SUPERFUND FINAL CLOSE-OUT REPORT
ISLAND CHEMICAL CORP./VIRGIN ISLANDS CHEMICAL CORP.
SUPERFUND SITE
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ST. CROIX, US VIRGIN ISLANDS

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Prepared by

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Island Chemical Superfund Site
St. Croix, US Virgin Islands

I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has determined that all appropriate response actions at the Island Chemical (VICHEM) Superfund site (Site) have been completed, remedial action objectives achieved, and human health and the environment protected under all reasonably anticipated site uses and exposures in accordance with the *Close-Out Procedures for National Priorities List Sites* (OSWER Directive 9320.2-09A-P).

In accordance with the *Comprehensive Environmental Response, Compensation, and Liability Act* (1980) (CERCLA) and the *Superfund Amendments and Reauthorization Act of 1986* (SARA), the responsible parties have implemented and completed all appropriate response actions selected in the August 2002 Record of Decision (ROD).

Based upon field observations associated with EPA's oversight of construction activities, and the final inspection conducted on March 4, 2009 of the Site by EPA and the Virgin Islands Department of Planning and Natural Resources (VIDPNR), EPA has determined that the potentially responsible parties (PRPs) Berlex Laboratories, Inc. (Berlex) and Pharmacia & Upjohn (P&U) Company [a subsidiary of Pfizer Inc. (Pfizer)], have constructed the remedy in accordance with the August 13, 2002 ROD, the Consent Decree (CD), entered on February 17, 2004 and the associated Remedial Action Work Plan (RAWP) specifications. The PRPs have demonstrated in their certification of completion and their final post-remediation monitoring report that the Site performance standards have been achieved. Cleanup goals have been reached at both areas of the Site which were subject to remediation. Further, EPA has determined that the cleanup goals achieved are protective of all reasonably anticipated Site uses and exposures. The only outstanding administrative item is to complete the sale of the Site property, with the net proceeds going to EPA to reimburse certain past costs. At that point, EPA will remove its CERCLA Section 107(l) lien.

II. SUMMARY OF SITE CONDITIONS

Background

The VICHEM Site is located on Plot 13Q of Estate Bethlehem Middle Works in the south-central portion of St. Croix in the U.S. Virgin Islands. Plot 13Q is bordered to the north and east by an intermittent stream. The River Gut, which originates north of the Site, drains to the Caribbean Sea. The Site geology is characterized by approximately 85 feet of fill and Alluvial materials (sandy-clay to sandy-silt and clayey sand) overlying the clayey marl of the Kingshill Formation. Groundwater underlying the Site flows predominantly to the south-southeast. Land use surrounding the VICHEM Site includes a mix of commercial and industrial purposes and the Site is zoned as I-2 (Light Industry).

Charles H. Steffey, Inc. (CHS, Inc.) purchased the VICHEM Site in 1968. At some point prior to 1969, CHS, Inc. changed its name to CHS Holding Corporation (CHS). From 1968 to 1982, the Site was used for the manufacture and blending of a variety of pharmaceutical products. By the end of 1982, the facility was permanently closed. CHS currently retains ownership of the Site. Between 1984 and 1991, several investigations were conducted at the Site by EPA and a former tenant, Island Chemical Company, which was later acquired by Berlex. This investigative work identified six areas of

potential environmental concern:

- Laboratory and Warehouse Building;
- Aboveground storage tank (AST) area;
- Former process pit (FPP) area;
- Loading dock/former laboratory pit area;
- Soil beneath concrete pad near ASTs;
- Concrete storage pad.

During initial stages of site assessment, both EPA and Berlex conducted response activities including soil excavation with on-Site treatment or off-Site disposal, drum removals, and off-Site disposal of AST contents. Between September 1989 and October 1991, EPA conducted a removal action at the Site. At that time, the laboratory/warehouse building was found to contain approximately 400 drums (some extremely deteriorated), leaking cylinders of chlorine and hydrogen chloride, and over 800 containers of laboratory reagents that included sodium metal, potassium cyanide, and ethyl ether. EPA removed 354 drums containing 14,720 gallons of various chemicals and 8,061 pounds of lab pack chemicals from the laboratory/warehouse building and disposed of these materials off-Site.

On May 31, 1990, EPA filed a Notice of CERCLA lien on the Site property pursuant to Section 107(l) of CERCLA, 42 U.S.C. § 9607(l), to secure payment for the costs incurred in the performance of response actions at the Site.

On September 29, 1994, EPA entered into an Administrative Order on Consent (AOC), Index No. II CERCLA-94-0401, with Berlex and Island Chemical Company; Pierrel S.p.A, a subsidiary of P&U and also a former tenant at the Site, was added as a respondent to the AOC in April 1999. The AOC, pursuant to Section 106(a) of CERCLA, as amended, 42 U.S.C. §9606(a), required the performance of a Remedial Investigation/Feasibility Study (RI/FS) at the Site.

The primary objectives of the RI were to: 1) collect the data needed to characterize the nature and extent of contamination and adequately support human health and ecological baseline risk assessments and 2) provide a basis on which a subsequent remedial action plan would be recommended. All six areas of potential concern were investigated during the initial assessment and the subsequent RI, along with the nature and extent of soil and groundwater contamination, and potential off-Site sediment contamination. Based on the data collected, only the AST and FPP areas were determined to require remediation. Contaminants of concern at the Site included ethylbenzene and xylene, in soils and groundwater at the AST area and chloroform in groundwater at the FPP area. The Site posed potential threats to human health and the environment through ingestion associated with contaminated soil and groundwater.

EPA added the VICHEM Site to the National Priorities List (NPL) on June 17, 1996.

In August of 2003, the United States entered into an ability to pay consent decree with CHS pursuant to which CHS is obligated to sell the Site property and remit the net proceeds of the sale to EPA. At the present time, there is a contract for sale of the Site property. EPA and the U.S. Department of Justice are working with the Virgin Islands Department of Taxation to resolve outstanding tax issues from the Site.

On September 23, 2003, EPA signed a Consent Decree (RD/RA Consent Decree) for the Site with Island Chemical Company, Berlex Laboratories, Schering Berlin, Inc., Pharmacia & Upjohn S.p.A., Pharmacia & Upjohn Company, Pharmacia & Upjohn Inc., and Pharmacia Corporation (Settling Defendants), which were operators (or successors

to the operators) at the Site. Under the Consent Decree, the Settling Defendants agreed to perform the remedy selected in EPA's August 2002 Record of Decision, valued at $1,400,000, and pay $490,000 of EPA's past response costs as well as EPA's future oversight costs. The Consent Decree was entered on February 17, 2004.

Remedial Construction Activities

As part of the RI/FS, the PRPs implemented a field Pilot Test of Soil Vapor Extraction/Air Sparging (SVE/AS) in February 2000. Following successful completion of the Pilot Test, and with the approval of EPA and the VIDPNR, an SVE/AS system for the AST area was placed in continuous operation in June 2001 by the PRPs.

A chain link fence was installed in spring 2000 along the property line to secure the area from unauthorized access, and in the spring of 2002, the PRPs demolished the Site buildings and removed and disposed/recycled all of the tanks and related equipment.

The following RAOs based on the human health risk assessment were required for the Site:

- Mitigate the toxicity, mobility, and/or volume of VOCs (ethylbenzene and xylene) in soils in the AST area so as to minimize continued leaching to groundwater;
- Mitigate the toxicity, mobility, and/or volume of VOCs (ethylbenzene and xylene) in groundwater in the AST area and downgradient so as to achieve MCLs and protect potential future groundwater users;
- Mitigate the toxicity, mobility, and/or volume of chloroform in groundwater in the FPP area and downgradient so as to achieve MCLs and protect future potential groundwater users; and
- Restrict on-Site groundwater use to nonpotable purposes until the water quality is restored to MCLs.

On August 14, 2002, the Regional Administrator signed a Record of Decision (ROD) selecting the following remedy:

- SVE/AS to treat contaminated groundwater, saturated soil, and unsaturated soil at the AST source area;
- Monitored Natural Attenuation (MNA) to address low-level residual contamination in groundwater at the FPP area and downgradient areas; and
- Institutional controls (in the form of existing VIDPNR well permitting laws and regulations) to limit the pumping of groundwater at the Site to prevent interference with the selected remedy and to also prevent human exposure to contaminated groundwater until EPA's Maximum Contaminant Levels (MCLs) are achieved.

The ROD also selected groundwater pump and treat as a contingency remedy in the event that groundwater cleanup goals were not achieved in a reasonable time period.

The cleanup goals for soils in the AST area were 6,500 µg/kg for ethylbenzene, and 90,000 µg/kg for xylene. For groundwater, the cleanup goals were 700 µg/L for ethylbenzene, 10,000 µg/L for xylene, and 100 µg/L for chloroform.

In the RD/RA Consent Decree, the PRPs agreed to perform the remedial design/remedial action (RD/RA) specified in the ROD. On a voluntary basis, the PRPs had been operating the SVE/AS system in the AST Area (which was consistent with the requirements of the ROD) since 2001, and an extensive network of monitoring wells was already in place. A formal remedial design phase was, therefore, not required by the

Consent Decree, except in the event EPA determined that supplemental activities were required to achieve performance standards. The PRPs submitted a Remedial Action Work Plan (RAWP) in September 2004 that details all elements of the required remedial action:

- Remedial Element I: SVE/AS for the AST Area;
- Remedial Element II: MNA for the FPP Area; and,
- Remedial Element III: Institutional Controls.

SVE/AS System in AST Area

The SVE/AS system included six SVE wells, one AS well, and eleven vapor monitoring probes, together with a surface vapor barrier that prevented short-circuiting of air flow and direct contact with surface soil. A groundwater monitoring network comprising a total of eight wells (shallow and deep) was also installed in the AST area. Continuous operation of the SVE/AS system by the PRPs from June 2001 through November 2003 removed approximately 2,030 pounds of AST area contaminants and reached asymptotically low limits of mass removal. Rebound testing indicated that negligible residual mass was left in the unsaturated zone. The mass removed correlates well with source mass estimates presented in the Feasibility Study (FS) of 1,900 pounds.

AST Area Groundwater Sampling Results up to June 2004

AST Area groundwater has been monitored quarterly commencing in June 2001, when the SVE/AS system was placed in continuous operation, including three events subsequent to shut down of the AS/SVE system on November 3, 2003. Groundwater concentrations were reduced from a high of 176,000 µg/L of total toluene, ethylbenzene and xylenes (TEX) in June 2001 (baseline levels) in the most contaminated well (MW-6), to 13 µg/L in September 2003, the last sampling event prior to the November 2003 shutdown of the SVE/AS system. Four other AST area groundwater monitoring locations remained below the ROD cleanup goals for the entire period, and were generally at or near nondetectable levels from November 2001 onward.

Rebound and post-shut down evaluations performed in August 2002, December 2003, March 2004 and June 2004 indicated modest increases in groundwater concentrations, to levels generally below cleanup goals. Post-shutdown levels in MW-1 and MW-6 in June 2004 were reduced 88-99.99% from baseline concentrations in June 2001, confirming the permanence of the remediation. Concentrations in MW 6 decreased from 6,900 µg/L TEX in December 2003 to 14 µg/L TEX in June 2004. The concentrations in MW 1, which increased from December 2003 to March 2004 to 21,400 µg/L, decreased to 1,270 µg/L TEX in December 2004, as natural attenuation degraded the residual contaminant concentrations following source removal/treatment of the vadose zone (2,035 pounds removed via SVE).

Prior to source-mass removal in the AST area, the extent of groundwater impacts was relatively limited (approximately 30 to 40 feet downgradient) due to natural attenuation processes.

Wells located to the north of the AST Area, MW-8 and MW-10, were installed during the Remedial Investigation (RI) to monitor the possible off-property migration of contaminants although the predominant groundwater flow direction is to the south/southeast. These wells were sampled during the baseline event and in the three events s subsequent to December 2003. In each event, concentrations of TEX were 0.6 µg/L in MW-8 and MW-10, indicating that there is no migration of Site COCs to the north.

AST Confirmatory Soil Sampling

Soil samples were collected in the AST area on a 25 foot by 25 foot grid pattern with vertical samples collected every 2 feet to the water table, in February 2004 and analyzed for Site contaminant VOCs. The results demonstrated that contaminant levels were below cleanup goals in all samples analyzed. The highest depth averaged concentrations of soil samples in one location were 369 µg/kg of ethylbenzene and 296 µg/kg of xylenes, compared with the ROD cleanup goals of 6,500 µg/kg and 90,000 µg /kg, respectively.

MNA in FPP Area

EPA selected MNA as the remedy for FPP Area groundwater, and chloroform concentrations in groundwater have decreased sharply since 1998 such that the cleanup goal has now been reached. From 1998 to June 2004, chloroform in MW-2, the source area of historically highest concentrations, decreased from 2,400 µg/L to 13 µg/L. Chloroform concentrations in the FPP Area have been consistently below the cleanup goal since 2000. MW-11, a downgradient well which had an increase in chloroform from an estimated 3 µg/L in 1998 to 40.4 µg/L in 2000, was below cleanup goals in 2004, indicating that chloroform has attenuated downgradient. Chloroform was not been detected in any of the AST Area wells, and methylene chloride (a potential degradation product of chloroform) was not detected above 1 µg/L in any FPP or AST wells up to June 2004.

ROD Cleanup Goals Achieved

Based upon the soil and groundwater data, which indicated compliance with all cleanup goals, EPA determined that supplemental remedial construction activities were not necessary, and use of the contingency remedy of groundwater pump and treat would not be required in either the AST Area or FPP Area. Construction was, therefore, considered to be complete. Subsequent Post-Remediation groundwater monitoring at both AST and FPP areas showed that compliance with all cleanup goals have been met. A description of the Post-Remediation monitoring results is located in Section IV: Monitoring Results.

Institutional Controls

The ROD indicated that VIDPNR, in consultation with EPA, would utilize institutional controls (in the form of existing well permitting laws and regulations) to limit the pumping of groundwater at the Site, to prevent interference with the selected remedy, and to also prevent human exposure to contaminated groundwater until ROD cleanup goals are achieved. Pursuant to the CD, if requested by EPA, the PRPs were to execute and record an easement to provide access to the Site and ensure that groundwater was not used for potable purposes and activities at the Site would not interfere with the remedy. The PRPs maintained fencing around the Site and maintained oversight of groundwater conditions during remediation. Based upon the groundwater data, which indicate compliance with all cleanup goals, EPA did not require filing of an easement because groundwater contaminant levels allow for use without restriction.

No reuse is known to be currently planned for the Site. The property is currently up for sale. The Preliminary Closeout Report was signed on March 24, 2004. The Remedial Action Report was approved on September 17, 2004. The final inspection was held on March 4, 2009. The final Five-Year Review was signed on March 20, 2009.

Community Involvement Activities

The Region's community involvement staff conducted an active campaign to ensure that the residents were well informed about the activities at the Site. Community involvement activities included routine publication of progress fact sheets.

III. DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

Cleanup activities at the Site were undertaken in accordance with the AOC, the ROD, the CD, and the RAWP. All applicable EPA and Territorial quality assurance and quality control (QA/QC) procedures and protocols were incorporated into the SVE/AS Operation and Maintenance Plan, and the RAWP. The Quality Management Plan (QMP) of the Supervising Contractor, Golder Associates Inc., was reviewed and approved by EPA and documents the ongoing Quality Assurance (QA) policies, procedures, responsibilities and management systems in place to implement the required QA program. EPA analytical methods and certified laboratories were used for all monitoring during remedial activities, and data validation was performed in accordance with EPA protocols. All procedures and protocols followed for confirmatory groundwater and soil sample collection and analyses are documented in the RAWP, and comply with EPA and Territorial requirements. Oversight of construction activities, sampling procedures, and post-remediation monitoring was provided by EPA's contractor, CDM Federal Programs Corp. In addition, EPA conducted yearly Site visits and the VIDPNR personnel periodically visited the Site

The QA/QC program used throughout the soil and ground water remedial activities was rigorous and in conformance with EPA standards; therefore, EPA determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the Remedial Action, in accordance with the ROD, CD, and RAWP.

IV. MONITORING RESULTS

AST Area

Groundwater monitoring was performed semi-annually from 2004 to 2006. Three wells, MW-1, MW-6, and AST-VMP-3D, were monitored in the AST area for TEX parameters and a list of key intrinsic biodegradation parameters. All TEX results were below cleanup goals except for one detection of ethylbenzene at 1700 µg/L in December 2004. EPA approved annual post-remediation monitoring in the AST Area in April 2006. TEX concentrations have remained below cleanup goals during three rounds of post-remediation monitoring from 2006 to 2008. The data are reported in the Final Post-Remediation Report (Golder 2008). Table 1 shows the post-remediation monitoring results for the AST Area. Since post-remediation monitoring showed compliance with cleanup goals, no further sampling of the monitoring wells is required in the AST Area.

FPP Area

In the FPP area, annual post-remediation groundwater monitoring began in the 2nd quarter 2005. Three wells, MW-2, MW-7, and MW-11, were monitored for chloroform. Chloroform concentrations remained below cleanup goals during three rounds of post-remediation monitoring from 2005 to 2007. The data are reported in the Final Post-Remediation Report (Golder 2008). Table 1 shows the post-remediation monitoring results for the FPP Area. Since post-remediation monitoring showed compliance with cleanup goals, no further sampling of the monitoring wells is required in the FPP Area.

V. SUMMARY OF OPERATION AND MAINTENANCE

There are no further operation and maintenance activities associated with this Site. The PRPs will properly decommission all remaining monitoring wells. All SVE equipment has been removed from the Site. The fence will be left in place. There were no proprietary institutional controls implemented for this Site and no follow-up activities associated with the institutional controls. Following issuance of this report, EPA will seek the Virgin Islands concurrence on the deletion of this Site from the NPL.

VI. SUMMARY OF REMEDIATION COSTS

The ROD estimate of costs for the Selected Remedy was as follows:

Capital costs:	$ 850,760
Estimated present worth O&M costs:	$ 553,500
Total estimated present-worth cost:	$ 1,404,260

The PRPs incurred capital costs for remedy implementation of approximately $600,000. Operation and maintenance costs were $560,000 and included:

- SVE/AS system operation
- Maintenance and monitoring for 30 months
- Quarterly and post-remediation groundwater sampling and reporting for 48 months, and
- Confirmatory soil sampling.

VII. PROTECTIVENESS

This Site meets all the site completion requirements as specified in OSWER Directive 9320.2-09-A-P, Close-Out Procedures for National Priorities List Sites. Specifically, post-remediation groundwater monitoring and confirmatory soil sampling verifies that the Site has achieved the following ROD cleanup objectives:

- Cleanup actions specified in the ROD have been achieved
- Groundwater and soil results are below cleanup goals.

A bibliography of all reports relevant to the remediation of this Site under the Superfund program is attached. The Site is zoned as I-2 (Light Industry). However, the soil cleanup standards provide for exposures that would be allowed under normal residential use. Groundwater cleanup standards provide for use as a drinking water supply. EPA considers the Site suitable for unlimited use and unrestricted exposure. When a site meets standards for unlimited use without restriction, there is no further need for any monitoring nor any need for institutional controls and the site can be deleted from the NPL. However, it should be noted that all sites deleted from the NPL are eligible for further removal or remedial actions should future conditions warrant such action. Whenever there is a significant release from a site deleted from the NPL, the site may be restored to the NPL without application of the Hazard Ranking System

VIII. FIVE-YEAR REVIEW

This Site has no hazardous substances, associated with the NPL release, remaining above levels that would prevent unlimited use and unrestricted exposure. The remedy is completed. The first and final Five-Year Review was signed on March 20, 2009.

Approved:

for Walter Mugdan, Director
Emergency & Remedial Response Division

May 22, 2009
Date

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Table 1
Virgin Island Chemical Site
Post- Remediation
Sampling Results

AST Area Groundwater

Sample ID:		MW-1						MW-6						AST-VMP-3D					
Event:	Cleanup Goal	2006 2Q		2007 2Q		2008 1Q		2006 2Q		2007 2Q		2008 1Q		2006 2Q		2007 2Q		2008 1Q	
Sample Date:	(ug/L)	5/2/2006		5/1/2007		2/5/2008		5/2/2006		5/1/2007		2/5/2008		5/2/2006		5/1/2007		2/5/2008	
Volatile Organics (ug/L)																			
Ethylbenzene	700	5	U	5	U	5	U	6.8		5	U	5	U	5	U	5	U	5	U
Toluene	1,000	1.2	J	5	U	5	U	2.1	J	5	U	5	U	0.8	J	5	U	5	U
Total Xylenes	10,000	12		5	U	5	U	250		3.7	J	5	U	6.4		5	U	5	U
Total TEX		38		0		0		259		3.7		0		7.2		0		0	

FPP Area Groundwater

Sample ID:		MW-2						MW-7						MW-11					
Sample Date:	Cleanup Goal (ug/L)	5/2005		5/2006		5/2007		5/2005		5/2006		5/2007		5/2005		5/2006		5/2007	
Volatile Organics (ug/L)																			
Chloroform	100	ND		23		22		ND		ND		ND		ND		23		21	

Note:
"U" indicates a value below the detection limit of the analysis.
"J" indicates an estimated value
ND indicates non-detect
ug/L = micrograms per liter