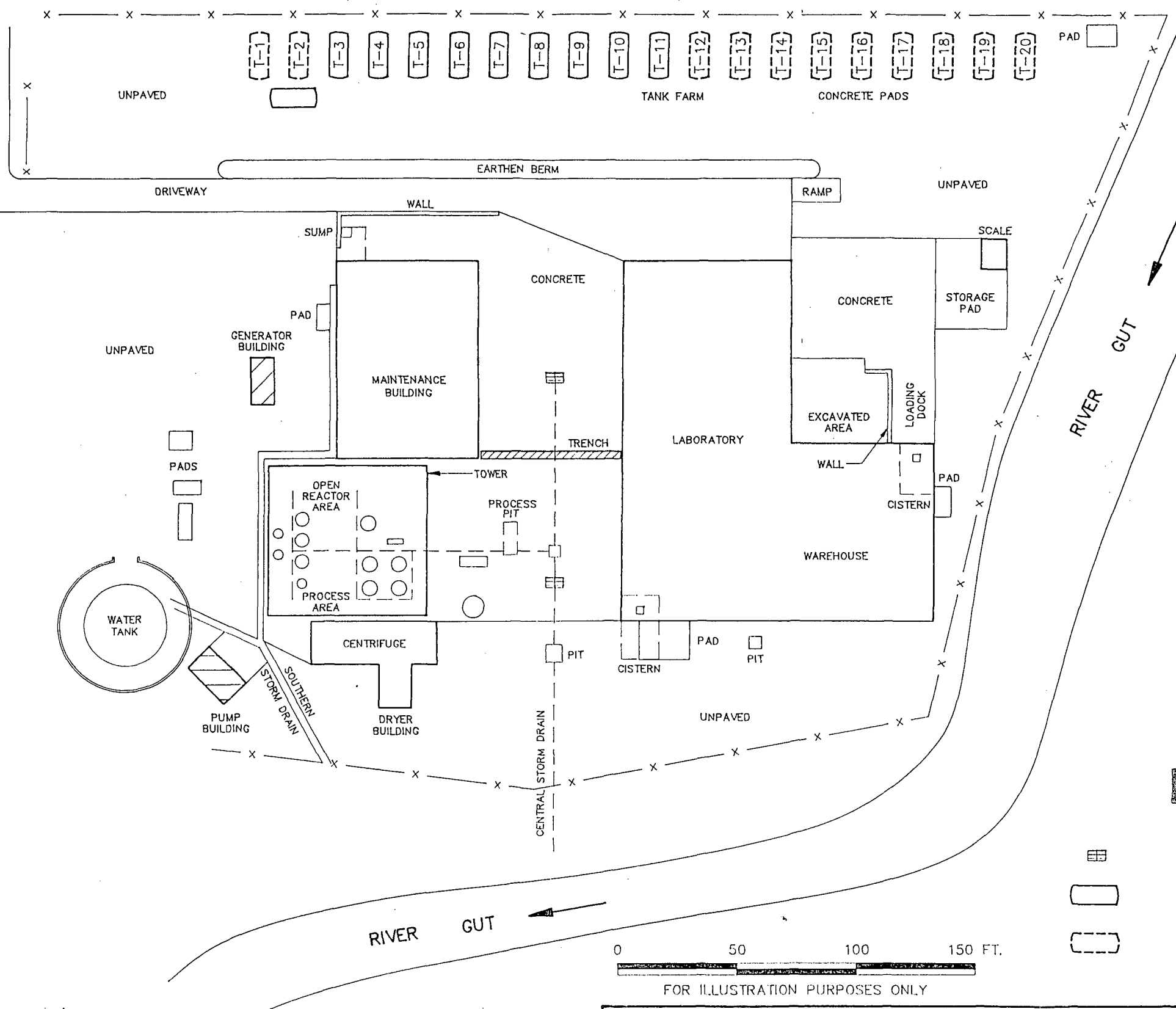
DATE
 6/6/95

REVISED NO.

DRAFT 1-1

302155

ROUTE 66
MELVIN EVANS HIGHWAY



DRAFT

-  INLET
-  EXISTING ABOVEGROUND STORAGE TANK
-  TANK PAD-FORMER ABOVEGROUND STORAGE TANK LOCATION

0 50 100 150 FT.
FOR ILLUSTRATION PURPOSES ONLY



Harding Lawson Associates
Engineering and
Environmental Services
131 North Third Street
Philadelphia, PA 19106
215-627-4505
DRAWN JSW
JOB NUMBER 29872.13.2

SITE MAP

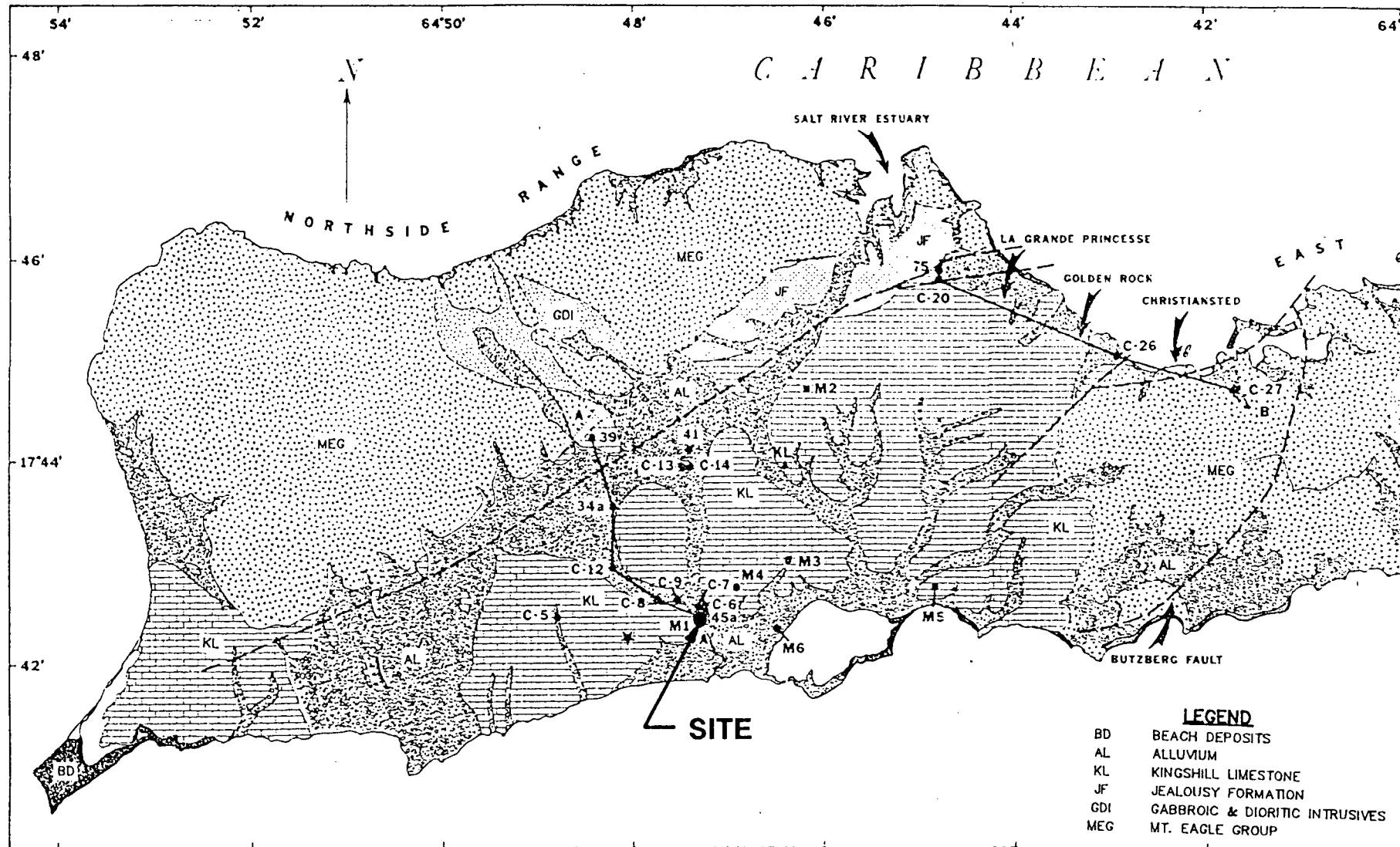
VIRGIN ISLAND CHEMICAL SITE
ST. CROIX, U.S. VIRGIN ISLANDS

APPROVED FILE 29872B01 DATE 5/6/95 REVISED DATE

FIGURE

1-2

SOURCE:
PROPOSED ICC SOIL SAMPLING LOCATIONS BY ENVIRO-SCIENCES, INC. DATED: 6/19/86 AND
SITE MAP, VI CHEMICAL, ST. CROIX, U.S.V.I. BY NUS CORPORATION DOCUMENT 02-9101-04-51, UNDATED



302157



Harding Lawson Associates
Engineering and
Environmental Services
131 North Third Street
Philadelphia, PA 19106
215-627-4505

DRAWN
JSW

JOB NUMBER
29872.13.2

REGIONAL GEOLOGICAL MAP

VIRGIN ISLAND CHEMICAL SITE
ST. CROIX, U.S. VIRGIN ISLANDS

APPROVED

FILE
S-BASE

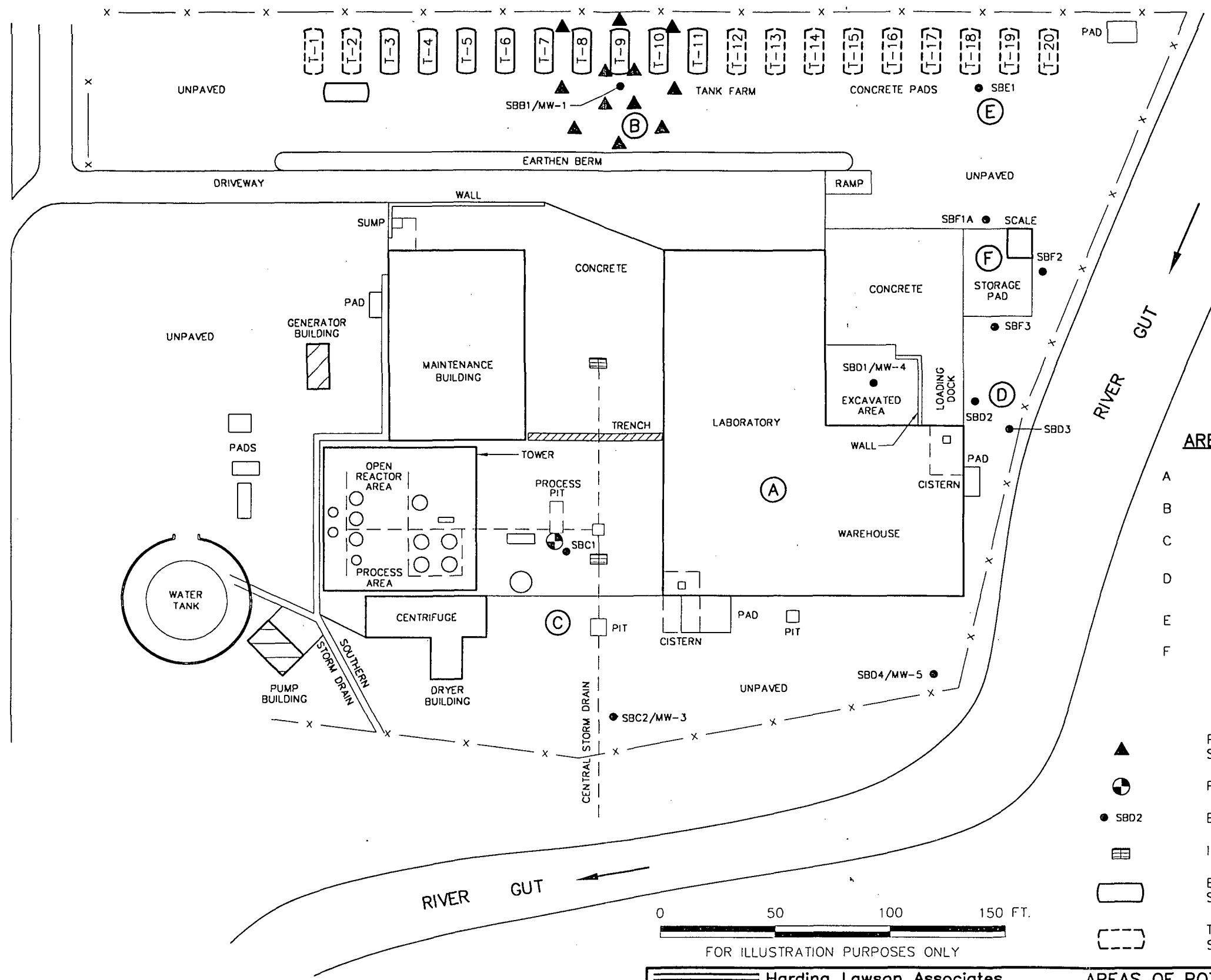
DATE
6/7/95

REVISED DATE

FIGURE

DRAFT 1-3

ROUTE 66
MELVIN EVANS HIGHWAY



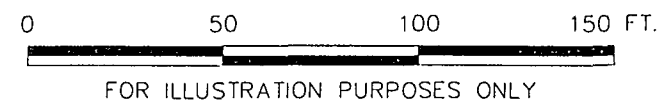
DRAFT

AREAS OF POTENTIAL CONCERN

- A LABORATORY & WAREHOUSE BUILDING
- B ABOVEGROUND TANK FARM
- C FORMER PROCESS PIT
- D LOADING DOCK AND FORMER LAB PIT & DRAIN AREA
- E SOIL BENEATH CONCRETE PAD
- F CONCRETE STORAGE PAD

LEGEND

- ▲ PROPOSED SURFACE SOIL SAMPLING LOCATION
- PROPOSED MW-2 LOCATION
- SBD2 EXISTING SOIL BORING
- INLET
- EXISTING ABOVEGROUND STORAGE TANK
- TANK PAD-FORMER ABOVEGROUND STORAGE TANK LOCATION



SOURCE:
PROPOSED ICC SOIL SAMPLING LOCATIONS BY ENVIRO-SCIENCES, INC. DATED: 6/19/86 AND
SITE MAP, VI CHEMICAL, ST. CROIX, U.S.V.I. BY NUS CORPORATION DOCUMENT 02-9101-04-51, UNDATED

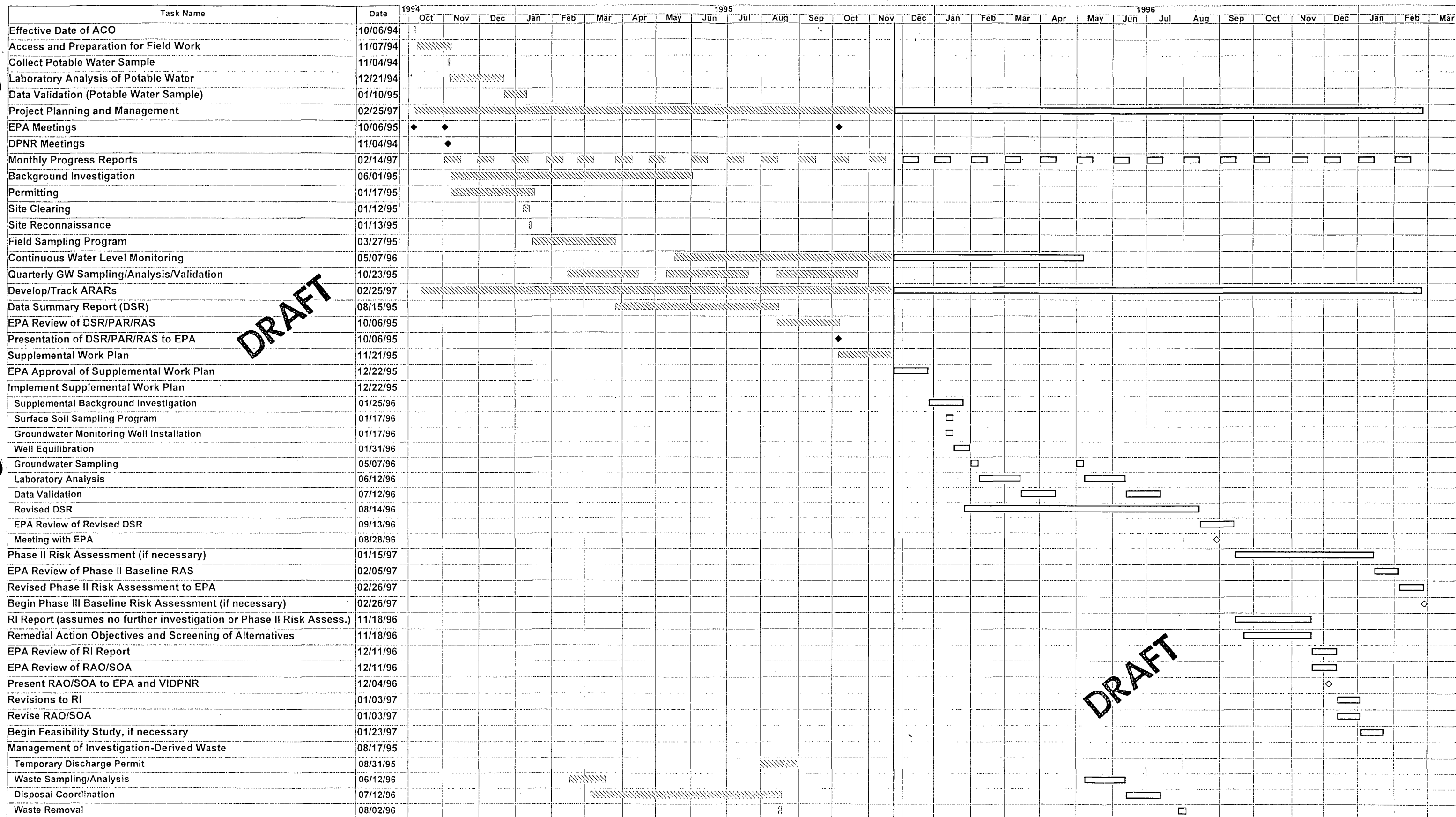
Harding Lawson Associates
Engineering and
Environmental Services
131 North Third Street
Philadelphia, PA 19106
215-627-4505
DRAWN JSW
JOB NUMBER 29872.13.2
APPROVED

AREAS OF POTENTIAL CONCERN AND SAMPLING LOCATIONS

ISLAND CHEMICAL COMPANY
ST. CROIX, U.S. VIRGIN ISLANDS

FILE 29872B01
DATE 7/27/95
REVISED DATE

FIGURE
3-1



Notes:

1. Schedule is based on months from EPA approval of Supplemental Work Plan
2. Assumes weather-related delays will not exceed 5 working days total.

Figure 5-1
Work Plan Implementation Schedule
Island Chemical Company
St. Croix, U.S. Virgin Islands

DISTRIBUTION

Draft Phase II Remedial Investigation Work Plan
Virgin Island Chemical Site
St. Croix, U.S. Virgin Islands

November 21, 1995

Copy No. ____

Copies 1 - 7:
Copy: 8 (unbound):

Chief, Eastern New York/Caribbean Superfund
United States Environmental Protection Agency
Section II
Emergency and Remedial Response Division
290 Broadway
New York, New York 10007-1866
Attention: Virgin Island Chemical Site Project Coordinator

Copy 9:

Chief, New York/Caribbean Superfund Branch
Office of Regional Counsel
United States Environmental Protection Agency
290 Broadway
New York, New York 10007-1866
Attention: Virgin Island Chemical Site Attorney

Copy 10:

Government of the Virgin Islands of the United States
Department of Planning and Natural Resources
Division of Environmental Protection
Charlotte Amalie
St. Thomas, U.S. Virgin Island 00802
Attention: Virgin Island Chemical Site Project Manager

Copies 11 - 13:

Sills, Cummis, Zuckerman, Radin, Tischman, Epstein & Gross
One Riverfront Plaza
Newark, New Jersey 07102-5400

Copies 14 - 15:

Harding Lawson Associates
Philadelphia, Pennsylvania

Quality Assurance/Quality Control Reviewer

Bharat Patel R.G., CPG
Associate Hydrogeologist

This document was prepared for the sole use of the ICC and the regulatory agencies involved with the project, the only intended beneficiaries of our work. No other parties should rely on the information contained herein without the prior written consent of HLA.

JMS/mls/sdb/tg/jmc/DRM/BP
G:\WORK\29872\WPR001.DOC