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November 6, 1996

SILLS CUMMIS ZUCKERMAN RADIN TISCHMAN EPSTEIN & GROSS

NOV 12 1996

RECEIVED
LGS

VIA FEDERAL EXPRESS

Caroline Kwan
U.S. Environmental Protection
Agency/Region II
290 Broadway, 20th Floor
New York, New York 10007-1866

Re: Vichem Site/St. Croix, Virgin Islands

Dear Ms. Kwan

Enclosed please find a Draft Remedial Investigation Work Plan Addendum--Phase III (the "work plan") for the above-captioned site, prepared by Harding Lawson Associates ("HLA") on behalf of Berlex Laboratories, Inc. ("Berlex") and Island Chemical Company ("ICC") (Berlex and ICC are hereinafter collectively referred to as "Berlex") for your review and comment. Berlex believes that the enclosed work plan addresses all of the concerns articulated by representatives of the United States Environmental Protection Agency ("EPA") at our meeting on October 17, 1996. Upon EPA approval of the work plan, and prior to field work, HLA will provide to EPA a schedule of implementation, a revised Project Field Sampling Plan, and a revised Quality Assurance Project Plan for EPA review and concurrence.

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Please be advised, however, that Berlex's agreement to perform the work delineated in the work plan is conditioned upon the following. The first, and most obvious, condition is agreed upon access to the Vichem site and the relevant off site facilities to perform the work. Berlex has no reason to believe that CHS Holding will deny access to the Vichem site. Berlex has also taken steps to ascertain who owns the property adjacent to the on site tank farm. (See letters attached hereto; and EPA counsel, Gregory Jaffee, who is likewise looking into this issue, has agreed to keep me apprised of any information gleaned in connection with his inquiry.) HLA has also ordered a property map that will presumably identify the owner(s) of the property on the other side of the River Gut. We will proceed to secure access to off site wells, once it is determined, as discussed in Section 3.1.4 the work plan, whether or not the requisite information can be obtained through existing data.

The second condition upon which performance of the work plan is premised is one discussed at our October 17 meeting. As indicated on several occasions, Berlex does not believe that it has any liability for contamination in and around the aforementioned tank farm. ICC did not use the tanks in the tank farm during Berlex's ownership of ICC. In addition, in previous correspondence to Carol Berns, Berlex likewise disclaimed liability for metals contamination which may exist on or off site. ICC, during the period of Berlex's ownership, did not use metals in its operations on site. To the extent that Berlex is willing to further investigate the tank farm and metals contamination, Berlex believes that the actual responsible party for this contamination should share in the cost of the contemplated investigation, which HLA estimates will cost several hundred thousand dollars.

Not liable for tank farm, & metals on- off- site

Further, as you no doubt know, Berlex made it clear when it entered into the ACO for the remedial investigation for this site, that the investigation it was prepared to undertake was limited to the Scope of Work attached as an exhibit to the ACO. Berlex repeatedly averred that it would investigate specifically identified areas of environmental concern <u>on site</u>, and any new areas of environmental concern identified <u>on site</u> during the course of the investigation. Berlex explicitly declined to perform any investigation off site, or to engage in a fishing expedition of areas on site for which there was no evidence of contamination. Notwithstanding that EPA understood the circumscribed undertaking to which Berlex committed, EPA now requires that Berlex "chase" contamination on and off site for which it is evident that Berlex is not liable. Either that or proceed with an expensive dispute resolution process.

To date, Berlex alone of the PRPs named by EPA has carried the cost burden not only of site investigation (in this regard, Berlex has expended approximately $1.5 million), but also of pursuing the recalcitrant parties responsible for the contamination under investigation.[1] While Berlex recognizes EPA's need for a complete remedial investigation of the Vichem site, we respectfully suggest that EPA must understand that Berlex cannot continue indefinitely to fund an investigation into contamination for which it is not liable. Berlex must insist that EPA intervene with Pierrel SpA to direct Pierrel SpA's immediate participation in this investigation.

We look forward to your response to the work plan and the conditions upon which it is furnished. In the interim, if you have technical questions, please feel free to contact HLA. Otherwise, either you or Ms. Berns should feel free to contact me.

Very truly yours,

Lori G. Singer

cc: Carol Berns, Esq. (without enclosure)

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[1] Berlex has repeatedly asked EPA to assist it in pursuing the parties actually responsible for site conditions. Particularly with regard to Pierrel SpA, Berlex has provided EPA with testimony from Pierrel management and operations personnel testifying to spills of hazardous substances by Pierrel on site, as well as use by Pierrel of the materials discovered on site through Berlex's investigation. Under separate cover, we will provide this information to EPA yet again for your review and consideration.

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[1] ADMITTED IN NY ONLY
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October 14, 1996

PLEASE REPLY TO NEWARK

VIA TELECOPY AND REGULAR MAIL

Wilfredo Geigel, Esq.
27 Anchor Way
Gallows Bay, St. Croix
United States Virgin Islands 00824

Re: CHS Holding Co., Inc.

Dear Mr. Geigel:

It has recently come to our attention that CHS Holding Co., Inc./Mr. Steffey sold a piece of property a few months ago located adjacent to the Vichem site in St. Croix. We would appreciate it if you could confirm whether this sale took place, and if you could provide any information as to the exact location and size of the property, as well as particulars as to the purchaser and his intended end use for the site.

We recognize that this information is of public record; however, your response would greatly expedite our access to the information, and we would appreciate any courtesies you extend in this regard.

Thank you for your time and attention.

Very truly yours,

Lori G. Singer

Lori G. Singer

LGS:peb

LAW OFFICES
WILFREDO A. GEIGEL

WILFREDO A. GEIGEL
ADMITTED TO PRACTICE IN
U.S. VIRGIN ISLANDS AND
COMMONWEALTH OF PUERTO RICO

REPLY TO:
_ ST. CROIX OFFICE
_ PUERTO RICO OFFICE

October 17, 1996

Lori Singer, Esq.
SILLS, CUMMIS, ZUCKERMAN, RADIN
TISCHMAN, EPSTEIN & GROSS, P.A.
One Riverfront Plaza
Newark, NJ 07102

Re: Berlex v. CHS

Dear Lori:

Your letter of October 14, 1996 is acknowledged.

Please be advised that CHS Holding Company owns a property adjacent to the Vichem site which was mortgaged by CHS. This property is part of the settlement agreement with the U.S. Government which requires that when the property is sold the proceeds will go to the federal government as part of the obligations of CHS with the government under the agreement. This agreement further requires that CHS carry out efforts to sell the property in order for the government to collect the proceeds from the sale.

I hope this clears up any doubts that you may have regarding the property.

Regards,

Wilfredo A. Geigel, Esq.

WAG/mk

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DRAFT REMEDIAL INVESTIGATION WORK PLAN ADDENDUM - PHASE III
VIRGIN ISLAND CHEMICAL SITE
ST. CROIX, U.S. VIRGIN ISLANDS

Prepared for
Island Chemical Company

HLA Project No. 35241.5

John S. Virgie, P.G.
Senior Geologist

Edward A. Nemecek, R.G., CPG
Principal Hydrogeologist
Regional Geosciences Manager

November 7, 1996

Harding Lawson Associates
14 Washington Road, Building 7
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CONTENTS

FIGURES

DISTRIBUTION

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1.0 BACKGROUND

1.1 Introduction

Harding Lawson Associates (HLA) has prepared this *Remedial Investigation Work Plan Addendum* on behalf of Island Chemical Corporation (ICC) as part of the Remedial Investigation (RI) of the Virgin Island Chemical site (site) located in St. Croix, U.S. Virgin Islands. This RI Work Plan Addendum is intended to address issues discussed and agreed to during the meeting on October 17, 1996, with the U.S. Environmental Protection Agency, Region II (EPA). 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* (Work Plan), dated March 17, 1994 and revised August 5, 1994 (HLA, 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 the River Gut. It is bordered to the west by an undeveloped lot and to the southwest by Route 66. A concrete batch plant, and two automobile repair shops are located to the east of the site, across the River Gut. An asphalt paving company is located north-northwest of the site across the River Gut.

1.2.2 Site Structures

The facility is currently 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
- Above-Ground 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)
- 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 ground 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 into the River Gut. An earthen berm, approximately 4 feet high, 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 (Figure 1-2). Flow in the 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.

Based on previous investigations, shallow soils beneath the site consist of alluvium. The geology and hydrogeology of St. Croix were discussed in more detail in the Work Plan and in the DSR. 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 Remedial Investigation Work Plan (HLA, 1994).

From October 1994 to August 1995, HLA implemented the EPA-approved Remedial Investigation Work Plan. Results of work performed to date were summarized in the *Draft Data Summary Report* (DSR), dated August 15, 1995 (HLA, 1995). The key findings of that investigation were:

- Volatile organic compounds (VOCs) were detected in soils and shallow groundwater samples collected at MW-1 in the vicinity of Tanks 8 and 9 in the above-ground storage tank (AST) area.
- The two primary constituents of concern identified in previous investigations, pyridine and chloroform, were not detected in any soil or groundwater samples collected during HLA's 1995 investigation.
- The visual reconnaissance performed after site clearing revealed no additional potential source areas.

Following EPA's review of the DSR, HLA prepared a proposal letter (April 12, 1996) and Phase II RI Work Plan (May 15, 1996) to address the following data needs requested by EPA:

- Obtain additional information in shallow groundwater flow direction over time.
- Extent of impacted soil and groundwater identified in the vicinity of Tanks 8 and 9 in the AST area.
- Groundwater quality near the center of the site (Former Process Pit Area).

From May through August 1996, HLA implemented the EPA-approved Phase II RI Work Plan. Results of the work performed during the completion of Phase II activities were summarized in the *Draft*

Supplemental Data Summary Report, dated September 13, 1996 (HLA, 1996). The key findings of that investigation were:

- The lateral and vertical extent of VOCs in soils at the AST area were defined to the north, east, and south[1] of the identified source area, but not to the west (offsite). The extent of VOCs in groundwater was not defined in a downgradient or western direction .
- Chloroform was detected above the Federal Maximum Contaminant Level (MCL) in shallow groundwater at the former process pit area (Monitoring Well MW-2).
- Based on several months of continuous groundwater level monitoring, a shallow groundwater divide trending north-south is interpreted to exist at the site. The groundwater flow direction across the majority of the site west of the divide is to the west and northwest, and the flow direction in the easternmost portion of the site east of the divide to the east and northeast.

On October 17, 1996, EPA met with HLA to discuss the findings of the *Supplemental Data Summary Report*. EPA suggested that several data needs still remained and that they be addressed through supplemental investigative activities. Objectives are discussed below. Activities are identified in Section 2.

1.4 Objectives

The objectives of this phase (Phase III) of the RI are to address the following data needs identified during the October 17, 1996 meeting with EPA.

- Further evaluate the lateral and vertical extent (onsite and offsite) of toluene, ethylbenzene, and xylene (TEX) previously detected in soils and groundwater related to the small area near Tanks 8 and 9 in the AST area.
- Estimate hydrogeologic properties (specifically hydraulic conductivity) of the shallow and deep water-bearing zones onsite.
- Evaluate the flow direction in the deeper portion of the water-bearing zone.
- Perform groundwater sampling (including production wells P1 and P2) to evaluate the extent of VOCs, including chloroform, in groundwater.
- Evaluate zinc concentrations onsite and in River Gut.
- Preliminarily evaluate the applicability of soil vapor extraction as a remedial alternative for soil in the AST area.

The tasks described in Sections 2 and 3 of this RI Work Plan Addendum are designed to achieve these objectives. Following completion of these tasks, HLA will evaluate the findings of the RI and present results.

[1] At the meeting on October 17, 1996, EPA's contractor, CDM Federal Programs, disputed that the extent of VOCs had been defined to the south of the presumed source area, since VOCs had been detected in southernmost boring SBB2. HLA noted that continuous field screening of soils from 0 to 18 feet at SBB2 did not detect VOCs. The presence of VOCs in soil samples from 20 to 22 feet and 22 to 24 feet at SBB2 is attributed to capillary effects by underlying, VOC-containing groundwater.

2.0 WORK PLAN APPROACH

Figure 2-1 presents a flow chart which summarizes the proposed tasks to be implemented to satisfy the data needs identified in Section 1.4. The tasks to be completed are as follows:

1. **AST Area Investigation:**

   Soils

   - Install up to six soil borings offsite (west) of previous boring SBB17/MW-6 and at the request of EPA, install up to four additional soil borings within the general AST area to evaluate the possible presence of additional source areas. Data from previous soil boring SBE1 which was installed near the former concrete pad will also be used in this evaluation.
   - Preliminarily evaluate the applicability of soil vapor extraction (SVE) as a remedial alternative by collecting soil samples for analysis of grain size, moisture, total organic carbon and porosity.

   Groundwater

   - Evaluate the lateral extent of TEX in shallow groundwater offsite to the west of the AST area by collecting groundwater samples using a Hydropunch® at multiple locations, and by installing an offsite shallow monitoring well near the downgradient extent of the plume; access restrictions may limit the well location.
   - Evaluate the vertical extent of TEX in groundwater beneath the AST area by installing a double-cased monitoring well whose depth will be based on TEX concentrations detected in depth-discrete groundwater Hydropunch® samples collected from a borehole next to MW-6.
   - Preliminary estimate of the hydrogeologic properties of the shallow and deep water-bearing zones by performing slug tests and by monitoring water level responses during development of the newly installed monitoring wells.

2. **Evaluation of Groundwater Quality:**

   - Evaluate site-wide distribution of VOCs in groundwater by collecting groundwater samples from onsite and offsite wells including newly installed shallow well, newly installed deep well in AST area, shallow monitoring wells and deep former production wells using low-flow purging techniques.

3. **Evaluation of Deep Zone Groundwater Flow Direction:**

   - Utilize a downhole television survey to evaluate the screen intervals and the integrity of onsite former production wells P1 and P2.
   - Measure water level in the new deep well in the AST area and incorporate this information with water levels collected from existing onsite production wells to evaluate onsite flow direction in the deep portion of the water-bearing zone.
   - If adequate water level data fro the deeper portion of the water-bearing zone are not available, obtain access, survey physical location and measure elevation, and measure water levels in selected offsite production wells near the site. Incorporate water level elevation data from offsite and onsite deep wells to further evaluate regional flow direction in the deep water-bearing zone; access restrictions may limit the number of wells to be monitored.

4. **Onsite Soil, Storm Drain and River Gut Sediment Sampling:**

   - Secure access to collect sediment samples from offsite locations in River Gut. Collect up to sixteen sediment samples within the onsite drainage system and in the section of the River Gut along the site boundary to evaluate zinc concentrations. Sampling in River Gut will be conducted upstream, across from, and downstream of the site. These data will be evaluated with data from previous sampling activities; access restrictions may limit the number of samples to be collected.

5. **Data Validation**

   - Confirmation level laboratory data generated for investigative samples will be validated as discussed in the Work Plan.

6. **Data Evaluation and Reporting:**

   - Interpret, evaluate and summarize the results of the proposed supplemental investigation, incorporate the results with previous investigations, and prepare a report for submittal to the EPA.

7. **Meetings, Progress Reports, and Presentations to EPA**

8. **Management and Disposal of Investigation-Derived Wastes**

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3.0 SUPPLEMENTAL REMEDIAL INVESTIGATION TASKS

The tasks to be completed during this phase of the RI are explained in more detail below. Specifics of well locations, wells to be sampled, soil sample locations, analytical parameters, and other activities may need to be modified based on possible legal access restrictions, physical restrictions and on the findings of various phases of each tasks. EPA will be notified of any substantive changes. These changes, if necessary, will be discussed with and approved by EPA prior to implementation. Work will be conducted following the procedures outlined in the previously approved Work Plan.

3.1 Field Sampling Program

3.1.1 Soil and Groundwater Investigation at AST Area

3.1.1.1 Property Access and Well Permits

ICC representatives have begun to secure offsite property access agreements. Prior to mobilization, ICC will make best efforts to secure property access to offsite soil and groundwater sampling locations west of the AST area. Additionally, at this time ICC will attempt to gain access to all offsite well locations described in Section 3.1.4.2. Prior to mobilization, HLA will obtain the appropriate permits from the Virgin Island Department of Planning and Natural Resources to install the proposed monitoring wells.

3.1.1.2 Soil Sampling

Soil sampling will be performed to investigate (1) the lateral and vertical extent of TEX in soil offsite and adjacent to Tanks 8 and 9 (west of boring SBB17), and (2) to assess the potential for other potential source areas in the general AST area. Proposed boring locations are shown on Figure 3-1. A minimum of three soil borings will be installed along a 20-foot radius offsite (west) of previous boring SBB17. Up to three additional offsite borings may be installed based on photoionization detector (PID) field screening results and field observations.

Four borings will be installed onsite within the AST area north and south of the previously defined impacted area to investigate the potential presence of other source areas. The results from soil boring SBE-1 (installed during Phase I activities adjacent to former Tank 20; No PID readings were measured and no VOCs were detected above the detection limit in samples collected from the boring installed at this location) will used in conjunction with the four new borings to evaluate the general AST area.

Soil sampling will follow the detailed procedures that are described in the EPA-approved Work Plan and supporting documents and which have been implemented by HLA in previous phases of this RI. At each boring, soil samples will be collected continuously from ground surface to the water table using a split-spoon. Upon opening the split-spoon, the sample will be physically scored and screened for the presence of organic vapors using a PID. A sample from each 2-foot interval will then be immediately placed into a laboratory-prepared container. Additional sample volume from each interval will be placed into resealable plastic bags and screened in the field for headspace organic vapors using the procedures described in the Work Plan. Procedures for sample handling, management, and shipping will be implemented as described in the Work Plan.

Two soil samples from each boring will be analyzed: one from directly above the water table and one from the sample interval with the highest PID reading. Soil samples will be analyzed for target compound list (TCL) VOCs.

Shelby Tube samples will be collected from two of the onsite borings for analysis of grain size, moisture, total organic carbon, and porosity. These samples will be collected using 3-inch outside diameter Shelby tubes. The Shelby tubes will be constructed of stainless steel tubing or equivalent materials. The lower end is beveled to form a tapered cutting edge. The upper end of the Shelby tube is fastened to a check valve that helps hold the sample in place as it is being withdrawn. The Shelby tube is positioned at the upper portion of the interval to be sampled, and advanced the length of the

tube (typically 2 feet). The advancement of the Shelby Tube is performed smoothly and steadily by the application of hydraulic pressure from the drill rig to the drilling rod connected to the Shelby tube. The Shelby tube is extracted using the same mechanisms operated in reverse.

3.1.1.3 Offsite Shallow Groundwater Investigation

The purpose of this task is to determine the areal extent of the dissolved TEX in groundwater, where the TEX concentrations exceed their respective MCL. Groundwater samples will be collected approximately 5 feet below the water table at three locations along a 50-foot radius west (offsite) of MW-6 using a Hydropunch® sampler.

The Hydropunch® sampler is a specialized tool designed to obtain groundwater samples within the saturated zone without the installation of a monitoring well. It is constructed of stainless steel and Teflon with viton O-rings. The Hydropunch® sampler is designed to be driven by the slide hammer commonly used for obtaining split-spoon samples.

When the targeted sample depth is reached (in this case approximately 5 feet below the water table), the Hydropunch® sampler is opened by pulling back the body (outside sleeve) of the tool. Soil friction holds the drive cone in place as the body moves up. Once opened, groundwater flows through the dedicated disposable screen into the tool from the surrounding formation. After allowing sufficient time for groundwater to fill the sample chamber, a teflon bailer will be lowered into the borehole to retrieve a groundwater sample which will be transferred to laboratory-cleaned 40-ml glass vials. The groundwater sample will be immediately analyzed onsite using a portable gas chromatograph (GC) calibrated for TEX. The groundwater samples that are collected will be placed in the purge and trap vessel, extracted and analyzed. The data collected through field GC screening is classified as screening level data.

Further investigation will be guided by the results of the onsite GC analysis of the three Hydropunch® samples. If TEX concentrations exceed their respective MCLs, then additional groundwater samples will be collected using the above procedure at incremental 50-foot radii sample locations (i.e., approximately 100 feet from MW-6). If the results of all three of the first Hydropunch® samples are below MCLs, then a 4-inch diameter monitoring well will be installed at the furthest downgradient or western location. The well will be installed and developed as described in the Work Plan similar to all the other shallow monitoring wells constructed to date. The well screen will be 10 feet long, have a slot size of 0.020 inches, and extend approximately 5 feet below the encountered water table depth. Development water will be placed in 55-gallon drums and staged onsite pending disposal.

3.1.1.4 Onsite Deep Groundwater Investigation

The vertical extent of VOCs in groundwater at the AST area will be evaluated by installation of a double-cased monitoring well to be located near MW-6. A pilot soil boring will be advanced to a depth of approximately 5 feet below the encountered water table. No soil sampling will be performed in this boring (soil sampling was already performed in this area at SBB11 and SBB17). A steel casing will then be grouted in place at that depth to prevent cross-contamination during deeper drilling. The steel casing will be installed as follows. The pilot boring will be reamed to a diameter of 12-inches to the designated depth using mud rotary drilling techniques. An 8-inch diameter steel casing with welded joints will then be lowered to the bottom of the boring and centered. Cement grout will then be emplaced in the annular space around the casing via a tremie pipe from the bottom up. The drilling fluid in the annular space will be displaced by the grout, the drilling equipment will be decontaminated and the drilling fluid inside the casing will be circulated thoroughly with potable water until visible drilling fluids have been removed and relatively clear water remains inside the casing.

After the grout has set for at least 24 hours, a pilot boring will be advanced through the grout. Depth-discrete Hydropunch® samples will then be collected at 10-foot intervals (starting at the interval 5 to 10 feet below water table). These samples will be analyzed for TEX using the onsite field GC. The boring will be advanced to a depth where concentrations of any individual chemical do not exceed MCLs. Then the boring will be advanced 10 feet below this depth, reamed to 8 inches in diameter

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and a 4-inch diameter monitoring well will be installed, using the procedures outlined in the Work Plan. A diagram of the proposed double-cased well is provided as Figure 3-2.

3.1.1.5 Aquifer Testing

Preliminary information on the hydrogeologic properties of the shallow and deep portions of the water-bearing zones will be obtained by conducting the following activities. During development of the newly installed wells, water levels will be continuously monitored in the well being developed and in the nearest (or nearby) adjacent wells either manually or by using an automated data logger-pressure transducer system. This will provide information regarding possible hydraulic connection between the shallow and deep portion of the water-bearing zone. Monitoring of recovery of water levels in selected onsite wells after development will also provide limited information on relative hydraulic conductivity between the upper and lower portions of the aquifer. Slug tests will also be performed at shallow and deep wells to supplement the data collected during well development.

3.1.1.6 Survey

The coordinate location and elevation of the new wells will be surveyed as specified in the 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 locations will be converted from plane coordinates to latitude and longitude.

The vertical position of the new wells 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.

3.1.2 Site-Wide Groundwater Quality Sampling

After installation and development of the new wells in the AST area, groundwater samples will be collected from the onsite and offsite monitoring wells and the deep production wells P-1 and P-2. The site-wide groundwater sampling will be conducted to further evaluate groundwater quality at the site. Specifically, objectives of the site-wide groundwater sampling are to evaluate the extent of TEX compounds related to the AST area, and (2) to assess the presence of chloroform previously reported at MW-2. Groundwater sampling will be conducted approximately 2 weeks after installation and development of the new wells.

At the request of EPA, low-flow (minimal drawdown) groundwater sampling procedures (as described in Puls and Barcelona, 1995) will be utilized in place of the procedures described in the Work Plan. A 2-inch diameter Grundfos® Redi Flo 2 submersible sampling pump or a bladder pump will be utilized for purging and sampling. As recommended by Puls and Barcelona (1993), HLA will purge and sample using a flow rate not to exceed 0.5 liters per minute. A water quality probe will be used to measure key indicator parameters (pH, specific conductance, redox, dissolved oxygen, and turbidity) during purging. After stabilization of the water quality indicator parameters, groundwater samples will be collected directly from the pump discharge line. Sample containers, preservation, shipping, and chain-of-custody procedures will be implemented as described in the Work Plan. Groundwater samples will be analyzed for TCL VOCs using the CLP protocol.

3.1.3 Onsite Groundwater Elevation Monitoring

Groundwater elevations have been monitored at the site using automatic water level recorders (TUBERs) installed at MW-1 and MW-3 in August 1995 and at MW-4 and MW-5 in April 1996. Four recorders are currently installed. The most recent data (since June 1996) will be downloaded from these recorders during the upcoming field program. These data will be combined with water levels which will be measured manually from all wells prior to the site-wide groundwater sampling event. Groundwater contour maps will be prepared for multiple dates using the water table elevations calculated from the manual and automated measurements.

3.1.4 Evaluate Groundwater Flow Direction In Deep Water-Bearing Zone

HLA has recently received documents from the U.S. Geological Survey (USGS) entitled *Water Resources Data Puerto Rico and the U.S. Virgin Islands Water Year 1992, USGS water-Data Report PR-92-1,1993 and Water Wells on St Croix, U.S. Virgin Islands, Open File Report 91-503, 1994* . HLA has also requested the most recent Water Resources Data report and any other relevant information concerning water level data on St. Croix from the USGS. HLA will evaluate this data in an attempt estimate the regional flow direction of the deeper portion of the water-bearing zone in lieu of performing the activities described below. If this information does not provide the necessary data to estimate the regional flow direction of the deeper portion of the water-bearing zone, then the groundwater flow direction in the deep portion of the water-bearing zone will be evaluated by obtaining information from both onsite and offsite deep wells, as described below.

3.1.4.1 Onsite Deep Wells

The onsite deep production wells (P-1 and P-2) will be evaluated using a downhole television camera to determine the actual well integrity and screen interval. After the survey, water levels will be measured at P-1 and P-2. These data will be combined with water level data from the new deep well to be installed in the AST area to preliminarily evaluate onsite flow direction in the deep water-bearing zone.

3.1.4.2 Offsite Deep Wells

The purpose of this task is to survey the locations and elevations of selected offsite production wells, and to measure groundwater levels in these wells to aid in evaluation of regional flow direction in the deep water-bearing zone in the vicinity of the site. The existence of these wells, or their accessibility, has not been field verified. The locations have been plotted based on existing records and aerial photograph review. The offsite groundwater production wells proposed to be surveyed include (see Figure 3-3):

- Former WAPA well directly south of site
- Well at Charlie's Concrete Company (east of site)
- Wells at Meridian Engineering (northwest of site)
- Golden Grove Wells 1 and 2 (west of site)
- U.S. Geological Survey Wells downstream of the site near confluence with Bethlehem Gut.

Prior to mobilization for the field sampling program, ICC will make best efforts to secure property access permission from the owners of the above wells, and will attempt to obtain relevant available information regarding the construction, usage, and status of these wells. The horizontal and vertical positions of these wells will then be surveyed following the procedures described in the Work Plan. Groundwater levels will then be measured from at wells using the procedures outlined in the Work Plan.

The groundwater elevations calculated from the offsite and onsite deep wells will be used to evaluate flow direction in the deep portion of the water-bearing zone. Water level contour map(s) may be prepared.

3.1.5 Onsite Soil, Storm Drain and River Gut Sediment Sampling

Samples of River Gut sediments will be collected at the onsite, upstream and downstream locations shown in Figure 3-4. Samples SD1, SD2 and SD3 will be collected from the central storm drain system. Sample SD4 will be collected from the southern storm drain system. These samples can only be collected if sufficient material exists for analytical purposes. Locations may have to be modified in the field to depositional areas where adequate sediment volumes are available. Sample SD1 will be collected from the storm drain at a point approximately 25 feet below the process area. Sample SD2

will be collected from the junction of the lines forming the central storm drain system. Sample SD3 will be collected from the settling basin which collects drainage from the central storm drain system before discharging to River Gut. Sample SD4 will be collected from within the southern storm drain system at a point approximately 10 feet upgradient of the point where this system discharges to River Gut.

Samples RG1 through RG10 will be collected from the River Gut stream channel. Samples RG1 and RG2 will be collected approximately 100 feet upstream of the site boundary just downstream of the abandoned railroad bridge. Sample RG1 will be collected from the stream bed near the center of the stream channel. Sample RG2 will be collected from the northeastern stream bank in an area of non-site-related waste material observed in the fill. Sample RG3 will be collected from the center of the stream bed upstream of the former lab drain discharge. Sample RG4 will be collected from the center of the stream bed below the former lab drain. Sample RG5 will be collected from the center of the stream bed approximately 100 feet downstream from RG4. Sample RG6 will be collected in an area of non-site-related waste material observed in the fill on the northeastern side of the River Gut bank. Sample RG7 will be collected from the River Gut stream bed at a point approximately 50 feet upstream from where the central storm drain system from the site discharges to River Gut. Sample RG8 will be collected from the River Gut stream bed at a point where the central storm drain system from the site discharges to River Gut. Sample RG9 will be will be collected from the River Gut stream bed at the point where southern storm drain system from the site discharges to River Gut. Sample RG10 will be collected downstream of the site at directly upstream of the sheet piling water and sediment retention wall installed across the River Gut stream channel. This location is upstream of the Route 66 bridge crossing the River Gut stream channel, and upstream of the confluence of River Gut with Bethlehem Gut. Samples RG11 and RG12 will be held in reserve and may be selected as additional sampling locations in the field. Several areas of non-site-related waste material have been observed during previous studies in the northeastern stream bank opposite the site. Samples RG11 and RG12 will be reserved for collecting sediments from the northeastern stream bank in an area of observed non-site-related waste material not already targeted by this investigation.

The samples will be analyzed for zinc, total organic carbon, particle grain size, pH, redox, and conductivity.

3.2 Data Validation

Confirmation level laboratory data generated for investigative samples will be validated as discussed in the Work Plan.

3.3 Data Evaluation

The data generated during this phase of the RI will be evaluated in conjunction with the data previously generated and reported by HLA (1995, 1996). The data will be evaluated to gain further information on the following:

- Onsite and offsite extent of TEX in soil and groundwater in AST Area
- Potential extent of chloroform, if any, in groundwater
- Flow direction(s) in the shallow and deep portion of the water-bearing zone
- Onsite sediment, onsite soil and River Gut sediment zinc concentrations

3.4 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.

3.5 Project Meetings and Reporting

3.5.1 Meetings with EPA

One meeting with EPA will be requested following receipt, interpretation, and validation of data generated during the implementation of this RI Work Plan Addendum and prior to preparation of a final Draft Data Summary Report Addendum (DSRA) or preparation of the RI, whichever is appropriate. At that time, the findings will be discussed along with the format for the final Draft DSRA. Additional meetings with EPA will be conducted as needed or upon request.

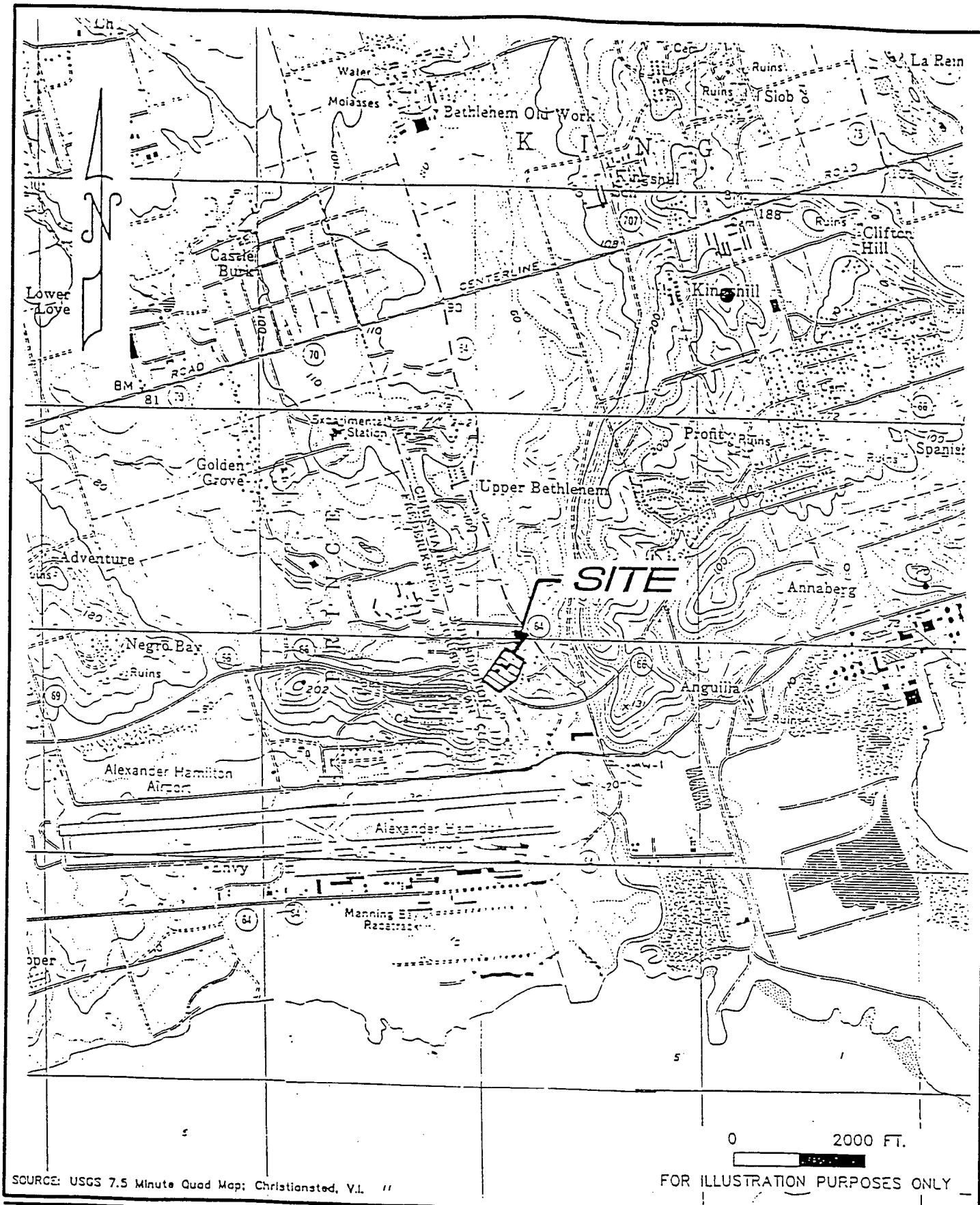
3.5.2 Monthly Progress Reports

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 Work Plan.

3.6 Management of Investigation-Derived Waste

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

FIGURES



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

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

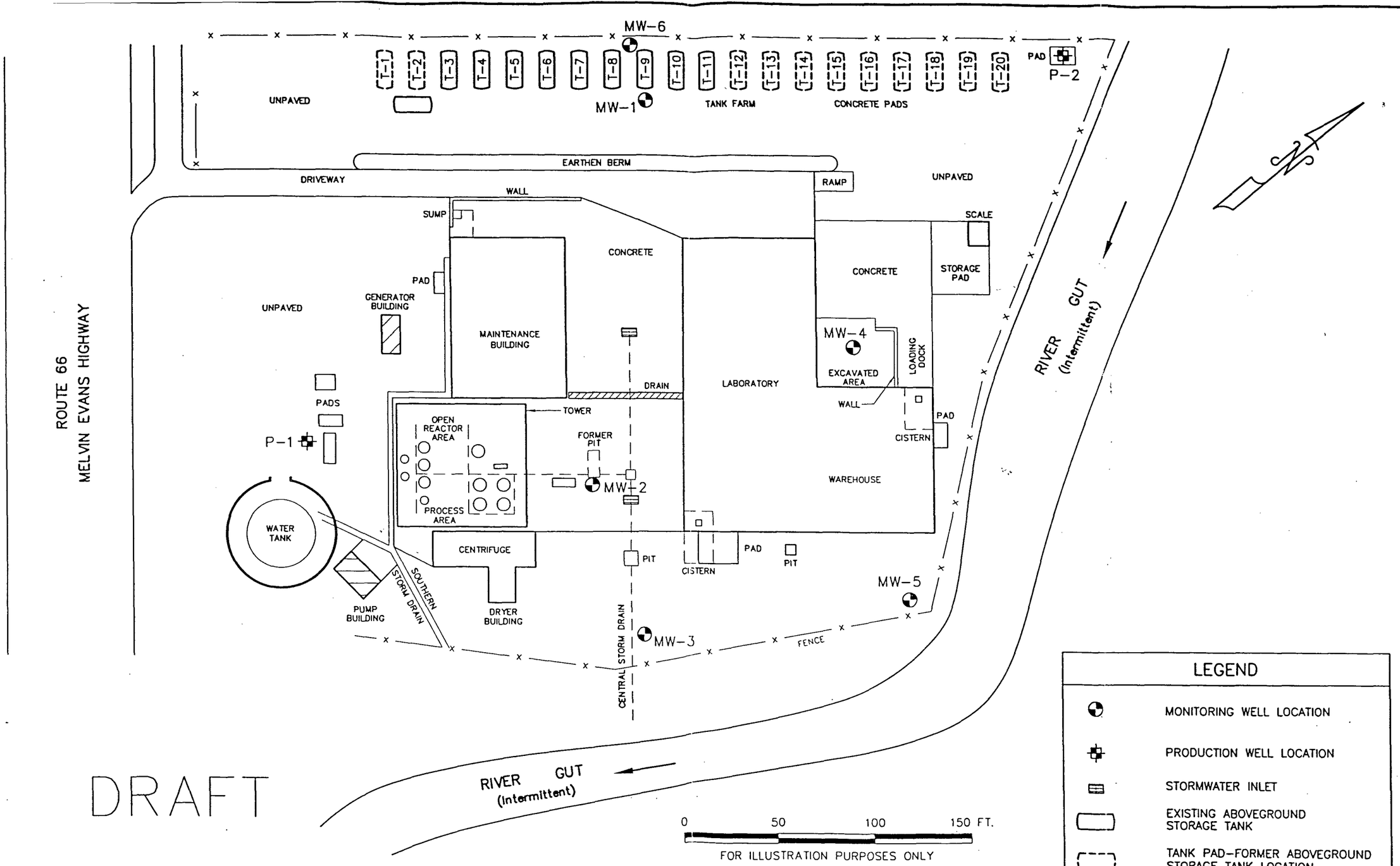
SITE LOCATION MAP

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE
1-1

DRAWN	JOB NUMBER	APPROVED	DRAWING NUMBER	DATE	REVISED DATE
WGA	35241.5		35241A0A	11/5/96	

302180



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LEGEND

- MONITORING WELL LOCATION
- PRODUCTION WELL LOCATION
- STORMWATER INLET
- EXISTING ABOVEGROUND STORAGE TANK
- TANK PAD–FORMER ABOVEGROUND STORAGE TANK LOCATION

SOURCE:
ADAPTED FROM SITE MAP, VI CHEMICAL, ST. CROIX, U.S.V.I. BY NUS CORPORATION DOCUMENT 02-9101-04-5I, UNDATED

Harding Lawson Associates
Engineering and
Environmental Services
14 Washington Road
Princeton Junction, New Jersey 08550
609-936-0700

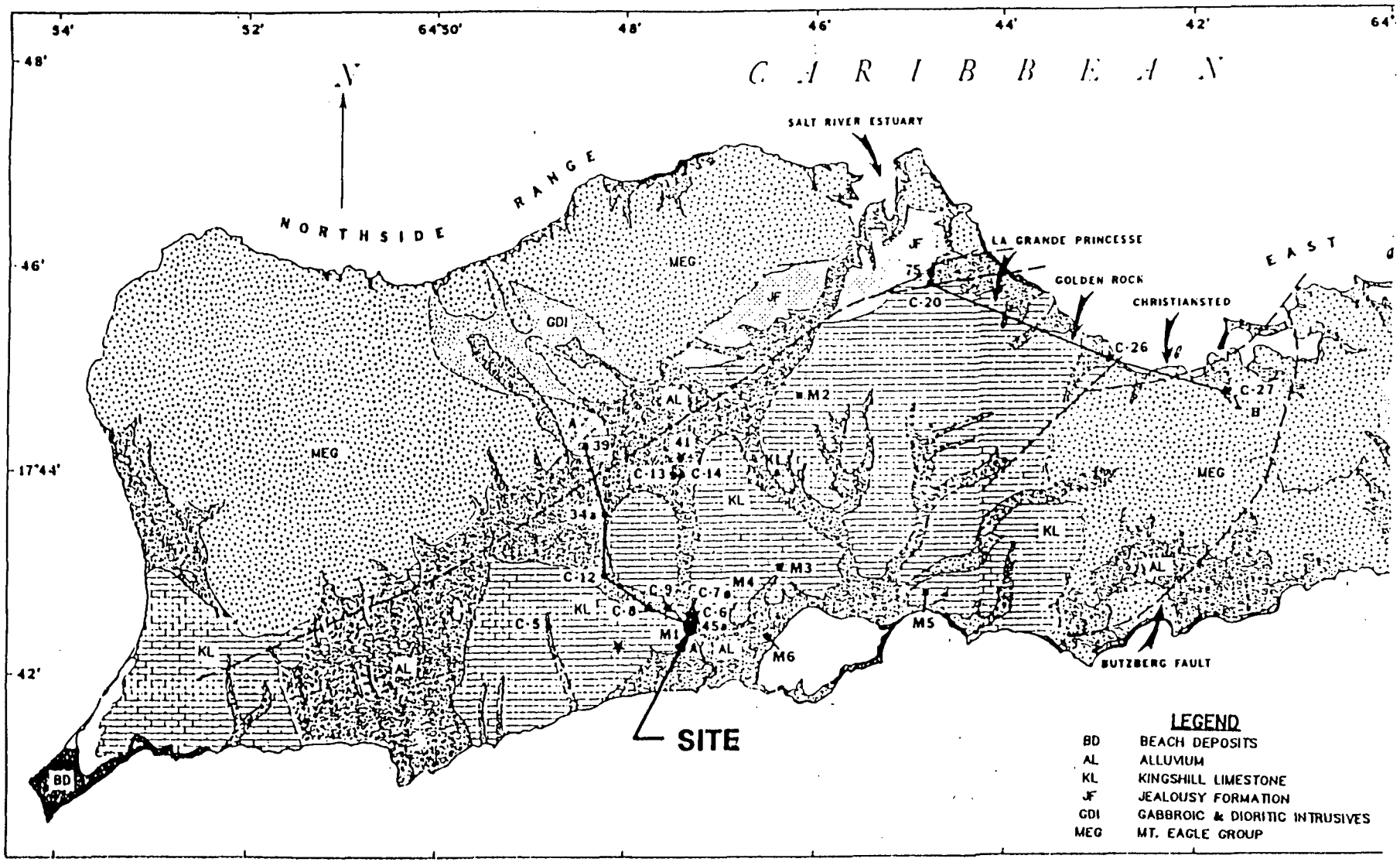
LOCATION OF MONITORING AND PRODUCTION WELLS

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE 1-2

DRAWN	JOB NUMBER	APPROVED	DWG. No.	DATE	REVISED DATE
JSW/WGA	35241.2.12		35241B03	11/7/96	9/13/96

302181



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REGIONAL GEOLOGICAL MAP

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE
1-3

DRAWN	JOB NUMBER	APPROVED	DRAWING NUMBER	DATE	REVISED DATE
WGA	35241.5			11/5/96	

Determine horizontal and vertical extent of affected soils offsite, related to the identified onsite source area associated with the AST farm that may be acting as an ongoing source of groundwater contamination.

Secure access to offsite property for soil boring and well installation

Collect soil samples from boring at selected location

Field screen samples for organic vapors using PID

Do organic vapor concentrations exceed field screening criteria in the vadose zone?

Yes

Select location for additional offsite boring radially outward from this location.

No

Has maximum number of planned borings been completed?

Yes

Evaluate data

No

Do VOC concentrations exceed TEX in soil criteria in the vadose zone?

Yes

Submit two samples from each boring for laboratory analysis

No

Has the minimum number of planned borings been completed?

Yes

No

Assess location(s) for additional offsite and onsite soil borings to define extent of impacted soil.

Complete 4 soil borings in AST area

Field screen samples for organic vapors using PID

Submit two samples from each boring for laboratory analysis

Evaluate data. Select location for deep well to assess vertical extent of affected groundwater associated with AST area

Install deep monitoring well at location near MW-6

Do data suggest need for additional sampling

Yes

No

Soil Sample Data collection task completed. Proceed to Hydropunch Sampling Program

Begin Hydropunch sampling program to assess horizontal extent of affected groundwater near AST area.

Mobilize to planned location for Hydropunch boring. Advance boring to 5 ft below water table. Collect groundwater sample using a Hydropunch.

Analyze sample onsite for TEX using field GC

Are TEX concentrations below MCLs?

No

Are TEX concentrations lower than at locations closer to source area?

Yes

Select additional location 50 feet radially outward from boring sampled

No

If data suggest possibility of offsite source area, halt program, confer with EPA

Have the 3 planned locations been sampled?

Yes

No

Install shallow monitoring well at furthest downgradient location sampled

Collect complete round of groundwater samples

Does chloroform in groundwater exceed MCL?

No

Are MCLs exceeded?

Yes

No further action

Do suitable data exist to determine deep groundwater flow direction?

Yes

No

Secure access permission from owners of nearby wells. Obtain available relevent information on well construction, usage and status. Survey offsite wells and measure water levels

deep-zone groundwater flow map.

Yes

Prepare Data Summary Report Addendum

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Engineering and Environmental Services
14 Washington Road
Princeton Junction, New Jersey 08550
609-936-0700

FLOW CHART

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE 2-1

DRAWN	JOB NUMBER	APPROVED	DWG. No.	DATE	REVISED DATE
WGA	35241.5		35241B06	11/7/96	

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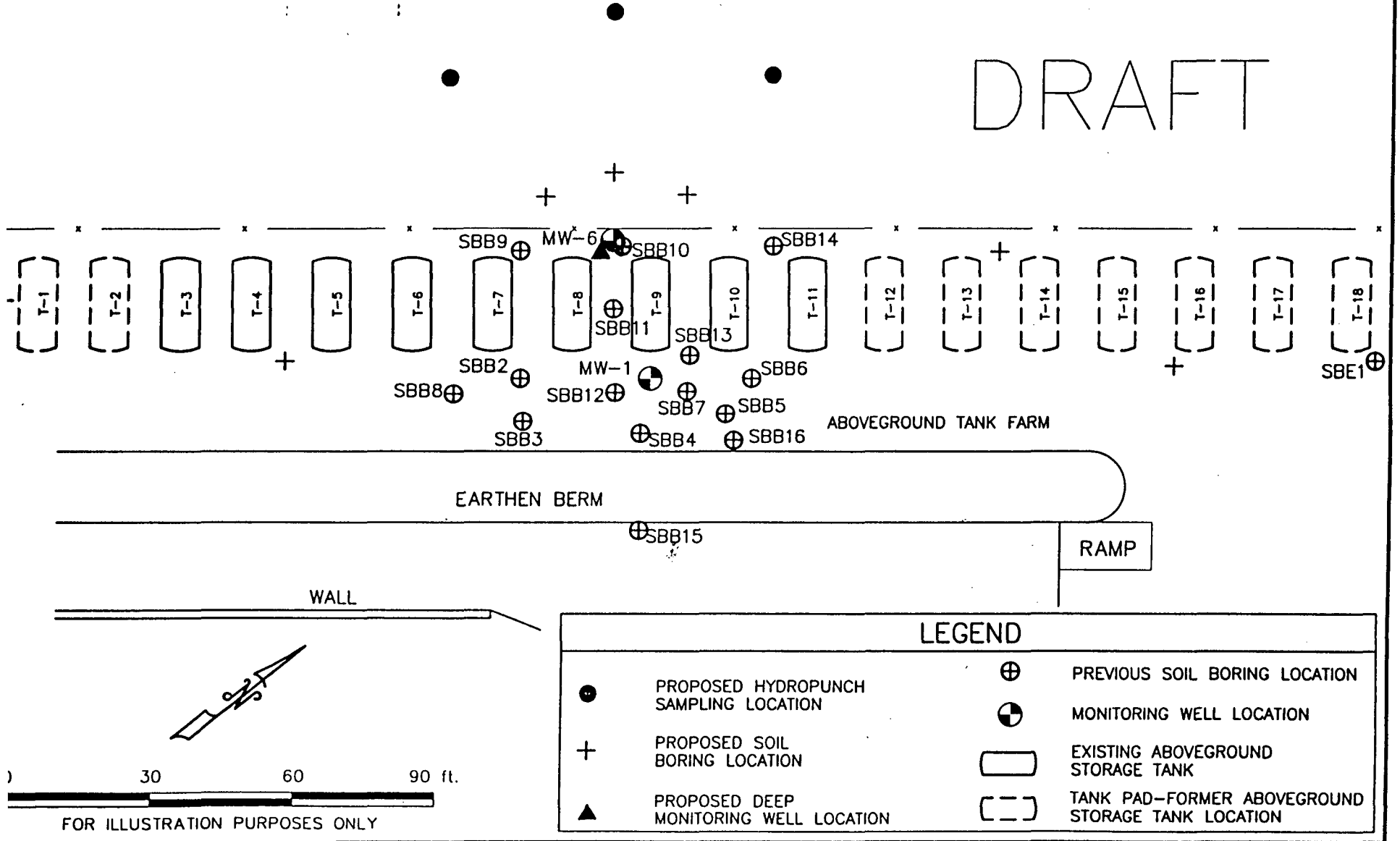

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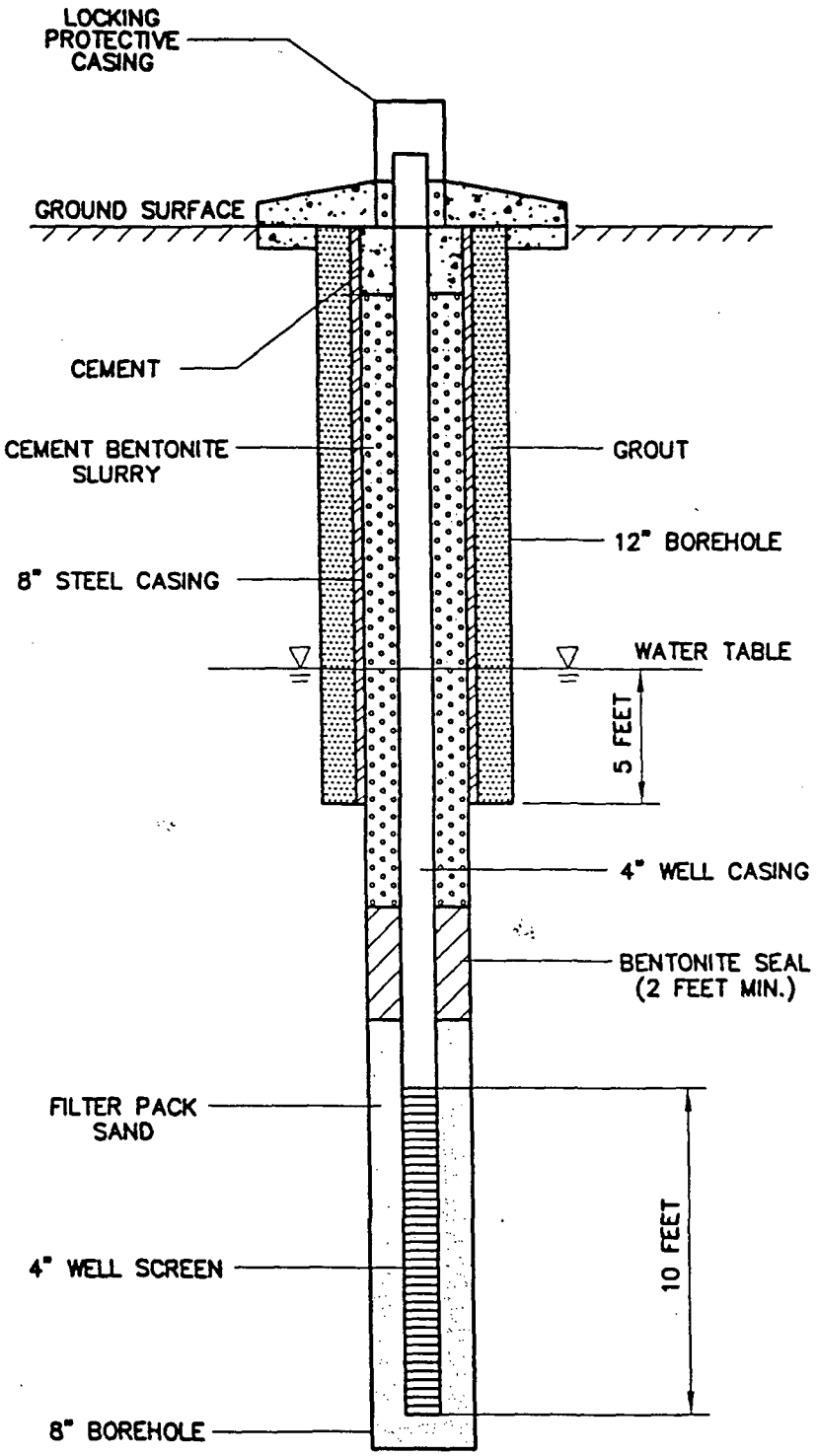
PROPOSED SAMPLING LOCATIONS

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE 3-1

DRAWN	JOB NUMBER	APPROVED	DRAWING NUMBER	DATE	REVISED DATE
WGA	35241.5		35241A11	11/7/96	



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DOUBLE-CASED MONITORING WELL CONSTRUCTION DIAGRAM

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE 3-2

DRAWN	JOB NUMBER	APPROVED	DRAWING NUMBER	DATE	REVISED DATE
JSW/WGA	35241.5		35241A07	11/7/96	

GOLDEN GROVE ADULT CORRECTIONAL FACILITY

UNDEVELOPED

ARGICULTURAL

ROUTE 64

MERIDAN ENGINEERING COMPANY

VIRGIN ISLANDS ASPHALT PRODUCTS COMPANY

VIRGIN ISLANDS PAVING COMPANY

FIX-IT-RIGHT TRANSMISSION

BETHLEHEM GUT

UNDEVELOPED LOT

OLD GOLDEN GROVE WELL FIELD

THREE SUBDIVISIONS (APPROXIMATE)

SITE

KING'S AUTOMOTIVE / AUTO BODY

CHARLIES CONCRETE COMPANY

MELVIN EVANS HIGHWAY

WOODED LOT (WITH UNUSED WAPA WELL)

RIVER GUT

U.S.G.S. MONITORING WELL

ZENON CONSTRUCTION COMPANY

ROUTE 66

FEDERAL GOVERNMENT

CATCHMENT AREA

0 200 400 600 FT.

FOR ILLUSTRATION PURPOSES ONLY

LEGEND

- BUILDING
- STREAM
- ROAD
- TREE LINE
- EXPECTED LOCATION OF OFFSITE WELLS

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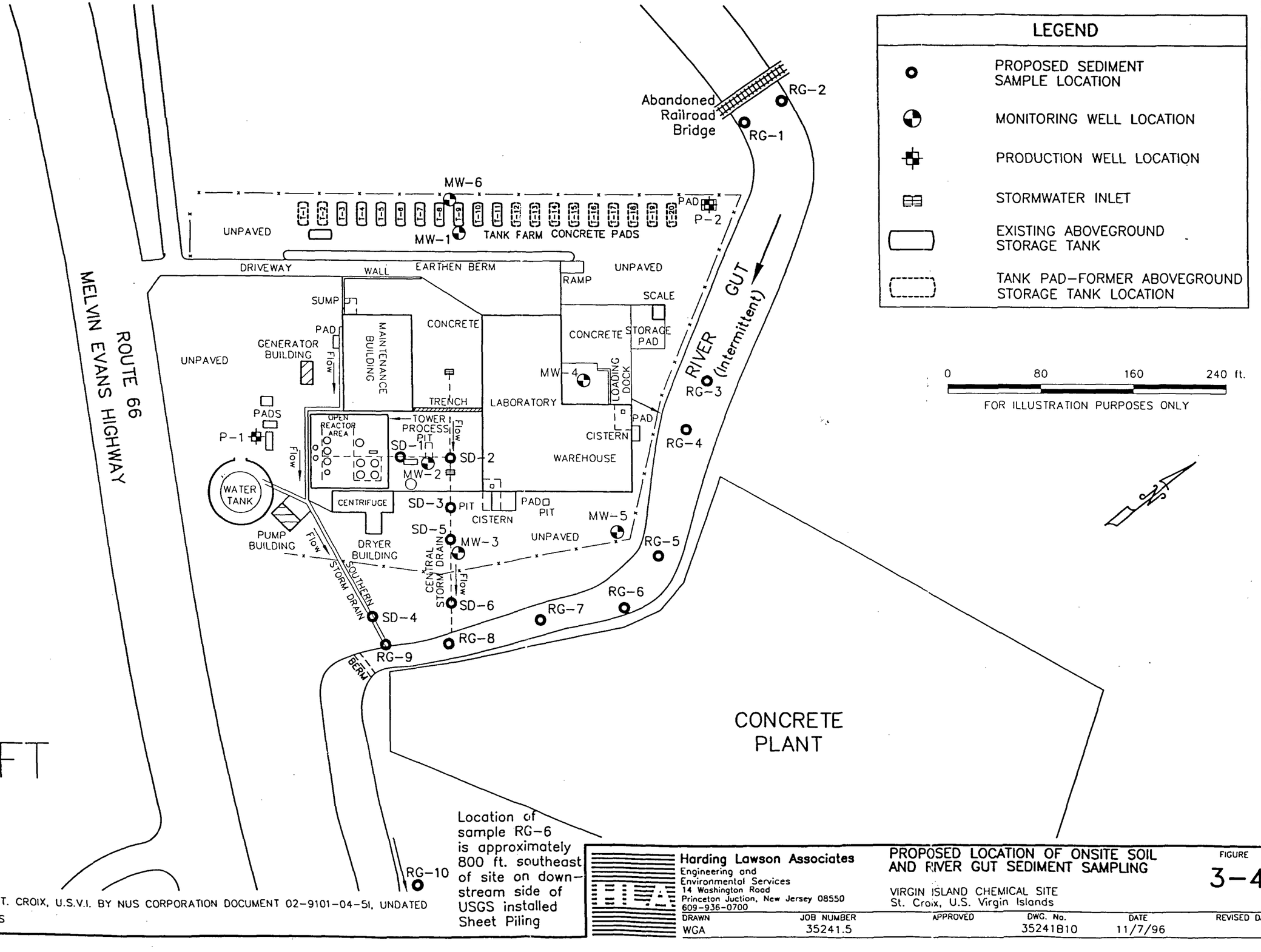
APPROXIMATE LOCATION OF OFFSITE PRODUCTION WELLS

VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands

FIGURE 3-3

DRAWN	JOB NUMBER	APPROVED	DWG. No.	DATE	REVISED DATE
JSW/WGA	35241.5		35241B11	11/7/96	

302186


LEGEND
PROPOSED SEDIMENT SAMPLE LOCATION
MONITORING WELL LOCATION
PRODUCTION WELL LOCATION
STORMWATER INLET
EXISTING ABOVEGROUND STORAGE TANK
TANK PAD–FORMER ABOVEGROUND STORAGE TANK LOCATION
0 80 160 240 ft.
FOR ILLUSTRATION PURPOSES ONLY
ROUTE 66
MELVIN EVANS HIGHWAY
Abandoned Railroad Bridge
RG-1
RG-2
RG-3
RG-4
RG-5
RG-6
RG-7
RG-8
RG-9
RG-10
RIVER GUT (Intermittent)
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
SD-1
SD-2
SD-3
SD-4
SD-5
SD-6
P-1
P-2
UNPAVED
DRIVEWAY
WALL
EARTHEN BERM
RAMP
SCALE
SUMP
PAD
GENERATOR BUILDING
MAINTENANCE BUILDING
CONCRETE
CONCRETE STORAGE PAD
LOADING DOCK
TRENCH
LABORATORY
PADS
OPEN REACTOR AREA
TOWER PROCESS PIT
Flow
CISTERN
WAREHOUSE
WATER TANK
CENTRIFUGE
PIT
PAD
PUMP BUILDING
DRYER BUILDING
SOUTHERN STORM DRAIN
CENTRAL STORM DRAIN FLOW
BERM
TANK FARM CONCRETE PADS
CONCRETE PLANT
DRAFT
Location of sample RG-6 is approximately 800 ft. southeast of site on down-stream side of USGS installed Sheet Piling
SOURCE:
SITE MAP, VI CHEMICAL, ST. CROIX, U.S.V.I. BY NUS CORPORATION DOCUMENT 02-9101-04-5I, UNDATED AND AERIAL PHOTOGRAPHS
Harding Lawson Associates
Engineering and Environmental Services
14 Washington Road
Princeton Junction, New Jersey 08550
609-936-0700
PROPOSED LOCATION OF ONSITE SOIL AND RIVER GUT SEDIMENT SAMPLING
VIRGIN ISLAND CHEMICAL SITE
St. Croix, U.S. Virgin Islands
FIGURE 3-4
DRAWN WGA
JOB NUMBER 35241.5
APPROVED
DWG. No. 35241B10
DATE 11/7/96
REVISED DATE
302187

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

November 7, 1996

Copy No. 11

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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 - 17:	Harding Lawson Associates Princeton Junction, New Jersey

Quality Assurance/Quality Control Reviewer

_____

Jason Schindler P.G.
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
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