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FINAL COMBINED PRELIMINARY ASSESSMENT/SITE INSPECTION REPORT FOR CHLOR-ALKALI FACILITY (FORMER) BERLIN, NEW HAMPSHIRE

Prepared For:
U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
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LIST OF ACRONYMS

American Tissue	American Tissue Corporation
AOC	Administrative Order by Consent
AGQS	Ambient Groundwater Quality Standards
approx.	Approximately
bgs	below ground surface
BHRA	Bureau of Health Risk Assessment
CDDs	chlorinated dibenzo-p-dioxins
CDFs	chlorinated dibenzofurans
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cfs	cubic feet per second
Chlor-Alkali	Chlor-Alkali Facility (former)
CLP	Contract Laboratory Program
Clean Harbors	Clean Harbors, Inc.
Co.	Company
Cont.	Continued
Concl.	Concluded
Cr-S-3	S-3 Soil Standards for chromium III (5,000 mg/kg) and for chromium VI (540 mg/kg)
Cr-UCL	Upper Concentration Limits for chromium III (10,000 mg/kg) and for chromium VI (5,400 mg/kg)
CRQL	Contract Required Quantitation Limit
CWA	Clean Water Act
DAS	Delivery of Analytical Services
DHHS	Department of Health & Human Services
DO	Dissolved Oxygen
EB	equipment blank
ECF	Elemental-Chlorine Free
EPA	U.S. Environmental Protection Agency
ft	Feet
ft^2	square-foot
FID	Flame Ionization Detector
Fraser Paper	Fraser Papers, Inc.
GMZ	groundwater management zone
HpCDD	heptachlorodibenzodioxin
HpCDF	heptachlorodibenzofuran
HxCDD	hexachlorodibenzodioxin
HxCDF	hexachlorodibenzofuran
ID	Identification
IDL	Instrument Detection Limit
Inc.	Incorporated
LEA	Limited Environmental Assessment
LLC	Limited Liability Company
mg/kg	milligrams per kilogram

LIST OF ACRONYMS (Continued)

mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
mil	millimeter
MS/MSD	Matrix Spike/Matrix Spike Duplicate
mv	millivolts
MVA	Mercury Vapor Analyzer
N	North
NA	Not Applicable
NA	Not Available
NaCl	sodium chloride
NaHg	sodium amalgam
ND	Not Detected
NE	Not Established
NERL	Northeast Regional Laboratory
ng/g	nanograms per gram
ng/kg	nanograms per kilogram
ng/L	nanograms per liter
ng/m^3	nanograms per cubic meter
NH	New Hampshire
NH DES	New Hampshire Department of Environmental Services
NH DHHS	New Hampshire Department of Health and Human Services
No.	Number
NOAA SQuiRTs	National Oceanic and Atmospheric Administration Screening Quick Reference Tables
Normandeau	Normandeau Associates, Inc.
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
OCDD	octachlorodibenzodioxin
OCDF	octachlorodibenzofuran
ORP	Oxidation Reduction Potential
OSHA	Occupational Safety and Health
PA/SI	Preliminary Assessment/Site Inspection
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
PeCDD	pentachlorodibenzodioxin
PeCDF	pentachlorodibenzofuran
PEL	Probable Effects Level
pg/g	picograms per gram
PID	Photoionization Detector
Plan	Final Draft Cell House Remediation Project Post-Closure Monitoring and Maintenance Plan
PPE	Probable Point of Entry
ppm	parts per million
ppt	parts per trillion
PSNH	Public Service of New Hampshire

LIST OF ACRONYMS (Concluded)

RCMP	Risk Characterization and Management Policy
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
Ref	Reference Sample
Region I	Region I
RL	Reporting Limit
RSD	Relative Standard Deviation
Sevee	Sevee & Maher Engineering, Inc.
SOW	Scope of Work
SSE	Selective Sequential Extraction
START	Superfund Technical Assessment and Response Team
STL	Severn Trent Laboratory
SVOCs	semivolatile organic compounds
TCDD	tetrachlorodibenzodioxin
TCDF	tetrachlorodibenzofuran
TCE	trichloroethene
TCLP	Toxicity Characteristics Leaching Procedure
TDL	Target Distance Limit
TEF	Toxicity Equivalency Factor
TEL	Threshold Effects Level
TEQ	Toxicity Equivalency Quotient
Tighe & Bond	Tighe & Bond Consulting Engineers Environmental Specialists
TPHs	total petroleum hydrocarbons
UCL	Upper Concentration Limits
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µS/cm	Microsiemens per centimeter
USGS	U.S. Geological Survey
VOCs	volatile organic compounds
W	West
Weston MNH	Weston Solutions, Inc. Manchester, New Hampshire
WWTF	waste water treatment facility
%	percent
′	Feet
″	Inches
°	Degrees
′	Minutes
″	Seconds
-	Not Applicable
~	Approximate
<	Less than
°C	Degrees Celsius

INTRODUCTION

The Weston Solutions, Inc., Superfund Technical Assessment and Response Team 2000 (START) was requested by the U.S. Environmental Protection Agency (EPA) Region I, Office of Site Remediation and Restoration to perform a Combined Preliminary Assessment/Site Inspection (PA/SI) of the Chlor-Alkali Facility (former) (Chlor-Alkali) property located adjacent to the Sawmill Dam in Berlin, New Hampshire (NH). Tasks were conducted in accordance with the PA/SI scope of work and technical specifications provided by EPA Region I.

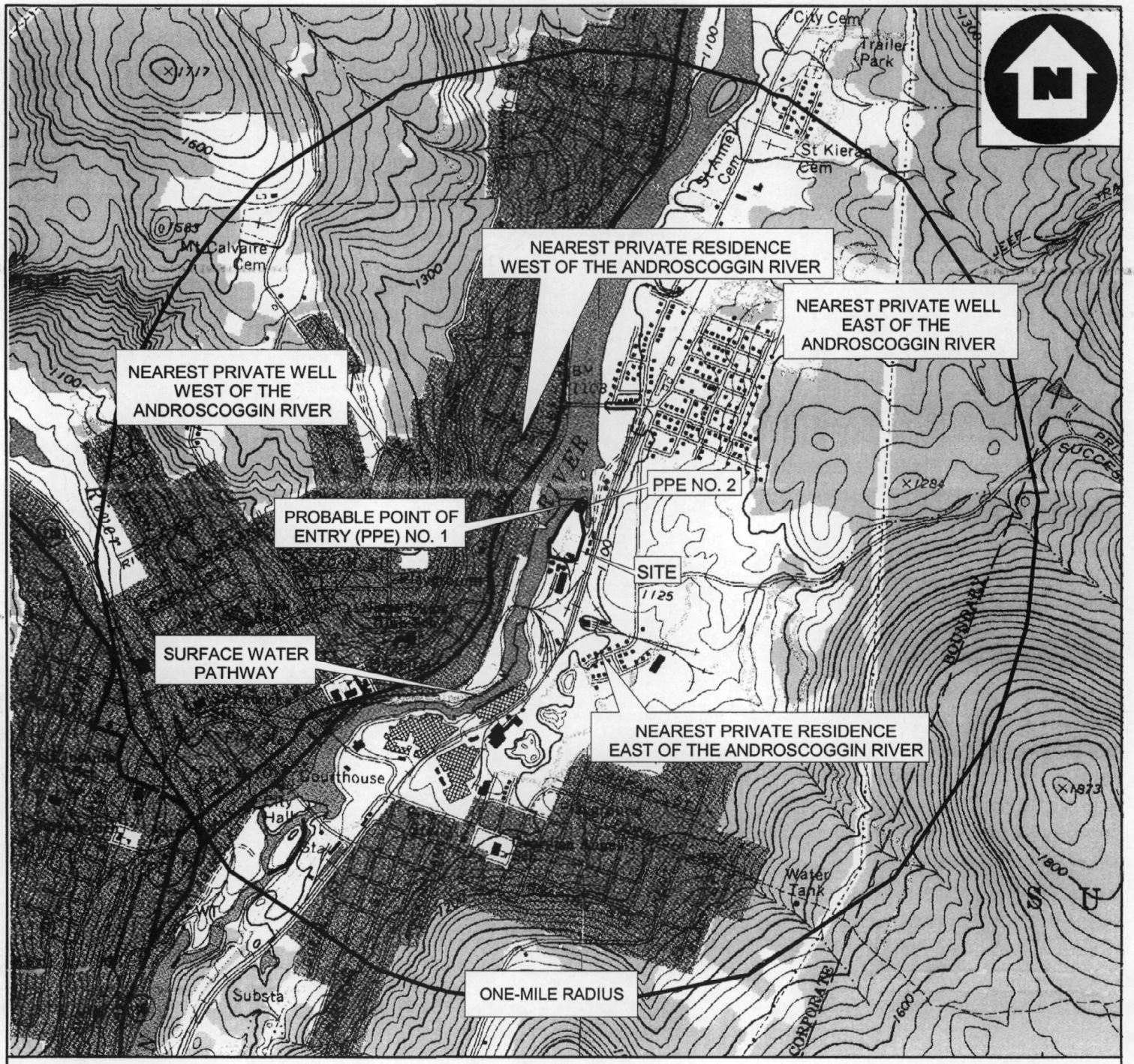
Background information used in the generation of this report was obtained through file searches conducted at EPA Region I, NH Department of Environmental Services (NH DES), telephone interviews with town officials, conversations with persons knowledgeable of the Chlor-Alkali property and conversations with other Federal, State, and local agencies.

This package follows the guidelines developed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA Region I regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State, or local regulations. PA/SIs are intended to provide a preliminary screening of sites to facilitate EPA Region I's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

The street address, coordinates, and/or contaminant locations presented in this report identify the general area in which the site is located. They represent one or more locations EPA considers to be part of the site based upon the screening information collected or generated in the course of this or previous investigation(s). The EPA Site Assessment program is designed to identify "releases or threatened releases" of hazardous substances, and the focus of this investigation is on the release(s) or potential release(s), rather than precisely delineated site boundaries. A site is defined under the EPA Site Assessment program as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." EPA anticipates that the preliminary description of site boundaries will be refined as more information is developed regarding where the contamination has come to be located.

SITE DESCRIPTION

The Chlor-Alkali property is located adjacent to (south-southeast of) the Sawmill Dam, along the east side of the Androscoggin River, in Berlin, Coos County, NH (Figure 1) [1]. The geographic coordinates for the property, as measured from the approximate center of the property, are 44° 28' 40.53" north latitude and 71° 10' 02.75" west longitude [24]. The approximately 4.6-acre property is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 262 and is zoned as Industrial/Business [4; 25]. The property is currently owned by Ms. Christine C. Shubert, Chapter 7 Trustee for the Estate of Pulp and Paper of America, LLC [26; 75]. Pulp and Paper of America, LLC declared bankruptcy in 2001 [134].



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 7.5' U.S.G.S. QUADRANGLE(S):
BERLIN, NH. 1970; PHOTO-INSPECTED 1989.

0.5 0 0.5 1 Miles

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 Feet

0.5 0 0.5 1 1.5 2 2.5 Kilometers

QUADRANGLE LOCATION

SITE LOCATION MAP

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS
Restoring Resource Efficiency

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE:
04-05-0205	A. MISKIMAN	11/18/2004
FILE NAME: E:\ARC_APRS\START2\Chlor_alkali.apr		FIGURE 1

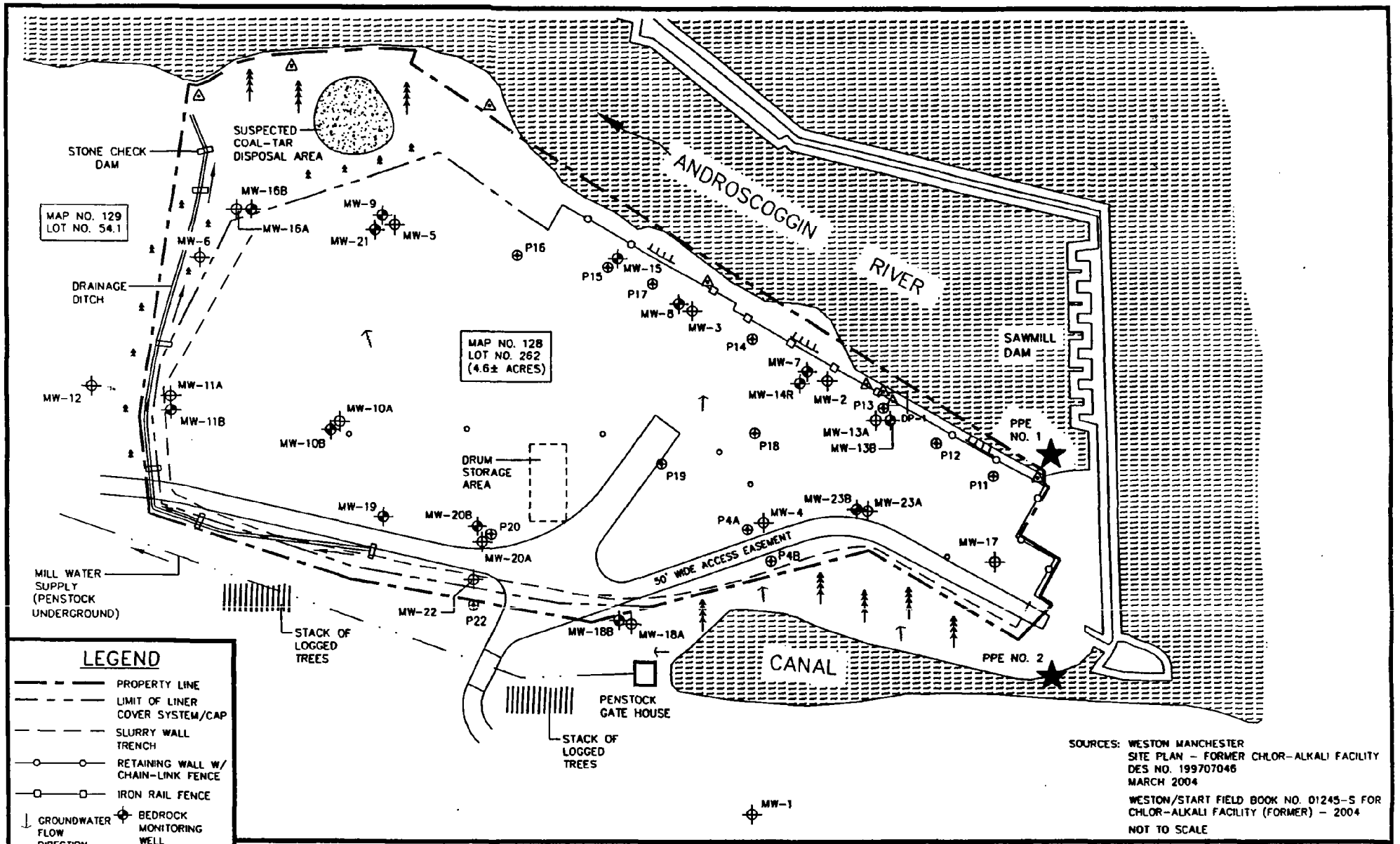
The Chlor-Alkali property is located in the northern portion of the former Burgess Mill property, east of the Androscoggin River, west of Hutchins Street, north of the Cleveland Bridge, and south of Bridge Street and the Sawmill Dam. The Chlor-Alkali property is surrounded by Fraser Papers Inc. (Fraser Paper) property, owned by Fraser NH LLC, to the north, south, and east; and the Androscoggin River to the west (Figure 2) [25].

On 25 August 2004, as part of the PA/SI, START conducted an on-site reconnaissance of the Chlor-Alkali property, accompanied by EPA Region I representatives Ms. Nancy Smith and Mr. Richard Goehlert; EPA Headquarters representative Ms. Joan Fisk; NH DES representatives Mr. John Regan, Ms. Margaret Bastien, and Mr. Richard Pease; EPA Headquarters contractors Mr. Thomas Barrasso and Mr. Hagai Nassau of E^2 Inc., and Mr. Kenyon Larson and Mr. Brian Busiek of SRA International, Inc.; NH DES contractors Mr. Joseph Schmidl and Mr. Art Cunningham of Weston Solutions, Inc. Manchester, New Hampshire (Weston MNH); Ms. Laura Lee Viger of the City of Berlin Health Department and Mr. James Wheeler of the City of Berlin Public Works; and Fraser Paper representative Ms. Tammie Lavoie. At the time of the on-site reconnaissance, Weston MNH's subcontractors were conducting a mercury removal adjacent to (west of) the Chlor-Alkali property, along the shore of the Androscoggin River [102, pp. 11-39].

The Chlor-Alkali property is not currently accessible to the public. The only access to the property is through the Fraser Paper property. A staffed guard house is located at the entrance to the Fraser Paper property, off Unity Street and east of the Androscoggin River. From the Fraser Paper property, a dirt access road enters the Chlor-Alkali property in the southeast corner and extends north along the eastern property boundary to the northern property boundary. The dirt access road forks to the northwest in the central portion of the property [102, pp. 11-12,18].

START observed wood chips on the site surface which reportedly cover a liner installed across approximately 4 acres of the property. START observed 24 monitoring wells, 12 piezometers, and six gas vents emerging from the site surface. In addition, START observed one piezometer and four monitoring wells located on the adjacent Fraser Paper property. Green wooden boxes were positioned on several wells and piezometers. According to Mr. Schmidl, these boxes were used by a U.S. Geological Survey (USGS) field team for holding monitoring instruments during USGS' site investigation work. A concrete retaining wall and a chain-link fence extend along the northern and western boundaries of the Chlor-Alkali property. Two exceptions include an approximately 50-foot section along the western property boundary that is bordered by an iron-rail fence, and an unfenced portion along the southwestern property boundary which is located along the river. START observed a temporary drum storage area in the eastern portion of the property. These drums are utilized by Weston MNH in their on-going site investigation. According to Mr. Schmidl, 20 drums contain investigation derived waste, personal protective equipment, and soil from a March 2004 soil/source sampling and monitoring well installation event; one drum contains contaminated material removed from the banks along the Androscoggin River during the on-going mercury removal activities; and approximately nine drums are empty [102, pp. 17-34].

The topography of the site is mounded in the center and slopes radially in all directions. However, the greatest slope is west, toward the Androscoggin River, and south toward the southern property boundary and a drainage ditch. The southern property boundary is unofficially marked by the drainage ditch and overgrown vegetation. In addition, a "stone drain", consisting of stone and gravel rip-rap, was observed on the site surface, reportedly along the perimeter of the liner to allow



SITE SKETCH

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS®

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
04-05-0205	W. SHAW	4/5/04

FILE NAME: S:\04050205\04010001\FIGURES\FIG2.DWG

FIGURE 2

precipitation to run off the site and into the surrounding drainage system [64; 102, pp. 17-19]. From the chain-link and iron-rail fencing along the western property boundary, the elevation sharply decreases down to a bedrock outcrop along the east bank of the Androscoggin River. At the time of the START on-site reconnaissance, this difference in elevation was approximately 20 to 30 feet [102, p. 21]. However, START assumes the water level of the Androscoggin River fluctuates as a result of seasonal precipitation and the operation of upstream dams; therefore, this difference in elevation would decrease with increasing water levels.

A brick penstock gatehouse and stacks of logged trees are located on the Fraser Paper property to the east. In addition, the Dummer Yard Landfill (NH DES Identification No. 198704035) is visible to the east from the approximate center of the Chlor-Alkali property. This landfill is located approximately 0.2 miles east of the Chlor-Alkali property, east of Hutchins Street.

START observed a suspected coal-tar disposal area identified by Weston MNH in the southwestern corner of the Chlor-Alkali property. This area is overgrown with vegetation. START observed a "tar-like" material on the ground surface and between rocks and bricks along the edge of the Androscoggin River west of the suspected coal-tar disposal area [102, pp. 18-19, 23].

START accessed the Androscoggin Riverbank and observed NH DES mercury removal activities. START observed silver metallic-like beads, suspected to be elemental mercury, on the bedrock surface along the east bank of the Androscoggin River, adjacent to the Chlor-Alkali property. START observed three seeps in the retaining wall along the western property boundary. One seep, approximately 6 inches to 1 foot in diameter, was active with groundwater draining directly into the Androscoggin River. START also observed suspected beads of elemental mercury within the bedrock fractures along the riverbed [102, pp. 21-22].

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

In the early 1850s, the H. Winslow Company (also documented as H. Winslow & Company) built a sawmill located "at the head of Berlin Falls" in Berlin, NH [2, p. 28; 43; 45].

From approximately 1866 to 1868, Mr. William W. Brown and Mr. Lewis T. Brown purchased the controlling interest of the sawmill and/or H. Winslow Company and changed its name to the Berlin Mills Company [2, p. 28; 43; 45].

According to an October 1887 Sanborn Map, the Berlin Mills Saw & Grist Mill was located along the west side of the Androscoggin River adjacent to an unnamed dam (where the current Sawmill Dam stands). The map depicts the current Chlor-Alkali property as undeveloped and labeled as "vacant lumber yard" [159].

On 24 May 1888, the Berlin Mills Company purchased land located in Berlin, Dix, Dummer, Errol, Gorham, Grant, Milan, Millsfield, Pittsburg, and Stewartstown, NH; islands and riverbanks in Milan and Berlin, NH; and a piece of shoreline along the bank of the Androscoggin River in Gorham, NH from Mr. William W. Brown, Mr. Thomas Edwards, Mr. James W. Parker, and Mr. Herbert J. Brown. [76]. START assumes that this purchase included land on which the Chlor-Alkali property is located.

In 1888, the Berlin Mills Company built the Riverside Groundwood Mill along the banks of the Androscoggin River [45; 93]. Available information does not specify the exact location of this mill. START assumes the Riverside Groundwood Mill was located in Berlin, NH.

In 1891, the Berlin Mills Company built the Riverside Paper Mill and the Burgess Sulfite Fibre Company along the banks of the Androscoggin River, to manufacture chemical wood fibre [2, p. 28; 45; 93].

According to 1892 and 1895 Sanborn Maps and a 1893 USGS topographic map, land along the east side of the Androscoggin River (*i.e.*, the location of the Chlor-Alkali property) was undeveloped. At this time, the Berlin Mills Saw & Grist Mill, the Berlin Mills Co. Pulp Mill, and the Berlin Falls Fibre Co. were located in Berlin, NH along the west side of the Androscoggin River [160; 161; 199].

During approximately 1893 to 1897, the Burgess Mill (also documented as the Berlin Mills Company and the Burgess Sulfite Fiber Company) was built in Berlin, NH, and produced 75 tons of sulphite pulp per day. In October 1898, the Burgess Mill purchased the Rumford Falls electrolytic plant equipment that utilized the Ernest A. Le Sueur's electrolytic cells to produce alkali and chlorine. This equipment was moved to Berlin to produce chlorine to bleach the pulp produced at the Burgess Mill. A Chemical Mill, also documented as the Electrochemical Plant, located on the Chlor-Alkali property, was established and consisted of 72 electrolytic cells with platinum wire anodes that used a normal current of 800 amperes at a voltage per cell [3, pp. 8-9; 93, p. 43]. In 1898, an approximately 7,400-square-foot (ft^2) two-story building was built on the Chlor-Alkali property, east of the Androscoggin River [19]. It is assumed by START that this building housed the first electrolytic cells. After approximately 1 year, the plant began using "Acheson graphite" for the anodes and increased the plant size to 125 electrolytic cells. Four of 10 water wheels in the "old Berlin Mills Company saw mill" generated the energy that powered the electrolytic cells [3, pp. 8-9].

The Le Sueur process utilized diaphragm electrolytic cells to produce chlorine [124; 162]. A diaphragm electrolytic cell consists of a porous diaphragm (typically containing asbestos) that allows a brine solution to flow from the anode to cathode. An electric current is passed through the brine, and chlorine gas is produced at the anode while sodium ions at the cathode react with water to produce caustic soda [44; 162].

Mercury electrolytic cells, discovered in 1892, consist of flowing mercury along the bottom of the cell. The flowing mercury serves as the cathode. When an electric current passes through brine solution in one compartment, chlorine is produced at the anode (graphite), and sodium dissolves in the mercury, forming a sodium amalgam (NaHg) at the cathode. The amalgam flows into a second compartment where it decomposes into sodium and mercury. The sodium reacts with water in the compartment, producing caustic soda and hydrogen, and the mercury returns to the electrolytic cell [44; 126].

During winter 1899 to 1900, the Chemical Mill closed because there was insufficient power generated by the water wheels in the mill to run the plant [3, p. 8].

From approximately 1899 to 1900, "experimental cells" that utilized an unsubmerged cathode, invented by E. A. Allen and H. K. Moore, were located in the "digester house" at the Burgess Mill. The exact location of the digester house is unknown to START. During the winter of 1899 to 1900,

a cell was designed with an unsubmerged diaphragm. Subsequently, 160 of these cells were installed in the Chemical Mill on the Chlor-Alkali property [3, p. 9]. It is unknown whether these "experimental cells" were diaphragm or mercury cells; both types of cells produce chlorine.

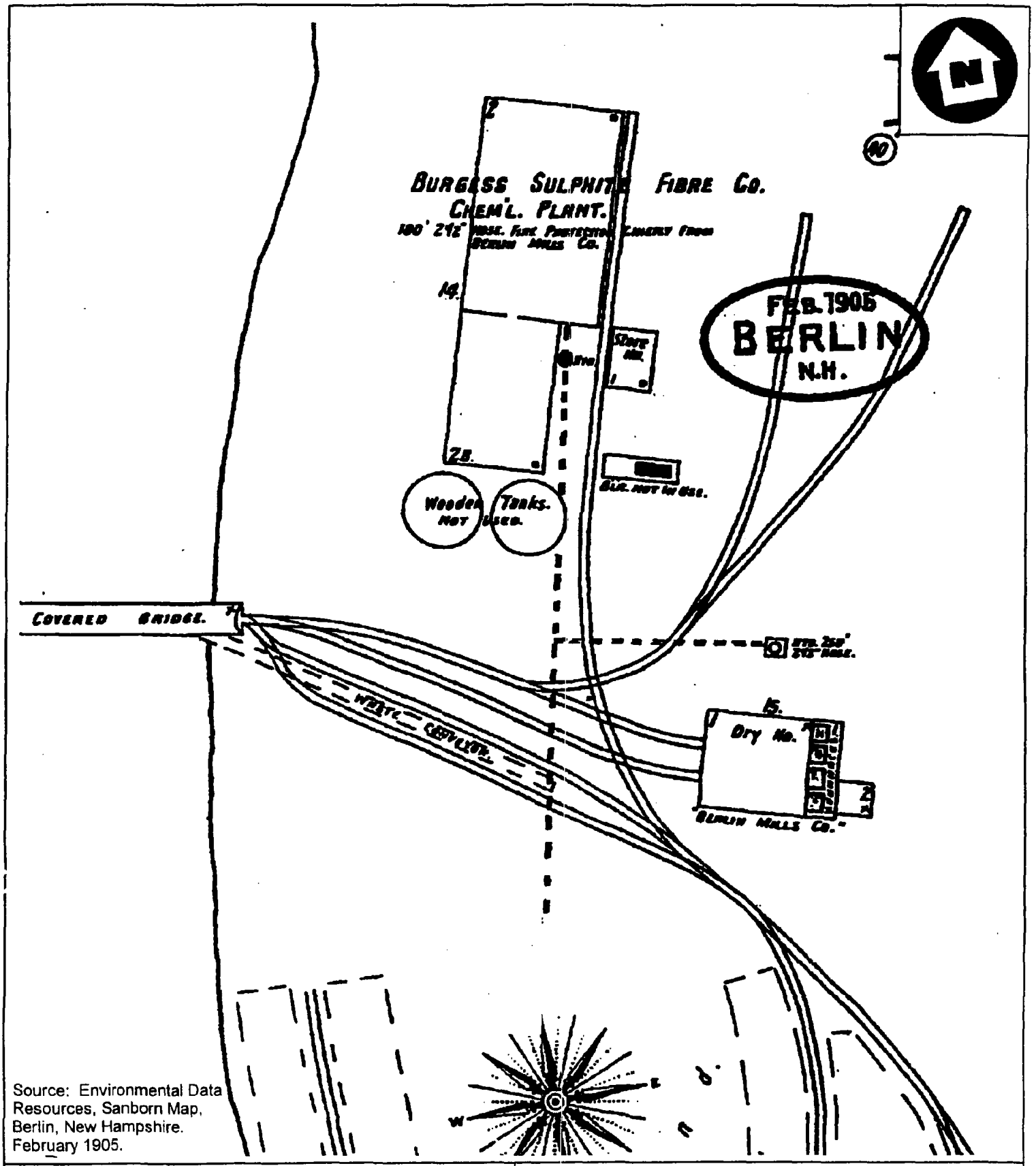
After 9 months, the Chemical Mill stopped using the unsubmerged diaphragm cells due to several construction mistakes (the graphite used was not impregnated, the brine was not purified, and the chlorine gas space in the cells was too small) and reportedly "...threw them out of the back window and called it good riddance." The Le Sueur cells, using Acheson graphite, and improved H. K. Allen unsubmerged diaphragm cells were used instead [3, pp. 8 and 9]. There was no mention of the use of mercury or mercury cells in a 1 June 1922 *The Brown Bulletin* article that outlined the use of electrolytic cells to produce chlorine at this time.

According to a February 1905 Sanborn Map, the "Burgess Sulphite Fibre Co. Chem'l. Plant.", located on the Chlor-Alkali property, consisted of a two-story, approximately 7,400-ft^2 building located approximately 80 feet east of the Androscoggin River, two round wooden tanks labeled "not used" located south of the two-story building, and one approximately 500-ft^2 "store ho." (an assumed storage building) and an approximately 350-ft^2 building labeled "not in use" located east of the two-story building (Figure 3). In addition, a one-story, approximately 2,400-ft^2 building labeled "Dry Ho." and "Berlin Mills Co." containing furnaces was located southeast of the two wooden tanks. Railroad tracks extended north-to-south along the east side of the two-story building, and east to west from the "Dry Ho." building to a covered bridge that extended across the Androscoggin River. A fire hydrant pipe extended north-to-south from the 7,400-ft^2 two-story building for approximately 950 feet to an area labeled "Lumber Ground". In addition, a "waste conveyor" was located on the Chlor-Alkali property that appears to connect to the (assumed) 6-inch diameter pipe and extend west across to the west bank of the Androscoggin River [16]. The direction in which the conveyor carried waste is unknown.

In 1906, the Berlin Mills Company purchased the Burgess interests in the Burgess Sulphite Fibre Company and gradually increased production. Reportedly, the size of the Electrochemical Plant was increased to keep up with production [93].

The byproducts of the electrolytic cells (chlorine, caustic soda, and hydrogen) were used by the Berlin Mills Company to produce more products. In 1908, instead of releasing caustic soda to the river (assumed by START to be the Androscoggin River), the Brown Company began marketing its White Mountain Brand Caustic Soda which was reportedly in high demand [93; 158]. Reportedly, an electrolytic cell produces over 1 pound of caustic soda for each pound of chlorine produced. However, production of this caustic soda was not increased until the Berlin Mills Company could find other products that required chlorine as a raw material. As a result, in 1909, chloroform plants were built. Other products produced by the Brown Company that required chloroform and chlorine included anaesthesia, dry cleaning solvents, sulphur chlorides, carbon tetrachloride, liquid chlorine, and calcium arsenate [93, p. 44]. In addition, in 1914, the Kream Krisp Plant was built to utilize the byproduct hydrogen. Hydrogen was brought into contact with vegetable oils to produce a type of shortening. Previously, the hydrogen escaped into the atmosphere [93]. The location of the Kream Krisp Plant is unknown to START.

Caustic soda is typically sold as 50 percent (%) or 73% concentration by weight, or as anhydrous beads or flakes. Mercury electrolytic cells produce the highest purity of caustics compared to any other electrolytic cell process (50% or 73% caustic soda directly, without an evaporation process).



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire. February 1905.

HISTORICAL MAP
(SANBORN MAP FEBRUARY 1905)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS
Restoring Resource Efficiency
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

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Figure 3

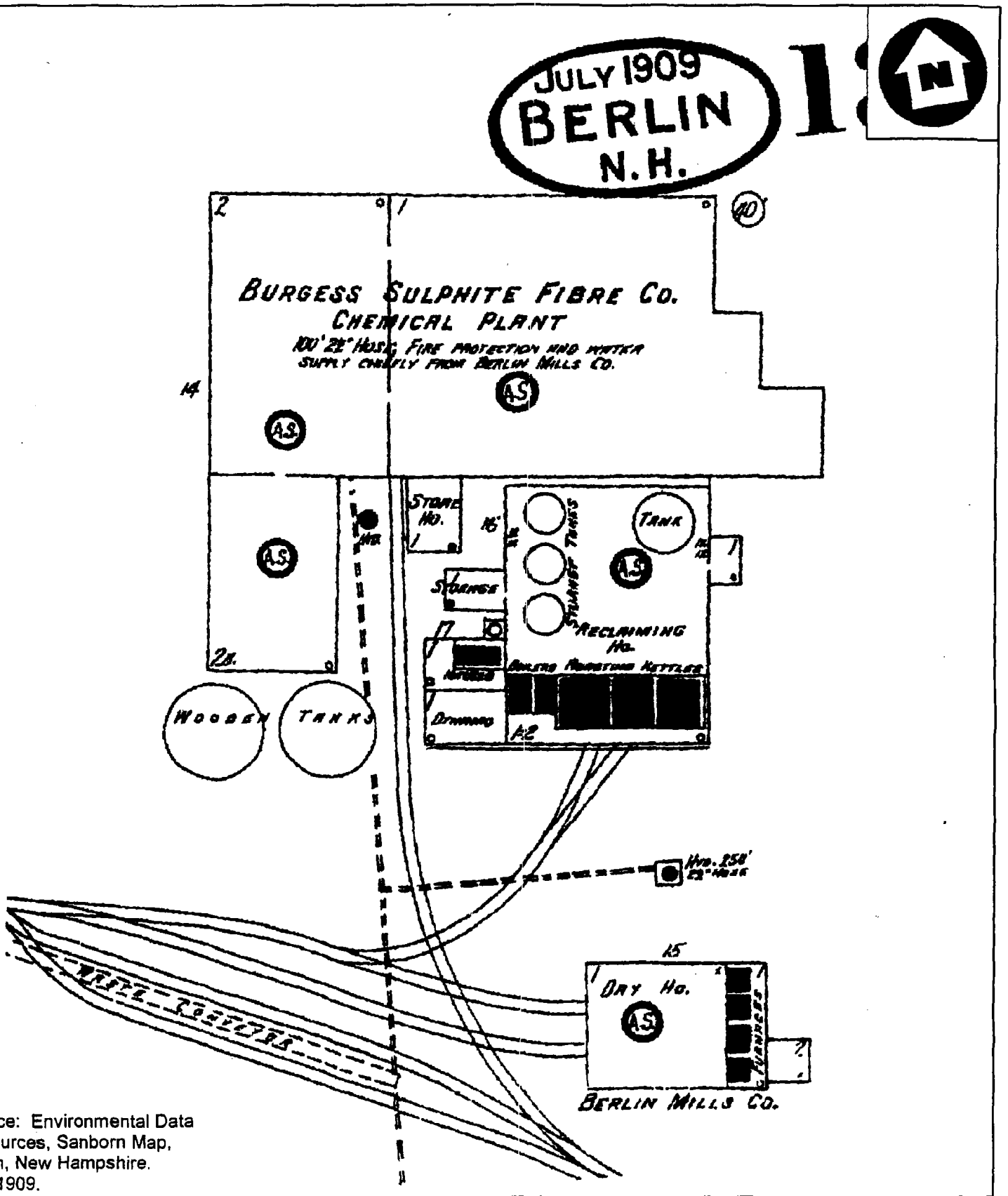
The caustic is cooled and passed through an activated carbon filter to reduce the mercury levels, to a parts per million (ppm) level. The catholyte of the diaphragm cell process produces caustic soda at approximately 12% concentration by weight. If caustic soda is produced for sale, steam for evaporation to concentrate the caustic soda is required [162; 163]. It is unknown to START which electrolytic cell process on the Chlor-Alkali property produced the caustic soda. In 1919, a carbon storage building was present on the Chlor-Alkali property to support the mercury cell process; however, during that time, an evaporating room was also present on the property, indicating the diaphragm process may have continued to be used [19].

According to a July 1909 Sanborn Map, the "Burgess Sulphite Fibre Co. Chemical Plant" located on the Chlor-Alkali property expanded in size (Figure 4). A one-story, approximately 11,250-ft^2 addition was added on to the east side of the approximately 7,400-ft^2 two-story on-site building. In addition, a "Reclaiming Ho." was built south of the addition and measured approximately 7,200 ft^2. The Reclaiming Ho. contained four storage tanks and an area labeled "boilers....kettles." The two wooden tanks are no longer labeled "not used", and the approximately 500-ft^2 "Store Ho.", the "Dry Ho.", and the waste conveyor remain on the property [17].

According to a November 1914 Sanborn Map, the "Burgess Sulphite Fibre Co. Chemical Plant" is now labeled as the "Chemical Plant" on the Chlor-Alkali property (Figure 5). This portion of the Berlin Mills Company property continued to be developed between 1909 and 1914. An approximately 2,700-ft^2 addition, labeled the "Caustic Ho.", is located on the east side of the "Reclaiming Ho." A assumed 12- inch-diameter pipe extends from the "River" (assumed to be the canal) in the northeast portion of the property to the "Caustic Ho.", and an assumed 10-inch diameter-pipe connects the "Caustic Ho." to additional pipes running south through the property and west across the Iron Bridge (the former Covered Bridge illustrated on the 1905 and 1909 Sanborn Maps). In addition, an approximate 5,000-ft^2 "Store Ho." (assumed storage building) was built south of the "Reclaiming Ho.", and an approximately 2,000-ft^2 "Dry Kiln" building is located south of the new storage building. The two former wooden tanks are now labeled as "acid tanks", and railroad tracks still connect the main Chemical Plant building to the property to the south [18].

On 30 November 1917, the Berlin Mills Company and the Burgess Sulphite Fibre Company changed their names to operate under the name of Brown Company [28; 93].

On 20 March 1919, a survey of the Brown Company "Chemical Plant" on the Chlor-Alkali property was conducted by the Plan Department of the Associated Mutual Insurance Co.'s, and a map was produced. According to the map, the northern portion of the Chlor-Alkali property consisted of four two-story cell houses located directly along the eastern bank of the Androscoggin River (Figure 6). These cell houses were built from 1898 to 1917 and contained "chlorine gas cells". A building adjacent to the southernmost cell house was built in 1898 and contained lime and liquor tanks. In addition, there was an evaporation building that contained "evaporators" (southeast of the cell houses); a caustic plant that contained caustic tanks and caustic furnaces (south of the evaporation building); an absorption building (along the river, adjacent to the salt and lime tanks and the "tank ho."); a boiler house (adjacent to the caustic plant) that contained boilers, an ash pit beneath the boilers, and coal; one building that contained brine tanks (southwestern portion of the property); a repair shop (east of the cell houses); a "carbon storage" building (south of the repair shop); a "hydrogen gasometer ho." (east of the cell houses); a "transfer ho." that contained transformers,



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire. July 1909.

HISTORICAL MAP
(SANBORN MAP JULY 1909)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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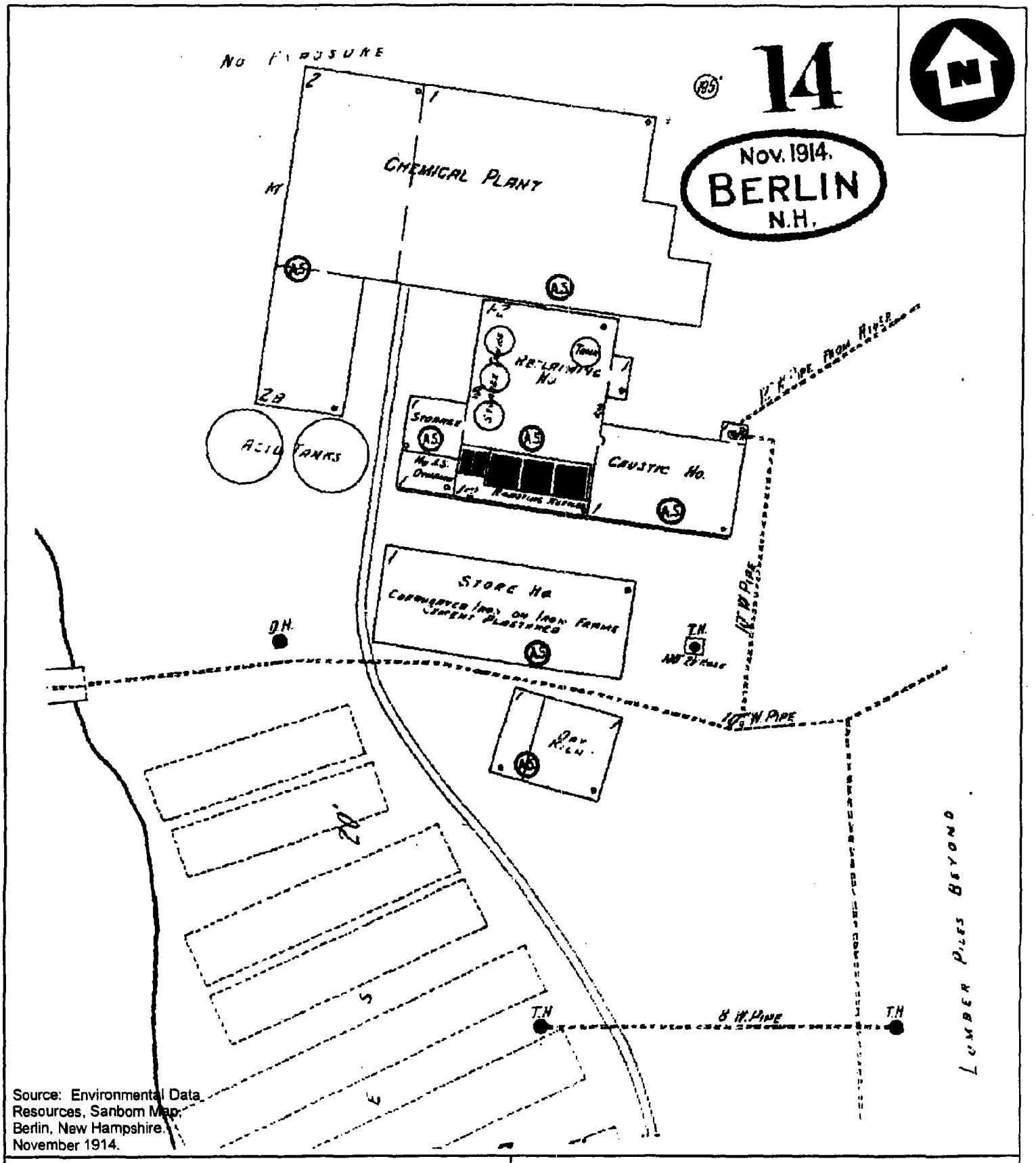
Figure 4



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire, November 1914.

HISTORICAL MAP
(SANBORN MAP NOVEMBER 1914)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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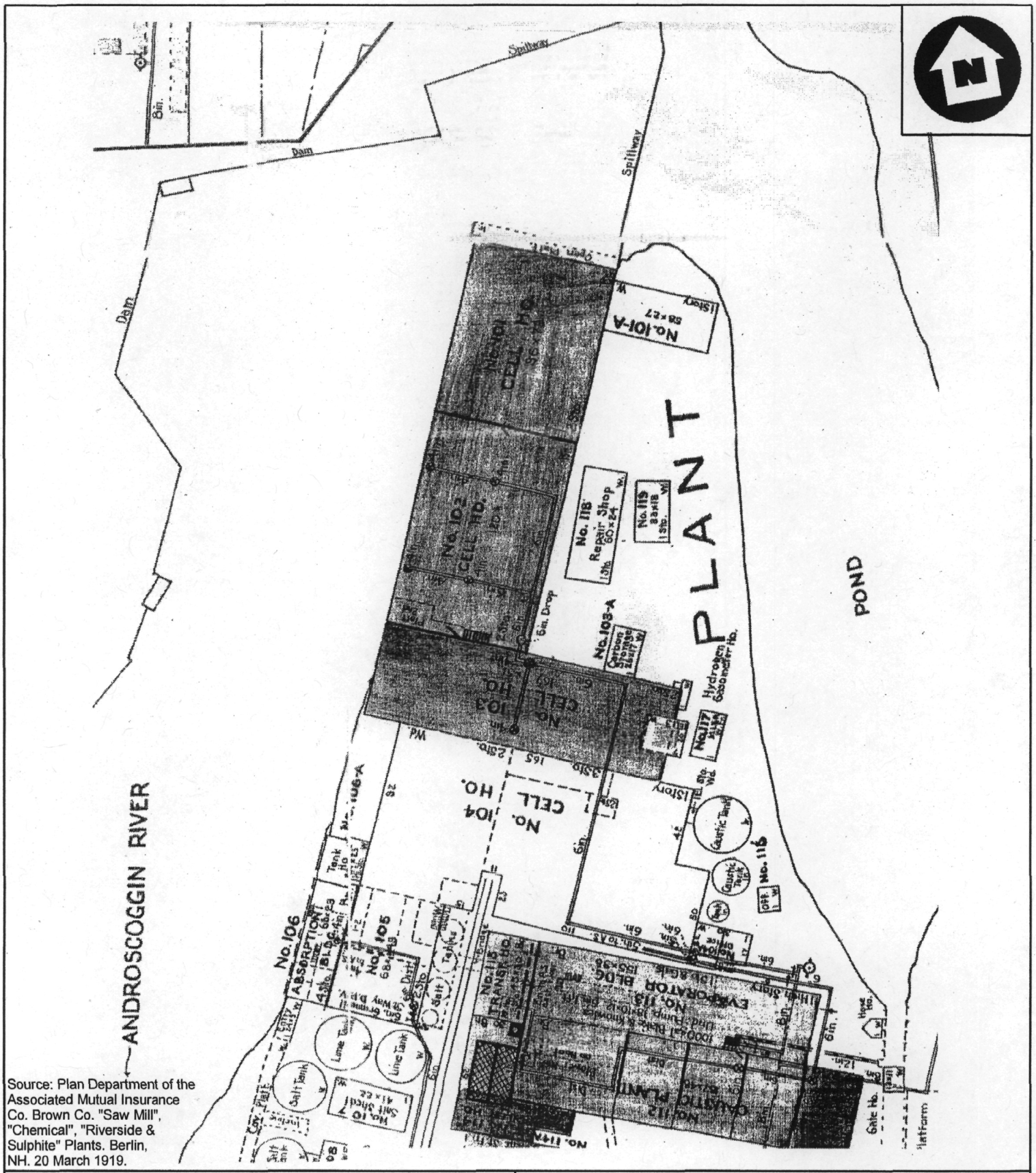
Figure 5



Source: Plan Department of the Associated Mutual Insurance Co. Brown Co. "Saw Mill", "Chemical", "Riverside & Sulphite" Plants. Berlin, NH. 20 March 1919.

HISTORICAL MAP
(SURVEY MAP MARCH 1919)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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Figure 6

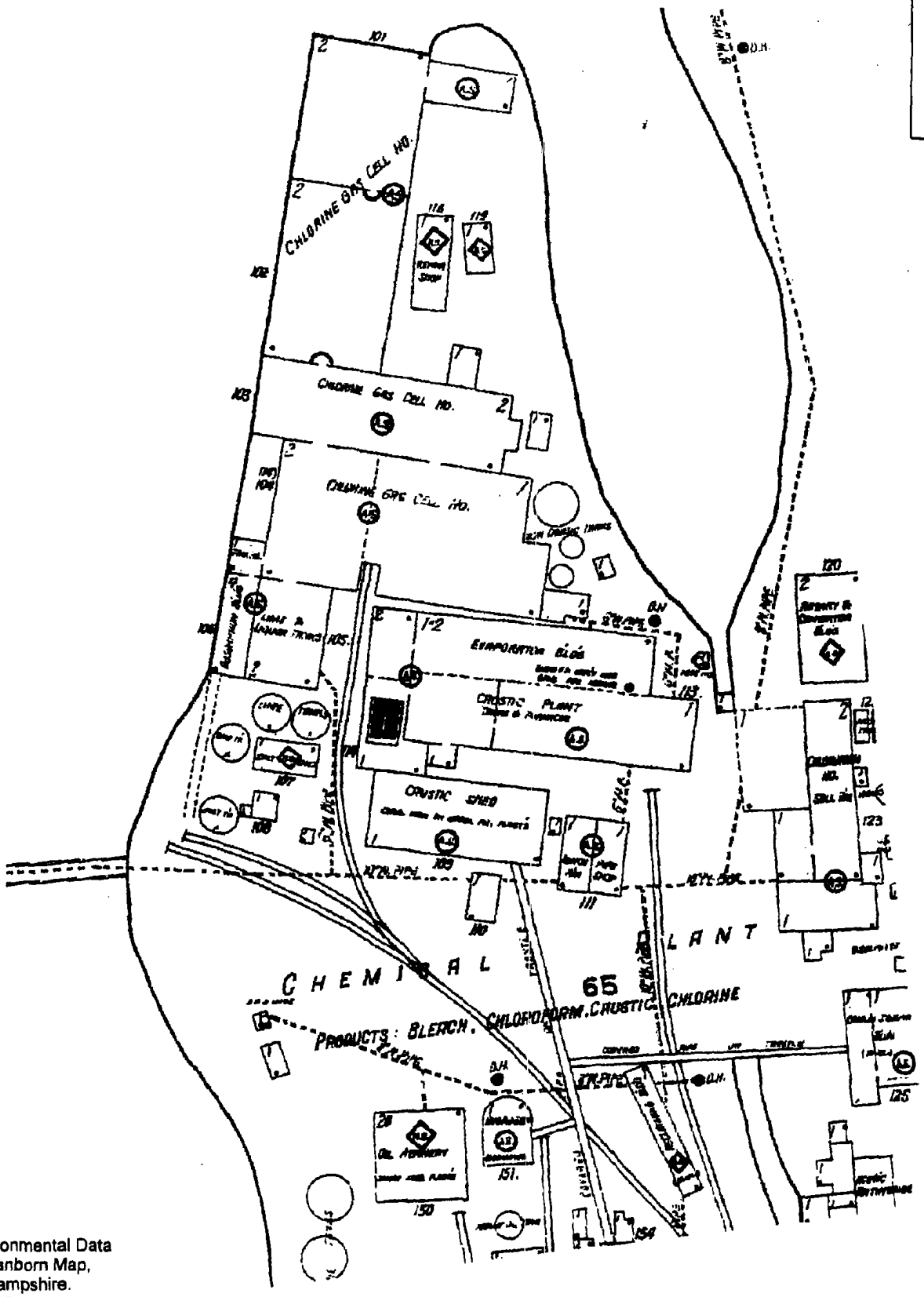
generators, a vacuum pump, and a blower fan (west of the evaporation building); and a "tank ho." (along the river, north of the absorption building). In addition, there was a salt shed, a building containing brine tanks, and several salt and lime tanks located along the eastern property boundary along the Androscoggin River. Caustic tanks were located along the eastern property boundary.

East of the canal, beyond the current eastern Chlor-Alkali property boundary, was a "chloroform" building that generated chloroform; a chloroform tank of unknown size; two 10,000-gallon alcohol tanks; a rotary converter building; and a building for "caustic storage" [19]. The structures on the southern portion of the Chlor-Alkali property are unknown; the map used as a reference is incomplete. It should be noted that in March 1919, the Sawmill Dam is documented as present along the Androscoggin River. According to details provided on the survey map, "raw stock" on the Chemical Plant property included salt, sulphur, lime, charcoal, chemicals, and peanut oil; and "products" included bleach, chloroform, caustic, chlorine, acetone, chemicals, and vegetable fats. Power used on the Chemical Plant property was generated by water and electric transmission, and the fuel used was coal. In addition, the roofs of the buildings were constructed of wood (planks, beams, and timber), reinforced concrete, steel trusses, and "asbestos protected metal"; and the floors were constructed of wood (planks, beams, and timber), reinforced concrete, and iron plates. In March 1919, 200 employees reportedly worked at the chemical plant on day and night shifts [19].

According to a December 1920 Sanborn Map, the northern portion of the Brown Company Chemical Plant located on the Chlor-Alkali property remained the same as illustrated on the March 1919 map (Figures 6 and 7). The southern portion of the property contained a caustic shed and a building labeled "pipe shop". In addition, the map illustrates an assumed 6-inch-diameter pipe connecting the lime and liquor tank building to an assumed 10-inch-diameter pipe that extended east-to-west across the Chlor-Alkali property. This assumed 10-inch-diameter pipe also extended to the chloroform building east of the canal and west across the bridge to the western side of the Androscoggin River. It appeared that railroad tracks ran through the Chlor-Alkali property, and two covered pipes were located on trestles that connected the caustic shed and two unknown buildings to the south and east. In addition, a building labeled as "hydrogen gasometer", an oil refinery building, and several other unlabeled buildings were located south of the caustic shed and cell house area. Chemical Plant products listed on the map are bleach, chloroform, caustic, and chlorine [20].

In 1922, over 600 Le Sueur electrolytic cells with Acheson graphite and 160 Allen-Moore electrolytic cells with improved unsubmerged diaphragms were used at the Chemical Mill [3, p. 9]. START attempted to determine what type of cell contains "unsubmerged diaphragms"; however, this information could not be ascertained.

According to a 14 January 1922 map and index of buildings at the "Chemical Mill" of the Brown Company, the following buildings were located on the Chlor-Alkali property: six cell houses, two buildings for carbon storage, an office, a lime slacking room, two buildings for hydration, a salt shed, a building containing salt tanks, an office, a hydrogen gasometer house, two repair shops, a caustic shed, two storage rooms, a kettle room, an evaporating room, a boiler house, a pump house, and a transfer house. The index also described the buildings' roof and construction materials as consisting of tar, gravel, brick, concrete, and steel [23].



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire. December 1920.

HISTORICAL MAP
(SANBORN MAP DECEMBER 1920)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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E:\Arc_aprs\Start2\Chlor-Alkali.apr	Figure 7

According to a May 1928 Sanborn Map of the Chlor-Alkali property, the property remained the same as illustrated on the 1920 Sanborn Map, with the following exceptions: the addition of a chlorine building located in the southern portion of the current Chlor-Alklai property, adjacent/underneath the covered pipe trestle; an expansion of the caustic shed toward the east; the removal of two unlabeled buildings in the southwestern corner of the property; the removal of a building labeled "pipe shop"; and the removal of a small building attached to the north side of the cell house (south of the repair shop) (Figure 8). In addition, east of the canal, the rotary convertor building became an office, and a building was added east of the chloroform building [21].

In 1935, the Brown Company filed for bankruptcy and was reportedly sold three times from 1935 through 1940 [45]. START attempted to determine to whom the Brown Company was sold during this time. However, this information could not be confirmed.

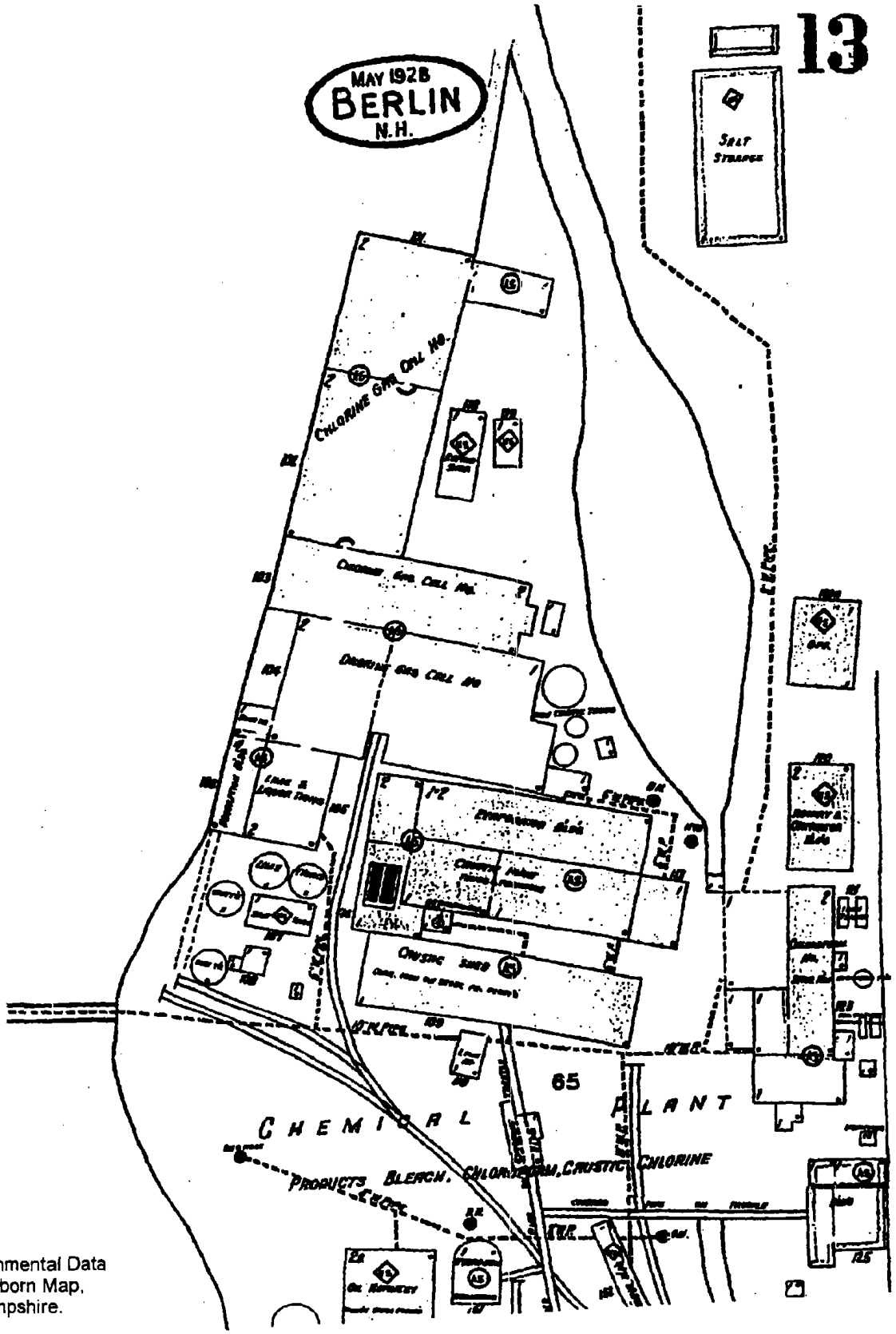
A 1937 USGS topographic map depicts the Chlor-Alkali property with two buildings on site [199]. This information conflicts with historical Sanborn Maps and the 1922 map and building index of the property [19-23].

Photodocumentation of the Chlor-Alkali property in 1937 reveals two different types of cells located within cell house buildings on the Chlor-Alkali property (Attachment A, Photographs 1 and 2) [182-183]. One photograph is labeled as "Show room series (Watt)"[183]. It is unknown to START whether "Watt" is the name of the photographer, or if it is referring to Charles Watt, who obtained an English patent in 1851 for producing chlorine by the electrolytic cell process [184]. START attempted to confirm the types of cells shown within these pictures; however, this information could not be ascertained.

An October 1937 Brown Company photograph labeled as "Chemical Mill" is assumed by START to have been taken on the Chlor-Alkali property (Attachment A, Photograph 3). The photograph captures several workers rolling 55-gallon drums labeled as "1,000 lbs Chloroform Anaesthetic" into a rail car for shipment [186]. This may illustrate how chloroform was produced by the Brown Company and sold as an anaesthetic.

A 1942 USGS topographic map depicts the Chlor-Alkali property with only two buildings on site [199]. This information conflicts with Sanborn Maps and the building index of the property [19-23].

From August to November 1949, photographs document the construction of the Sawmill Dam along the Androscoggin River, located immediately upstream of the Chlor-Alkali property (Attachment A, Photographs 4 through 8). Soil and/or sediment was moved into the current river channel to construct an unpaved road along the eastern bank, adjacent to the cell houses. In addition, soil and/or sediment was moved to construct a road and working platform located adjacent to the current Sawmill Dam falls, west of the Chlor-Alkali site. The river channel was narrowed, and a wooden bridge connected the unpaved road along the east bank of the river to the road and working platform adjacent to the Sawmill Dam. Trucks, construction materials, and a crane moving soil/sediment are documented within the photographs. A 11 November 1949 photograph depicts the completed Sawmill Dam (Attachment A, Photograph 9) [189-193]. START assumes the dam was built by the Brown Company.



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire. May 1928.

HISTORICAL MAP
(SANBORN MAP MAY 1928)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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Figure 8

A photograph dated 22 May 1950 shows Cell House No. 6 on the Chlor-Alkali property with "Hooker cells" located within the building (Attachment A, Photograph 10) [181]. Hooker cells are diaphragm cells that typically used asbestos diaphragms [44].

Photodocumentation of the Chlor-Alkali property in April 1951 reveals the cell house buildings located flush against a concrete retaining wall along the western property boundary and the Androscoggin River (Attachment A, Photograph 11). One outfall drain pipe, shown in the photograph, is active and draining directly into the river. Debris piles are located along the riverbank and slope directly up the concrete retaining wall to the first-floor windows of the cell house building [185]. START is unable to determine the contents of the debris piles from the photographs. June and July 1951 photographs depict construction taking place along the western exterior of one of the cell house buildings located directly along the river. The water level of the river is relatively low; and wooden scaffolding extends into the river, and is attached to one of the cell houses (Attachment A, Photographs 12 and 13) [187-188].

Reportedly, the Brown Company ceased operations in the early 1950s [13, p. 2-1].

According to a Sanborn Map revised in 1955, the Chlor-Alkali property remained the same as illustrated on the December 1928 Sanborn Map, with the exception of the removal of the following: the caustic shed, the repair shop, a suspected lime storage building, a building labeled as "hydrogen gasometer", the oil refinery building, the railroad tracks that led to the cell houses, and the covered pipes on the trestles. In addition, several buildings were constructed in the southeastern portion of the property; however, their use is unknown (Figures 8 and 9) [22].

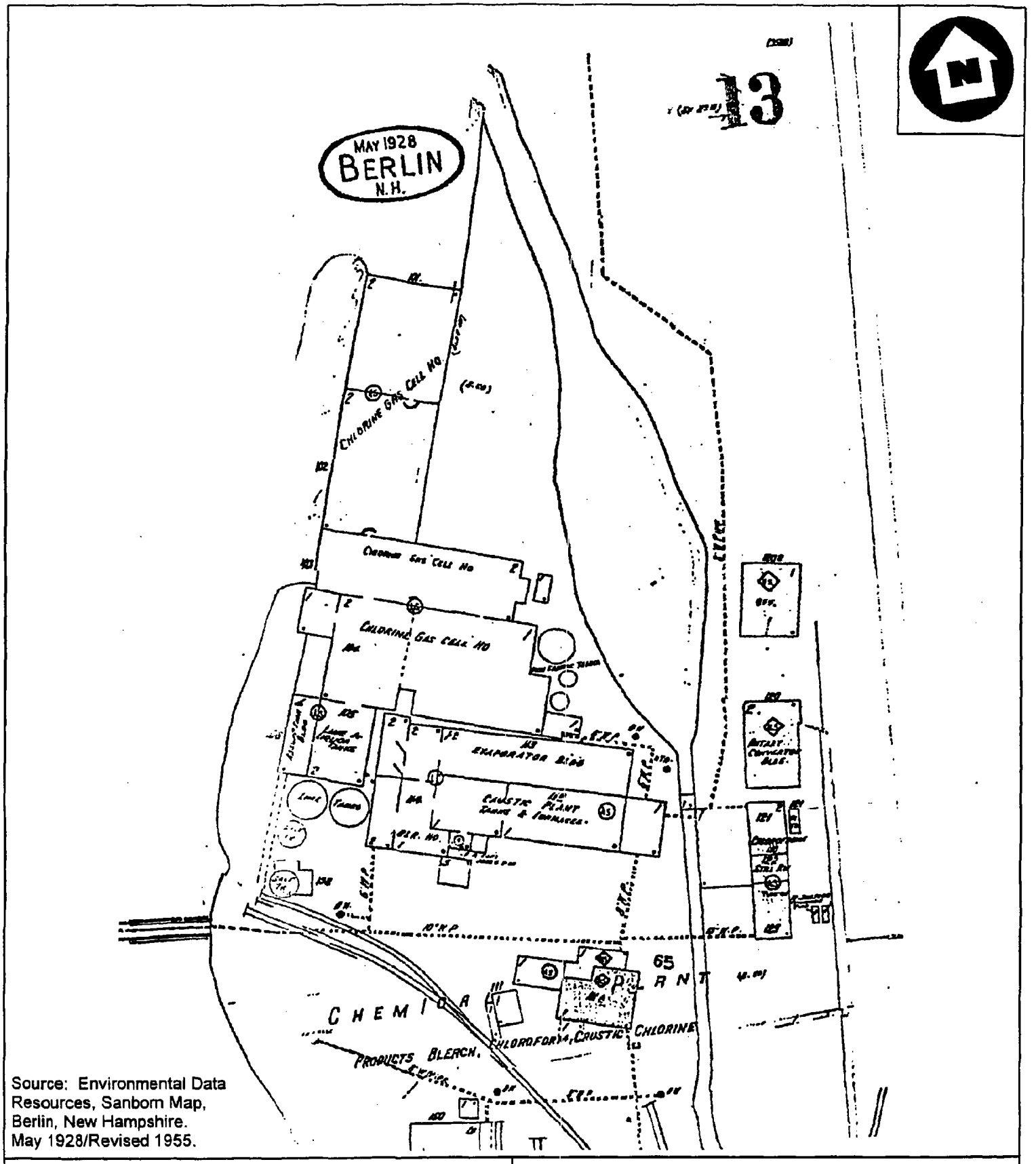
According to an interview with a Brown Company former employee, the cell house operation was shut down in 1962 and the majority of the buildings were demolished in 1963 [55].

In 1967, Gulf Western reportedly purchased the Brown Company [45]. However, START was unable to confirm this purchase at the Coos County Registry of Deeds.

On 8 December 1980, the Brown Company merged with James River Delaware, Inc. This transaction gave James River Delaware, Inc. "...full title to the property of the Brown Company in New Hampshire..." [29; 30].

On 8 December 1980, James River Corporation of Virginia purchased all James River Delaware, Inc.'s property in the State of New Hampshire [31].

On 10 December 1981, a spill of approximately 4,000 gallons of "caustic" occurred at an undisclosed location at the "Burgess Pulp Mill" and was reported to the New Hampshire Water Supply and Pollution Control Commission. START suspects "Burgess Pulp Mill" refers to the James River Corporation of Virginia property that includes the Chlor-Alkali site. The spill area was sealed off and contained with sawdust. It is estimated that approximately 1,000 to 2,000 gallons of the caustic was released to the Androscoggin River via the storm sewer system. The pH of the Androscoggin River was tested at the Mason Street Bridge (pH 6.4), Shelburne Village (pH 7.1), and at Gorham P.S. Dam (pH 8.2). In addition, the flow of the Androscoggin River was measured as 2,640 cubic feet per second, and there was no evidence of fish kill reported [48].



Source: Environmental Data Resources, Sanborn Map, Berlin, New Hampshire. May 1928/Revised 1955.

HISTORICAL MAP
(SANBORN MAP MAY 1928/REVISED 1955)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS
Restoring Resource Efficiency
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

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Figure 9

On 22 December 1981, a release of approximately 200 to 300 pounds of liquid chlorine on the second floor of the "Bleach Plant" occurred [47]. It unknown to START whether the Bleach Plant was associated with the Chlor-Alkali property. *There is no further information regarding this release* in available file information.

On 28 June 1985, James River Corporation informed NH DES that they reorganized their subsidiaries, including James River-Berlin/Gorham, Inc., into James River Paper Company, Inc.; a subsidiary of James River Corporation. However, the plant located in Berlin would continue to operate under the name James River-Berlin/Gorham, Inc. [46].

On 22 August 1995, Crown Paper Co. purchased James River Paper Company, Inc. property located in Berlin, Gorham, and Success, NH [32].

On 17 December 1996, a release of caustic soda to the groundwater occurred at the Crown Vantage, Inc. property (assumed by START to be a subsidiary of Crown Paper Co.) between the Alpha Plant (part of the Bleach Plant) and the Pulp Dryer building. It is unknown to START whether the Bleach Plant was associated with the Chlor-Alkali property. Due to a reported caustic soda release 1 to 2 years earlier, the groundwater around the caustic soda tank was monitored "routinely". The pH was normally 10 units, however, following this release, groundwater indicated a pH of 13 units. Potential sources of the caustic soda release include two caustic storage tanks, caustic delivery pumps, a caustic rail car delivery area, and floor-drains in the Bleach Plant building. In addition, a caustic rail car was unloaded prior to the increase in pH. On 19 December 1996, an acid release with a pH of 2.6 units was discovered during the continued monitoring and investigation of the source of the caustic release. An acid rail car had unloaded prior to this decrease in pH. Crown Vantage Inc. conducted an investigation to discover/locate any leaks in the sewer system and the caustic unloading drain line; rebuilt the caustic pumps; and sealed the concrete floor around the caustic and acid pumps up to the floor-drain to eliminate any chemical release through the floor. A correlation appeared to exist between the caustic/acid rail car unloading and the changes in pH. On 31 December 1996, Crown Vantage, Inc. reported they "reduced the severity of the pH swings", and would continue to monitor the pH, and conduct an internal inspection of the caustic tanks [5; 6]. According to an Environmental Engineer at Crown Vantage, Inc., the releases were caused mainly by a floor-drain in the wastewater treatment outflow building [7].

In May 1997, Crown Vantage requested from the Surface Water Quality Bureau of the New Hampshire Water Supply and Pollution Control Division to have their Resident Fish Monitoring removed from their National Pollutant Discharge Elimination System (NPDES) permit. The letter indicates that dioxin concentrations in trout and hornpout caught in the Shelburne Dam area in Shelburne, NH, ranged from 2.5 to 4.5 parts per trillion (ppt), prior to May 1994. In May 1994, after the mill converted to Elemental-Chlorine Free (ECF) by eliminating liquid chlorine, dioxin levels in fish decreased, with concentrations ranging from nondetectable to 0.61 ppt. However, in 1996, dioxin concentrations in fish increased [108].

On 5 March 1998, a "white liquor" spill was reported to the NH DES Waste Management Division [8]. According to Crown Vantage, approximately 85 to 100 gallons of a 10% solution of "white liquor", an aqueous solution of sodium hydroxide, sodium carbonate, and sodium sulfide used for digesting wood chips in the kraft pulping process, spilled in the Lime Kiln building at the Crown Vantage, Inc. facility. The exact location of this spill was not available in file information.

Approximately 5 to 10 gallons reached a catchbasin on Unity Street which is connected via piping to the Androscoggin River. Actions taken or reportedly scheduled included the following: installation of "curbing" on the door through which the materials were released, reinforcing the standard operating procedure for locking out the causticizer drain, and establishing a dike at the fence-line along Unity Street in the future [9].

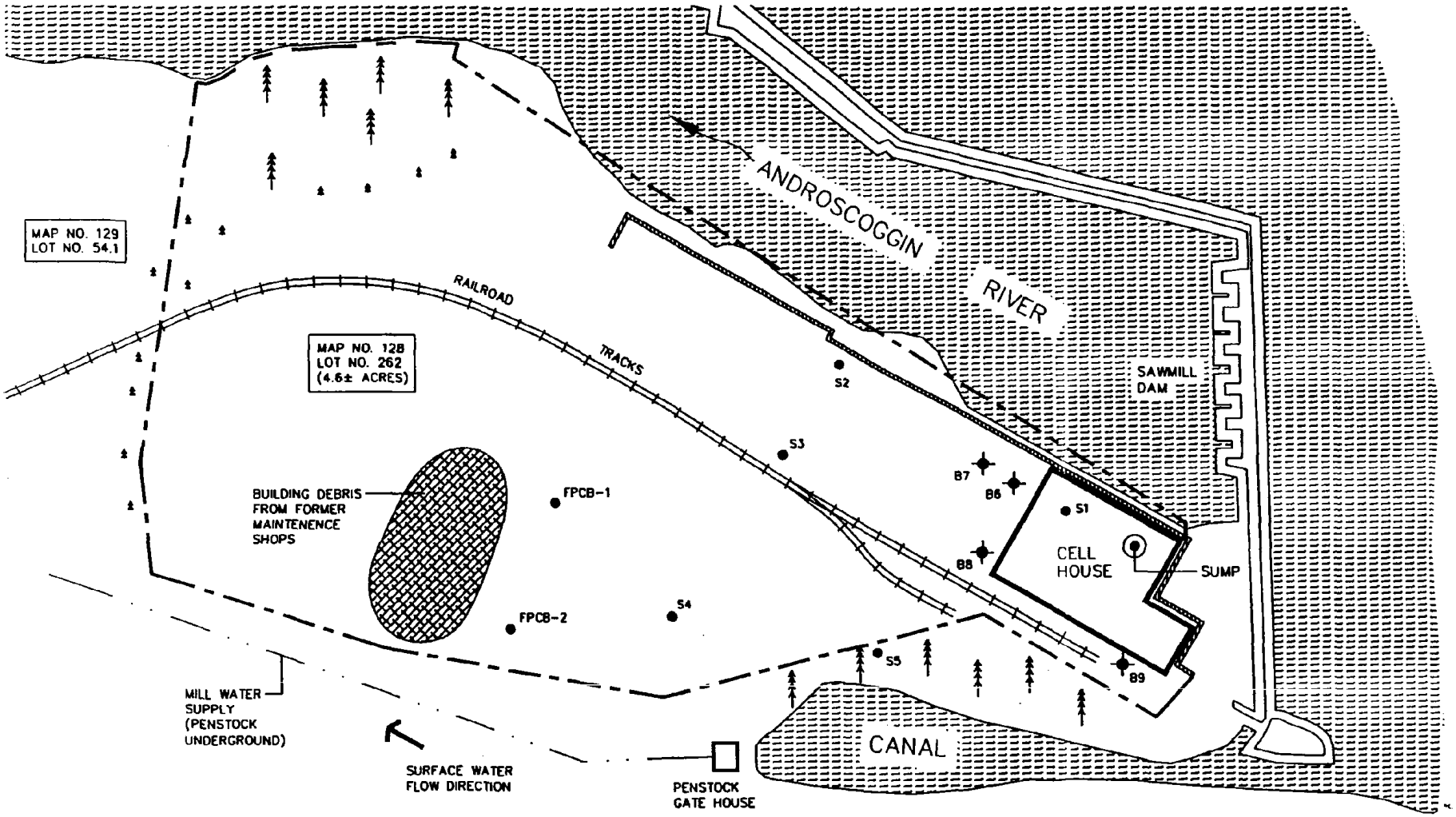
On 24 March 1999, an Asset Purchase Agreement was signed in which Crown Paper Co., Crown Vantage New Hampshire Electric Inc., and Berlin Mills Railway, Inc. sold the pulp and paper mills located in Berlin and Gorham, NH and related hydroelectric generating facilities and landfill to American Tissue Holdings, Inc. and Pulp & Paper of America LLC (also referred to as Pulp and Paper of America, LLC; Pulp of America LLC; and Pulp of America in reference documents) [75; 134].

In 1999, Tighe & Bond Consulting Engineers Environmental Specialists (Tighe & Bond) conducted a Limited Environmental Assessment (LEA) of the Crown Vantage Pulp & Paper Mills in Berlin and Gorham, NH, on behalf of American Tissue Corporation (American Tissue) of Waterford, New York (a subsidiary of American Tissue Holdings, Inc.) [10; 12; 134]. Tighe & Bond reported one remaining "Cell House" on the Chlor-Alkali property. The Cell House was a brick building, measuring approximately 76 feet by 96 feet. The basement of the Cell House had a concrete floor with floor-drains and sumps that reportedly led to the river, and an outfall pipe located on the west side of the building. In addition, remains of other former buildings on the Chlor-Alkali building were still present at the time of the LEA, including building and tank foundations [10, p. 4-20].

On 31 March 1999, as part of the LEA, Tighe & Bond collected two soil samples from two floor sumps located in the Cell House and one sample of a sandblast material from the Cell House area. Analytical results indicated the presence of three Toxicity Characteristics Leaching Procedure (TCLP) metals (cadmium, lead, and mercury) and two total metals (lead and mercury) in the two soil samples collected from the floor sumps; and one TCLP metal (lead) and two total metals (lead and mercury) in the sample of the sandblast material [10, p. 5-2, and Table 5-2]. Refer to the Waste/Source Sampling section of this report for a detailed description of sampling and analytical results.

On 6 and 7 April 1999, as part of the LEA, Tighe & Bond collected nine surficial soil samples {FPCB-1, FPCB-2, S-1 [6 inches ( )], S-1 (24), S-2 through S-5, and Sump Conf.} to assess the vertical and horizontal extent of lead and mercury contamination on the Chlor-Alkali property (Figure 10). Analytical results of the samples indicated the presence of seven volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), lead, mercury, and total petroleum hydrocarbons (TPHs) [10, p. 5-5, Table 6-3]. Refer to the Waste/Source Sampling and Soil Exposure Pathway sections of this report for a detailed description of sampling and analytical results.

On 7 April 1999, as part of the LEA, Tighe & Bond advanced four soil borings (B-6 through B-9) along the south and east sides of the Cell House, and collected one "confirmatory" sample from each soil boring (Figure 10). Based on field observations, three additional samples (B-7 S-3, B-8 S-4, and B-9 S-3) were collected from the soil/groundwater interface. Analytical results of the soil boring samples indicated the presence of TPHs, 10 VOCs [acetone, benzene, 2-butanone, chloroform, ethylbenzene, methylene chloride, tetrachloroethene (PCE), toluene, trichloroethene (TCE), and xylene], and two metals (lead and mercury) [10, p. 5-2, 5-3, Table 6-2]. Refer to the Waste/Source Sampling and Soil Exposure Pathway sections of this report for a detailed description of sampling and analytical results.



SOURCES: WESTON MANCHESTER
SITE PLAN – FORMER CHLOR-ALKALI FACILITY
DES NO. 199707046
MARCH 2004

WESTON/START FIELD BOOK NO. 01245-S FOR
CHLOR-ALKALI FACILITY (FORMER) – 2004

NOT TO SCALE

TIGHE & BOND, CONSULTING ENGINEERS
CELL HOUSE SOIL DELINEATION PROJECT
CROWN PARER
JUNE 1999

LEGEND

- PROPERTY LINE
- RETAINING WALL
- INDICATES DIRECTION OF SURFACE WATER FLOW
- SURFACE SOIL SAMPLE LOCATION
- SOIL BORING LOCATION
- WOODED AREA
- SHRUBS/ BRUSH

SITE SKETCH

HISTORICAL SOIL BORING AND SURFACE SOIL SAMPLING LOCATIONS (TIGHE & BOND – APRIL 1999)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS®
REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
04-05-0205	W. SHAW	12/13/04

FILE NAME: S:\04050205\04010001\FIGURES\FIG7.DWG

FIGURE 10

On 7 April 1999, as part of the LEA, Tighe & Bond collected one groundwater sample from soil boring B-7 located on the south side of the Cell House, in front of the lower garage door. The groundwater sample (B-7 5′-7′) was collected from the soil boring using a 2-inch diameter dedicated disposable bailer through the center of the hollow-stem auger. A petroleum sheen was observed in the groundwater. Analytical results of the groundwater sample indicated the presence of TPHs, 18 VOCs, lead, and mercury [10, p. 5-4, Table 6-1]. Refer to the Groundwater Pathway section of this report for a detailed description of sampling and analytical results.

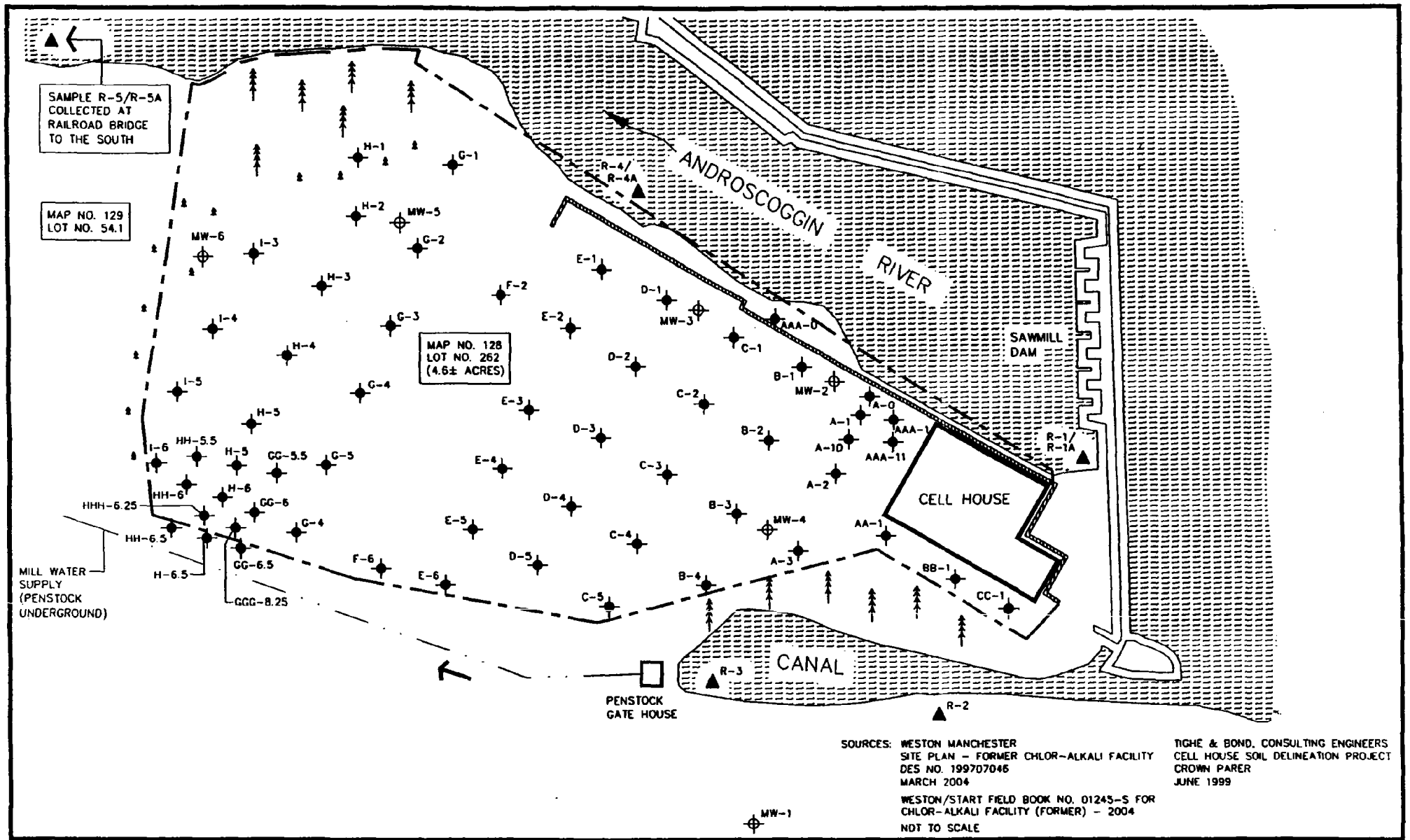
From 28 April through 30 April 1999, Tighe & Bond advanced a total of 42 borings to refusal across a 60-foot by 60-foot grid on the Chlor-Alkali property (Figure 11) [13, p. 3-1 and Appendix A; 91]. Soil samples were collected from these borings to visually classify the soils and conduct chemical analyses. Analytical results of the soil samples indicated the presence of four VOCs, two PCBs, and eight metals [13, p. 3-1, Appendix C]. Refer to the Waste/Source Sampling and Soil Exposure Pathway sections of this report for a detailed description of sampling and analytical results.

On 30 April 1999, presumably on behalf of Crown Vantage, Tighe & Bond collected five surface water samples (R-1 through R-5) in the vicinity of the Chlor-Alkali property (Figure 11). It is unknown to START why water sample R-2 is depicted on land on Tighe & Bond's map. No metals were detected above the laboratory detection limits for lead [10 micrograms per liter (μg/L)] and mercury (0.2 μg/L) [13, Apprendix E]. Refer to the Surface Water Pathway section of this report for a detailed description of sampling and analytical results.

On 13 and 14 May 1999, Maine Test Borings, Inc. of Brewster, Maine, under direction of Tighe & Bond, advanced six soil borings, and completed them as 2-inch-diameter overburden monitoring wells (MW-2 through MW-6) on the Chlor-Alkali property and a monitoring well (MW-1) off site to the east of the Chlor-Alkali property (Figure 11). The wells were installed using hollow-stem augers, and the depth of the monitoring wells ranged from 5.5 feet to 17.2 feet [assumed below ground surface (bgs)]. Surficial and subsurface soil samples were collected from the borings. Analytical results of the soil samples indicated the presence of lead and mercury [13, p. 3-1, Appendix C]. Refer to the Waste/Source Sampling and Soil Exposure Pathway sections of this report for a detailed description of sampling analytical results.

On 17 and 18 May 1999, Tighe & Bond advanced 17 additional soil borings to refusal on the Chlor-Alkali property. The objective of this investigation was to classify the soil and collect samples for chemical analyses [13, p. 3-1]. However, START was unable to determine the locations from which the soil samples were collected or the analytical results for these sample in available file information.

On 18 May 1999, Crown Vantage, Inc., outlined an agreed upon, proposed solution with NH DES to remediate the Chlor-Alkali property, including the following actions: declare the approximate 4-acre area an existing construction debris and demolition landfill; cap the landfill; remove contaminated soils that would be in contact with future groundwater levels; demolish the Cell House; install six groundwater monitoring wells for long-term monitoring; install a barrier to prevent the migration of the penstock intake pond through the area as groundwater; and set forth deed restrictions on future use of the area [11].



SOURCES: WESTON MANCHESTER
SITE PLAN – FORMER CHLOR-ALKALI FACILITY
DES NO. 199707046
MARCH 2004

WESTON/START FIELD BOOK NO. 01245-S FOR CHLOR-ALKALI FACILITY (FORMER) – 2004

NOT TO SCALE

TIGHE & BOND, CONSULTING ENGINEERS
CELL HOUSE SOIL DELINEATION PROJECT
CROWN PARER
JUNE 1999

LEGEND

- PROPERTY LINE
- RETAINING WALL
- INDICATES DIRECTION OF SURFACE WATER FLOW
- SURFACE WATER SAMPLE LOCATION
- SOIL BORING LOCATION
- OVERBURDEN MONITORING WELL
- WOODED AREA
- SHRUBS/ BRUSH

SITE SKETCH

HISTORICAL SOIL BORING AND SURFACE WATER SAMPLING LOCATIONS (TIGHE & BOND – APRIL THROUGH JUNE 1999)

CHLOR-ALKALI FACILITY (FORMER) BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS®

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
04-05-0205	W. SHAW	12/10/04

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FIGURE 11

On 27 May 1999, Tighe & Bond advanced 19 soil borings on site to further delineate lead and mercury contamination surrounding two soil borings (A-1 and H-6) advanced by Tighe & Bond in April 1999 (Figure 11). Both surficial and subsurface soil samples were collected from these soil borings. Analytical result of the soil samples indicated the presence of lead, mercury, and TPHs [13, Appendix C Table AAA, Figure 6]. Refer to the Waste/Source Sampling and Soil Exposure Pathway sections of this report for a detailed description of sampling and analytical results.

On 1 June 1999, Tighe & Bond, presumably on behalf of Crown Vantage, collected three surface water samples (R-1A, R-4A, and R-5A) in the vicinity of the Chlor-Alkali property (Figure 11). Analytical results of the surface water samples indicate that no metals were detected above their laboratory detection limits [13, Appendix E]. Refer to the Surface Water Pathway section of this report for a detailed description of sampling and analytical results.

On 1 June 1999, Tighe & Bond collected six groundwater samples from overburden monitoring wells MW-1 through MW-6 (Figure 11). Analytical results indicated the presence of seven VOCs (chloroform; cis-1,2-dichloroethene; p-isopropylene; naphthalene; PCE; TCE; and vinyl chloride) and three metals (barium, lead, and mercury) [13, Appendix D]. Refer to the Groundwater Pathway of this report for a detailed description of sampling and analytical results.

On 17 June 1999, Tighe & Bond collected five sediment samples (SED-1 through SED-5) in the vicinity of the Chlor-Alkali property along the Androscoggin River and one groundwater seep sample (SEEP-1) along a bedrock outcrop southwest of the Chlor-Alkali property. There is no map available illustrating these sample locations in the file information obtained by START. Analytical results indicated the presence of lead and mercury in the sediment samples and the presence of mercury in the groundwater seep sample [13, Appendix F; 52]. Refer to the Waste/Source Sampling and Groundwater Pathway sections of this report for a detailed description of sampling and analytical results.

On 23 June 1999, Pulp of America LLC purchased the "Burgess Mill Area" in Berlin, NH and other parcels of land located in Berlin, Gorham, and Milan, NH from Crown Paper Co. [33]. Reportedly, on 9 July 1999, American Tissue purchased the Crown Vantage, Inc. pulp mill in Berlin, NH and paper mill in Gorham, NH [12].

From 7 July to 9 July 1999, Maine Test Borings, Inc. of Brewster, Maine, under direction of Tighe & Bond, installed three 2-inch-diameter bedrock monitoring wells (MW-7 through MW-9) on the Chlor-Alkali property (Figure 2) [13, p. 3-1, Appendix A].

On 19 July 1999, on behalf of Crown Vantage, Sevee & Maher Engineering, Inc. (Sevee) conducted a groundwater elevation survey of the Chlor-Alkali property using overburden monitoring wells MW-1 through MW-6 and bedrock monitoring wells MW-7 through MW-9, two elevation points along the Androscoggin River, and an elevation point in the canal located east of the Chlor-Alkali property. Based on these results, Sevee reported that groundwater flows radially away from the canal, and west and southwest toward the Androscoggin River. In addition, based on the water level measurements, the "...vertical gradients" at the site are "...strong in a downward direction" [13, p. 3-2].

In August 1999, Sevee submitted a Final Draft Conceptual Design Report to NH DES as part of the Crown Vantage Cell House Remediation Project. The objectives of the remediation were to minimize the off-site migration of mercury and lead from the property and to prevent human exposure to wastes present on the site surface. Sevee proposed a landfill liner to eliminate direct exposure to waste on the surface (*e.g.*, asbestos and asbestos-containing products) and to reduce the infiltration of precipitation; a vertical impermeable subsurface barrier to prevent the off-site migration of potentially contaminated groundwater and to divert groundwater from entering the property; sediment removal along the shores of the Androscoggin River; and long-term groundwater monitoring. In addition, Sevee recommended all pipes and other openings that discharged to the Androscoggin River in the vicinity of the Chlor-Alkali property be sealed; the demolition of all on-site buildings; and the construction of a utility road [13, pp. 6-2 - 8-3].

On 10 August 1999, on behalf of Crown Vantage, Sevee collected groundwater samples from monitoring wells MW-1, MW-2, MW-4, MW-4A, MW-5 through MW-9, MW-10A and MW-10B. Analytical results indicated the presence of lead and mercury in the groundwater samples. In addition, in August and October through December 2000, water level depths were recorded for the canal, MW-1 through MW-9, MW-10A, MW-10B, and piezometers P-4A, P-11 through P-22, and SP-1 through SP-3 [71]. Information regarding the installation of monitoring wells MW-4A, MW-10A, and MW-10B, and piezometers P-4A, and P-11 through P-22 was not found in available file information obtained by START. Refer to the Groundwater Pathway of this report for a detailed description of groundwater analytical results.

On 18 August 1999, Pulp and Paper of America, LLC submitted a Site Specific Application (No. 990823-01) to NH DES regarding the closure of the Cell House area [56; 58]. In a letter to NH DES dated the same day, the Environmental Director of Crown Vantage explained that the application for the Site Alteration Permit for closure of the property was listed under Pulp and Paper of America, LLC, but was being conducted by Crown Vantage with Sevee as the lead consultant [57]. START assumes the Site Specific Application and the Site Alteration Permit are the same documents.

On 25 August 1999, on behalf of Crown Vantage, Sevee submitted a report entitled "Erosion and Sedimentation Control Plan for Cell House Remediation Project" to NH DES. The plan outlines existing and proposed drainage facilities and erosion control measures for the Chlor-Alkali property. The letter states that there are no native soils on the Chlor-Alkali property. The soil consists of fill, including gravel, brick, demolition debris, and ash [58].

In August 1999, Pulp & Paper of America submitted a Notification of Demolition and Renovation to NH DES for the Cell House. Using a polarized light microscopy dispersion staining method to detect the presence of asbestos, an asbestos contractor (Morrissey Enterprises of Lewiston, Maine) proposed to remove approximately 3,500 ft^2 of asbestos roofing material from the Cell House. The asbestos-containing material was proposed to be disposed by Normandeau Trucking, Inc. of Groveton, NH at the Pulp & Paper of America Mt. Carberry Landfill in Success, NH. Once the removal was complete, the Cell House would be demolished by a contractor [60].

On 30 August 1999, NH DES issued Pulp & Paper of America RSA 485-A:17 Site Specific Permit No.WPS-5420 [59]. START assumes this permit refers to Pulp and Paper of America's Site Specific Application No. 990823-01, submitted on 18 August 1999 [56; 58].

On 30 August 1999, the City of Berlin Fire Department granted Pulp & Paper of America, LLC Demolition Permit No. 207/D to demolish the approximately 80-foot by 100-foot Cell House located in the northern portion of the Chlor-Alkali property [61].

From 8 to 15 September 1999, Morrissey Enterprises removed asbestos roofing material from the Cell House roof located on the Chlor-Alkali property. Eleven samples of the Cell House's roof material (roofing paper or roofing cement) were collected, and eight samples were analyzed for asbestos. Analytical results indicated the presence of chrysotile in one layer of roofing paper (five to six layers encountered), and cellulose and glass fibers [88]. Air samples were collected during the roofing removal and analyzed for asbestos. The maximum concentration detected was less than 0.003 fibers per cubic centimeter of air [60]. Refer to the Air Migration Pathway section of this report for a detailed description of analytical results.

During September through December 1999, Clean Harbors, Inc. (Clean Harbors) of Bow, NH, contracted by Pulp & Paper of America, removed mercury from along the eastern bank of the Androscoggin River and portions of the riverbed. The mercury removal was conducted along the eastern riverbank and extended approximately 50 feet west into the river [65; 66]. Refer to the Waste/Source Sampling and Surface Water Pathway sections of this report for a detailed description of the removal.

In a letter to NH DES dated 24 November 1999, the Environmental Director of Crown Vantage since April 1980, Mr. Raymond H. Danforth, stated that the Chlor-Alkali property "...was used to generate chlorine through the chlor-alkali process which required the use of mercury as one of the electrodes." In addition, there was "...never a waste water treatment facility associated with the cell house operation to treat wastes from the chlor-alkali process..." , "(therefore) there were no WWTF [waste water treatment facility] sludges which would contain mercury deposited at the site." In addition, there is no knowledge or documentation of the disposal of mercury cell brine purification muds on site [55].

In November 1999, on behalf of Crown Vantage, Sevee submitted a report entitled "Engineering Plans and Specifications for Cell House Remediation Closure Project" to NH DES. The report outlined the project conditions and specifications for contractor(s) working on the site closure [63].

On 30 November 1999, on behalf of Crown Vantage, Sevee collected an aqueous sample from a pipe (DP-1) that drains into the Androscoggin River [71]. Drain pipe DP-1 is a 3-inch-diameter steel pipe located in the concrete retaining wall along the western boundary of the Chlor-Alkali property [64, Table 8]. The original use for this pipe is unknown. For the purposes of this PA/SI, START considers this sample to be a groundwater seep sample. Mercury was detected at 0.00052 milligrams per liter (mg/L). Lead was not detected [71]. Refer to the Waste/Source Sampling and Groundwater Pathway sections of this report for a detailed description of analytical results.

In December 1999, on behalf of Crown Vantage, Sevee prepared a *Final Draft Cell House Remediation Project Post-Closure Monitoring and Maintenance Plan* (Plan). The Plan summarized the site closure activities that took place on the Chlor-Alkali property and states that the site closure was implemented during transfer of ownership from Crown Vantage to Pulp and Paper of America. Crown Vantage was responsible for the site closure; however, Pulp and Paper of America would have future monitoring and maintenance responsibilities. The frequency of monitoring and

inspections were outlined within the Plan. The closure included razing all structures on site, construction of a slurry wall, the installation of a liner system over the area where mercury and lead were detected, the construction of drainage channels along the eastern and southern portions of the site, the removal of visible mercury and lead from the banks and from within the Androscoggin River, the installation of a fence along the western portion of the site, and the construction of an access road on site [64, p. 1-3]. START assumes that all openings within the retaining wall along the western property boundary were grouted and also completed as part of the site closure activities [64, Figure C-102]. In addition, a deed restriction was reportedly placed on the property and filed at the Coos County Registry of Deeds as part of closure activities [64, p. 5-1]. START was unable to locate this deed restriction at the Coos County Registry of Deeds.

The impermeable liner system installed on site consisted of a build-up of 12 inches of "common borrow" and then 6 of sand beneath a 40-millimeter (mil) thick, textured, high-density polyethylene liner (40-mil liner), then a drainage geocomposite and 2 feet of wood bark above the 40-mil liner. The 40-mil liner and geocomposite extended 4 feet beyond the slurry wall. The slurry wall was a minimum of 2 feet wide and was installed from the ground surface to the top of bedrock around the southern and eastern sides of the property. In addition, a 2-to-3-inch "stone drain" was constructed along the perimeter of the 40-mil liner to allow precipitation to run off the site and into the surrounding drainage system [64, pp. 2-1 and Figure 2-1].

Thirteen geotechnical monitoring points were established on top of the concrete retaining wall, already in place, to monitor the wall's lateral movement. In addition, two settlement monitoring plates (SMP-1 and SMP-2) were installed within the 40-mil liner. These plates were installed to monitor the settlement (if any) of the 40-mil liner and/or underlying wastes [64, pp. 6-1 - 6-3, 7-1].

Several piezometers and two monitoring wells were installed on the Chlor-Alkali property as part of site closure activities. Further information regarding the installation of these piezometers and monitoring wells was not provided in available file information obtained by START. The piezometers and monitoring wells were to be used to monitor the groundwater elevation and to collect samples using a low-flow sampling method. In addition, two drainage pipes and two surface water locations would be sampled for chemical analyses. All water quality samples would be collected for 5 years and analyzed for lead and mercury. Sampling procedures are outlined in the Plan [64, p. 6-1, 9-1 - 9-5; 91, pp. 2-7].

In addition, as part of site closure activities, mercury was removed from the riverbanks and river bottom along the eastern banks of the Androscoggin River in 1999. A future inspection of the river was proposed to be conducted to remove any additional mercury present and to determine whether the release of mercury from the site to the river was decreasing [64, pp. 10-1 - 10-2].

An NH DES inter-department communication dated 7 March 2000 provides the project status of the Chlor-Alkali property. At that time, construction activities completed at the site included removal of all visible mercury and mercury-contaminated sediment from the Androscoggin River adjacent to and approximately 450 feet downstream of the Chlor-Alkali property; removal of demolition debris in the same reach of the river; installation of the 40-mil liner and slurry wall; demolition of the Cell House and burial of its debris on site; and completion of pressure grouting of the bedrock along a limited portion of the riverbank. The inter-department communication states that since completion of the above activities, mercury has continued to be released into the Androscoggin River [68].

In addition, this inter-department communication indicates that after the 40-mil liner and slurry wall were installed, groundwater levels within the slurry wall decreased, with the exception of "...an alarming rise" in groundwater levels in a "...limited portion of the site." The portion of the site where groundwater rose was not defined in the inter-department communication. Crown Vantage was concerned that there was a structural failure in the retaining wall. Therefore, with NH DES's permission, "...a hole" was opened in the retaining wall (START assumes via drain pipe DP-1), and groundwater was released directly into the Androscoggin River. One (assumed surface water) sample was collected from the Androscoggin River in December 1999, and analytical results did not indicate elevated levels of dissolved mercury. In addition, NH DES suggested that Crown Vantage may be directed to conduct fish tissue analyses both upstream and downstream of the site [68].

On 7 March 2000, on behalf of Crown Vantage, Sevee collected an aqueous sample from drain pipe DP-1. For the purposes of this PA/SI, START considers this sample to be a groundwater seep sample. Mercury was detected in the sample at 0.00031 mg/L. Lead was not detected [71]. Refer to the Waste/Source Sampling and Groundwater Water Pathway sections of this report for a detailed description of analytical results.

On 8 March 2000, NH DES responded to Crown Vantage's December 1999 Plan and listed several additional requirements to be met by Crown Vantage before the Plan could be approved [69]. According to NH DES Rule Env-Wm 102.94, a landfill is a facility which collects and disposes of wastes by landfilling methods. The term includes facilities that collect and store waste indefinitely [198]. NH DES stated that the site meets the definition of a landfill under NH DES Rule Env-Wm 102.94. Therefore, in accordance with NH DES Rule Env-Wm 2502.01(a), Crown Vantage was required to submit a permit for the construction, operation, and closure of a landfill. Additional requirements include the following elements: 1.) The submittal of a Financial Assurance Plan for the cost of post-closure monitoring. 2.) A more detailed description of the wastes present on site and their associated risks. 3.) A signed agreement by both Crown Vantage and Pulp & Paper of America assigning post-closure maintenance and monitoring activities. 4.) A more detailed description of current site access and its restrictions in the future. 5.) The establishment of reference points on top of the retaining wall, and the surveying of these points. 6.) Groundwater discharged through two pipes in the retaining wall must meet the NH Ambient Groundwater Quality Standards or this release into the Androscoggin River cannot take place in the future. 7.) A more comprehensive program to monitor the settlement of the site. 8.) The submittal of a Groundwater Management Permit application under which groundwater elevation surveys would be conducted, an increased number of parameters would be analyzed for during groundwater sampling activities, and additional monitoring wells would be sampled. 9.) The installation of a second upgradient monitoring well. 10.) Copies of groundwater sampling reports sent to NH DES [69].

On 15 March 2000, Crown Vantage, Inc. and Crown Paper Company filed petitions for reorganization under Chapter 11 of the U.S. Bankruptcy Code [15].

On 27 and 28 March and 13 and 14 June 2000, on behalf of Crown Vantage, Sevee collected groundwater samples, surface water samples, and an aqueous sample from drain pipe DP-1 from the Chlor-Alkali property. Groundwater samples were collected from monitoring wells MW-1 through MW-9, MW-10A, and MW-10B. Surface water samples (SW-1 and SW-2) were collected from the Androscoggin River, at the outfall of the drainage ditch discharging to the Androscoggin River along the southern portion of the lined area. In addition, a drain pipe sample (DP-1) was collected from

the pipe located in the concrete retaining wall along the western boundary of the Chlor-Alkali property [71; 91]. For the purposes of this PA/SI, START considers the sample collected from DP-1 a groundwater seep sample. Analytical results of the groundwater samples indicated the presence of 16 VOCs and four metals. Analytical results of the surface water samples indicated the presence of five VOCs and three metals. Analytical results of the groundwater seep sample indicated the presence of one VOC and one metal [71; 91]. In addition, on 13 June 2000, water level depths were recorded for the canal, MW-1 through MW-9, MW-10A, MW-10B, and piezometers P-4A, P-11 through P-22, and SP-1 through SP-3 [71]. Refer to the Waste/Source Sampling, Groundwater Pathway, and Surface Water Pathway sections of this report for a detailed description of sampling and analytical results.

On 23 June 2000, NH DES personnel conducted an inspection of the Chlor-Alkali property, and were accompanied by representatives from Pulp and Paper of America and American Tissue. Mercury was observed along the Androscoggin River, including in the fissures of the rock, along the riverbank, and submerged in the river. NH DES noted that mercury deposits were not observed on top of the bedrock near the retaining wall, as were observed in November/December 1999. NH DES observed dark coffee-colored leachate, originating from the top of the 40-mil liner, discharging to the river. The exact location of this discharge was not described by NH DES; however, the cause of the discharge was attributed to precipitation passing through 2 feet of bark (assumed located on top of the 40-mil liner). NH DES noted that the pipe that was reopened to relieve the hydrostatic pressure from elevated groundwater levels behind the wall continued to flow. NH DES also noted that the retaining wall in the northern portion of the site was experiencing erosion and/or deterioration. In addition, a groundwater seep was identified in the northern portion of the property, and two leachate seeps were observed at the southern portion of the property. The groundwater seep originated behind the retaining wall, which appeared to have lost 4 to 6 inches of concrete from erosion. One leachate seep was located near the terminus of the retaining wall along the river, and the second leachate seep was located in proximity to the discharge of the drainage ditch. The two leachate seeps, based on visual observation, appeared to contain high concentrations of iron and had a petroleum sheen. Based upon these field observations, NH DES requested additional groundwater, drain pipe, groundwater seep, and leachate sampling be conducted and maintenance be performed on the retaining wall [70].

On 19 July 2000, a Draft Administrative Order by Consent (AOC) was issued by NH DES to Crown Paper Co., Inc. for the following Brown Paper Company and Crown Paper Co., Inc. violations on the Chlor-Alkali property: disposal of mercury and solid waste on the property without a permit; filling in a bank adjacent to waters of the State without a permit; discharging mercury and/or mercury-containing wastes to the surface water or groundwater without a permit; and closing a demolition debris landfill without a permit. START assumes Crown Vantage is a subsidiary of Crown Paper Co., Inc. The AOC required Crown Paper Co., Inc. to submit a removal and restoration plan to NH DES for the removal of all sediments containing visible deposits of mercury within the project area along the Androscoggin River, and the removal of demolition debris from the banks and within the Androscoggin River. In addition, the AOC required Crown Paper Co., Inc. to return to the project area during low-water conditions and re-inspect and remove any further mercury as defined above [62]. START was unable to determine whether this AOC was agreed upon by both parties.

On 28 August 2000, NH DES contacted Crown Vantage Co. regarding the 23 June 2000 inspection conducted on the Chlor-Alkali property. NH DES stated that they were aware that Crown Paper Co., Inc. was currently reviewing the AOC; however, the removal of the additional mercury observed in and adjacent to the river should be conducted during low-flow conditions that would exist through October. NH DES requested Crown Vantage to forward their proposed schedule for the mercury removal and their anticipated completion date for the AOC review [72].

A 7 September 2000 NH DES telephone conversation with Mr. Danforth (Environmental Director for Crown Vantage) stated that Pulp & Paper of America had brought legal suit against Mr. Danforth for "...failure to accurately report environmental conditions at the Mill Site." Mr. Danforth informed NH DES that the AOC was forwarded to the Crown Vantage attorneys for consideration by the bankruptcy court. In addition, Mr. Danforth reported that Clean Harbors estimated that a total of 600 pounds of mercury were removed from the river during October and November 1999. The new deposits of mercury discovered were estimated to be 10 pounds [74].

On 18 September 2000, NH DES stated that groundwater sampling and analysis were completed in accordance with the "Post Closure Monitoring and Maintenance Plan" dated December 1999. NH DES directed Crown Vantage to conduct a Site Investigation as a result of the elevated VOC and metals concentrations detected in groundwater samples collected from on-site monitoring wells. This Site Investigation would require biannual groundwater sampling under a groundwater management permit that Crown Vantage would need to submit; air sampling of the landfill vents for mercury vapors; and sediment sampling in the Androscoggin River for mercury [73].

On 18 September 2000, Crown Vantage informed NH DES that they had not owned or operated the Chlor-Alkali property since July 1999, and did "...not intend to provide further input into the Cell House remediation work", or enter into an AOC [15].

On 25 and 26 September 2000, Pulp & Paper of America, as part of the fish testing requirements specified in an NPDES permit (Part I. B. Resident Fish Monitoring), analyzed three fish fillet composite samples. Analytical results indicated the presence of both dioxins and furans in all three samples [87]. Refer to the Surface Water Pathway section of this report for a detailed description of sampling and analytical results.

On 13 October 2000, NH DES informed Pulp and Paper of America that Crown Vantage had ceased further involvement in the remedial activities for the Chlor-Alkali site. Therefore, NH DES requested Pulp and Paper of America to perform a Site Investigation to assess the extent of on-site soil and groundwater contamination; to collect sediment samples from the Androscoggin River to determine the extent of mercury contamination in the sediment; to investigate the potential risk of mercury vapors emitting from the on-site gas vents; and to submit a Groundwater Management Permit that includes provisions for biannual on-site groundwater sampling. In addition, NH DES requested immediate removal of visible elemental mercury in the bedrock in the riverbed by a qualified contractor [85].

From 27 November through 1 December 2000, United Industrial Services, assumed by START to be contracted by Pulp and Paper of America, inspected 13 zones along the Androscoggin River and conducted mercury removal from zones 5 through 11. Mercury was found as liquid and solder-like material, and approximately 1.5 pounds of mercury were found and disposed of from these zones. A sample of unknown material was collected on 1 December 2000 by either United Industrial

Services or by an NH DES representative present on site [67]. There is no further information regarding this sample in available file information.

On 13 December 2000, NH DES sent Mr. Robert A. Olah, President of Crown Vantage, Inc., a Notice of Cost Recovery. The noticed stated that Crown Vantage Co. is the responsible party for the release of hazardous substances into the environment from the Chlor-Alkali site and is liable for all costs incurred by NH DES [86].

On 10 April 2001, on behalf of Pulp & Paper of America, Tighe & Bond collected groundwater samples from monitoring wells MW-1, MW-2, and MW-5 through MW-9, and an aqueous sample from DP-1. For the purposes of this PA/SI, START considers the sample collected from DP-1 a groundwater seep sample. Reportedly, several wells could not be sampled because they were dry, damaged, or could not be bailed. Analytical results indicated the presence of VOCs (chloroform, methylene chloride, PCE, and TCE) and metals (arsenic, lead, and mercury) in groundwater, and one metal (barium) in DP-1 [91, p. 2-7]. Refer to the Waste/Source Sampling and Groundwater Pathway sections of this report for a detailed description of analytical results.

On 18 April 2001, Pulp and Paper of America, LLC submitted a total of 21 fish tissue samples for total mercury analysis. The fish collection locations were not available in file information obtained by START. START assumes the fish were collected from the Androscoggin River. Analytical results indicated that mercury concentrations ranged from 0.14 milligrams per kilogram (mg/kg) to 0.72 mg/kg [107]. Refer to the Surface Water Pathway section of this report for a detailed description of analytical results.

On 5 June 2001, on behalf of Pulp & Paper of America, Tighe & Bond prepared an Application for Groundwater Management Permit for the Chlor-Alkali site (referred to as the "Cell House Landfill Site" on the permit). A groundwater management zone (GMZ) boundary was proposed outlining areas that are or may be impacted by the former release of lead, mercury, and VOCs from the site. The GMZ extends north to the toe of the Sawmill Dam, approximately 250 feet northeast of monitoring wells MW-2 and MW-7; to the southwest, approximately 300 feet southwest of monitoring well MW-6; to the east, beyond the Chlor-Alkali property boundary to the western edge of the railroad right of way; and to the west, to the Androscoggin River. In addition, Tighe & Bond proposed the installation of additional monitoring wells (overburden and bedrock) to more accurately monitor the extent of contamination; a long-term groundwater monitoring program; continued collection of groundwater elevation data; hydraulic conductivity testing; bedrock fracture trace analysis; the collection of surface water samples; landfill gas sampling; and the completion of a Human Health Risk Assessment and a Screening Level Ecological Risk Evaluation [91, p. 4-1, Figure 10]. Based on available file information obtained by START, START was unable to determine whether these proposed actions were completed by Tighe & Bond.

In June and July 2001, NH Department of Health & Human Services (DHHS), Bureau of Health Risk Assessment (BHRA), conducted a "Voluntary Fish Collection Program for the Androscoggin River" [95]. As a result, 64 fish were sampled from the Androscoggin River from Berlin, south of the Cleveland Dam, downstream to the Town of Shelburne [14]. Analytical results indicated concentrations of mercury ranging from 8 nanograms per gram (ng/g) to 1,600 ng/g [14]. Refer to the Surface Water Pathway section of this report for a detailed description of sampling and analytical results.

In December 2001, on behalf of NH DES, Weston MNH collected one aqueous sample from an outfall pipe (assumed DP-1) draining into the Androscoggin River, and located in the concrete retaining wall bordering the western boundary of the Chlor-Alkali property; and 20 sediment samples from 10 locations along the Androscoggin River, both upstream and downstream of the Chlor-Alkali property (Figure 12). For the purposes of this PA/SI, START considers the sample collected from DP-1 a groundwater seep sample. Analytical results indicated the presence of mercury at 0.0005 mg/L in the outfall pipe sample with a pH of 6.75. Analytical results indicated the presence of total mercury and monomethyl mercury in sediment samples and both bioavailable and non-bioavailable species of mercury in the sediment [94; 195; 196]. Refer to the Waste/Source Sampling, Groundwater Pathway, and Surface Water Pathway section of this report for a detailed description of sampling and analytical results.

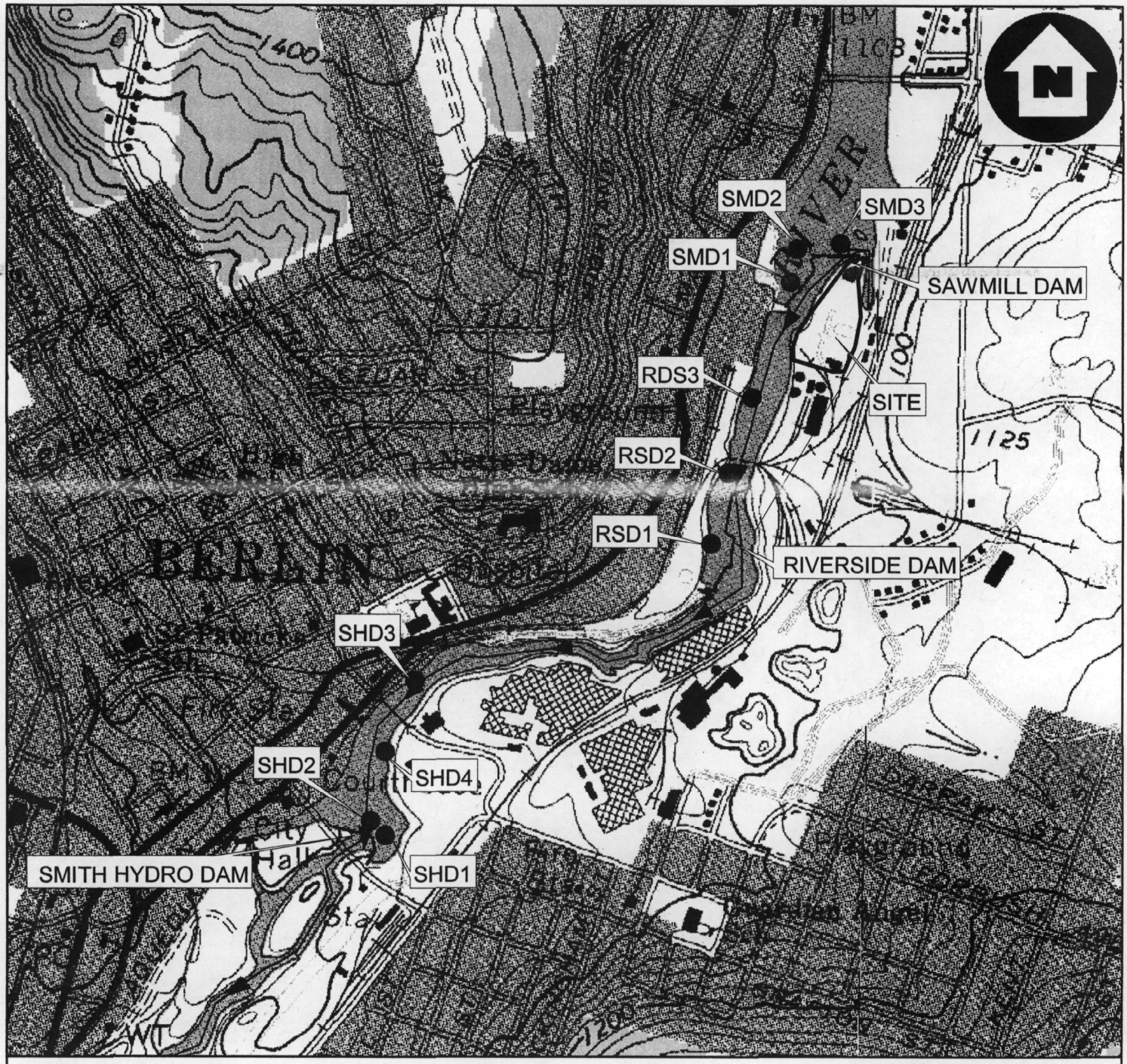
On 2 May 2002, the Berlin Planning Board voted to amend the conditions for the "Minor Subdivision-Activity & Use Restriction Area-Cell House Site" submitted by Pulp and Paper of America for the property located on Map No. 129, Lot No. 54 (Chlor-Alkali property). The amendments included the following: 1.) the Activity and Use Restriction of the parcel is still recognized as an environmental liability; 2.) the lot will not be built upon once subdivided; 3.) access to this parcel will be via a right-of-way off Community Street at the main entrance guard shack [92].

In May 2002, Nexfor Fraser N.H. LLC informed NH DES that the U.S. Bankruptcy Court for the District of Delaware approved the sale of "certain" Pulp & Paper of America, LLC assets to Fraser N.H. LLC, including the Berlin-Gorham mill operations. The Chlor-Alkali property was not included in this sale [53].

In October 2002, on behalf of NH DES, Weston MNH conducted landfill gas monitoring from the six passive vents located on the Chlor-Alkali property. On 17 October 2002, the vents were field-screened for mercury vapors using a mercury vapor analyzer. No mercury was detected with the mercury vapor analyzer. On 30 October 2002, the vents were field-screened for percent methane, oxygen, carbon dioxide, combustible gas, and hydrogen sulfide. Levels of methane (0 to 1.4 %) were recorded with corresponding lower explosive limits (0.0 to 28%), as well as decreased percent oxygen (15.4 to 21.2%), and increased carbon dioxide (0.3 to 2.8%) and hydrogen sulfide levels (0 to 4 ppm). The hydrogen sulfide readings were considered suspect due to instrument drift in ambient air [89].

From 11 through 15 November 2002, ENPRO Services, Inc., contracted by NH DES, conducted a mercury removal along the Androscoggin riverbank within the USGS survey grid mapped as 10-foot by 10-foot sections. Approximately 32 ounces of free-mercury and mercury-containing scrap metal were removed from the Androscoggin River and stored on site until removed on 18 December 2002 [90].

On 16 July 2003, USGS collected one surface water sample from a pool of water from the Androscoggin River, on the bedrock outcrop adjacent to (west of) the Chlor-Alkali site. USGS observed "bright beads of metallic mercury" at the bottom of the pool of water sampled. Analytical results indicated the presence of methyl-mercury and total mercury in the surface water [54]. Refer to the Surface Water Pathway section of this report for a detailed description of sampling and analytical results.



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 7.5' U.S.G.S. QUADRANGLE(S):

BERLIN, NH. 1970; PHOTO-INSPECTED 1989.

0.2 0 0.2 0.4 0.6 0.8 Miles

1000 0 1000 2000 3000 4000 Feet

0.3 0 0.3 0.6 0.9 Kilometers

QUADRANGLE LOCATION

● SEDIMENT SAMPLE LOCATION (APPROX.)

WESTON SOLUTIONS, INC.,
MANCHESTER, NEW HAMPSHIRE
SAMPLE LOCATION MAP

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS
Restoring Resource Efficiency

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE:
04-05-0205	A. MISKIMAN	12/6/2004
FILE NAME: E:\ARC_APRS\START2\Chlor_alkali.apr		FIGURE 12

On 6 January 2004, the Chlor-Alkali property was listed in the EPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database as Chlor-Alkali Facility (former), located adjacent to the Sawmill Dam in Berlin, NH [1; 204].

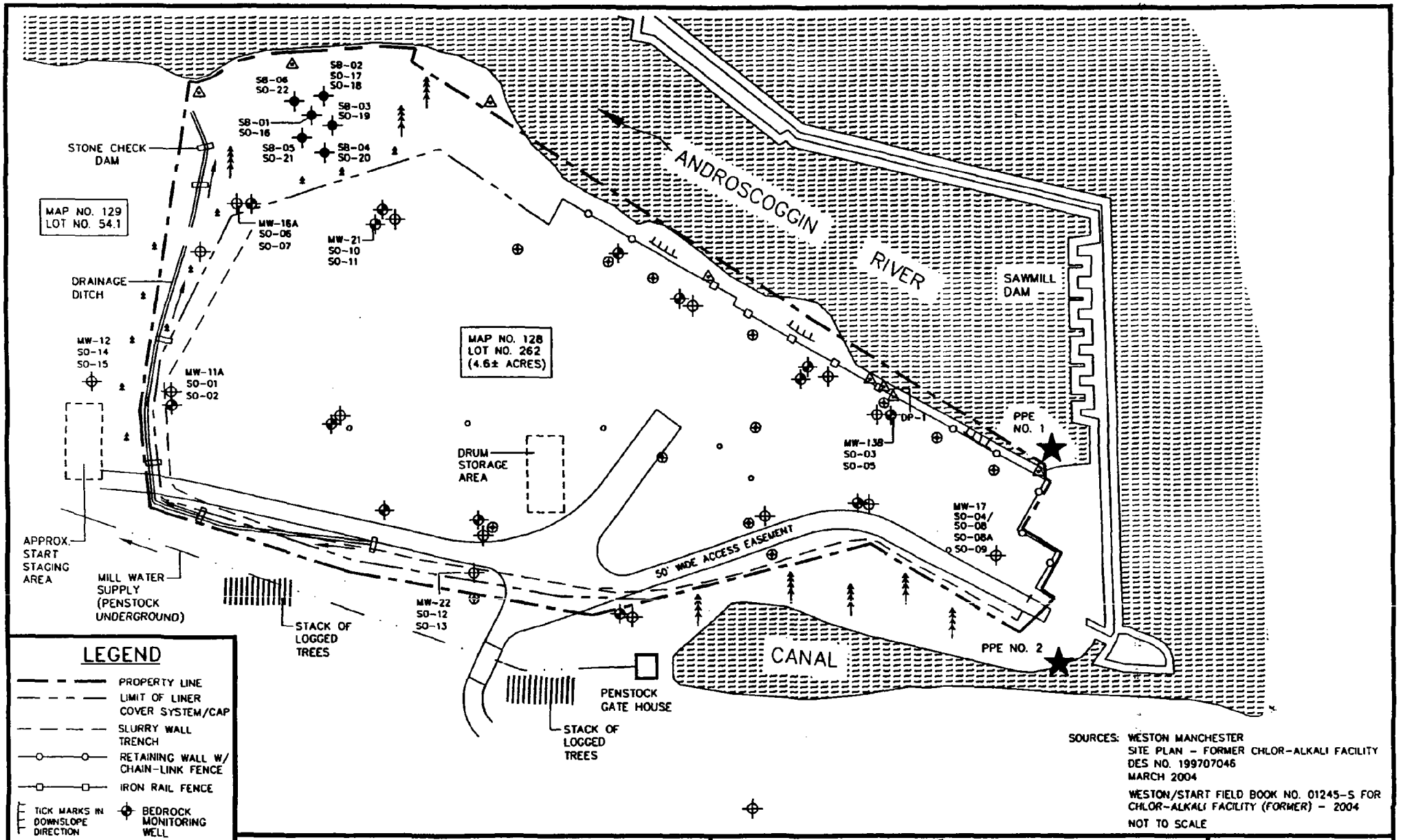
In February and March 2004, on behalf of NH DES, Weston MNH oversaw the installation of seven overburden monitoring wells (MW-11A, MW-13A, MW-16A, MW-17, MW-20A, MW-22, and MW-23A) and nine bedrock monitoring wells (MW-11B, MW-13B, MW-14R, MW-15, MW-16B, MW-19, MW-20B, MW-21, and MW-23B) on the Chlor-Alkali property. In addition, two overburden monitoring wells (MW-12 and MW-18A) and one bedrock monitoring well (MW-18B) were installed on the Fraser Paper property (Figure 13) [203].

From 1 through 4 March 2004 and on 8 March 2004, soil/source sampling activities were conducted at the Chlor-Alkali property. EPA was unable to obtain access to the Chlor-Alkali property prior to sampling activities. Therefore, on behalf of EPA and in cooperation with NH DES, Weston MNH collected 21 soil/source samples (SO-01 through SO-08; SO-08A; SO-09 through SO-13; SO-16 through SO-22) from soil borings advanced by Weston MNH's subcontractors on the Chlor-Alkali property. Samples SO-01 through SO-08, SO-08A, and SO-09 through SO-13 were collected from six soil borings advanced through the 40-mil liner. These borings were completed as monitoring wells (MW-11A, MW-13B, MW-16A, MW-17, MW-21, and MW-22).

Weston MNH and START personnel collected two soil/source samples (SO-14 and SO-15) from a soil boring advanced on the Fraser Paper property. This boring was completed as monitoring well MW-12. Weston MNH collected soil/source samples SO-16 through SO-22 from six soil borings (SB-01 through SB-06) advanced in the southwestern portion of the Chlor-Alkali property in a suspected coal-tar disposal area. These borings were not completed as monitoring wells (Figures 13 through 15) [27; 203]. Soil/source samples collected by Weston MNH are referred to as START soil/source samples throughout this report. Soil boring and well construction logs prepared by Weston MNH personnel are presented in Attachment B of this report.

Once the soil/source samples were collected on the Chlor-Alkali property by Weston MNH personnel, the samples were relinquished to START personnel, through proper chain-of-custody procedures, on the Fraser Paper property. START completed the remaining sample shipping and chain-of-custody activities [27; 109-120].

Analytical results of START soil/source samples collected from beneath the 40-mil liner on the Chlor-Alkali property indicated the presence of six VOCs (acetone, 2-butanone, carbon tetrachloride, chloroform, PCE, and TCE); 20 semivolatile organic compounds (SVOCs) [acenaphthene; anthracene; benzaldehyde; benzo(a)anthracene; benzo(a)pyrene; benzo(b)fluoranthene; benzo(g,h,i)perylene; benzo(k)fluoranthene; butylbenzylphthalate; carbazole; 2-chloronaphthalene; chrysene; dibenzo(a,h)anthracene; 2,4-dichlorophenol; fluoranthene; fluorene; indeno(1,2,3-cd)pyrene; 2-methylnaphthalene; phenanthrene; pyrene]; two pesticides (4,4-DDE and gamma-chlordane); one PCB (Aroclor-1254); 23 metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc); cyanide; monomethyl mercury; asbestos (chrysotile); cellulose; and mineral wool; and 15 dioxin/furan congeners [2,3,7,8-tetrachlorodibenzodioxin (TCDD); 1,2,3,7,8-pentachlorodibenzodioxin (PeCDD); 1,2,3,6,7,8-hexachlorodibenzodioxin (HxCDD); 1,2,3,4,6,7,8-heptachlorodibenzodioxin (HpCDD);



SOURCES: WESTON MANCHESTER
SITE PLAN - FORMER CHLOR-ALKALI FACILITY
DES NO. 199707046
MARCH 2004

WESTON/START FIELD BOOK NO. 01245-S FOR CHLOR-ALKALI FACILITY (FORMER) - 2004

NOT TO SCALE

START SAMPLE LOCATION SKETCH

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

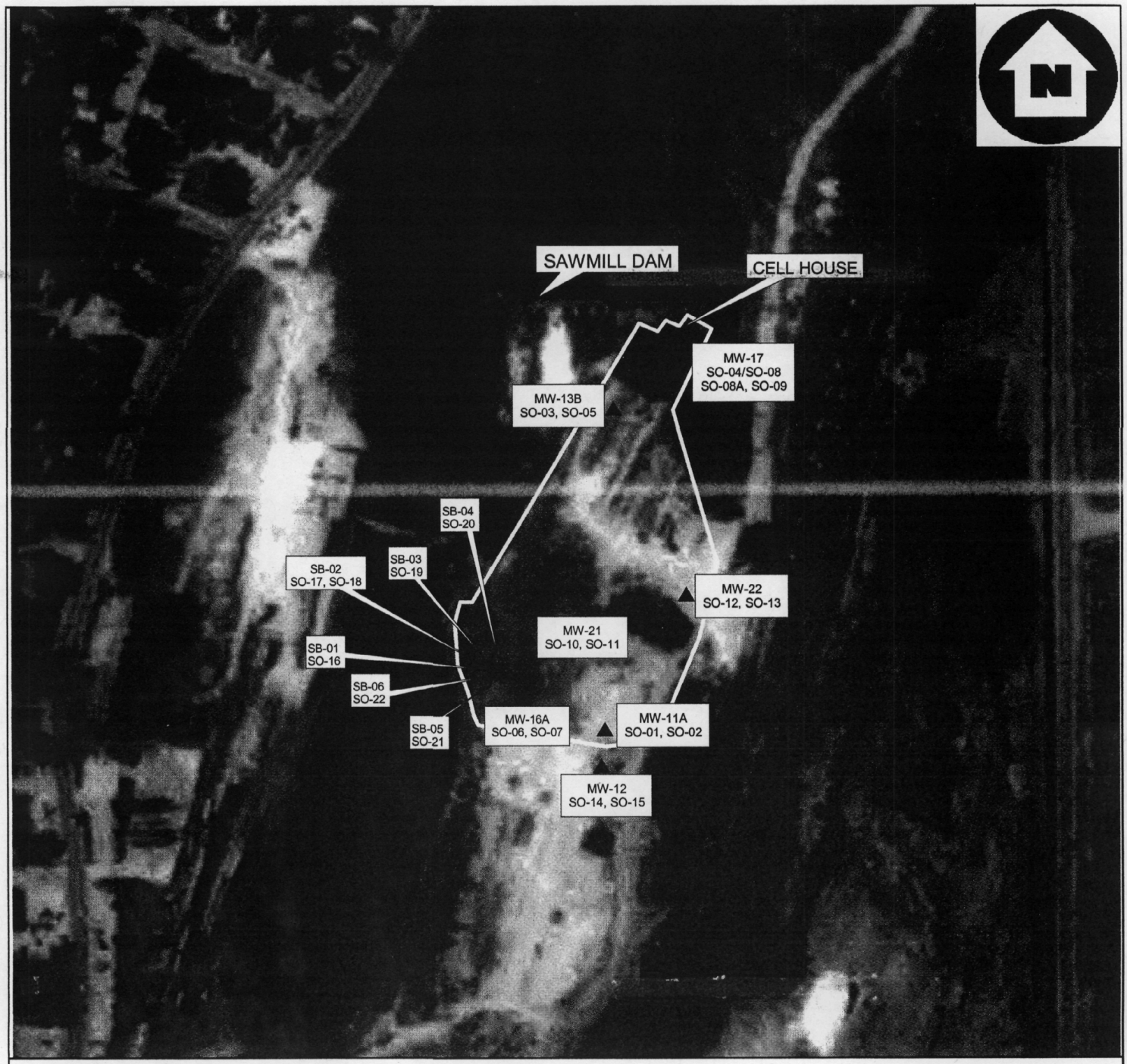
WESTON SOLUTIONS®

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
04-05-0205	W. SHAW	4/5/04

FILE NAME: S:\04050205\04010001\FIGURES\FIG3.DWG

FIGURE 13



Digital Orthophoto of Berlin, NH USGS Quadrangle, 1992.

0.05 0 0.05 0.1 0.15 0.2 Miles

250 0 250 500 750 1000 Feet

0.1 0 0.1 0.2 0.3 Kilometers

QUADRANGLE LOCATION

▲ MONITORING WELL ● SOIL BORING

START SAMPLE LOCATION MAP
(AERIAL PHOTOGRAPH 1992)

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

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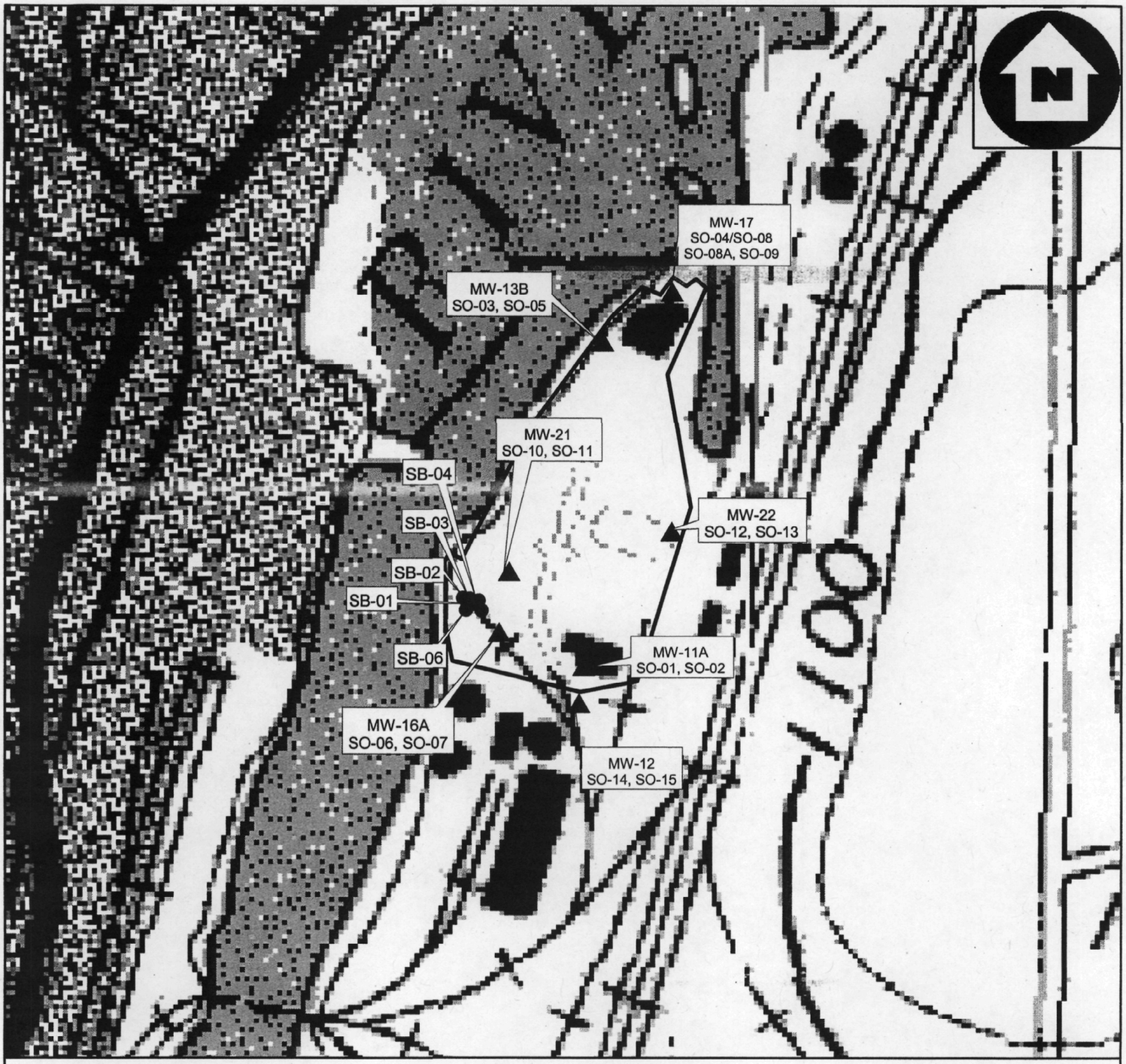
TDD #	DRAWN BY:	DATE:
04-05-0205	A. MISKIMAN	12/14/2004
FILE NAME: E:\ARC_APRS\START2\Chlor_Alkali.APR		FIGURE 14



BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 7.5' U.S.G.S. QUADRANGLE(S):

BERLIN, NH. 1970; PHOTO-INSPECTED 1989.

0.05 0 0.05 0.1 0.15 Miles

200 0 200 400 600 800 1000 Feet

0.05 0 0.05 0.1 0.15 0.2 0.25 0.3 Kilometers

▲ MONITORING WELL ● SOIL BORING

QUADRANGLE LOCATION

START SAMPLE LOCATION MAP (TOPOGRAPHIC MAP 1970)

CHLOR-ALKALI FACILITY (FORMER) BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS
Restoring Resource Efficiency

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE:
04-05-0205	A. MISKIMAN	10/01/2004
FILE NAME: E:\ARC_APRS\START2\Chlor_Alkali.APR		FIGURE 15

octachlorodibenzodioxin (OCDD); 2,3,7,8-tetrachlorodibenzofuran (TCDF); 1,2,3,7,8-pentachlorodibenzofuran (PeCDF); 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-hexachlorodibenzofuran (HxCDF); 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-heptachlorodibenzofuran (HpCDF); 1,2,3,4,7,8,9-HpCDF; and octachlorodibenzofuran (OCDF)] [109-112; 115-120]. Refer to the Waste/Source Sampling section of this report for a detailed description of sampling and analytical results.

Analytical results of START soil/source samples collected from the southern and southwestern corner of the Chlor-Alkali property indicated the presence of three VOCs (acetone, benzene, and chloroform), 18 SVOCs [acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene], one pesticide (endrin aldehyde), one PCB (Aroclor-1254), 22 metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, and zinc), cyanide, monomethyl mercury, asbestos, 14 dioxin/furan congeners (2,3,7,8-TCDD; 1,2,3,7,8,9-HxCDD; 1,2,3,4,6,7,8-HpCDD; OCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; and OCDF), and asbestos [109-112; 115-120]. Refer to the Waste/Source Sampling section of this report for a detailed description of sampling and analytical results.

In April 2004, on behalf of NH DES, Weston MNH collected 11 groundwater samples from 11 overburden monitoring wells (MW-2, MW-4, MW-5, MW-10A, MW-11A, MW-13A, MW-16A, MW-17, MW-20A, MW-22, and MW-23A) and 13 groundwater samples from 13 bedrock monitoring wells (MW-7, MW-8, MW-9, MW-10B, MW-11B, MW-13B, MW-14R, MW-15, MW-16B, MW-19, MW-20B, MW-21, and MW-23B) located throughout the Chlor-Alkali property. Monitoring well MW-3 was not sampled because the well was dry at the time of sampling activities. In addition, three groundwater samples were collected from two overburden monitoring wells (MW-12 and MW-18A) and one bedrock monitoring well (MW-18B) located on Fraser Paper property. Based upon the validated Weston MNH groundwater analytical results, the presence of three VOCs (acetone, naphthalene, and vinyl chloride), one SVOC (phenanthrene), and seven inorganics (arsenic, barium, cadmium, chromium, lead, mercury, and selenium) are present in the overburden aquifer beneath the Chlor-Alkali property; and three VOCs (acetone, PCE, and TCE) and seven inorganics (arsenic, barium, chromium, cadmium, lead, mercury, and selenium) are present in the bedrock aquifer beneath the Chlor-Alkali property [50; 51].

From 23 to 25 August 2004, Global Remediation, subcontracted by Weston MNH for NH DES, conducted a mercury removal along the Androscoggin Riverbank adjacent to the Chlor-Alkali property [127]. The amount of material removed from the riverbank was not available to START at the time of preparation of this report.

On 27 August 2004, NH DES collected one solid and one liquid sample of the material collected during the NH DES removal of mercury along the banks of the Androscoggin River. The samples were submitted to EPA Region I's Northeast Regional Laboratory (NERL) in Chelmsford, Massachusetts on 31 August 2004 for mercury analysis. Based on results from both visual inspection of the samples and the mercury vapor analyzer readings, NERL concluded that the

samples contained mercury and no further testing was warranted [140]. Refer to the Waste/Source Sampling and Surface Water Pathway sections of this report for a detailed description of sampling and analytical results.

In October 2004, on behalf of START, Normandeau Associates, Inc. (Normandeau) of Yarmouth, Maine delineated the frontage of wetlands (length or perimeter) along both the east and west banks and within the channel of the Androscoggin River in Berlin, NH. The study area included an approximate 0.3-mile stretch, located at the Sawmill Dam downstream to the Smith Hydro Dam. As a result, Normandeau delineated a total of 1,782 linear feet of wetland located within the area of study [129]. Refer to the Surface Water Pathway section of this report for a detailed description of wetland delineation activities and results.

Table 1 presents identified structures or areas on the Chlor-Alkali property that are documented or potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1

Source Evaluation for Chlor-Alkali Facility (former)

Source Area	Containment Factors	Spatial Location
Landfill*	A 2-foot wide slurry wall from bedrock to the ground surface along the south and east sides. Concrete retaining wall along the west side. Capped with a 40-millimeter thick textured high-density polyethylene impermeable liner that extends 4 feet beyond the slurry wall, to the limits of the concrete retaining wall, and to the northern property boundary.	Approximately 4 acres that begins at the northern property boundary and extends south (lined area).
Contaminated Soil	None.	Approximately 0.6 acres is estimated in the southern and southwestern portion of the property (uncapped area).

* Buildings containing electrolytic cells and other materials formerly present on the property were reportedly razed in the 1960s, with the exception of the last remaining cell house razed in 1999. All structures and associated wastes were reportedly disposed of on site and used as fill material prior to the installation of the 40-mil liner. According to NH DES Rule Env-Wm 102.94, a landfill is a facility which collects and disposes of wastes by landfilling methods. The term includes facilities that collect and store waste indefinitely. NH DES reported the property meets the definition of a landfill.

[55; 64; 69; 109-117; 119; 120; 123; 198]

Table 2 summarizes the types of potentially hazardous substances which have been disposed, used, or stored on the Chlor-Alkali property.

Table 2

Hazardous Waste Quantity for Chlor-Alkali Facility (former)

Substance	Quantity or Volume/Area	Years of Use/Storage	Years of Disposal	Source Area
Salt, sulphur, lime, charcoal, chemicals (not specified), peanut oil, bleach, chloroform, caustic, chlorine, acetone, vegetable fats, platinum, graphite, diaphragms, VOCs, SVOCs, pesticides, PCBs, metals, cyanide, dioxin/furan congeners, asbestos, concrete, brick, slag, wood, cellulose, mineral wool, and unknown building debris.	4 acres	1898-present	1898-1999	Landfill
VOC, SVOCs, metals, cyanide, dioxin-furan congeners, asbestos, and coal tar-like material.	0.6 acres	1898-present	1898-present	Contaminated Soil

VOCs = Volatile organic compounds.
SVOCs = Semivolatile organic compounds.
PCBs = Polychlorinated biphenyls.

Specific substances are discussed in greater detail in the Waste/Source Sampling and appropriate pathway sections of this report.

[3; 19; 64; 93; 109-120; 123]

There are no additional CERCLIS-listed properties located within 1 radial mile of the Chlor-Alkali property. There are 18 Resource Conservation and Recovery Information System (RCRIS) database-listed properties located in Berlin, New Hampshire [153]. Table 3 summarizes the RCRIS-listed properties located within 1 radial mile of the Chlor-Alkali property.

Table 3

Resource Conservation and Recovery Information System-Listed Properties Located Within 1 Radial Mile of the Chlor-Alkali Facility (former)

Handler Name	Town	Location	EPA Handler ID
Berlin City Department of Public Works	Berlin	146 White Street	NHD510129406
Berlin Foundry & Machine Co.	Berlin	489 Goebel Street	NHD510001126
Berlin High School	Berlin	550 Willard Street	NHD986484095
Berlin Mills Railway, Inc.	Berlin	650 Main Street	NHD056329360

Table 3

Resource Conservation and Recovery Information System-Listed Properties Located Within 1 Radial Mile of the Chlor-Alkali Facility (former) (Concluded)

Handler Name	Town	Location	EPA Handler ID
Berlin Water Pollution Control Facility WWTF	Berlin	15 Devens Street	NHD510003577
Brooks 355	Berlin	200 Pleasant Street	NHD510150691
Cumberland Farms 2835	Berlin	173 Main Street	NHD986473338
Demers Dry Cleaners	Berlin	751 Main Street	NHD500011945
Fraser NH LLC	Berlin	Unity Street	NHD001079896
Great Lakes Hydro America LLC	Berlin	Off Route 16	NHD000649608
M & M Auto Body Shop Inc.	Berlin	46 Hillside Avenue	NHD986466746
New England Telephone Central Off	Berlin	High & Emery Street	NHD980511109
Nexfor Fraser Papers	Berlin	650 Main Street	NHD000649665
NH State of DES	Berlin	25 Wight Street	NHD510156995
NH State of DES	Berlin	Burgess School	NHD510157001
Public Service of NH Upper Hyrdo Group	Berlin	194 School Street	NHD986471043
Saint Lawrence and Atlantic Co	Berlin	650 Main Street	NHD510021496
Sherwin Williams Co	Berlin	162 Main Street	NHD000791277

EPA = Environmental Protection Agency.
ID = Identification.
LLC. = Limited Liability Company.
Co. = Company.
Inc. = Incorporated.
NH DES = New Hampshire Department of Environmental Services.

[153]

WASTE/SOURCE SAMPLING

Waste Source sampling associated with the Landfill and area of Contaminated Soil is described in detail below. In addition, a discussion of other sources formerly present on the property (*i.e.*, former cell houses and their contents, raw stock, products produced, associated wastes, etc.) is included under the Landfill source.

LANDFILL

Origin of Landfill Source

Beginning in the 1890s, operations on the Chlor-Alkali property included the electrolytic cell process to produce chlorine to bleach pulp [3; 55]. Several different types of materials were documented as used in the electrolytic cells. In the 1890s, diaphragm electrolytic cells with platinum wire anodes and "Acheson graphite" anodes were used and powered by four water-wheels [3; 93]. In the early 1900s, as pulp production at the mill increased, the number of electrolytic cells on the Chlor-Alkali property increased. By 1922, over 600 Le Sueur electrolytic cells (diaphragm cells) with Acheson graphite and 160 Allen-Moore electrolytic cells with improved "unsubmerged diaphragms" were used on the property [3; 124]. START was unable to determine what Allen-Moore and unsubmerged diaphragm cells consisted of. These electrolytic cells were located within buildings called "chlorine gas cell houses" (cell houses) [21; 22].

In 1919, raw stock documented on the Chlor-Alkali property included salt, sulphur, lime, charcoal, chemicals (of unknown type), and peanut oil. Products produced and/or stored on the property included bleach, chloroform, caustic, chlorine, acetone, chemicals, and vegetable fats. Power used on the property was generated by water and electric transmission, and coal was the source of fuel. In addition, the buildings on site were constructed of wood (planks, beams, and timber), reinforced concrete, steel trusses, tar, gravel, brick, and "asbestos protected metal"; and the floors were constructed of wood (planks, beams, and timber), reinforced concrete, and iron plates [19; 23].

In 1920, according to maps, a survey, and a building index of the Chlor-Alkali property, a total of six cell houses were located in the northern portion of the property. Four of these cell houses were located directly along the bank of the Androscoggin River. These cell houses were built from 1898 to 1917 and contained "chlorine gas cells". In addition, buildings containing lime and liquor tanks, "evaporators", caustic tanks, caustic furnaces, boilers, an ash pit, coal, brine tanks, "carbon storage", transformers, generators, vacuum pumps, blower fans, and salt were located in the current landfill-portion of the property [16-19; 23].

During the 1890s to the 1920s, diaphragm cells were documented as used on the Chlor-Alkali property to produce chlorine. Diaphragm cells consist of a porous diaphragm (*e.g.*, typically an asbestos diaphragm) that divides the electrolytic cell into anode and cathode compartments. A brine solution [sodium chloride (NaCl) in water] is present within the cell. A direct electric current is passed through the brine, and chlorine gas is produced at the anode, while sodium ions at the cathode react with water to produce caustic soda [44; 126].

Products produced by the electrolytic cells (caustic soda and hydrogen), in addition to chlorine, were used by the Berlin Mills Company to produce more products, such as the Brown Company White Mountain Brand Caustic Soda, chloroform, chloroform anaesthetic, and Kream Krisp (hydrogenated vegetable fat) [93; 186].

Hooker cells were photodocumented in 1950 within one of the cell houses on the property (Attachment A, Photograph 10). Hooker cells are diaphragm cells that use asbestos diaphragms [44; 181]. START attempted to locate further documentation detailing the post-1922 electrolytic cell process. However, this information was not available in file information. The information regarding byproducts produced on the Chlor-Alkali property from the electrolytic cell process and sold by the

Brown Company (*i.e.*, the White Mountain Caustic Soda), the presence of mercury located in the Landfill source on the property (discussed below), and the presence of elemental mercury observed within the bedrock fissures along the east bank of the Androscoggin River adjacent to the Chlor-Alkali property, indicate that mercury cells, in addition to diaphragm cells, are likely to have been used on site to produce chlorine [70; 93; 102].

Mercury electrolytic cells contain flowing mercury along the bottom of the cell. The flowing mercury serves as the cathode. When a direct electric current passes through brine solution in one compartment, chlorine is produced at the anode (graphite); and sodium dissolves in the mercury, forming an amalgam (NaHg) at the cathode. The amalgam flows into a second compartment where it decomposes into sodium and mercury. The sodium reacts with water in the compartment, producing caustic soda and hydrogen, and the mercury returns to the electrolytic cell [44; 126]. Mercury cells produce the highest purity of caustic soda than any other electrolytic cell process (50% or 73% caustic soda directly, without an evaporation process) [162; 163]. START attempted to determine the purity of caustic soda produced on the Chlor-Alkali property; however, this information was not found in available file information.

According to a former employee of the Brown Company interviewed by Crown Vantage, the cell house operation was shut down in 1962 and the majority of the buildings were demolished in 1963 [55]. START attempted to determine where the wastes that were present inside the cell house buildings before demolition were disposed of; however, this information was not available in file information obtained by START. START assumes all wastes were disposed of on site.

A 1970 USGS topographic map of the Chlor-Alkali property depicts one building (assumed to be the one remaining cell house building) located in the northern portion of the property, adjacent to the Androscoggin River; a building in the southeastern portion of the property; and railroad tracks entering the property in the south, extending northwest, and terminating in the southwestern portion of the property (Figure 15) [77].

In 1999, Sevee's Plan summarized the site closure activities that took place on the Chlor-Alkali property during the transfer of ownership from Crown Vantage to Pulp and Paper of America. Crown Vantage was responsible for the site closure; however, Pulp and Paper would have future monitoring and maintenance responsibilities. The closure included razing all structures on site, constructing a slurry wall, installing a 40-mil liner over the area where mercury and lead were detected, constructing drainage channels along the eastern and southern portions of the site, removing visible mercury and lead from the banks and from within the Androscoggin River, installating a fence along the western portion of the site, and constructing an access road on site [64]. START assumes that all openings within the retaining wall along the western property boundary were grouted and also completed as part of the site closure activities [64, Figure C-102]. In addition, a deed restriction was placed on the property and filed at the Coos County Registry of Deeds as part of closure activities [64]. START was unable to locate this deed restriction at the Coos County Registry of Deeds.

According to NH DES, because the site closure activities for the Chlor-Alkali property involved the razing and on-site disposal of the Cell House, and previously disposed of wastes were left in place on site, the property meets the definition of a landfill as defined by NH DES Rule Env-Wm 102.94 [69].

Analytical Results of Third-Party Samples

Prior to the installation of the 40-mil liner on the site surface, extensive soil/source sampling was conducted on the Chlor-Alkali property. On 31 March 1999, as part of the LEA, Tighe & Bond collected two soil samples from two floor sumps located in the Cell House, and collected one sample of sandblast material from the cell house area. The three samples were submitted to Severn Trent Laboratory (STL) of Westfield, Massachusetts for TCLP analysis for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver; and for total metals analysis for lead and mercury by unspecified methods [10]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

Three TCLP metals were detected in the two soil samples collected from the floor sumps at the following maximum concentrations: cadmium (140 µg/L), lead (340,000 µg/L), and mercury (3.4 µg/L). Tighe & Bond reported that both cadmium and lead TCLP concentrations exceeded their respective TCLP EPA Hazardous Waste Limits. The total metals analysis for the two soil sump samples indicated the presence of lead at a maximum concentration of 28,800 mg/kg, and mercury at a maximum concentration of 13 mg/kg. One TCLP metal (lead) was detected in the sandblast material sample, with a concentration of 840 µg/L; and total metals analysis of the sandblast material indicated the presence of lead at 37 mg/kg and mercury at 1.3 mg/kg. Tighe & Bond reported that both TCLP lead and total metals analysis mercury concentrations exceeded their TCLP EPA Hazardous Waste Limit or the NH DES S-1 Soil Standard, respectively [10, Table 5-2].

On 6 and 7 April 1999, Tighe & Bond collected nine surficial soil samples [FPCB-1, FPCB-2, S-1 (6), S-1 (24), S-2 through S-5, and "Sump Conf."] to assess the vertical and horizontal extent of lead and mercury contamination on the Chlor-Alkali property. Soil samples S-1 (6) and S-1 (24) were collected from material within the sump located within the Cell House, approximately 9 feet north of the lower garage door. Soil samples S-2 through S-5 were collected from the south and east sides of the existing Cell House at a depth of approximately 14 inches below grade. Soil samples FPCB-1 and FPCB-2 were collected from approximately 2 feet below grade near former maintenance shops. Sample Sump Conf. was collected approximately 18 inches below grade from the sump located approximately 30 feet north of the lower garage building within the Cell House (Figure 10). Surficial soil samples S-1 (6), S-1 (24), S-2 through S-5, and Sump Conf. were collected using a pre-cleaned 2-inch-diameter bucket auger and a spade and submitted to STL for total lead and mercury analyses by unspecified methods. In addition, samples FPCB-1 and FPCB-2 were also analyzed for seven VOCs (acetone, carbon disulfide, chloroform, ethylbenzene, methylene chloride, toluene, and total xylene), total PCBs, and TPHs by unspecified methods [10]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 4 summarizes the analytical results of surficial soil samples collected from the Chlor-Alkali property by Tighe & Bond on 6 and 7 April 1999.

Table 4

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 6 and 7 April 1999

Sample Location	Sample Depth* (feet)	Compound/ Element	Sample Concentration	NH DES Standards**			
				S-1	S-2	S-3	UCL
S-1 (6")	0.5	**METALS** (mg/kg)					
		Lead	14,000	400	400	400	4,000
		Mercury	14	1	7	7	70
S-1 (24")	2	**METALS** (mg/kg)					
		Lead	2,900	400	400	400	4,000
		Mercury	9.7	1	7	7	70
S-2	1.5	**METALS** (mg/kg)					
		Lead	98	400	400	400	4,000
		Mercury	39	1	7	7	70
S-3	1.5	**METALS** (mg/kg)					
		Lead	11 U	400	400	400	4,000
		Mercury	3.5	1	7	7	70
S-4	1.5	**METALS** (mg/kg)					
		Lead	39	400	400	400	4,000
		Mercury	1.4	1	7	7	70
S-5	1.5	**METALS** (mg/kg)					
		Lead	22	400	400	400	4,000
		Mercury	1.0	1	7	7	70
Sump Conf.	1.5	**METALS** (mg/kg)					
		Lead	23,000	400	400	400	4,000
		Mercury	84	1	7	7	70

Table 4

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 6 and 7 April 1999 (Continued)

Sample Location	Sample Depth* (feet)	Compound/ Element	Sample Concentration		NH DES Standards**			
					S-1	S-2	S-3	UCL
FPCB-1	0-2	**TPH** (mg/kg)						
		TPH	2,500		10,000	10,000	10,000	NE
		VOCs (µg/kg)						
		Acetone	5	U	9,000	9,000	9,000	10,000,000
		Carbon Disulfide	5	U	400	400	400	10,000,000
		Chloroform	5	U	NE	NE	NE	NE
		Ethylbenzene	5	U	140,000	140,000	140,000	10,000,000
		Methylene Chloride	1	J	NE	NE	NE	NE
		Toluene	5	U	100,000	100,000	100,000	10,000,000
		Xylene (total)	5	U	500,000	1,000,000	1,000,000	10,000,000
		PCBs (µg/kg)						
		PCBs	130	U	1,000	2,000	2,000	20,000
		METALS (mg/kg)						
		Lead	81		400	400	400	4,000
		Mercury	1.5		1	7	7	70
FPCB-2	0-2	**TPH** (mg/kg)						
		TPH	5,200		10,000	10,000	10,000	NE
		VOCs (µg/kg)						
		Acetone	71	B	9,000	9,000	9,000	10,000,000
		Carbon Disulfide	5	U	400	400	400	10,000,000
		Chloroform	2	J	NE	NE	NE	NE
		Ethylbenzene	5	U	140,000	140,000	140,000	10,000,000

Table 4

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 6 and 7 April 1999 (Concluded)

Sample Location	Sample Depth* (feet)	Compound/ Element	Sample Concentration		NH DES Standards**			
					S-1	S-2	S-3	UCL
FPCB-2 (Concl)	0-2	**VOCs** (µg/kg) (Concluded)						
		Methylene Chloride	1	JB	NE	NE	NE	NE
		Toluene	0.7	J	100,000	100,000	100,000	10,000,000
		Xylene (total)	5	U	500,000	1,000,000	1,000,000	10,000,000
		PCBs (µg/kg)						
		PCBs	16,000		1,000	2,000	2,000	20,000
		METALS (mg/kg)						
		Lead	150		400	400	400	4,000
		Mercury	3.8		1	7	7	70

µg/kg	=	Micrograms per kilogram.	VOCs	=	Volatile Organic Compounds.
mg/kg	=	Milligrams per kilogram.	PCBs	=	Polychlorinated biphenyls.
NE	=	Not established.	TPH	=	Total Petroleum Hydrocarbons.
J	=	Estimated value.			
NH DES	=	New Hampshire Department of Environmental Services.			
U	=	Analyte was not detected in the sample. The laboratory detection limit is provided.			
S-1, S-2, S-3	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 Soil Standards.			
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3 Upper Concentration Limits (UCL) in Soil.			
B	=	Indicates the analyte was found in both the sample and its associated laboratory blank.			

* The 1999 Tighe & Bond Preliminary Draft Limited Environmental Assessment (LEA) report states on page 5-5, Soil samples S-2 through S-5 were collected from the south and east sides of the existing Cell House at a depth of approximately 14 inches below grade. However, in Table 6-3, different sample depths are given. The sample depths provided above were listed in Table 6-3 of the Tighe & Bond Preliminary Draft LEA.

**Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

Analytical results for samples FPCB-1 and FPCB-2 indicated the characteristics of motor oil.

[10, Table 6-3]

On 7 April 1999, as part of the LEA, Tighe & Bond advanced four soil borings (B-6 through B-9) along the south and east sides of the Cell House. One "confirmatory" sample was collected from each soil boring at various depths and submitted to STL for total lead and mercury analyses by unspecified methods. Based on field observations, three additional samples (B-7 S-3, B-8 S-4, and B-9 S-3) were collected from the soil/groundwater interface at various depths and submitted to STL for total lead and mercury, TPH, and VOC analyses by unspecified methods. Tighe & Bond personnel documented visual and olfactory evidence of petroleum contamination in soils collected from soil borings B-6 through B-8. In addition, one soil boring sample (B-8 S-3) was collected and submitted to STL for total lead and mercury, and TPH analyses by unspecified methods [10, p. 5-2, 5-3, Table 6-2]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 5 is a summary of maximum concentrations of substances detected in soil boring samples collected from the Chlor-Alkali property by Tighe & Bond on 7 April 1999.

Table 5

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 7 April 1999

Substance	Concentration	Sample Number	Sample Depth (feet)	NH DES Standards*			
				S-1	S-2	S-3	UCL
TPH (mg/kg)	4,900	B-7 S-3	5-7	10,000	10,000	10,000	NE
VOCs (µg/kg)							
Acetone	44	B-7 S-3	5-7	9,000	9,000	9,000	1.0E+07
Benzene	2 J	B-9 S-3	10-12	300	300	300	1.0E+07
Butanone, 2-	6 J	B-8 S-4	15-17	NE	NE	NE	NE
Chloroform	3 J	B-9 S-3	10-12	NE	NE	NE	NE
Ethylbenzene	10 J	B-7 S-3	5-7	140,000	140,000	140,000	1.0E+07
Methylene Chloride	1 J	B-9 S-3	10-12	NE	NE	NE	NE
Tetrachloroethene	210	B-7 S-3	5-7	2,000	2,000	2,000	69E+05
Toluene	5 J	B-7 S-3	5-7	100,000	100,000	100,000	1.0E+07
Trichloroethene	12	B-7 S-3	5-7	800	800	800	1.0E+07
Xylene	70	B-7 S-3	5-7	500,000	1,000,000	1,000,000	1.0E+07

Table 5

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 7 April 1999 (Concluded)

Substance	Concentration	Sample Number	Sample Depth (feet)	NH DES Standards*			
				S-1	S-2	S-3	UCL
METALS (mg/kg)							
Lead	930	B-8 S-3	10-12	400	400	400	4,000
Mercury	180	B-7 S-3	5-7	1	7	7	70

TPH	=	Total Petroleum Hydrocarbons.	VOCs	=	Volatile Organic Compounds.
mg/kg	=	Milligrams per kilogram.	µg/kg	=	Micrograms per kilogram.
NE	=	Not established.	J	=	Estimated value.
NH DES	=	New Hampshire Department of Environmental Services.			
S-1, S-2, S-3	=	New Hampshire Department of Environmental Services Method 1 Soil Standards.			
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3 Upper Concentration Limits (UCL) in Soil.			

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

Analytical results indicated that soil samples B-7 S-3 and B-8 S-3 maintained characteristics similar to motor oil.

[10, Table 6-2]

From 28 April through 30 April 1999, Tighe & Bond advanced a total of 42 borings to refusal on the Chlor-Alkali property. Soil samples were collected at various locations across a 60-foot by 60-foot grid at various depths from the borings, and submitted to an unspecified laboratory and analyzed for lead and mercury by unspecified methods (Figure 11). In addition, select soil samples were analyzed for select VOCs (chloroform, p-isopropyltoluene, hexachlorabutadiene, naphthalene, and PCE); select PCBs (Aroclor 1254, Aroclor 1260, and total PCBs); and additional metals (arsenic, barium, cadmium, chromium, selenium, and silver) by unspecified methods [13, Appendix C]. START was only able to locate analytical results collected for the 40 boring samples in the available file information. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 6 is a summary of maximum concentrations of substances detected in soil boring samples collected from the Chlor-Alkali property by Tighe & Bond from 28 through 30 April 1999.

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
AA-1	**METALS** (mg/kg)					
	S-2	5-7	Lead	450	400	4,000
	S-3	10-12	Mercury	13	7	70
BB-1	**METALS** (mg/kg)					
	S-2	5-7	Lead	2,500	400	4,000
			Mercury	18	7	70
			Arsenic	2.4	12	120
			Barium	110	3,400	10,000
			Cadmium	0.24 U	230	2,300
			Chromium	2.0	Cr-S-3	Cr-UCL
			Selenium	2.4 U	4,200	10,000
			Silver	0.66	200	2,000
CC-1	**METALS** (mg/kg)					
	S-2	5-7	Lead	210	400	4,000
			Mercury	23	7	70
A-1	**METALS** (mg/kg)					
	S-2	5-7	Lead	290	400	4,000
			Mercury	8,500	7	70
			Arsenic	9.9	12	120
			Barium	460	3,400	10,000
			Cadmium	3.8	230	2,300
			Chromium	26	Cr-S-3	Cr-UCL
			Selenium	3.7 U	4,200	10,000
			Silver	2.5	200	2,000

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
A-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	86	400	4,000
	S-2	5-7	Mercury	4.5	7	70
A-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	96	400	4,000
			Mercury	32	7	70
B-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	130	400	4,000
			Mercury	180	7	70
B-2	**METALS** (mg/kg)					
	S-3	10-12	Lead	1,100	400	4,000
			Mercury	220	7	70
B-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	170	400	4,000
			Mercury	160	7	70
B-4	**METALS** (mg/kg)					
	S-2	5-7	Lead	160	400	4,000
			Mercury	80	7	70
	S-3	10-13	Arsenic	1.8	12	120
			Barium	25	3,400	10,000
			Cadmium	0.27 U	230	2,300
			Chromium	7.1	Cr-S-3	Cr-UCL
			Selenium	2.7 U	4,200	10,000
			Silver	0.54 U	200	2,000

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
C-1	**METALS** (mg/kg)					
	S-2	5-5' 5"	Lead	530	400	4,000
			Mercury	380	7	70
	VOCs (µg/kg)					
	S-2	5-5' 5"	Chloroform	14	NE	NE
			Hexachlorabutadiene	48	3,000	30,000
			p-Isopropyltoluene	110	NE	NE
C-2	**METALS** (mg/kg)					
	S-2	5-7	Lead	720	400	4,000
			Mercury	160	7	70
C-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	88	400	4,000
			Mercury	82	7	70
C-4	**METALS** (mg/kg)					
	S-1	0-1	Lead	41	400	4,000
	S-2	5-7	Mercury	22	7	70
C-5	**METALS** (mg/kg)					
	S-2	5-7	Lead	110	400	4,000
			Mercury	3.8	7	70

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
D-1	**METALS** (mg/kg)					
	S-2	0-5	Lead	430	400	4,000
			Mercury	290	7	70
	VOCs (µg/kg)					
	S-2	0-5	Chloroform	12	NE	NE
			Naphthalene	130	5,000	10E+6
			p-Isopropyltoluene	52	NE	NE
			Tetrachloroethene	21	2,000	69E+5
D-2	**METALS** (mg/kg)					
	S-2	5	Lead	770	400	4,000
			Mercury	640	7	70
D-3	**METALS** (mg/kg)					
	S-2	5-6' 9"	Lead	16	400	4,000
			Mercury	13	7	70
	S-1	6"-1'6"	Arsenic	0.91	12	120
			Barium	26	3,400	10,000
			Cadmium	0.21 U	230	2300
			Chromium	2.5	Cr-S-3	Cr-UCL
			Selenium	2.1 U	4,200	10,000
			Silver	0.41 U	200	2,000
D-4	**METALS** (mg/kg)					
	S-2	5-6' 4"	Lead	160	400	4,000
			Mercury	13	7	70

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
D-5	**METALS** (mg/kg)					
	S-1	0.5 -2' 6"	Lead	66	400	4,000
			Mercury	11	7	70
E-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	41	400	4,000
			Mercury	46	7	70
E-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	12	400	4,000
			Mercury	2.3 U	7	70
E-3	**METALS** (mg/kg)					
	S-2	5-7	Lead	1,200	400	4,000
	S-1	0-2	Mercury	6.0	7	70
	PCBs(µg/kg)					
	S-1	0-2	Aroclor-1254	2,690	1,000*	20,000*
	S-2	5-7	Aroclor-1260	352 U	1,000*	20,000*
	S-1	0-2	Total PCBs	2,690	1,000	20,000
E-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	50	400	4,000
			Mercury	3.4	7	70
	PCBs(µg/kg)					
	S-1	0-2	Aroclor-1254	1,120	1,000*	20,000*
			Aroclor-1260	1,080	1,000*	20,000*
			Total PCBs	2,200	1,000	20,000

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
E-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	64	400	4,000
			Mercury	14	7	70
	PCBs (µg/kg)					
	S-1	0-2	Aroclor-1254	8,550	1,000*	20,000*
			Aroclor-1260	287 U	1,000*	20,000*
			Total PCBs	8,550	1,000	20,000
E-6	**METALS** (mg/kg)					
	S-2	5-7	Lead	110	400	4,000
			Mercury	6.3	7	70
F-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	22	400	4,000
	S-2	5-7	Mercury	2.9 U	7	70
F-6	**METALS** (mg/kg)					
	S-2	5-7	Lead	26	400	4,000
			Mercury	2.7 U	7	70
G-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	390	400	4,000
			Mercury	20	7	70

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
G-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	73	400	4,000
			Mercury	260	7	70
			Arsenic	22	12	120
			Barium	1,700	3,400	10,000
			Cadmium	0.21 U	230	2,300
			Chromium	7.2	Cr-S-3	Cr-UCL
			Selenium	2.1 U	4,200	10,000
			Silver	0.42 U	200	2,000
G-3	**METALS** (mg/kg)					
	S-1	1-3	Lead	260	400	4,000
	S-2	5-6' 7"	Mercury	3.6	7	70
G-4	**METALS** (mg/kg)					
	S-2	5-7	Lead	22	400	4,000
			Mercury	0.24 U	7	70
G-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	25	400	4,000
	S-3	10-12	Mercury	0.29 U	7	70
	S-2	5-7	Arsenic	2.5	12	120
			Barium	32	3,400	10,000
			Cadmium	0.26 U	230	2,300
			Chromium	11	Cr-S-3	Cr-UCL
			Selenium	2.6	4,200	10,000
			Silver	0.51 U	200	2,000

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
G-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	48	400	4,000
			Mercury	2.7	7	70
H-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	110	400	4,000
	S-2	5-5.8	Mercury	5	7	70
H-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	690	400	4,000
	S-2	5-7	Mercury	16	7	70
H-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	130	400	4,000
			Mercury	10	7	70
H-4	**METALS** (mg/kg)					
	S-2	5-7	Lead	8,500	400	4,000
			Mercury	0.34 U	7	70
H-5	**METALS** (mg/kg)					
	S-2	5-7	Lead	33	400	4,000
			Mercury	27	7	70

Table 6

Summary of Analytical Results
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 28 through 30 April 1999 (Concluded)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards**	
					S-3	UCL
H-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	340	400	4,000
	S-4	15-15' 8"	Mercury	9,400	7	70

mg/kg	=	Milligrams per kilogram.	'	=	Feet.
µg/kg	=	Micrograms per kilogram.	"	=	Inches.
NE	=	Not established.	No.	=	Number.
PCBs	=	Polychlorinated biphenyls.	VOCs	=	Volatile Organic Compounds.
SVOCs	=	Semivolatile Organic Compounds.			
NH DES	=	New Hampshire Department of Environmental Services.			
S-3	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1, S-3 Soil Standards.			
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3, Upper Concentration Limits in Soil.			
Cr-S-3	=	S-3 Soil Standards for chromium III (5,000 mg/kg) and for chromium VI (540 mg/kg).			
Cr-UCL	=	Upper Concentration Limits for chromium III (10,000 mg/kg) and for chromium VI (5,400 mg/kg).			
*	=	The total PCB standard is provided.			
U	=	Analyte was not detected in the sample. The laboratory detection limit is provided.			

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

[13, Appendix C]

In May 1999, Maine Test Borings, Inc. of Brewster, Maine, under direction of Tighe & Bond, advanced six soil borings and completed them as overburden monitoring wells (MW-1 through MW-6). Monitoring well MW-1 is located off site. Surficial and subsurface soil samples were collected from the soil borings and analyzed for lead and mercury by an unknown laboratory and unspecified methods. According to the 1999 Sevee Final Draft Conceptual Design Report, these soil sample analytical results are dated both 13 and 14 May 1999 and 25 May 1999 [13, p. 3-1, Appendix C]. START was unable to determine the correct date of sample collection. START attempted to confirm whether these data were validated; however, this information was not available in files obtained by START. Therefore, START assumes these data are unvalidated. Table 7 is a summary of maximum concentrations of lead and mercury detected in soil boring samples collected by Tighe & Bond from the Chlor-Alkali property and off site in May 1999.

Table 7

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond in May 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
MW-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	54	400	4,000
			Mercury	86	7	70
MW-2	**METALS** (mg/kg)					
	S-2	5-7	Lead	360	400	4,000
			Mercury	410	7	70
MW-3	**METALS** (mg/kg)					
	S-2	5-7	Lead	1,200	400	4,000
	S-1	0-2	Mercury	2,100	7	70
MW-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	160	400	4,000
			Mercury	72	7	70
MW-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	88	400	4,000
			Mercury	3	7	70

Table 7

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond in May 1999 (Concluded)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
MW-6	**METALS** (mg/kg)					
	S-2	5-7	Lead	79	400	4,000
			Mercury	5.4	7	70

mg/kg	=	Milligrams per kilogram.
No.	=	Number.
NH DES	=	New Hampshire Department of Environmental Services.
S-3	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1, S-3 Soil Standards.
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3, Upper Concentration Limits in Soil.

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

[13, Appendix C, Table MW]

On 17 and 18 May 1999, Tighe & Bond advanced 17 additional borings to refusal on the Chlor-Alkali property [13, p. 3-1]. START was unable to locate the soil sample analytical results collected from these 17 borings in available file information.

On 27 May 1999, Tighe & Bond advanced 19 soil borings (A-0, A-10, AAA-1, AAA-11, BBB-10, GG-5.5, GG-6, GG-6.5, GG-6.25, H-5.5, H-6.5, HH-5.5, HH-6, HH-6.5, HHH-6.25, I-3, I-4, I-5, I-6) to further delineate the lead and mercury contamination surrounding two soil borings (A-1 and H-6) that were advanced by Tighe & Bond in April 1999. In addition, Tighe & Bond extended the soil boring grid south and advanced four additional borings (I-3 through I-6). Both surficial and subsurface soil samples were collected from these soil borings and analyzed by an unknown laboratory for lead and mercury by unspecified methods. In addition, samples collected from soil borings A-10, AAA-1, AAA-11, and GG-5.5 were also analyzed for TPHs, a carbon range, and analyzed to determine the composition of the hydrocarbons present (petroleum identification) [13, Appendix C, Figure 6]. START attempted to confirm whether these data were validated; however, this information was not available in files obtained by START. Therefore, START assumes these data are unvalidated. *Table 8 is a summary of maximum concentrations of lead and mercury detected* in the soil boring samples collected from the Chlor-Alkali property on 27 May 1999.

Table 8

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
DELINEATION OF SOIL BORING A-1						
A-0	**METALS** (mg/kg)					
	S-2	5-7	Lead	330	400	4,000
			Mercury	500	7	70
A-10	**METALS** (mg/kg)					
	S-2	5-7	Lead	960	400	4,000
			Mercury	120	7	70
	TPHs (mg/kg)					
	S-2	5-7	TPHs	6,400	10,000	NE
	S-2, S-3	5-7, 10-12	Carbon Range	C-14 to C-32	NE	NE
	S-2, S-3	5-7, 10-12	Petroleum ID	Motor Oil	NE	NE
AAA-1	**METALS** (mg/kg)					
	S-3	10-12	Lead	160	400	4,000
			Mercury	130	7	70
	TPHs (mg/kg)					
	S-3	10-12	TPHs	690	10,000	NE
	S-1, S-2, S-3	0-2, 5-7, 10-12	Carbon Range	C-14 to C-32	NE	NE
	S-1, S-2, S-3	0-2, 5-7, 10-12	Petroleum ID	Motor Oil	NE	NE
AAA-11	**METALS** (mg/kg)					
	S-2	5-7	Lead	2,000	400	4,000
			Mercury	80	7	70
	TPHs (mg/kg)					
	S-2	5-7	TPHs	4,700	10,000	NE
	S-1, S-2	0-2, 5-7	Carbon Range	C-14 to C-32	NE	NE
	S-1, S-2	0-2, 5-7	Petroleum ID	Motor Oil	NE	NE

Table 8

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
BBB-10	**METALS** (mg/kg)					
	S-2	5-7	Lead	55	400	4,000
			Mercury	7.6	7	70
DELINEATION OF SOIL BORING H-6						
GG-5.5	**METALS** (mg/kg)					
	S-1	0-2	Lead	190	400	4,000
	S-2	5-7	Mercury	8.1	7	70
	TPHs (mg/kg)					
	S-1	0-2	TPHs	610	10,000	NE
			Carbon Range	C-14 to C-32	NE	NE
			Petroleum ID	Motor Oil	NE	NE
GG-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	910	400	4,000
			Mercury	10	7	70
GG-6.5	**METALS** (mg/kg)					
	S-1	0-2	Lead	120	400	4,000
GG-6.25	**METALS** (mg/kg)					
	S-2	5-7	Lead	64	400	4,000
H-5.5	**METALS** (mg/kg)					
	S-2	5-7	Lead	52	400	4,000
H-6.5	**METALS** (mg/kg)					
	S-1	0-2	Lead	270	400	4,000
	S-3	10-12	Mercury	7.3	7	70

Table 8

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
HH-5.5	**METALS** (mg/kg)					
	S-1	0-2	Lead	32	400	4,000
HH-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	300	400	4,000
			Mercury	5.5	7	70
HH-6.5	**METALS** (mg/kg)					
	S-2	5-7	Lead	110	400	4,000
			Mercury	3	7	70
HHH-6.25	**METALS** (mg/kg)					
	S-1	0-2	Lead	100	400	4,000
	S-2	5-7	Mercury	1.7	7	70
ROW I						
I-3	**METALS** (mg/kg)					
	S-1	0-2	Mercury	20	7	70
I-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	250	400	4,000
			Mercury	13	7	70
I-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	370	400	4,000
			Mercury	12	7	70

Table 8

Summary of Maximum Concentrations
Soil Boring Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Concluded)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES Standards*	
					S-3	UCL
I-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	120	400	4,000
			Mercury	6.9	7	70

mg/kg	=	Milligrams per kilogram.	ID	=	Identification.
TPH	=	Total Petroleum Hydrocarbons.	No.	=	Number.
NE	=	Not Established.			
NH DES	=	New Hampshire Department of Environmental Services.			
S-3	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1, S-3 Soil Standards.			
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3, Upper Concentration Limits in Soil.			

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

No mercury was detected in samples GG-6.4 S-1 through S-3, GG-6.25 S-1 through S-3, H-5.5 S-1 and S-2, and HH-5.5 S1 through S-4. No lead was detected in samples I-3 S-1 through S-3.

[13, Appendix C]

On 17 June 1999, Tighe & Bond collected one groundwater seep sample (SEEP-1) from the bedrock outcrop, located southwest of the Cell House. The sample was submitted to STL and was analyzed for lead by EPA Method 200.7 and for mercury by EPA Method 245.1. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Unvalidated analytical results indicated the presence of mercury at 2.4 μg/L. No lead was detected above the laboratory detection limit in SEEP-1 [13, Appendix F].

From 8 to 15 September 1999, Morrissey Enterprises removed asbestos roofing material from the Cell House roof located on the Chlor-Alkali property. Eleven samples of the Cell House's roof material (roofing paper or roofing cement) were collected, and eight samples were submitted to Columbia Analytical Services, Inc. for asbestos analysis by EPA Method 600/R-93/11G. Analytical results indicated the presence of chrysotile in one layer of roofing paper (5 to 6 layers encountered), and cellulose and glass fibers [88].

On 30 November 1999, on behalf of Crown Vantage, Sevee collected one aqueous sample from drain pipe DP-1. For the purposes of this PA/SI, START considers the aqueous sample a groundwater seep sample. The sample was analyzed by an unknown laboratory for lead and mercury by unspecified methods. Mercury was detected at 0.00052 mg/L. No lead was detected above the detection limit [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 7 March 2000, on behalf of Crown Vantage, Sevee collected one aqueous source sample from drain pipe DP-1. For the purposes of this PA/SI, START considers this sample a groundwater seep sample. The sample was analyzed by an unknown laboratory for lead and mercury by unspecified methods. Mercury was detected at 0.00031 mg/L. Lead was not detected [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 27 March 2000, on behalf of Crown Vantage, Sevee attempted to collected aqueous source samples from drain pipes DP-1 and DP-2. DP-1 was described as a 3-inch-diameter steel pipe and DP-2 as an 8-inch diameter steel pipe, both located in the concrete retaining wall of the Chlor-Alkali property, that drain directly into the Androscoggin River. At the time of sampling, DP-2 was reported dry. One aqueous source sample was collected from DP-1, submitted to an unknown laboratory, and analyzed for VOCs by EPA Method 8260B and for metals (arsenic, barium, lead, and mercury) by an unspecified method. For the purposes of this PA/SI, START considers the sample collected from DP-1 a groundwater seep sample. Analytical results indicated the presence of naphthalene (2 µg/L) and barium (0.124 mg/L) in DP-1 [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 13 June 2000, on behalf of Crown Vantage, Sevee attempted to collect aqueous samples from pipes DP-1 and DP-2. At the time of sampling, DP-2 was reported dry. One aqueous sample was collected from DP-1, submitted to an unknown laboratory, and analyzed for VOCs by EPA Method 8260B and for metals (arsenic, barium, lead, and mercury) by an unspecified method. For the purposes of this PA/SI, START considers the sample collected from DP-1 a groundwater seep sample. Analytical results indicated the presence of naphthalene (3 µg/L), tetrahydrofuran (5 J µg/L), arsenic (0.003 J mg/L), and barium (0.13 mg/L) in DP-1 [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 10 April 2001, on behalf of Pulp & Paper of America, Tighe & Bond collected a groundwater seep sample from drain pipe DP-1. The sample was submitted to an unspecified laboratory and analyzed for VOCs and metals by unspecified methods. Analytical results indicated the presence of barium at "trace levels" in DP-1 [91, p. 2-7]. START attempted to determine whether these data were validated based upon available file information. However, this could not be confirmed. Therefore, for the purposes of this evaluation, START assumes these data are unvalidated.

In December 2001, on behalf of NH DES, Weston MNH collected one aqueous sample from an outfall pipe (assumed DP-1) draining into the Androscoggin River, and located in the concrete retaining wall bordering the western boundary of the Chlor-Alkali property. For the purposes of this PA/SI, START considers the aqueous sample collected from DP-1 a groundwater seep sample. The sample was submitted to Resource Laboratories in Portsmouth, NH and analyzed for VOCs (EPA Method 8260B), total lead (EPA Method 200.7), and total mercury (EPA Method 245.1). Unvalidated analytical results indicated the presence of mercury at 0.0005 mg/L in the sample, with a pH of 6.5. No VOCs or lead were detected in the sample above quantitation limits [94].

On 27 August 2004, NH DES collected one solid and one liquid sample of the material collected during the NH DES removal of mercury along the banks of the Androscoggin River, adjacent to the Chlor-Alkali property. The samples were submitted to EPA Region I's NERL on 31 August 2004 for mercury analysis. The samples were placed in a fume hood, and a background indoor air sample for mercury was collected and screened for mercury vapor using an Ohio Lumex RA-915+ Zeeman Mercury Spectrometer Analyzer. The average readings for mercury in the indoor air sample measured 4 to 6 nanograms per cubic meter (ng/m^3), and instantaneous levels of mercury measured 6 to 8 ng/m^3. Both the solid and liquid samples submitted to NERL were screened using the same instrument. The head-space reading for the liquid sample measured mercury vapor concentrations greater than 10,000 ng/m^3. The head-space reading for the solid sample measured mercury vapor at concentrations greater than 11,000 ng/m^3. Based on results from both visual inspection of the samples and the mercury vapor analyzer readings, NERL concluded that the samples contained mercury and no further testing was warranted [140].

Analytical Results of START Soil/Source Samples

During the March 2004 source sampling event, on behalf of EPA and in cooperation with NH DES, Weston MNH personnel collected 12 soil/source samples (SO-01 through SO-05, SO-08, SO-08A, and SO-09 through SO-13) from soil borings advanced through the 40-mil liner on the Chlor-Alkali property in order to determine the presence of any hazardous substances that may be associated with the Landfill source. The soil borings from which these soil/source samples were collected were subsequently completed as monitoring wells. Once the soil/source samples were collected, all samples were relinquished to START, through proper chain-of-custody procedures, on the Fraser Paper property. START completed the remaining sample shipping and chain-of-custody activities. Samples SO-01 through SO-05 and SO-08 through SO-13 were analyzed through EPA Contract Laboratory Program (CLP) laboratories for SVOCs, pesticides, PCBs, metals, cyanide, and dioxin/furan congeners, and through Delivery of Analytical Services (DAS) laboratories for VOCs, monomethyl mercury, and asbestos. Sample SO-08A was analyzed for asbestos only through a DAS laboratory. The analytical method used for VOC, SVOC, pesticide, and PCB analyses was CLP Scope of Work (SOW) OLM04.3. The analytical method used for metals and cyanide analyses was CLP SOW ILM05.2. The analytical method used for monomethyl mercury analysis was modified EPA Method 1630. The analytical method used for dioxin/furan analysis was EPA CLP Method DLM01.4. The analytical method used for asbestos analysis was bulk asbestos analysis by Polarized Light Microscopy with Dispersion Staining [27; 109-120]. Sample locations are illustrated on Figures 13 through 15 and described in Table 9.

Table 9

Landfill Source Sample Summary: Chlor-Alkali Facility (former)
Samples Collected for START from 1 March through 4 March 2004

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source						
SO-01 (MS/MSD)	A1C37 MA1C37 D14427	3/3/04 0830	Grab	3-5 ft (VOCs collected at approx. 3-4 ft)	Sample collected from soil boring MW-11A located within the capped area in the southern portion of the Chlor-Alkali property. Material was blue-green with a crayon-like texture, CLAY with silt. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 38.94" N 71° 10' 01.92" W
SO-02	A1C38 MA1C38 D14428	3/3/04 1045	Grab	24-25.5 ft (VOCs collected at approx. 24-25 ft)	Sample collected from soil boring MW-11A located within the capped area in the southern portion of the Chlor-Alkali property. Material was olive gray, fine-to-medium SAND with silt and fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 38.94" N 71° 10' 01.92" W
SO-03	A1C39 MA1C39 D14429	3/1/04 1655	Grab	1.5-6 ft	Sample collected from soil boring MW-13B located within the capped area in the northwestern portion of the Chlor-Alkali property. Material was dark gray, fine SAND, with silt, medium-to-coarse sand, and fine gravel. The material contained broken brick and concrete fragments. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 44.39" N 71° 10' 01.66" W
SO-04	A1C40 MA1C40 D14430	3/4/04 1205	Grab	12-16 ft (VOCs collected at approx. 15 ft)	Duplicate of sample SO-08, collected for quality control.	44° 28' 45.27" N 71° 10' 00.07" W
SO-05	A1C41 MA1C41 D14431	3/2/04 1430	Grab	23-25 ft (VOCs collected at 23, 23.3, and 23.5 ft)	Sample collected from soil boring MW-13B located within the capped area in the northwestern portion of the Chlor-Alkali property. Material was light brown, fine-to-medium SAND, with silt and medium-to-coarse gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 44.39" N 71° 10' 01.66" W

Table 9

Landfill Source Sample Summary: Chlor-Alkali Facility (former)
Samples Collected for START from 1 March through 4 March 2004 (Continued)

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source (Continued)						
SO-08	A1C44 MA1C44 D14434	3/4/04 1205	Grab	12-16 ft (VOCs collected at approx. 15 ft)	Sample collected from soil boring MW-17 located within the capped area in the northern portion of the Chlor-Alkali property. Material was dark brown, medium-to-coarse SAND, and silt and medium gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 45.27" N 71° 10' 00.07" W
SO-08A	D14461	3/4/04 1500	Grab	Depth unknown	Sample collected from soil boring MW-17 located within the capped area in the northern portion of the Chlor-Alkali property. Material was yellow and fibrous, and contained white needle fibers. Depth of material is unknown. Material encountered in one of the 3-inch split-spoons during the decontamination process. No air monitoring readings recorded.	44° 28' 45.27" N 71° 10' 00.07" W
SO-09	A1C45 MA1C45 D14435	3/4/04 1400	Grab	16-17.5 ft (VOCs collected from approx. 16.5-17 ft)	Sample collected from soil boring MW-17 located within the capped area in the northern portion of the Chlor-Alkali property. Material was light gray and dark brown, medium-to-coarse SAND, with silt and fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 45.27" N 71° 10' 00.07" W
SO-10	A1C46 MA1C46 D14436	3/4/04 1345	Grab	3-5 ft (VOCs collected from 3 ft, 10 inches; 4 ft, 0.5 inches; and 4 ft, 2 inches)	Sample collected from soil boring MW-21 located within the capped area in the southwestern portion of the Chlor-Alkali property. Material was medium-to-coarse SAND with coarse sand and fine gravel. Color of material was not recorded. Effervescence occurred during VOC sampling; the vial septa did not bulge; therefore, the sample was sent to laboratory for analysis. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 40.50" N 71° 10' 03.72" W

Table 9

Landfill Source Sample Summary: Chlor-Alkali Facility (former)
Samples Collected for START from 1 March through 4 March 2004 (Concluded)

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source (Concluded)						
SO-11	A1C47 MA1C47 D14437	3/4/04 1420	Grab	6-8 ft (VOCs collected from 7 ft, 5 inches; 7 ft, 7 inches; and 7 ft, 9 inches)	Sample collected from soil boring MW-21 located within the capped area in the southwestern portion of the Chlor-Alkali property. Material was dark brown, medium-to-coarse SAND, and fine-to-medium gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 40.50" N 71° 10' 03.72" W
SO-12	A1C48 MA1C48 D14438	3/3/04 1500	Grab	6-9 ft (VOCs collected from 7-8 ft)	Sample collected from soil boring MW-22 located outside the capped area in the eastern portion of the Chlor-Alkali property. Material was dark brown, medium-to-coarse SAND, and silt and fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 41.24" N 71° 09' 59.95" W
SO-13	A1C49 MA1C49 D14439	3/3/04 1630	Grab	15-18.5 ft (VOCs collected from 15.5-16 ft)	Sample collected from soil boring MW-22 located outside the capped area in the eastern portion of the Chlor-Alkali property. Material was dark brown, medium-to-coarse SAND, and medium-to-coarse gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 41.24" N 71° 09' 59.95" W

PID	=	Photoionization Detector.	°	=	Degrees.
MS/MSD	=	Matrix Spike/Matrix Spike Duplicate.	'	=	Minutes.
VOCs	=	Volatile Organic Compounds.	"	=	Seconds.
ft	=	Feet.	N	=	North.
MVA	=	Mercury Vapor Analyzer.	W	=	West.
approx.	=	Approximately.	No.	=	Number.
FID	=	Flame Ionization Detector.			
Chlor-Alkali	=	Chlor-Alkali Facility (former).			
mg/m^3	=	Milligrams per cubic meter.			
Weston MNH	=	Weston Solutions, Inc., Manchester, New Hampshire.			

All soil/source samples were collected by Weston Solutions, Inc., Manchester, New Hampshire (Weston MNH) personnel. Sample descriptions and sample depths were provided by Weston MNH. All samples were relinquished by Weston MNH to START at an off-site location.

[27; 109-120; 149]

Table 10 is a summary of organic compounds, inorganic elements, and asbestos, with the exception of dioxin/furan congeners, detected through DAS and CLP analyses of START soil/source samples collected from the Landfill source on the Chlor-Alkali property. All substances detected greater than the Contract Required Quantitation Limit (CRQL) (for organic analyses) or Instrument Detection Limit

(IDL) (for inorganic analyses) are listed in the following table. Soil/source sample analytical results are compared to NH DES Risk Characterization and Management Policy (RCMP) Background Concentrations of Metals in Soil and Method 1 Category S-3 Soil Standards. Category S-3 Soil Standards are used for comparison because the soil beneath the 40-mil liner within the landfill has a low frequency of use and intensity of use, and is not accessible to the public. In addition, background concentrations for naturally occurring metals in the vicinity of Chlor-Alkali are unknown. Therefore, START compared inorganic analytical results to available NH DES RCMP Background Concentrations of Metals in Soil [121]. Bolded substances and concentrations indicate the value exceeds the bolded NH DES RCMP Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 NH S-3 Soil Standard. Complete analytical results of START soil/source samples including quantitation and detection limits are presented in Attachment C. Analytical results for dioxin/furan congeners are presented in Table 11.

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-01	**INORGANICS**			
	Aluminum	31,100 J mg/kg	NA	NA
	Barium	399 mg/kg	NA	3,400 mg/kg
	Beryllium	**3.4 mg/kg**	**0.95 mg/kg**	**1 mg/kg**
	Calcium	163,000 J mg/kg	NA	NA
	Chromium	**56.2 mg/kg**	**33 mg/kg**	540 or 5,000 [a] mg/kg
	Cobalt	1.6 mg/kg	NA	NA
	Iron	9,020 J mg/kg	NA	NA
	Lead	16.2 J mg/kg	51 mg/kg	400 mg/kg
	Magnesium	18,700 mg/kg	NA	NA
	Manganese	1,300 J mg/kg	NA	NA
	Mercury	0.20 J mg/kg	0.31 mg/kg	13 mg/kg
	Nickel	14.5 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	3,000 mg/kg	NA	NA
	Vanadium	21.3 mg/kg	NA	NA
	Zinc	**104 mg/kg**	**98 mg/kg**	5,000 mg/kg
	Monomethyl Mercury	0.411 J ng/g	NA	NA

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-02	**VOCs**			
	Acetone	15 J EB µg/kg	-	9,000 µg/kg
	INORGANICS			
	Aluminum	5,280 J mg/kg	NA	NA
	Arsenic	1.4 J mg/kg	11 mg/kg	11 mg/kg
	Barium	26.0 mg/kg	NA	3,400 mg/kg
	Beryllium	0.23 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.12 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	1,690 J mg/kg	NA	NA
	Chromium	16.6 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	3.1 mg/kg	NA	NA
	Copper	6.5 mg/kg	NA	NA
	Iron	10,000 J mg/kg	NA	NA
	Lead	10.9 mg/kg	51 mg/kg	400 mg/kg
	Magnesium	3,610 mg/kg	NA	NA
	Manganese	131 J mg/kg	NA	NA
	Nickel	5.9 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	787 mg/kg	NA	NA
	Vanadium	10.3 mg/kg	NA	NA
	Zinc	29.9 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	0.030 J ng/g	NA	NA

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-03	**SVOCs**			
	Acenaphthene	530 J µg/kg	-	270,000 µg/kg
	Anthracene	6,500 µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	37,000 [b] µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	**25,000 µg/kg**	-	**4,000 µg/kg**
	Benzo(b)fluoranthene	28,000 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	15,000 J µg/kg	-	5.0 E + 6 [c] µg/kg
	Benzo(k)fluoranthene	19,000 µg/kg	-	400,000 µg/kg
	Carbazole	1,300 J µg/kg	-	NA
	Chrysene	35,000 [b] µg/kg	-	4.0 E + 6 µg/kg
	Dibenzo(a,h)anthracene	**7,300 µg/kg**	-	**4,000 µg/kg**
	Fluoranthene	48,000 [b] µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	740 J µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	15,000 µg/kg	-	40,000 µg/kg
	Phenanthrene	13,000 µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	46,000 [b] µg/kg	-	5.0 E + 6 [c] µg/kg
	PESTICIDES			
	DDE, 4'4-	15 µg/kg	-	56,000 µg/kg
	INORGANICS			
	Aluminum	4,880 J mg/kg	NA	NA
	Arsenic	4.1 J mg/kg	11 mg/kg	11 mg/kg
	Barium	47.6 mg/kg	NA	3,400 mg/kg
	Beryllium	0.25 mg/kg	0.95 mg/kg	1 mg/kg

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil**		NH DES RCMP Method 1 Category S-3 Soil Standard**	
SO-03 (Concl.)	**INORGANICS (Concluded)**							
	Cadmium	9.5	J	mg/kg	1.9	mg/kg	230	mg/kg
	Calcium	15,700	J	mg/kg	NA		NA	
	Chromium	6.8		mg/kg	33	mg/kg	540 or 5,000 [a]	mg/kg
	Cobalt	149		mg/kg	NA		NA	
	Copper	961		mg/kg	NA		NA	
	Iron	110,000	J	mg/kg	NA		NA	
	Lead	50.9		mg/kg	51	mg/kg	400	mg/kg
	Magnesium	2,090		mg/kg	NA		NA	
	Manganese	181	J	mg/kg	NA		NA	
	Mercury	**5.2**	**J**	**mg/kg**	**0.31**	**mg/kg**	13	mg/kg
	Nickel	**42.3**		**mg/kg**	**23**	**mg/kg**	3,900	mg/kg
	Potassium	939	J	mg/kg	NA		NA	
	Silver	0.58		mg/kg	NA		200	mg/kg
	Thallium	2.8		mg/kg	NA		NA	
	Vanadium	13.1		mg/kg	NA		NA	
	Zinc	**1,390**		**mg/kg**	**98**	**mg/kg**	5,000	mg/kg
	Monomethyl Mercury	0.325	J	ng/g	NA		NA	
	ASBESTOS							
	Chrysotile	< 1		%	-		NA	

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil**		NH DES RCMP Method 1 Category S-3 Soil Standard**	
SO-04	**VOCs**							
	Chloroform	59	J	µg/kg	-		100	µg/kg
	Tetrachloroethene	67	J	µg/kg	-		2,000	µg/kg
	SVOCs							
	Benzaldehyde	390	J	µg/kg	-		NA	
	INORGANICS							
	Aluminum	2,620	J	mg/kg	NA		NA	
	Arsenic	5.8	J	mg/kg	11	mg/kg	11	mg/kg
	Barium	46.6		mg/kg	NA		3,400	mg/kg
	Beryllium	0.34		mg/kg	0.95	mg/kg	1	mg/kg
	Calcium	3,890	J	mg/kg	NA		NA	
	Chromium	9.2		mg/kg	33	mg/kg	540 or 5,000	mg/kg
	Cobalt	2.6		mg/kg	NA		NA	
	Copper	19.8		mg/kg	NA		NA	
	Cyanide	0.58		mg/kg	-		500	mg/kg
	Iron	12,500	J	mg/kg	NA		NA	
	Lead	**56.2**		**mg/kg**	**51**	**mg/kg**	400	mg/kg
	Magnesium	589		mg/kg	NA		NA	
	Manganese	116	J	mg/kg	NA		NA	
	Mercury	**3.7**	**J**	**mg/kg**	**0.31**	**mg/kg**	13	mg/kg
	Nickel	8.1		mg/kg	23	mg/kg	3,900	mg/kg
	Potassium	371		mg/kg	NA		NA	
	Thallium	2.1		mg/kg	NA		NA	
	Vanadium	19.9		mg/kg	NA		NA	
	Monomethyl Mercury	0.261	J	ng/g	NA		NA	

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-05	**VOCs**			
	Acetone	14 J EB µg/kg	-	9,000 µg/kg
	INORGANICS			
	Aluminum	6,760 J mg/kg	NA	NA
	Arsenic	0.77 J mg/kg	11 mg/kg	11 mg/kg
	Barium	54.6 mg/kg	NA	3,400 mg/kg
	Beryllium	0.29 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.18 J mg/kg	1.9 mg/kg	230 mg/kg
	Chromium	7.4 mg/kg	33 mg/kg	540 or 5,000 * mg/kg
	Cobalt	3.6 mg/kg	NA	NA
	Copper	15.9 mg/kg	NA	NA
	Iron	11,200 J mg/kg	NA	NA
	Lead	4.0 mg/kg	51 mg/kg	400 mg/kg
	Magnesium	2,990 mg/kg	NA	NA
	Manganese	195 J mg/kg	NA	NA
	Mercury	**0.60 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	5.6 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	1,660 mg/kg	NA	NA
	Sodium	2,160 mg/kg	NA	NA
	Thallium	1.0 mg/kg	NA	NA
	Vanadium	13.5 mg/kg	NA	NA
	Zinc	51.0 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	0.905 J ng/g	NA	NA

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-08	**VOCs**			
	Acetone	17 J EB µg/kg	-	9,000 µg/kg
	Chloroform	**110 J µg/kg**	-	**100 µg/kg**
	Tetrachloroethene	140 J µg/kg	-	2,000 µg/kg
	Trichloroethene	11 J µg/kg	-	800 µg/kg
	SVOCs			
	Benzaldehyde	1,400 J µg/kg	-	NA
	Butylbenzylphthalate	340 J µg/kg	-	NA
	Carbazole	390 J µg/kg	-	NA
	Chloronaphthalene, 2-	350 J µg/kg	-	NA
	Dichlorophenol, 2,4-	380 J µg/kg	-	700 µg/kg
	Indeno(1,2,3-cd)pyrene	350 J µg/kg	-	40,000 µg/kg
	Methylnaphthalene, 2-	340 J µg/kg	-	150,000 µg/kg
	Phenanthrene	340 J µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	460 µg/kg	-	5.0 E + 6 [c] µg/kg
	INORGANICS			
	Aluminum	7,430 J mg/kg	NA	NA
	Arsenic	6.6 J mg/kg	11 mg/kg	11 mg/kg
	Barium	55.8 mg/kg	NA	3,400 mg/kg
	Beryllium	0.48 mg/kg	0.95 mg/kg	1 mg/kg
	Calcium	25,100 J mg/kg	NA	NA
	Chromium	10.5 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	2.6 mg/kg	NA	NA
	Copper	20.2 mg/kg	NA	NA
	Cyanide	0.74 mg/kg	-	500 mg/kg

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-08 (Concl.)	**INORGANICS (Concluded)**			
	Iron	12,700 J mg/kg	NA	NA
	Lead	**69.2 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	2,010 mg/kg	NA	NA
	Manganese	195 J mg/kg	NA	NA
	Mercury	**1.5 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	7.1 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	618 mg/kg	NA	NA
	Thallium	1.7 mg/kg	NA	NA
	Vanadium	20.9 mg/kg	NA	NA
	Monomethyl Mercury	0.778 J ng/g	NA	NA
	ASBESTOS			
	Chrysotile	Trace	-	NA
SO-08A	**ASBESTOS**			
	Cellulose	~5 %	-	NA
	Mineral Wool*	79 %	-	NA
SO-09	**VOCs**			
	Acetone	360 J EB µg/kg	-	9,000 µg/kg
	INORGANICS			
	Aluminum	3,340 J mg/kg	NA	NA
	Arsenic	4.0 J mg/kg	11 mg/kg	11 mg/kg
	Barium	30.7 mg/kg	NA	3,400 mg/kg
	Beryllium	0.39 mg/kg	0.95 mg/kg	1 mg/kg

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-09 (Concl.)	**INORGANICS (Concluded)**			
	Cadmium	0.36 J mg/kg	1.9 mg/kg	230 mg/kg
	Chromium	8.3 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	2.3 mg/kg	NA	NA
	Copper	45.7 mg/kg	NA	NA
	Cyanide	0.25 mg/kg	-	500 mg/kg
	Iron	7,640 J mg/kg	NA	NA
	Lead	**140 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	986 mg/kg	NA	NA
	Manganese	60.8 J mg/kg	NA	NA
	Mercury	**1.6 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	6.0 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	532 mg/kg	NA	NA
	Thallium	1.1 mg/kg	NA	NA
	Vanadium	14.1 mg/kg	NA	NA
	Zinc	46.4 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	8.292 J ng/g	NA	NA
SO-10	**VOCs**			
	Acetone	190 J EB µg/kg	-	9,000 µg/kg
	Butanone, 2-	11 J µg/kg	-	2,000 µg/kg
	Carbon Tetrachloride	51 J µg/kg	-	12,000 µg/kg
	Chloroform	**530 [b] J µg/kg**	-	**100 µg/kg**

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-10 (Cont.)	**SVOCs**					
	Acenaphthene	340	J	µg/kg	-	270,000 µg/kg
	Anthracene	2,300		µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	16,000		µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	**13,000**		**µg/kg**	-	**4,000 µg/kg**
	Benzo(b)fluoranthene	12,000		µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	5,100		µg/kg	-	5.0 E + 6 µg/kg
	Benzo(k)fluoranthene	12,000		µg/kg	-	400,000 µg/kg
	Carbazole	470	J	µg/kg	-	NA
	Chrysene	15,000		µg/kg	-	4.0 E + 6 µg/kg
	Dibenzo(a,h)anthracene	2,600		µg/kg	-	4,000 µg/kg
	Fluoranthene	20,000 [b]		µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	380	J	µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	5,700		µg/kg	-	40,000 µg/kg
	Phenanthrene	6,300		µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	20,000 [b]		µg/kg	-	5.0 E + 6 [c] µg/kg
	PESTICIDES					
	Chlordane, gamma-	14		µg/kg	-	19,000 µg/kg
	DDE, 4'4-	11	J	µg/kg	-	56,000 µg/kg
	PCBs					
	Aroclor-1254	190	J	µg/kg	-	2,000 µg/kg
	INORGANICS					
	Aluminum	6,640	J	mg/kg	NA	NA
	Antimony	**7.5**	**J**	**mg/kg**	**1.64 mg/kg**	26 mg/kg
	Arsenic	**39.5**	**J**	**mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	876		mg/kg	NA	3,400 mg/kg

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil**		NH DES RCMP Method 1 Category S-3 Soil Standard**	
SO-10 (Concl.)	**INORGANICS (Concluded)**							
	Beryllium	0.40		mg/kg	0.95	mg/kg	1	mg/kg
	Cadmium	1.4	J	mg/kg	1.9	mg/kg	230	mg/kg
	Calcium	30,400	J	mg/kg	NA		NA	
	Chromium	25.1		mg/kg	33	mg/kg	540 or 5,000 *	mg/kg
	Cobalt	13.4		mg/kg	NA		NA	
	Copper	109		mg/kg	NA		NA	
	Cyanide	0.35		mg/kg	-		500	mg/kg
	Iron	46,100	J	mg/kg	NA		NA	
	Lead	**178**		**mg/kg**	**51**	**mg/kg**	400	mg/kg
	Magnesium	7,700		mg/kg	NA		NA	
	Manganese	308	J	mg/kg	NA		NA	
	Mercury	**2.6**	**J**	**mg/kg**	**0.31**	**mg/kg**	13	mg/kg
	Nickel	**30.7**		**mg/kg**	**23**	**mg/kg**	3,900	mg/kg
	Potassium	1,570		mg/kg	NA		NA	
	Selenium	1.5	J	mg/kg	5	mg/kg	4,200	mg/kg
	Thallium	2.4		mg/kg	NA		NA	
	Vanadium	30.0		mg/kg	NA		NA	
	Zinc	**159**		**mg/kg**	**98**	**mg/kg**	5,000	mg/kg
	Monomethyl Mercury	10.577	J	ng/g	NA		NA	
	ASBESTOS							
	Chrysotile	Trace			-		NA	

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil**		NH DES RCMP Method 1 Category S-3 Soil Standard**	
SO-11	**VOCs**							
	Chloroform	72	J	µg/kg	-		100	µg/kg
	SVOCs							
	Anthracene	2,000	J	µg/kg	-		1.7 E + 6	µg/kg
	Benzo(a)anthracene	16,000		µg/kg	-		40,000	µg/kg
	Benzo(a)pyrene	**13,000**		**µg/kg**	-		**4,000**	**µg/kg**
	Benzo(b)fluoranthene	13,000		µg/kg	-		400,000	µg/kg
	Benzo(g,h,i)perylene	7,500		µg/kg	-		5.0 E + 6 [c]	µg/kg
	Benzo(k)fluoranthene	12,000		µg/kg	-		400,000	µg/kg
	Carbazole	460	J	µg/kg	-		NA	
	Chrysene	17,000		µg/kg	-		4.0 E + 6	µg/kg
	Dibenzo(a,h)anthracene	3,400		µg/kg	-		4,000	µg/kg
	Fluoranthene	20,000 [b]		µg/kg	-		5.0 E + 6	µg/kg
	Indeno(1,2,3-cd)pyrene	7,300		µg/kg	-		40,000	µg/kg
	Phenanthrene	5,300		µg/kg	-		5.0 E + 6 [c]	µg/kg
	Pyrene	21,000 [b]		µg/kg	-		5.0 E + 6 [c]	µg/kg
	PESTICIDES							
	Chlordane, gamma-	16		µg/kg	-		19,000	µg/kg
	DDE, 4'4-	11	J	µg/kg	-		56,000	µg/kg
	INORGANICS							
	Aluminum	7,070	J	mg/kg	NA		NA	
	Antimony	**7.4**	**J**	**mg/kg**	**1.64**	**mg/kg**	26	mg/kg
	Arsenic	**35.6**	**J**	**mg/kg**	**11**	**mg/kg**	**11**	**mg/kg**
	Barium	1,160		mg/kg	NA		3,400	mg/kg
	Beryllium	0.43		mg/kg	0.95	mg/kg	1	mg/kg

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-11 (Concl.)	**INORGANICS (Concluded)**			
	Calcium	13,900 J mg/kg	NA	NA
	Chromium	20.3 mg/kg	33 mg/kg	540 or 5,000* mg/kg
	Cobalt	7.6 mg/kg	NA	NA
	Copper	59.9 mg/kg	NA	NA
	Cyanide	0.14 mg/kg	-	500 mg/kg
	Iron	44,300 J mg/kg	NA	NA
	Lead	**172 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	4,170 mg/kg	NA	NA
	Manganese	324 J mg/kg	NA	NA
	Mercury	**3.1 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	20.7 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	1,140 mg/kg	NA	NA
	Selenium	0.87 J mg/kg	5 mg/kg	4,200 mg/kg
	Thallium	2.4 mg/kg	NA	NA
	Vanadium	21.5 mg/kg	NA	NA
	Zinc	**184 mg/kg**	**98 mg/kg**	5,000 mg/kg
	Monomethyl Mercury	1.525 J ng/g	NA	NA
	ASBESTOS			
	Chrysotile	Trace	-	NA

Table 10

Summary of Analytical Results: Landfill Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-12	**VOCs**			
	Acetone	18 J EB µg/kg	-	9000 µg/kg
	SVOCs			
	Benzo(a)anthracene	590 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	500 µg/kg	-	4,000 µg/kg
	Benzo(b)fluoranthene	400 µg/kg	-	400,000 µg/kg
	Benzo(k)fluoranthene	490 µg/kg	-	400,000 µg/kg
	Chrysene	690 µg/kg	-	4.0 E + 6 µg/kg
	Fluoranthene	1,200 µg/kg	-	5.0 E + 6 µg/kg
	Phenanthrene	1,200 µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	1,500 µg/kg	-	5.0 E + 6 [c] µg/kg
	INORGANICS			
	Aluminum	6,070 J mg/kg	NA	NA
	Arsenic	**17.5 J mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	96.9 mg/kg	NA	3,400 mg/kg
	Beryllium	0.38 mg/kg	0.95 mg/kg	1 mg/kg
	Chromium	9.3 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	5.2 mg/kg	NA	NA
	Copper	58.7 mg/kg	NA	NA
	Cyanide	0.33 mg/kg	-	500 mg/kg
	Iron	14,900 J mg/kg	NA	NA
	Lead	**93.7 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	2,880 mg/kg	NA	NA
	Manganese	226 J mg/kg	NA	NA

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-12 (Concl.)	**INORGANICS (Concluded)**			
	Mercury	2.2 J mg/kg	0.31 mg/kg	13 mg/kg
	Nickel	10.4 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	883 mg/kg	NA	NA
	Selenium	0.80 J mg/kg	5.0 mg/kg	4,200 mg/kg
	Thallium	1.5 mg/kg	NA	NA
	Vanadium	20.6 mg/kg	NA	NA
	Zinc	75.5 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	2.630 J ng/g	NA	NA
SO-13	**INORGANICS**			
	Aluminum	5,810 J mg/kg	NA	NA
	Barium	60.2 mg/kg	NA	3,400 mg/kg
	Beryllium	0.39 mg/kg	0.95 mg/kg	1 mg/kg
	Calcium	2,870 J mg/kg	NA	NA
	Chromium	10.0 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	7.9 mg/kg	NA	NA
	Copper	12.0 mg/kg	NA	NA
	Iron	14,400 J mg/kg	NA	NA
	Lead	7.9 mg/kg	51 mg/kg	400 mg/kg
	Magnesium	3,160 mg/kg	NA	NA
	Manganese	1,060 J mg/kg	NA	NA
	Mercury	0.23 J mg/kg	0.31 mg/kg	13 mg/kg
	Nickel	7.4 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	958 mg/kg	NA	NA

Table 10

Summary of Analytical Results: Landfill Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil**	NH DES RCMP Method 1 Category S-3 Soil Standard**
SO-13 (Concl.)	**INORGANICS (Concluded)**			
	Thallium	2.9 mg/kg	NA	NA
	Vanadium	18.1 mg/kg	NA	NA
	Zinc	43.4 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	0.597 J ng/g	NA	NA
	ASBESTOS			
	Chrysotile	Trace	-	NA

NA	=	Not available.	~	=	Approximate.
-	=	Not applicable.	Cont.	=	Continued.
mg/kg	=	Milligrams per kilogram.	Concl.	=	Concluded.
ng/g	=	Nanograms per gram.	%	=	Percent.
µg/kg	=	Micrograms per kilogram.	<	=	Less than.
PCBs	=	Polychlorinated Biphenyls.			
VOCs	=	Volatile Organic Compounds.			
SVOCs	=	Semivolatile Organic Compounds.			
NH DES	=	New Hampshire Department of Environmental Services.			
RCMP	=	Risk Characterization and Management Policy.			
*	=	Mineral wool is defined as fibers made by blowing air or steam through slag.			
J	=	Quantitation is approximate due to limitations identified during the quality control review.			
EB	=	The compound was identified in an aqueous equipment blank that was used to assess field contamination associated with soil/source samples.			

[a] Both the New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for chromium (III) at 5,000 mg/kg and chromium (VI) at 540 mg/kg are listed.
[b] Result reported from diluted analysis.
[c] The New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for benzo(g,h,i)perylene, phenanthrene, and pyrene is a total of <5,000 for all three semivolatile organic compounds.

** Analytical results are compared to New Hampshire Department of Environmental Services Risk Characterization and Management Policy 1998 (revised 2001) Background Concentration of Metals in Soil Standards and/or the 1998 (revised 2001) NH DES RCMP Method 1 NH S-3 Soil Standard.

Bolded substances and concentrations indicate the value exceeds the bolded New Hampshire Department of Environmental Services Risk Characterization and Management Policy Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 NH S-3 Soil Standard.

[109-117; 119; 120; 121; 148]

Table 11 is a summary of analytical data of dioxin/furan congener Toxicity Equivalency Factor (TEF) values for START soil/source samples colleted from the Landfill source on the Chlor-Alkali property. Dioxin/furan congeners differ in their relative toxicity. The most toxic congener is 2,3,7,8-tetrachlorodibenzodioxin (TCDD). TEFs allow the toxicity of a specific congener to be compared relative to 2,3,7,8-TCDD (which has a TEF equal to 1). The toxicity of each congener, expressed as a TEF, multiplied by the congener's concentration in a sample, equals the Toxicity Equivalency Quotient (TEQ). To estimate the toxicity of an entire sample, a widely accepted procedure is used, in which the TEQs for each congener in a sample are summed to give the total TEQ. The total TEQ expresses the overall toxicity of the entire group of dioxin/furan congeners in a specific sample [105; 106; 122]. Soil/source sample analytical results are compared to NH DES RCMP Risk-Based S-3 Standards and EPA Region III Risk-Based Industrial Soil Standards. NH DES RCMP Risk-Based S-3 Standards were used because NH DES RCMP Method 1 S-3 standards do not exist for dioxin/furan congeners. Complete analytical results of START soil/source samples, including quantitation and detection limits, are presented in Attachment C.

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004

Sample Location	Congener	Sample Concentration			TEF [a]	TEQ [b]		NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [c]
SO-01	**DIOXINS/FURANS**								
	HpCDD, 1,2,3,4,6,7,8-	5.57	J EB	ng/kg	0.01	0.0557	ng/kg	NA	NA
	OCDD	44.8	J EB	ng/kg	0.0001	0.00448	ng/kg	NA	NA
	TCDF, 2,3,7,8-	42.1	J EB	ng/kg	0.1	4.21	ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	14.9	J	ng/kg	0.05	0.745	ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	11.5	J EB	ng/kg	0.5	5.75	ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	19.0	J EB	ng/kg	0.1	1.90	ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	4.30	J	ng/kg	0.1	0.43	ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	1.35	J	ng/kg	0.1	0.135	ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	8.58	J EB	ng/kg	0.01	0.0858	ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	3.80		ng/kg	0.01	0.038	ng/kg	NA	NA
	OCDF	23.1	J EB	ng/kg	0.0001	0.00231	ng/kg	NA	NA
	Total Dioxin/Furan TEQ	13	J	ng/kg				NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-02	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	0.182 J ng/kg	1.0	0.182 ng/kg	300 ng/kg	19 ng/kg
	HpCDD, 1,2,3,4,6,7,8-	0.319* EB ng/kg	0.01	0.00319 ng/kg	NA	NA
	OCDD	3.05 J EB ng/kg	0.0001	0.000305 ng/kg	NA	NA
	TCDF, 2,3,7,8-	5.55 EB ng/kg	0.1	0.555 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	1.04 J ng/kg	0.05	0.052 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	1.00 J EB ng/kg	0.5	0.5 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	1.11 J EB ng/kg	0.1	0.111 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	0.244* ng/kg	0.1	0.0244 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	0.141 J ng/kg	0.1	0.0141 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	0.452 J EB ng/kg	0.01	0.00452 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	0.242 J ng/kg	0.01	0.00242 ng/kg	NA	NA
	OCDF	2.93 J EB ng/kg	0.0001	0.000293 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	1.4 J ng/kg	-	-	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-03	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	4.62* ng/kg	1.0	4.62 ng/kg	300 ng/kg	19 ng/kg
	PeCDD, 1,2,3,7,8-	1.57* ng/kg	1.0	1.57 ng/kg	NA	NA
	HpCDD, 1,2,3,4,6,7,8-	10.1 EB ng/kg	0.01	0.101 ng/kg	NA	NA
	OCDD	43.9 EB ng/kg	0.0001	0.00439 ng/kg	NA	NA
	TCDF, 2,3,7,8-	16,900 J EB$ ng/kg	0.1	1,690 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	10,900 $ ng/kg	0.05	545 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	6,590 EB$ ng/kg	0.5	3,295 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	14,400 EB$ ng/kg	0.1	1,440 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	3,280 $ ng/kg	0.1	328 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	552 ng/kg	0.1	55.2 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	192 ng/kg	0.1	19.2 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	3,790 J EB$ ng/kg	0.01	37.9 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	1,350 ng/kg	0.01	13.5 ng/kg	NA	NA
	OCDF	2,370 EB ng/kg	0.0001	0.237 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	7,400 J ng/kg	-	-	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-04	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	0.269 J ng/kg	1.0	0.269 ng/kg	300 ng/kg	19 ng/kg
	OCDD	4.44 J EB ng/kg	0.0001	0.000444 ng/kg	NA	NA
	TCDF, 2,3,7,8-	89.8 J EB ng/kg	0.1	8.98 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	14.8 ng/kg	0.05	0.74 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	8.32 EB ng/kg	0.5	4.16 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	10.6 EB ng/kg	0.1	1.06 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	2.14 J ng/kg	0.1	0.214 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	3.33 J EB ng/kg	0.01	0.0333 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	1.54 J ng/kg	0.01	0.0154 ng/kg	NA	NA
	OCDF	4.97 J EB ng/kg	0.0001	0.000497 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	15 J ng/kg	-	-	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-05	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	0.183* ng/kg	1.0	0.183 ng/kg	300 ng/kg	19 ng/kg
	HpCDD, 1,2,3,4,6,7,8-	0.262 J EB ng/kg	0.01	0.00262 ng/kg	NA	NA
	OCDD	2.26 J EB ng/kg	0.0001	0.000226 ng/kg	NA	NA
	TCDF, 2,3,7,8-	116 EB ng/kg	0.1	11.6 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	65.8 ng/kg	0.05	3.29 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	57.3 EB ng/kg	0.5	28.65 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	91.0 EB ng/kg	0.1	9.1 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	21.2 ng/kg	0.1	2.12 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	6.28 ng/kg	0.1	0.628 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	1.79 J ng/kg	0.1	0.179 ng/kg	NA	NA
	HpCDF,1,2,3,4,6,7,8-	29.5 J EB ng/kg	0.01	0.295 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	12.5 ng/kg	0.01	0.125 ng/kg	NA	NA
	OCDF	29.9 EB ng/kg	0.0001	0.00299 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	56 J ng/kg			NA	0NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration			TEF [a]	TEQ [b]		NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-08	**DIOXINS/FURANS**								
	HpCDD, 1,2,3,4,6,7,8-	0.792	J EB	ng/kg	0.01	0.00792	ng/kg	NA	NA
	OCDD	6.79	J EB	ng/kg	0.0001	0.000679	ng/kg	NA	NA
	TCDF, 2,3,7,8-	126	EB	ng/kg	0.1	12.6	ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	15.8		ng/kg	0.05	0.79	ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	10.5	EB	ng/kg	0.5	5.25	ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	15.1	EB	ng/kg	0.1	1.51	ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	2.91	J	ng/kg	0.1	0.291	ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	5.72	J EB	ng/kg	0.01	0.0572	ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	2.53	J	ng/kg	0.01	0.0253	ng/kg	NA	NA
	OCDF	8.13	J EB	ng/kg	0.0001	0.000813	ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	20	J	ng/kg	-	-		NA	NA
SO-09	**DIOXINS/FURANS**								
	OCDD	3.22	J EB	ng/kg	0.0001	0.000322	ng/kg	NA	NA
	TCDF, 2,3,7,8-	18.9	EB	ng/kg	0.1	1.89	ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	5.63		ng/kg	0.05	0.2815	ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	3.84	J EB	ng/kg	0.5	1.92	ng/kg	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-09 (Concl.)	**DIOXINS/FURANS (Concluded)**					
	HxCDF, 1,2,3,4,7,8-	8.57 EB ng/kg	0.1	0.857 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	1.87 J ng/kg	0.1	0.187 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	0.495 J ng/kg	0.1	0.0495 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	3.74 J EB ng/kg	0.01	0.0374 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	2.12 J ng/kg	0.01	0.0212 ng/kg	NA	NA
	OCDF	6.17 J EB ng/kg	0.0001	0.000617 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	5.2 J ng/kg	-	-	NA	NA
SO-10	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	7.41 ng/kg	1.0	7.41 ng/kg	300 ng/kg	19 ng/kg
	HxCDD, 1,2,3,6,7,8-	2.26 J ng/kg	0.1	0.226 ng/kg	4,000 ng/kg	460 ng/kg
	HpCDD, 1,2,3,4,6,7,8-	24.3 EB ng/kg	0.01	0.243 ng/kg	NA	NA
	OCDD	158 EB ng/kg	0.0001	0.0158 ng/kg	NA	NA
	TCDF, 2,3,7,8-	10,000 J EB& ng/kg	0.1	1,000.0 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	501 ng/kg	0.05	25.05 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	387 EB ng/kg	0.5	193.5 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	277 J EB ng/kg	0.1	27.7 ng/kg	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-10 (Concl)	**DIOXINS/FURANS (Concluded)**					
	HxCDF, 1,2,3,6,7,8-	69.2 ng/kg	0.1	6.92 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	15.6 ng/kg	0.1	1.56 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	10.3 ng/kg	0.1	1.03 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	94.6 J EB ng/kg	0.01	0.946 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	44.8 ng/kg	0.01	0.448 ng/kg	NA	NA
	OCDF	134 EB ng/kg	0.0001	0.0134 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	1,300 J ng/kg	-	-	NA	NA
SO-11	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	8.67 ng/kg	1.0	8.67 ng/kg	300 ng/kg	19 ng/kg
	PeCDD, 1,2,3,7,8-	1.81 J ng/kg	1.0	1.81 ng/kg	NA	NA
	HxCDD, 1,2,3,6,7,8-	3.38 J ng/kg	0.1	0.338 ng/kg	4,000[g] ng/kg	460 [f] ng/kg
	HpCDD, 1,2,3,4,6,7,8-	12.6 EB ng/kg	0.01	0.126 ng/kg	NA	NA
	OCDD	57.5 EB ng/kg	0.0001	0.00575 ng/kg	NA	NA
	TCDF, 2,3,7,8-	8,970 EBS ng/kg	0.1	897.0 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	800 ng/kg	0.05	40 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	567 EB ng/kg	0.5	283.5 ng/kg	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [c]
SO-11 (Concl.)	**DIOXINS/FURANS (Concluded)**					
	HxCDF, 1,2,3,4,7,8-	610 J EB ng/kg	0.1	61.0 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	97.9 ng/kg	0.1	9.79 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	21.1 ng/kg	0.1	2.11 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	30.1 ng/kg	0.1	3.01 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	99.7 J EB ng/kg	0.01	0.997 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	170 ng/kg	0.01	1.7 ng/kg	NA	NA
	OCDF	119 EB ng/kg	0.0001	0.0119 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	1,300 J ng/kg	-	-	NA	NA
SO-12	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	0.327* ng/kg	1.0	0.327 ng/kg	300 ng/kg	19 ng/kg
	HpCDD, 1,2,3,4,6,7,8-	0.868 J EB ng/kg	0.01	0.00868 ng/kg	NA	NA
	OCDD	5.08 J EB ng/kg	0.0001	0.000508 ng/kg	NA	NA
	TCDF, 2,3,7,8-	165 EB ng/kg	0.1	16.5 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	88.3 ng/kg	0.05	4.415 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	74.6 EB ng/kg	0.5	37.3 ng/kg	NA	NA
	HxCDF,1,2,3,4,7,8-	131 EB ng/kg	0.1	13.1 ng/kg	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-12 (Concl.)	**DIOXINS/FURANS (Concluded)**					
	HxCDF, 1,2,3,6,7,8-	35.0 ng/kg	0.1	3.50 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	9.96 ng/kg	0.1	0.996 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	2.30 J ng/kg	0.1	0.230 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	54.1 J EB ng/kg	0.01	0.541 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	21.0 ng/kg	0.01	0.21 ng/kg	NA	NA
	OCDF	52.3 EB ng/kg	0.0001	0.00523 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	77 J ng/kg	-	-	NA	NA
SO-13	**DIOXINS/FURANS**					
	HpCDD, 1,2,3,4,6,7,8-	0.246 J EB ng/kg	0.01	0.00246 ng/kg	NA	NA
	OCDD	2.56 J EB ng/kg	0.0001	0.000256 ng/kg	NA	NA
	TCDF, 2,3,7,8-	4.46 EB ng/kg	0.1	0.446 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	2.19 J ng/kg	0.05	0.1095 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	1.60 J EB ng/kg	0.5	0.8 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	3.12 J EB ng/kg	0.1	0.312 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	0.937 J ng/kg	0.1	0.0937 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	1.44 J EB ng/kg	0.01	0.0144 ng/kg	NA	NA

Table 11

Summary of Analytical Results: Landfill Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 through 4 March 2004 (Concluded)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-13 (Concl.)	**DIOXINS/FURANS (Concluded)**					
	HpCDF, 1,2,3,4,7,8,9-	0.452 J ng/kg	0.01	0.00452 ng/kg	NA	NA
	OCDF	1.68 J EB ng/kg	0.0001	0.000168 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	1.8 J ng/kg	-	-	NA	NA

*	=	Estimated maximum possible concentration (EMPC).	ng/kg	=	Nanograms per kilogram.
$	=	Concentrations reported from a 0.5 gram sample analysis.	NA	=	Not available.
&	=	Concentrations reported from a 0.6 gram sample analysis.	TEF	=	Toxicity Equivalency Factor.
TEQ	=	Toxicity Equivalency Quotient.	RCMP	=	Risk Characterization and Management Policy.
PeCDD	=	Pentachlorodibenzodioxin.	PeCDF	=	Pentachlorodibenzofuran.
TCDD	=	Tetrachlorodibenzo(p)dioxin.	TCDF	=	Tetrachlorodibenzofuran.
HxCDD	=	Hexachlorodibenzodioxin.	HxCDF	=	Hexachlorodibenzofuran.
HpCDD	=	Heptachlorodibenzodioxin.	HpCDF	=	Heptachlorodibenzofuran.
OCDD	=	Octachlorodibenzodioxin.	OCDF	=	Octachlorodibenzofuran.
-	=	Not applicable.	Concl.	=	Concluded.
NH DES	=	New Hampshire Department of Environmental Services.			
J	=	Indicates concentrations reported by the laboratory under the lowest standard.			
EB	=	The compound was identified in an equipment blank that was used to assess field contamination associated with soil/source samples.			
EPA	=	U.S. Environmental Protection Agency.			
[a]	=	TEF values listed are found in "Toxicity Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number 12, December 1998, Table 1, page 778.			
[b]	=	TEQ value equals the product of the congener concentration and its TEF value.			
[c]	=	1998 New Hampshire Department of Environmental Services (NH DES) Risk Characterization and Management Policy (RCMP) Soil Category S-3 Direct Contact Risk-Based Standards are based upon restricted access to the property with a limited potential for exposure, either currently or in the reasonably foreseeable future. 1998 (revised 2001) NH DES RCMP Method 1 Soil Categories S-1 through S-3 Standards do not exist for dioxin/furan congeners.			
[d]	=	The Total Dioxin/Furan TEQ value is the sum of the TEQs for each congener in the given sample. This value is calculated including the estimated maximum possible concentrations.			
[e]	=	2004 U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration.			
[f]	=	U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration is for "hexachlorodibenzodioxin mix"; therefore, START applied standard to all hexachlorodibenzodioxins detected in START soil/source samples.			
[g]	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Soil Category S-3 Direct Contact Risk-Based Standard for hexachlorodibenzodioxin is applied to all hexachlorodibenzodioxins detected in START soil/source samples.			

[118; 121; 122; 171]

In summary, 12 soil/source samples (SO-01 through SO-05, SO-08, SO-08A, and SO-09 through SO-13) were collected for START from soil borings advanced through the 40-mil liner and the Landfill source on the Chlor-Alkali property in March 2004. Six VOCs, 20 SVOCs, two pesticides, one PCB, 23 metals, monomethyl mercury, cyanide, asbestos, and 15 dioxin/furan congeners were detected in these START soil/source samples. The analytical results of these soil/source samples are discussed in the following paragraphs.

Volatile Organic Compounds

Six VOCs, including acetone, 2-butanone, carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene, were detected above CRQL values in START soil/source samples collected from the Landfill source on the Chlor-Alkali property [109].

Positive VOC results were estimated and non-detected VOC results were rejected in samples SO-01 through SO-05, and SO-08 through SO-13 because the temperature in the shipment package exceeded its quality control limit of 4 degrees Celsius. The results for acetone are potentially biased high due to suspected equipment blank (EB) field contamination. The positive results for chloroform and tetrachloroethene in samples SO-04 and SO-08 were estimated due to poor field duplication precision [109].

Historical documentation indicates products produced and/or stored on the Chlor-Alkali property included acetone, bleach, chlorine, and chloroform [19; 23]. In addition, carbon tetrachloride was produced by the Brown Company; however, it is unknown whether its production occurred on the Chlor-Alkali property [93, p. 44]. Chloroform is a transformation product of carbon tetrachloride, and chlorine is used to produce PCE and TCE [164; 165]. It is unknown whether PCE or TCE were produced on the Chlor-Alkali property. In addition, the use and/or disposal of 2-butanone on site has not been documented. START assumes that the presence of these VOCs (acetone, 2-butanone, carbon tetrachloride, chloroform, PCE, and TCE) detected in on-site soil/source samples are the result of historical operations conducted on the Chlor-Alkali property.

There were no VOCs detected in START soil/source samples collected from the Landfill source that exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-111; 121].

Semivolatile Organic Compounds

Twenty SVOCs [acenaphthene, anthracene, benzaldehyde, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, butylbenzylphthalate, carbazole, 2-chloronaphthalene, chrysene, dibenzo(a,h)anthracene, 2,4-dichlorophenol, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, and pyrene] were detected above CRQL values in START soil/source samples collected from the Landfill source on the Chlor-Alkali property [110-112].

Positive and non-detected results were estimated or rejected in sample SO-01 because two or more SVOC surrogate compounds did not meet recovery criteria in the acid and/or base/neutral fraction. Positive results were estimated and non-detected results were rejected for four SVOCs (acetophenone; 2,4-dichlorophenol; 2-chloronaphthalene; and acenaphthene) in all samples due to poor recovery in the performance evaluation sample. The results for caprolactam in sample SO-08 are potentially biased

high due to suspected EB field contamination. The positive results for benzaldehyde in samples SO-04 and SO-08 were estimated due to poor field duplication precision. Non-detected results for hexachlorocyclopentadiene were rejected in samples SO-01, SO-03, SO-09, and SO-10 due to poor calibration sensitivity [110].

Sixteen of the 20 SVOCs detected, including acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, phenanthrene, and pyrene, are polycyclic aromatic hydrocarbons (PAHs). PAHs are byproducts of the incomplete combustion of organic products such as wood and coal [154-156]. Historical documentation indicates that in 1919, coal was the source of fuel on the Chlor-Alkali property. The 1919 Brown Company survey of the "Chemical Plant"on the Chlor-Alkali property illustrates four buildings containing furnaces, boilers (one labeled as "coal"), and/or ash pits; and "raw stock" on the property included charcoal. However, there are additional potential off-site sources of these PAHs, including the remaining mill property, a reported 1913 sawmill fire, and the Berlin Mills Railway's locomotives that utilized coal as their fuel [19; 158]. However, START assumes that the presence of these PAHs in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

A reaction of benzyl dichloride and lime produces benzaldehyde [148, p. 128]. Historical documentation indicates that tanks containing lime were present on the Chlor-Alkali property [19]. In addition, benzaldehyde is used as a solvent for cellulose ethers. Cellulose ethers are produced from the alkali of cellulose [148, p. 482]. Historical documentation indicates that chlorine was produced on site through the chlor-alkali process to bleach wood pulp [3; 93]. As a result, START assumes that the presence of benzaldehyde in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Chlorophenols are produced when wood pulp is bleached with chlorine [167]. Historical documentation indicates that chlorine was produced on the Chlor-Alkali property to bleach pulp [3; 93]. Based on available information obtained by START, it is unclear whether the bleaching process of the pulp occurred on the Chlor-Alkali property. START assumes that the presence of 2,4-dichlorophenol in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Carbazole is present in coal tar produced at high temperatures and is produced during coal gasification [157]. 2-Chloronaphthalene is produced from the chlorination of naphthalene. Naphthalene can be produced from the boiling of coal-tar oils [148, pp. 259, 806]. Historical documentation indicates that tar was one of the construction materials used on the former on-site buildings [19; 23]. Reportedly, coal tar may be used as a binding agent in graphite electrodes and graphite electrodes have been documented as used in the electrolytic cells on site [3; 179]. In addition, tanks containing lime were located on the Chlor-Alkali property [19]. The use of lime on site was not specified in available file information. However, lime can be used to capture sulfur gases released from the burning of coal [207]. In addition, non-native fill material observed in the soil borings advanced through the landfill included coal-tar-like material and slag [96; 151; Appendix D]. As a result, START assumes that the presence of carbazole and 2-chloronaphthalene in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

The use and/or disposal of butylbenzylphthalate on site has not been documented [110-112]. However, START assumes that the presence of this SVOC in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Two SVOCs [benzo(a)pyrene and dibenzo(a,h)anthracene] were detected in START soil/source samples collected from the Landfill source at concentrations exceeding their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-112; 121].

Pesticides

Two pesticides (gamma-Chlordane and 4,4-DDE) were detected in START soil/source samples collected from the Landfill source located on the Chlor-Alkali property [110-111].

Positive results for gamma-Chlordane, 4,4'-DDD, and endosulfan sulfate in sample SO-03; and beta-BHC and endrin aldehyde in sample SO-11 were qualified as undetected due to failed target compound identification criteria (poor correlation results between gas chromatograph columns). Positive results for beta-BHC, 4,4'-DDT, and endrin aldehyde in sample SO-10; 4,4'-DDT in sample SO-11; and beta-BHC in sample SO-12, were qualified as rejected due to failed target compound identification criteria. And positive results for 4,4'-DDE in sample SO-10; and 4,4'-DDE in sample SO-11 were qualified as estimated results due to failed target compound identification criteria [110].

The use and/or disposal of gamma-Chlordane and 4,4-DDE on site has not been documented. However, START assumes that the presence of these two pesticides is the result of historical operations conducted on the Chlor-Alkali property.

There are no pesticides detected in START soil/source samples collected from the Landfill source that exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-111; 121].

Polychlorinated Biphenyls

One PCB (Aroclor-1254) was detected in START soil/source samples collected from the Landfill source located on the Chlor-Alkali property [110-111].

Positive results for Aroclor-1254 in sample SO-10 were qualified as estimated results due to failed target compound identification criteria [110].

Historical documentation indicates that buildings present on the Chlor-Alkali property contained transformers [16-19; 23]. PCBs have been used as coolants and lubricants in transformers and other electrical equipment [166]. As a result, START assumes that the presence of Aroclor-1254 is the result of historical operations conducted on the Chlor-Alkali property.

There are no PCBs detected in START soil/source samples collected from the Landfill source that exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-111; 121].

Metals and Cyanide

Twenty-five inorganics (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, zinc, and monomethyl mercury) were detected in START soil/source samples collected from the Landfill source on the Chlor-Alkali property [115-116].

Positive and non-detected results for aluminum, calcium, manganese, mercury, and monomethyl mercury were estimated in all samples due to poor field duplication precision. Positive and non-detected results for iron were estimated in all samples due to poor field duplication precision. Antimony (sample SO-03), cadmium (samples SO-01, SO-04, SO-08, and SO-11 through SO-13), and/or selenium (sample SO-03) results were rejected due to high iron and/or calcium interference [115-117]. Positive and non-detected results for antimony, arsenic, manganese, and selenium were estimated in all soil/source samples because the spike analytes for these elements did not meet the percent recovery criteria for the matrix spike/matrix spike duplicate (MS/MSD) sample [115; 116].

Historical documentation indicates that tanks containing salt and lime were present on the Chlor-Alkali property [19]. Salt, or sodium chloride (NaCl), is composed of the elements sodium and chlorine [206]. Lime is also known as calcium oxide or calcium hydroxide. One of the byproducts the Brown Company produced as a result of their chlorine production on the Chlor-Alkali property was calcium arsenate [93, p. 44; 148, p. 700]. Calcium arsenate is produced by the interaction of calcium chloride and sodium arsenate [148, pp. 202-202]. In addition, arsenic exceeded the NH DES RCMP Background Concentrations of Metals in Soil [110-112; 115; 116; 121]. As a result, START assumes that the presence of arsenic, calcium, and sodium in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Mercury and monomethyl mercury were detected in START on-site soil/source samples [115-117]. It is suspected that mercury was used as the cathode during the electrolytic cell process to produce chlorine on site. Inorganic mercury can be methylated by bacteria in soils to form monomethyl mercury [168]. In addition, mercury exceeded the NH DES RCMP Background Concentrations of Metals in Soil [110-112; 115; 116; 121]. As a result, START assumes that the presence of mercury and monomethyl mercury in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, thallium, vanadium, and zinc are naturally occurring [205]. In addition, antimony, beryllium, cadmium, chromium, lead, nickel, and zinc exceeded the NH DES RCMP Background Concentrations of Metals in Soil [110-112; 115; 116; 121]. However, START assumes that the presence of aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, thallium, vanadium, and zinc in START soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Two metals (arsenic and beryllium) were detected in START soil/source samples collected from the Landfill source at concentrations that exceeded NH DES RCMP Method 1 Category S-3 Soil Standards; and nine metals (antimony, arsenic, beryllium, cadmium, chromium, lead, mercury, nickel, and zinc) exceeded the NH DES RCMP Background Concentrations of Metals in Soil [110-112; 115; 116; 121].

Asbestos

Chrysotile asbestos, cellulose, and mineral wool were detected in START on-site soil/source samples collected from the Landfill source on the Chlor-Alkali property [119-120]. Construction materials and roofs of the buildings located on the Chlor-Alkali property consisted of wood (planks, beams, and timber), reinforced concrete, steel trusses, tar, gravel, brick, and asbestos-protected metal; and the floors were constructed of wood (planks, beams, and timber), reinforced concrete, and iron plates [19; 23]. Chemical analysis of the roofing material from the last remaining cell house roof located on the Chlor-Alkali property indicated the presence of chysotile in one layer of roofing paper (five to six layers encountered), and cellulose and glass fibers [88]. Mineral wool is defined as fibers made by blowing air or steam through slag [148]. Non-native fill material observed in the soil borings advanced through the landfill included coal tar, "yellow fibrous material", wood scraps, pieces of concrete, brick fragments, and slag [96; 150]. In addition, historical documentation indicates diaphragm cells, which typically use asbestos diaphragms, were used on site [3; 44; 124; 126; 181]. As a result, START assumes that the presence of chrysotile asbestos, cellulose, and mineral wool in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

No NH DES RCMP Method 1 Category S-3 Soil Standards or NH DES RCMP Background Concentrations exist for asbestos [121].

Dioxin/Furan Congeners

Fifteen dioxin/furan congeners (2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,4,6,7,8-HpCDD; OCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; and OCDF) were detected in START soil/source samples collected from the Landfill source located the Chlor-Alkali property [118].

Positive results for 1,2,3,7,8-PeCDD were estimated in samples SO-03 and SO-11; and positive results for 1,2,3,4,6,7,8-HpCDF were estimated in all samples collected from the Landfill source due to the "Action Low" performance evaluation score. The non-detected results for 1,2,3,7,8-PeCDD were rejected in all soil/source samples in the Landfill source, except samples SO-03 and SO-11, due to "Action Low" PE score [118].

According to EPA's *Draft Dioxin Reassessment*, electrode sludge sampled from European chlorine manufacturers that used electrolytic cells with graphite electrodes indicated high levels of chlorinated dibenzofurans (CDFs). The source of the CDFs in the graphite electrode sludge is uncertain; however, one source may be from the chlorination of PAHs present in coal tar used as a binding agent in the graphite electrodes [179]. Historical documentation indicates that electrolytic cells on the Chlor-Alkali property used graphite anodes [3]. In addition, the furan congeners account for a large fraction of the total dioxin/furan congener TEQ in START soil/source samples collected from the Landfill source [118]. Additionally, chlorinated dibenzo-p-dioxins (CDDs) and CDFs are formed during the chlorine bleaching process of pulp and paper [169; 170]. Historical documentation indicates that chlorine was produced on the Chlor-Alkali property to bleach the pulp produced on the surrounding mill property [3; 93]. It is unknown if the actual bleaching process took place on the Chlor-Alkali property. START assumes that the presence of these 15 dioxin/furan congeners in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

NH DES RCMP Risk-Based S-3 Standards and EPA Region III Risk-Based Industrial Soil Standards only exist for 2,3,7,8-TCDD and 1,2,3,6,7,8-HxCDD. No concentrations of 2,3,7,8-TCDD and 1,2,3,6,7,8-HxCDD detected in START soil/source samples collected from the Landfill source exceeded their respective standards [121; 171].

CONTAMINATED SOIL

Origin of Contaminated Soil Source

According to historical Sanborn and USGS topographic maps of the Chlor-Alkali property, railroad tracks entered the southern property boundary, extended northwest, and terminated at the current suspected coal-tar disposal area (Figures 3 through 5, 7 through 9, and 15) [18; 20; 22; 77]. A bridge (labeled as "covered bridge" in 1909 and "iron bridge" in 1914) was located in the southwestern corner of the Chlor-Alkali property, connecting the east and west banks of the Androscoggin River [18; 20-22]. In 1914, this portion of the property contained piles of lumber [18]. In 1928, the lumber piles were no longer present and the southwestern portion of the property was vacant, with the exception of the railroad tracks and a "covered pipe trestle". The covered pipe trestle connected the Caustic Shed to a building located south of the Chlor-Alkali property boundary [21]. According to 1928 and 1955 Sanborn Maps, the covered pipe trestle was no longer present and a cluster of buildings were located in the southeastern portion of the property. It is unknown to START what operations were conducted within these buildings [20; 22]. According to a 1970 USGS topographic map, the bridge in the southwestern corner of the property no longer existed; however, a building in the northern portion of the property (presumably the last Cell House), the buildings in the southeastern portion of the property, and the railroad tracks terminating in the southwestern corner of the property still existed [77].

During the START 2004 on-site reconnaissance, START observed an approximately 0.6-acre area, overgrown with vegetation, located in the southern and southwestern portion of the property. This area was not covered by wood chips, like the northern portion of the site, indicating the 40-mil liner did not cover this portion of the property. START observed the suspected coal-tar disposal area identified by Weston MNH in the southwestern corner of the property. START observed a "tar-like" material on the ground surface and between rocks and bricks along the edge of the Androscoggin River west of the suspected coal-tar disposal area [102, pp. 18-19, 23].

Analytical Results of Third-Party Samples

According to the 1999 Sevee Plan, the 40-mil liner was installed over the area where mercury and lead were historically detected [64]. However, START does not have sufficient information to determine whether the 40-mil liner covered the entire potentially contaminated area. Therefore, the entire unlined portion of the site, approximately 0.6 acres in the southern and southwestern portion of the property, is considered a Contaminated Soil source. All soil/source samples collected from the Chlor-Alkali property, prior to the installation of the 40-mil liner in 1999, are described in detail in the Waste/Source Sampling section under the Landfill source of this report.

Analytical Results of On-Site START Soil/Source Samples

During the March 2004 soil/source sampling event, Weston MNH personnel, contractors for NH DES, collected nine soil/source samples (SO-06, SO-07, SO-16 through SO-22) from the Contaminated Soil

source on behalf of EPA in order to determine the presence of any hazardous substances associated with the Contaminated Soil source. The soil boring from which soil/source samples SO-06 and SO-07 were collected was subsequently completed as monitoring well MW-16A. Soil/source samples SO-16 through SO-22 were collected by Weston MNH from soil borings advanced in the southwestern portion of the Chlor-Alkali property in the suspected coal-tar disposal area. These borings were not completed as monitoring wells. Once the soil/source samples were collected, the samples were relinquished to START, through proper chain-of-custody procedures, on the Fraser Paper property. START completed the remaining sample shipping and chain-of-custody activities. Soil/source samples SO-06, SO-07, and SO-16 were analyzed through EPA CLP laboratories for SVOCs, pesticides, PCBs, metals, cyanide, and dioxin/furan congeners, and through DAS laboratories for VOCs, monomethyl mercury, and asbestos. Soil/source samples SO-17 through SO-22 were analyzed through EPA CLP laboratories for SVOCs and metals only. The analytical method used for VOC, SVOC, pesticide, and PCB analyses was CLP SOW OLM04.3. The analytical method used for metals and cyanide analyses was CLP SOW ILM05.2. The analytical method used for monomethyl mercury analysis was modified EPA Method 1630. The analytical method used for dioxin/furan anaysis was EPA CLP Method DLM01.4. The analytical method used for asbestos analysis was bulk asbestos analysis by Polarized Light Microscopy with Dispersion Staining [27; 109-120]. Sample locations are illustrated on Figures 13 through 15 and described in Table 12.

Table 12

Contaminated Soil Source Sample Summary: Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source						
SO-06	A1C42 MA1C42 D14432	3/3/04 0930	Grab	0-2 ft (VOCs collected at 7-15 inches)	Sample collected from soil boring MW-16A located outside the capped area in the southwestern portion of the Chlor-Alkali property. Material was black and light-to-dark brown, fine-medium SAND and fine-to-medium GRAVEL, with silt and fine-to-medium sand. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.48" N 71° 10' 03.91" W
SO-07	A1C43 MA1C43 D14433	3/3/04 1055	Grab	8-10 ft (VOCs collected at 5, 10, and 15 inches above the bedrock surface).	Sample collected from soil boring MW-16A located outside the capped area in the southwestern portion of the Chlor-Alkali property. Material was black and light brown, SILT and fine-to-medium SAND, with medium sand. The VOC fraction was collected from fine-to-very fine well-sorted SAND and weathered bedrock material. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.48" N 71° 10' 03.91" W

Table 12

Contaminated Soil Source Sample Summary: Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source (Continued)						
SO-16	A1C52 MA1C52 D14442	3/8/04 1230	Grab	2-5 ft (portion of SVOCs collected from 0-6 inches and 24-25 inches)	Sample collected from soil boring SB-01 located in the central portion of a suspected coal-tar disposal area, in the southwestern portion the Chlor-Alkali property. Material was black and white, medium-to-coarse SAND, with organics and fine-to-medium sand, and trace fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.94" N 71° 10' 04.58" W
SO-17	A1C53 MA1C53	3/8/04 1345	Grab	0-13 inches	Sample collected from soil boring SB-02 located in a suspected coal-tar disposal area in the southwestern portion of the Chlor-Alkali property. Material was black, medium-to-coarse SAND, with fine-to-medium sand and trace fine gravel. PID = 2.0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 40.03" N 71° 10' 04.76" W
SO-18	A1C54 MA1C54	3/8/04 1345	Grab	0-13 inches	Duplicate of sample SO-17, collected for quality control.	44° 28' 40.03" N 71° 10' 04.76" W
SO-19	A1C55 MA1C55	3/8/04 1445	Grab	0-16 inches	Sample collected from soil boring SB-03 located in a suspected coal-tar disposal area in the southwestern portion of the Chlor-Alkali property. Material was black, medium-to-coarse SAND, with fine-to-medium sand and trace fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 40.02" N 71° 10' 04.62" W
SO-20	A1C56 MA1C56	3/8/04 1300	Grab	18 inches to 28 inches	Sample collected from soil boring SB-04 located in a suspected coal-tar disposal area in the southwestern portion of the Chlor-Alkali property. Material was black, medium-to-coarse SAND, with fine-to-medium sand and trace fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.99" N 71° 10' 04.40" W

Table 12

Contaminated Soil Sample Summary: Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Concluded)

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source (Concluded)						
SO-21 (MS/MSD)	A1C57 MA1C57	3/8/04 1515	Grab	4-14 inches; and 2 ft to 2 ft, 3 inches	Sample collected from soil boring SB-05 located in a suspected coal-tar disposal area in the southwestern portion of the Chlor-Alkali property. Material was black, medium-to-coarse SAND, with fine-to-medium sand, and trace fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.83" N 71° 10' 04.33" W
SO-22	A1C58 MA1C58	3/8/04 1420	Grab	1-7 inches; 8-17 inches	Sample collected from soil boring SB-06 located in a suspected coal-tar disposal area in the southwestern portion of the Chlor-Alkali property. Material was black, medium-to-coarse SAND, with fine-to-medium sand and trace fine gravel. PID = 0 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 39.83" N 71° 10' 04.70" W

MS/MSD	=	Matrix Spike/Matrix Spike Duplicate.
VOCs	=	Volatile Organic Compounds.
SVOCs	=	Semivolatile Organic Compounds.
PID	=	Photoionization Detector.
No.	=	Number.
FID	=	Flame Ionization Detector.
MVA	=	Mercury Vapor Analyzer.
mg/m^3	=	Milligrams per cubic meter.
Chlor-Alkali	=	Chlor-Alkali Facility (former).
ft	=	Feet.
°	=	Degrees.
'	=	Minutes.
"	=	Seconds.
N	=	North.
W	=	West.

All soil/source samples were collected by Weston Solutions, Inc., Manchester, New Hampshire (Weston MNH) personnel, on behalf of the U.S. Environmental Protection Agency. Sample descriptions and sample depths were provided by Weston MNH. All samples were relinquished by Weston MNH to START at an off-site location.

[27; 109-120; 149]

Table 13 is a summary of organic compounds and inorganic elements, with the exception of dioxin/furan congeners, detected through DAS and CLP analyses of START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property. Samples SO-06, SO-07, and SO-16 were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, monomethyl mercury, asbestos, and dioxin/furan congeners. Samples SO-17 through SO-22 were analyzed for SVOCs and metals only [109-112; 115-120]. All substances detected at concentrations greater than the CRQL (for organic analyses) or IDL (for inorganic analyses) are listed in the following table. Soil/source sample analytical results are compared to NH DES RCMP Method 1 Category S-3 Soil Standards and Background Concentrations of Metals in Soil. Category S-3 Soil Standards are used for comparison because the Chlor-Alkali property has a low frequency of use and intensity of use, and is not accessible to the public. In addition, background concentrations for naturally occurring metals in the vicinity of the site are unknown; therefore, START compared inorganic analytical results to available NH DES RCMP Background Concentrations of Metals in Soil [121]. Bolded substances and concentrations indicate the value equals or exceeds the bolded NH DES RCMP Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 S-3 Soil Standard. Complete analytical results of START soil/source samples including quantitation and detection limits are presented in Attachment C. Dioxin/furan analytical results for START soil/source samples collected from the Contaminated Soil source are presented in Table 14.

Table 13

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-06	**VOCs**			
	Acetone	2,000[b] J EB µg/kg	-	9,000 µg/kg
	Benzene	16 J µg/kg	-	300 µg/kg
	Chloroform	60 J µg/kg	-	100 µg/kg
	SVOCs			
	Acenaphthene	790 J µg/kg	-	270,000 µg/kg
	Anthracene	1,500 µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	3,400 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	2,800 µg/kg	-	4,000 µg/kg
	Benzo(b)fluoranthene	2,600 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	1,800 µg/kg	-	5.0 E + 6 µg/kg
	Benzo(k)fluoranthene	2,400 µg/kg	-	400,000 µg/kg
	Carbazole	800 µg/kg	-	NA
	Chrysene	3,400 µg/kg	-	4.0 E + 6 µg/kg
	Dibenzo(a,h)anthracene	620 J µg/kg	-	4,000 µg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-06 (Cont.)	**SVOCs (Concluded)**			
	Dibenzofuran	530 J µg/kg	-	NA
	Fluoranthene	5,400 µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	820 µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	1,700 µg/kg	-	40,000 µg/kg
	Naphthalene	420 J µg/kg	-	5,000 µg/kg
	Phenanthrene	4,700 µg/kg	-	5.0 E + 6 µg/kg
	Pyrene	5,400 µg/kg	-	5.0 E + 6 [c] µg/kg
	INORGANICS			
	Aluminum	9,480 J mg/kg	NA	NA
	Arsenic	5.3 J mg/kg	11 mg/kg	11 mg/kg
	Barium	146 mg/kg	NA	3,400 mg/kg
	Beryllium	0.39 mg/kg	0.95 mg/kg	13 mg/kg
	Cadmium	0.55 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	3,580 J mg/kg	NA	NA
	Chromium	16.7 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	11.1 mg/kg	NA	NA
	Copper	52.1 mg/kg	NA	NA
	Iron	20,200 J mg/kg	NA	NA
	Lead	**60.3 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	5,930 mg/kg	NA	NA
	Manganese	355 J mg/kg	NA	NA
	Mercury	**1.6 J mg/kg**	**0.31 mg/kg**	13 mg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-06 (Concl.)	**INORGANICS (Concluded)**			
	Nickel	**408 mg/kg**	**23 mg/kg**	3,900 mg/kg
	Potassium	2,320 mg/kg	NA	NA
	Thallium	1.0 mg/kg	NA	NA
	Vanadium	38.6 mg/kg	NA	NA
	Zinc	**110 mg/kg**	**98 mg/kg**	5,000 mg/kg
	Monomethyl Mercury	0.175 J ng/g	NA	NA
	ASBESTOS			
	Chrysotile	< 1 %	-	NA
SO-07	**VOCs**			
	Acetone	17 J EB µg/kg	-	9,000 µg/kg
	INORGANICS			
	Aluminum	6,850 J mg/kg	NA	NA
	Arsenic	0.70 J mg/kg	11 mg/kg	11 mg/kg
	Barium	64.5 mg/kg	NA	3,400 mg/kg
	Beryllium	0.27 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.18 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	1,580 J mg/kg	NA	NA
	Chromium	3.0 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	3.4 mg/kg	NA	NA
	Copper	8.0 mg/kg	NA	NA
	Iron	11,600 J mg/kg	NA	NA

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*		NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-07 (Concl.)	**INORGANICS (Concluded)**							
	Lead	5.1		mg/kg	51	mg/kg	400	mg/kg
	Magnesium	5,450		mg/kg	NA		NA	
	Manganese	171	J	mg/kg	NA		NA	
	Mercury	**0.91**	**J**	**mg/kg**	**0.31**	**mg/kg**	13	mg/kg
	Nickel	3.9		mg/kg	23	mg/kg	3,900	mg/kg
	Potassium	2,040		mg/kg	NA		NA	
	Thallium	1.1		mg/kg	NA		NA	
	Vanadium	17.3		mg/kg	NA		NA	
	Zinc	29.7		mg/kg	98	mg/kg	5,000	mg/kg
	Monomethyl Mercury	0.151	J	ng/g	NA		NA	
SO-16	**VOCs**							
	Acetone	32	EB	µg/kg	-		9,000	µg/kg
	SVOCs							
	Anthracene	650		µg/kg	-		1.7 E + 6	µg/kg
	Benzo(a)anthracene	1,500		µg/kg	-		40,000	µg/kg
	Benzo(a)pyrene	1,100		µg/kg	-		4,000	µg/kg
	Benzo(b)fluoranthene	950		µg/kg	-		400,000	µg/kg
	Benzo(g,h,i)perylene	720		µg/kg	-		5.0 E + 6 [c]	µg/kg
	Benzo(k)fluoranthene	1,200		µg/kg	-		400,000	µg/kg
	Carbazole	330	J	µg/kg	-		NA	
	Chrysene	1,600		µg/kg	-		4.0 E + 6	µg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-16 (Cont.)	**SVOCs (Concluded)**			
	Fluoranthene	2,800 µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	340 J µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	650 µg/kg	-	40,000 µg/kg
	Phenanthrene	2,900 µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	3,700 µg/kg	-	5.0 E + 6 [c] µg/kg
	PESTICIDES			
	Endrin Aldehyde	17 J µg/kg	-	NA
	PCBs			
	Aroclor-1254	320 J µg/kg	-	2,000 µg/kg
	INORGANICS			
	Aluminum	2,220 J mg/kg	NA	NA
	Arsenic	**18.1 J mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	173 mg/kg	NA	3,400 mg/kg
	Beryllium	0.38 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.66 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	8,180 J mg/kg	NA	NA
	Chromium	9.6 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	5.4 mg/kg	NA	NA
	Copper	50.9 mg/kg	NA	NA
	Cyanide	0.58 mg/kg	-	500 mg/kg
	Iron	12,600 J mg/kg	NA	NA
	Lead	**79.8 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	746 mg/kg	NA	NA
	Manganese	278 J mg/kg	NA	NA
	Mercury	**4.8 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	**92.4 mg/kg**	**23 mg/kg**	3,900 mg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-16 (Concl.)	**INORGANICS (Concluded)**						
	Potassium	522		mg/kg	NA	NA	
	Thallium	0.83		mg/kg	NA	NA	
	Vanadium	12.5		mg/kg	NA	NA	
	Zinc	**108**		**mg/kg**	**98 mg/kg**	5,000	mg/kg
	Monomethyl Mercury	5.757	J	ng/g	NA	NA	
	ASBESTOS						
	Chrysotile	Trace			-	NA	
SO-17	**SVOCs**						
	Acenaphthene	740	J	µg/kg	-	270,000	µg/kg
	Anthracene	1,300	J	µg/kg	-	1.7 E + 6	µg/kg
	Benzo(a)anthracene	3,600		µg/kg	-	40,000	µg/kg
	Benzo(a)pyrene	2,900		µg/kg	-	4,000	µg/kg
	Benzo(b)fluoranthene	2,200		µg/kg	-	400,000	µg/kg
	Benzo(g,h,i)perylene	1,400	J	µg/kg	-	5.0 E + 6 [c]	µg/kg
	Benzo(k)fluoranthene	2,400		µg/kg	-	400,000	µg/kg
	Chrysene	4,100		µg/kg	-	4.0 E + 6	µg/kg
	Dibenzo(a,h)anthracene	500	J	µg/kg	-	4,000	µg/kg
	Fluoranthene	5,200		µg/kg	-	5.0 E + 6	µg/kg
	Fluorene	530	J	µg/kg	-	510,000	µg/kg
	Indeno(1,2,3-cd)pyrene	1,200	J	µg/kg	-	40,000	µg/kg
	Methylnaphthalene, 2-	480	J	µg/kg	-	150,000	µg/kg
	Naphthalene	370	J	µg/kg	-	5,000	µg/kg
	Phenanthrene	6,700		µg/kg	-	5.0 E + 6 [c]	µg/kg
	Pyrene	8,900		µg/kg	-	5.0 E + 6 [c]	µg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*		NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-17 (Concl.)	**INORGANICS**							
	Aluminum	3,780	J	mg/kg	NA		NA	
	Arsenic	**32.0**	**J**	**mg/kg**	**11**	**mg/kg**	**11**	**mg/kg**
	Barium	359		mg/kg	NA		3,400	mg/kg
	Beryllium	0.42		mg/kg	0.95	mg/kg	1.[illegible]	mg/kg
	Cadmium	0.54	J	mg/kg	1.9	mg/kg	230	mg/kg
	Calcium	2,890	J	mg/kg	NA		NA	
	Chromium	9.4		mg/kg	33	mg/kg	540 or 5,000 [a]	mg/kg
	Cobalt	5.0		mg/kg	NA		NA	
	Copper	36.2		mg/kg	NA		NA	
	Iron	8,210	J	mg/kg	NA		NA	
	Lead	**95.2**		**mg/kg**	**51**	**mg/kg**	400	mg/kg
	Magnesium	454		mg/kg	NA		NA	
	Manganese	428	J	mg/kg	NA		NA	
	Mercury	**2.8**	**J**	**mg/kg**	**0.31**	**mg/kg**	13	mg/kg
	Nickel	**34.1**		**mg/kg**	**23**	**mg/kg**	3,900	mg/kg
	Potassium	1,040		mg/kg	NA		NA	
	Thallium	1.8		mg/kg	NA		NA	
	Vanadium	20.9		mg/kg	NA		NA	
	Zinc	**144**		**mg/kg**	**98**	**mg/kg**	5,000	mg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*		NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-18	**SVOCs**							
	Acenaphthene	1,100	J	µg/kg	-		270,000	µg/kg
	Anthracene	1,900	J	µg/kg	-		1.7 E + 6	µg/kg
	Benzo(a)anthracene	5,100		µg/kg	-		40,000	µg/kg
	Benzo(a)pyrene	3,800		µg/kg	-		4,000	µg/kg
	Benzo(b)fluoranthene	2,500		µg/kg	-		400,000	µg/kg
	Benzo(g,h,i)perylene	1,800	J	µg/kg	-		5.0 E + 6 [c]	µg/kg
	Benzo(k)fluoranthene	3,100		µg/kg	-		400,000	µg/kg
	Chrysene	5,400		µg/kg	-		4.0 E + 6	µg/kg
	Dibenzo(a,h)anthracene	940	J	µg/kg	-		4,000	µg/kg
	Fluoranthene	6,400		µg/kg	-		5.0 E + 6	µg/kg
	Fluorene	790	J	µg/kg	-		510,000	µg/kg
	Indeno(1,2,3-cd)pyrene	1,500	J	µg/kg	-		40,000	µg/kg
	Methylnaphthalene, 2-	590	J	µg/kg	-		150,000	µg/kg
	Naphthalene	380	J	µg/kg	-		5,000	µg/kg
	Phenanthrene	9,400		µg/kg	-		5.0 E + 6 [c]	µg/kg
	Pyrene	13,000		µg/kg	-		5.0 E + 6 [c]	µg/kg
	INORGANICS							
	Aluminum	2,460	J	mg/kg	NA		NA	
	Arsenic	**25.8**	**J**	**mg/kg**	**11**	**mg/kg**	**11**	**mg/kg**
	Barium	287		mg/kg	NA		3,400	mg/kg
	Beryllium	0.40		mg/kg	0.95	mg/kg	1	mg/kg
	Cadmium	0.50	J	mg/kg	1.9	mg/kg	230	mg/kg
	Calcium	2,710	J	mg/kg	NA		NA	

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-18 (Concl.)	**INORGANICS (Concluded)**			
	Chromium	7.4 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	4.5 mg/kg	NA	NA
	Copper	32.5 mg/kg	NA	NA
	Iron	7,520 J mg/kg	NA	NA
	Lead	**82.0 mg/kg**	**51 mg/kg**	400 mg/kg
	Manganese	435 J mg/kg	NA	NA
	Mercury	**7.6 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	**29.0 mg/kg**	**23 mg/kg**	3,900 mg/kg
	Potassium	1,500 mg/kg	NA	NA
	Silver	0.17 J mg/kg	NA	200 mg/kg
	Thallium	1.2 mg/kg	NA	NA
	Vanadium	16.6 mg/kg	NA	NA
	Zinc	**103 mg/kg**	**98 mg/kg**	5,000 mg/kg
SO-19	**SVOCs**			
	Acenaphthene	2,500 J µg/kg	-	270,000 µg/kg
	Anthracene	4,100 J µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	8,600 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	6,800 µg/kg	-	4,000 µg/kg
	Benzo(b)fluoranthene	6,000 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	3,400 J µg/kg	-	5.0 E + 6 [c] µg/kg
	Benzo(k)fluoranthene	6,100 µg/kg	-	400,000 µg/kg
	Carbazole	490 J µg/kg	-	NA

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*		NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-19 (Cont.)	**SVOCs (Concluded)**							
	Chrysene	9,800		µg/kg	-		4.0 E + 6	µg/kg
	Dibenzo(a,h)anthracene	1,300	J	µg/kg	-		4,000	µg/kg
	Fluoranthene	12,000		µg/kg	-		5.0 E + 6	µg/kg
	Fluorene	1,900	J	µg/kg	-		510,000	µg/kg
	Indeno(1,2,3-cd)pyrene	3,000	J	µg/kg	-		40,000	µg/kg
	Methylnaphthalene, 2-	1,400	J	µg/kg	-		150,000	µg/kg
	Naphthalene	1,300	J	µg/kg	-		5,000	µg/kg
	Phenanthrene	18,000		µg/kg	-		5.0 E + 6 [c]	µg/kg
	Pyrene	23,000		µg/kg	-		5.0 E + 6 [c]	µg/kg
	INORGANICS							
	Aluminum	2,270	J	mg/kg	NA		NA	
	Arsenic	**25.4**	**J**	**mg/kg**	**11**	**mg/kg**	**11**	**mg/kg**
	Barium	211		mg/kg	NA		3,400	mg/kg
	Beryllium	0.34		mg/kg	0.95	mg/kg	1	mg/kg
	Cadmium	0.32	J	mg/kg	1.9	mg/kg	230	mg/kg
	Calcium	3,360	J	mg/kg	NA		NA	
	Chromium	8.0		mg/kg	33	mg/kg	540 or 5,000 [a]	mg/kg
	Cobalt	3.4		mg/kg	NA		NA	
	Copper	28.7		mg/kg	NA		NA	
	Iron	6,410	J	mg/kg	NA		NA	
	Lead	41.9		mg/kg	51	mg/kg	400	mg/kg
	Manganese	189	J	mg/kg	NA		NA	

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-19 (Concl.)	**INORGANICS (Concluded)**			
	Mercury	**2.1 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	17.1 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	441 mg/kg	NA	NA
	Thallium	1.0 mg/kg	NA	NA
	Vanadium	13.1 mg/kg	NA	NA
	Zinc	**109 mg/kg**	**98 mg/kg**	5,000 mg/kg
SO-20	**SVOCs**			
	Acenaphthene	2,100 J µg/kg	-	270,000 µg/kg
	Anthracene	3,600 J µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	8,000 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	**6,600 µg/kg**	-	**4,000 µg/kg**
	Benzo(b)fluoranthene	4,600 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	3,200 J µg/kg	-	5.0 E + 6 µg/kg
	Benzo(k)fluoranthene	5,800 µg/kg	-	400,000 µg/kg
	Carbazole	1,200 J µg/kg	-	NA
	Chrysene	8,100 µg/kg	-	4.0 E + 6 µg/kg
	Dibenzo(a,h)anthracene	1,300 J µg/kg	-	4,000 µg/kg
	Dibenzofuran	1,000 J µg/kg	-	NA
	Fluoranthene	13,000 µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	2,000 J µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	2,800 J µg/kg	-	40,000 µg/kg
	Methylnaphthalene, 2-	1,100 J µg/kg	-	150,000 µg/kg
	Naphthalene	1,900 J µg/kg	-	5,000 µg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-20 (Cont.)	**SVOCs (Concluded)**			
	Phenanthrene	18,000 µg/kg	-	5.0 E + 6 [c] µg/kg
	Pyrene	20,000 µg/kg	-	5.0 E + 6 [c] µg/kg
	INORGANICS			
	Aluminum	3,600 J mg/kg	NA	NA
	Antimony	**5.6 J mg/kg**	**1.64 mg/kg**	26 mg/kg
	Arsenic	**17.4 J mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	248 mg/kg	NA	3,400 mg/kg
	Beryllium	0.43 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.89 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	2,180 J mg/kg	NA	NA
	Chromium	17.4 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	6.6 mg/kg	NA	NA
	Copper	51.2 mg/kg	NA	NA
	Iron	16,600 J mg/kg	NA	NA
	Lead	**211 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	946 mg/kg	NA	NA
	Manganese	205 J mg/kg	NA	NA
	Mercury	**5.8 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	19.1 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	752 mg/kg	NA	NA
	Selenium	0.69 J mg/kg	5.0 mg/kg	4,200 mg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration			NH DES RCMP Background Concentrations of Metals in Soil*		NH DES RCMP Method 1 Category S-3 Soil Standard*	
SO-20 (Concl.)	**INORGANICS (Concluded)**							
	Thallium	1.8		mg/kg	NA		NA	
	Vanadium	28.8		mg/kg	NA		NA	
	Zinc	**193**		**mg/kg**	**98**	**mg/kg**	5,000	mg/kg
SO-21	**SVOCs**							
	Acenaphthene	1,100	J	µg/kg	-		270,000	µg/kg
	Anthracene	1,900	J	µg/kg	-		1.7 E + 6	µg/kg
	Benzo(a)anthracene	5,900		µg/kg	-		40,000	µg/kg
	Benzo(a)pyrene	**4,900**		**µg/kg**	-		**4,000**	**µg/kg**
	Benzo(b)fluoranthene	3,400		µg/kg	-		400,000	µg/kg
	Benzo(g,h,i)perylene	2,600		µg/kg	-		5.0 E + 6	µg/kg
	Benzo(k)fluoranthene	3,500		µg/kg	-		400,000	µg/kg
	Chrysene	6,200		µg/kg	-		4.0 E + 6	µg/kg
	Dibenzo(a,h)anthracene	980	J	µg/kg	-		4,000	µg/kg
	Fluoranthene	6,800		µg/kg	-		5.0 E + 6	µg/kg
	Fluorene	800	J	µg/kg	-		510,000	µg/kg
	Indeno(1,2,3-cd)pyrene	2,100		µg/kg	-		40,000	µg/kg
	Methylnaphthalene, 2-	350	J	µg/kg	-		150,000	µg/kg
	Phenanthrene	9,100		µg/kg	-		5.0 E + 6	µg/kg
	Pyrene	15,000		µg/kg	-		5.0 E + 6	µg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-21 (Concl.)	**INORGANICS**			
	Aluminum	2,660 J mg/kg	NA	NA
	Arsenic	**39.7 J mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	252 mg/kg	NA	3,400 mg/kg
	Beryllium	0.37 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.68 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	3,080 J mg/kg	NA	NA
	Chromium	10.3 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	6.5 mg/kg	NA	NA
	Copper	50.2 mg/kg	NA	NA
	Iron	17,500 J mg/kg	NA	NA
	Lead	**124 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	590 mg/kg	NA	NA
	Manganese	308 J mg/kg	NA	NA
	Mercury	**3.0 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	**52.1 mg/kg**	**23 mg/kg**	3,900 mg/kg
	Potassium	511 mg/kg	NA	NA
	Selenium	1.2 J mg/kg	5.0 mg/kg	4,200 mg/kg
	Thallium	1.5 mg/kg	NA	NA
	Vanadium	28.7 mg/kg	NA	NA
	Zinc	**130 mg/kg**	**98 mg/kg**	5,000 mg/kg

Table 13

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-22	**SVOCs**			
	Acenaphthene	1,200 J µg/kg	-	270,000 µg/kg
	Anthracene	1,900 J µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	5,600 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	**5,300 µg/kg**	-	**4,000 µg/kg**
	Benzo(b)fluoranthene	3,800 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	2,900 µg/kg	-	5.0 E + 6 ° µg/kg
	Benzo(k)fluoranthene	3,600 µg/kg	-	400,000 µg/kg
	Chrysene	6,000 µg/kg	-	4.0 E + 6 µg/kg
	Dibenzo(a,h)anthracene	1,100 J µg/kg	-	4,000 µg/kg
	Fluoranthene	6,300 µg/kg	-	5.0 E + 6 µg/kg
	Fluorene	870 J µg/kg	-	510,000 µg/kg
	Indeno(1,2,3-cd)pyrene	2,400 µg/kg	-	40,000 µg/kg
	Methylnaphthalene, 2-	680 J µg/kg	-	150,000 µg/kg
	Naphthalene	670 J µg/kg	-	5,000 µg/kg
	Phenanthrene	9,500 µg/kg	-	5.0 E + 6 ° µg/kg
	Pyrene	15,000 µg/kg	-	5.0 E + 6 ° µg/kg
	INORGANICS			
	Aluminum	2,390 J mg/kg	NA	NA
	Arsenic	**29.5 J mg/kg**	**11 mg/kg**	**11 mg/kg**
	Barium	282 mg/kg	NA	3,400 mg/kg
	Beryllium	0.37 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.48 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	2,640 J mg/kg	NA	NA

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-22 (Cont.)	***INORGANICS (Continued)***			
	Chromium	9.2 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	5.2 mg/kg	NA	NA
	Copper	37.5 mg/kg	NA	NA
	Iron	7,600 J mg/kg	NA	NA
	Lead	**107 mg/kg**	**51 mg/kg**	400 mg/kg
	Manganese	124 J mg/kg	NA	NA
	Mercury	**2.4 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	**25.0 mg/kg**	**23 mg/kg**	3,900 mg/kg
	Potassium	387 mg/kg	NA	NA
	Thallium	1.3 mg/kg	NA	NA

Table 13

Summary of Analytical Results: Contaminated Soil Source Soil/Source Sample Analysis for Chlor-Alkali Facility (former) Samples Collected for START on 3 and 8 March 2004 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-22 (Concl.)	**INORGANICS (Concluded)**			
	Vanadium	17.5 mg/kg	NA	NA
	Zinc	**117 mg/kg**	**98 mg/kg**	5,000 mg/kg

<	=	Less than.
%	=	Percent.
Concl.	=	Concluded.
Cont.	=	Continued.
NH DES	=	New Hampshire Department of Environmental Services.
RCMP	=	Risk Characterization and Management Policy.
NA	=	Not available.
-	=	Not applicable.
J	=	Quantitation is approximate due to limitations identified during the quality control review.
EB	=	The compound was identified in an aqueous equipment blank that was used to assess field contamination associated with soil/source samples.
mg/kg	=	Milligrams per kilogram.
ng/g	=	Nanograms per gram.
µg/kg	=	Micrograms per kilogram.
VOCs	=	Volatile Organic Compounds.
SVOCs	=	Semivolatile Organic Compounds.
PCBs	=	Polychlorinated Biphenyls.

[a] Both the New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for chromium (III) at 5,000 mg/kg and chromium (VI) at 540 mg/kg are listed.
[b] Result reported from diluted analysis.
[c] The New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for benzo(g,h,i)perylene, phenanthrene, and pyrene is a total of <5,000 for all three semivolatile organic compounds.

* Analytical results are compared to New Hampshire Department of Environmental Services Risk Characterization and Management Policy 1998 (revised 2001) Background Concentration of Metals in Soil Standards and/or the 1998 (revised 2001) NH DES RCMP Method 1 NH S-3 Soil Standard.

Bolded substances and concentrations indicate the value equals or exceeds the bolded New Hampshire Department of Environmental Services Risk Characterization and Management Policy (NH DES RCMP) Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 S-3 Soil Standard.

[109-117; 119; 120; 121; 148]

Table 14 is a summary of analytical data for dioxin/furan congener TEF values for START soil/source samples SO-06, SO-07, and SO-16. Dioxin/furan congeners differ in their relative toxicity. The most toxic congener is 2,3,7,8-TCDD. TEFs allow the toxicity of a specific congener to be compared relative to 2,3,7,8-TCDD (which has a TEF equal to 1). The toxicity of each congener, expressed as a TEF, multiplied by the congener's concentration in a sample, equals the TEQ. To estimate the toxicity of an entire sample, a widely accepted procedure is used, in which the TEQs for each congener in a sample are summed to give the total TEQ. The total TEQ expresses the overall toxicity of the entire group of dioxin/furan congeners in a specific sample [105; 106; 122]. Soil/source sample analytical results are compared to NH DES RCMP Risk-Based S-3 Standards and EPA Region III Risk-Based Industrial Soil Standards. NH DES RCMP Risk-Based S-3 Standards were used because NH DES RCMP Method 1 S-3 standards do not exist for dioxin/furan congeners. Complete analytical results of START soil/source samples, including quantitation and detection limits, are presented in Attachment C.

Table 14

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-06	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	0.414 J ng/kg	1.0	0.414 ng/kg	300 ng/kg	19 ng/kg
	HxCDD, 1,2,3,7,8,9-	1.05* ng/kg	0.1	0.105 ng/kg	4,000 ng/kg	460 ng/kg
	HpCDD, 1,2,3,4,6,7,8-	6.27 EB ng/kg	0.01	0.0627 ng/kg	NA	NA
	OCDD	49.7 EB ng/kg	0.001	0.00497 ng/kg	NA	NA
	TCDF, 2,3,7,8-	98.9 EB ng/kg	0.1	9.89 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	47.1 ng/kg	0.05	2.355 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	32.8 EB ng/kg	0.5	16.4 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	63.2 J EB ng/kg	0.1	6.32 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	13.8 ng/kg	0.1	1.38 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	4.74 J ng/kg	0.1	0.474 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	1.64 J ng/kg	0.1	0.164 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	21.8 J EB ng/kg	0.01	0.218 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	8.75 ng/kg	0.01	0.0875 ng/kg	NA	NA
	OCDF	44.9 EB ng/kg	0.0001	0.00449 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	38 J ng/kg	-	-	NA	NA

Table 14

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-07	**DIOXINS/FURANS**					
	HpCDD, 1,2,3,4,6,7,8-	0.217 J EB ng/kg	0.01	0.00217 ng/kg	NA	NA
	OCDD	2.10 J EB ng/kg	0.0001	0.00021 ng/kg	NA	NA
	TCDF, 2,3,7,8-	1.94 EB ng/kg	0.1	0.194 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	0.481 J ng/kg	0.05	0.02405 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	0.382 J EB ng/kg	0.5	0.191 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	0.676 J EB ng/kg	0.1	0.0676 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	0.216 J ng/kg	0.1	0.0216 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	0.428 J EB ng/kg	0.01	0.00428 ng/kg	NA	NA
	OCDF	0.800* EB ng/kg	0.0001	0.00008 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	0.50 J ng/kg			NA	NA
SO-16	**DIOXINS/FURANS**					
	HpCDD, 1,2,3,4,6,7,8-	2.87 J EB ng/kg	0.01	0.0287 ng/kg	NA	NA
	OCDD	19.1 EB ng/kg	0.0001	0.00191 ng/kg	NA	NA
	TCDF, 2,3,7,8-	123 EB ng/kg	0.1	12.3 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	45.7 ng/kg	0.05	2.285 ng/kg	NA	NA

Table 14

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-16 (Cont.)	**DIOXINS/FURANS (Continued)**					
	PeCDF, 2,3,4,7,8-	38.0 EB ng/kg	0.5	19.0 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	63.5 EB ng/kg	0.1	6.35 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	15.7 ng/kg	0.1	1.57 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	4.47 J ng/kg	0.1	0.447 ng/kg	NA	NA
	HxCDF, 1,2,3,7,8,9-	1.89 J ng/kg	0.1	0.189 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	26.4 J EB ng/kg	0.01	0.264 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	11.8 ng/kg	0.01	0.118 ng/kg	NA	NA
	OCDF	42.5 EB ng/kg	0.0001	0.00425 ng/kg	NA	NA

Table 14

Summary of Analytical Results: Contaminated Soil Source
Soil/Source Sample Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 3 and 8 March 2004 (Concluded)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-16 (Concl.)	**DIOXINS/FURANS (Concluded)**					
	Total Dioxin/Furan TEQ [d]	42 J ng/kg	-	-	NA	NA

*	=	Estimated maximum possible concentration (EMPC).	ng/kg	=	Nanograms per kilogram.
NA	=	Not available.	Cont.	=	Continued.
TEF	=	Toxicity Equivalency Factor.	TEQ	=	Toxicity Equivalency Quotient.
PeCDF	=	Pentachlorodibenzofuran.	RCMP	=	Risk Characterization and Management Policy.
TCDD	=	Tetrachlorodibenzo(p)dioxin.	TCDF	=	Tetrachlorodibenzofuran.
HxCDD	=	Hexachlorodibenzodioxin.	HxCDF	=	Hexachlorodibenzofuran.
HpCDD	=	Heptachlorodibenzodioxin.	HpCDF	=	Heptachlorodibenzofuran.
OCDD	=	Octachlorodibenzodioxin.	OCDF	=	Octachlorodibenzofuran.
-	=	Not applicable.	Concl.	=	Concluded.
NH DES	=	New Hampshire Department of Environmental Services.			
J	=	Indicates concentrations reported by the laboratory under the lowest standard.			
EB	=	The compound was identified in an equipment blank that was used to assess field contamination associated with soil/source samples.			
EPA	=	U.S. Environmental Protection Agency.			
a	=	TEF values listed are found in "Toxicity Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number 12, December 1998, Table 1, page 778.			
b	=	TEQ value equals the product of the congener concentration and its TEF value.			
c	=	1998 New Hampshire Department of Environmental Services (NH DES) Risk Characterization and Management Policy (RCMP) Soil Category S-3 Direct Contact Risk-Based Standards are based upon restricted access to the property with a limited potential for exposure, either currently or in the reasonably foreseeable future. 1998 (revised 2001) NH DES RCMP Method 1 Soil Categories NH S-1 through S-3 Standards do not exist for dioxin/furan congeners.			
d	=	The Total Dioxin/Furan TEQ value is the sum of the TEQs for each congener in the given sample. This value is calculated including the estimated maximum possible concentrations.			
e	=	2004 U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration.			
f	=	U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration is for "hexachlorodibenzodioxin mix"; therefore, START applied standard to all hexachlorodibenzodioxins detected in START soil/source samples.			
g	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Soil Category S-3 Direct Contact Risk-Based Standard for hexachlorodibenzodioxin is applied to all hexachlorodibenzodioxins detected in START soil/source samples.			

[118; 121; 122; 171]

In summary, nine soil/source samples (SO-06, SO-07, SO-16 through SO-22) were collected for START from the Contaminated Soil source on the Chlor-Alkali property. Three VOCs, 18 SVOCs, one pesticide, one PCB, 23 metals (including monomethyl mercury), cyanide, asbestos, and 14 dioxin/furan congeners were detected in these START soil/source samples. The analytical results are discussed in the following paragraphs.

Volatile Organic Compounds

Three VOCs (acetone, benzene, and chloroform) were detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [109].

Positive VOC results were estimated and non-detected VOC results were rejected in samples SO-06, SO-07, and SO-16 because the temperature in the shipment package exceeded its quality control limit of 4 degrees Celsius. The results for acetone are potentially biased high due to suspected EB field contamination [109].

Historical documentation indicates products produced and/or stored on the Chlor-Alkali property included acetone and chloroform [19; 23]. As a result, START assumes that the presence of acetone and chloroform in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Benzene was detected in START on-site soil/source sample SO-06 [109]. Benzene is a constituent of petroleum products, and an oil refinery building was formerly located in the southern portion of the Chlor-Alkali property [20; 22; 148, p. 129]. As a result, START assumes that the presence of benzene in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

No VOCs were detected in START soil/source samples collected from the Contaminated Soil source at concentrations that exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standard [109].

Semivolatile Organic Compounds

Eighteen SVOCs [acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene] were detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [110-112].

Positive results were estimated and non-detected results were rejected for four SVOCs (acetophenone; 2,4-dichlorophenol; 2-chloronaphthalene; and acenaphthene) in all START soil/source samples due to poor recovery in the performance evaluation sample [110-112].

The SVOCs acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene are PAHs, byproducts of the incomplete combustion of organic products such as wood and coal. Coal was documented as a fuel source on the Chlor-Alkali property as well as throughout the remainder

of the surrounding mill property [19; 154-156; 158]. As a result, START assumes that the presence of these PAHs in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Carbazole is present in coal tar produced at high temperatures and is produced during coal gasification [157]. In addition, coal tar is a source for dibenzofuran, which is commonly used as an insecticide [148, p. 428]. Historical documentation indicates that tar was one of the construction materials used on the former on-site buildings [19; 23]. Reportedly, coal tar may be used as a binding agent in graphite electrodes. Graphite electrodes have been documented as used in the electrolytic cells on site [3; 179]. In addition, tanks containing lime were located on the Chlor-Alkali property [19]. The use of lime on site was not specified in available file information. However, lime can be used to capture sulfur gases released from the burning of coal [207]. In addition, non-native fill material observed in soil borings advanced on site include coal tar and slag. During the START 2004 on-site reconnaissance, "tar-like" material was observed on the ground surface in the southwestern corner of the property [96; 103, p. 38; 151]. As a result, START assumes that the presence of carbazole and dibenzofuran in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

One SVOC [benzo(a)pyrene] was detected in START soil/source samples collected from the Contaminated Soil source at concentrations exceeding its respective NH DES RCMP Method 1 Category S-3 Soil Standard [110-112; 121].

Pesticides

One pesticide (endrin aldehyde) was detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [110; 111].

Positive results for gamma-Chlordane, dieldrin, and endrin aldehyde in sample SO-16 were qualified as undetected due to failed target compound identification criteria (poor correlation results between gas chromatograph columns) [110].

The use and/or disposal of endrin aldehyde on site has not been documented. However, START assumes that the presence of this pesticide in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

No NH DES RCMP Method 1 Category S-3 Soil Standard for endrin aldehyde exists [121].

Polychlorinated Biphenyls

One PCB (Aroclor-1254) was detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [110; 111].

Positive results for Aroclor-1254 in soil/source sample SO-16 were estimated because the dual column correlation did not meet the percent difference confirmation criteria [110].

Historical documentation indicates that buildings present on the Chlor-Alkali property contained transformers [16-19; 23]. PCBs have been used as coolants and lubricants in transformers and other electrical equipment [166]. As a result, the presence of Aroclor-1254 in an on-site soil/source sample is assumed by START to be the result of historical operations conducted on the Chlor-Alkali property.

No PCBs were detected in START soil/source samples collected from the Contaminated Soil source at concentrations that exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standard [110-111; 121].

Metals and Cyanide

Twenty-four inorganics (aluminum, antimony, arsenic, barium, beryllium, calcium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, zinc, and monomethyl mercury) were detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [115-116].

Positive and non-detected results for aluminum, calcium, manganese, mercury, and monomethyl mercury were estimated in all START soil/source samples collected from the Contaminated Soil source (SO-06, SO-07, and SO-16 through SO-22) due to poor field duplication precision. Positive and non-detected results for iron were estimated in all samples (SO-06, SO-07, and SO-16 through SO-22) due to poor field duplication precision [115-117]. Positive and non-detected results for antimony, arsenic, manganese, and selenium were estimated in all soil/source samples because the spike analytes for these elements did not meet the percent recovery criteria for the MS/MSD sample [115; 116].

Historical documentation indicates that lime tanks were present on the Chlor-Alkali property [19]. Lime is also known as calcium oxide or calcium hydroxide, and one of the byproducts the Brown Company produced as a result of their chlorine production on the Chlor-Alkali property was calcium arsenate [93, p. 44; 148, p. 700]. Calcium arsenate is produced by the interaction of calcium chloride and sodium arsenate [148, pp. 202-202]. In addition, arsenic exceeded the NH DES RCMP Background Concentrations of Metals in Soil and its NH DES RCMP Method 1 Category S-3 Soil Standard [110-112; 115; 116; 121]. As a result, START assumes that the presence of arsenic and calcium in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

It is suspected that mercury may have been used as the cathode during the electrolytic cell process to produce chlorine on site. Inorganic mercury can be methylated by bacteria in soils to form monomethyl mercury [168]. In addition, mercury exceeded its NH DES RCMP Background Concentration of Metals in Soil standard [115; 116; 121]. As a result, START assumes that the presence of mercury and monomethyl mercury in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

Aluminum, antimony, barium, beryllium, cadmium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, nickel, potassium, selenium, silver, thallium, vanadium, and zinc are naturally occurring [115-116; 205]. In addition, four metals (antimony, lead, nickel, and zinc) were detected in START soil/source samples collected from the Contaminated Soil source at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil [115; 116; 121]. However, START assumes that their presence in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

One metal (arsenic) was detected in START soil/source samples collected from the Contaminated Soil source at concentrations exceeding its respective NH DES RCMP Method 1 Category S-3 Soil Standard. In addition, six metals (antimony, arsenic, lead, mercury, nickel, and zinc) were detected in START soil/source samples collected from the Contaminated Soil source at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil [115; 116; 121].

Asbestos

Chrysotile asbestos was detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [119-120]. Construction materials and roofs of the buildings located on the Chlor-Alkali property are documented to have consisted of asbestos-protected metal [19; 23]. Chemical analysis of the roofing material from the last remaining cell house roof located on the Chlor-Alkali property indicated the presence of chrysotile in one layer of roofing paper (five to six layers encountered) [88]. In addition, historical documentation indicates diaphragm cells, which typically use asbestos diaphragms, were used on site [3; 44; 124; 126; 181]. As a result, START assumes that the presence of asbestos in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

No NH DES RCMP Method 1 Category S-3 Soil Standards or NH DES RCMP Background Concentrations exist for asbestos [121].

Dioxin/Furan Congeners

Fourteen dioxin/furan congeners (2,3,7,8-TCDD; 1,2,3,7,8,9-HxCDD; 1,2,3,4,6,7,8-HpCDD; OCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; and OCDF) were detected in START soil/source samples collected from the Contaminated Soil source on the Chlor-Alkali property [118].

The non-detected results for 1,2,3,7,8-PeCDD were rejected in all START soil/source samples collected from the Contaminated Soil source and analyzed for dioxin/furan congeners (SO-06, SO-07, and SO-16) due to an "Action Low" PE score [118].

According to EPA's *Draft Dioxin Reassessment*, electrode sludge sampled from European chlorine manufacturers that used electrolytic cells with graphite electrodes indicated high levels of CDFs. The source of the CDFs in the graphite electrode sludge is uncertain; however, one source may be the chlorination of PAHs present in coal tar used as a binding agent in the graphite electrodes [179]. Historical documentation indicates that electrolytic cells on the Chlor-Alkali property used graphite anodes [3]. In addition, the furan congeners account for a large fraction of the total dioxin/furan

congener TEQ in START soil/source samples collected from the Contaminated Soil source [118]. Additionally, CDDs and CDFs are formed during the chlorine bleaching process of pulp and paper [169; 170]. Historical documentation indicates that chlorine was produced on the Chlor-Alkali property to bleach the pulp produced on the surrounding mill property [3; 93]. It is unknown if the actual bleaching process took place on the Chlor-Alkali property. START assumes that the presence of these dioxin/furan congeners in on-site soil/source samples is the result of historical operations conducted on the Chlor-Alkali property.

NH DES RCMP Risk-Based S-3 Standards and EPA Region III Risk-Based Industrial Soil Standards only exist for 2,3,7,8-TCDD and 1,2,3,6,7,8-HxCDD. Neither 2,3,7,8-TCDD nor 1,2,3,6,7,8-HxCDD were detected in START soil/source samples collected from the Contaminated Soil source at concentrations exceeding their respective standards [118; 121; 171].

Analytical Results of Off-Site START Soil/Source Samples

During the March 2004 soil/source sampling event, on behalf of EPA and in cooperation with NH DES, Weston MNH personnel collected two off-site soil samples (SO-14 and SO-15) from a soil boring advanced on the Fraser Paper property, approximately 25 feet south of the Chlor-Alkali property boundary, in order to determine the extent of the Contaminated Soil source. Once the soil/source samples were collected, the samples were relinquished to START, through property chain-of-custody procedures, on the Fraser Paper property. The soil boring was subsequently completed as monitoring well MW-12. Samples SO-14 and SO-15 were analyzed through EPA CLP laboratories for SVOCs, pesticides, PCBs, metals, cyanide, and dioxin/furan congeners, and through DAS laboratories for VOCs, monomethyl mercury, and asbestos [27, pp. 4, 11; 109-120]. The samples are considered off-site samples because they were collected beyond the currently considered site boundary (*i.e.*, Chlor-Alkali property). However, the analytical results provide information regarding the presence of hazardous substances in soil located just beyond the Chlor-Alkali property boundary. Sample locations are illustrated on Figures 13 through 15 and described in Table 15.

Table 15

Off-site Sample Summary: Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004

Sample Location No.	Traffic Report No(s).	Date/ Time (hours)	Remarks	Sample Depth	Sample Source	Latitude/Longitude Coordinates
MATRIX: Soil/Source						
SO-14	A1C50 MA1C50 D14440	3/1/04 1109	Grab	0-2 ft	Sample collected from soil boring MW-12 located on Fraser Paper property, south of the Chlor-Alkali property. Material was dark brown, medium SAND, with fine and coarse sand and fine-to-medium sand. The material contained little coal slag with some "high chroma iron halos" (intense color and indication of weathering and aerobic conditions). PID = 0.3 units; FID = 0 units; MVA = 0 mg/m^3.	44° 28' 38.32" N 71° 10' 02.00" W
SO-15	A1C51 MA1C51 D14441	3/2/04 1300	Grab	15-18.4 ft (VOCs collected at 17, 17.2, and 18.2 ft)	Sample collected from soil boring MW-12 located on Fraser Paper property, south of the Chlor-Alkali property. Material was light brown, medium-to-coarse SAND, with silt and medium gravel. PID = 0 units; FID = 0 units. No reading taken on the MVA.	44° 28' 38.32" N 71° 10' 02.00" W

PID = Photoionization Detector.
FID = Flame Ionization Detector.
mg/m^3 = Milligrams per cubic meter.
° = Degrees.
' = Minutes.
" = Seconds.
Chlor-Alkali = Chlor-Alkali Facility (former).
No. = Number.
MVA = Mercury Vapor Analyzer.
ft = Feet.
N = North.
W = West.
VOCs = Volatile Organic Compounds.

All soil/source samples were collected by Weston Solutions, Inc., Manchester, New Hampshire (Weston MNH) personnel, on behalf of the U.S. Environmental Protection Agency. Sample descriptions and sample depths were provided by Weston MNH. All samples were relinquished by Weston MNH to START at an off-site location.

[27; 109-120; 149]

Table 16 is a summary of organic compounds and inorganic substances, with the exception of dioxin/furan congeners, detected through DAS and CLP analyses of START off-site soil/source samples. Samples SO-14 and SO-15 were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, cyanide, monomethyl mercury, asbestos, and dioxin/furan congeners [109-112; 115-120]. All substances detected at concentrations greater than the CRQL (for organic analyses) or IDL (for inorganic analyses) are listed in the following table. Soil/source sample analytical results are compared to NH DES Risk Characterization and Management Policy Method 1 Category S-3 Soil Standards and Background Concentrations of Metals in Soil. Category S-3 Soil Standards are used for comparison because the Chlor-Alkali property has a low frequency of use and intensity of use, and is not accessible to the public. In addition, background concentrations for naturally occurring metals in the vicinity of the site are unknown; therefore, START compared inorganic analytical results to available NH DES RCMP Background Concentrations of Metals in Soil [121]. Bolded substances and concentrations indicate the value exceeds the bolded NH DES RCMP Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 S-3 Soil Standard. Complete analytical results of START soil/source samples, including quantitation and detection limits, are presented in Attachment C. Dioxin/furan congener analytical results for START off-site samples are presented in Table 17.

Table 16

Summary of Analytical Results
Off-Site Soil/Source Sample Analysis for the Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-14	**VOCs**			
	Acetone	760 J EB µg/kg	-	9,000 µg/kg
	Chloroform	46 J µg/kg	-	100 µg/kg
	SVOCs			
	Anthracene	340 J µg/kg	-	1.7 E + 6 µg/kg
	Benzo(a)anthracene	1,300 µg/kg	-	40,000 µg/kg
	Benzo(a)pyrene	970 µg/kg	-	4,000 µg/kg
	Benzo(b)fluoranthene	1,000 µg/kg	-	400,000 µg/kg
	Benzo(g,h,i)perylene	480 J µg/kg	-	5.0 E + 6 [b] µg/kg
	Benzo(k)fluoranthene	1,000 µg/kg	-	400,000 µg/kg
	Chrysene	1,500 µg/kg	-	4.0 E + 6 µg/kg
	Fluoranthene	2,100 µg/kg	-	5.0 E + 6 µg/kg
	Indeno(1,2,3-cd)pyrene	530 µg/kg	-	40,000 µg/kg
	Phenanthrene	2,000 µg/kg	-	5.0 E + 6 [b] µg/kg
	Pyrene	2,300 µg/kg	-	5.0 E + 6 [b] µg/kg

Table 16

Summary of Analytical Results
Off-Site Soil/Source Sample Analysis for the Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-14 (Concl.)	**PESTICIDES**			
	Chlordane, gamma-	4.0 µg/kg	-	19,000 µg/kg
	INORGANICS			
	Aluminum	5,340 J mg/kg	NA	NA
	Arsenic	8.5 J mg/kg	11 mg/kg	11 mg/kg
	Barium	68.9 mg/kg	NA	3,400 mg/kg
	Beryllium	0.33 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.44 J mg/kg	1.9 mg/kg	230 mg/kg
	Calcium	2,000 J mg/kg	NA	NA
	Chromium	11.3 mg/kg	33 mg/kg	540 or 5,000 [a] mg/kg
	Cobalt	6.7 mg/kg	NA	NA
	Copper	48.0 mg/kg	NA	NA
	Iron	16,400 J mg/kg	NA	NA
	Lead	**80.4 mg/kg**	**51 mg/kg**	400 mg/kg
	Magnesium	2,590 mg/kg	NA	NA
	Manganese	233 J mg/kg	NA	NA
	Mercury	**5.8 J mg/kg**	**0.31 mg/kg**	13 mg/kg
	Nickel	**307 mg/kg**	**23 mg/kg**	3,900 mg/kg
	Potassium	985 mg/kg	NA	NA
	Thallium	1.1 mg/kg	NA	NA
	Vanadium	25.7 mg/kg	NA	NA
	Zinc	89.1 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	0.281 J ng/g	NA	NA
	ASBESTOS			
	Chrysotile	< 1 %	-	NA

Table 16

Summary of Analytical Results
Off-Site Soil/Source Sample Analysis for the Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-15	**VOCs**			
	Acetone	31 J EB µg/kg	-	9,000 µg/kg
	INORGANICS			
	Aluminum	6,600 J mg/kg	NA	NA
	Arsenic	1.6 J mg/kg	11 mg/kg	11 mg/kg
	Barium	33.7 mg/kg	NA	3,400 mg/kg
	Beryllium	0.27 mg/kg	0.95 mg/kg	1 mg/kg
	Cadmium	0.18 J mg/kg	1.9 mg/kg	230 mg/kg
	Chromium	20.6 mg/kg	33 mg/kg	540 or 5,000* mg/kg
	Cobalt	4.9 mg/kg	NA	NA
	Copper	18.5 mg/kg	NA	NA
	Iron	12,500 J mg/kg	NA	NA
	Lead	4.2 mg/kg	51 mg/kg	400 mg/kg
	Magnesium	3,390 mg/kg	NA	NA
	Manganese	137 J mg/kg	NA	NA
	Mercury	0.097 J mg/kg	0.31 mg/kg	13 mg/kg
	Nickel	11.8 mg/kg	23 mg/kg	3,900 mg/kg
	Potassium	1,130 mg/kg	NA	NA
	Thallium	0.91 mg/kg	NA	NA
	Vanadium	25.9 mg/kg	NA	NA

Table 16

Summary of Analytical Results
Off-Site Soil/Source Sample Analysis for the Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Background Concentrations of Metals in Soil*	NH DES RCMP Method 1 Category S-3 Soil Standard*
SO-15 (Concl.)	**INORGANICS (Concluded)**			
	Zinc	37.6 mg/kg	98 mg/kg	5,000 mg/kg
	Monomethyl Mercury	0.050 J ng/g	NA	NA

NH DES = New Hampshire Department of Environmental Services.
RCMP = Risk Characterization and Management Policy.
Concl. = Concluded.
NA = Not available.
- = Not applicable.
J = Quantitation is approximate due to limitations identified during the quality control review.
EB = The compound was identified in an equipment blank that was used to assess field contamination associated with soil/source samples.
mg/kg = Milligrams per kilogram.
µg/kg = Micrograms per kilogram.
ng/kg = Nanograms per kilogram.
% = Percent.
VOCs = Volatile Organic Compounds.
SVOCs = Semivolatile Organic Compounds.

[a] Both the New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for chromium (III) at 5,000 mg/kg and chromium (VI) at 540 mg/kg are listed.
[b] The New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 S-3 Soil Standard for benzo(g,h,i)perylene, phenanthrene, and pyrene is a total of <5,000 for all three semivolatile organic compounds.

* Analytical results are compared to New Hampshire Department of Environmental Services Risk Characterization and Management Policy 1998 (revised 2001) Background Concentration of Metals in Soil Standards and/or the 1998 (revised 2001) NH DES RCMP Method 1 NH S-3 Soil Standard.

Bolded substances and concentrations indicate the value exceeds the bolded New Hampshire Department of Environmental Services Risk Characterization and Management Policy (NH DES RCMP) Background Concentration of Metals in Soil Standard and/or the NH DES RCMP Method 1 S-3 Soil Standard.

[109-117; 119; 120; 121;148]

Table 17 is a summary of analytical data for dioxin/furan congener TEF values for START soil/source samples SO-14 and SO-15. Dioxin/furan congeners differ in their relative toxicity. The most toxic congener is 2,3,7,8-TCDD. TEFs allow the toxicity of a specific congener to be compared relative to 2,3,7,8-TCDD (which has a TEF equal to 1). The toxicity of each congener, expressed as a TEF, multiplied by the congener's concentration in a sample, equals the TEQ. To estimate the toxicity of an entire sample, a widely accepted procedure is used, in which the TEQs for each congener in a sample are summed to give the total TEQ. The total TEQ expresses the overall toxicity of the entire group of dioxin/furan congeners in a specific sample [105; 106; 122]. Soil/source sample analytical results are compared to NH DES RCMP Risk-Based S-3 Standards and EPA Region III Risk-Based Industrial Soil Standards. NH DES RCMP Risk-Based S-3 Standards were used because NH DES RCMP Method 1 S-3 standards do not exist for dioxin/furan congeners. Complete analytical results of START soil/source samples, including quantitation and detection limits, are presented in Attachment C.

Table 17

Summary of Analytical Results: Off-Site Samples
Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2001

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-14	**DIOXINS/FURANS**					
	TCDD, 2,3,7,8-	2.33 ng/kg	1.0	2.33 ng/kg	300 ng/kg	19 ng/kg
	PeCDD, 1,2,3,7,8-	0.696 J ng/kg	1.0	0.696 ng/kg	NA	NA
	HxCDD, 1,2,3,4,7,8-	1.10 J ng/kg	0.1	0.110 ng/kg	4,000 [g] ng/kg	460[f] ng/kg
	HxCDD, 1,2,3,6,7,8-	1.15 J ng/kg	0.1	0.115 ng/kg	4,000 [g] ng/kg	460 [f] ng/kg
	HxCDD, 1,2,3,7,8,9-	1.40 J ng/kg	0.1	0.140 ng/kg	4,000 [g] ng/kg	460 [f] ng/kg
	HpCDD, 1,2,3,4,6,7,8-	14.5 EB ng/kg	0.01	0.145 ng/kg	NA	NA
	OCDD	145 EB ng/kg	0.0001	0.0145 ng/kg	NA	NA
	TCDF, 2,3,7,8-	619 EB# ng/kg	0.1	61.9 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	91.1 ng/kg	0.05	4.555 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	76.1 EB ng/kg	0.5	38.05 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	89.2 J EB ng/kg	0.1	8.92 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	22.0 ng/kg	0.1	2.20 ng/kg	NA	NA
	HxCDF, 2,3,4,6,7,8-	7.14 ng/kg	0.1	0.714 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	73.3 J EB ng/kg	0.01	0.733 ng/kg	NA	NA
	HpCDF, 1,2,3,4,7,8,9-	31.2 ng/kg	0.01	0.312 ng/kg	NA	NA
	OCDF	1,570 EB ng/kg	0.0001	0.157 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	120 J ng/kg	-	-	NA	NA

Table 17

Summary of Analytical Results: Off-Site Samples
Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004 (Continued)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-15	**DIOXINS/FURANS**					
	HpCDD, 1,2,3,4,6,7,8-	0.235 J EB ng/kg	0.01	0.00235 ng/kg	NA	NA
	OCDD	3.06 J EB ng/kg	0.0001	0.000306 ng/kg	NA	NA
	TCDF, 2,3,7,8-	2.03 J EB ng/kg	0.1	0.203 ng/kg	NA	NA
	PeCDF, 1,2,3,7,8-	1.67* ng/kg	0.05	0.0835 ng/kg	NA	NA
	PeCDF, 2,3,4,7,8-	0.751* EB ng/kg	0.5	0.3755 ng/kg	NA	NA
	HxCDF, 1,2,3,4,7,8-	1.09 J EB ng/kg	0.1	0.109 ng/kg	NA	NA
	HxCDF, 1,2,3,6,7,8-	0.277 J ng/kg	0.1	0.0277 ng/kg	NA	NA
	HpCDF, 1,2,3,4,6,7,8-	0.571 J EB ng/kg	0.01	0.00571 ng/kg	NA	NA

Table 17

Summary of Analytical Results: Off-Site Samples
Dioxin/Furan Analysis for Chlor-Alkali Facility (former)
Samples Collected for START on 1 and 2 March 2004 (Concluded)

Sample Location	Congener	Sample Concentration	TEF [a]	TEQ [b]	NH DES RCMP Risk-Based S-3 Standard [c]	EPA Risk-Based Industrial Soil Standard [e]
SO-15	**DIOXINS/FURANS (Concluded)**					
	OCDF	3.32 J EB ng/kg	0.0001	0.000332 ng/kg	NA	NA
	Total Dioxin/Furan TEQ [d]	0.81 J ng/kg			NA	NA

*	=	Estimated maximum possible concentration (EMPC).	ng/kg	=	Nanograms per kilogram.
NA	=	Not available.	TEQ	=	Toxicity Equivalency Quotient.
TEF	=	Toxicity Equivalency Factor.	#	=	Concentrations reported from a 1.1 gram sample analysis.
PeCDD	=	Pentachlorodibenzodioxin.	PeCDF	=	Pentachlorodibenzofuran.
TCDD	=	Tetrachlorodibenzo(p)dioxin.	TCDF	=	Tetrachlorodibenzofuran.
HxCDD	=	Hexachlorodibenzodioxin.	HxCDF	=	Hexachlorodibenzofuran.
HpCDD	=	Heptachlorodibenzodioxin.	HpCDF	=	Heptachlorodibenzofuran.
OCDD	=	Octachlorodibenzodioxin.	OCDF	=	Octachlorodibenzofuran.
-	=	Not applicable.	Concl.	=	Concluded.
NH DES	=	New Hampshire Department of Environmental Services.	RCMP	=	Risk Characterization and Management Policy.
J	=	Indicates concentrations reported by the laboratory under the lowest standard.			
EB	=	The compound was identified in an equipment blank that was used to assess field contamination associated with soil/source samples.			
EPA	=	U.S. Environmental Protection Agency.			
a	=	TEF values listed are found in "Toxicity Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number 12, December 1998, Table 1, page 778.			
b	=	TEQ value equals the product of the congener concentration and its TEF value.			
c	=	1998 New Hampshire Department of Environmental Services (NH DES) Risk Characterization and Management Policy (RCMP) Soil Category S-3 Direct Contact Risk-Based Standards based upon restricted access to the property with a limited potential for exposure, either currently or in the reasonably foreseeable future. 1998 (revised 2001) NH DES RCMP Method 1 Soil Categories NH S-1 through S-3 Standards do not exist for dioxin/furan congeners.			
d	=	The Total Dioxin/Furan TEQ value is the sum of the TEQs for each congener in the given sample. This value is calculated including the estimated maximum possible concentrations.			
e	=	2004 U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration.			
f	=	U.S. Environmental Protection Agency Region III Risk-Based Soil Industrial Concentration is for "hexachlorodibenzodioxin mix"; therefore, START applied standard to all hexachlorodibenzodioxins detected in START soil/source samples.			
g	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Soil Category S-3 Direct Contact Risk-Based Standard for hexachlorodibenzodioxin is applied to all hexachlorodibenzodioxins detected in START soil/source samples.			

[118; 121; 122; 171]

In summary, two soil/source samples (SO-14 and SO-15) were collected for START from a soil boring advanced on the Fraser Paper property. Analytical results indicated that two VOCs, 11 SVOCs, one pesticide, 20 metals (including monomethyl mercury), asbestos, and 16 dioxin/furan congeners were detected in these START soil/source samples. The analytical results of these soil/source samples are discussed in the following paragraphs.

Volatile Organic Compounds

Two VOCs, acetone and chloroform, were detected in START soil/source samples collected from the Fraser Paper property [109].

Positive VOC results were estimated and non-detected VOC results were rejected in samples SO-14 and SO-15 because the temperature in the shipment package exceeded its quality control limit of 4 degrees Celsius. The results for acetone are potentially biased high due to suspected EB field contamination [109].

Historical documentation indicates products produced and/or stored on the Chlor-Alkali property included acetone and chloroform [19; 23]. The presence of acetone and chloroform has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property [109]. For the purposes of this PA/SI, the presence of VOCs in off-site soil/source samples will not be evaluated.

No VOCs detected in START soil/source samples collected from the Fraser Paper property exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-111; 121].

Semivolatile Organic Compounds

Eleven SVOCs [anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, fluoranthene, indeno(1,2,3)pyrene, phenanthrene, and pyrene] were detected in START soil/source samples collected from the Fraser Paper property [110].

Positive results were estimated and non-detected results were rejected for four SVOCs (acetophenone; 2,4-dichlorophenol; 2-chloronaphthalene; and acenaphthene) in all samples due to poor recovery in the performance evaluation sample. Non-detected results for hexachlorocyclopentadiene were rejected in samples SO-14 and SO-15 due to poor calibration sensitivity [110].

The presence of these 11 SVOCs has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property [110]. For the purposes of this PA/SI, the presence of SVOCs in off-site soil/source samples will not be evaluated.

No SVOCs detected in START soil/source samples collected from the Fraser Paper property exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standards [110-111; 121].

Pesticides

One pesticide, gamma-Chlordane, was detected in START soil/source samples collected from the Fraser Paper property.

Positive results for endrin aldehyde in sample SO-14 were qualified as rejected due to failed target compound identification criteria. Positive results for 4,4'-DDE in sample SO-10; 4,4'-DDE in sample SO-11; and endrin aldehyde in sample SO-15 were qualified as estimated results due to failed target compound identification criteria [110].

The presence of gamma-Chlordane has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property [110]. For the purposes of this PA/SI, the presence of gamma-Chlordane in off-site soil/source samples will not be evaluated.

Polychlorinated Biphenyls

No PCBs were detected in START soil/source samples collected from the Fraser Paper property [110].

Positive results for Aroclor-1254 in sample SO-10; and Aroclor-1254 in sample SO-15 were qualified as estimated results due to failed target compound identification criteria [110].

Metals and Cyanide

Twenty metals (aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, thallium, vanadium, zinc, and monomethyl mercury) were detected in START soil/source samples collected from the Fraser Paper property [115].

Cadmium results were estimated due to high iron and/or calcium interference. Positive and non-detected results for antimony, arsenic, manganese, and selenium were estimated because the spike analytes for these elements did not meet the percent recovery criteria for the MS/MSD sample [115].

The presence of these 20 metals has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property [115; 116]. For the purposes of this PA/SI, the presence of metals in off-site soil/source samples will not be evaluated.

No cyanide was detected in START soil/source samples collected from the Fraser Paper property [115].

No metals detected in START soil/source samples collected from the Fraser Paper property exceeded their respective NH DES RCMP Method 1 Category S-3 Soil Standard. Three metals (lead, mercury, and nickel) were detected in START soil/source samples collected from the Fraser Paper property at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil [115; 116; 121].

Asbestos

Asbestos (chrysotile) was detected in START soil/source samples collected from the Fraser Paper property [120]. The presence of chrysotile has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property. For the purposes of this PA/SI, the presence of chrysotile in off-site soil/source samples will not be evaluated.

No NH DES RCMP Method 1 Category S-3 Soil Standards or NH DES RCMP Background Concentrations exist for asbestos [121].

Dioxin/Furan Congeners

Sixteen dioxin/furan congeners (2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,4,7,8-HxCDD; 1,2,3,6,7,8-HxCDD; 1,2,3,7,8,9-HxCDD; 1,2,3,4,6,7,8-HpCDD; OCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 2,3,4,6,7,8-HxCDF; 1,2,3,4,6,7,8-HpCDF; 1,2,3,4,7,8,9-HpCDF; and OCDF) were detected in START soil/source samples collected from the Fraser Paper property [118].

Positive results for 1,2,3,7,8-PeCDD were estimated in sample SO-14, and positive results for 1,2,3,4,6,7,8-HpCDF were estimated in samples SO-14 and SO-15 due to the "Action Low" performance evaluation score. The non-detected results for 1,2,3,7,8-PeCDD were rejected in all samples except SO-14 due to "Action Low" PE score [118].

The presence of these 16 dioxin/furan congeners has also been documented in START on-site soil/source samples and is assumed to be the result of historical operations conducted on the Chlor-Alkali property [118]. For the purposes of this PA/SI, the presence of dioxin/furan congeners in off-site soil/source samples will not be evaluated.

In summary, in March 2004, in coordination with NH DES and Weston MNH, and on behalf of EPA, soil/source sampling was conducted as a part of the Chlor-Alkali PA/SI. Soil/source samples were collected from potential source areas on the Chlor-Alkali property, including the Landfill source and the Contaminated Soil source. Based on analytical results, on-site source areas containing seven VOCs, 22 SVOCs, three pesticides, one PCB, 25 inorganics, asbestos, cellulose, mineral wool, and 17 dioxin/furan congeners have been documented. Of these substances, two SVOCs and two metals were detected at concentrations exceeding their respective NH DES RCMP Method 1 Category S-3 Soil Standards. In addition, nine metals were detected at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals [109-121]. To date, actions taken to address the contaminated sources at the Chlor-Alkali property include the installation of the 40-mil liner to prevent direct contact with the site surface; the removal of mercury along the east bank of the Androscoggin River; and the placement of a deed restriction on the Chlor-Alkali property [64].

GROUNDWATER PATHWAY

The surficial materials underlying the Chlor-Alkali property are mapped as composed of glacial till [98]. However, in 1999, all structures on site were razed and used as fill on the property. Then, a 40-mil liner was installed on the surface of approximately 4.0 acres of the 4.6-acre site. The cover system installed consisted of a build-up of 12 inches of "common borrow" and then 6 inches of sand beneath a 40-mil liner; then a drainage geocomposite and 2 feet of bark/wood chips above the 40-mil liner [64]. Boring logs, completed by Weston MNH during the installation of monitoring wells in February and March 2004, indicate the overburden material on site consists of brown to black fine-to-coarse sand, gravel, medium-grained pink gneiss fragments, silt, and "woody peat" at depths down to approximately 25 feet bgs. In addition, Weston MNH observed a substantial amount of non-native fill material in soil borings, including coal tar, "yellow fibrous material", wood scraps, pieces of concrete, brick fragments, and slag [96; 151].

Depth to bedrock beneath the Chlor-Alkali property is 4 to 26 ft bgs [96; 203]. According to the Bedrock Geologic Map of New Hampshire, bedrock beneath the property is characterized as metabasalt of the Middle Ordovician age [99]. As part of the March 2004 sampling activities, nine bedrock corings were advanced to depths down to 64 ft bgs. The bedrock material was characterized by Weston MNH as comprised of gneiss with massive zones, fractured zones, quartz veins, and areas of chlorite enrichment. Bedrock fractures, when present, appeared to be nearly vertical; and Weston MNH noted that some fractures appeared to be water-bearing [96; 151]. During the START on-site reconnaissance, bedrock outcrops were observed along the western property boundary adjacent to the Androscoggin River [102, p. 21].

Based on Sevee's 1999 groundwater elevation survey of the Chlor-Alkali property using overburden and bedrock monitoring wells MW-1 through MW-9, two elevation points along the Androscoggin River, and an elevation point in the canal located east of the Chlor-Alkali property, groundwater flows radially away from the Androscoggin canal and west and southwest toward the Androscoggin River. In addition, based on the water level measurements, the "vertical gradients" at the site are "strong in a downward direction" [13, p. 5-2]. Depth to groundwater ranges from approximately 6.5 to 12.5 ft bgs [96]. The average annual precipitation for Berlin, NH is approximately 38.2 inches [97].

All or part of the following cities or towns are located within 4 radial miles of the Chlor-Alkali property: Berlin (population 10,331), Gorham (population 2,895), Milan (population 1,331), Shelburne (population 379), and the unincorporated town of Success (population 2) [34; 35].

The Town of Berlin is supplied public drinking water from the Berlin Water Works of Berlin, NH. Berlin Water Works obtains its drinking water from a surface water source located along the Upper Ammonoosuc River, greater than 4 radial miles from the Chlor-Alkali property and not located along the 15-mile downstream surface water pathway. However, a back-up gravel-packed groundwater well is located 1.95 miles north-northeast of the Chlor-Alkali property. When the back-up well is utilized, Berlin Water Works blends this source with the surface water intake to supply the Town of Berlin. According to the Superintendent of Berlin Water Works, it is difficult to estimate what percentage this well contributes and how many people are served by the back-up well when it is utilized [27, pp. 36-37; 36; 42]. Therefore, START assumes 50 percent of the total residents served by Berlin Water Work's are served by their back-up well (approximately 5,150 people) when it is utilized. According to the Berlin Water Works July 2003 list of private well users, there are no households served by private drinking water supply wells within 0.25 radial miles of the Chlor-Alkali property, and there are 48 households served by private drinking water supply wells within

1 radial mile of the Chlor-Alkali property [38]. However, this information conflicts with the estimated population served by private wells using CENTRACTS data [37].

The Town of Gorham is supplied public drinking water from the Gorham Water & Sewer Department. The Gorham Water & Sewer Department obtains its drinking water from two surface water sources (Icy Gulch Brook and Perkins Brook) located greater than 4 radial miles from the Chlor-Alkali property and not located along the 15-mile downstream surface water pathway. In addition, Gorham Water & Sewer Department maintains two back-up gravel-packed wells, also located greater than 4 radial miles from the Chlor-Alkali property [40; 41; 102, pp. 7, 8]. The Gorham Water & Sewer Department Superintendent estimates that approximately 2,800 persons are served by the system [102, pp. 7, 8]. According to the Gorham Town Offices, there are 80 households within Gorham that utilize private wells [100].

All residents within the Town of Milan and the Town of Shelburne are served by private drinking water supply wells [101; 102, p. 8].

According to the Coos County Administrative Offices, there are only summer residents in the unincorporated town of Success, and there is no public water supply. Therefore, it is assumed that these part-time residents either bring in their own water or are supplied water from private drinking water supplies [150].

Table 18 summarizes public groundwater supply sources located within 4 radial miles of the Chlor-Alkali property.

Table 18

Public Groundwater Supply Sources Within 4 Radial Miles of Chlor-Alkali Facility (former)

Distance/ Direction from Site	Source Name	Location of Source[a]	Estimated Population Served	Source Type[b]
1.95 north-northeast*	Berlin Water Works Well	Berlin	5,150	Unknown[c]

[a] Indicates Town in which well is located.
[b] Overburden, Bedrock, or Unknown.
[c] Gravel-packed well.

* This well is the back-up supply for Berlin Water Works.

[27, pp. 36-37; 36; 42]

Populations served by private groundwater drinking water supplies located within 4 radial miles of the Chlor-Alkali property were estimated using equal distribution of CENTRACTS data identifying population, households, and private water wells for U.S. Census "block groups" which lie wholly or in part within individual radial distance rings measured from potential sources on the property [37; 38]. The nearest private well located east of the Androscoggin River is located approximately 0.5 miles northeast of the Chlor-Alkali property. The nearest private well located west of the Androscoggin River is located approximately 0.4 miles northwest of the Chlor-Alkali property [39].

Table 19 summarizes estimated drinking water populations served by groundwater sources located within 4 radial miles of the Chlor-Alkali property.

Table 19

Estimated Drinking Water Populations Served by Groundwater Sources Within 4 Radial Miles of Chlor-Alkali Facility (former)

Radial Distance from Chlor-Alkali Facility (former) (miles)	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
≥ 0.00 to 0.25	0	0	0
> 0.25 to 0.50	6	0	6
> 0.50 to 1.00	24	0	24
> 1.00 to 2.00	110	5,150	5,260
> 2.00 to 3.00	141	0	141
> 3.00 to 4.00	176	0	176
TOTAL	457	5,150	5,607

START assumes 50 percent of the total residents served by Berlin Water Work's are served by their back-up well (approximately 5,150 people) when it is utilized.

The estimated population served by private wells is based on CENTRACTS data.

[37; 40; 41; 102, pp. 7, 8]

On 7 April 1999, as part of the LEA, Tighe & Bond collected one groundwater sample (B-7 5'-7') from soil boring B-7, located along the south side of the Cell House, in front of the lower garage door. The groundwater sample was collected from the soil boring using a 2-inch-diameter dedicated disposable bailer through the center of the hollow-stem auger. A petroleum sheen was observed in the groundwater. The groundwater sample was submitted to STL for VOCs, confirmatory lead and mercury, TPHs, a carbon range, and a petroleum ID analyses via unspecified methods [10, p. 5-4, Table 6-1]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 20 summarizes the analytical results of groundwater sample B-7(5'-7') collected by Tighe & Bond from the Chlor-Alkali property on 7 April 1999.

Table 20

Summary of Analytical Results
Groundwater Sample B-7 (5'-7') Analysis for Chlor-Alkali Facility (former)
Sample Collected by Tighe & Bond on 7 April 1999

Substance	Concentration	NH DES*	
		GW-1	GW-2
TPH (mg/L)	17	NE	NE
Carbon Range	C12-C32	NA	NA
Petroleum ID	Motor Oil	NA	NA
VOCs (µg/L)			
Benzene	1.0	5	2,000
Chloroform	3.8	NE	NE
Dichloroethene, cis-1,2-	1.0	70	NE
Dichloroethene, 1,1-	1.0 U	7	0
Ethylbenzene	6.2	700	30,000
Isopropyltoluene, p-	1.2	NE	NE
Methyl-t-butyl ether	1.0 U	70	50,000
Naphthalene	23	20	6,000
Tetrachloroethene	13	5	3,000
Toluene	3.1	1,000	6,000
Trichlorobenzene, 1,2,3-	1.0 U	NE	NE
Trichlorobenzene, 1,2,4-	1.0 U	70	600
Trichloroethene	4.4	5	300
Trimethylbenzene, 1,2,4-	3.6	NE	NE
Trimethylbenzene, 1,3,5-	1.2	NE	NE
Vinyl Chloride	2.3	2	2
Xylene, m + p-	20	10,000	6,000
Xylene, o-	13	10,000	6,000

Table 20

Summary of Analytical Results
Groundwater Sample B-7 (5'-7') Analysis for Chlor-Alkali Facility (former)
Sample Collected by Tighe & Bond on 7 April 1999 (Concluded)

Substance	Concentration	NH DES*	
		GW-1	GW-2
METALS (µg/L)			
Lead	34,000**	15	NE
Mercury	17,000**	2	NE

µg/L	=	Micrograms per liter.
mg/L	=	Milligrams per liter.
NE	=	Not established.
ID	=	Identification.
NA	=	Not applicable.
TPHs	=	Total Petroleum Hydrocarbons.
VOCs	=	Volatile organic compounds.
NH DES	=	New Hampshire Department of Environmental Services.
RCMP	=	Risk Characterization and Management Policy.
U	=	Analyte was not detected in the sample. The laboratory detection limit is provided.
GW-1, GW-2	=	NH DES RCMP Method 1 Groundwater Standards.

* Tighe & Bond compared their analytical results to NH DES RCMP Method 1 Groundwater Standards GW-1 and GW-2. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES RCMP Method 1 Groundwater Standards were updated in April 2004.

** Groundwater samples not filtered prior to metals analyses.

[10, Table 6-1]

In May 1999, presumably on behalf of Crown Vantage, Maine Test Borings, Inc. of Brewster, Maine, under direction of Tighe & Bond, advanced five soil borings and completed them as 2-inch-diameter overburden monitoring wells (MW-2 through MW-6) on the Chlor-Alkali property. In addition, Maine Test Borings, Inc. advanced one soil boring off site and completed it as an overburden monitoring well (MW-1). The depths of these monitoring wells range from 5.5 feet to 17.2 feet bgs [13 p. 3-1, Appendix C].

On 1 June 1999, presumably on behalf of Crown Vantage, Tighe & Bond collected six groundwater samples from overburden monitoring wells MW-1 through MW-6. Groundwater sample MW-1 was used to document reference conditions. The method by which the groundwater samples were collected is unknown to START. The groundwater samples were submitted to an unknown laboratory and analyzed for VOCs and dissolved metals using unspecified laboratory methods [13, Appendix D]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Maximum concentrations of substances detected in the groundwater samples collected by Tighe & Bond on 1 June 1999 from the Chlor-Alkali property are summarized in Table 21.

Table 21

Summary of Maximum Concentrations
Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 1 June 1999

Substance	Concentration	Sample Location	Background Concentration (MW-1)	NH DES GW-1*
VOCs (µg/L)				
Chloroform	23	MW-6	1.0 U	6
Dichloroethene, cis-1,2,-	0.75 J	MW-2	1.0 U	70
Isopropyltoluene, p-	12	MW-6	1.0 U	NE
Naphthalene	10	MW-4	5.0 U	20
Tetrachloroethene	2.4	MW-6	1.0 U	5
Trichloroethene	1.9	MW-3	1.0 U	5
Vinyl Chloride	1.1	MW-2	2.0 U	2
DISSOLVED METALS (µg/L)				
Arsenic	10 U	MW-2 through MW-5	10 U	50
Barium	150	MW-3, MW-5	140	2,000
Cadmium	2 U	MW-2 through MW-5	2 U	5
Chromium	10 U	MW-2 through MW-5	10 U	100
Lead	10	MW-3	10 U	15
Mercury	2.8	MW-3	0.2 U	2
Selenium	10 U	MW-2 through MW-5	10 U	50
Silver	5 U	MW-2 through MW-5	5 U	50

µg/L = Micrograms per liter.
NE = Not established.
VOCs = Volatile Organic Compounds.
J = Estimated value.
U = Analyte was not detected. The laboratory detection limit is provided.
NH DES = New Hampshire Department of Environmental Services.
GW-1 = New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 Groundwater Standards.

* Tighe & Bond compared their analytical results to NH DES RCMP Method 1 Groundwater Standards GW-1. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES RCMP Method 1 Groundwater Standards were updated in April 2004.

The filter for the metals sample collected from MW-6 broke. Therefore, no metals results are available for MW-6.

[13, Appendix D]

On 17 June 1999, on behalf of Crown Vantage, Tighe & Bond collected one groundwater seep sample (SEEP-1) from the bedrock outcrop, located southwest of the Cell House. The sample was submitted to STL of Westfield, Massachusetts and analyzed for lead by EPA Method 200.7 and for mercury by EPA Method 245.1. Analytical results indicated the presence of mercury at 2.4 µg/L. No lead was detected in SEEP-1 [13, Appendix F; 52]. START attempted to confirm whether these data were validated; however, this information was not available in the file information obtained by START. Therefore, START assumes these data are unvalidated.

From 7 July to 9 July 1999, Maine Test Borings, Inc. of Brewster, Maine, under direction of Tighe & Bond, installed three 2-inch diameter bedrock monitoring wells (MW-7 through MW-9) on the Chlor-Alkali property (depths ranging from 38.1 to 43.8 feet bgs). These wells were installed adjacent to shallow overburden wells MW-2, MW-3, and MW-5, respectively [13, p. 3-1, Appendix A].

On 19 July 1999, on behalf of Crown Vantage, Sevee conducted a groundwater elevation survey of the Chlor-Alkali property using monitoring wells MW-1 through MW-9, two elevation points along the Androscoggin River, and an elevation point in the canal located east of the Chlor-Alkali property. Based on the results of this survey, groundwater flows radially away from the canal, and west and southwest toward the Androscoggin River. In addition, based on the water level measurements of three couplet wells (MW-2/MW-7; MW-3/MW-8; and MW-5/MW-9), the "vertical gradients" at the site are "strong in a downward direction" [13, pp. 5-1, 5-2].

On 10 August 1999, on behalf of Crown Vantage, Sevee collected groundwater samples from monitoring wells MW-1, MW-2, MW-4, MW-4A, MW-5 through MW-9, MW-10A and MW-10B. The location of monitoring well MW-4A is unknown to START. The method by which the groundwater samples were collected is unknown to START. Groundwater samples were submitted to an unknown laboratory and analyzed for dissolved metals (lead and mercury) by unspecified methods. The highest concentrations of lead (0.082 mg/L) and mercury (0.046 mg/L) were detected in a sample collected from monitoring well MW-4A [71]. START attempted to confirm whether these data were validated; however, this information was not available in the file information obtained by START. Therefore, START assumes these data are unvalidated.

On 30 November 1999, on behalf of Crown Vantage, Sevee collected an aqueous source sample from drain pipe DP-1. For the purposes of this PA/SI, START considers the aqueous sample collected from DP-1 a groundwater seep sample. The sample was analyzed by an unknown laboratory for lead and mercury by unspecified methods. Mercury was detected at 0.00052 mg/L. No lead was detected in the sample [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

In December 1999, Sevee prepared the Plan which summarizes the site closure activities that took place on the Chlor-Alkali property, including the installation of several piezometers and two monitoring wells [64, p. 8-2; 91, p. 2-7]. At the time of this Plan, monitoring wells MW-1 through MW-9, MW-10A, and MW-10B and piezometers P-11 through P-22 were present on the Chlor-Alkali property [64, p. 8-2]. Further information regarding which piezometers and monitoring wells were installed as part of site closure activities was not specified in available file information obtained by START.

On 7 March 2000, on behalf of Crown Vantage, Sevee collected an aqueous sample from drain pipe DP-1. For the purposes of this PA/SI, START considers the aqueous sample collected from DP-1 a groundwater seep sample. The sample was analyzed by an unknown laboratory fot lead and mercury by unspecified methods. Mercury was detected at 0.00031 mg/L. Lead was not detected in the sample [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 27 and 28 March 2000 and 13 and 14 June 2000, on behalf of Crown Vantage, Sevee collected groundwater samples from monitoring wells MW-2 through MW-9, MW-10A, and MW-10B located on the Chlor-Alkali property and from MW-1 located off site. The method by which the March 2000 groundwater samples were collected is unknown to START; however, field parameters (pH, specific conductance, temperature, and redox potential) were recorded. Groundwater samples were submitted to an unknown laboratory and analyzed for VOCs by EPA Method 8260B, and for metals (arsenic, barium, lead, and mercury) using an unspecified method. The pH of the groundwater ranged from 6.6 (MW-6) to 11.8 (MW-10A). Monitoring wells MW-2, MW-6 through MW-9, and MW-10A had pH measurements greater than 9.5 standard units The June 2000 samples were collected using a peristaltic pump and submitted to Analytics Environmental Laboratory in Portsmouth, NH, for VOC analysis by EPA Method 8260B, and to Maine Environmental Laboratory in Yarmouth, Maine for metals (arsenic, barium, lead, and mercury) analysis by EPA Method SW846. Field parameters (pH, specific conductance, temperature, and redox potential) were also recorded. The pH of the groundwater samples ranged from 6.7 (MW-5) to 11.9 (MW-10A). Monitoring wells MW-2, MW-6 through MW-9, and MW-10A had pH measurements greater than 9.5 standard units [71]. START attempted to confirm whether these analytical data were validated; however, this information was not available in the file information obtained by START. Therefore, START assumes these data are unvalidated. The maximum concentration of VOCs and metals detected in groundwater samples collected by Sevee from the Chlor-Alkali property in March and June 2000 are summarized in Table 22.

Table 22

Summary of Maximum Concentrations
Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Sevee Maher Engineers, Inc. in March and June 2000

Substance	March 2000		June 2000	
	Concentration	Sample Location	Concentration	Sample Location
VOCs (µg/L)				
Acetone	44	MW-8	53	MW-8, MW-10A
Carbon disulfide	21	MW-6	24	MW-6
Chloroform	133*	MW-10A	259*	MW-10A
Dichloroethene, cis-1,2-	1 J	MW-2, MW-8	1 J	MW-8
Dichloroethene, trans-1,2-	2	MW-8	2 J*	MW-8
Hexachlorobutadiene	5	MW-8	2	MW-8

Table 22

Summary of Maximum Concentrations
Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Sevee Maher Engineers, Inc. in March and June 2000
(Concluded)

Substance	March 2000		June 2000	
	Concentration	Sample Location	Concentration	Sample Location
VOCs (Concluded) (µg/L)				
Isopropyltoluene	18	MW-6	18	MW-6
Methylene chloride	8	MW-10A	12	MW-10A
Methyl ethyl ketone	1,210*	MW-10A	1,070*	MW-10A
Naphthalene	9	MW-4	2 J*	MW-8
Tetrachlorethene	183*	MW-8	113*	MW-8
Tetrahydrofuran	1,330*	MW-10A	1,250*	MW-10A
Trichloroethene	152*	MW-10A	143*	MW-8
Vinyl chloride	1 J	MW-2	1 J	MW-2
Xylene, o-	2	MW-2	2	MW-2
Xylene, m, p-	4	MW-2	4	MW-2
METALS (mg/L)				
Arsenic	0.057	MW-6	0.028	MW-10A
Barium	0.26	MW-5	0.029	MW-10A
Lead	0.008	MW-2	0.033	MW-7
Mercury	0.0212	MW-8	0.085	MW-8

µg/L = Micrograms per liter.
mg/L = Milligrams per liter.
VOC = Volatile Organic Compound.
J = Estimated value.
* = Indicates the concentration is reported from diluted analysis.

No VOCs were detected in samples collected from MW-01, MW-04, and MW-10B in March and June 2000. Monitoring well MW-03 was dry during both March and June 2000 sampling events.

Groundwater samples MW-8 and MW-10A are duplicate samples; therefore, the maximum concentration is reported.

[71]

On 10 April 2001, on behalf of Pulp & Paper of America, Tighe & Bond collected groundwater samples from monitoring wells MW-1, MW-2, MW-5 through MW-9, and a groundwater seep sample from the drain pipe DP-1. Reportedly, several wells could not be sampled because they were dry, damaged, or could not be bailed. Groundwater samples were submitted to an unspecified laboratory and analyzed for VOCs and metals by unspecified methods. Analytical results of groundwater samples indicated the presence of four VOCs (chloroform, methylene chloride, PCE, and TCE) and three metals (arsenic, lead, and mercury). Analytical results of the groundwater seep sample indicated the presence of one metal (barium) [91, p. 2-7]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

Throughout the 1999 through 2001 groundwater sampling events, groundwater elevations were measured at each available monitoring well. In addition, Sevee allegedly installed 13 piezometers after the 40-mil liner was installed to gage groundwater elevation. Groundwater elevations ranged from 4.55 feet (MW-1 in October 1999) to 21.00 feet (MW-8 in April 2001) below grade. As a result of these groundwater elevation surveys, groundwater flow direction is reportedly northwest toward the Androscoggin River. The horizontal gradient is approximately 0.033 feet per foot in the overburden and approximately 0.00067 feet per foot in the bedrock aquifer [91, pp. 2-7 and 2-8, Appendix F].

In December 2001, on behalf of NH DES, Weston MNH collected one groundwater seep sample from an outfall pipe (assumed DP-1) discharging into the Androscoggin River, and located in the concrete retaining wall bordering the western boundary of the Chlor-Alkali property. The sample was submitted to Resource Laboratories in Portsmouth, NH and analyzed for VOCs (EPA Method 8260B), total lead (EPA Method 200.7), and total mercury (EPA Method 245.1). Unvalidated analytical results indicated the presence of mercury at 0.0005 mg/L in the sample with a pH of 6.5. Lead was not detected in the groundwater seep sample [94].

In February and March 2004, on behalf of NH DES, Weston MNH oversaw the installation of seven overburden monitoring wells (MW-11A, MW-13A, MW-16A, MW-17, MW-20A, MW-22, and MW-23A) and nine bedrock monitoring wells (MW-11B, MW-13B, MW-14R, MW-15, MW-16B, MW-19, MW-20B, MW-21, and MW-23B) on the Chlor-Alkali property. In addition, two overburden monitoring wells (MW-12 and MW-18A) and one bedrock monitoring well (MW-18B) were installed on the Fraser Paper property [203].

Analytical Results of On-Site Weston MNH Overburden Groundwater Samples

On 7 and 8 April 2004, on behalf of NH DES, Weston MNH collected 11 groundwater samples (MW2-0404, MW4-0404, MW5-0404, MW10A-0404, MW11A-0404, MW13A-0404, MW16A-0404, MW17-0404, MW20A-0404, MW22-0404, and MW23A-0404) from 11 overburden monitoring wells (MW-2, MW-4, MW-5, MW-10A, MW-11A, MW-13A, MW-16A, MW-17, MW-20A, MW-22, and MW-23A) located throughout the Chlor-Alkali property. Overburden monitoring well MW-3 was not sampled because the well was dry at the time of sampling activities. No groundwater sample was collected to document reference conditions in the overburden aquifer. All groundwater samples were submitted to Northeast Laboratory Services (Northeast) in Waterville, Maine and were analyzed for eight metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA SW-846 Methods 3010A/6010B for metals and EPA Methods 7470A/7471A for mercury. In addition, groundwater samples MW2-0404, MW13A-0404, and

MW23A-0404 were analyzed for low-level VOCs by EPA SW-846 Method 8260B and for low-level SVOCs by EPA Methods 3510 and 8270C. With NH DES' permission, START conducted a Tier II validation on the groundwater analytical results. Table 23 summarizes overburden groundwater samples collected by Weston MNH personnel from the Chlor-Alkali property on 7 and 8 April 2004.

Table 23

Sample Summary: Chlor-Alkali Facility (former)
Overburden Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Overburden Groundwater				
MW2-0404	AG02609	4/7/04 1540	Grab	Sample collected from overburden monitoring well MW-2 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.51 °C, specific conductivity = 776 µS/cm, pH = 10.02, ORP = -133 mv, % DO = 0.51, turbidity = 9 NTU. MVA = 0.003 mg/m³.
MW4-0404	AG02624	4/8/04 1045	Grab	Sample collected from overburden monitoring well MW-4 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 7.86 °C, specific conductivity = 226 µS/cm, pH = 6.88, ORP = -74 mv, % DO = 0.21, turbidity = 21 NTU. Headspace readings using a mercury analyzer = 0.000 mg/m³.
MW5-0404	AG02601	4/7/04 1225	Grab	Sample collected from overburden monitoring well MW-5 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 9.21 °C, specific conductivity = 643 µS/cm, pH = 6.43, ORP = 68 mv, % DO = 2.08, turbidity = 5 NTU. MVA = 0.000 mg/m³.
MW10A-0404	AG02619	4/8/04 ~0950	Grab	Sample collected from overburden monitoring well MW-10A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 10.63 °C, specific conductivity = 629 µS/cm, pH = 7.30, ORP = -156 mv, % DO = 0.19, turbidity = 6.8 NTU. MVA = NA.

Table 23

Sample Summary: Chlor-Alkali Facility (former)
Overburden Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004
(Continued)

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Overburden Groundwater (Continued)				
MW11A-0404	AG02604	4/7/04 ~1055	Grab	Sample collected from overburden monitoring well MW-11A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 9.48 °C, specific conductivity = 310 µS/cm, pH = 6.09, ORP = 43.0 mv, % DO = 0.22, turbidity = 26 NTU. MVA = NA.
MW13A-0404	AG02610	4/7/04 1710	Grab	Sample collected from overburden monitoring well MW-13A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.42 °C, specific conductivity = 492 µS/cm, pH = 9.09, ORP = 1.168 mv, % DO = 0.16, turbidity = NA. MVA = 0.059 mg/m.
MW16A-0404	AG02597	4/7/04 0945	Grab	Sample collected from overburden monitoring well MW-16A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.45 °C, specific conductivity = 548 µS/cm, pH = 7.16, ORP = -46 mv, % DO = 0.23, turbidity = 7 NTU. MVA = 0.006 mg/m^3.
MW17-0404	AG02623	4/8/04 0810	Grab	Sample collected from overburden monitoring well MW-17 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 4.36 °C, specific conductivity = 178 µS/cm, pH = 7.93, ORP = -144 mv, % DO = 0.21, turbidity = 2.2 NTU. MVA = 0.000 mg/m^3.
MW20A-0404	AG02616	4/7/04 ~1650	Grab	Sample collected from overburden monitoring well MW-20A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.20 °C, specific conductivity = 2,746 µS/cm, pH = 9.46, ORP = -328.1 mv, % DO = 0.07, turbidity = NA. MVA = 0.029 mg/m^3.

Table 23

Sample Summary: Chlor-Alkali Facility (former)
Overburden Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004
(Concluded)

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Overburden Groundwater (Concluded)				
MW22-0404	AG02618	4/7/04 ~1820	Grab	Sample collected from overburden monitoring well MW-22 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 5.73 °C, specific conductivity = 739 µS/cm, pH = 7.24, ORP = -177.5 mv, % DO = 0.16, turbidity = 0.20 NTU. MVA = NA.
MW23A-0404	AG02612	4/7/04 0845	Grab Well starting to go dry prior to sampling.	Sample collected from overburden monitoring well MW-23A using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 6.95 °C, specific conductivity = 308 µS/cm, pH = 6.51, ORP = 24.8 mv, % DO = 1.42, turbidity = 3.6 NTU, MVA = 0.000 mg/m³.

~	=	Approximate.	mg/m³	=	Milligrams per cubic meter.
°C	=	Degrees Celsius.	NA	=	Not Available.
µS/cm	=	Microsiemens per centimeter.	%	=	Percent.
mv	=	Millivolts.	No.	=	Number.
NTU	=	Nephelometric Turbidity Units.	DO	=	Dissolved Oxygen.
ORP	=	Oxidation Reduction Potential.	MVA	=	Mercury Vapor Analyzer.
Weston MNH	=	Weston Solutions, Inc. of Manchester, New Hampshire.			

[50; 51; 201]

Table 24 is a summary of organic and inorganic substances detected through VOC, SVOC, and metals analyses of Weston MNH overburden groundwater samples collected on 7 and 8 April 2004. No reference sample was collected. Therefore, all substances detected greater than the Reporting Limit (RL) are listed in the following table. Groundwater sample analytical results are compared to NH DES RCMP Method 1 GW-1 Standards, and NH DES Ambient Groundwater Quality Standards (AGQS). NH DES RCMP Method 1 GW-1 standards characterize the risk associated with groundwater used as a source for drinking water. AGQSs are maximum concentrations levels for regulated contaminants in groundwater which result from human operations or activities. NH's Groundwater Protection Rules (Env-Ws 410) establish AGQS as the goal for groundwater quality. NH DES RCMP Method 1 GW-2 standards, which characterize the risk associated with the groundwater as a source of indoor air contamination, were not used by START for comparison purposes because there are no on-site workers or buildings located on the Chlor-Alkali property [121]. Bolded substances and concentrations indicate that the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS. Complete analytical results of Weston MNH groundwater samples, including quantitation and detection limits, are presented in Attachment D.

Table 24

Summary of Analytical Results
Overburden Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW2-0404	**INORGANICS**			
	Barium	0.023 mg/L	2.0 mg/L	2.0 mg/L
	Lead	0.011 mg/L	0.015 mg/L	0.015 mg/L
	Mercury	**0.0071 mg/L**	**0.002 mg/L**	**0.002 mg/L**
MW4-0404	**INORGANICS**			
	Arsenic	0.015 mg/L	0.05 mg/L	0.05 mg/L
	Barium	0.029 mg/L	2.0 mg/L	2.0 mg/L
	Lead	0.005 J mg/L	0.015 mg/L	0.015 mg/L
MW5-0404	**INORGANICS**			
	Barium	0.79 mg/L	2.0 mg/L	2.0 mg/L
	Chromium	0.012 mg/L	0.100* mg/L	0.1 mg/L
	Lead	**0.024 mg/L**	**0.015 mg/L**	**0.015 mg/L**
	Mercury	0.00023 mg/L	0.002 mg/L	0.002 mg/L
MW10A-0404	**INORGANICS**			
	Arsenic	**0.026 mg/L**	**0.01 mg/L**	0.05 mg/L
	Barium	0.022 mg/L	2.0 mg/L	2.0 mg/L
	Lead	0.008 J mg/L	0.015 mg/L	0.015 mg/L
MW11A-0404	**INORGANICS**			
	Barium	0.049 mg/L	2.0 mg/L	2.0 mg/L
MW13A-0404	**VOCs**			
	Acetone	420** J µg/L	6,000 µg/L	700 µg/L
	Naphthalene	**28 µg/L**	**20 µg/L**	**20 µg/L**
	Vinyl chloride	**3.6 J µg/L**	**2 µg/L**	**2 µg/L**
	SVOCs			
	Phenanthrene	15 µg/L	210 µg/L	210 µg/L

Table 24

Summary of Analytical Results
Overburden Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW13A-0404 (Concl.)	**INORGANICS**			
	Barium	0.012 J mg/L	2.0 mg/L	2.0 mg/L
	Mercury	**0.0049 mg/L**	**0.002 mg/L**	**0.002 mg/L**
MW16A-0404	**INORGANICS**			
	Barium	0.014 J mg/L	2.0 mg/L	2.0 mg/L
MW17-0404	**INORGANICS**			
	Barium	0.025 mg/L	2.0 mg/L	2.0 mg/L
MW20A-0404	**INORGANICS**			
	Arsenic	**0.10 mg/L**	**0.01 mg/L**	**0.05 mg/L**
	Barium	**0.79 mg/L**	**2.0 mg/L**	**2.0 mg/L**
	Cadmium	**0.01 mg/L**	**0.005 mg/L**	**0.005 mg/L**
	Chromium	**0.16 mg/L**	**0.100* mg/L**	**0.1 mg/L**
	Lead	**1.0 mg/L**	**0.015 mg/L**	**0.015 mg/L**
	Mercury	**0.0038 mg/L**	**0.002 mg/L**	**0.002 mg/L**
	Selenium	**0.05 mg/L**	**0.05 mg/L**	**0.05 mg/L**
MW22-0404	**INORGANICS**			
	Barium	0.015 J mg/L	2.0 mg/L	2.0 mg/L
	Lead	**0.011 mg/L**	**0.015 mg/L**	**0.015 mg/L**

Table 24

Summary of Analytical Results
Overburden Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW23A-0404	**INORGANICS**			
	Barium	0.083 mg/L	2.0 mg/L	2.0 mg/L
	Lead	0.005 J mg/L	0.015 mg/L	0.015 mg/L

J	=	Estimated value due to limitations identified during quality control review.
NH DES	=	New Hampshire Department of Environmental Services.
RCMP	=	Risk Characterization and Management Policy.
AGQS	=	Ambient Groundwater Quality Standards.
VOC	=	Volatile Organic Compound.
SVOC	=	Semivolatile Organic Compound.
mg/L	=	Milligrams per liter.
µg/L	=	Micrograms per liter.
*	=	Standard listed is for total chromium.
**	=	Reported from diluted analysis.

*** Analytical results are compared to 1998 (revised 2004) NH DES RCMP Method 1 GW-1 Standards, and/or 1999 NH DES AGQS.

Bolded substances and concentrations indicate the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS.

[50; 51; 121; 174]

In summary, Weston MNH collected 11 overburden groundwater samples from the Chlor-Alkali property. Analytical results of the samples indicated the presence of three VOCs (acetone, naphthalene, and vinyl chloride), one SVOC (phenanthrene), and seven metals (arsenic, barium, cadmium, chromium, lead, mercury, and selenium) at concentrations above RLs [50; 51]. The analytical results for Weston MNH overburden groundwater samples are discussed in greater detail in the following paragraphs.

Volatile Organic Compounds

Three VOCs, including acetone, naphthalene, and vinyl chloride, were detected at concentrations above RLs in Weston MNH overburden groundwater samples collected from monitoring wells located on the Chlor-Alkali property [50].

Positive and non-detected results for five VOCs (acetone; 2-hexanone; 2-methyl-2-pentanone; methylene chloride; tetrahydrofuran) were estimated for all samples because they did not meet relative standard deviation in the initial calibration of the laboratory instrument. For all samples except MW13A-0404, positive and non-detected results were either estimated or rejected for three VOCs (acetone; 1,2-dibromo-3-chloropropane; and tert-Butanol) because either they did not meet the relative standard deviation (RSD) in the initial calibration of the laboratory instrument or they did not meet the RSD in the continuing calibration of the laboratory instrument. Positive and non-detected results for groundwater sample MW13A-0404 were estimated because the sample did not meet internal standard count criteria. Naphthalene and/or tert-Buranol results were qualified as undetected in some samples due to laboratory blank contamination. Non-detected tert-Butanol and 1,2-dibromo-3-chloropropane results were rejected in all samples due to poor calibration sensitivity. Positive and non-detected results for two VOCs (methylene chloride and t-butyl-methyl ether) were estimated because spike compounds did not meet percent recovery and/or relative percent difference criteria for all aqueous laboratory control sample/laboratory control sample duplicates [50].

Historical documentation indicates products produced and/or stored on the Chlor-Alkali property included acetone [19; 23]. Acetone and naphthalene were also detected in START on-site soil/source samples [109]. Vinyl chloride is a transformation produce of PCE and TCE [175; 176]. Both PCE and TCE were detected in soil/source samples collected from the Chlor-Alkali property [109]. Although no reference samples were collected for comparison purposes, the presence of these non-naturally occurring substances in overburden groundwater beneath the Chlor-Alkali property will be considered at least partially attributable to on-site sources.

Two VOCs (naphthalene and vinyl chloride) were detected in Weston MNH overburden groundwater samples at concentrations that exceeded their respective NH DES RCMP Method 1 GW-1 Standards and their respective NH DES AGQS [50; 51; 121; 174].

Semivolatile Organic Compounds

One SVOC, phenanthrene, was detected above its RL in a Weston MNH overburden groundwater sample collected from a monitoring well located on the Chlor-Alkali property [50].

Positive and non-detected results for two SVOCs (benzidine and hexachlorocyclopentadiene) were estimated for all samples because they did not meet the RSD in the initial calibration of the laboratory instrument. Positive and non-detected results for two SVOCs (nitrobenzene and 4-nitrophenol) were estimated for all samples because they did not meet the RSD in the continuing calibration of the laboratory instrument. Positive and non-detected results for four SVOCs (benzoic acid, fluorene, 4-nitrophenol, and N-Nitrosodimethylamine) were estimated for all samples because spike compounds did not meet percent recovery and/or relative percent difference criteria for all aqueous laboratory control sample/laboratory control sample duplicates [50].

Phenanthrene was also detected in START on-site soil/source samples [110; 112]. Therefore, the presence of phenanthrene in overburden groundwater beneath the Chlor-Alkali property will be considered at least partially attributable to on-site sources.

No SVOCs were detected in Weston MNH overburden groundwater samples at concentrations that exceeded their respective NH DES RCMP Method 1 GW-1 Standard or NH DES AGQS [50; 121; 174].

Metals

Seven metals (arsenic, barium, cadmium, chromium, lead, mercury, and selenium) were detected at concentrations above RLs in Weston MNH overburden groundwater samples collected from monitoring wells located on the Chlor-Alkali property [51].

Positive results for arsenic, barium, cadmium, and chromium were estimated in all samples if results were less than the RL or less than two times the laboratory RL due to uncertainty near the detection limit [51].

These seven metals were also detected in START on-site soil/source samples [115; 116]. Therefore, the presence of these metals in overburden groundwater beneath the Chlor-Alkali property will be considered partially attributable to on-site sources.

Six metals (arsenic, cadmium, chromium, lead, mercury, and selenium) were detected in Weston MNH overburden groundwater samples at concentrations that exceeded their respective NH DES RCMP Method 1 GW-1 Standards and their respective NH DES AGQS [51; 121; 174].

Analytical Results of On-Site Weston MNH Bedrock Groundwater Samples

On 7 and 8 April 2004, on behalf of NH DES, Weston MNH collected 13 groundwater samples (MW7-0404, MW8-0404, MW9-0404, MW10B-0404, MW11B-0404, MW13B-0404, MW14R-0404, MW15-0404, MW16B-0404, MW19-0404, MW20B-0404, MW21-0404, and MW23-0404) from 13 bedrock monitoring wells (MW-7, MW-8, MW-9, MW-10B, MW-11B, MW-13B, MW-14R, MW-15, MW-16B, MW-19, MW-20B, MW-21, and MW-23B) located throughout the Chlor-Alkali property. No groundwater sample was collected to document reference conditions in the bedrock aquifer. All groundwater samples were submitted to Northeast in Waterville, Maine and analyzed for eight metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA SW-846 Methods 3010A/6010B for metals and 7470A/7471A for mercury. In addition, groundwater samples MW7-0404, MW13B-0404, MW14R-0404 and MW23B-0404 were analyzed for low-level VOCs by EPA SW-846 Method 8260B and low-level SVOCs by EPA Methods 3510 and 8270C. With NH DES' permission, START conducted a Tier II validation on the groundwater analytical results. Table 25 summarizes bedrock groundwater samples collected by Weston MNH personnel from the Chlor-Alkali property on 7 and 8 April 2004.

Table 25

Sample Summary: Chlor-Alkali Facility (former)
Bedrock Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Bedrock Groundwater				
MW7-0404	AG02608	4/7/04 1445	Grab	Sample collected from bedrock monitoring well MW-7 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.48 °C, specific conductivity = 2,604 µS/cm, pH = 11.43, ORP = -60 mv, % DO = 0.31, turbidity = 125 NTU. MVA = 0.000 mg/m^3.
MW8-0404	AG02603	4/7/04 1400	Grab	Sample collected from bedrock monitoring well MW-8 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 10.64 °C, specific conductivity = 6,042 µS/cm, pH = 11.86, ORP = -3.0 mv, % DO = 5.88, turbidity = 5.1 NTU. MVA = 0.000 mg/m^3.
MW9-0404	AG02600	4/7/04 1145	Grab	Sample collected from bedrock monitoring well MW-9 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 10.36 °C, specific conductivity = 2,600 µS/cm, pH = 6.35, ORP = -6.9 mv, % DO = 0.24, turbidity = 60 NTU. MVA = 0.000 mg/m^3.
MW10B-0404	AG02620	4/8/04 ~1055	Grab	Sample collected from bedrock monitoring well MW-10B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 11.40 °C, specific conductivity = 2,634 µS/cm, pH = 10.58, ORP = 57.5 mv, % DO = 0.45, turbidity = 13 NTU. MVA = NA.
MW11B-0404	AG02605	4/7/04 ~1215	Grab	Sample collected from bedrock monitoring well MW-11B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 9.39 °C, specific conductivity = 2,475 µS/cm, pH = 9.29, ORP = 10.3 mv, % DO = 4.34, turbidity = 29 NTU. MVA = NA.

Table 25

Sample Summary: Chlor-Alkali Facility (former)
Bedrock Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004
(Continued)

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Bedrock Groundwater (Continued)				
MW13B-0404	AG02611	4/7/04 1800	Grab	Sample collected from bedrock monitoring well MW-13B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.43 °C, specific conductivity = 2,900 µS/cm, pH = 12.02, ORP = -168 mv, % DO = 0.16, turbidity = 1.6 NTU. MVA = 0.003 mg/m^3.
MW14R-0404	AG02614	4/7/04 0900	Well purged dry with bailer on 4/7/04. Second attempt to sample on 4/8/04.	Sample collected from bedrock monitoring well MW-14R using a bailer. No parameters recorded prior to sampling. Headspace readings using an MVA = NA.
MW15-0404	AG02602	4/7/04 1315	Grab	Sample collected from bedrock monitoring well MW-15 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.76 °C, specific conductivity = 1,806 µS/cm, pH = 11.89, ORP = -19.6 mv, % DO = 7.00, turbidity = 5 NTU. MVA = 0.018 mg/m^3.
MW16B-0404	AG02598	4/7/04 1025	Grab	Sample collected from bedrock monitoring well MW-16B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 9.18 °C, specific conductivity = 3,854 µS/cm, pH = 11.94, ORP = -6.8 mv, % DO = 0.18, turbidity = 8 NTU. MVA = 0.000 mg/m^3.
MW19-0404	AG02615	4/7/04 ~1510	Grab	Sample collected from bedrock monitoring well MW-19 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 9.23 °C, specific conductivity = 298 µS/cm, pH = 7.26, ORP = -159.3 mv, % DO = 0.22, turbidity = 21 NTU. MVA = NA.

Table 25

Sample Summary: Chlor-Alkali Facility (former)
Bedrock Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004
(Concluded)

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Bedrock Groundwater (Concluded)				
MW20B-0404	AG02617	4/7/04 ~1735	Grab	Sample collected from bedrock monitoring well MW-20B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 8.83 °C, specific conductivity = 4,566 µS/cm, pH = 11.90, ORP = -92.0 mv, % DO = 0.11, turbidity = 25 NTU. MVA = NA.
MW21-0404	AG02599	4/7/04 1100	Grab	Sample collected from bedrock monitoring well MW-21 using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 10.90 °C, specific conductivity = 4,461 µS/cm, pH = 11.91, ORP = -149 mv, % DO = 0.11, turbidity = 26 NTU. MVA = 0.017 mg/m³.
MW23B-0404	AG02613	4/8/04 0935	Grab	Sample collected from bedrock monitoring well MW-23B using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 7.30 °C, specific conductivity = 240 µS/cm, pH = 8.22, ORP = -142 mv, % DO = 0.12, turbidity = 24 NTU. MVA = 0.000 mg/m³.

~	=	Approximate.	mg/m³	=	Milligrams per cubic meter.
°C	=	Degrees Celsius.	NA	=	Not Available.
µS/cm	=	Microsiemens per centimeter.	%	=	Percent.
mv	=	Millivolts.	No.	=	Number.
NTU	=	Nephelometric Turbidity Units.	DO	=	Dissolved Oxygen.
ORP	=	Oxidation Reduction Potential.	MVA	=	Mercury Vapor Analyzer.
Weston MNH	=	Weston Solutions, Inc. of Manchester, New Hampshire.			

[50; 51; 201]

Table 26 is a summary of organic and inorganic substances detected through VOC, SVOC, and metals analyses of Weston MNH bedrock groundwater samples collected on 7 and 8 April 2004. No reference sample was collected. Therefore, all substances detected greater than the RL are listed in the following table. Groundwater sample analytical results are compared to NH DES RCMP Method 1 GW-1 and NH DES AGQS. Bolded substances and concentrations indicate that the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS. Complete analytical results of Weston MNH groundwater samples, including quantitation and detection limits, are presented in Attachment D.

Table 26

Summary of Analytical Results
Bedrock Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW7-0404	**VOCs**			
	Acetone	18 J µg/L	6,000 µg/L	700 µg/L
	Tetrachloroethene	**12 J µg/L**	**5 µg/L**	**5 µg/L**
	Trichloroethene	**10 J µg/L**	**5 µg/L**	**5 µg/L**
	INORGANICS			
	Arsenic	0.053 mg/L	0.01 mg/L	0.05 mg/L
	Barium	0.065 mg/L	2 mg/L	2 mg/L
	Cadmium	0.004 J mg/L	0.005 mg/L	0.005 mg/L
	Chromium	0.011 mg/L	0.100* mg/L	0.100* mg/L
	Lead	0.087 mg/L	0.015 mg/L	0.015 mg/L
	Mercury	**0.022 mg/L**	**0.002 mg/L**	**0.002 mg/L**
	Selenium	0.062 mg/L	0.05 mg/L	0.05 mg/L
MW8-0404	**INORGANICS**			
	Arsenic	0.052 mg/L	0.01 mg/L	0.05 mg/L
	Barium	0.011 J mg/L	2 mg/L	2 mg/L
	Lead	0.027 mg/L	0.015 mg/L	0.015 mg/L
	Mercury	0.33 mg/L	0.002 mg/L	0.002 mg/L
	Selenium	0.061 mg/L	0.05 mg/L	0.05 mg/L
MW9-0404	**INORGANICS**			
	Arsenic	0.044 mg/L	0.01 mg/L	0.05 mg/L
	Barium	0.067 mg/L	2 mg/L	2 mg/L
	Cadmium	**0.005 mg/L**	**0.005 mg/L**	**0.005 mg/L**
	Lead	0.014 mg/L	0.015 mg/L	0.015 mg/L

Table 26

Summary of Analytical Results
Bedrock Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration		NH DES RCMP Method 1*** GW-1		NH DES AGQS***	
MW10B-0404	**INORGANICS**						
	Arsenic	0.042	mg/L	0.01	mg/L	0.05	mg/L
	Barium	0.095	mg/L	2	mg/L	2	mg/L
	Chromium	**0.018**	**mg/L**	**0.100***	**mg/L**	**0.100***	**mg/L**
	Lead	**0.042**	**mg/L**	**0.015**	**mg/L**	**0.015**	**mg/L**
	Mercury	0.00032	mg/L	0.002	mg/L	0.002	mg/L
MW11B-0404	**INORGANICS**						
	Arsenic	0.024	mg/L	0.01	mg/L	0.05	mg/L
	Barium	0.023	mg/L	2	mg/L	2	mg/L
	Lead	0.01	mg/L	0.015	mg/L	0.015	mg/L
MW13B-0404	**VOCs**						
	Acetone	30 J	µg/L	6,000	µg/L	700	µg/L
	INORGANICS						
	Arsenic	0.011	mg/L	0.01	mg/L	0.05	mg/L
	Barium	0.055	mg/L	2	mg/L	2	mg/L
MW14R-0404	**VOCs**						
	Acetone	120** J	µg/L	6,000	µg/L	700	µg/L
	INORGANICS						
	Arsenic	**0.33**	**mg/L**	**0.01**	**mg/L**	**0.05**	**mg/L**
	Barium	0.18	mg/L	2	mg/L	2	mg/L
	Cadmium	**0.057**	**mg/L**	**0.005**	**mg/L**	**0.005**	**mg/L**
	Lead	**0.016**	**mg/L**	**0.015**	**mg/L**	**0.015**	**mg/L**
	Mercury	**0.0051**	**mg/L**	**0.002**	**mg/L**	**0.002**	**mg/L**
	Selenium	**0.32**	**mg/L**	**0.05**	**mg/L**	**0.05**	**mg/L**

Table 26

Summary of Analytical Results
Bedrock Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004 (Continued)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW15-0404	**INORGANICS**			
	Arsenic	**0.027 J mg/L**	**0.01 mg/L**	0.05 mg/L
	Barium	**0.016 J mg/L**	**2 mg/L**	**2 mg/L**
	Chromium	**0.15 mg/L**	**0.100* mg/L**	**0.100* mg/L**
MW16B-0404	**INORGANICS**			
	Arsenic	**0.095 mg/L**	**0.01 mg/L**	**0.05 mg/L**
	Barium	**0.024 mg/L**	**2 mg/L**	**2 mg/L**
	Lead	0.014 mg/L	0.015 mg/L	0.015 mg/L
	Mercury	**0.0002 J mg/L**	**0.002 mg/L**	**0.002 mg/L**
	Selenium	**0.05 mg/L**	**0.05 mg/L**	**0.05 mg/L**
MW19-0404	**INORGANICS**			
	Barium	0.046 mg/L	2 mg/L	2 mg/L
	Lead	**0.005 J mg/L**	**0.015 mg/L**	**0.015 mg/L**
MW20B-0404	**INORGANICS**			
	Arsenic	**0.077 mg/L**	**0.01 mg/L**	**0.05 mg/L**
	Barium	**0.20 mg/L**	**2 mg/L**	**2 mg/L**
	Chromium	0.082 mg/L	0.100* mg/L	0.100* mg/L
	Lead	**0.17 mg/L**	**0.015 mg/L**	**0.015 mg/L**
	Mercury	**0.0019 J mg/L**	**0.002 mg/L**	**0.002 mg/L**
	Selenium	**0.057 mg/L**	**0.05 mg/L**	**0.05 mg/L**

Table 26

Summary of Analytical Results
Bedrock Groundwater Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Weston MNH on 7 and 8 April 2004 (Concluded)

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1*** GW-1	NH DES AGQS***
MW21-0404	**INORGANICS**			
	Arsenic	**0.063 mg/L**	**0.01 mg/L**	**0.05 mg/L**
	Barium	0.028 mg/L	2 mg/L	2 mg/L
	Lead	**0.085 mg/L**	**0.015 mg/L**	**0.015 mg/L**
	Mercury	0.00067 mg/L	0.002 mg/L	0.002 mg/L
	Selenium	**0.058 mg/L**	**0.05 mg/L**	**0.05 mg/L**
MW23B-0404	**INORGANICS**			
	Barium	0.096 mg/L	2 mg/L	2 mg/L

µg/L	=	Micrograms per liter.
mg/L	=	Milligrams per liter.
Weston MNH	=	Weston Solutions, Inc. of Manchester, New Hampshire.
NH DES	=	New Hampshire Department of Environmental Services
RCMP	=	Risk Characterization and Management Policy.
AGQS	=	Ambient Groundwater Quality Standards.
J	=	Estimated value.
*	=	Standard listed is for total chromium.
**	=	Reported from diluted analysis.

*** Analytical results are compared to 1998 (revised 2004) NH DES RCMP Method 1 GW-1 Standards, and/or 1999 NH DES AGQS.

Bolded substances and concentrations indicate the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS.

[50; 51; 121; 174]

In summary, Weston MNH collected 13 bedrock groundwater samples from the Chlor-Alkali property. Analytical results of Weston MNH bedrock groundwater samples indicated the presence of three VOCs (acetone, PCE, and TCE) and seven inorganics (arsenic, barium, chromium, cadmium, lead, mercury, and selenium) at concentrations above RLs [50; 51]. The analytical results are discussed in greater detail in the following paragraphs.

Volatile Organic Compounds

Three VOCs, including acetone, PCE, and TCE, were detected at concentrations above RLs in Weston MNH bedrock groundwater samples collected from monitoring wells located on the Chlor-Alkali property [50].

Positive and non-detected results for five VOCs (acetone; 2-hexanone; 2-methyl-2-pentanone; methylene chloride; tetrahydrofuran) were estimated for all samples because they did not meet RSD in the initial calibration of the laboratory instrument. For all samples except MW13A-0404, positive and non-detected results were either estimated or rejected for three VOCs (acetone; 1,2-dibromo-3-chloropropane; and tert-Butanol) because either they did not meet the RSD in the initial calibration of the laboratory instrument or they did not meet the RSD in the continuing calibration of the laboratory instrument. Positive and non-detected results for groundwater sample MW13A-0404 were estimated because the sample did not meet internal standard count criteria. Naphthalene and/or tert-Buranol results were qualified as undetected in some samples due to laboratory blank contamination. Non-detected tert-Butanol and 1,2-dibromo-3-chloropropane were rejected in all samples due to poor calibration sensitivity. Positive and non-detected results for two VOCs (methylene chloride and t-butyl-methyl ether) were estimated because spike compounds did not meet percent recovery and/or relative percent difference criteria for all aqueous laboratory control sample/laboratory control sample duplicates [50].

Historical documentation indicates products produced and/or stored on the Chlor-Alkali property included acetone [19; 23]. Acetone, PCE, and TCE were also detected in START on-site soil/source samples [109]. Although no reference samples were collected for comparison purposes, the presence of these non-naturally occurring substances in bedrock groundwater beneath the Chlor-Alkali property will be considered at least partially attributable to on-site sources.

Two VOCs (PCE and TCE) were detected in Weston MNH bedrock groundwater samples at concentrations that exceeded their respective NH DES RCMP Method 1 GW-1 Standards and their respective NH DES AGQS [50; 51; 121; 174].

Semivolatile Organic Compounds

No SVOCs were detected at concentrations above RLs in bedrock groundwater samples collected by Weston MNH from monitoring wells located on the Chlor-Alkali property [50].

Positive and non-detected results for two SVOCs (benzidine and hexachlorocyclopentadiene) were estimated for all samples because they did not meet the RSD in the initial calibration of the laboratory instrument. Positive and non-detected results for two SVOCs (nitrobenzene and 4-nitrophenol) were estimated for all samples because they did not meet the RSD in the continuing calibration of the laboratory instrument. Positive and non-detected results for four SVOCs (benzoic acid, fluorene, 4-nitrophenol, and N-Nitrosodimethylamine) were estimated for all samples because spike compounds did not meet percent recovery and/or relative percent difference criteria for all aqueous laboratory control sample/laboratory control sample duplicates [50].

Metals

Seven metals (arsenic, barium, cadmium, chromium, lead, mercury, and selenium) were detected at concentrations above RLs in Weston MNH bedrock groundwater samples collected from monitoring wells located on the Chlor-Alkali property [51].

Positive results for arsenic and chromium were estimated in MW15-0404 because the arsenic and chromium spikes did not meet percent recovery criteria [51]. Positive results for arsenic, barium, cadmium, and chromium were estimated in all samples if results were less than the RL or less than two times the laboratory RL due to uncertainty near the detection limit [51].

These seven metals were also detected in START on-site soil/source samples [115; 116]. Therefore, the presence of these seven metals in bedrock groundwater collected from beneath the Chlor-Alkali property will be considered at least partially attributable to on-site sources.

Six metals (arsenic, cadmium, chromium, lead, mercury, and selenium) were detected in Weston MNH bedrock groundwater samples at concentrations that exceeded their respective NH DES RCMP Method 1 GW-1 Standards and their respective NH DES AGQS [51; 121; 174].

Analytical Results of Off-Site Weston MNH Groundwater Samples

On 7 and 8 April 2004, on behalf of NH DES, Weston MNH collected three groundwater samples (MW12-0404, MW18A-0404, and MW-18B-0404) from two overburden monitoring wells (MW-12 and MW-18A) and one bedrock monitoring well (MW-18B) located on the Fraser Property. All groundwater samples were submitted to Northeast in Waterville, Maine and analyzed for eight metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) by EPA SW-846 Methods 3010A/6010B for metals and 7470A/7471A for mercury. With NH DES' permission, START conducted a Tier II validation on the groundwater analytical results. Table 27 summarizes groundwater samples collected by Weston MNH personnel from the Fraser Paper property on 7 and 8 April 2004.

Table 27

Sample Summary: Chlor-Alkali Facility (former)
Off-Site Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Off-site Groundwater				
MW12-0404	AG02606	4/7/04 ~1300	Grab	Sample collected from overburden monitoring well MW-12 located on Fraser Papers, Inc. property using a peristaltic pump. Parameter readings *recorded prior to sampling were as follows:* temperature = 7.04 °C, specific conductivity = 280, µS/cm, pH = 6.37, ORP = 16.1 mv, % DO = 0.29, turbidity = 13 NTU. MVA = NA.

Table 27

Sample Summary: Chlor-Alkali Facility (former)
Off-Site Groundwater Samples Collected by Weston MNH on 7 and 8 April 2004
(Concluded)

Sample Location No.	Traffic Report No.	Date/Time (hours)	Remarks	Sample Source
MATRIX: Off-site Groundwater (Concluded)				
MW18A-0404	AG02621	4/8/04 ~0815	Grab	Sample collected from overburden monitoring well MW-18A located on Fraser Papers, Inc. property using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 6.76 °C, specific conductivity = 374 µS/cm, pH = 6.43, ORP = -48 mv, % DO = 0.20, turbidity = 26 NTU. MVA = NA.
MW18B-0404	AG02622	4/8/04 ~0855	Grab	Sample collected from bedrock monitoring well MW-18B located on Fraser Papers, Inc. property using a peristaltic pump. Parameter readings recorded prior to sampling were as follows: temperature = 6.82 °C, specific conductivity = 1,298 µS/cm, pH = 11.55, ORP = -207.8 mv, % DO = 0.15, turbidity = 4.3 NTU. MVA = NA.

~	=	Approximate.	mg/m³	=	Milligrams per cubic meter.
°C	=	Degrees Celsius.	NA	=	Not Available.
µS/cm	=	Microsiemens per centimeter.	%	=	Percent.
mv	=	Millivolts.	No.	=	Number.
NTU	=	Nephelometric Turbidity Units.	DO	=	Dissolved Oxygen.
ORP	=	Oxidation Reduction Potential.	MVA	=	Mercury Vapor Analyzer.
Weston MNH	=	Weston Solutions, Inc. of Manchester, New Hampshire.			

[50; 51; 201]

Table 28 is a summary of metals detected through metals analysis of Weston MNH groundwater samples collected from the Fraser Paper property on 7 and 8 April 2004. No reference sample was collected. Therefore, all substances detected greater than the RL are listed in the following table. Groundwater sample analytical results are compared to NH DES RCMP Method 1 GW-1 and NH DES AGQS. Bolded substances and concentrations indicate the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS. Complete analytical results of Weston MNH groundwater samples, including quantitation and detection limits, are presented in Attachment D.

Table 28

Summary of Analytical Results: Off-Site Groundwater Sample Analysis for Chlor-Alkali Facility (former) Samples Collected by Weston MNH on 7 and 8 April 2004

Sample Location	Compound/ Element	Sample Concentration	NH DES RCMP Method 1* GW-1	NH DES AGQS*
MW12-0404	**INORGANICS**			
	Barium	0.055 mg/L	2 mg/L	2 mg/L
MW18A-0404	**INORGANICS**			
	Barium	0.21 mg/L	2 mg/L	2 mg/L
	Lead	0.013 mg/L	0.015 mg/L	0.015 mg/L
MW18B-0404	**INORGANICS**			
	Arsenic	**0.015 mg/L**	**0.01 mg/L**	0.05 mg/L
	Barium	0.014 J mg/L	2 mg/L	2 mg/L

mg/L = Milligrams per liter.
Weston MNH = Weston Solutions, Inc. of Manchester, New Hampshire.
NH DES = New Hampshire Department of Environmental Services.
RCMP = Risk Characterization and Management Policy.
AGQS = Ambient Groundwater Quality Standards.

* Analytical results are compared to 1998 (revised 2004) NH DES RCMP Method 1 GW-1 Standards, and/or 1999 NH DES AGQS.

Bolded substances and concentrations indicate the value equals or exceeds the bolded NH DES RCMP Method 1 GW-1, and/or NH DES AGQS.

[51; 121; 174]

In summary, Weston MNH collected two groundwater samples from the Fraser Paper property. Analytical results of Weston MNH off-site groundwater samples collected from the Fraser Paper property indicated the presence of three metals (arsenic, barium, and lead) at concentrations above RLs [51].

Metals

Three metals (arsenic, barium, and lead) were detected at concentrations above RLs in Weston MNH off-site groundwater samples collected from monitoring wells located on the Fraser Paper property [51].

Positive results for arsenic, barium, cadmium, and chromium were estimated in all samples if results were less than the RL or less than two times the laboratory RL due to uncertainty near the detection limit [51].

These three metals were also detected in START on-site soil/source samples [115; 116]. For the purposes of this PA/SI, the presence of metals in off-site groundwater samples will not be evaluated.

One metal (arsenic) was detected in a Weston MNH off-site groundwater sample at a concentration that exceeded its respective NH DES RCMP Method 1 GW-1 Standard [51; 121; 174].

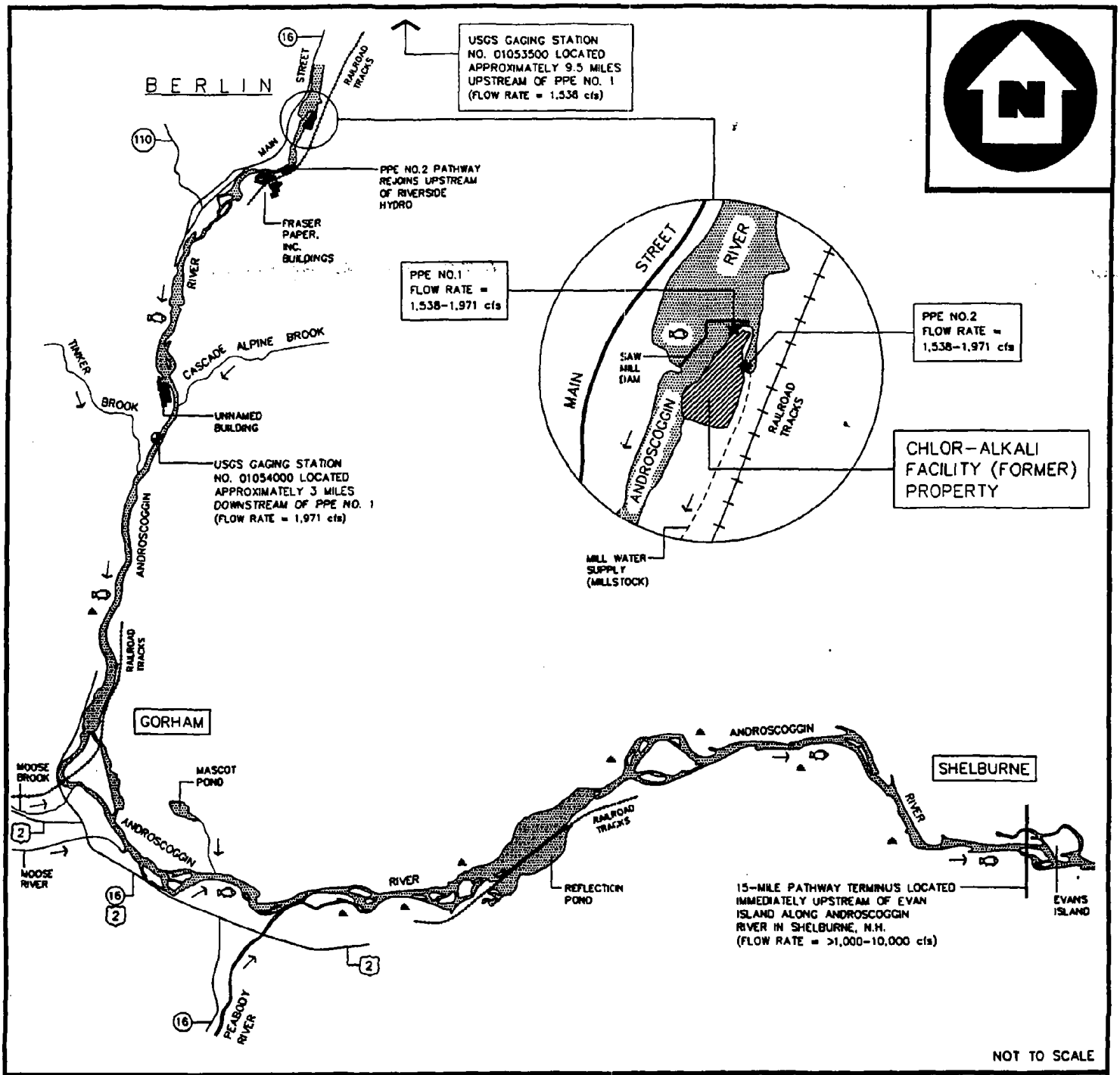
Due to the availability of third-party data, START did not perform groundwater sampling as part of the Chlor-Alkali PA/SI. Based on analytical results from groundwater samples collected from the Chlor-Alkali property by Weston MNH in April 2004, groundwater beneath the property has been impacted by a release of hazardous substances which is at least partially attributable to on-site sources. Specifically, the overburden aquifer has been impacted by a release of three VOCs (acetone, naphthalene, and vinyl chloride), one SVOC (phenanthrene), and seven metals (arsenic, barium, cadmium, chromium, lead, mercury, and selenium). The bedrock aquifer has been impacted by a release of three VOCs (acetone, PCE, and TCE) and seven metals (arsenic, barium, chromium, cadmium, lead, mercury, and selenium). Of these substances, five VOCs and six metals were detected at concentrations exceeding their respective NH DES RCMP Method 1 GW-1 Standards and/or NH DES AGQS [51; 121; 174]. However, based on the location and distance to the nearest public and private groundwater drinking water supply wells, no impacts to nearby drinking water sources from on-site sources are known or suspected.

To date, actions taken to address the groundwater contamination at the Chlor-Alkali property include the following: installing a 2-foot wide slurry wall from bedrock to the ground surface along the south and east sides of the property; pressure grouting openings within the retaining wall along the western property boundary; installing the 40-mil liner to restrict groundwater recharge; and installing piezometers throughout the property to monitor groundwater elevation. In addition, groundwater sampling has been conducted by NH DES [50; 51; 64].

SURFACE WATER PATHWAY

Topography on the Chlor-Alkali property is mounded in the center, so stormwater runoff flows radially in all directions. However, the greatest slope is west toward the Androscoggin River, and south toward a drainage ditch at the southern edge of the property. The eastern portion of the property drains toward the east and northeast onto the Fraser Paper property and into a canal of the Androscoggin River [102, pp. 17, 19].

START has identified two probable points of entry (PPEs) along the Androscoggin River. The most upstream PPE (PPENo. 1) is located on the Androscoggin River, downstream (south) of the Sawmill Dam, at the most upstream portion of the western Chlor-Alkali property boundary. The second PPE (PPE No. 2) is located along the canal to the east of the Chlor-Alkali property. The canal flows to the south and is connected to an active underground penstock that feeds the Fraser Paper property. The penstock runs south into Fraser Paper property, through a filter house, and over-flow enters the east side of the Androscoggin River upstream of the Riverside Hydro (a hydro station located downstream of the Riverside Dam and upstream of the Smith Hydro Dam) (Figure 16) [180].



LEGEND

★ PROBABLE POINT OF ENTRY TO SURFACE WATER PATHWAY

cfs = CUBIC FEET PER SECOND

FLOW DIRECTION

FISHERY

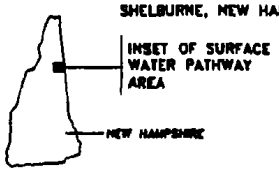
WETLANDS

ROUTE MARKER

U.S. ROUTE

STATE ROUTE

SOURCE: U.S.G.S 30 X 60 MINUTE SERIES QUADRANGLE(S):-
BERLIN, NEW HAMPSHIRE 1970
SHELBURNE, NEW HAMPSHIRE-MAINE 1970



SURFACE WATER PATHWAY SKETCH

CHLOR-ALKALI FACILITY (FORMER)
BERLIN, NEW HAMPSHIRE

WESTON SOLUTIONS

REGION I SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM

TDD #	DRAWN BY:	DATE
04-05-0205	W. SHAW	8/18/04

FILE NAME: S:\04050205\04010001\FIGURES\FIG4.DWG

FIGURE 16

The total 15-mile surface water pathway for the Chlor-Alkali property is comprised of the Androscoggin River, starting at PPE No. 1 and ending at the 15-mile downstream terminus for PPE No. 2 at approximately 0.05 miles upstream of Evans Island in Shelburne, NH (Figure 16). The total target distance limit (TDL) for the property is 15.0 miles [77; 78; 128].

There are eight dams located along the Androscoggin River within the TDL for the property. Great Lakes Hydro America, LLC owns six hydroelectric dams along the TDL, including the Sawmill Dam, Riverside Dam, and Cross Power Dam in Berlin; the Gorham Dam and Cascade Dam in Gorham; and the Shelburne Dam in Shelburne. In addition, the J. Brodie Smith Dam located in Berlin and the Public Service of New Hampshire (PSNH) Dam located in Gorham are owned by the Public Service Company of New Hampshire [83; 130]. The flow rate and height of the Androscoggin River fluctuate as a result of changes in seasonal precipitation and the operation of these dams.

In 2001, USGS Gaging Station No. 01053500, located along the Androscoggin River in Errol, NH, approximately 9.5 miles upstream of PPE No. 1, had an average flow rate of 1,538 cubic feet per second (cfs) [78; 80; 131]. In 2001, USGS Gaging Station No. 01054000, located along the Androscoggin River in Gorham, NH, approximately 3 miles downstream of PPE No. 1 and south of the Cascade Dam, had an average flow rate of 1,971 cfs [77; 79; 131]. Consequently, the flow rate of the Androscoggin River at the PPEs is estimated to be between 1,538 and 1,971 cfs; and, therefore, the Androscoggin River is classified as a large stream to river (> 1,000 to 10,000 cfs). Linear interpolation was not used to calculate the estimated flow rate at the PPEs using the flow rates at the upstream and downstream gaging stations described above because the assigned dilution weight for this surface water body would not change. In addition, according to the Hazard Ranking System Guidance Manual, interpolation is not advised for estimating flow rate when dams are located between the gaging stations [202].

Table 29 summarizes surface water bodies located along the 15-mile downstream surface water pathway for the Chlor-Alkali property.

Table 29

Surface Water Bodies Along the 15-Mile Downstream Pathway from Chlor-Alkali Facility (former)

Surface Water Body	Descriptor[a]	Length of Reach (miles)	Flow Characteristics (cfs)[b]	Length of Wetlands (miles)
Androscoggin River	Large stream to river	15.0*	>1,000-10,000	8.5*

[a] Large stream to river >1,000-10,000 cfs.
[b] Cubic feet per second.

* The length of wetlands is a total length that includes the wetland frontage measured on the U.S. Fish and Wildlife National Wetland Inventory maps and the 2004 Normandeau Associates, Inc. wetland delineation results.

[77; 78; 128; 129; 152]

The Androscoggin River is classified as a Class B surface water body by NH DES. Class B waters are defined as the second highest quality waters acceptable for fishing, swimming, and other recreational purposes, and after adequate treatment, for use as water supplies. According to the State of New Hampshire 2000 Section 305(b) Water Quality Report, the Androscoggin River is considered "impaired" due to water quality exceedances of copper, dioxins, pathogens, and zinc [82]. In addition, the Androscoggin River Watershed Council posted a swimming advisory for the Androscoggin River beginning 1 mile north of the Berlin and Gorham town line [147]. It is unknown when this swimming advisory took effect.

There are no known surface water drinking water intakes along the 15-mile downstream surface water pathway for the Chlor-Alkali property [27, pp. 36-37; 102].

According to the NH Fish Stocking Report for 2003, the Androscoggin River was stocked with Brown Trout, Eastern Brook Trout, and Rainbow Trout in Berlin; and Landlocked Salmon in Gorham and Shelburne, located downstream of the Chlor-Alkali property. In addition, in 2003, the Androscoggin River was stocked with these four species of fish in Cambridge, Dummer, Errol, and Milan, located upstream of the Chlor-Alkali property [81]. According to the NH Fish & Game Department records, fish are stocked upstream of the Sawmill Dam in Berlin, and no fish are stocked downstream of the Sawmill Dam. This information conflicts with the NH Fish Stocking Report for 2003. After further investigation, a representative of the NH Fish & Game Department determined that the Landlocked Salmon stocked in Gorham and Shelburne, as reported in the 2003 Fish Stocking Report, came from one of NH's southern hatcheries as surplus. Apparently, the hatchery did not know the "rulings" [132; 133]. START assumes the ruling states no fish are to be stocked in the Androscoggin River downstream of the Sawmill Dam.

According to the New Hampshire Department of Health and Human Services (NH DHHS), a State-wide fish consumption advisory exists for mercury for all inland freshwater bodies in NH. In addition, a specific fish consumption advisory exists for the Androscoggin River, from the Sawmill Dam to the Maine border, for dioxin. Discrepancies exist as to when these advisories were issued [136-139]. There is no specific fish consumption advisory for mercury for the Androscoggin River [138]. In 2001, the Androscoggin River in Berlin, downstream to the Maine border, was classified as catch-and-release [136].

Although this fishery is classified as catch-and-release only, according to a representative at the State of New Hampshire Fish and Game Department, several factors exist that may allow fish from this stretch of the river to enter the human food chain. These factors are as follows: 1) the "lower Androscoggin River" has recently been discovered as a trophy trout fishery, and an increased number of licensed fishing guides utilize the Androscoggin River; 2) during the spring spawning months, large trophy fish migrate upstream into tributaries which are not classified as catch-and-release; and 3) Berlin's high percentage of poverty-level residents may use these fish as a food source to supplement their budgets [146].

In October 2004, Normandeau of Yarmouth, Maine, was subcontracted by START to delineate the wetland frontage (length and/or perimeter of wetlands) along both the east and west banks and within the channel of the Androscoggin River in Berlin, NH. The study area included an approximate 0.3-mile stretch, located at the Sawmill Dam downstream to the Smith Hydro Dam. Wetland observations were either made from the top of the riverbank or from a boat. Wetland identification

was based on vegetation, hydrologic indicators, and soil borings, where appropriate, to confirm the presence of hydric soils. As a result, Normandeau delineated a total of 1,782 linear feet of Palustrine Emergent persistent, Palustrine Scrub Shrum broad-leaved persistent, and Palustrine Unconsolidated Shore cobble-gravel wetland located within the area of study. All the Palustrine classes contained hydrophytic vegetation [129].

Sensitive environments along the 15-mile downstream surface water pathway include a Clean Water Act (CWA)-protected water body, 8.5 miles of wetlands, a fishery, and sensitive habitats [81; 129; 132-133; 135; 152]. According to the NH Heritage Bureau, known habitats along the 15-mile downstream surface water pathway include one Federally-listed threatened/State-listed endangered species (Bald Eagle), two State-listed endangered species (Smooth Woodsia and Mountain Sweet-Cicely), and two State-listed threatened species (Common Nighthawk and Fragrant Fern) [135].

According to an employee of New Hampshire Audubon Society, Bald Eagles travel through the Androscoggin River corridor, including the Town of Berlin, and prey on the dense concentration of gulls near the Sawmill Dam. The Bald Eagles use this area more heavily in winter and travel through at lower elevations to descend and feed opportunistically [197].

According to the NH Fish and Game Department and New Hampshire Audubon Society, additional sensitive species that occur along the 15-mile downstream surface water pathway include one State-listed endangered species (Peregrine Falcon), and four State-listed threatened species (Common Loon, Common Nighthawk, Osprey, and Northern Harrier). In addition, Bald Eagles reportedly use the Androscoggin River for fishing and foraging; utilize trees along this stretch for winter roosting; and have been observed nesting at locations north of PPE No. 1. The Common Nighthawk maintains nests on buildings in Berlin, and the Northern Harrier uses the floodplain marshes and fields along the Androscoggin River in Shelburne, NH. The State-listed threatened species Osprey uses the Androscoggin for fishing. In addition, there is a potential habitat for the State-listed threatened Pine Marten abutting the Androscoggin River in Shelburne [141; 143-145]. The locations of these additional habitats were not provided by NH Fish and Game Department or New Hampshire Audubon Society [141; 144]. Table 30 summarizes sensitive environments that occur along the 15-mile downstream surface water pathway for the Chlor-Alkali property.

Table 30

Sensitive Environments Along the 15-Mile Downstream Pathway from Chlor-Alkali Facility (former)

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)[a]
Clean Water Act	CWA-protected water body	Androscoggin River	0 to 15.0	>1,000-10,000
Androscoggin River Wetlands	Wetlands (8.5 miles)	Androscoggin River	0.15 to 15.0*	>1,000-10,000

Table 30

Sensitive Environments Along the 15-Mile Downstream Pathway from Chlor-Alkali Facility (former) (Concluded)

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)[a]
Bald Eagle habitat	Federally-listed Threatened/State-listed Endangered Species	Androscoggin River	3.3	>1,000-10,000
Smooth Woodsia habitat	State-listed Endangered Species	Androscoggin River	0.9 and 2.1	>1,000-10,000
Mountain Sweet-Cicely habitat	State-listed Endangered Species	Androscoggin River	2.1	>1,000-10,000
Common Nighthawk habitat	State-listed Threatened Species	Androscoggin River	0.7	>1,000-10,000
Fragrant Fern habitat	State-listed Threatened Species	Androscoggin River	0.9 and 2.1	>1,000-10,000
Northern Harrier habitat	State-listed Threatened Species	Androscoggin River	Unknown [b]	>1,000-10,000
Peregrine Falcon habitat	State-listed Endangered Species	Androscoggin River	Unknown [b]	>1,000-10,000
Common Loon habitat	State-listed Threatened Species	Androscoggin River	Unknown [b]	>1,000-10,000
Osprey habitat	State-listed Threatened Species	Androscoggin River	Unknown [b]	>1,000-10,000

[a] Cubic feet per second.
[b] The specific locations of the Northern Harrier, Peregrine Falcon, Common Loon, and Osprey habitats were not provided by the New Hampshire Fish and Game Department and the New Hampshire Audubon Society.
* Wetlands occur at various locations within this stretch of the Androscoggin River.

PPE = Probably Point of Entry.
CWA = Clean Water Act.

[129; 131; 135; 141; 144; 145; 152]

Fish Tissue Sampling

In 1997, a letter addressed to the Surface Water Quality Bureau of the New Hampshire Water Supply and Pollution Control Division from Crown Vantage indicates that dioxin concentrations in trout and hornpout caught in the Shelburne Dam area in Shelburne, NH, ranged from 2.5 to 4.5 ppt, prior to May 1994. In May 1994, dioxin levels in fish decreased, with concentration ranging from

nondetectable to 0.61 ppt. However, in 1996, dioxin concentrations in fish increased [108]. No additional information regarding sampling, analytical methods, analytical results, or data validation was provided in available file information obtained by START.

On 25 and 26 September 2000, Pulp & Paper of America, as part of the fish testing requirements specified in their NPDES permit (Part I. B. Resident Fish Monitoring), analyzed three composite fish fillet samples caught in Shelburne, NH (assumed from the Androscoggin River) [87; 104]. In previous years, Pulp & Paper of America used the Maine Department of Environmental of Protection data to meet the fish testing requirements for their permit [104]. The three composite fish fillet samples (Trout with the skin on, Trout with the skin off, and Brown Bullhead with the skin off) were submitted to Alta Analytical Laboratory in El Dorado Hills, California and analyzed for tetra to octa chlorinated dioxins and dibenzofurans by EPA Method 1613. The TEQ ranges for the three composite fish fillet samples were based on U.S. EPA TEFs {Trout with skin [1.44 picograms per gram (pg/g) to 1.47 pg/g]; Trout with skin off (0.740 pg/g to 0.843 pg/g); and Brown Bullhead with skin off (3.44 pg/g to 3.47 pg/g)] [87]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

On 18 April 2001, Pulp and Paper of America LLC submitted a total of 21 fish tissue samples (seven Trout with the skin on, seven Trout with the skin off, and seven Brown Bullhead) to Columbia Analytical Services, Inc. in Jacksonville, Florida for mercury analysis. The fish collection locations and the part of the fish analyzed were not specified in available file information obtained by START. START assumes the fish were collected from the Androscoggin River. The fish tissue samples were analyzed for total mercury by EPA Method 7471A. Analytical results indicated that mercury concentrations ranged from 0.14 to 0.72 mg/kg [107]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

In June and July 2001, the State of NH DHHS BHRA conducted a voluntary fish collection event at the Androscoggin River. The notice indicated that the fish would be analyzed for mercury content and the results would be reviewed by BHRA to determine if enhanced consumption advisories are needed to protect the health of persons eating fish from the Androscoggin River [95]. As a result, the muscles of 64 fish (Rainbow Trout, Small Mouth Bass, Brook Trout, Northern Pike, Brown Bullhead, Yellow Perch, Horn Pout, Fall Fish, and Atlantic Salmon) were sampled from the Androscoggin River from south of the Cleveland Dam (downstream of the Chlor-Alkali site) in Berlin downstream to the Town of Shelburne [14]. Reportedly, the fish were submitted to the DHHS Public Health Laboratories for mercury analysis (assumed total mercury analysis) [95]. Analytical results indicated concentrations of mercury ranging from 8 nanograms per gram (ng/g) to 1,600 ng/g within the study area. Fish caught in Berlin had mercury concentrations ranging from 121 ng/g to 638 ng/g [14]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated. To date, there is no specific fish consumption advisory for mercury along the Androscoggin River [128].

Surface Water Sampling

On 30 April 1999, presumably on behalf of Crown Vantage, Tighe & Bond collected five surface water samples (R-1 through R-5) in the vicinity of the Chlor-Alkali property. Surface water sample R-1 was collected "upgradient at dam" [downstream (south) of the Sawmill Dam]; R-2 and R-3 were reportedly collected from a "pond" located east of the Cell House (canal); R-4 was collected from the Androscoggin River, downgradient of the Cell House; and sample R-5 was collected at a railroad bridge located downstream of the Chlor-Alkali property (Figure 11). Samples R-1 through R-5 were submitted to an unknown laboratory and analyzed for lead and mercury by unspecified methods. Lead and mercury were not detected above their laboratory detection limits (10 µg/L for lead and 0.2 µg/L for mercury) [13, Apprendix E]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

On 1 June 1999, presumably on behalf of Crown Vantage, Tighe & Bond collected three additional surface water samples (R-1A, R-4A, and R-5A) in the vicinity of the Chlor-Alkali property. Surface water sample R-1A was collected "upgradient at dam"(downstream of the Sawmill Dam); R-4A was collected from the Androscoggin River downgradient of the Cell House; and R-5A was collected at the railroad bridge (Figure 11). The samples were submitted to an unknown laboratory and analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. Analytical results indicated that no metals were detected above their laboratory detection limits (arsenic, barium, chromium, lead, and selenium at 10 µg/L; mercury at 0.2 µg/L; and silver at 5 µg/L) in any of the samples collected [13, Appendix E]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

On 27 March 2000, on behalf of Crown Vantage, Sevee collected two surface water samples (SW-1 and SW-2) from the Androscoggin River, at the outfall of the drainage ditch into the Androscoggin River along the southern portion of the lined area [71; 91]. Field parameters (pH, specific conductance, temperature, and redox potential) were recorded, and samples were submitted to an unknown laboratory and analyzed for VOCs by EPA Method 8260B, and for metals (arsenic, barium, lead, and mercury) using an unspecified method. The pH measured for SW-1 was 7.1, and the pH for SW-2 was 6.9. No VOCs were detected in the samples. Three metals were detected in the samples at the following maximum concentrations: arsenic (0.008 mg/L in sample SW-2), barium (0.007 mg/L in sample SW-2), and lead (0.002 J mg/L in both samples SW-1 and SW-2) [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

On 13 June 2000, on behalf of Crown Vantage, Sevee collected two surface water samples (SW-1 and SW-2) from the Androscoggin River, at the outfall of the drainage ditch into the Androscoggin River along the southern portion of the lined area [71; 91]. The samples were submitted to Analytics Environmental Laboratory in Portsmouth, NH and analyzed for VOCs by EPA Method 8260B. In addition, the samples were submitted to Maine Environmental Laboratory and analyzed for arsenic, barium, lead, and mercury by EPA Methods 206.2; 208.2/4.1.3; 239.2/4.1.3; and 245.1, respectively. The pH measured for SW-1 was 6.4, and the pH for SW-2 was 6.5. Five VOCs were detected in the samples at the following maximum concentrations: acetone (16 µg/L in sample SW-

1); methyl ethyl ketone (12 µg/L in sample SW-1); 2-hexanone (9 J µg/L in sample SW-1); methyl isobutyl ketone (9 J µg/L in sample SW-1); and 1,2,3-trichloropentane (1 J µg/L in sample SW-1). No metals were detected in the samples above detection limits [71]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated.

On 16 July 2003, USGS collected one surface water sample from a pool of water along the Androscoggin River; the pool of water was located on a bedrock outcrop adjacent to (west of) the Chlor-Alkali site. USGS personnel observed "bright beads of metallic mercury" at the bottom of the pool of water sampled. The sample was collected in accordance with USGS' clean protocol, analyzed by Wisconsin District Mercury Laboratory, and analyzed for unfiltered total mercury and unfiltered methyl mercury. Unvalidated analytical results indicated the presence of methylmercury at 2.14 nanograms per liter (ng/L) and total mercury at 59,000 ng/L [54; 172; 177].

Sediment Sampling

On 17 June 1999, presumably on behalf of Crown Vantage, Tighe & Bond collected five sediment samples (SED-1 through SED-5) in the vicinity of the Chlor-Alkali property. Sediment sample SED-1 was collected at the east end of the Riverside Dam along the southeast bank of the Androscoggin River; SED-2 was collected at the west end of the Riverside Dam; and SED-3 was collected upgradient of the entrance to the Canal. In addition, SED-4 was collected from the base of Rip-Rap Swale located southeast of the Cell House, and SED-5 was collected from the Androscoggin Riverbank approximately 80 feet southwest of SED-4. The samples were submitted to STL of Westfield, Massachusetts, and analyzed for lead and mercury by EPA Method 160.3 [13, Appendix F; 52]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, for the purposes of this PA/SI, START assumes these data are unvalidated. Table 31 summarizes the analytical results of sediment samples collected by Tighe & Bond on 17 June 1999 for the Chlor-Alkali property.

Table 31

Summary of Analytical Results
Sediment Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 17 June 1999

Sample Location	Element	Sample Concentration		
SED-1	Lead	19		mg/kg
	Mercury	0.077		mg/kg
SED-2	Lead	24	U	mg/kg
	Mercury	0.055		mg/kg

Table 31

Summary of Analytical Results
Sediment Sample Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 17 June 1999 (Concluded)

Sample Location	Element	Sample Concentration
SED-3	Lead	110 mg/kg
	Mercury	0.11 mg/kg
SED-4	Lead	54 mg/kg
	Mercury	1.2 mg/kg
SED-5	Lead	120 mg/kg
	Mercury	0.36 mg/kg

mg/kg = Milligram per kilogram.
U = Analyte was not detected in the sample. The laboratory detection limit is provided.

[13, Appendix F; 52]

In December 2001, on behalf of NH DES, Weston MNH collected 20 sediment samples from 10 locations along the Androscoggin River. Three locations (SMD1 through SMD3) were upstream of the Sawmill Dam and the Chlor-Alkali property; three locations (RSD1 through RSD3) were between the Sawmill Dam and Riverside Dam; and four locations (SHD1 through SHD4) were between the Riverside Dam and Smith Hydro Dam (Figure 12). Table 32 summarizes sediment samples collected by Weston MNH from 4 through 6 December 2001 for the Chlor-Alkali property.

Table 32

Sample Summary: Chlor-Alkali Facility (former)
Sediment Samples Collected by Weston MNH from 4 to 6 December 2001

Sample	Depth (feet)	Date	Sediment Description
Upstream of Sawmill Dam			
SMD1-1	0-0.5	12/6/01	Material is pale yellow-brown, medium-to-fine SAND with some coarse sand and little silt. Poorly sorted material. No odor detected. No layering throughout the core.
SMD1-2	0.5-1.0	12/6/01	Material is pale yellow-brown, medium-to-fine SAND with some coarse sand and little silt. Poorly sorted material. No odor detected. No layering throughout the core.
SMD2-1	0.0-0.5	12/6/01	Material is medium gray-brown, medium-to-fine SAND, predominantly fine sand, with silt and little organics. Poorly sorted material. Faint banding due to varying organic content.

Table 32

Sample Summary: Chlor-Alkali Facility (former)
Sediment Samples Collected by Weston MNH from 4 to 6 December 2001 (Continued)

Sample	Depth (feet)	Date	Sediment Description
Upstream of Sawmill Dam (Concluded)			
SMD2-2	0.5-1.0	12/6/01	Material is medium gray-brown, medium-to-fine SAND, predominantly medium sand, with little coarse sand and silt. No odor detected. No layering throughout the core.
SMD3-1	0.0-0.5	12/6/01	Material is gray-brown medium-to-fine SAND, predominantly medium sand, with 15% silt and 5% organics. Poorly sorted.
SMD3-2	0.5-1.0	12/6/01	Material is medium SAND with 20% fine sand, 10% coarse sand, and 5-10% silt. Poorly sorted material. No odor detected. Color of material not provided.
Downstream of Sawmill Dam and Upstream of Riverside Dam			
RSD1-1	0-0.2	12/4/01	Material is medium yellow-brown, medium-to-fine SAND, with little silt, and thin veneer of organic silt. Black specks in sample potentially coal or slag. Macroinvertebrate larvae observed.
RSD1-2	0.5-0.8	12/4/01	Material is medium yellow-brown, massive, medium-to-fine SAND with little silt. No layering throughout the core.
RSD1-3	1-1.3	12/4/01	Material is medium yellow-brown, massive, medium-to-fine SAND with little silt. No layering throughout the core.
RSD2-1	0-0.5	12/4/01	Material is medium brown, fine SAND and SILT (30%) with abundant (20%) wood fragments/fibers, and little medium-to-coarse sand. Thin veneer of organic silt at top. Macroinvertebrate observed. No layering throughout the core.
RSD3-1	0-0.2	12/4/01	Material is medium yellow-brown, medium-to-coarse SAND, and little fine sand and silt. Moderately sorted. Rare fragments of fresh coal, slag, and glass. One 1-centimeter-long clam and macroinvertebrate observed. No odor detected. Sample collected with dredge.
Downstream of Riverside Dam and Upstream of Smith Hydro Dam			
SHD1-1	0-0.25	12/5/01	Material is dark gray-brown, organic SILT, with 10% fine sand and 15% organics. Plant rootlets in uppermost 0 to 0.3 feet of core and thin layers of alternating fine to coarse vegetative debris. No odor detected.
SHD1-2	0.5-1.0	12/5/01	Material is gray-brown, fine SANDY SILT, 20 to 30% fine sand, 10 to 15% organics (slightly less organics than SHD1-1). No layering throughout the core. No odor detected.

Table 32

Sample Summary: Chlor-Alkali Facility (former)
Sediment Samples Collected by Weston MNH from 4 to 6 December 2001 (Concluded)

Sample	Depth (feet)	Date	Sediment Description
Downstream of Riverside Dam and Upstream of Smith Hydro Dam (Concluded)			
SHD1-3	1.0-1.5	12/5/01	Material is gray-brown, silty very fine SAND, with less organics and silt than SHD1-2. No odor detected.
SHD2-1	0-0.25	12/5/01	Material is gray-brown, silty very fine with 20 to 30% silt and 10% organics. Material is well-sorted and had a moderate organic/septic odor.
SHD2-2	0.5-1.0	12/5/01	Material is medium gray-brown, fine-to-medium SAND with little silt and coarse sand with trace organics. Poorly to moderately sorted material. No odor detected.
SHD2-3	1.0-1.5	12/5/01	Material is predominantly gray-brown, fine SAND with little silt and coarse sand and trace organics (slightly more sandy than SHD2-2). Gradational contact at 1.3 feet. Below 1.3 feet, material becomes black, organic fine sand with silt and moderate percentage of vegetative debris with organic/septic odor.
SHD3-1	0-0.2	12/5/01	Material is gray-brown, fine SAND with little medium-to-coarse sand. Poorly sorted material. Sample collected with a dredge.
SHD4-1	0-0.5	12/5/01	Material is medium brown, fine-to-coarse SAND with fine gravel. Fragments of brick, concrete, and glass found. No layering throughout the core.
SHD4-2	0.5-1.0	12/5/01	Material is medium brown, fine-to-coarse SAND with fine gravel. Fragments of brick, concrete, and glass found. No layering throughout the core.

% = Percent.
Weston MNH = Weston Solutions, Inc. of Manchester, New Hampshire.

[94]

The sediment samples were submitted to Frontier Geosciences, Inc. in Seattle, Washington and were analyzed for total mercury and monomethyl mercury, according to SOPs FGS-066 and FGS-069 for total mercury, and SOPs FGS-045 and FGS-070 for monomethyl mercury. In addition, sediment samples RSD1-2, RSD2-1, RSD3-1, SHD1-1, SHD1-3, SHD2-1, SHD2-3, and SHD4-1 were analyzed for selective sequential extraction (SSE) mercury according to "Application of Selective Extractions to the Determination of Mercury Speciation in Mine Tailings and Adjacent Soils" [195; 196]. The SSE mercury analysis provides information on the biogeochemically relevant fractionation of mercury in sediment under different aqueous environments, including water soluble, "stomach acid" soluble, organo-chelated, elemental, and mercuric sulfide [195]. With NH DES' permission, START conducted a Tier II validation of the Weston MNH sediment data [94; 196].

Table 33 is a summary of total mercury and monomethyl mercury detected in sediment samples collected by Weston MNH in December 2001. For the purposes of this PA/SI, samples collected upstream of the Sawmill Dam (SMD1-1, SMD1-2, SMD2-1, SMD2-2, SMD3-1, and SMD3-2) are considered background samples. START used the highest concentration of total mercury and monomethyl mercury detected in these samples as reference concentrations. As a result, SMD2-2 is the reference sample for total mercury, and SMD3-2 is the reference sample for monomethyl mercury. For each sample location, a substance is listed if it is detected at three times or greater than the reference sample concentration. In accordance with NH DES Evaluation of Sediment Quality guidance, sediment sample analytical results are compared to 1999 National Oceanic and Atmospheric Administration (NOAA) Screening Quick Reference Tables (SQuiRTs) Threshold Effects Level (TEL) values and Probable Effects Level (PEL) values for mercury in freshwater sediment [142; 178]. Additionally, sediment sample analytical results are compared to NOAA SQuiRTs Background value for mercury in freshwater sediment [142]. Bolded inorganic analytes and concentrations indicate that the concentration detected exceeded the bolded NOAA SQuiRTs Background, TEL, and/or PEL concentrations. Complete analytical results of Weston MNH sediment samples, including quantitation and detection limits, are presented in Attachment E. Analytical results for SSE mercury are presented in Table 34.

Table 33

Summary of Analytical Results
Sediment Sample Total Mercury and Monomethyl Mercury Analysis
Samples Collected by Weston MNH from 4 through 6 December 2001

Sample	Inorganic Analyte	Concentration	Reference Concentration	Comments	NOAA SQuiRTs Background	NOAA SQuiRTs TEL	NOAA SQuiRTs PEL
Downstream of Sawmill Dam and Upstream of Riverside Dam							
RSD1-1	**Total Mercury**	**105 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
RSD1-2	**Total Mercury**	**286 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	486 ng/g
	Monomethyl mercury	0.022 J ng/g	0.129 J ng/g	-	NA	NA	NA
RSD1-3	**Total Mercury**	**166 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
RSD2-1	**Total Mercury**	**1,210 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	**486 ng/g**
	Monomethyl mercury	3.77 J ng/g	0.129 J ng/g	29.2 × Ref	NA	NA	NA
RSD3-1	**Total Mercury**	**39.4 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
	Monomethyl mercury	0.036 J ng/g	0.129 J ng/g	-	NA	NA	NA
Downstream of Riverside Dam and Upstream of Smith Hydro Dam							
SHD1-1	**Total Mercury**	**99.1 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
	Monomethyl mercury	0.476 J ng/g	0.129 J ng/g	3.7 × Ref	NA	NA	NA
SHD1-2	**Total Mercury**	**129 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
SHD1-3	**Total Mercury**	**538 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	**486 ng/g**
	Monomethyl mercury	1.83 J ng/g	0.129 J ng/g	14.2 × Ref	NA	NA	NA

Table 33

Summary of Analytical Results
Sediment Sample Total Mercury and Monomethyl Mercury Analysis
Samples Collected by Weston MNH from 4 through 6 December 2001(Concluded)

Sample	Inorganic Analyte	Concentration	Reference Concentration	Comments	NOAA SQuiRTs Background	NOAA SQuiRTs TEL	NOAA SQuiRTs PEL
Downstream of Riverside Dam and Upstream of Smith Hydro Dam (Concluded)							
SHD2-1	**Total Mercury**	**163 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
	Monomethyl mercury	1.86 J ng/g	0.129 J ng/g	14.4 x Ref	NA	NA	NA
SHD2-2	**Total Mercury**	**68.0 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	174 ng/g	486 ng/g
SHD2-3	**Total Mercury**	**586 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	**486 ng/g**
	Monomethyl mercury	0.629 J ng/g	0.129 J ng/g	4.9 x Ref	NA	NA	NA
SHD3-1	**Total Mercury**	**191 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	486 ng/g
SHD4-1	**Total Mercury**	**797 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	**486 ng/g**
	Monomethyl mercury	0.204 J ng/g	0.129 J ng/g		NA	NA	NA
SHD4-2	**Total Mercury**	**619 J ng/g**	436 J ng/g	-	**4 - 51 ng/g**	**174 ng/g**	**486 ng/g**

Ref	=	Reference Sample.	PEL	=	Probable Effects Level.
NA	=	Not available.	TEL	=	Threshold Effects Level.
ng/g	=	Nanograms per gram.	J	=	Estimated value.
NOAA SQuiRTs	=	National Oceanic and Atmospheric Administration Screening Quick Reference Tables.			
-	=	Not applicable; not detected greater than or equal to three times reference concentrations.			
Weston MNH	=	Weston Solutions, Inc. of Manchester, New Hampshire.			

Bolded inorganic analytes and concentrations indicate the concentration detected exceeded the bolded NOAA SQuiRTs background, TEL, and/or PEL concentrations.

[142; 178; 195; 196]

Table 34 is a summary of SSE mercury analytical results for sediment samples collected by Weston MNH on 4 through 6 December 2001. Only Weston MNH sediment samples RSD1-2, RSD2-1, RSD3-1, SHD1-1, SHD1-3, SHD2-1, SHD2-3, and SHD4-1 were analyzed for SSE mercury. No sediment samples collected upstream of the Sawmill Dam were analyzed for SSE mercury [196]. SSE analytical results were not compared to standards because START is unaware of the existence of any comparable standards. Complete SSE analytical results of Weston MNH sediment samples, including quantitation and detection limits, are presented in Attachment E.

Table 34

Summary of Analytical Results
Sediment Sample Selective Sequential Extraction Mercury Analysis
Samples Collected by Weston MNH from 4 through 6 December 2001

Sample	Inorganic Analyte	Concentration		
RSD1-2	SSE F1	0.6	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	42.5	J	ng/g
	SSE F4	24.8	J	ng/g
	SSE F5	21.3	J	ng/g
	SSE Total	89.2	J	ng/g
RSD2-1	SSE F1	1.0	J	ng/g
	SSE F2	0.80	UJ	ng/g
	SSE F3	343	J	ng/g
	SSE F4	2,370	J	ng/g
	SSE F5	5,670	J	ng/g
	SSE Total	8,390	J	ng/g
RSD3-1	SSE F1	0.9	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	11.9	J	ng/g
	SSE F4	2.9	J	ng/g
	SSE F5	0.4	UJ	ng/g
	SSE Total	15.7	J	ng/g

Table 34

Summary of Analytical Results
Sediment Sample Selective Sequential Extraction Mercury Analysis
Samples Collected by Weston MNH from 4 through 6 December 2001 (Continued)

Sample	Inorganic Analyte	Concentration		
SHD1-1	SSE F1	0.4	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	96.7	J	ng/g
	SSE F4	13.2	J	ng/g
	SSE F5	7.4	J	ng/g
	SSE Total	118	J	ng/g
SHD1-3	SSE F1	4.1	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	227	J	ng/g
	SSE F4	297	J	ng/g
	SSE F5	66.0	J	ng/g
	SSE Total	593	J	ng/g
SHD2-1	SSE F1	13.9	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	344	J	ng/g
	SSE F4	198	J	ng/g
	SSE F5	20.5	J	ng/g
	SSE Total	576	J	ng/g
SHD2-3	SSE F1	5.5	J	ng/g
	SSE F2	0.8	UJ	ng/g
	SSE F3	163	J	ng/g
	SSE F4	423	J	ng/g
	SSE F5	34.2	J	ng/g
	SSE Total	626	J	ng/g

Table 34

Summary of Analytical Results
Sediment Sample Selective Sequential Extraction Mercury Analysis
Samples Collected by Weston MNH from 4 through 6 December 2001 (Concluded)

Sample	Depth (feet)	Inorganic Analyte	Concentration
SHD4-1	0-0.5	SSE F1	4.2 J ng/g
		SSE F2	0.8 UJ ng/g
		SSE F3	91.9 J ng/g
		SSE F4	158 J ng/g
		SSE F5	108 J ng/g
		SSE Total	362 J ng/g

SSE = Selective Sequential Extraction.
SSE F1 = Preferential extraction fraction of water soluble mercury compounds (*e.g.*, HgCl2, HgSO4, etc.).
SSE F2 = Preferential extraction fraction of 'stomach acid' soluble mercury compounds (*e.g.*, HgO).
SSE F3 = Preferential extraction fraction of organo-chelated mercury (*e.g.*, Hg-humics, Hg2Cl2, etc.).
SSE F4 = Preferential extraction fraction of elemental mercury (*e.g.*, mineral lattice, Hg2Cl2, Hg-elemental).
SSE F5 = Preferential extraction fraction of mercuric sulfide compounds (*e.g.*, HgS, meta-HgS, HgSe, HgAu, etc.).
SSE Total = Sum of fractions F1 through F5.
ng/g = Nanograms per gram.
J = Estimated value due to limitations identified in the quality control review.
UJ = Value is non-detected and detection limit is estimated.
Weston MNH = Weston Solutions, Inc. of Manchester, New Hampshire.

[195; 196]

The Weston MNH sediment samples arrived at the laboratory in a frozen state and remained frozen until sample analysis. Total mercury sample RSD2-1 and monomethyl mercury samples SHD2-1, SHD2-3, and SMD3-1 arrived at the laboratory cracked and were placed into new containers. No published holding times are known to exist for monomethyl mercury and SSE mercury. Therefore, during validation, START applied a conservative 28-day holding time for all mercury analyses. Positive and non-detected results for all samples analyzed for monomethyl mercury and SSE mercury were estimated because the sample holding times were exceeded. Positive and non-detected results for total mercury, monomethyl mercury, SSE F1, SSE F3, and SSE F5 were estimated due to poor laboratory duplication precision. Positive and non-detected results for SSE F2 were estimated because continuing calibration verification did not meet the acceptance criteria [196].

Total mercury was not detected in samples collected downstream of the Sawmill Dam at concentrations greater than or equal to three times the highest reference sample concentration (SMD2-2 at 436 ng/g). Reference sample SMD2-2 was collected upstream of the Sawmill Dam. The reference sample SMD2-2 analytical result for total mercury is uniquely high in comparison with the five other reference samples' concentrations (all less than 4 ng/g). With the exception of

reference sample SMD2-2's total mercury concentration, the concentration of total mercury increases downstream of the Sawmill Dam and Chlor-Alkali property with concentrations ranging from 39.4 to 1,210 ng/g. There may be potential explanations for the uniquely high upstream reference concentration, including: 1) Based on photographs depicting the movement of soil and/or sediment within the river channel during construction of the Sawmill Dam in 1949, the possibility exists that contaminated sediment was moved during construction activities; and 2) An unknown source of mercury may exist upstream [189-193]. The concentration of total mercury detected in reference sample SMD2-2 exceeded the 1999 NOAA SQuiRTs TEL for mercury in freshwater sediment (174 ng/g). In addition, total mercury in all samples collected downstream of the Sawmill Dam, with the exception of RSD3-1, exceed the NOAA SQuiRTs background concentration for mercury; total mercury in seven of the 14 samples collected downstream of the Sawmill Dam (RSD1-2, RSD2-1, SHD1-3, SHD2-3, SHD3-1, SHD4-1, and SHD4-2) exceeded the NOAA SQuiRTs TEL values for mercury; and total mercury in five of the 14 samples collected downstream of the Sawmill Dam (RSD2-1, SHD1-3, SHD2-3, SHD4-1, and SHD4-2) exceeded the NOAA SQuiRTs PEL values for mercury [142; 196].

Monomethyl mercury was detected at concentrations greater than or equal to three times the highest reference sample concentration (SMD3-2 at 0.129 ng/g) in five of the 14 samples collected downstream of the Sawmill Dam [196]. Monomethyl mercury was also detected in START on-site soil/source samples [117]. Therefore, the presence of monomethyl mercury in sediment within the Androscoggin River, downstream of the Sawmill Dam, will be considered partially attributable to the Chlor-Alkali property.

SSE mercury analytical results indicate that both bioavailable and non-bioavailable species of mercury are present in the sediment collected from the Androscoggin River downstream of the Chlor-Alkali property. F1 fraction is the preferential extraction fraction of water soluble mercury compounds; F2 fraction is the preferential extraction fraction of "stomach acid" soluble mercury compounds; F3 fraction is the preferential extraction fraction of organo-chelated mercury; F4 fraction is the preferential extraction fraction of elemental mercury; and F5 fraction is the preferential extraction fraction of mercuric sulfide compounds. Fractions F1 through F3 are "more readily methylated" than those containing mercury in the fractions F4 and F5. The highest concentrations of mercury species in the sediment samples were found in the F3 through F5 fractions [195; 196].

Actions

During September through December 1999, Clean Harbors of Bow, NH, contracted by Pulp & Paper of America, removed mercury from along the eastern bank of the Androscoggin River and portions of the riverbed. A grid of 15 approximately 40-foot zones numbered 0 through 15 was established, beginning at the toe of the Sawmill Dam and continuing south. Zone 0 begins at the toe of Sawmill Dam (44° 28.715' North latitude and 71° 10.058' West longitude), and the zones increase in number as one proceeds south. Zone 15, the southernmost zone, is located at 44° 28.706' North latitude and 71° 10.072 West longitude. The mercury removal was conducted along the eastern riverbank and extended approximately 50 feet west into the river. Clean Harbors used a vacuum truck, scoops, shovels, spatulas, and basters to collect the mercury. The mercury collected by hand-powered equipment was put into jars; and the jars were labeled with the section of the river from which the

mercury was collected. The mercury collected using a vacuum truck was stored in a 5,000-gallon, 25-cubic-yard, sealed roll-off container [65; 66].

In addition, Clean Harbors subcontracted Bancroft Martin of West Paris, Maine to install sandbags in the river so that water could be removed in specific areas for the mercury removal. Minimal or no visible signs of mercury were identified in Zones 0 through 4. Reportedly, increasing amounts of mercury were found between Zones 5 and 10, with the majority of mercury located within Zones 10 and 11. Clean Harbors swept Zones 6 through 11 three times to remove all visible mercury along the riverbank, behind demolition debris and rocks, and within cracks and crevices. Mercury was noted to be found as small beads within sand and gravel deposits along the riverbank, within fractures of the bedrock beneath the water's edge, as small pools in deep crevices, as well as overlain by encrusted ferrous objects [65]. The amount of material removed from the riverbank in 1999 was not available to START at the time of preparation of this report.

From 27 November through 1 December 2000, on behalf of Pulp and Paper of America, United Industrial Services inspected 13 zones along the Androscoggin River and conducted mercury removal from Zones 5 through 11 [67; 180]. Mercury was found as liquid and solder-like material, and approximately 1.5 pounds of mercury were found and disposed of off site. A sample of unknown material was collected on 1 December 2000 by either United Industrial Services or by a NH DES representative present on site [67]. There is no further information regarding this sample in available file information.

From 11 through 15 November 2002, on behalf of NH DES, ENPRO Services, Inc., conducted a mercury removal along the Androscoggin Riverbank within the USGS survey grid mapped as 10-foot by 10-foot sections. Approximately 32 ounces of free-mercury and mercury-containing scrap metal were removed from the Androscoggin River and stored on site, until removed for disposal on 18 December 2002 [90].

From 23 to 25 August 2004, on behalf of NH DES, Weston MNH subcontracted Global Remediation to conduct a mercury removal along the Androscoggin Riverbank adjacent to the Chlor-Alkali property [127]. The amount of material removed from the riverbank and from within bedrock fissures adjacent to the Chlor-Alkali property during this removal was not available to START at the time of preparation of this report. According to NH DES personnel, a total of over 135 pounds of mercury has been removed during the 1999, 2000, 2002, and 2004 removals occurring along the riverbank of the Androscoggin River adjacent to the Chlor-Alkali property [173].

On 27 August 2004, NH DES collected one solid and one liquid sample of the material collected during the 23 to 25 August 2004 removal of mercury along the banks of the Androscoggin River, adjacent to the Chlor-Alkali property. The samples were submitted to EPA Region I's NERL on 31 August 2004 for mercury analysis. The samples were placed in a fume hood, and a background indoor air sample for mercury was collected and screened for mercury vapor using an Ohio Lumex RA-915+ Zeeman Mercury Spectrometer Analyzer. The average readings for mercury in the indoor air sample measured 4 to 6 ng/m^3, and instantaneous levels of mercury measured 6 to 8 ng/m^3. Both the solid and liquid samples submitted to NERL were screened using the same instrument. The head-space reading for the liquid sample measured mercury vapor concentrations greater than 10,000 ng/m^3. The head-space reading for the solid sample measured mercury vapor at concentrations

greater than 11,000 ng/m^3. Based on results from both visual inspection of the samples and the mercury vapor analyzer readings, NERL concluded that these samples contained mercury and no further testing was warranted or conducted [140].

Due to the availability of third-party data, START did not perform sediment sampling as part of the Chlor-Alkali PA/SI. In December 2001, on behalf of NH DES, Weston MNH performed sediment sampling from the Androscoggin River for the Chlor-Alkali property. Based on analytical results, the surface water pathway has been impacted by a release of monomethyl mercury which appears to be at least partially attributable to the on-site sources. In addition, based on NERL's characterization of the material removed from the bedrock fissures and riverbank adjacent to the Chlor-Alkali property as mercury, a release of mercury to the surface water pathway has been documented by direct observation. As a result, impacts to a CWA-protected water body and a fishery have been documented.

SOIL EXPOSURE PATHWAY

In 1999, all remaining structures on site were razed and used as fill on the property. A cover system was installed on the surface and consisted of a build-up of 12 inches of "common borrow" and then 6 inches of sand beneath a 40-mil liner; then a drainage geocomposite and 2 feet of bark/wood chips above the 40-mil liner [64]. Prior to the installation of the 40-mil liner on the surface of the property, the topography of the Chlor-Alkali property was reportedly flat [91, p. 2-1]. Currently, topography on the Chlor-Alkali property is mounded in the center and slopes radially in all directions. However, the greatest slope is west, toward the Androscoggin River, and south toward a drainage ditch [102, p. 17].

The surficial materials underlying the Chlor-Alkali property are mapped as glacial till [98]. Currently, the approximately 4.0-acre, 40-mil lined area is covered with bark/wood chips. The uncapped area of the property, measuring approximately 0.6 acres, consists of a dirt utility road in the eastern portion of the property and overgrown vegetation located in the southern and southwestern portions of the property. START observed a "tar-like" material on the ground surface and between rocks and bricks along the edge of the Androscoggin River in the southwest corner of the property [102, p. 19; 103, p. 38; 123].

The nearest private residence east of the Androscoggin River is located in Berlin and is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 259, approximately 0.2 miles southeast of the Chlor-Alkali property. The nearest private residence west of the Androscoggin River is located in Berlin and is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 251, approximately 0.13 miles northwest of the Chlor-Alkali property [25]. There are no schools or day-care facilities located within 200 feet of any potential on-site source areas. There are no full-time workers associated with the Chlor-Alkali property [102, p. 23]. The population within 1 radial mile of the property is estimated to be 2,478 [37].

Currently, the Chlor-Alkali property is not accessible to the public. The only access to the property is through the Fraser Paper property at their staffed guard house entrance, off Unity Street east of the Androscoggin River. From the Fraser Paper property, a dirt access road enters the Chlor-Alkali property in the southeast corner and extends north along the eastern property boundary to the

northern property boundary. The dirt access road forks to the northwest toward the center of the property. In addition, there is reportedly no access to the Chlor-Alkali property along the Androscoggin Riverbank [102, pp. 11-12, 18].

On 6 and 7 April 1999, as part of the LEA, Tighe & Bond collected nine surficial soil samples [FPCB-1, FPCB-2, S-1 (6), S-1 (24), S-2 through S-5, and Sump Conf.] to assess the vertical and horizontal extent of lead and mercury contamination on the Chlor-Alkali property (Figure 10). Soil samples S-1 (6) and S-1 (24) were collected from material within the sump located within the Cell House, approximately 9 feet north of the lower garage door. Soil samples S-2 through S-5 were collected from the south and east sides of the existing Cell House at a depth of approximately 14 inches below grade. Soil samples FPCB-1 and FPCB-2 were collected from approximately 2 feet below grade near former maintenance shops. In addition, sample Sump Conf. was collected approximately 18 inches below grade from the sump located approximately 30 feet north of the lower garage building within the Cell House. The samples were collected using a pre-cleaned 2-inch-diameter bucket auger and a spade, and submitted to STL and analyzed for total lead and mercury. In addition, two samples (FPCB-1 and FPCB-2) were analyzed for seven VOCs (acetone, carbon disulfide, chloroform, ethylbenzene, methylene chloride, toluene, and xylene), total PCBs, and TPHs. Analytical results indicated the presence of seven VOCs (acetone, carbon disulfide, chloroform, ethylbenzene, methylene chloride, toluene, and xylene), PCBs, lead, mercury, and TPHs [10, p. 5-5 and Table 6-3]. Refer to the Waste/Source Sampling section for a complete summary of analytical results.

On 7 April 1999, as part of the LEA, Tighe & Bond advanced four soil borings (B-6 through B-9) along the south and east sides of the Cell House. One surficial soil sample was collected at 0 to 2 feet from three of the four borings (Samples B-6 S-1, B-7 S-1, and B-8 S-1) and submitted to STL for total lead and mercury analyses. Lead was detected in the three samples at concentrations ranging from 70 mg/kg to 140 mg/kg, and mercury was detected in the three samples at concentrations ranging from 0.98 mg/kg to 4.1 mg/kg [10, Table 6-2]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated.

On 28 through 30 April 1999, Tighe & Bond advanced a total of 42 soil borings to refusal on the Chlor-Alkali property. Surficial soil samples were collected from the borings and submitted to an unspecified laboratory for lead and mercury analyses by unspecified methods. In addition, select surficial soil samples were analyzed for PCBs (Aroclor 1254, Aroclor 1260, and total PCBs) and six additional metals (arsenic, barium, cadmium, chromium, selenium, and silver) [13, Appendix C]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. START was only able to locate analytical results for 40 borings in available file information. Table 35 is a summary of substances detected in surficial samples collected from soil borings advanced on the Chlor-Alkali property by Tighe & Bond from 28 through 30 April 1999.

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
AA-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	5	400	4,000
			Mercury	2.2 U	7	70
BB-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	4.8	400	4,000
			Mercury	2.1 U	7	70
CC-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	4.3	400	4,000
			Mercury	2.1 U	7	70
A-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	35	400	4,000
			Mercury	2.2 U	7	70
A-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	86	400	4,000
			Mercury	2.1 U	7	70
A-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	96	400	4,000
			Mercury	32	7	70
B-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	130	400	4,000
			Mercury	180	7	70
B-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	7.9	400	4,000
			Mercury	2 U	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
B-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	170	400	4,000
			Mercury	160	7	70
B-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	48	400	4,000
			Mercury	7.9	7	70
C-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	26	400	4,000
			Mercury	6.4	7	70
C-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	6.9	400	4,000
			Mercury	2.5	7	70
C-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	88	400	4,000
			Mercury	82	7	70
C-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	41	400	4,000
			Mercury	2.1 U	7	70
C-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	17	400	4,000
			Mercury	2.1	7	70
D-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	13	400	4,000
			Mercury	4.7	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration		NH DES**	
						S-3	UCL
D-2	**METALS** (mg/kg)						
	S-1	0-2	Lead	54		400	4,000
			Mercury	18		7	70
D-3	**METALS** (mg/kg)						
	S-1	6"-1' 6"	Lead	9.3		400	4,000
			Mercury	2.1	U	7	70
			Arsenic	0.91		12	120
			Barium	26		3,400	10,000
			Cadmium	0.21	U	230	2,300
			Chromium	2.5		Cr-S-3	Cr-UCL
			Selenium	2.1	U	4,200	10,000
			Silver	0.41	U	200	2,000
D-4	**METALS** (mg/kg)						
	S-1	2"-6"	Lead	27		400	4,000
			Mercury	5		7	70
D-5	**METALS** (mg/kg)						
	S-1	0-2	Lead	66		400	4,000
			Mercury	11		7	70
E-1	**METALS** (mg/kg)						
	S-1	0-2	Lead	41		400	4,000
			Mercury	46		7	70
E-2	**METALS** (mg/kg)						
	S-1	0-2	Lead	12		400	4,000
			Mercury	2.3	U	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
E-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	82	400	4,000
			Mercury	6.0	7	70
	PCBs (µg/kg)					
	S-1	0-2	Aroclor-1254	2,690	1,000*	20,000*
			Aroclor-1260	291 U	1,000*	20,000*
			Total PCBs	2,690	1,000	20,000
E-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	50	400	4,000
			Mercury	3.4	7	70
	PCBs (µg/kg)					
	S-1	0-2	Aroclor-1254	1,120	1,000*	20,000*
			Aroclor-1260	1,080	1,000*	20,000*
			Total PCBs	2,200	1,000	20,000*
E-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	64	400	4,000
			Mercury	14	7	70
	PCBs (µg/kg)					
	S-1	0-2	Aroclor-1254	8,550	1,000*	20,000*
			Aroclor-1260	287 U	1,000*	20,000*
			Total PCBs	8,550	1,000	20,000
E-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	19	400	4,000
			Mercury	2.2 U	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
F-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	22	400	4,000
			Mercury	2.8 U	7	70
F-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	24	400	4,000
			Mercury	2.2 U	7	70
G-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	390	400	4,000
			Mercury	20	7	70
G-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	73	400	4,000
			Mercury	260	7	70
			Arsenic	22	12	120
			Barium	1,700	3,400	10,000
			Cadmium	0.21 U	230	2,300
			Chromium	7.2	Cr-S-3	Cr-UCL
			Selenium	2.1 U	4,200	10,000
			Silver	0.42 U	200	2,000
G-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	260	400	4,000
			Mercury	2.4 U	7	70
G-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	8.8	400	4,000
			Mercury	2.3 U	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
G-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	25	400	4,000
			Mercury	2.1 U	7	70
G-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	48	400	4,000
			Mercury	2.7	7	70
H-1	**METALS** (mg/kg)					
	S-1	0-2	Lead	110	400	4,000
			Mercury	3.2	7	70
H-2	**METALS** (mg/kg)					
	S-1	0-2	Lead	690	400	4,000
			Mercury	9.4	7	70
H-3	**METALS** (mg/kg)					
	S-1	0-2	Lead	130	400	4,000
			Mercury	10	7	70
H-4	**METALS** (mg/kg)					
	S-1	0-2	Lead	97	400	4,000
			Mercury	2.3	7	70
H-5	**METALS** (mg/kg)					
	S-1	0-2	Lead	2.2 U	400	4,000
			Mercury	2.2 U	7	70

Table 35

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond from 28 through 30 April 1999 (Concluded)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES**	
					S-3	UCL
H-6	**METALS** (mg/kg)					
	S-1	0-2	Lead	340	400	4,000
			Mercury	0.41	17	70

mg/kg	=	*Milligrams per kilogram.*
µg/kg	=	Micrograms per kilogram.
NH DES	=	New Hampshire Department of Environmental Services.
'	=	Feet.
"	=	Inches.
No.	=	Number.
PCBs	=	Polychlorinated Biphenyls.
U	=	Analyte not detected in the sample. The laboratory detection limit is provided.
S-3	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1, S-3 Soil Standards.
UCL	=	New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3, Upper Concentration Limits in Soil.
Cr-S-3	=	S-3 Soil Standards for chromium III (5,000 mg/kg) and for chromium VI (540 mg/kg).
Cr-UCL	=	Upper Concentration Limits for chromium III (10,000 mg/kg) and for chromium VI (5,400 mg/kg).
*	=	The total PCB standard is provided.

**Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

[13, Appendix C]

In May 1999, Maine Test Borings, Inc., under direction of Tighe & Bond, advanced five soil borings on the Chlor-Alkali property and completed them as monitoring wells (MW-2 through MW-6) and advanced one soil boring off site and completed it as a monitoring well (MW-1). Surficial soil samples were collected from the soil borings, submitted to an unknown laboratory, and analyzed for lead and mercury by an unknown laboratory and unspecified methods [13 p. 3-1, Appendix C]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 36 is a summary of substances detected in surficial soil samples collected from soil borings advanced on the Chlor-Alkali property and off site by Tighe & Bond in May 1999.

Table 36

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond in May 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES*	
					S-3	UCL
MW-1	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	54	400	4,000
			Mercury	86	7	70
MW-2	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	120	400	4,000
			Mercury	14	7	70
MW-3	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	880	400	4,000
			Mercury	2,100	7	70
MW-4	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	160	400	4,000
			Mercury	72	7	70
MW-5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	88	400	4,000
			Mercury	3	7	70
MW-6	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	29	400	4,000
			Mercury	0.97	7	70

UCL = New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3 Upper Concentration Limit.
S-3 = New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1 Soil Standards.
mg/kg = Milligram per kilogram.
NH DES = New Hampshire Department of Environmental Services.
No. = Number.

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

[13, Appendix C, Table MW]

On 27 May 1999, Tighe & Bond advanced 19 soil borings (A-0, A-10, AAA-1, AAA-11, BBB-10, GG-5.5, GG-6, GG-6.5, GG-6.25, H-5.5, H-6.5, HH-5.5, HH-6, HH-6.5, HHH-6.25, I-3, I-4, I-5, I-6) to further delineate lead and mercury contamination surrounding two soil borings (A-1 and H-6) advanced by Tighe & Bond in April 1999. In addition, Tighe & Bond extended the soil boring grid and advanced four additional borings (I-3 through I-6). Surficial soil samples were collected from these soil borings and analyzed by an unknown laboratory for lead and mercury by unspecified methods. In addition, samples collected from soil borings A-10, AAA-1, AAA-11, and GG-5.5 were also analyzed for TPHs, a carbon range, and analyzed to determine the composition of the hydrocarbons present (petroleum ID) [13, Appendix C, Figure 6]. START attempted to confirm whether these data were validated; however, this information was not available in file information obtained by START. Therefore, START assumes these data are unvalidated. Table 37 is a summary of substances detected in surficial soil samples collected from soil borings advanced on the Chlor-Alkali property by Tighe & Bond on 27 May 1999.

Table 37

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES*	
					S-3	UCL
DELINEATION OF SOIL BORING A-1						
A-0	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	69	400	4,000
			Mercury	8.5	7	70
A-10	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	14	400	4,000
AAA-1	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	70	400	4,000
			Mercury	1.6	7	70
	TPHs (mg/kg)					
	S-1	0 - 2	TPHs	340	10,000	NE
			Carbon Range	C-20 to C-32	NE	NE
			Petroleum ID	Motor Oil	NE	NE

Table 37

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES*	
					S-3	UCL
AAA-11	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	160	400	4,000
			Mercury	3.7	7	70
	TPHs (mg/kg)					
	S-1	0 - 2	TPHs	410	10,000	NE
			Carbon Range	C-14 to C-32	NE	NE
			Petroleum ID	Motor Oil	NE	NE
BBB-10	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	47	400	4,000
			Mercury	1.6	7	70
DELINEATION OF SOIL BORING H-6						
GG-5.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	190	400	4,000
			Mercury	2.2	7	70
	TPHs (mg/kg)					
	S-1	0 - 2	TPHs	610	10,000	NE
			Carbon Range	C-14 to C-32	NE	NE
			Petroleum ID	Motor Oil	NE	NE
GG-6	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	910	400	4,000
			Mercury	10	7	70

Table 37

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Continued)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES*	
					S-3	UCL
GG-6.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	120	400	4,000
GG-6.25	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	45	400	4,000
H-5.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	47	400	4,000
H-6.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	270	400	4,000
HH-5.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	32	400	4,000
HH-6	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	300	400	4,000
			Mercury	5.5	7	70
HH-6.5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	15	400	4,000
HHH-6.25	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	100	400	4,000

Table 37

Summary of Analytical Results
Surficial Soil Analysis for Chlor-Alkali Facility (former)
Samples Collected by Tighe & Bond on 27 May 1999 (Concluded)

Soil Boring	Sample No.	Sample Depth (feet)	Compound/ Element	Sample Concentration	NH DES*	
					S-3	UCL
ROW I						
I-3	**METALS** (mg/kg)					
	S-1	0 - 2	Mercury	20	7	70
I-4	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	250	400	4,000
			Mercury	13	7	70
I-5	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	370	400	4,000
			Mercury	12	7	70
I-6	**METALS** (mg/kg)					
	S-1	0 - 2	Lead	120	400	4,000
			Mercury	6.9	7	70

UCL = New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 3, Upper Concentration Limits in Soil.
S-3 = New Hampshire Department of Environmental Services Risk Characterization and Management Policy Method 1, S-3 Soil Standards.
mg/kg = Milligram per kilogram.
NE = Not established.
TPHs = Total Petroleum Hydrocarbons.
ID = Identification.
NH DES = New Hampshire Department of Environmental Services.
No. = Number.

*Tighe & Bond compared their analytical results to NH DES Method 1 Soil Standards and Method 3 Upper Concentration Limits in Soil. START assumes Tighe & Bond used standards listed in the 1 January 1998 NH DES Contaminated Sites Risk Characterization and Management Policy, available at the time of sample collection. The current NH DES Method 1 Soil Standards were updated in April 2001. The current NH DES S-3 soil standard for mercury is 13 mg/kg.

No mercury was detected in surficial soil samples A-10 S-1, GG-6.5 S-1, GG-6.25 S-1, H-5.5 S-1, H-6.5 S-1, HH-5.5 S-1, HH-6.5 S-1, and HHH-6.25 S-1. No lead was detected in surficial soil sample I-3 S-1. No Total Petroleum Hydrocarbons were detected in A-10 S-1.

[13, Appendix C]

During the March 2004 sampling event, on behalf of EPA and in coordination with NH DES, Weston MNH collected seven surficial soil/source samples (SO-06 and SO-17 through SO-22) from borings advanced in the Contaminated Soil source of the property for START. Samples SO-17 through SO-22 were collected from borings advanced in the suspected coal-tar disposal area of the Contaminated Soil source of the Chlor-Alkali property. Sample SO-06 was collected from the soil surface (0 to 24 inches below grade) and analyzed for VOCs, SVOCs, pesticides, PCBs, inorganics, monomethyl mercury, asbestos, and dioxin/furan congeners. Samples SO-17 through SO-22 were collected from 0 to 28 inches below grade and analyzed for SVOCs and metals only [27, pp. 2-30; 109-120]. No reference sample was collected [27, pp. 2-30].

Three VOCs (acetone, benzene, and chloroform), 18 SVOCs [acenaphthene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenzo(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, pyrene], 23 metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, thallium, vanadium, zinc, and monomethyl mercury), asbestos (chrysotile), and 14 dioxin/furan congeners were detected above CRQLs or IDLs in START surface soil/source samples [110-112; 115; 116]. Refer to the Waste/Source Sampling section of this report for a complete summary of analytical results.

START assumes the presence of the three VOCs, 18 SVOCs, 23 inorganics, asbestos, and 14 dioxin/furan congeners detected in surficial soil/source samples collected from the Contaminated Soil source is the result of historical operations conducted on the Chlor-Alkali property. However, no reference samples were collected for comparison purposes; therefore, an area of contaminated surface soil has not been documented.

One SVOC [benzo(a)pyrene] and one metal (arsenic) were detected in START surface soil/source samples collected from the Contaminated Soil source at concentrations exceeding their respective NH DES RCMP Method 1 Category S-3 Soil Standards. In addition, one SVOC [benzo(a)pyrene] and six metals (antimony, arsenic, lead, mercury, nickel, and zinc) were detected in START surface soil/source samples collected from the Contaminated Soil source at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil [110-112; 115; 116; 121].

In summary, in March 2004, in coordination with NH DES and Weston MNH, and on behalf of EPA, START performed soil/source sampling as a part of the Chlor-Alkali PA/SI. Three VOCs, 18 SVOCs, 23 metals, asbestos, and 14 dioxin/furan congeners were detected in on-site surficial soil. However, no reference samples were collected for comparison purposes. START assumes that the presence of these hazardous substances in surface soil is the result of historical operations conducted on the Chlor-Alkali property. In addition, one SVOC and one metal were detected in surface soil/source samples at concentrations exceeding their respective NH DES RCMP Method 1 Category S-3 Standards; and one SVOC and seven metals were detected in surface soil/source samples at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil. However, based on site observations and conditions, restricted access to the property, and lack of public use of the property, no impacts to nearby residential populations are known or suspected.

To date, actions taken to address the surficial soil contamination of the Chlor-Alkali property include the installation of a 40-mil liner over the area where mercury and lead were historically detected to minimize the off-site migration of contaminants and prevent human exposure to wastes present on the site surface [13; 64; 68]. However, approximately 0.6 acres of the property remain unlined. In addition, a deed restriction was placed on the property and filed at the Coos County Registry of Deeds as part of closure activities [64]. START was unable to locate this deed restriction at the Coos County Registry of Deeds.

AIR PATHWAY

There are no on-site residents or workers associated with the Chlor-Alkali property. The nearest private residence east of the Androscoggin River is located in Berlin and identified on the Town of Berlin's Tax Assessor's Map No. 128 as Lot No. 259, approximately 0.2 miles southeast of the Chlor-Alkali property. The nearest private residence west of the Androscoggin River is located in Berlin and identified on the Town of Berlin's Tax Assessor's Map No. 128 as Lot No. 251, approximately 0.13 miles northwest of the Chlor-Alkali property [25]. Currently, the Chlor-Alkali property is not accessible to the public. The only access to the property is through Fraser Paper property via a staffed guard house entrance, off Unity Street east of the Androscoggin River [102, pp. 11-12,18]. Table 38 summarizes the estimated population within 4 radial miles of the property.

Table 38

Estimated Population Within 4 Radial Miles of Chlor-Alkali Facility (former)

Radial Distance from Chlor-Alkali Facility (former) (miles)	Estimated Population
On a Source	0
> 0.00 to 0.25	94
> 0.25 to 0.50	275
> 0.50 to 1.00	2,109
> 1.00 to 2.00	5,887
> 2.00 to 3.00	1,849
> 3.00 to 4.00	1,271
TOTAL	11,485

[37]

According to the NH Natural Heritage Bureau, one occurrence of a Federally-listed threatened/State-listed endangered species habitat and eight occurrences of State-listed endangered/threatened species habitats are located within 4 radial miles of the Chlor-Alkali property [135]. In addition, a CWA-protected water body and an estimated 680.9 acres of wetlands are located within 4 radial miles of the Chlor-Alkali property [152].

Table 39 summarizes the sensitive environments located within 4 radial miles of the Chlor-Alkali property.

Table 39

Sensitive Environments Located Within 4 Radial Miles of Chlor-Alkali Facility (former)

Radial Distance from Chlor-Alkali Facility (former) (miles)	Sensitive Environment/Species (status)
On a source	None
> 0.00 to 0.25	Clean Water Act-protected water body
	1.9 acres of wetlands
> 0.25 to 0.50	None
> 0.50 to 1.00	0.8 acres of wetlands
	Habitats for three State-listed Endangered/Threatened Species
> 1.00 to 2.00	176.9 acres of wetlands
> 2.00 to 3.00	221.1 acres of wetlands
	Habitats for three State-listed Endangered/Threatened Species
> 3.00 to 4.00	280.2 acres of wetlands
	Habitats for one Federally-listed Threatened/State-listed Endangered Species
	Habitats for two State-listed Endangered/Threatened Species

[135; 152]

From 8 to 15 September 1999, Morrissey Enterprises removed asbestos roofing material from the Cell House roof located on the Chlor-Alkali property. Eleven samples of the Cell House building's roof material (roofing paper or roofing cement) were collected, and eight samples were submitted to Columbia Analytical Services, Inc. for asbestos analysis using EPA Method 600/R-93/11G. Analytical results indicated the presence of chysotile in one layer of roofing paper (five to six layers encountered), and cellulose and glass fibers [88]. Air samples were collected during the roofing removal and analyzed by Phase Contrast Microscopy at 400 times magnification in accordance with the National Institute for Occupational Safety and Health 7400 counting method and as specified in OSHA Standard 29 CFR 1910.1101 and 1926.1101. The maximum concentration of total fibers detected, regardless of composition or identification, was less than 0.003 fibers per cubic centimeter of air [60].

In October 2002, on behalf of NH DES, Weston MNH conducted landfill gas monitoring from the six passive vents located on the Chlor-Alkali property. On 17 October 2002, the vents were field-screened for mercury vapors using a Mercury Vapor Analyzer (MVA). No mercury was detected with the MVA. On 30 October 2002, the vents were field-screened for percent methane, oxygen, carbon dioxide, combustible gas, and hydrogen sulfide using a Landtec GEM Model 500 probe with a hydrogen sulfide pod. Detectable levels of methane (0 to 1.4 %) were recorded, with corresponding lower explosive limits (0.0 to 28%), as well as decreased percent oxygen (15.4 to

21.2%), and increased carbon dioxide (0.3 to 2.8%) and hydrogen sulfide levels (0 to 4 ppm). The hydrogen sulfide readings were considered suspect due to instrument drift in ambient air [89].

START did not collect air samples as part of the Chlor-Alkali PA/SI. During the START on-site reconnaissance, START conducted ambient air monitoring with a photoionization detector (PID), combustible gas indicator/oxygen meter, and a MVA. No elevated air monitoring readings were detected on site. Based on a lack of available data, no release of hazardous substances to the Air Migration Pathway from on-site sources has been documented. To date, no impacts to nearby residential populations or sensitive environments are known or suspected.

SUMMARY

The Chlor-Alkali Facility (former) (Chlor-Alkali) property is located adjacent to (south-southeast of) the Sawmill Dam, along the east side of the Androscoggin River, in Berlin, Coos County, New Hampshire. The approximately 4.6-acre property is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 262. The property is currently owned by Ms. Christine C. Shubert, Chapter 7 Trustee for the Estate of Pulp and Paper of America, LLC. The topography of the site is mounded in the center and slopes radially in all directions. However, the greatest slope is west, toward the Androscoggin River, and south toward the southern property boundary and a drainage ditch. Approximately 4 acres of property are covered by wood chips, which reportedly cover an 40-millimeter-thick textured high-density polyethylene liner (40-mil liner) installed on site. There are 24 monitoring wells, 12 piezometers, and six gas vents on site. A concrete retaining wall and a chain-link fence extend along the northern and western boundaries of the Chlor-Alkali property. Two exceptions include an approximately 50-foot section along the western property boundary that is bordered by an iron-rail fence, and an unfenced portion along the southwestern property boundary which is located along the river. The southern property boundary is unofficially marked by a drainage ditch and overgrown vegetation. The remaining 0.6 acres of the property is unlined with a suspected coal-tar disposal area and overgrown with vegetation located in the southwestern unlined portion of the property.

Beginning in the1890s, the Burgess Mill/Berlin Mills Company manufactured chlorine and related products, including caustic soda and hydrogen, utilizing electrolytic cells in "cell houses" on the Chlor-Alkali property. Historical documentation indicates that diaphragm cells, and potentially mercury cells, were used to produce the chlorine. During the 1960s, reportedly the majority of the buildings on the property were razed, with the exception of one remaining cell house. From the 1960s to 1999, property ownership changed hands numerous times. In 1995, Crown Vantage Co. purchased the Chlor-Alkali property. Numerous on-site sampling events documented the presence of mercury and lead in on-site soils and groundwater. In addition, elemental mercury has been observed and removed from bedrock fissures within the Androscoggin Riverbed, adjacent to the Chlor-Alkali property. In 1999, during transfer of ownership of the Chlor-Alkali property from Crown Vantage Co. to Pulp and Paper of America, site closure activities included razing all remaining structures on site, constructing a slurry wall, installing a 40-mil liner over the area where mercury and lead were detected, constructing drainage channels along the eastern and southern portions of the site, removing visible mercury and lead from the banks and from within the Androscoggin River, installing a fence along the western portion of the site, constructing an access road on site, and placing a deed restriction on the property. All structures and associated wastes were reportedly disposed of on site and used as fill material prior to the installation of the 40-mil liner in 1999. Pulp and Paper of America, LLC declared bankruptcy in 2001.

Sampling of on-site soil (prior to the installation of the 40-mil liner), groundwater, Androscoggin River sediment, Androscoggin River surface water, and groundwater seeps was completed by Tighe & Bond Consulting Engineers Environmental Specialists (Tighe & Bond) and Sevee & Maher Engineers, Inc. for the property owners; and additional sampling by Weston Solutions, Inc. of Manchester, New Hampshire (Weston MNH), on behalf of New Hampshire Department of Environmental Services (NH DES), has indicated the presence of mercury in various matrices sampled. In addition, elemental mercury has been observed and removed from bedrock fissures

along the eastern Androscoggin Riverbed, by Pulp and Paper of America and NH DES. Previous investigations of the property include a Limited Environmental Assessment (LEA), completed by Tighe & Bond; and sampling as part of this Preliminary Assessment/Site Investigation (PA/SI) conducted by Weston Solutions, Inc. Superfund Technical Assessment and Response Team (START) in 2004. Soil/source samples were collected for START from potential source areas on the Chlor-Alkali property, including a Landfill source and a Contaminated Soil source. Based on analytical results, on-site source areas containing seven volatile organic compounds (VOCs), 22 semivolatile organic compounds (SVOCs), three pesticides, one polychlorinated biphenyl (PCB), 25 inorganics, asbestos, cellulose, mineral wool, and 17 dioxin/furan congeners have been documented. Of these substances, two SVOCs and two metals were detected at concentrations exceeding their respective New Hampshire Department of Environmental Services Risk Characterization and Management Policy (NH DES RCMP) Method 1 Category S-3 Soil Standards. In addition, nine metals were detected at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals. To date, actions taken to address the contaminated sources at the Chlor-Alkali property include the installation of the 40-mil liner on 4.0 acres to prevent direct contact with the site surface; the removal of mercury along the east bank of the Androscoggin River; and the placement of a deed restriction on the Chlor-Alkali property.

An estimated 457 people are served by private drinking water supply wells located within 4 radial miles of the Chlor-Alkali property. The nearest private well located east of the Androscoggin River is located approximately 0.5 miles northeast of the Chlor-Alkali property. The nearest private well located west of the Androscoggin River is located approximately 0.4 miles northwest of the Chlor-Alkali property. One back-up public groundwater drinking water supply well is located within 4 radial miles of the Chlor-Alkali property. Depth to on-site groundwater ranges from approximately 6.5 to 12.5 feet. Based on analytical results from groundwater samples collected from the Chlor-Alkali property by Weston MNH in April 2004, groundwater beneath the property has been impacted by a release of hazardous substances which appear to be at least partially attributable to on-site sources. Specifically, the overburden aquifer has been impacted by a release of three VOCs (acetone, naphthalene, and vinyl chloride), one SVOC (phenanthrene), and seven inorganics (arsenic, barium, cadmium, chromium, lead, mercury, and selenium. The bedrock aquifer has been impacted by a release of three VOCs (acetone, tetrachloroethene, and trichloroethene) and seven inorganics (arsenic, barium, cadmium, chromium, lead, mercury, and selenium). Of these substances, five VOCs and six metals were detected at concentrations exceeding their NH DES RCMP Method 1 GW-1 Standards and/or NH DES Ambient Groundwater Quality Standards. However, based on the location and distance to the nearest public and private groundwater drinking water supply wells, no impacts to nearby drinking water sources from on-site sources are known or suspected.

Predominantly, stormwater flow from the Chlor-Alkali property is directed west to the Androscoggin River and south to the drainage ditch where stormwater is directed west to the river. The eastern portion of the property drains toward the east and northeast onto Fraser Paper property and into an adjacent canal of the Androscoggin River. The entire 15-mile downstream surface water pathway for the Chlor-Alkali property is comprised of the Androscoggin River. There are no surface water drinking water intakes located along the Androscoggin River. Approximately 8.5 miles of wetland frontage, a Clean Water Act (CWA)-protected water body, a fishery, one Federally-listed endangered/threatened species habitat, and eight State-listed endangered/threatened species habitats exist along the 15-mile downstream surface water pathway. Based on analytical results from

sediment samples collected from the Androscoggin River, the surface water pathway has been impacted by a release of monomethyl mercury which appears to be at least partially attributable to the on-site sources. In addition, based on characterization of the material removed from the bedrock fissures and riverbank adjacent to the Chlor-Alkali property as mercury, a release of mercury to the surface water pathway has been documented by direct observation. As a result, impacts to a CWA-protected water body and a fishery have been documented. To date, actions taken to address the release of elemental mercury from the Chlor-Alkali property to the surface water pathway include the removal of mercury along the banks of the Androscoggin River, adjacent to the Chlor-Alkali property, in 1999, 2000, 2002, and 2004.

There are no workers employed on the Chlor-Alkali property. The population within 1 radial mile of the property is estimated to be 2,478. The nearest private residence east of the Androscoggin River is located in Berlin and is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 259, approximately 0.2 miles southeast of the Chlor-Alkali property. The nearest private residence west of the Androscoggin River is located in Berlin and is identified on the Town of Berlin Tax Assessor's Map No. 128 as Lot No. 251, approximately 0.13 miles northwest of the Chlor-Alkali property. No known schools or day-care facilities are located within 200 feet of any source areas on the Chlor-Alkali property; and there are no known terrestrial sensitive environments located on the property. Currently, the Chlor-Alkali property is not accessible to the public. The only access to the property is through Fraser Paper property at their staffed guard house entrance, off Unity Street east of the Androscoggin River. Three VOCs, 18 SVOCs, 23 metals, cyanide, asbestos, and 14 dioxin/furan congeners were detected in on-site surficial soil collected for START. However, no reference samples were collected for comparison purposes. START assumes the presence of these hazardous substances in surface soil is the result of historical operations conducted on the Chlor-Alkali property. In addition, one SVOC and one metal were detected in surface soil/source samples at concentrations exceeding their respective NH DES RCMP Method 1 Category S-3 Standards, and one SVOC and seven metals were detected in surface soil/source samples at concentrations exceeding their respective NH DES RCMP Background Concentrations of Metals in Soil. However, based on site observations and conditions, restricted access to the property, and lack of public use of the property, no impacts to nearby residential populations are known or suspected. To date, actions taken to address the surficial soil contamination of the Chlor-Alkali property include the installation of a 40-mil liner over the area where mercury and lead were historically detected to minimize the off-site migration of contaminants and prevent human exposure to wastes present on the site surface. However, approximately 0.6 acres of the property remain unlined. In addition, a deed restriction was placed on the property and filed at the Coos County Registry of Deeds as part of closure activities.

There are an estimated 11,485 people located within 4 radial miles of the Chlor-Alkali property. According to the NH Natural Heritage Bureau, sensitive environments located within 4 radial miles of the property include one occurrence of a Federally-listed threatened/State-listed endangered species habitat and eight occurrences of State-listed endangered/threatened species habitats. In addition, a CWA-protected water body and an estimated 680.9 acres of wetlands are located within 4 radial miles of the Chlor-Alkali property. No quantitative air sampling has been conducted on the Chlor-Alkali property. No impacts to nearby residential populations or sensitive environments from a release to air from the property are known or suspected.

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RG2645-5&T6369

FILED IN NEW YORK

PLATE NO. #3833c

DATE Oct. 21, 1937

DEPT. Chemical Mill

SUBJECT Cell House

REMARKS Show room series

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

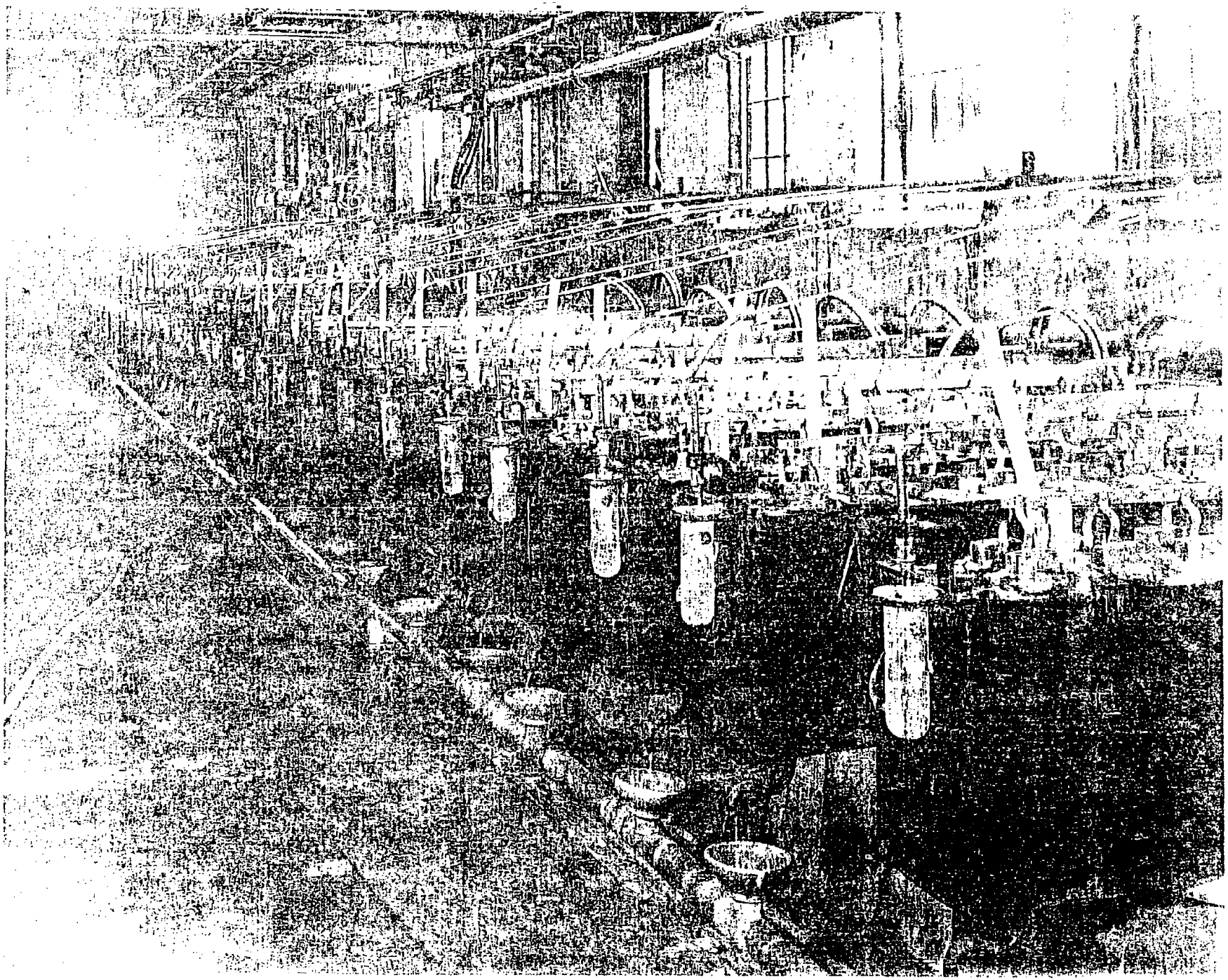

PLATE NO. A 3833d DATE Oct. 21, 1937

DEPT. Chemical Mill

SUBJECT Cell House

REMARKS Showroom series (Watt)

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

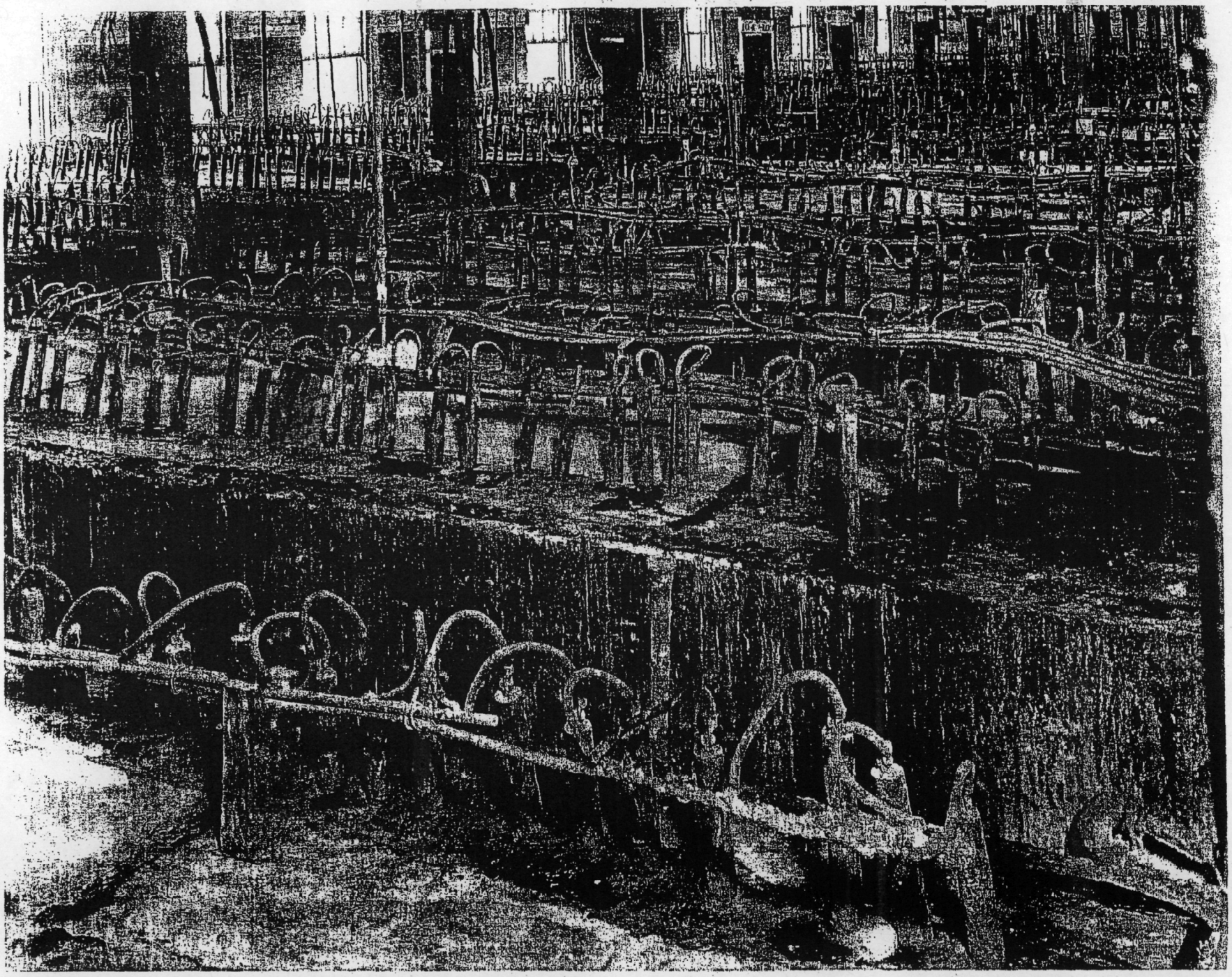

PLATE NO. #3828 DATE Oct. 9, 1937

DEPT. Chemical Mill (Ray Baker)

SUBJECT Chloroform Tanks Drums

REMARKS Shipping of —

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

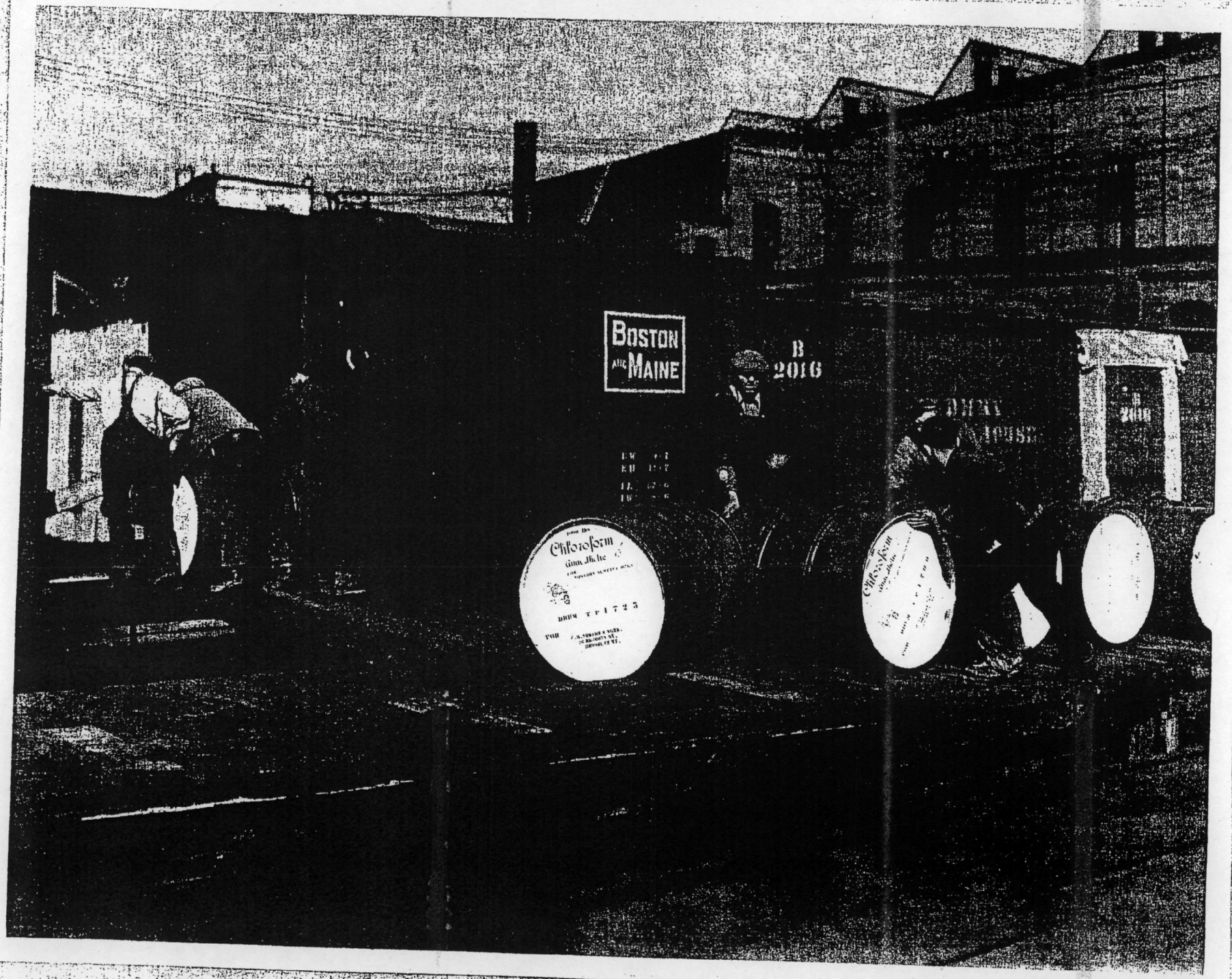
BOSTON
AND MAINE
B
2016
Chloroform
DRUM

PLATE NO. A4108-1 DATE August 12, 1949

DEPT. Eng. - (McGill)

SUBJECT Saw Mill Dam - Construction of -

REMARKS Progress photo

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

1913 6599 1246 500

PLATE NO. H4108-10 DATE October 14, 1949

DEPT. Eng. — (McGill)

SUBJECT Saw Mill Dam — Construction of —

REMARKS. Progress photo

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

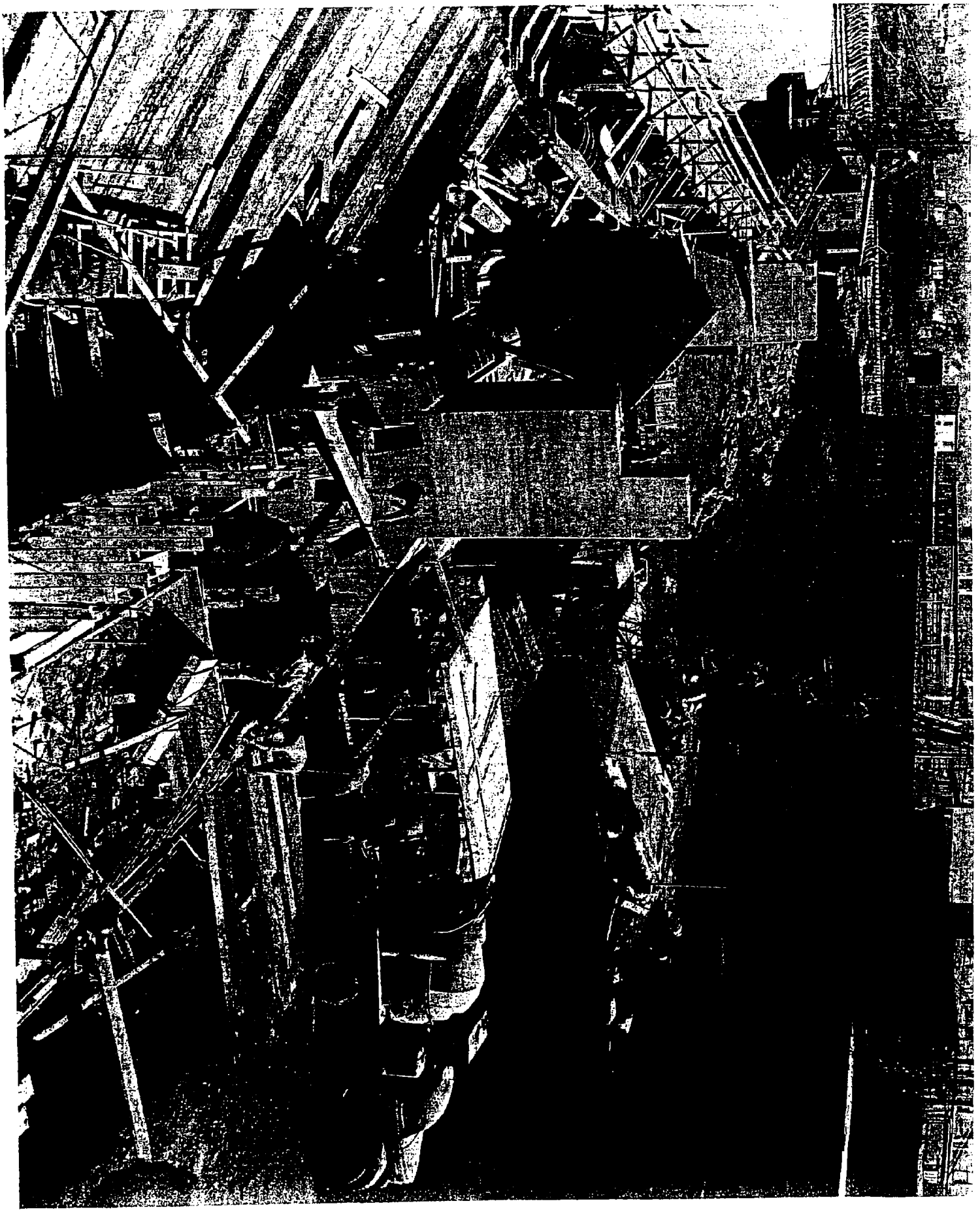

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PLATE NO. H4108-11 DATE October 21, 1949

DEPT. Eng. — (McGill)

SUBJECT Saw Mill Dam — Construction of —

REMARKS Progress photo

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BERLIN, N. H.

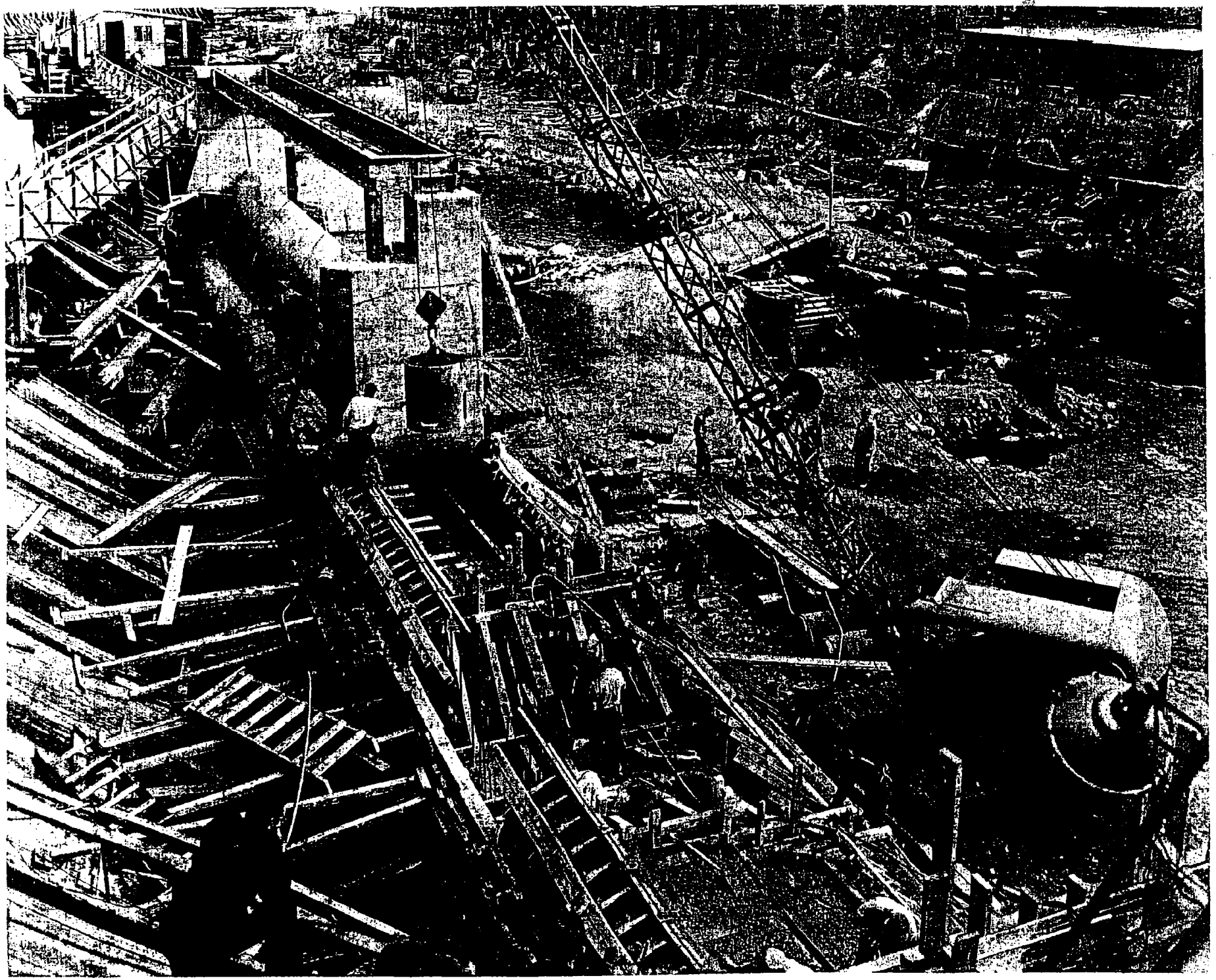

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PLATE NO. H4108-12 DATE October 28, 1949

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SUBJECT Saw Mill Dam

REMARKS Progress photo

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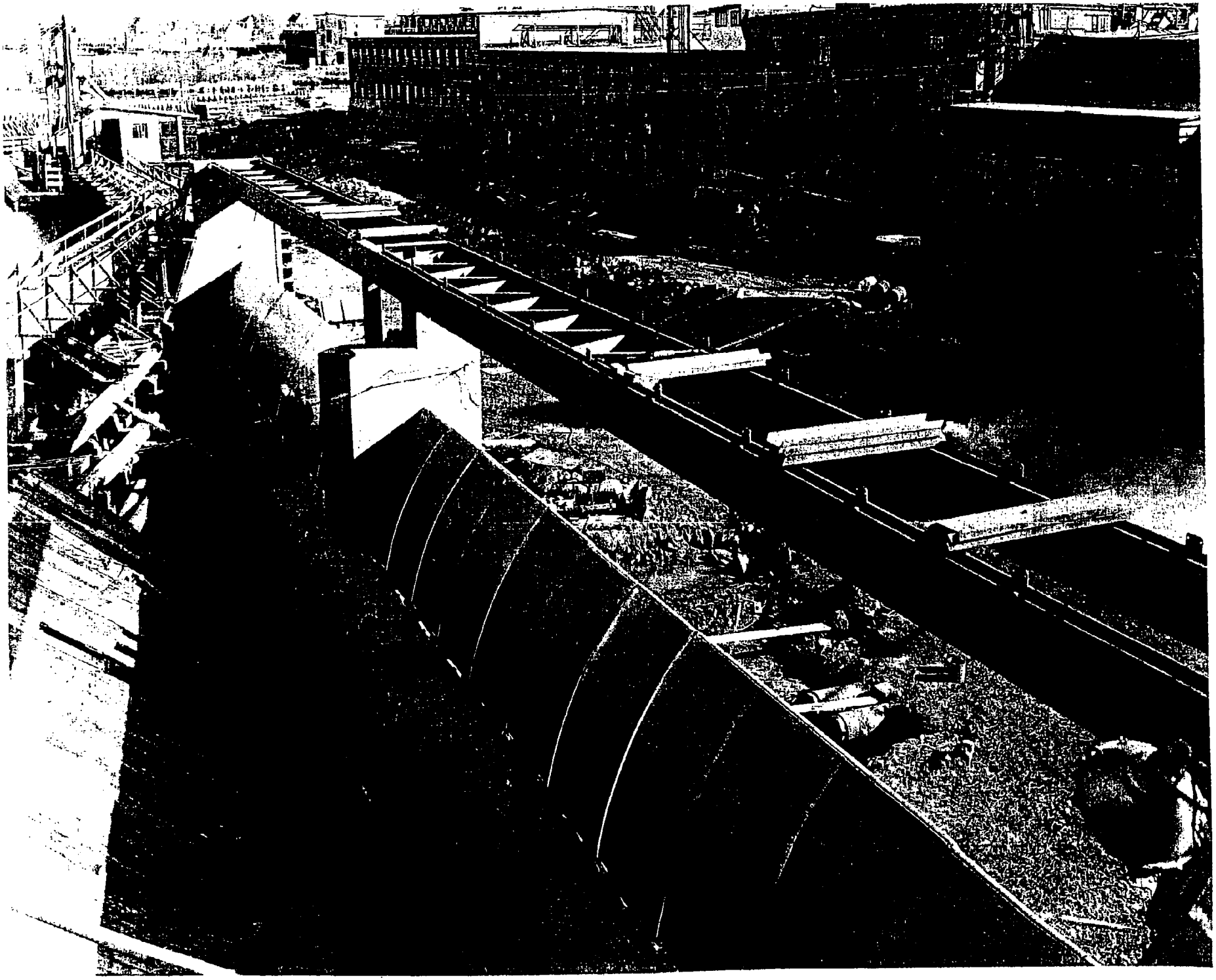

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PLATE NO. A4108-13 DATE November 4, 1949

DEPT. Eng. — (McGill)

SUBJECT Saw Mill Dam

REMARKS Progress photo

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BERLIN, N. H.

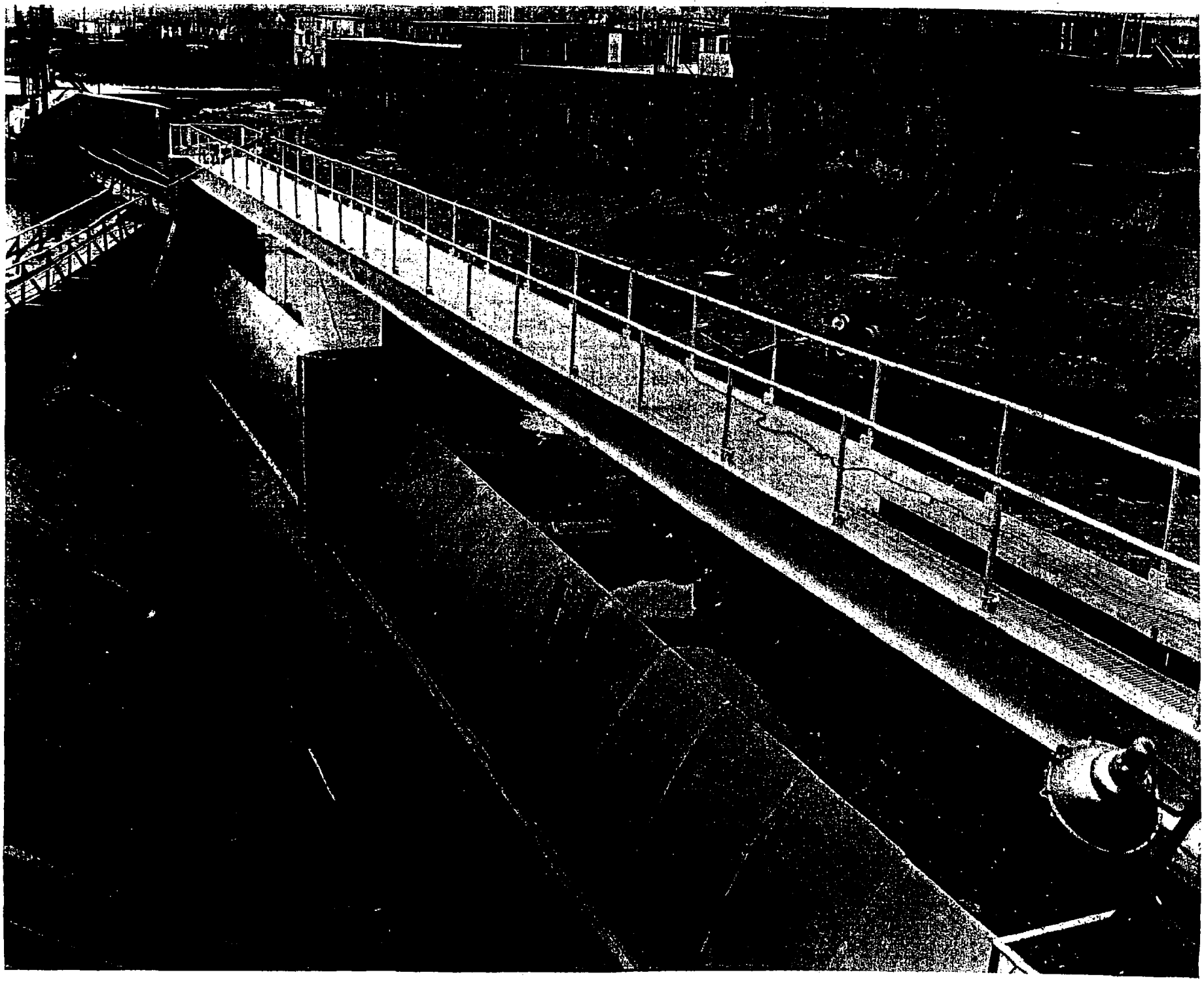

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PLATE NO. A 4108-14

DATE November 11, 1949

DEPT. Eng. (McGill)

SUBJECT Saw Mill Dam

REMARKS Completed

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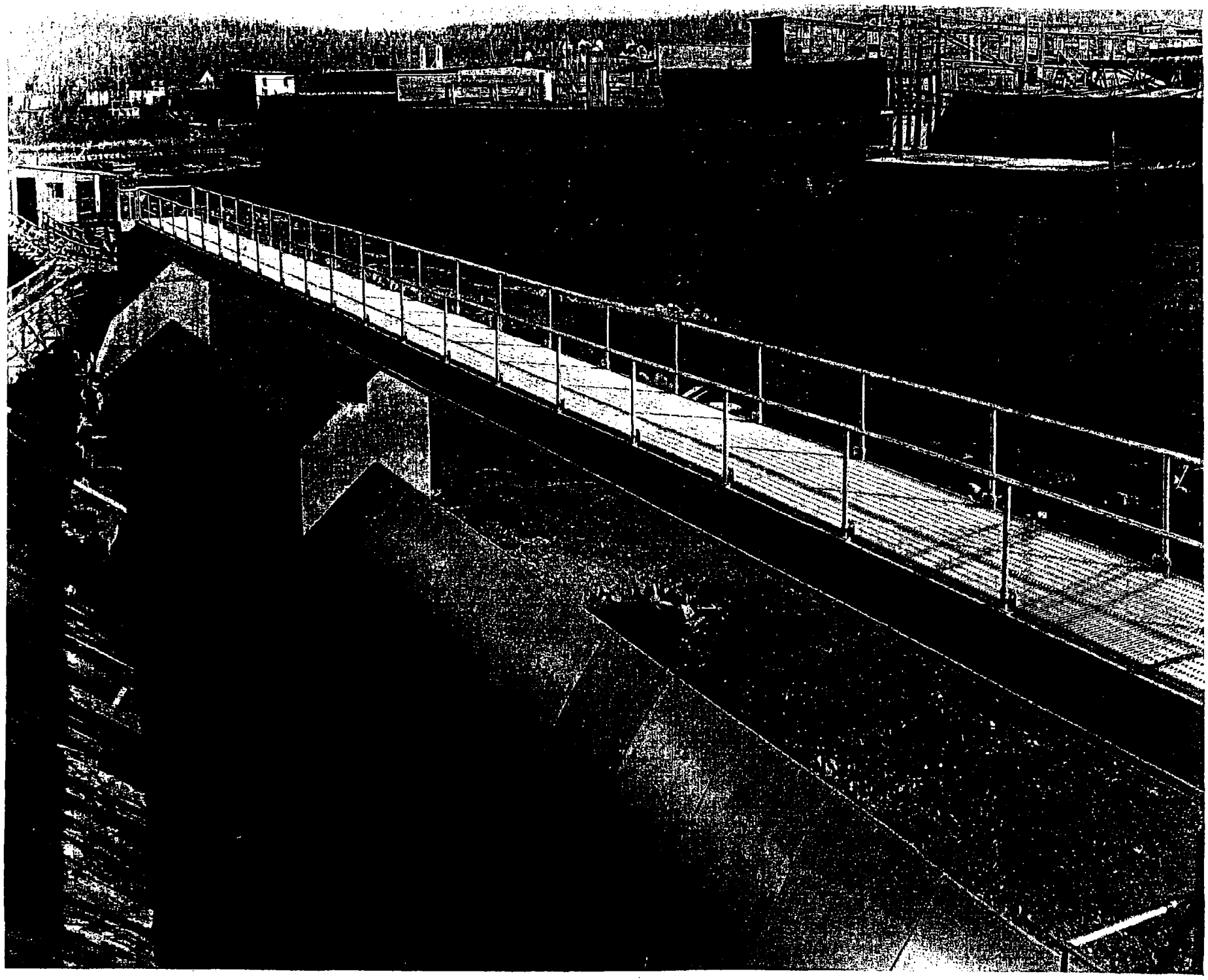
BERLIN, N. H.



DEPT. Chemical Mill — (Eaton)

SUBJECT Hooker Cell Installation in #6 Cell House

REMARKS (See BM 1557 Series - Before and after)

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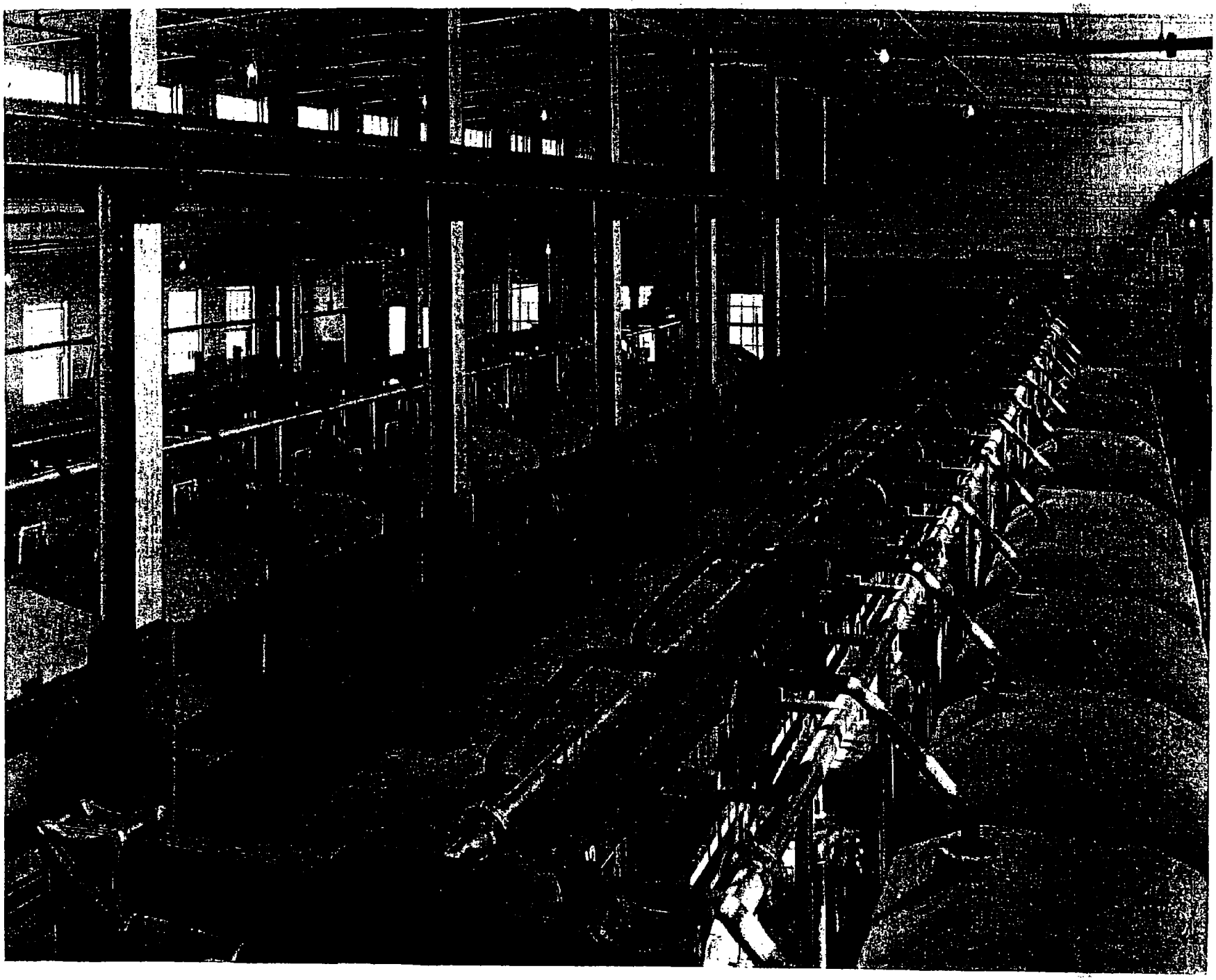


1943 9/03 1050 500

PLATE NO. BM1734 ab DATE April 18, 1951

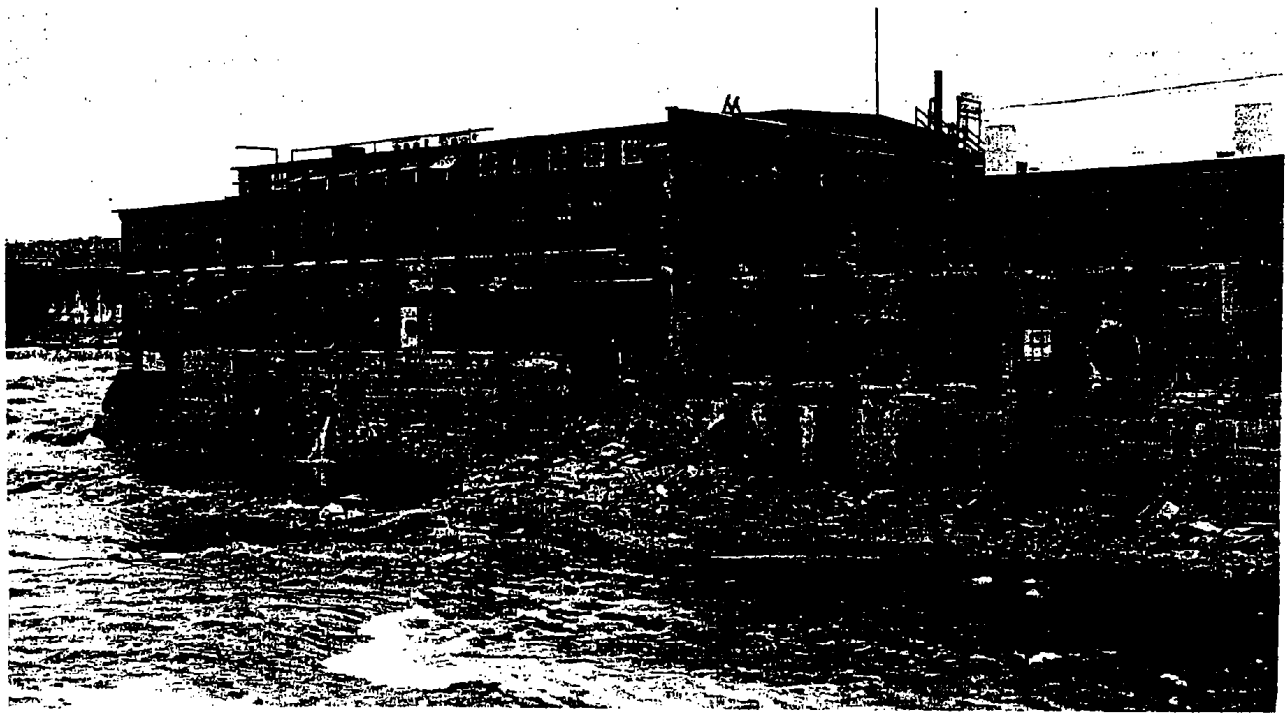
DEPT. Chemical Mill - (Riva)

SUBJECT Cellhouse - New

REMARKS Progress Photos

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.

(a)



(b)

1943 9703 1050 500

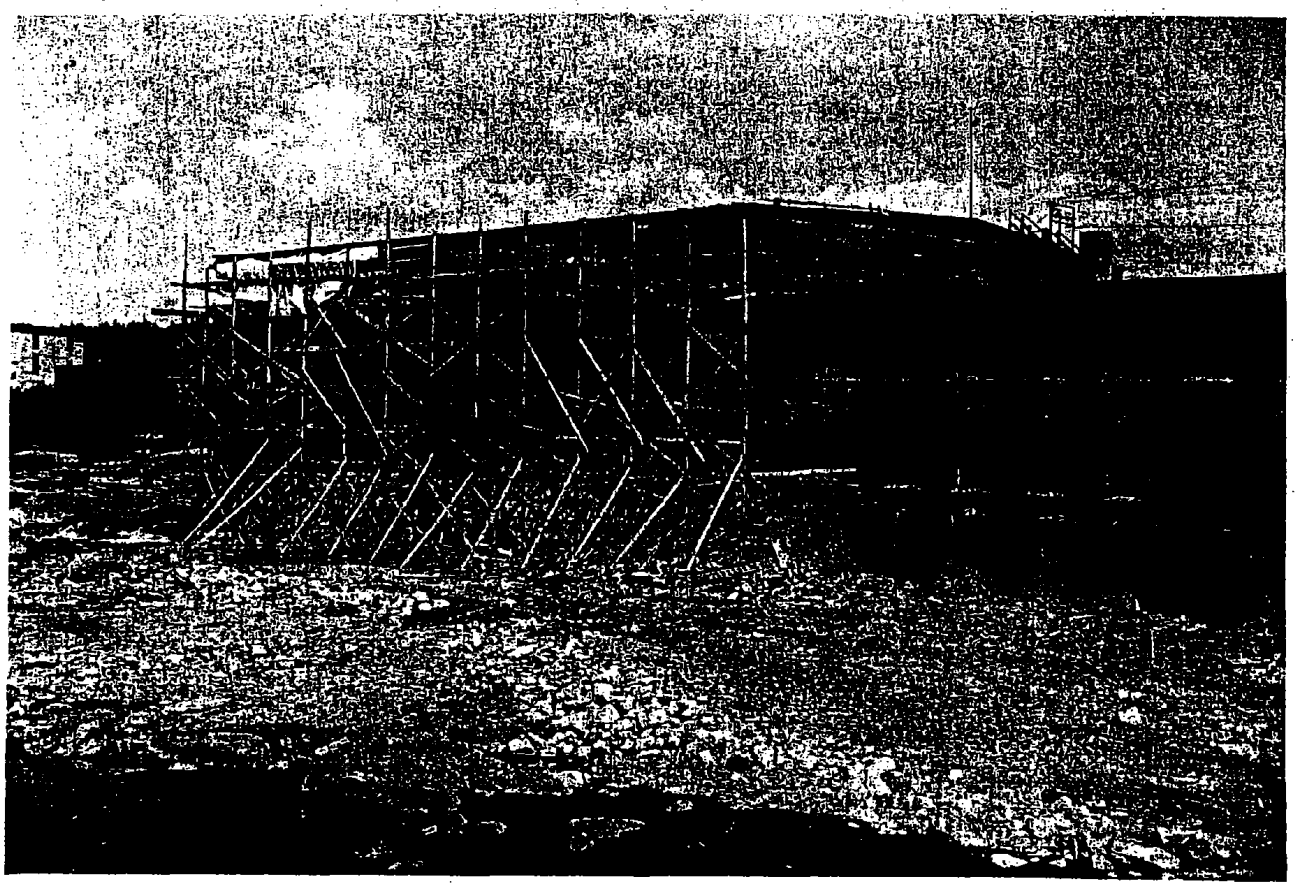
PLATE NO. BM 1797 DATE July 7, 1951

DEPT. Chemical Mill – (Riva)

SUBJECT Cellhouse – (New)

REMARKS Progress Photo

BROWN CO., RESEARCH DEPT. PHOTO SECTION
BERLIN, N. H.



1843 9/03 1030 300

PLATE NO. BM 1781 ab DATE June 18, 1951

DEPT. Chemical Mill – (Rira)

SUBJECT Cellhouse – new

REMARKS Progress Photos

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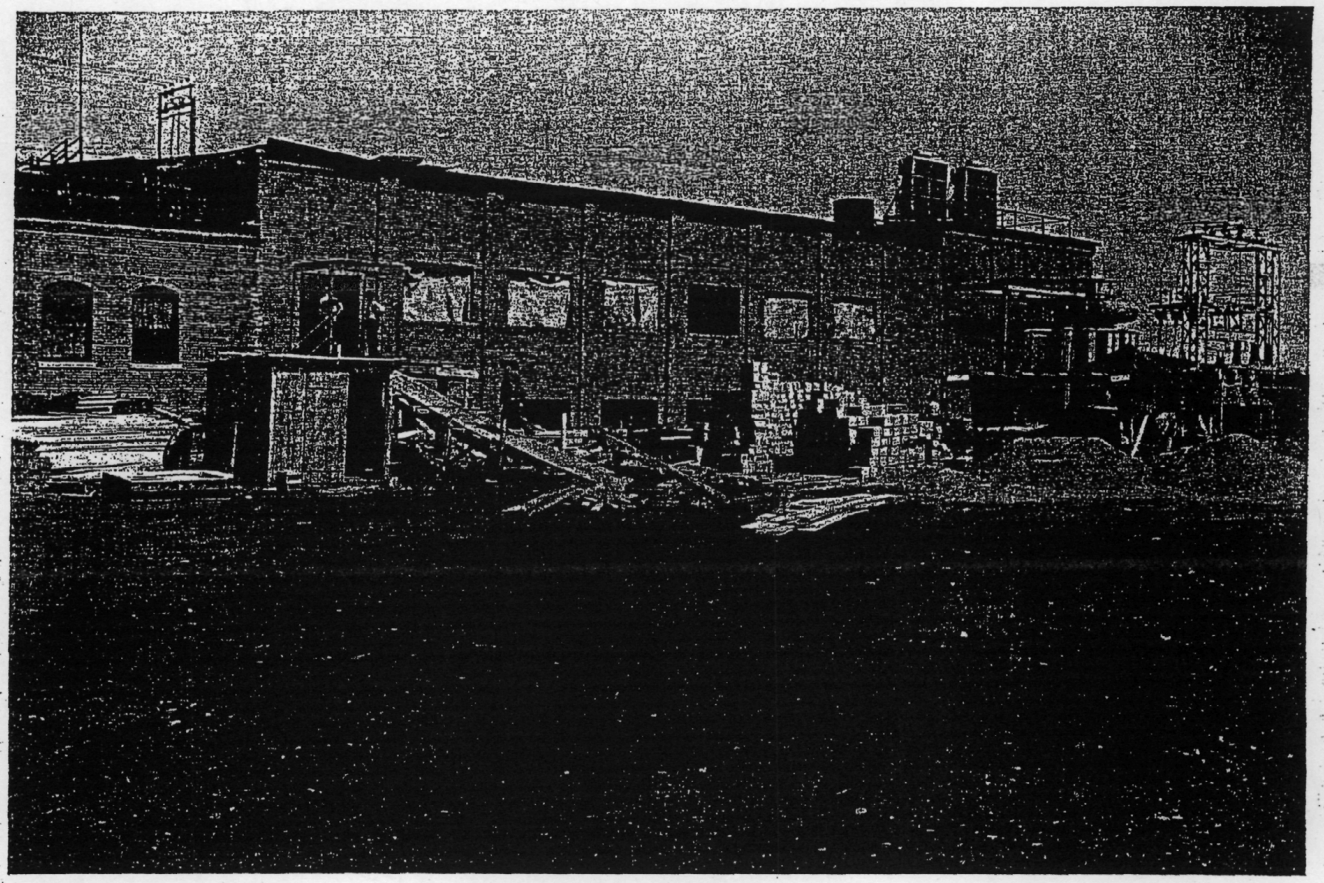

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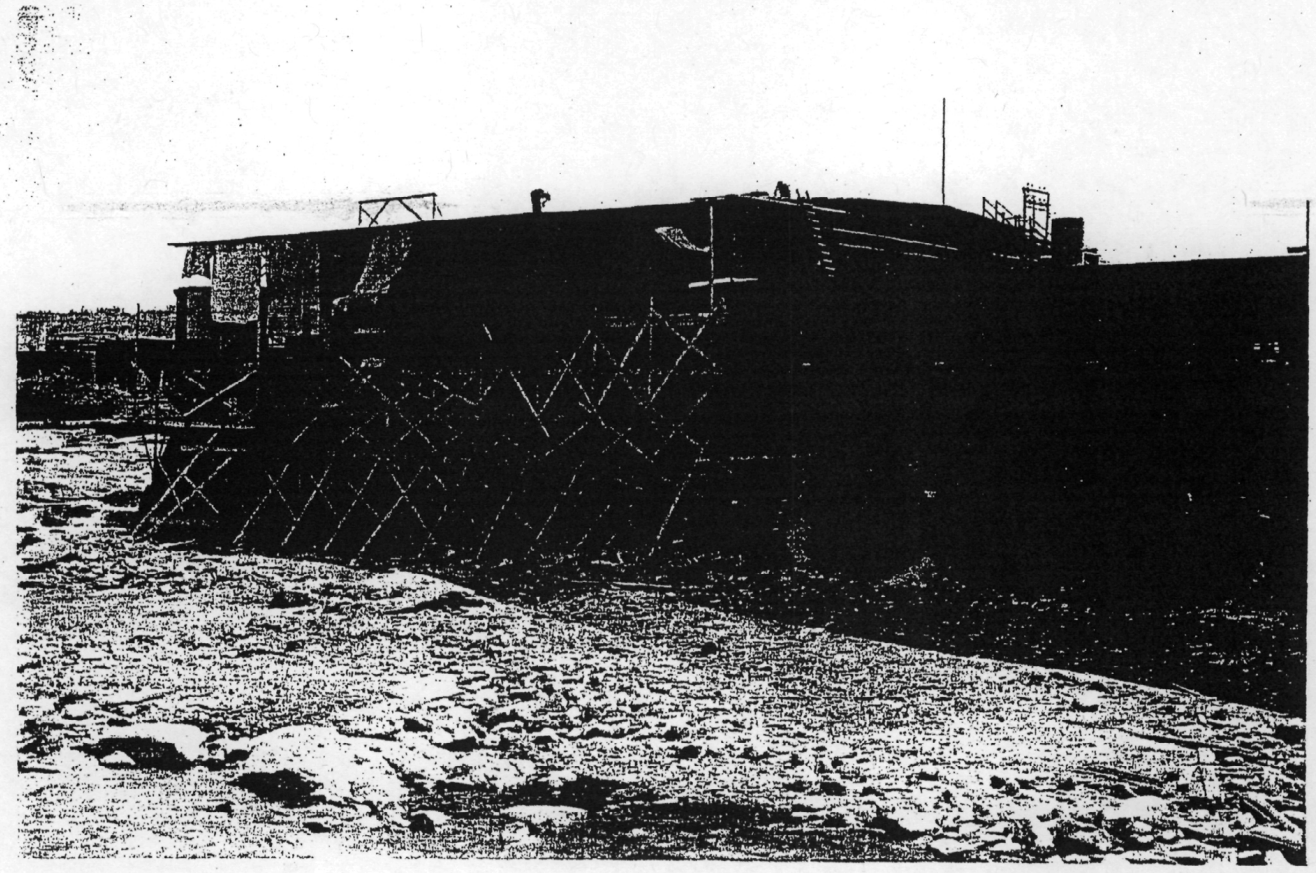


(b)

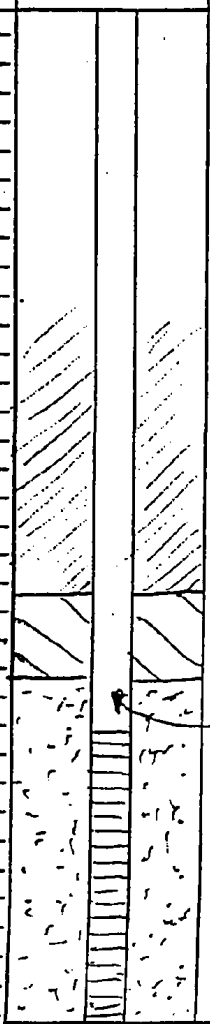
ATTACHMENT B

CHLOR-ALKALI FACILITY (FORMER)

SOIL BORING AND WELL CONSTRUCTION LOGS
WESTON MNH, ON BEHALF OF
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

Borings advanced 1 through 4 and 8 March 2004

WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet 1 of 1	Well ID: MW-11A
	Project: Former Berlin City Hall	Drilling Method: 4¼" HS Auger	
Client: NHDES		Total Well Depth: 25.5	
Date(s) ~~Drilled~~: Installed: 3/3/2004		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness:	
Drill Rig: Truck Rig		Well Construction:	
Drill Foreman:		Static Water Depth:	
Logged by: Angela Vautour		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
			3-foot stickup of 4-inch outer protective casing. SURFACE	
0, 5, 10, 10.5, 13.5, 15, 20, 25, 25.5			cement/bentonite grout; bentonite chips (medium); Sand (#2); 2-inch diameter schedule 40 PVC; 10-foot screen (20-slot) from 15.5–25.5 ft BGS	Screen: 15.5–25.5 ft BGS; Sand: 25.5–13.5 ft BGS; Bentonite: 10.5–13.5 ft BGS
			BEDROCK	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet 1 of 1	Well ID: MW-12
	Project: BERLIN CELL HOUSE	Drilling Method: 4 1/4" HS Auger	
Client: NHDES		Total Well Depth: 18 FT	
Date(s) ~~Drilled~~: Installed: 3/2/2004		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness: 18 FT	
Drill Rig: Truck Rig		Well Construction:	
Drill Foreman:		Static Water Depth:	
Logged by: Angela Hautaur		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
0			SURFACE	
3			2 inch diameter schedule 40 PVC	
5				
6				Sand from 18-6 FT BGS
8			Bentonite Chips (medium) Sand (#2)	Bentonite from 6-3 ft bgs
10			10-FOOT SCREEN (20-slot) FROM	8-18 FT BGS
15				
18			BEDROCK	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	03-MARCH-2004
Drilling Method:	4¼" HS AUGER / 3" SPLIT SPOONS
Total Depth:	10 FT
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	
Remarks:	NO WOOD CHIPS OR POLYETHYLENE LINER AT THIS LOCATION.

Site Id:	
Project Number:	
Project Name:	FORMER BERLIN CELL HOUSE
Location:	MW-16A
Logged By:	JOE SOUNEY
Project Manager:	JOE SCHMIDL
Contractor:	GEOSEARCH / EDI

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) — PID (OVM)	Material Description	USCS Soil Type	Notes (mg/m³) Hg hits
		19/24	1	6/6 4/5	Ø	Top 3" brown, organic; 3"-7" crushed concrete debris; 7"-9" d.brown, f.grained; 9"-15" l.brown, fine-to med sand; 15"-19" d.brown, med.grained		Ø
2		12/24	2	4/4 2/4	Ø	D.Brown, Black Material med.grained w/ trace concrete debris		Ø
4		0/24	/	29/ 120/1-inch	/	NO MATERIAL RECOVERED AUGER REFUSAL → MOVED OVER 18-INCHES		/
5 6		0/24	/	/ /	/	No SPOONS WERE ABLE TO BE COLLECTED FROM ~5-8 FT BGS		/
		19/24	3	29/107 79/120	Ø	Top 5" d.brown, black course sands w/ ½" dia. debris + gravel; BOTTOM fine- to v.fine, well-sorted sands w/ weathered bedrock fragments @ v. bottom.		Ø
10								
	▼							
						ENCOUNTERED WEATHERED BEDROCK @ 10 FT BGS. GOING TO SET OVERBURDEN WELL AT THIS DEPTH.		
15								
						WESTON START sample SO-06 collected from 0FT-2FT BGS BECAUSE THERE IS NO LINER AT THIS LOCATION		
20								
						WESTON START sample SO-07 collected from 8FT-10FT BGS. WEATHERED BEDROCK ENCOUNTERED AT 10FT BGS.		
25								

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WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet 1 of 1	Well ID: MW-16R
	Project: Former Berlin Legal House	Drilling Method: 4 1/2" HS Auger	
Client: NHDES		Total Well Depth: 16 FT	
Date(s) ~~Drilled~~: Installed: 3/3/2024		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness: 10 FT	
Drill Rig: CME 85		Well Construction:	
Drill Foreman: Joe Keegan		Static Water Depth:	
Logged by: Joe Sowney		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
+3			4-inch outer protective casing (5-feet long: 2ft in hole / 3 ft out of hole) SURFACE	No 60-mil. polyethylene liner at this location.
0			cement / bentonite grout	
1			Bentonite chips (medium)	
2			Sand (#2)	
3				
4				
5			2-inch diameter schedule 40-PVC	
6			5-FOOT SCREEN (20-slot)	
8				
10			BEDROCK	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	2/21/00
Drilling Method:	
Total Depth:	
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	

Site Id:	
Project Number:	
Project Name:	Berlin Cell House
Location:	MW-17
Logged By:	A. Vautove
Project Manager:	J. Schmidl
Contractor:	EDI / Geosearch

Remarks: using 2" spoon, blow counts high, due to weight of hammer. drillers were advised by J. Schmidl that they did not have to keep track of blow counts

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm)	Material Description	USCS Soil Type	Notes
		11/24"	1		0.0	0-4': light brown sand, cobbles		refusal @ 4' with auger
			2		0.0	4-5: cobbles, rock - refusal, relocating.		
5		10"/24"	3		0.0	4-6: organic material, f-m light brown sand, brick		
		5"/24"	4		0.0	6-8: brick, dark brown f-m sand.		
		2"/24"	5		0.0	8-10: brick, wood, cement		
10		2"/24"	6		0.0	10-12': wood, yellow fibrous material, rock		
		5"/24"	7		0.0	12-14': dark brown material, trace brick, wood, light brown fine sand, yellow fibrous material.		
15		6"/24"	8		0.0	14-16': dark brown material, wood, brick, m-g gravel, gray m-coarse sand.		
		11/24"				17.5-19.5': saturated brown, m-c sand, trace gravel.		
20								
25								

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WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet / of	Well ID: MW-17
	Project: Former Berlin Cell House	Drilling Method: 4 1/2" HS Auger	
Client: NHDES		Total Well Depth: 17.5 ft	
Date(s) ~~Drilled~~ Installed: 3/4/2024		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness: 17.5 ft	
Drill Rig: Truck		Well Construction:	
Drill Foreman:		Static Water Depth:	
Logged by: Angela Vautour		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
			SURFACE	
0				
2.5			2-inch diameter schedule 40 PVC	
5				Sand from 17.5-5.5 ft bgs
5.5			Bentonite Chips (medium)	bentonite from 2.5-3.5 ft bgs
7.5			Sand (#2)	
10			10-FOOT SCREEN (20-slot) FROM 7.5-17.5 FT BGS	
15				
17.5				
			BEDROCK	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	04-MARCH-2004
Drilling Method:	4¼ HS AUGERS
Total Depth:	
Borehole Dia.:	4"
Static Water Level:	
Ground Surface Elevation:	

Site Id:	
Project Number:	
Project Name:	FORMER BERLIN CELL HOUSE
Location:	MW-21
Logged By:	JOE SOUNEY
Project Manager:	Joe Schmidl
Contractor:	Geosearch / EDI

Remarks:
- BEDROCK AT 8 FT BGS.
- 4" CASING SET TO 12 FT BGS.
- SEE ROCK CORING LOG FOR BEDROCK LOG.

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) → OVM/PID	Material Description	UCS Soil Type	Notes (mg/m³) Hg hits
0						SURFACE		
			/	/	/	WOOD CHIPS	/	
2			/	/	/	FINE-GRAINED SAND (WELL SORTED) - FILL	/	
3	24/24		1	4/9 22/31	Ø	Top 8" f. grained, well sorted sand-fill; 8-16" dark brown-to-black tight med. grained sand/soil w/ some rocks; 16-24" red brick	~~Ø~~ DMS	Ø
5	12/12		2	29/33	Ø	Top 3.5" d. brown-black tight med. grained sand; 3.5"-12" weathered gneiss	~~Ø~~ DMS	Ø
6	24/24		3	17/21 20/120	Ø	Top 5" med. grained sand w/ some brick pieces-tight; 5"-8" tight grey gneiss fragments w/ weathered chlorite + sands; 8"-24" wet, ~~loose~~ DMS black to d. brown, tight medium- to coarse-grained w/ wood at very end.		Ø
8								
10								
	▼					ENCOUNTERED WEATHERED BEDROCK @ 8 FT BGS. WILL ROLLERBIT INTO BEDROCK + SET CASING. 4" CASING SET TO 12 FT BGS (i.e., CASING SET 4 FT INTO BEDROCK)		
15								
20						WESTON START Sample SO-10 collected from 3-5 FT BGS AT 13:45 HOURS. WOOD CHIPS AND SAND FILL FROM 0-3 FT BGS.		
25						WESTON START sample SO-11 collected from 6-8 FT BGS AT 14:20 HOURS.		

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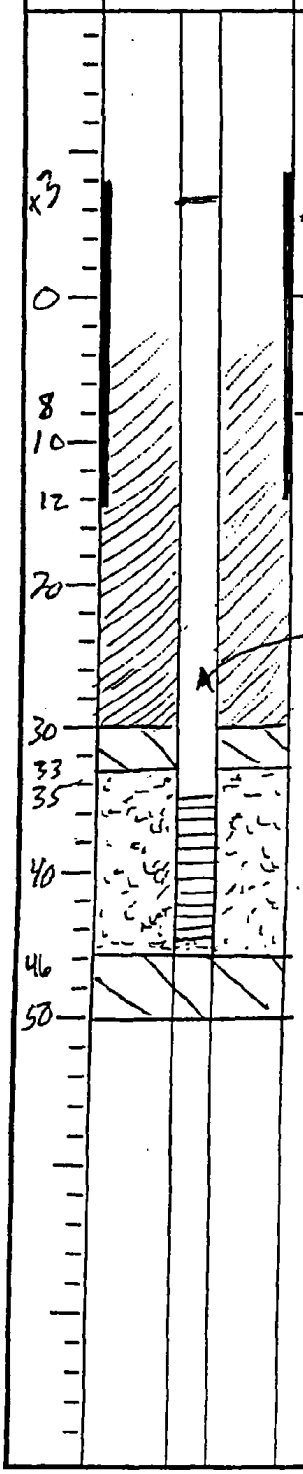
WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet 1 of 1	Well ID: MW-21
	Project: FORMER BERLIN CELL HOUSE	Drilling Method: Wireline HV (Series 10 diamond)	
Client: NHDES		Total Well Depth: 50	
Date(s) ~~Drilled~~ Installed: 3/12/2004		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness: 8 FT / Casing set to 12 ft bgs	
Drill Rig: ~~Truck Rig~~ CME 85		Well Construction:	
Drill Foreman: Joe Keenan		Static Water Depth:	
Logged by: Joe Sinney		Depth to Groundwater:	



Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
			4-inch outer protective casing set to 12 ft bgs	
x3			SURFACE	
0			LANDFILL / OVERBURDEN	
8				
10			BEDROCK	
12				
20			2-inch diameter Schedule 40 PVC	
30			10-FOOT SCREEN (20-slot) from 35-45 ft bgs	
33				
35				
40			cement / bentonite grout	
46			bentonite chips (medium)	
50			Sand (#2)	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON SOLUTIONS	ROCK CORING LOG	Sheet 1 of 4	Boring No.: MW-21
	Project: Former Berlin Gas House	Coring Method: Wireline HQ (3 7/8" Series 10 diamond)	
Client: NHDES		Total Core Interval: 12.4 – 52'	
Date(s) Cored: March 08, 09, 2004		Core Angle: Vertical	
Drilling Contractor: Geosearch / EDI		Ground Elevation:	
Drill Rig: CME 85		No. of Core Boxes: 3	
Drill Foreman: Joe Keenan		Overburden Thickness: 8 ft; casing down to 12 ft bgs	
Logged by: Joe Souney		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Recovery RQD	Core Time (min/ft)	Descriptive Log	Remarks
12.4		Rec = 100% RQD = 93%	Core times unknown	■ Fine- to Medium-Grained Layered Gneiss	Core Run 1 (60-inches) (12.4 - 15 ft BGS) Box 1 — 3/8/2004
13				Horizontal hairline fracture (not filled)	No Hits on run w/ Jerome mercury meter
14				red + brown staining (hematite?) on fracture faces -- very distinct -- water-bearing fracture.	Truck Rig drilled this run
15					
		Rec = 100% RQD = 74%		probable mineralization (although more brown than red)	Core Run 2 (60-inches) (15-20 ft BGS) Box 2 — 3/8/2004
16			3 min		No hits on run w/ Jerome mercury meter
				■ Fine- to Medium-Grained Gneiss w/ greater abundance of feldspar (plagioclase), qtz, and chlorite than previous run. (many plagioclase + qtz veins)	ATV rig now drilling this hole.
17			3 min		
18			5 min		
19			5 min		Lost 50-Gallons H_2O today
20			8 min		— End 3/8/2004 —
		Rec = 103% RQD = 75%		■ Fine- to Medium-Grained Gneiss	Core Run 3 (62-inches) (20 - 25 ft BGS) Box 1 + 2 — 3/9/2004
				45° Angle Fracture	
21			5 min	■ This run is more rich w/ K-spar than previous runs. Also lots of plagioclase feldspar	No hits on run w/ Jerome mercury meter
22			4 min		

Legend: J-Joint, F-Fault, B-Bedding, C-Contact, D-Drilling Break, M-Mineralized Zone, WX-Weathering Zone

WESTON SOLUTIONS	ROCK CORING LOG	Sheet 2 of 4	Boring No.: MW-21
	Project: Berlin Lee House	Coring Method:	
Client: NHDES		Total Core Interval: 12.4 – 50	
Date(s) Cored: March 08-09, 2004		Core Angle: VERTICAL	
Drilling Contractor: Geosearch / EDI		Ground Elevation:	
Drill Rig: CME 85		No. of Core Boxes: 3	
Drill Foreman: Joe Keenan		Overburden Thickness: 8 ft; casing down to 12 ft bgs	
Logged by: Joe Sorey		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Recovery RQD	Core Time (min/ft)	Descriptive Log	Remarks
23			4 min	vugs minor Fe/red-brown staining on fracture faces vugs and 45° hairline fracture	CORE RUN 3 (62 inches) (20-25 FT BGS) 3/9/2004 No hits on rm w/ Jerome mercury meter.
24			3 min	* zone w/ vugs is rich in K-spar	
25			4 min		
26		Rec= 97% RQD = 75%	4 min	■ fine- to medium-grained well-layered gneiss. (no plagioclase + qtz veins like in core run 2 + 3).	CORE RUN 4 (58-inches) (25-30 FT BGS) 3/9/2004 Box 2 No hits on rm w/ Jerome Mercury meter.
27			4 min		
28			7 min		
29			7 min		
30			4 min.	continued w/ drillers tape that we are @ 30 ft bgs	– lost 200-gallons H_2O thus far today –
31		Rec= 101% RQD= 98%	7 min.	■ fine- to medium-grained layered gneiss. core very homogeneous throughout entire run. This run took the longest to drill so far ■ No plagioclase, qtz veins.	CORE RUN 5 (61-inches) (30-35 FT BGS) 3/9/2004 Box 2 No hits on rm w/ Jerome Mercury meter.
32			8 min		

Legend: J-Joint, F-Fault, B-Bedding, C-Contact, D-Drilling Break, M-Mineralized Zone, WX-Weathering Zone

WESTON SOLUTIONS	ROCK CORING LOG	Sheet 3 of 4	Boring No.: MW-21
	Project: Berlin Cell House	Coring Method: Wireline HV (3 1/8" series 10 diamond)	
Client: NHDES		Total Core Interval: 12.4 – 50	
Date(s) Cored: March 08 & 09, 2004		Core Angle: Vertical	
Drilling Contractor: Geosearch / EDI		Ground Elevation:	
Drill Rig: CME 85		No. of Core Boxes: 3	
Drill Foreman: Joe Keenan		Overburden Thickness: 8 ft; casing down to 12 ft bgs	
Logged by: Joe Sowney		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Recovery RQD	Core Time (min/ft)	Descriptive Log	Remarks	
				(See description for core run 5 on previous page)	CORE RUN 5 (61 inches) (30–35 FT BGS)	3/9/2004
33			8 min		No hits on run w/ Jerome Mercury meter.	
34			14 min			
			11 min		H_2O Truck had to refill H_2O tank	
35						3/9/2004
35	D	Rec = 98%		Fine- to Medium-Grained Gneiss	CORE RUN 6 (58.5 inches) (35–40 FT BGS)	
36		RQD = 100%	3 min		Box 2 + 3	
					No hits on run w/ Jerome Mercury meter.	
37			3 min			
				light tan-yellowish mineralization (?) on bottom fracture face (nothing on top fracture face but pieces don't fit perfectly together)		
38	D		3 min	feldspar + chlorite-rich zone		
39	D		4 min			
				partially open 45° hairline fracture		
				more chlorite-rich		
40	D		4 min			
	D	Rec = 98%		Fine- to Medium-grained gneiss	CORE RUN 7 (58.5 inches) (40–45 FT BGS)	3/9/2004
	D			small rock fragments and wedges		
41	D	RQD = 95%	4 min		Box 3	
					No hits on run w/ Jerome Mercury meter.	
42			4 min			

Legend: J-Joint, F-Fault, B-Bedding, C-Contact, D-Drilling Break, M-Mineralized Zone, WX-Weathering Zone

WESTON SOLUTIONS	ROCK CORING LOG	Sheet 4 of 4	Boring No.: MW-21
	Project: BERLIN CELL HOUSE	Coring Method: Wireline HV (3 3/8" series 10 diamond)	
Client: NHDES		Total Core Interval: 12.4 - 50	
Date(s) Cored: MARCH 08/09, 2004		Core Angle: Vertical	
Drilling Contractor: Geosearch / EDI		Ground Elevation:	
Drill Rig: CME 85		No. of Core Boxes: 3	
Drill Foreman: Joe Keenan		Overburden Thickness: 8 ft; casing down to 12 ft bgs	
Logged by: Joe Sowney		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Recovery RQD	Core Time (min/ft)	Descriptive Log	Remarks	
				Fine- to medium-grained gneiss	CORE RUN 7 (58.5 inches) (40-45 FT BGS)	3/9/2004
43			7 min		Box 3	
					No hits on run w/ Jerome mercury meter.	
	D			rock fragments		
44	D		6 min			
45	D		6 min			
		Rec = 100%		Fine- to Medium-Grained Gneiss. Competent throughout.	CORE RUN 8 (60-inches)	3/9/2004
46	D	RQD = 93%	8 min		Box 3	
	D					
	D					
47			3 min			
48			3 min			
	D					
49	D		3 min			
	D				-Lost 350 gallons total today-	
50			3 min		-END 3/9/2004 -	
				END OF BEDROCK CORE		

Legend: J-Joint, F-Fault, B-Bedding, C-Contact, D-Drilling Break, M-Mineralized Zone, WX-Weathering Zone

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	2/3/03
Drilling Method:	
Total Depth:	
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	

Site Id: MW-22	Project Number:
Project Name: Berlin Well House	
Location: MW-22	
Logged By: A. Van Houe	
Project Manager: J. Schmidl	
Contractor: EDI / Geosearch	

Remarks: Using 3" spoon, blow counts extremely high, due to weight of hammer. Drillers were advised by J. Schmidl that they did not need to keep track of counts when using 3" spoon.

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm)	Material Description	UCS Soil Type	Notes
		4/24	1		0.0	Road material, large rocks, gravel, trace brick		
		1/24	2		0.0	Slough from previous spoon.		
5		17/24	3		0.0	dark brown, m-c sand, trace gravel, piece of lime		
		24/24	4		0.0	m-c brown sand, trace gravel		
		3/24	5		0.0	dark brown, m-c sand, subrounded gravel		
10								
		14/24	6		0.0	saturated, m-c brown sand, m-gravel		
		12/24	7		0.0	Saturated, dark brown m-c sand, m. gravel		
15		12/24	8		0.0	f-m dark brown sand, few cobbles, piece of wood		
		4/24	9			Saturated dark brown sand, rock		
20								
25								

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WESTON SOLUTIONS	WELL CONSTRUCTION LOG	Sheet 1 of 1	Well ID: MW-22
	Project: Berlin Cell House	Drilling Method: 4 1/4" HS Auger	
Client: NHDES		Total Well Depth: 18.5 ft	
Date(s) ~~Drilled~~: Installed: 3/3/2024		Ground Elevation:	
Drilling Contractor: Geosearch / EDI		Overburden Thickness: 18.5 ft	
Drill Rig: Truck		Well Construction:	
Drill Foreman:		Static Water Depth:	
Logged by: Angela Vautour		Depth to Groundwater:	

Depth (ft bgs)	Graphic Log	Features	Descriptive Log	Remarks
			SURFACE	
0				
3.5			2-inch diameter schedule 40 PVC	Sand 18.5-6.5 FT BGS
5			Bentonite Chips (medium)	Bentonite 3.5-6.5 FT BGS
6.5			Sand (#2)	
8.5				
10			10-FOOT SCREEN (20-slot) FROM	8.5-18.5 FT BGS
15				
18.5				
			BEDROCK	

Legend: F-Fracture, C-Contact, M-Mineralized Zone, WX-Weathered Zone

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled: 08-MARCH-2004
Drilling Method: 3-INCH SPLIT SPOON
Total Depth: 5.5 ft
Borehole Dia.:
Static Water Level:
Ground Surface Elevation:

Site Id:
Project Number:

Project Name: FORMER BERLIN GELL HOUSE
Location: SB-01 (WESTON START ID: SO-16)
Logged By: JOE SOWNEY
Project Manager: JOSEPH SCHMOL
Contractor: GEOSEARCH / EDI

Remarks:
- Bedrock AT ~5.5 FT BGS
- NOT Enough sample volume to collect 2 samples. Authorized by START to collect 1 sample.
- Sample collected (SO-16) at 12:30

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) → OVM/PID	Material Description	USCS Soil Type	Hg Hits (ng/m³) Notes
		13/24	1	3/7 7/9	Ø	Top 6-inches: Black, med.- to fine-grained coal tar material Bottom 7-inches: woody material		Ø
2		24/24	2	1/1 1/1	Ø	Top 5-inches: Black, med.- to fine-grained coal tar Bottom 19-inches: woody material again } 5-foot spoon		Ø
4 5		0/2	3	1/100	Ø	No recovery except for bedrock fragments lodged in nose-cone of spoon.		Ø
			BEDROCK			BEDROCK		
10								
15								
20								
25								

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	08-MARCH-2004
Drilling Method:	3-inch split spoon
Total Depth:	4 ft
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	

Site Id:

Project Number:

Project Name: FORMER BERLIN CELC HOUSE

Location: SB-02 (WESTON START ID: SO-18)

Logged By: JOE SOWNEY

Project Manager: JOSEPH SCHMOC

Contractor: Geosearch / EDI

Remarks:
- BEDROCK AT 4-FT BGS
- SAMPLE SO-18 COLLECTED AT 13:45
- ALSO COLLECTED SO-17 DUPLICATE SAMPLE (AT 13:45)

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) OVM/PID	Material Description	USCS Soil Type	Hg Hits (ug/m3) Notes
		22/24	1	weight of hammer 2 / 4/6	Ø	Top 13 inches: Black, med.-to fine-grained coal tar material. Bottom 9 inches: Brown, tight but wet, fine-to med. grained sand		Ø
2		24/24	2	3/3 / 7/50 4"	Ø	Brown, tight but wet, fine-to med. grained sand. Bedrock lodged into nose-cone of split spoon		Ø
4								
5			BEDROCK			BEDROCK		
10								
15								
20								
25								

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	08-MARCH-2004
Drilling Method:	3-inch split spoon
Total Depth:	
Borehole Dia.:	
Static Water Level:	
Site Id:	
Project Number:	
Ground Surface Elevation:	
Project Name:	FORMER BERLIN CERC HAGE
Location:	SB-03 (WESTON START ID: SO-19)
Logged By:	Joe Sewney
Project Manager:	Joseph Schmidt
Contractor:	Geosearch / GDI

Remarks:
- BEDROCK AT 4 FT BGS
- COLLECTED SAMPLE SO-19 AT 14:45.

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) OVM/PID	Material Description	UCS Soil Type	Hg Hits (mg/m³) Notes
		24/24	1	1/1	Ø	Top 16-inches: Black, med- to fine-grained coal tar material		Ø
2				2/3	Ø	Bottom 4-inches: woody-peat layer		
		16/24	2	3/7	Ø	Top 13-inches: woody-peat layer		Ø
4				50 in 4"		Bottom 3-inches: Bedrock		
5			BEDROCK			BEDROCK		
10								
15								
20								
25								

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	08-MARCH-2004
Drilling Method:	3-inch split spoon
Total Depth:	9 ft
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	

Site Id:

Project Number:

Project Name: Former Berlin Cell House

Location: SB-04 (WESTON START ID: SO-20)

Logged By: Joe Sowney

Project Manager: Joseph Schmidt

Contractor: GEOSEARCH / EDI

Remarks:
- BEDROCK AT 9 FT BGS
- SAMPLE SO-20 COLLECTED AT 13:00

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) → OVM/PID	Material Description	UCS Soil Type	Hg Hits (mg/m³) Notes
		9/24	1	2/1	Ø	Top 3-inches: wood chips		Ø
2				1/1		Bottom 6-inches: Black, med- to fine-grained coal tar material		
		9/24	2	1/1	Ø	Top 4-inches: Black, med- to fine-grained coal tar material		Ø
4				2/2		Bottom 5-inches: wood chips again		
5		9/24	3	1/3	Ø	Top 6-inches: wood chips		Ø
6				3/5		Bottom 3-inches: Black, wet, loose peat layer w/ straw	natural odor	
		15/24	4	3/4	Ø	Black, wet, loose peat layer w/ straw	natural odor	Ø
8				3/3				
9		0/12	5	32/12	Ø	Black, wet, loose peat layer w/ straw	natural odor	Ø
10			BEDROCK			BEDROCK		
15								
20								
25								

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled:	28-MARCH-2004
Drilling Method:	3-inch split spoon
Total Depth:	4-ft
Borehole Dia.:	
Static Water Level:	
Ground Surface Elevation:	

Site Id:	
Project Number:	
Project Name:	FORMER BERLIN CEDL HOUSE
Location:	SB-05 (WESTON START ID: SO-21)
Logged By:	JOE SOUNEY
Project Manager:	JOSEPH SCHMIDL
Contractor:	Geosearch / EDI

Remarks:
- ☐ BEDROCK AT 4-FT BGS
- ☐ COLLECTED SAMPLE SO-21 AT 15:15
- ☐ MS/MSD COLLECTED
- ☐ Had to move rig forward 6-inches & drive another 3-inch spoon from 0-2 ft bgs to get enough sample volume for MS/MSD

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) → OVM/PID	Material Description	UCS Soil Type	Hg Hits (ug/m3) Notes
		18/24	1	1/1	Ø	0-4 inches: wood chips; 4-14 inches: Black, med.- to fine-grained coal tar material; 14-18 inches: woody-peat-like material ↑		Ø
2				1/1				
		15/24	2	2/2	Ø	1-3 inches: Black, med.- to fine-grained coal tar material		Ø
4				3/7		3-5 inches: woody, peat-like material ↑		
5			BEDROCK			Bedrock		
10								
	▼							
15								
20								
25								

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WESTON
MANAGERS DESIGNERS/CONSULTANTS

Date Drilled: 08-MARCH-2004
Drilling Method: 3-inch split spoon
Total Depth:
Borehole Dia.:
Static Water Level:
Ground Surface Elevation:

Site Id:
Project Number:

Project Name: FORMER BERLIN CELL HOUSE
Location: SB-06 (WESTON START ID: SO-22)
Logged By: JOE SOUNEY
Project Manager: JOSEPH SCHMIDL
Contractor: Geosearch / EDI

Remarks:
- BEDROCK AT 5-FT BGS
- SAMPLE SO-22 COLLECTED AT 14:20.

Depth (ft)	Water Level	Recovery (in/in)	Sample No.	Blow Count	Headspace (ppm) → OVM/PID	Material Description	UCS Soil Type	Hg Hits (mg/m³) Notes
2		17/24	1	1/1	Ø	Top 1-inch: wood chips; 2-7 inches Black, med.- to f. grained coal tar material		Ø
				5/6		7-8 inches: Brown, tight, fine- to med-grained sand; 8-17 inch		
		22/24	2	3/3	Ø	overspoon: Top 2 inches: Black, med.- to fine-grained coal tar material		Ø
				Skip				
5				50 for 4 inches		Bottom 20 inches woody / wood chip material — Peat-like		
			BEDROCK			BEDROCK		
10								
	▼							
15								
20								
25								

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ATTACHMENT C

CHLOR-ALKALI FACILITY (FORMER)

SOIL/SOURCE SAMPLE ANALYTICAL RESULTS
START

Samples collected 1 through 4 and 8 March 2004

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or SQL.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the SQL or the adjusted SQL.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated SQL.
EB	=	The compound was identified in an aqueous EB that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous TB that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous BB that was used to assess field contamination associated with soil/sediment samples.

DATA SUMMARY KEY
INORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The result is rejected due to gross deficiencies in quality control criteria. The result is unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
U	=	The compound was analyzed for but not detected. The associated numerical value is the SDL or the adjusted SDL.
UJ	=	The compound was analyzed for but not detected. The associated numerical value is the estimated SDL.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 2
VOLATILE SOIL ANALYSES - MEDIUM LEVEL
µg/kg

SAMPLE NUMBER:		D14427	D14453
SAMPLE LOCATION:		SO-01	BLK-02
LABORATORY NUMBER:		04030822	04030843
COMPOUND	CRQL		
Dichlorodifluoromethane	1300	R	R
Chloromethane	1300	R	R
Vinyl Chloride	1300	R	R
Bromomethane	1300	R	R
Chloroethane	1300	R	R
Trichlorofluoromethane	1300	R	R
1,1-Dichloroethene	1300	R	R
1,1,2-Trichloro-1,2,2-trifluoroethane	1300	R	R
Acetone	1300	R	R
Carbon Disulfide	1300	R	R
Methyl Acetate	1300	R	R
Methylene Chloride	1300	R	R
trans-1,2-Dichloroethene	1300	R	R
Methyl tert-Butyl Ether	1300	R	R
1,1-Dichloroethane	1300	R	R
cis-1,2-Dichloroethene	1300	R	R
2-Butanone	1300	R	2200 J
Chloroform	1300	R	R
1,1,1-Trichloroethane	1300	R	R
Cyclohexane	1300	R	R
Carbon Tetrachloride	1300	R	R
Benzene	1300	R	R
1,2-Dichloroethane	1300	R	R
Trichloroethene	1300	R	R
Methylcyclohexane	1300	R	R
1,2-Dichloropropane	1300	R	R
Bromodichloromethane	1300	R	R
cis-1,3-Dichloropropene	1300	R	R
4-Methyl-2-Pentanone	1300	R	R
Toluene	1300	R	R
trans-1,3-Dichloropropene	1300	R	R
1,1,2-Trichloroethane	1300	R	R
Tetrachloroethene	1300	R	R
2-Hexanone	1300	R	R
Dibromochloromethane	1300	R	R
1,2-Dibromoethane	1300	R	R
Chlorobenzene	1300	R	R
Ethylbenzene	1300	R	R
Xylene (Total)	1300	R	R
Styrene	1300	R	R
Bromoform	1300	R	R
Isopropylbenzene	1300	R	R
1,1,2,2-Tetrachloroethane	1300	R	R
1,3-Dichlorobenzene	1300	R	R
1,4-Dichlorobenzene	1300	R	R
1,2-Dichlorobenzene	1300	R	R
1,2-Dibromo-3-chloropropane	1300	R	R
1,2,4-Trichlorobenzene	1300	R	R
DILUTION FACTOR:		1.0	1.0
DATE SAMPLED:		03/03/04	03/01/04
DATE ANALYZED:		03/16/04	03/16/04
% MOISTURE:		85	NA

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 1
VOLATILE SOIL ANALYSES - LOW LEVEL
µg/kg

SAMPLE NUMBER:		D14428	D14429	D14430	D14431	D14432
SAMPLE LOCATION:		SO-02	SO-03	SO-04	SO-05	SO-06
LABORATORY NUMBER:		04030823	04030824	04030825	04030826	04030827
COMPOUND	CRQL					
Dichlorodifluoromethane	10	R	R	R	R	R
Chloromethane	10	R	R	R	R	R
Vinyl Chloride	10	R	R	R	R	R
Bromomethane	10	R	R	R	R	R
Chloroethane	10	R	R	R	R	R
Trichlorofluoromethane	10	R	R	R	R	R
1,1-Dichloroethene	10	R	R	R	R	R
1,1,2-Trichloro-1,2,2-trifluoroethane	10	R	R	R	R	R
Acetone	10	15 J EB	R	R	14 J EB	*2000 J EB
Carbon Disulfide	10	3 J	R	R	R	6 J
Methyl Acetate	10	R	R	4 J	R	R
Methylene Chloride	10	R	R	R	R	R
trans-1,2-Dichloroethene	10	R	R	R	R	R
Methyl tert-Butyl Ether	10	R	R	R	R	R
1,1-Dichloroethane	10	R	R	R	R	R
cis-1,2-Dichloroethene	10	R	R	R	R	R
2-Butanone	10	3 J	R	R	R	6 J
Chloroform	10	6 J	R	59 J	R	60 J
1,1,1-Trichloroethane	10	R	R	R	R	R
Cyclohexane	10	R	R	R	R	R
Carbon Tetrachloride	10	R	R	R	R	R
Benzene	10	R	R	3 J	R	16 J
1,2-Dichloroethane	10	R	R	R	R	R
Trichloroethene	10	R	R	4 J	R	R
Methylcyclohexane	10	R	R	R	R	R
1,2-Dichloropropane	10	R	R	R	R	R
Bromodichloromethane	10	R	R	R	R	R
cis-1,3-Dichloropropene	10	R	R	R	R	R
4-Methyl-2-Pentanone	10	R	R	R	R	R
Toluene	10	R	R	R	R	R
trans-1,3-Dichloropropene	10	R	R	R	R	R
1,1,2-Trichloroethane	10	R	R	R	R	R
Tetrachloroethene	10	1 J	1 J	67 J	R	5 J
2-Hexanone	10	R	R	R	R	R
Dibromochloromethane	10	R	R	R	R	R
1,2-Dibromoethane	10	R	R	R	R	R
Chlorobenzene	10	R	R	R	R	R
Ethylbenzene	10	R	R	R	R	R
Xylene (Total)	10	R	R	R	R	R
Styrene	10	R	R	R	R	R
Bromoform	10	R	R	R	R	R
Isopropylbenzene	10	R	R	R	R	R
1,1,2,2-Tetrachloroethane	10	R	R	R	R	R
1,3-Dichlorobenzene	10	R	R	R	R	R
1,4-Dichlorobenzene	10	R	R	R	R	R
1,2-Dichlorobenzene	10	R	R	R	R	R
1,2-Dibromo-3-chloropropane	10	R	R	R	R	R
1,2,4-Trichlorobenzene	10	R	R	R	R	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/03/04	03/01/04	03/04/04	03/02/04	03/03/04
DATE ANALYZED:		03/15/04	03/15/04	03/15/04	03/16/04	03/16/04
% MOISTURE:		13	15	18	9	12

* - Result reported from medium level analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 1
VOLATILE SOIL ANALYSES - LOW LEVEL
µg/kg

SAMPLE NUMBER:		D14433	D14434	D14435	D14436	D14437
SAMPLE LOCATION:		SO-07	SO-08	SO-09	SO-10	SO-11
LABORATORY NUMBER:		04030828	04030829	04030830	04030831	04030832
COMPOUND	CRQL					
Dichlorodifluoromethane	10	R	R	R	R	R
Chloromethane	10	R	R	R	R	R
Vinyl Chloride	10	R	R	R	R	R
Bromomethane	10	R	R	R	R	R
Chloroethane	10	R	R	R	R	R
Trichlorofluoromethane	10	R	R	R	R	R
1,1-Dichloroethene	10	R	R	R	R	R
1,1,2-Trichloro-1,2,2-trifluoroethane	10	R	R	R	R	R
Acetone	10	17 J EB	17 J EB	360 J EB	190 J EB	R
Carbon Disulfide	10	R	R	R	1 J	R
Methyl Acetate	10	R	R	R	R	R
Methylene Chloride	10	R	R	R	R	R
trans-1,2-Dichloroethene	10	R	R	R	R	R
Methyl tert-Butyl Ether	10	R	R	R	R	R
1,1-Dichloroethane	10	R	R	R	R	R
cis-1,2-Dichloroethene	10	R	R	R	R	R
2-Butanone	10	R	R	R	11 J	R
Chloroform	10	R	110 J	4 J	*530 J	72 J
1,1,1-Trichloroethane	10	R	R	R	R	R
Cyclohexane	10	R	R	R	R	R
Carbon Tetrachloride	10	R	6 J	R	51 J	6 J
Benzene	10	R	8 J	R	R	R
1,2-Dichloroethane	10	R	R	R	R	R
Trichloroethene	10	R	11 J	2 J	R	R
Methylcyclohexane	10	R	R	R	R	R
1,2-Dichloropropane	10	R	R	R	R	R
Bromodichloromethane	10	R	R	R	R	R
cis-1,3-Dichloropropene	10	R	R	R	R	R
4-Methyl-2-Pentanone	10	R	R	R	R	R
Toluene	10	R	R	R	R	R
trans-1,3-Dichloropropene	10	R	R	R	R	R
1,1,2-Trichloroethane	10	R	R	R	R	R
Tetrachloroethene	10	R	140 J	3 J	R	R
2-Hexanone	10	R	R	R	R	R
Dibromochloromethane	10	R	R	R	R	R
1,2-Dibromoethane	10	R	R	R	R	R
Chlorobenzene	10	R	R	R	R	R
Ethylbenzene	10	R	R	R	R	R
Xylene (Total)	10	R	R	R	R	R
Styrene	10	R	R	R	R	R
Bromoform	10	R	R	R	R	R
Isopropylbenzene	10	R	R	R	R	R
1,1,2,2-Tetrachloroethane	10	R	R	R	R	R
1,3-Dichlorobenzene	10	R	R	R	R	R
1,4-Dichlorobenzene	10	R	R	R	R	R
1,2-Dichlorobenzene	10	R	R	R	R	R
1,2-Dibromo-3-chloropropane	10	R	R	R	R	R
1,2,4-Trichlorobenzene	10	R	R	R	R	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/03/04	03/04/04	03/04/04	03/04/04	03/04/04
DATE ANALYZED:		03/16/04	03/16/04	03/16/04	03/16/04	03/16/04
% MOISTURE:		8	19	25	13	17

* - Result reported from medium level analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 1
VOLATILE SOIL ANALYSES - LOW LEVEL
µg/kg

SAMPLE NUMBER:		D14438	D14439	D14440	D14441	D14442
SAMPLE LOCATION:		SO-12	SO-13	SO-14	SO-15	SO-16
LABORATORY NUMBER:		04030833	04030834	04030835	04030836	04030854RE
COMPOUND	CRQL					
Dichlorodifluoromethane	10	R	R	R	R	10 U
Chloromethane	10	R	R	R	R	10 U
Vinyl Chloride	10	R	R	R	R	10 U
Bromomethane	10	R	R	R	R	10 U
Chloroethane	10	R	R	R	R	10 U
Trichlorofluoromethane	10	R	R	R	R	10 U
1,1-Dichloroethene	10	R	R	R	R	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	10	R	R	R	R	10 U
Acetone	10	18 J EB	R	760 J EB	31 J EB	32 EB
Carbon Disulfide	10	R	R	R	2 J	10 U
Methyl Acetate	10	R	R	R	R	10 UJ
Methylene Chloride	10	R	R	R	R	10 U
trans-1,2-Dichloroethene	10	R	R	R	R	10 U
Methyl tert-Butyl Ether	10	R	R	R	R	10 U
1,1-Dichloroethane	10	R	R	R	R	10 U
cis-1,2-Dichloroethene	10	R	R	R	R	10 U
2-Butanone	10	3 J	R	4 J	R	10 U
Chloroform	10	3 J	R	46 J	1 J	4 J
1,1,1-Trichloroethane	10	R	R	R	R	10 U
Cyclohexane	10	R	R	R	R	10 U
Carbon Tetrachloride	10	R	R	1 J	R	10 U
Benzene	10	R	R	1 J	R	10 U
1,2-Dichloroethane	10	R	R	R	R	10 U
Trichloroethene	10	R	R	R	R	10 U
Methylcyclohexane	10	R	R	R	R	10 U
1,2-Dichloropropane	10	R	R	R	R	10 U
Bromodichloromethane	10	R	R	R	R	10 U
cis-1,3-Dichloropropene	10	R	R	R	R	10 U
4-Methyl-2-Pentanone	10	R	R	R	R	10 UJ
Toluene	10	R	R	R	R	10 UJ
trans-1,3-Dichloropropene	10	R	R	R	R	10 U
1,1,2-Trichloroethane	10	R	R	R	R	10 U
Tetrachloroethene	10	R	R	2 J	R	10 UJ
2-Hexanone	10	R	R	R	R	10 UJ
Dibromochloromethane	10	R	R	R	R	10 U
1,2-Dibromoethane	10	R	R	R	R	10 UJ
Chlorobenzene	10	R	R	R	R	10 UJ
Ethylbenzene	10	R	R	R	R	10 UJ
Xylene (Total)	10	R	R	R	R	10 UJ
Styrene	10	R	R	R	R	10 UJ
Bromoform	10	R	R	R	R	10 U
Isopropylbenzene	10	R	R	R	R	10 UJ
1,1,2,2-Tetrachloroethane	10	R	R	R	R	10 UJ
1,3-Dichlorobenzene	10	R	R	R	R	10 UJ
1,4-Dichlorobenzene	10	R	R	R	R	10 UJ
1,2-Dichlorobenzene	10	R	R	R	R	10 UJ
1,2-Dibromo-3-chloropropane	10	R	R	R	R	10 UJ
1,2,4-Trichlorobenzene	10	R	R	R	R	10 UJ
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/03/04	03/03/04	03/01/04	03/02/04	03/08/04
DATE ANALYZED:		03/16/04	03/16/04	03/16/04	03/16/04	03/18/04
% MOISTURE:		16	17	10	17	31

* - Result reported from medium level analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 1
VOLATILE SOIL ANALYSES - LOW LEVEL
µg/kg

SAMPLE NUMBER:	D14452
SAMPLE LOCATION:	BLK-01
LABORATORY NUMBER:	04030842

COMPOUND	CRQL		
Dichlorodifluoromethane	10		R
Chloromethane	10		R
Vinyl Chloride	10		R
Bromomethane	10		R
Chloroethane	10		R
Trichlorofluoromethane	10		R
1,1-Dichloroethene	10		R
1,1,2-Trichloro-1,2,2-trifluoroethane	10		R
Acetone	10	3	J
Carbon Disulfide	10		R
Methyl Acetate	10		R
Methylene Chloride	10		R
trans-1,2-Dichloroethene	10		R
Methyl tert-Butyl Ether	10		R
1,1-Dichloroethane	10		R
cis-1,2-Dichloroethene	10		R
2-Butanone	10		R
Chloroform	10		R
1,1,1-Trichloroethane	10		R
Cyclohexane	10		R
Carbon Tetrachloride	10		R
Benzene	10		R
1,2-Dichloroethane	10		R
Trichloroethene	10		R
Methylcyclohexane	10		R
1,2-Dichloropropane	10		R
Bromodichloromethane	10		R
cis-1,3-Dichloropropene	10		R
4-Methyl-2-Pentanone	10		R
Toluene	10		R
trans-1,3-Dichloropropene	10		R
1,1,2-Trichloroethane	10		R
Tetrachloroethene	10		R
2-Hexanone	10		R
Dibromochloromethane	10		R
1,2-Dibromoethane	10		R
Chlorobenzene	10		R
Ethylbenzene	10		R
Xylene (Total)	10		R
Styrene	10		R
Bromoform	10		R
Isopropylbenzene	10		R
1,1,2,2-Tetrachloroethane	10		R
1,3-Dichlorobenzene	10		R
1,4-Dichlorobenzene	10		R
1,2-Dichlorobenzene	10		R
1,2-Dibromo-3-chloropropane	10		R
1,2,4-Trichlorobenzene	10		R

DILUTION FACTOR:	1.0
DATE SAMPLED:	03/01/04
DATE ANALYZED:	03/16/04
% MOISTURE:	NA

* - Result reported from medium level analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 3
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:		D14444	D14445	D14446	D14447	D14448
SAMPLE LOCATION:		Rig-01	RB-01	RB-02	RB-03	RB-04
LABORATORY NUMBER:		04030837	04030838	04030839	04030840	04030841
COMPOUND	CRQL					
Dichlorodifluoromethane	10	R	R	R	R	R
Chloromethane	10	R	R	R	R	R
Vinyl Chloride	10	R	R	R	R	R
Bromomethane	10	R	R	R	R	R
Chloroethane	10	R	R	R	R	R
Trichlorofluoromethane	10	R	R	R	R	R
1,1-Dichloroethene	10	R	R	R	R	R
1,1,2-Trichloro-1,2,2-trifluoroethane	10	R	R	R	R	R
Acetone	10	R	R	R	R	17 J
Carbon Disulfide	10	R	R	R	R	R
Methyl Acetate	10	R	R	R	R	R
Methylene Chloride	10	R	R	R	R	R
trans-1,2-Dichloroethene	10	R	R	R	R	R
Methyl tert-Butyl Ether	10	R	R	R	R	R
1,1-Dichloroethane	10	R	R	R	R	R
cis-1,2-Dichloroethene	10	R	R	R	R	R
2-Butanone	10	R	R	R	R	R
Chloroform	10	R	R	R	R	R
1,1,1-Trichloroethane	10	R	R	R	R	R
Cyclohexane	10	R	R	R	R	R
Carbon Tetrachloride	10	R	R	R	R	R
Benzene	10	R	R	R	R	R
1,2-Dichloroethane	10	R	R	R	R	R
Trichloroethene	10	R	R	R	R	R
Methylcyclohexane	10	R	R	R	R	R
1,2-Dichloropropane	10	R	R	R	R	R
Bromodichloromethane	10	R	R	R	R	R
cis-1,3-Dichloropropene	10	R	R	R	R	R
4-Methyl-2-Pentanone	10	R	R	R	R	R
Toluene	10	R	R	R	R	R
trans-1,3-Dichloropropene	10	R	R	R	R	R
1,1,2-Trichloroethane	10	R	R	R	R	R
Tetrachloroethene	10	R	R	R	R	R
2-Hexanone	10	R	R	R	R	R
Dibromochloromethane	10	R	R	R	R	R
1,2-Dibromoethane	10	R	R	R	R	R
Chlorobenzene	10	R	R	R	R	R
Ethylbenzene	10	R	R	R	R	R
Xylene (Total)	10	R	R	R	R	R
Styrene	10	R	R	R	R	R
Bromoform	10	R	R	R	R	R
Isopropylbenzene	10	R	R	R	R	R
1,1,2,2-Tetrachloroethane	10	R	R	R	R	R
1,3-Dichlorobenzene	10	R	R	R	R	R
1,4-Dichlorobenzene	10	R	R	R	R	R
1,2-Dichlorobenzene	10	R	R	R	R	R
1,2-Dibromo-3-chloropropane	10	R	R	R	R	R
1,2,4-Trichlorobenzene	10	R	R	R	R	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/01/04	03/01/04	03/02/04	03/03/04	03/04/04
DATE ANALYZED:		03/11/04	03/11/04	03/11/04	03/11/04	03/11/04

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0671F SDG: D14427
LABORATORY: ENVIROSYSTEMS, INC.

TABLE 3
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:		D14449	D14454	D14455
SAMPLE LOCATION:		RB-05	TB-01	TB-02
LABORATORY NUMBER:		04030855	04030844	04030856
COMPOUND	CRQL			
Dichlorodifluoromethane	10	10 U	R	10 U
Chloromethane	10	10 U	R	10 U
Vinyl Chloride	10	10 U	R	10 U
Bromomethane	10	10 U	R	10 U
Chloroethane	10	10 U	R	10 U
Trichlorofluoromethane	10	10 U	R	10 U
1,1-Dichloroethene	10	10 U	R	10 U
1,1,2-Trichloro-1,2,2-trifluoroethane	10	10 U	R	10 U
Acetone	10	10 UJ	R	10 UJ
Carbon Disulfide	10	10 U	R	10 U
Methyl Acetate	10	10 UJ	R	10 UJ
Methylene Chloride	10	10 U	R	10 U
trans-1,2-Dichloroethene	10	10 U	R	10 U
Methyl tert-Butyl Ether	10	10 U	R	10 U
1,1-Dichloroethane	10	10 U	R	10 U
cis-1,2-Dichloroethene	10	10 U	R	10 U
2-Butanone	10	10 UJ	R	10 UJ
Chloroform	10	10 U	R	10 U
1,1,1-Trichloroethane	10	10 U	R	10 U
Cyclohexane	10	10 U	R	10 U
Carbon Tetrachloride	10	10 U	R	10 U
Benzene	10	10 U	R	10 U
1,2-Dichloroethane	10	10 U	R	10 U
Trichloroethene	10	10 U	R	10 U
Methylcyclohexane	10	10 U	R	10 U
1,2-Dichloropropane	10	10 U	R	10 U
Bromodichloromethane	10	10 U	R	10 U
cis-1,3-Dichloropropene	10	10 U	R	10 U
4-Methyl-2-Pentanone	10	10 UJ	R	10 UJ
Toluene	10	10 U	R	10 U
trans-1,3-Dichloropropene	10	10 U	R	10 U
1,1,2-Trichloroethane	10	10 U	R	10 U
Tetrachloroethene	10	10 U	R	10 U
2-Hexanone	10	10 UJ	R	10 UJ
Dibromochloromethane	10	10 U	R	10 U
1,2-Dibromoethane	10	10 U	R	10 U
Chlorobenzene	10	10 U	R	10 U
Ethylbenzene	10	10 U	R	10 U
Xylene (Total)	10	10 U	R	10 U
Styrene	10	10 U	R	10 U
Bromoform	10	10 UJ	R	10 UJ
Isopropylbenzene	10	10 U	R	10 U
1,1,2,2-Tetrachloroethane	10	10 U	R	10 U
1,3-Dichlorobenzene	10	10 U	R	10 U
1,4-Dichlorobenzene	10	10 U	R	10 U
1,2-Dichlorobenzene	10	10 U	R	10 U
1,2-Dibromo-3-chloropropane	10	10 U	R	10 U
1,2,4-Trichlorobenzene	10	10 U	R	10 U
DILUTION FACTOR:		1.0	1.0	1.0
DATE SAMPLED:		03/08/04	03/01/04	03/08/04
DATE ANALYZED:		03/11/04	03/11/04	03/11/04

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 1
SEMIVOLATILE SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C37	A1C38	A1C39	A1C40	A1C41	A1C42
SAMPLE LOCATION:		SO-01	SO-02	SO-03	SO-04	SO-05	SO-06
LABORATORY NUMBER:		040183-01	040183-02	040183-07	040183-12	040183-03	040183-04
COMPOUND	CRQL						
Benzaldehyde	330	R	370 UJ	3500 UJ	390 J	350 UJ	740 UJ
Phenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
bis(2-Chloroethyl)Ether	330	R	370 U	3500 U	410 U	350 U	740 U
2-Chlorophenol	330	2800 U	370 U	3500 U	110 J	350 U	740 U
2-Methylphenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
2,2'-oxybis(1-Chloropropane)	330	R	370 U	3500 U	410 U	350 U	740 U
Acetophenone	330	R	R	R	63 J	R	R
4-Methylphenol	330	2800 U	370 U	3500 U	89 J	350 U	740 U
N-Nitroso-di-n-propylamine	330	R	370 U	3500 U	410 U	350 U	740 U
Hexachloroethane	330	R	370 U	3500 U	410 U	350 U	740 U
Nitrobenzene	330	R	370 U	3500 U	410 U	350 U	740 U
Isophorone	330	R	370 U	3500 U	410 U	350 U	740 U
2-Nitrophenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
2,4-Dimethylphenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
bis(2-Chloroethoxy)methane	330	R	370 U	3500 U	410 U	350 U	740 U
2,4-Dichlorophenol	330	2800 U	R	R	140 J	R	R
Naphthalene	330	R	370 U	3500 U	120 J	350 U	420 J
4-Chloroaniline	330	R	370 U	3500 U	410 U	350 U	740 U
Hexachlorobutadiene	330	R	370 U	3500 U	410 U	350 U	740 U
Caprolactam	330	R	370 U	3500 U	410 U	350 U	740 U
4-Chloro-3-methylphenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
2-Methylnaphthalene	330	R	370 U	3500 U	110 J	350 U	230 J
Hexachlorocyclopentadiene	330	R	370 UJ	R	410 U	350 UJ	740 UJ
2,4,6-Trichlorophenol	330	2800 U	370 U	3500 U	410 U	350 U	740 U
2,4,5-Trichlorophenol	830	6900 U	940 U	8800 U	1000 U	880 U	1900 U
1,1'-Biphenyl	330	R	370 U	3500 U	410 U	350 U	740 U
2-Chloronaphthalene	330	R	R	R	130 J	R	R
2-Nitroaniline	830	R	940 U	8800 U	1000 U	880 U	1900 U
Dimethylphthalate	330	R	370 U	3500 U	410 U	350 U	740 U
2,6-Dinitrotoluene	330	R	370 U	3500 U	410 U	350 U	740 U
Acenaphthylene	330	R	370 U	3500 U	410 U	350 U	740 U
3-Nitroaniline	830	R	940 U	8800 U	1000 U	880 U	1900 U
Acenaphthene	330	R	R	530 J	75 J	R	790 J
2,4-Dinitrophenol	830	6900 U	940 U	8800 U	1000 U	880 U	1900 U
4-Nitrophenol	830	6900 U	940 U	8800 U	1000 U	880 U	1900 U
Dibenzofuran	330	R	370 U	3500 U	410 U	350 U	530 J
2,4-Dinitrotoluene	330	R	370 U	3500 U	410 U	350 U	740 U
Diethylphthalate	330	R	370 U	3500 U	410 U	350 U	740 U
Fluorene	330	R	370 U	740 J	88 J	350 U	820
4-Chlorophenyl-phenylether	330	R	370 U	3500 U	410 U	350 U	740 U
4-Nitroaniline	830	R	940 U	8800 U	1000 U	880 U	1900 U
4,6-Dinitro-2-methylphenol	830	6900 U	940 U	8800 U	1000 U	880 U	1900 U
N-Nitrosodiphenylamine (1)	330	R	370 U	3500 U	410 U	350 U	740 U
4-Bromophenyl-phenylether	330	R	370 U	3500 U	410 U	350 U	740 U
Hexachlorobenzene	330	R	370 U	3500 U	410 U	350 U	740 U
Atrazine	330	R	370 U	3500 U	410 U	350 U	740 U
Pentachlorophenol	830	6900 U	940 U	8800 U	1000 U	880 U	1900 U
Phenanthrene	330	R	370 U	13000	130 J	350 U	4700
Anthracene	330	R	370 U	6500	410 U	350 U	1500
Carbazole	330	R	370 U	1300 J	140 J	350 U	800
Di-n-butylphthalate	330	R	370 U	3500 U	410 U	350 U	740 U
Fluoranthene	330	R	370 U	*48000	410 U	350 U	5400
Pyrene	330	R	370 U	*46000	170 J	350 U	5400
Butylbenzylphthalate	330	R	370 U	3500 U	79 J	350 U	740 U
3,3'-Dichlorobenzidine	330	R	370 U	3500 U	410 U	350 U	740 U
Benzo(a)anthracene	330	R	370 U	*37000	410 U	350 U	3400
Chrysene	330	R	370 U	*35000	410 U	350 U	3400
bis(2-Ethylhexyl)phthalate	330	R	370 U	3500 U	410 U	350 U	740 U
Di-n-octylphthalate	330	R	370 U	3500 U	410 U	36 J	740 U
Benzo(b)fluoranthene	330	R	370 U	28000	410 U	350 U	2600
Benzo(k)fluoranthene	330	R	370 U	19000	410 U	350 U	2400
Benzo(a)pyrene	330	R	370 U	25000	410 U	350 U	2800
Indeno(1,2,3-cd)pyrene	330	R	370 U	15000	120 J	350 U	1700
Dibenzo(a,h)anthracene	330	R	370 U	7300	70 J	350 U	820 J
Benzo(g,h,i)perylene	330	R	370 U	15000 J	110 J	350 U	1800
DILUTION FACTOR:		1.0	1.0	9.0/18.0*	1.0	1.0	2.0
DATE SAMPLED:		03/03/04	03/03/04	03/01/04	03/04/04	03/02/04	03/03/04
DATE EXTRACTED:		03/05/04	03/05/04	03/05/04	03/08/04	03/05/04	03/05/04
DATE ANALYZED:		03/10/04	03/10/04	03/11/04	03/11/04	03/10/04	03/10/04
% MOISTURE:		88	12	15	21	7	12

* - Result reported from diluted analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 1
SEMIVOLATILE SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C43	A1C44	A1C45	A1C46	A1C47	A1C48
SAMPLE LOCATION:		SO-07	SO-08	SO-09	SO-10	SO-11	SO-12
LABORATORY NUMBER:		040183-05	040183-13	040183-16	040183-17	040183-18	040183-14
COMPOUND	CRQL						
Benzaldehyde	330	350 UJ	1400 J	47 J	2300 UJ	2400 UJ	390 UJ
Phenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
bis(2-Chloroethyl)Ether	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2-Chlorophenol	330	350 U	310 J	420 U	2300 U	2400 U	390 U
2-Methylphenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2,2'-oxybis(1-Chloropropane)	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Acetophenone	330	R	250 J	R	R	R	R
4-Methylphenol	330	350 U	300 J	420 U	2300 U	2400 U	390 U
N-Nitroso-di-n-propylamine	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Hexachloroethane	330	350 U	180 J	420 U	2300 U	2400 U	390 U
Nitrobenzene	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Isophorone	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2-Nitrophenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2,4-Dimethylphenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
bis(2-Chloroethoxy)methane	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2,4-Dichlorophenol	330	R	380 J	R	R	R	R
Naphthalene	330	350 U	310 J	43 J	2300 U	2400 U	63 J
4-Chloroaniline	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Hexachlorobutadiene	330	350 U	410 U	44 J	2300 U	2400 U	390 U
Caprolactam	330	350 U	110 J EB	420 U	2300 U	2400 U	390 U
4-Chloro-3-methylphenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2-Methylnaphthalene	330	350 U	340 J	420 U	2300 U	2400 U	390 U
Hexachlorocyclopentadiene	330	350 UJ	410 U	R	R	2400 U	390 U
2,4,6-Trichlorophenol	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2,4,5-Trichlorophenol	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
1,1'-Biphenyl	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2-Chloronaphthalene	330	R	350 J	R	R	R	R
2-Nitroaniline	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
Dimethylphthalate	330	350 U	410 U	420 U	2300 U	2400 U	390 U
2,6-Dinitrotoluene	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Acenaphthylene	330	350 U	410 U	420 U	2300 U	2400 U	390 U
3-Nitroaniline	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
Acenaphthene	330	R	200 J	R	340 J	290 J	120 J
2,4-Dinitrophenol	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
4-Nitrophenol	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
Dibenzofuran	330	350 U	410 U	49 J	2300 U	2400 U	72 J
2,4-Dinitrotoluene	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Diethylphthalate	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Fluorene	330	350 U	220 J	58 J	380 J	2400 U	140 J
4-Chlorophenyl-phenylether	330	350 U	410 U	420 U	2300 U	2400 U	390 U
4-Nitroaniline	830	880 U	1000 U	1000 U	5900 U	6000 U	980 U
4,6-Dinitro-2-methylphenol	830	880 U	130 J	1000 U	5900 U	6000 U	980 U
N-Nitrosodiphenylamine (1)	330	350 U	410 U	420 U	2300 U	2400 U	390 U
4-Bromophenyl-phenylether	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Hexachlorobenzene	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Atrazine	330	350 U	290 J	420 U	2300 U	2400 U	390 U
Pentachlorophenol	830	880 U	1000 U	1000 U	5900 U	6000 UJ	980 U
Phenanthrene	330	350 U	340 J	92 J	6300	5300	1200
Anthracene	330	350 U	410 U	47 J	2300	2000 J	280 J
Carbazole	330	350 U	390 J	420 U	470 J	460 J	110 J
Di-n-butylphthalate	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Fluoranthene	330	36 J	90 J	130 J	*20000	*20000	1200
Pyrene	330	350 U	460	92 J	*20000	*21000	1500
Butylbenzylphthalate	330	350 U	340 J	420 U	2300 U	2400 U	390 U
3,3'-Dichlorobenzidine	330	350 U	410 U	420 U	2300 U	2400 U	390 U
Benzo(a)anthracene	330	350 U	42 J	420 U	16000	16000	590
Chrysene	330	350 U	48 J	420 U	15000	17000	690
bis(2-Ethylhexyl)phthalate	330	350 U	470 U	420 U	2300 U	2400 U	390 U
Di-n-octylphthalate	330	350 U	43 J	59 J	2300 U	2400 U	390 U
Benzo(b)fluoranthene	330	350 U	410 U	420 U	12000	13000	400
Benzo(k)fluoranthene	330	350 U	410 U	420 U	12000	12000	490
Benzo(a)pyrene	330	350 U	410 U	420 U	13000	13000	500
Indeno(1,2,3-cd)pyrene	330	350 U	350 J	420 U	5700	7300	270 J
Dibenzo(a,h)anthracene	330	350 U	270 J	420 U	2600	3400	110 J
Benzo(g,h,i)perylene	330	350 U	280 J	420 U	5100	7500	290 J
DILUTION FACTOR:		1.0	1.0	1.0	6.0/12.0*	6.0/12.0*	1.0
DATE SAMPLED:		03/03/04	03/04/04	03/04/04	03/04/04	03/04/04	03/03/04
DATE EXTRACTED:		03/05/04	03/08/04	03/09/04	03/09/04	03/09/04	03/08/04
DATE ANALYZED:		03/10/04	03/11/04	03/12/04	03/12/04	03/15/04	03/11/04
% MOISTURE:		7	20	21	16	18	16

* - Result reported from diluted analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 1
SEMIVOLATILE SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C49	A1C50	A1C51	A1C52
SAMPLE LOCATION:		SO-13	SO-14	SO-15	SO-16
LABORATORY NUMBER:		040183-15	040183-08	040183-06	040183-19
COMPOUND	CRQL				
Benzaldehyde	330	390 UJ	65 J	370 UJ	470 UJ
Phenol	330	390 U	370 U	370 U	470 U
bis(2-Chloroethyl)Ether	330	390 U	370 U	370 U	470 U
2-Chlorophenol	330	390 U	370 U	370 U	470 U
2-Methylphenol	330	390 U	370 U	370 U	470 U
2,2'-oxybis(1-Chloropropane)	330	390 U	370 U	370 U	470 U
Acetophenone	330	R	R	R	R
4-Methylphenol	330	390 U	370 U	370 U	470 U
N-Nitroso-di-n-propylamine	330	390 U	370 U	370 U	470 U
Hexachloroethane	330	390 U	370 U	370 U	470 U
Nitrobenzene	330	390 U	370 U	370 U	470 U
Isophorone	330	390 U	370 U	370 U	470 U
2-Nitrophenol	330	390 U	370 U	370 U	470 U
2,4-Dimethylphenol	330	390 U	370 U	370 U	470 U
bis(2-Chloroethoxy)methane	330	390 U	370 U	370 U	470 U
2,4-Dichlorophenol	330	R	R	R	R
Naphthalene	330	390 U	87 J	370 U	270 J
4-Chloroaniline	330	390 U	370 U	370 U	470 U
Hexachlorobutadiene	330	390 U	370 U	370 U	470 U
Caprolactam	330	390 U	370 U	370 U	470 U
4-Chloro-3-methylphenol	330	390 U	370 U	370 U	470 U
2-Methylnaphthalene	330	390 U	120 J	370 U	120 J
Hexachlorocyclopentadiene	330	390 U	R	R	470 U
2,4,6-Trichlorophenol	330	390 U	370 U	370 U	470 U
2,4,5-Trichlorophenol	830	980 U	930 U	940 U	1200 U
1,1'-Biphenyl	330	390 U	370 U	370 U	470 U
2-Chloronaphthalene	330	R	R	R	R
2-Nitroaniline	830	980 U	930 U	940 U	1200 U
Dimethylphthalate	330	390 U	370 U	370 U	470 U
2,6-Dinitrotoluene	330	390 U	370 U	370 U	470 U
Acenaphthylene	330	390 U	110 J	370 U	470 U
3-Nitroaniline	830	980 U	930 U	940 U	1200 U
Acenaphthene	330	R	210 J	R	260 J
2,4-Dinitrophenol	830	980 U	930 U	940 U	1200 U
4-Nitrophenol	830	980 U	930 U	940 U	1200 U
Dibenzofuran	330	390 U	85 J	370 U	200 J
2,4-Dinitrotoluene	330	390 U	370 U	370 U	470 U
Diethylphthalate	330	390 U	370 U	370 U	470 U
Fluorene	330	390 U	180 J	370 U	340 J
4-Chlorophenyl-phenylether	330	390 U	370 U	370 U	470 U
4-Nitroaniline	830	980 U	930 U	940 U	1200 U
4,6-Dinitro-2-methylphenol	830	980 U	930 U	940 U	1200 U
N-Nitrosodiphenylamine (1)	330	390 U	370 U	370 U	470 U
4-Bromophenyl-phenylether	330	390 U	370 U	370 U	470 U
Hexachlorobenzene	330	390 U	370 U	370 U	470 U
Atrazine	330	390 U	370 U	370 U	470 U
Pentachlorophenol	830	980 U	930 U	940 U	1200 UJ
Phenanthrene	330	390 U	2000	370 U	2900
Anthracene	330	390 U	340 J	370 U	850
Carbazole	330	390 U	110 J	370 U	330 J
Di-n-butylphthalate	330	390 U	370 U	370 U	470 U
Fluoranthene	330	47 J	2100	370 U	2800
Pyrene	330	43 J	2300	370 U	3700
Butylbenzylphthalate	330	390 U	370 U	370 U	470 U
3,3'-Dichlorobenzidine	330	390 U	370 U	370 U	470 U
Benzo(a)anthracene	330	390 U	1300	370 U	1500
Chrysene	330	390 U	1500	370 U	1600
bis(2-Ethylhexyl)phthalate	330	390 U	370 U	370 U	470 U
Di-n-octylphthalate	330	390 U	370 U	370 U	470 U
Benzo(b)fluoranthene	330	390 U	1000	370 U	950
Benzo(k)fluoranthene	330	390 U	1000	370 U	1200
Benzo(a)pyrene	330	390 U	970	370 U	1100
Indeno(1,2,3-cd)pyrene	330	390 U	530	370 U	850
Dibenzo(a,h)anthracene	330	390 U	280 J	370 U	270 J
Benzo(g,h,i)perylene	330	390 U	480 J	370 UJ	720
DILUTION FACTOR:		1.0	1.0	1.0	1.0
DATE SAMPLED:		03/03/04	03/01/04	03/02/04	03/08/04
DATE EXTRACTED:		03/08/04	03/05/04	03/05/04	03/11/04
DATE ANALYZED:		03/11/04	03/11/04	03/11/04	03/15/04
% MOISTURE:		16	11	12	31

* - Result reported from diluted analysis.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C53
LABORATORY: CEIMIC CORPORATION

TABLE 1
SEMIVOLATILE SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C53	A1C54	A1C55	A1C56	A1C57	A1C58
SAMPLE LOCATION:		SO-17	SO-18	SO-19	SO-20	SO-21	SO-22
LABORATORY NUMBER:		040192-01	040192-02	040192-03	040192-04	040192-05	040192-06
COMPOUND	CRQL						
Benzaldehyde	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Phenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
bis(2-Chloroethyl)Ether	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2-Chlorophenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2-Methylphenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,2'-oxybis(1-Chloropropane)	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Acetophenone	330	R	R	R	R	R	R
4-Methylphenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
N-Nitroso-di-n-propylamine	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Hexachloroethane	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Nitrobenzene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Isophorone	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2-Nitrophenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,4-Dimethylphenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
bis(2-Chloroethoxy)methane	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,4-Dichlorophenol	330	R	R	R	R	R	R
Naphthalene	330	370 J	380 J	1300 J	1900 J	240 J	670 J
4-Chloroaniline	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Hexachlorobutadiene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Caprolactam	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
4-Chloro-3-methylphenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2-Methylnaphthalene	330	480 J	590 J	1400 J	1100 J	350 J	680 J
Hexachlorocyclopentadiene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,4,6-Trichlorophenol	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,4,5-Trichlorophenol	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
1,1'-Biphenyl	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2-Chloronaphthalene	330	R	R	R	R	R	R
2-Nitroaniline	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
Dimethylphthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
2,6-Dinitrotoluene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Acenaphthylene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
3-Nitroaniline	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
Acenaphthene	330	740 J	1100 J	2500 J	2100 J	1100 J	1200 J
2,4-Dinitrophenol	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
4-Nitrophenol	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
Dibenzofuran	330	2200 U	2100 U	4300 U	1000 J	2100 U	220 J
2,4-Dinitrotoluene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Diethylphthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Fluorene	330	530 J	790 J	1900 J	2000 J	800 J	870 J
4-Chlorophenyl-phenylether	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
4-Nitroaniline	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
4,6-Dinitro-2-methylphenol	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
N-Nitrosodiphenylamine (1)	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
4-Bromophenyl-phenylether	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Hexachlorobenzene	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Atrazine	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Pentachlorophenol	830	5500 U	5400 U	11000 U	10000 U	5400 U	5000 U
Phenanthrene	330	6700	9400	18000	18000	9100	9500
Anthracene	330	1300 J	1900 J	4100 J	3600 J	1900 J	1900 J
Carbazole	330	2200 U	2100 U	490 J	1200 J	220 J	260 J
Di-n-butylphthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Fluoranthene	330	5200	6400	12000	13000	6800	6300
Pyrene	330	8900	13000	23000	20000	15000	15000
Butylbenzylphthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
3,3'-Dichlorobenzidine	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Benzo(a)anthracene	330	3600	5100	8600	8000	5900	5600
Chrysene	330	4100	5400	9800	8100	6200	6000
bis(2-Ethylhexyl)phthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Di-n-octylphthalate	330	2200 U	2100 U	4300 U	4100 U	2100 U	2000 U
Benzo(b)fluoranthene	330	2200	2500	6000	4600	3400	3800
Benzo(k)fluoranthene	330	2400	3100	6100	5800	3500	3600
Benzo(a)pyrene	330	2900	3800	6800	6600	4900	5300
Indeno(1,2,3-cd)pyrene	330	1200 J	1500 J	3000 J	2800 J	2100	2400
Dibenzo(a,h)anthracene	330	500 J	940 J	1300 J	1300 J	980 J	1100 J
Benzo(g,h,i)perylene	330	1400 J	1800 J	3400 J	3200 J	2600	2900
DILUTION FACTOR:		5.0	5.0	10.0	10.0	5.0	5.0
DATE SAMPLED:		03/08/04	03/08/04	03/08/04	03/08/04	03/08/04	03/08/04
DATE EXTRACTED:		03/11/04	03/11/04	03/11/04	03/11/04	03/11/04	03/11/04
DATE ANALYZED:		03/16/04	03/17/04	03/16/04	03/17/04	03/17/04	03/17/04
% MOISTURE:		25	23	24	20	24	18

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C59
LABORATORY: CEIMIC CORPORATION

TABLE 1
SEMIVOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:		A1C59	A1C60	A1C61	A1C62	A1C63	A1C64
SAMPLE LOCATION:		Rig-01	RB-01	RB-02	RB-03	RB-04	RB-05
LABORATORY NUMBER:		040184-03	040184-04	040184-01	040184-02	040184-06	040184-07
COMPOUND	CRQL						
Benzaldehyde	10	10 U	10 U	10 U	10 U	10 U	10 UJ
Phenol	10	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethyl)Ether	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Chlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10	10 U	10 U	10 U	10 U	10 U	10 U
Acetophenone	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Methylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U
N-Nitroso-di-n-propylamine	10	10 U	10 U	10 U	10 U	10 U	10 U
Hexachloroethane	10	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Isophorone	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	10	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	10	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10	10 U	10 U	10 U	10 U	10 U	10 U
Caprolactam	10	10 U	2 J	10 U	10 U	10 U	1 J
4-Chloro-3-methylphenol	10	10 U	8 J	8 J	5 J	5 J	4 J
2-Methylnaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10	10 UJ	10 UJ	10 UJ	10 UJ	10 UJ	R
2,4,6-Trichlorophenol	10	10 U	10 U	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	25	25 U	25 U	25 U	25 U	25 U	25 U
1,1'-Biphenyl	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitroaniline	25	25 U	25 U	25 U	25 U	25 U	25 U
Dimethylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U
Acenaphthylene	10	10 U	10 U	10 U	10 U	10 U	10 U
3-Nitroaniline	25	25 U	25 U	25 U	25 U	25 U	25 U
Acenaphthene	10	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	25	25 U	25 U	25 U	25 U	25 U	25 U
4-Nitrophenol	25	25 U	25 U	25 U	25 U	25 U	25 U
Dibenzofuran	10	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U	10 U	10 U
Diethylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
Fluorene	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitroaniline	25	25 U	25 U	25 U	25 U	25 U	25 U
4,6-Dinitro-2-methylphenol	25	25 U	25 U	25 U	25 U	25 U	25 U
N-Nitrosodiphenylamine (1)	10	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10	10 U	10 U	10 U	10 U	10 U	10 U
Hexachlorobenzene	10	10 U	10 U	10 U	10 U	10 U	10 U
Atrazine	10	10 U	10 U	10 U	10 U	10 U	10 U
Pentachlorophenol	25	25 U	25 U	25 U	25 U	25 U	25 U
Phenanthrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	10	10 U	10 U	10 U	10 U	10 U	10 U
Carbazole	10	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	10	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Butylbenzylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene	10	10 U	10 U	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene	10	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10	10 U	10 U	10 U	10 U	10 U	10 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/01/04	03/01/04	03/02/04	03/03/04	03/04/04	03/08/04
DATE EXTRACTED:		03/05/04	03/05/04	03/05/04	03/05/04	03/08/04	03/11/04
DATE ANALYZED:		03/09/04	03/09/04	03/09/04	03/09/04	03/09/04	03/12/04

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C37	A1C38	A1C39	A1C40	A1C41	A1C42
SAMPLE LOCATION:		SO-01	SO-02	SO-03	SO-04	SO-05	SO-06
LABORATORY NUMBER:		040183-01	040183-02	040183-07	040183-12	040183-03	040183-04
COMPOUND	CRQL						
alpha-BHC	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
beta-BHC	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
delta-BHC	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
gamma-BHC (Lindane)	1.7	6.7 UJ	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
Heptachlor	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
Aldrin	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
Heptachlor Epoxide	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
Endosulfan I	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
Dieldrin	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
4,4'-DDE	3.3	13 U	3.8 U	15	4.1 U	3.5 U	3.7 U
Endrin	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
Endosulfan II	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
4,4'-DDD	3.3	13 U	3.8 U	*38 U	4.1 U	3.5 U	3.7 U
Endosulfan Sulfate	3.3	13 U	3.8 U	*38 U	4.1 U	3.5 U	3.7 U
4,4'-DDT	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
Methoxychlor	17	67 U	19 U	20 U	21 U	18 U	19 U
Endrin Ketone	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
Endrin Aldehyde	3.3	13 U	3.8 U	3.8 U	4.1 U	3.5 U	3.7 U
alpha-Chlordane	1.7	6.7 U	1.9 U	2.0 U	2.1 U	1.8 U	1.9 U
gamma-Chlordane	1.7	6.7 U	1.9 U	*20 U	2.1 U	1.8 U	1.9 U
Toxaphene	170	670 U	190 U	200 U	210 U	180 U	190 U
Aroclor-1016	33	130 U	38 U	38 U	41 U	35 U	37 U
Aroclor-1221	67	260 U	76 U	78 U	84 U	71 U	75 U
Aroclor-1232	33	130 U	38 U	38 U	41 U	35 U	37 U
Aroclor-1242	33	130 U	38 U	38 U	41 U	35 U	37 U
Aroclor-1248	33	130 U	38 U	38 U	41 U	35 U	37 U
Aroclor-1254	33	130 U	38 U	38 U	41 U	35 U	37 U
Aroclor-1260	33	130 U	38 U	38 U	41 U	35 U	37 U
DILUTION FACTOR:		1.0	1.0	1.0/10.0*	1.0	1.0	1.0
DATE SAMPLED:		03/03/04	03/03/04	03/01/04	03/04/04	03/02/04	03/03/04
DATE EXTRACTED:		03/05/04	03/05/04	03/05/04	03/08/04	03/05/04	03/05/04
DATE ANALYZED:		03/16/04	03/16/04	03/16/04	03/16/04	03/16/04	03/16/04
% MOISTURE:		88	12	15	21	7	12

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

S:\04010001\A1C37_PS.123

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C43	A1C44	A1C45	A1C46	A1C47	A1C48
SAMPLE LOCATION:		SO-07	SO-08	SO-09	SO-10	SO-11	SO-12
LABORATORY NUMBER:		040183-05	040183-13	040183-16	040183-17	040183-18	040183-14
COMPOUND	CRQL						
alpha-BHC	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
beta-BHC	1.7	1.8 U	2.1 U	2.2 U	R	*20 U	R
delta-BHC	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
gamma-BHC (Lindane)	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
Heptachlor	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
Aldrin	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
Heptachlor Epoxide	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
Endosulfan I	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
Dieldrin	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
4,4'-DDE	3.3	3.5 U	4.1 U	4.2 U	11 J	11 J	3.9 U
Endrin	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
Endosulfan II	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
4,4'-DDD	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
Endosulfan Sulfate	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
4,4'-DDT	3.3	3.5 U	4.1 U	4.2 U	R	R	3.9 U
Methoxychlor	17	18 U	21 U	22 U	20 U	20 U	20 U
Endrin Ketone	3.3	3.5 U	4.1 U	4.2 U	3.9 U	4.0 U	3.9 U
Endrin Aldehyde	3.3	3.5 U	4.1 U	4.2 U	R	*40 U	3.9 U
alpha-Chlordane	1.7	1.8 U	2.1 U	2.2 U	2.0 U	2.0 U	2.0 U
gamma-Chlordane	1.7	1.8 U	2.1 U	2.2 U	14	16	2.0 U
Toxaphene	170	180 U	210 U	220 U	200 U	200 U	200 U
Aroclor-1016	33	35 U	41 U	42 U	39 U	40 U	39 U
Aroclor-1221	67	72 U	82 U	85 U	79 U	81 U	79 U
Aroclor-1232	33	35 U	41 U	42 U	39 U	40 U	39 U
Aroclor-1242	33	35 U	41 U	42 U	39 U	40 U	39 U
Aroclor-1248	33	35 U	41 U	42 U	39 U	40 U	39 U
Aroclor-1254	33	35 U	41 U	42 U	190 J	40 U	39 U
Aroclor-1260	33	35 U	41 U	42 U	39 U	40 U	39 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0/10.0*	1.0
DATE SAMPLED:		03/03/04	03/04/04	03/04/04	03/04/04	03/04/04	03/03/04
DATE EXTRACTED:		03/05/04	03/08/04	03/09/04	03/09/04	03/09/04	03/08/04
DATE ANALYZED:		03/16/04	03/16/04	03/16/04	03/17/04	03/17/04	03/16/04
% MOISTURE:		7	20	21	16	18	16

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C37
LABORATORY: CEIMIC CORPORATION

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL SOIL ANALYSES
µg/kg

SAMPLE NUMBER:		A1C49	A1C50	A1C51	A1C52
SAMPLE LOCATION:		SO-13	SO-14	SO-15	SO-16
LABORATORY NUMBER:		040183-15	040183-08	040183-06	040183-19
COMPOUND	CRQL				
alpha-BHC	1.7	2.0 U	1.9 U	1.9 U	2.5 U
beta-BHC	1.7	2.0 U	1.9 U	1.9 U	2.5 U
delta-BHC	1.7	2.0 U	1.9 U	1.9 U	2.5 U
gamma-BHC (Lindane)	1.7	2.0 U	1.9 U	1.9 U	2.5 U
Heptachlor	1.7	2.0 U	1.9 U	1.9 U	2.5 U
Aldrin	1.7	2.0 U	1.9 U	1.9 U	2.5 U
Heptachlor Epoxide	1.7	2.0 U	1.9 U	1.9 U	2.5 U
Endosulfan I	1.7	2.0 U	1.9 U	1.9 U	2.5 U
Dieldrin	3.3	3.9 U	3.7 U	3.7 U	*48 U
4,4'-DDE	3.3	3.9 U	3.7 U	3.7 U	4.8 U
Endrin	3.3	3.9 U	3.7 U	3.7 U	4.8 U
Endosulfan II	3.3	3.9 U	3.7 U	3.7 U	4.8 U
4,4'-DDD	3.3	3.9 U	3.7 U	3.7 U	4.8 U
Endosulfan Sulfate	3.3	3.9 U	3.7 U	3.7 U	4.8 U
4,4'-DDT	3.3	3.9 U	3.7 U	3.7 U	*48 U
Methoxychlor	17	20 U	19 U	19 U	25 U
Endrin Ketone	3.3	3.9 U	3.7 U	3.7 U	4.8 U
Endrin Aldehyde	3.3	3.9 U	R	3.7 U	17 J
alpha-Chlordane	1.7	2.0 U	1.9 U	1.9 U	2.5 U
gamma-Chlordane	1.7	2.0 U	4.0	1.9 U	*25 U
Toxaphene	170	200 U	190 U	190 U	250 U
Aroclor-1016	33	39 U	37 U	37 U	48 U
Aroclor-1221	67	79 U	75 U	76 U	97 U
Aroclor-1232	33	39 U	37 U	37 U	48 U
Aroclor-1242	33	39 U	37 U	37 U	48 U
Aroclor-1248	33	39 U	37 U	37 U	48 U
Aroclor-1254	33	39 U	37 U	37 U	320 J
Aroclor-1260	33	39 U	37 U	37 U	48 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0/10.0*
DATE SAMPLED:		03/03/04	03/01/04	03/02/04	03/08/04
DATE EXTRACTED:		03/08/04	03/05/04	03/05/04	03/11/04
DATE ANALYZED:		03/16/04	03/16/04	03/16/04	03/17/04
% MOISTURE:		16	11	12	31

* - RESULT REPORTED FROM DILUTED ANALYSIS.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

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SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: A1C59
LABORATORY: CEIMIC CORPORATION

TABLE 2
PESTICIDE/POLYCHLORINATED BIPHENYL AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:		A1C59	A1C60	A1C61	A1C62	A1C63	A1C64
SAMPLE LOCATION:		Rig-01	RB-01	RB-02	RB-03	RB-04	RB-05
LABORATORY NUMBER:		040184-03	040184-04	040184-01	040184-02	040184-06	040184-07
COMPOUND	CRQL						
alpha-BHC	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
beta-BHC	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
delta-BHC	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
gamma-BHC (Lindane)	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Heptachlor	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Aldrin	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Heptachlor Epoxide	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Endosulfan I	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Dieldrin	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDE	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan II	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDD	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endosulfan Sulfate	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
4,4'-DDT	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Methoxychlor	0.50	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Endrin Ketone	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Endrin Aldehyde	0.10	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
alpha-Chlordane	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
gamma-Chlordane	0.050	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
Toxaphene	5.0	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Aroclor-1016	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1221	2.0	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Aroclor-1232	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1242	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1248	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1254	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1260	1.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0	1.0	1.0
DATE SAMPLED:		03/01/04	03/01/04	03/02/04	03/03/04	03/04/04	03/08/04
DATE EXTRACTED:		03/05/04	03/05/04	03/05/04	03/05/04	03/08/04	03/11/04
DATE ANALYZED:		03/14/04	03/14/04	03/14/04	03/14/04	03/14/04	03/14/04

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C37
LABORATORY: BONNER ANALYTICAL TESTING COMPANY

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

SAMPLE NUMBER:			MA1C37	MA1C38	MA1C39	MA1C41	MA1C42	MA1C43	
SAMPLE LOCATION:			SO-01	SO-02	SO-03	SO-05	SO-06	SO-07	
LABORATORY NUMBER:			BT97890	BT97891	BT97892	BT97893	BT97894	BT97895	
PERCENT SOLIDS:			15.2	88.6	85.2	90.9	85.8	91.8	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (mg/kg)							CONTRACT QUANTITATION LIMITS @ (mg/kg)
ALUMINUM	P	0.31	31100 J	5280 J	4880 J	6760 J	9480 J	6850 J	20
ANTIMONY	P	0.15	4.3 UJ	1.2 UJ	R	2.5 UJ	2.8 UJ	2.6 UJ	6
ARSENIC	P	0.29	9.8 UJ	1.4 J	4.1 J	0.77 J	5.3 J	0.70 J	1.5
BARIUM	P	0.03	399	26.0	47.6	54.6	146	64.5	20
BERYLLIUM	P	0.0005	3.4	0.23	0.25	0.29	0.39	0.27	0.5
CADMIUM	P	0.01	R	0.12 J	9.5 J	0.18 J	0.55 J	0.18 J	0.5
CALCIUM	P	1.30	163000 J	1690 J	15700 J	1230 UJ	3580 J	1580 J	500
CHROMIUM	P	0.005	56.2	16.6	6.8	7.4	16.7	3.0	1
COBALT	P	0.01	1.6	3.1	149	3.6	11.1	3.4	5
COPPER	P	0.09	15.3 U	6.5	961	15.9	52.1	8.0	3
IRON	P	0.23	9020 J	10000 J	110000 J	11200 J	20200 J	11600 J	10
LEAD	P	0.25	16.2 J	10.9	50.9	4.0	60.3	5.1	1
MAGNESIUM	P	0.21	18700	3610	2090	2990	5930	5450	500
MANGANESE	P	0.01	1300 J	131 J	181 J	195 J	355 J	171 J	1.5
MERCURY	CV	0.03	0.20 J	0.11 UJ	5.2 J	0.60 J	1.6 J	0.91 J	0.1
NICKEL	P	0.05	14.5	5.9	42.3	5.6	408	3.9	4
POTASSIUM	P	0.41	3000	787	939 J	1660	2320	2040	500
SELENIUM	P	0.23	23.0 UJ	4.0 UJ	R	3.8 UJ	4.1 UJ	3.8 UJ	3.5
SILVER	P	0.04	6.6 U	1.1 U	0.58	1.1 U	1.2 U	1.1 U	1
SODIUM	P	16.5	4370 U	133 U	318 U	2160	162 U	331 U	500
THALLIUM	P	0.23	16.4 U	2.8 U	2.8	1.0	1.0	1.1	2.5
VANADIUM	P	0.03	21.3	10.3	13.1	13.5	38.6	17.3	10
ZINC	P	0.07	104	29.9	1390	51.0	110	29.7	6
CYANIDE	AS	0.10	2.1 U	0.56 U	0.16 U	0.55 U	0.42 U	0.51 U	0.5

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
J = QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U = VALUE IS NON-DETECTED.
UJ = VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R = VALUE IS REJECTED.
@ = CRQLs WERE ADJUSTED BASED ON A FINAL ICP DIGESTATE VOLUME OF 100 MLs.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C37
LABORATORY: BONNER ANALYTICAL TESTING COMPANY

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

SAMPLE NUMBER:			MA1C50	MA1C51	
SAMPLE LOCATION:			SO-14	SO-15	
LABORATORY NUMBER:			BT97896	BT97897	
PERCENT SOLIDS:			91.0	87.5	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (mg/kg)			CONTRACT QUANTITATION LIMITS @ (mg/kg)
ALUMINUM	P	0.31	5340 J	6600 J	20
ANTIMONY	P	0.15	2.6 UJ	2.2 UJ	6
ARSENIC	P	0.29	8.5 J	1.6 J	1.5
BARIUM	P	0.03	68.9	33.7	20
BERYLLIUM	P	0.0005	0.33	0.27	0.5
CADMIUM	P	0.01	0.44 J	0.18 J	0.5
CALCIUM	P	1.30	2000 J	1470 UJ	500
CHROMIUM	P	0.005	11.3	20.6	1
COBALT	P	0.01	6.7	4.9	5
COPPER	P	0.09	48.0	18.5	3
IRON	P	0.23	16400 J	12500 J	10
LEAD	P	0.25	80.4	4.2	1
MAGNESIUM	P	0.21	2590	3390	500
MANGANESE	P	0.01	233 J	137 J	1.5
MERCURY	CV	0.03	5.8 J	0.097 J	0.1
NICKEL	P	0.05	307	11.8	4
POTASSIUM	P	0.41	985	1130	500
SELENIUM	P	0.23	3.8 UJ	4.0 UJ	3.5
SILVER	P	0.04	1.1 U	1.1 U	1
SODIUM	P	16.5	139 U	185 U	500
THALLIUM	P	0.23	1.1	0.91	2.5
VANADIUM	P	0.03	25.7	25.9	10
ZINC	P	0.07	89.1	37.6	6
CYANIDE	AS	0.10	0.21 U	0.57 U	0.5

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
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R = VALUE IS REJECTED.
@ = CRQLs WERE ADJUSTED BASED ON A FINAL ICP DIGESTATE VOLUME OF 100 MLs

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C40
LABORATORY: BONNER ANALYTICAL TESTING COMPANY

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

SAMPLE NUMBER:			MA1C40	MA1C44	MA1C45	MA1C46	MA1C47	MA1C48	MA1C49	
SAMPLE LOCATION:			SO-04	SO-08	SO-09	SO-10	SO-11	SO-12	SO-13	
LABORATORY NUMBER:			BT97957	BT97958	BT97959	BT97960	BT97961	BT97962	BT97963	
PERCENT SOLIDS:			78.0	76.6	74.3	86.6	83.8	81.4	93.6	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (mg/kg)								CONTRACT QUANTITATION LIMITS (mg/kg)
ALUMINUM	P	0.31	2620 J	7430 J	3340 J	6640 J	7070 J	6070 J	5810 J	20
ANTIMONY	P	0.15	3.5 UJ	3.3 UJ	3.5 UJ	7.5 J	7.4 J	2.8 UJ	2.5 UJ	6
ARSENIC	P	0.29	5.8 J	6.6 J	4.0 J	38.5 J	35.6 J	17.5 J	3.2 UJ	1.5
BARIUM	P	0.03	46.6	55.8	30.7	876	1160	96.9	60.2	20
BERYLLIUM	P	0.0005	0.34	0.48	0.39	0.40	0.43	0.38	0.39	0.5
CADMIUM	P	0.01	R	R	0.36 J	1.4 J	R	R	R	0.5
CALCIUM	P	1.30	3890 J	25100 J	1270 UJ	30400 J	13900 J	1510 UJ	2870 J	500
CHROMIUM	P	0.005	9.2	10.5	8.3	25.1	20.3	9.3	10.0	1
COBALT	P	0.01	2.6	2.6	2.3	13.4	7.6	5.2	7.9	5
COPPER	P	0.09	19.8	20.2	45.7	109	59.9	58.7	12.0	3
IRON	P	0.23	12500 J	12700 J	7640 J	46100 J	44300 J	14900 J	14400 J	10
LEAD	P	0.25	56.2	69.2	140	178	172	93.7	7.9	1
MAGNESIUM	P	0.21	589	2010	986	7700	4170	2880	3160	500
MANGANESE	P	0.01	116 J	195 J	60.6 J	308 J	324 J	226 J	1060 J	1.5
MERCURY	CV	0.03	3.7 J	1.5 J	1.6 J	2.6 J	3.1 J	2.2 J	0.23 J	0.1
NICKEL	P	0.05	8.1	7.1	6.0	30.7	20.7	10.4	7.4	4
POTASSIUM	P	0.41	371	618	532	1570	1140	883	958	500
SELENIUM	P	0.23	4.5 UJ	4.6 UJ	4.7 UJ	1.5 J	0.87 J	0.80 J	3.7 UJ	3.5
SILVER	P	0.04	1.3 U	1.3 U	1.3 U	1.2 U	1.2 U	1.2 U	1.1 U	1
SODIUM	P	16.5	209 U	264 U	147 U	200 U	234 U	173 U	336 U	500
THALLIUM	P	0.23	2.1	1.7	1.1	2.4	2.4	1.5	2.9	2.5
VANADIUM	P	0.03	19.9	20.9	14.1	30.0	21.5	20.6	18.1	10
ZINC	P	0.07	26.2 U	27.9 U	46.4	159	184	75.5	43.4	6
CYANIDE	AS	0.10	0.58	0.74	0.25	0.35	0.14	0.33	0.53 U	0.5

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
J = QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U = VALUE IS NON-DETECTED.
UJ = VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R = VALUE IS REJECTED.
NA = NOT ANALYZED.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C40
LABORATORY: BONNER ANALYTICAL TESTING COMPANY

TABLE 1
INORGANIC SOIL ANALYSES
mg/kg

SAMPLE NUMBER:			MA1C52	MA1C53	MA1C54	MA1C55	MA1C56	MA1C57	MA1C58	
SAMPLE LOCATION:			SO-16	SO-17	SO-18	SO-19	SO-20	SO-21	SO-22	
LABORATORY NUMBER:			BT97964	BT97965	BT97966	BT97967	BT97968	BT97969	BT97970	
PERCENT SOLIDS:			71.6	78.8	77.8	78.0	79.8	77.8	79.3	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (mg/kg)								CONTRACT QUANTITATION LIMITS (mg/kg)
ALUMINUM	P	0.31	2220 J	3780 J	2460 J	2270 J	3600 J	2660 J	2390 J	20
ANTIMONY	P	0.15	2.8 UJ	3.3 UJ	2.2 UJ	2.2 UJ	5.6 J	4.1 UJ	3.4 UJ	6
ARSENIC	P	0.29	18.1 J	32.0 J	25.8 J	25.4 J	17.4 J	39.7 J	29.5 J	1.5
BARIUM	P	0.03	173	359	287	211	248	252	282	20
BERYLLIUM	P	0.0005	0.38	0.42	0.40	0.34	0.43	0.37	0.37	0.5
CADMIUM	P	0.01	0.66 J	0.54 J	0.50 J	0.32 J	0.89 J	0.68 J	0.48 J	0.5
CALCIUM	P	1.30	8180 J	2890 J	2710 J	3360 J	2180 J	3080 J	2640 J	500
CHROMIUM	P	0.005	9.6	9.4	7.4	8.0	17.4	10.3	9.2	1
COBALT	P	0.01	5.4	5.0	4.5	3.4	6.6	6.5	5.2	5
COPPER	P	0.09	50.9	36.2	32.5	28.7	51.2	50.2	37.5	3
IRON	P	0.23	12800 J	8210 J	7520 J	6410 J	16600 J	17500 J	7600 J	10
LEAD	P	0.25	79.8	95.2	82.0	41.9	211	124	107	1
MAGNESIUM	P	0.21	746	454	380 U	279 U	946	590	370 U	500
MANGANESE	P	0.01	278 J	428 J	435 J	189 J	205 J	308 J	124 J	1.5
MERCURY	CV	0.03	4.8 J	2.8 J	7.6 J	2.1 J	5.8 J	3.0 J	2.4 J	0.1
NICKEL	P	0.05	92.4	34.1	29.0	17.1	19.1	52.1	25.0	4
POTASSIUM	P	0.41	522	1040	1500	441	752	511	387	500
SELENIUM	P	0.23	4.9 UJ	4.4 UJ	4.5 UJ	4.5 UJ	0.69 J	1.2 J	4.4 UJ	3.5
SILVER	P	0.04	1.4 U	1.3 U	0.17 J	1.3 U	1.3 U	1.3 U	1.3 U	1
SODIUM	P	16.5	129 U	146 U	91.6 U	99.5 U	123 U	131 U	115 U	500
THALLIUM	P	0.23	0.83	1.8	1.2	1.0	1.8	1.5	1.3	2.5
VANADIUM	P	0.03	12.5	20.9	16.6	13.1	28.8	28.7	17.5	10
ZINC	P	0.07	108	144	103	109	193	130	117	8
CYANIDE	AS	0.10	0.58	NA	NA	NA	NA	NA	NA	0.5

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
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NA = NOT ANALYZED.

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C59
LABORATORY: BONNER ANALYTICAL TESTIING COMPANY

TABLE 1
INORGANIC AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:			MA1C59	MA1C60	MA1C61	MA1C62	
SAMPLE LOCATION:			Rig-01	RB-01	RB-02	RB-03	
LABORATORY NUMBER:			BT97900	BT97901	BT97902	BT97903	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (µg/L)					CONTRACT QUANTITATION LIMITS (µg/L)
ALUMINUM	P	8.3	68.9 U	28.6 U	44.9 U	87.7 U	200
ANTIMONY	P	5.0	60.0 U	60.0 U	60.0 U	60.0 U	60
ARSENIC	P	2.9	15.0 U	15.0 U	15.0 U	15.0 U	15
BARIUM	P	0.50	2.2 J	200 UJ	200 UJ	200 UJ	200
BERYLLIUM	P	0.02	5.0 U	5.0 U	5.0 U	5.0 U	5
CADMIUM	P	0.30	5.0 U	5.0 U	5.0 U	5.0 U	5
CALCIUM	P	21.4	2790	49.4 J	46.8 J	51.6 J	5000
CHROMIUM	P	0.40	10.0 U	10.0 U	0.51 J	0.67 J	10
COBALT	P	0.60	50.0 U	50.0 U	50.0 U	50.0 U	50
COPPER	P	0.50	9.1	1.2 U	25.0 U	25.0 U	25
IRON	P	2.4	144	77.4	72.2	236	100
LEAD	P	3.7	10.0 UJ	10.0 UJ	10.0 UJ	10.0 UJ	10
MAGNESIUM	P	3.8	699	31.2 U	28.9 U	91.5 U	5000
MANGANESE	P	0.20	14.3	1.3	1.3	2.5	15
MERCURY	CV	0.07	0.20 U	0.20 U	0.20 U	0.20 U	0.2
NICKEL	P	1.1	40.0 U	1.5 J	40.0 U	40.0 U	40
POTASSIUM	P	9.4	333 J	5000 UJ	5000 UJ	5000 UJ	5000
SELENIUM	P	4.3	35.0 UJ	35.0 UJ	35.0 UJ	35.0 UJ	35
SILVER	P	0.90	10.0 U	10.0 U	10.0 U	10.0 U	10
SODIUM	P	199	1510	258 UJ	200 UJ	383 UJ	5000
THALLIUM	P	2.9	25.0 U	25.0 U	25.0 U	25.0 U	25
VANADIUM	P	0.40	50.0 U	50.0 U	50.0 U	50.0 U	50
ZINC	P	1.2	8.6	8.8	5.9	3.2	60
CYANIDE	AS	2.0	10.0 U	6.0 U	10.0 U	10.0 U	10

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
J - QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U - VALUE IS NON-DETECTED.
UJ - VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R - VALUE IS REJECTED.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 32635 SDG: MA1C63
LABORATORY: BONNER ANALYTICAL TESTIING COMPANY

TABLE 1
INORGANIC AQUEOUS ANALYSES
µg/L

SAMPLE NUMBER:			MA1C63	MA1C64	
SAMPLE LOCATION:			RB-04	RB-05	
LABORATORY NUMBER:			BT97971	BT97972	
INORGANIC ANALYTES	METHOD	METHOD DETECTION LIMITS (µg/L)			CONTRACT QUANTITATION LIMITS (µg/L)
ALUMINUM	P	8.3	46.8 U	15.4 U	200
ANTIMONY	P	5.0	60.0 U	60.0 U	60
ARSENIC	P	2.9	15.0 U	15.0 U	15
BARIUM	P	0.50	200 UJ	200 UJ	200
BERYLLIUM	P	0.02	5.0 U	5.0 U	5
CADMIUM	P	0.30	5.0 U	5.0 U	5
CALCIUM	P	21.4	38.6 UJ	5000 UJ	5000
CHROMIUM	P	0.40	10.0 U	10.0 U	10
COBALT	P	0.60	50.0 U	50.0 U	50
COPPER	P	0.50	25.0 UJ	25.0 UJ	25
IRON	P	2.4	120	41.8	100
LEAD	P	3.7	10.0 UJ	10.0 UJ	10
MAGNESIUM	P	3.8	28.5 U	32.0 U	5000
MANGANESE	P	0.20	1.1 J	1.1 J	15
MERCURY	CV	0.07	0.20 U	0.20 U	0.2
NICKEL	P	1.1	40.0 U	40.0 U	40
POTASSIUM	P	9.4	5000 UJ	5000 UJ	5000
SELENIUM	P	4.3	35.0 U	35.0 U	35
SILVER	P	0.90	10.0 U	10.0 U	10
SODIUM	P	199	5000 U	244 J	5000
THALLIUM	P	2.9	25.0 U	25.0 U	25
VANADIUM	P	0.40	50.0 U	50.0 U	50
ZINC	P	1.2	3.0 J	2.4 J	60
CYANIDE	AS	2.0	10.0 U	10.0 U	10

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR
AS - SEMI AUTOMATED SPECTROPHOTOMETRIC

NOTE:
J - QUANTITATION IS ESTIMATED DUE TO LIMITATIONS IDENTIFIED IN THE QUALITY CONTROL REVIEW (DATA REVIEW).
U - VALUE IS NON-DETECTED.
UJ - VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R - VALUE IS REJECTED.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0670F SDG: D14427
LABORATORY: BROOKS RAND LLC

TABLE 2
MONOMETHYL MERCURY AQUEOUS ANALYSES
ng/L

SAMPLE NUMBER:		D14444	D14445	D14446	D14447	D14448	D14449
SAMPLE LOCATION:		Rig-01	RB-01	RB-02	RB-03	RB-04	RB-05
LABORATORY NUMBER:		04BR137-17	04BR137-18	04BR137-19	04BR137-20	04BR137-21	04BR137-22
COMPOUND	MDL						
Monomethyl Mercury	0.045	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U	0.045 U
DATE SAMPLED:		03/01/04	03/01/04	03/02/04	03/03/04	03/04/04	03/08/04
DATE EXTRACTED:		04/01/04	04/01/04	04/01/04	04/01/04	04/01/04	04/01/04
DATE ANALYZED:		04/02/04	04/02/04	04/02/04	04/02/04	04/02/04	04/02/04

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SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0670F SDG: D14427
LABORATORY: BROOKS RAND LLC

TABLE 1
MONOMETHYL MERCURY SOIL ANALYSES
ng/g

SAMPLE NUMBER:		D14427	D14428	D14429	D14430	D14431	D14432
SAMPLE LOCATION:		SO-01	SO-02	SO-03	SO-04	SO-05	SO-06
LABORATORY NUMBER:		04BR137-1	04BR137-2	04BR137-3	04BR137-4	04BR137-5	04BR137-6
PERCENT SOLIDS:		16.0	88.9	82.8	81.3	89.5	86.8
COMPOUND	MDL						
Monomethyl Mercury	0.02	0.411 J	0.030 J	0.325 J	0.261 J	0.905 J	0.175 J
DATE SAMPLED:		03/03/04	03/03/04	03/01/04	03/04/04	03/02/04	03/03/04
DATE EXTRACTED:		03/23/04	03/23/04	03/23/04	03/23/04	03/23/04	03/23/04
DATE ANALYZED:		03/24/04	03/24/04	03/24/04	03/24/04	03/24/04	03/24/04

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0670F SDG: D14427
LABORATORY: BROOKS RAND LLC

TABLE 1
MONOMETHYL MERCURY SOIL ANALYSES
ng/g

SAMPLE NUMBER:		D14433	D14434	D14435	D14436	D14437	D14438
SAMPLE LOCATION:		SO-07	SO-08	SO-09	SO-10	SO-11	S0-12
LABORATORY NUMBER:		04BR137-7	04BR137-8	04BR137-9	04BR137-10	04BR137-11	04BR137-12
PERCENT SOLIDS:		92.2	81.2	76.0	87.6	84.6	81.8
COMPOUND	MDL						
Monomethyl Mercury	0.02	0.151 J	0.778 J	8.292 J	10.577 J	1.525 J	2.630 J
DATE SAMPLED:		03/03/04	03/04/04	03/04/04	03/04/04	03/04/04	03/03/04
DATE EXTRACTED:		03/23/04	03/23/04	03/23/04	03/23/04	03/23/04	03/23/04
DATE ANALYZED:		03/24/04	03/24/04	03/24/04	03/24/04	03/24/04	03/24/04

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SITE: CHLOR-ALKALI FACILITY (FORMER)
CASE: 0670F SDG: D14427
LABORATORY: BROOKS RAND LLC

TABLE 1
MONOMETHYL MERCURY SOIL ANALYSES
ng/g

SAMPLE NUMBER:		D14439	D14440	D14441	D14442
SAMPLE LOCATION:		SO-13	SO-14	SO-15	SO-16
LABORATORY NUMBER:		04BR137-13	04BR137-14	04BR137-15	04BR137-16
PERCENT SOLIDS:		80.9	89.4	84.3	67.7
COMPOUND	MDL				
Monomethyl Mercury	0.02	0.597 J	0.281 J	0.050 J	5.757 J
DATE SAMPLED:		03/03/04	03/01/04	03/02/04	03/08/04
DATE EXTRACTED:		03/23/04	03/23/04	03/23/04	03/23/04
DATE ANALYZED:		03/24/04	03/24/04	03/24/04	03/24/04

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

Data Summary Table
Dioxin/Furan Analysis - Soil Samples
Dry Weight

SITE: Chlor-Alkali Facility (Former) -Berlin, NH
CASE NO. DF002, SDG NO: A1C37
LABORATORY: Pace Analytical Services, Inc. - Broken Arrow, OK

SAMPLE NUMBER:	Toxicity Equivalency Factors (1)	A1C37		A1C38		A1C39		A1C40		A1C41		A1C42	
STATION LOCATION:		SO-01		SO-02		SO-03		SO-04		SO-05		SO-06	
MATRIX:		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.:		ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*
2,3,7,8-TCDD	1.0	UJ	0.404	0.182 J			4.62 *	0.269 J			0.183 *	0.414 J	
1,2,3,7,8-PeCDD	1.0	R		R			1.57 *	R		R		R	
1,2,3,4,7,8-HxCDD	0.1	UJ	0.343	U	0.0451	U	0.644	U	0.150	U	0.107	U	0.128
1,2,3,6,7,8-HxCDD	0.1	UJ	0.345	U	0.0439	U	0.598	U	0.145	U	0.108	U	0.126
1,2,3,7,8,9-HxCDD	0.1	UJ	0.344	U	0.0453	U	0.646	U	0.150	U	0.108		1.05 *
1,2,3,4,6,7,8-HpCDD	0.01	5.57 JEB		EB	0.319 *	10.1 EB		U	0.283	0.282 JEB		6.27 EB	
OCDD	0.0001	44.8 JEB		3.05 JEB		43.9 EB		4.44 JEB		2.26 JEB		49.7 EB	
2,3,7,8-TCDF	0.1	42.1 JEB		5.55 EB		16900 JEB$		89.8 JEB		116 EB		08.0 ED	
1,2,3,7,8-PeCDF	0.05	14.9 J		1.04 J		10900 $		14.8		65.8		47.1	
2,3,4,7,8-PeCDF	0.5	11.5 JEB		1.00 JEB		6590 EB$		8.32 EB		57.3 EB		32.8 EB	
1,2,3,4,7,8-HxCDF	0.1	19.0 JEB		1.11 JEB		14400 EB$		10.6 EB		91.0 EB		03.2 JEB	
1,2,3,6,7,8-HxCDF	0.1	4.30 J			0.244 *	3260 $		2.14 J		21.2		13.8	
2,3,4,6,7,8-HxCDF	0.1	1.35 J		0.141 J		552		U	0.203	6.28		4.74 J	
1,2,3,7,8,9-HxCDF	0.1	UJ	0.258	U	0.0491	192		U	0.267	1.79 J		1.64 J	
1,2,3,4,6,7,8-HpCDF	0.01	8.58 JEB		0.452 JEB		3790 JEB$		3.33 JEB		29.5 JEB		21.0 JEB	
1,2,3,4,7,8,9-HpCDF	0.01		3.60 *	0.242 J		1350		1.54 J		12.5		8.75	
OCDF	0.0001	23.1 JEB		2.93 JEB		2370 EB		4.97 JEB		29.9 EB		44.0 EB	
TOTAL TCDD		UJ	0.404	0.182 J		2.72 J		0.269 J		UJ	0.0603	1.01 J	
TOTAL PeCDD		UJ	0.469	UJ	0.0682	5.42 J		UJ	0.116	UJ	0.0845	UJ	0.179
TOTAL HxCDD		UJ	0.343	UJ	0.0439	UJ	0.596	UJ	0.145	UJ	0.107	2.00 J	
TOTAL HpCDD		8.76 JEB		UJ	0.0371	16.1 JEB		UJ	0.283	0.532 JEB		12.8 JEB	
TOTAL TCDF		54.4 JEB		8.56 JEB		36800 JEB$		111 JEB		282 JEB		162 JEB	
TOTAL PeCDF		50.2 J		3.13 J		32900 J$		31.9 J		270 J		165 J	
TOTAL HxCDF		33.8 JEB		1.25 JEB		24100 JEB$		13.5 JEB		148 JEB		110 JEB	
TOTAL HpCDF		17.0 JEB		1.23 JEB		7490 JEB$		7.13 JEB		61.2 JEB		33.1 JEB	
TOXIC EQUIVALENT (1):		13 J		1.4 J		7400 J		15 J		56 J		30 J	
%SOLIDS:		15		91		85		80		93		89	
DILUTION FACTOR:		1		1		1		1		1		1	
DATE SAMPLED:		03/03/2004		03/03/2004		03/01/2004		03/04/2004		03/02/2004		03/03/2004	
DATE OF RECEIPT:		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/06/2004	
SAMPLE EXTRACTION DATE:		03/09/2004		03/09/2004		03/09/2004		03/09/2004		03/09/2004		03/09/2004	
ANALYSIS DATE:		04/03/2004		04/03/2004		04/03/2004		03/31/2004		03/31/2004		03/31/2004	
LAB SAMPLE ID:		54007.01		54007.04		54007.05		54007.06		54007.07		54007.08	

* = The values in this column are either the Estimated Detection Limits (EDL) or the Estimated Maximum Possible Concentration (EMPC). The EMPC results are marked with a "*". The EDL values are unmarked.
The EMPC values are not qualified with a "J", since they are already estimated.
(1) The Toxic Equivalent concentration is calculated with the Toxicity Equivalency Factors (TEFs) found in "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number (12), December 1998, Table 1, page 778.
Concentrations reported by the laboratory below the lowest standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table I.
$ = Concentrations reported from a 0.5g sample analysis

Data Summary Table
Dioxin/Furan Analysis - Soil Samples
Dry Weight

SITE: Chlor-Alkali Facility (Former), Berlin, NH
CASE NO: DF002, SDG NO: A1C37
LABORATORY: Pace Analytical Services, Inc. - Broken Arrow, OK

SAMPLE NUMBER:	Toxicity Equivalency Factors (1)	A1C43		A1C44		A1C45		A1C46		A1C47		A1C48	
STATION LOCATION:		SO-07		SO-08		SO-09		SO-10		SO-11		SO-12	
MATRIX:		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC:		ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*
2,3,7,8-TCDD	1.0	U	0.0544	U	0.187	U	0.0950	7.41		8.67			0.327 *
1,2,3,7,8-PeCDD	1.0	R		R		R		R		1.81 J		R	
1,2,3,4,7,8-HxCDD	0.1	U	0.0357	U	0.269	U	0.126	U	0.459	U	0.753	U	0.0775
1,2,3,6,7,8-HxCDD	0.1	U	0.0345	U	0.270	U	0.124	2.26 J		3.38 J		U	0.0783
1,2,3,7,8,9-HxCDD	0.1	U	0.0358	U	0.269	U	0.126	U	0.460	U	0.755	U	0.0778
1,2,3,4,6,7,8-HpCDD	0.01	0.217 JEB		0.792 JEB		U	0.130	24.3 EB		12.6 EB		0.868 JEB	
OCDD	0.0001	2.10 JEB		6.79 JEB		3.22 JEB		158 EB		57.5 EB		5.08 JEB	
2,3,7,8-TCDF	0.1	1.94 EB		126 EB		16.9 EB		10000 JEB&		8970 EB$		165 EB	
1,2,3,7,8-PeCDF	0.05	0.481 J		15.8		5.63		501		800		88.3	
2,3,4,7,8-PeCDF	0.5	0.382 JEB		10.5 EB		3.84 JEB		387 EB		567 EB		74.6 EB	
1,2,3,4,7,8-HxCDF	0.1	0.676 JEB		15.1 EB		8.57 EB		277 JEB		610 JEB		131 EB	
1,2,3,6,7,8-HxCDF	0.1	0.216 J		2.91 J		1.87 J		69.2		97.9		35.0	
2,3,4,6,7,8-HxCDF	0.1	U	0.0532	U	0.401	0.495 J		15.6		21.1		9.96	
1,2,3,7,8,9-HxCDF	0.1	U	0.0539	U	0.465	U	0.169	10.3		30.1		2.30 J	
1,2,3,4,6,7,8-HpCDF	0.01	0.428 JEB		6.72 JEB		3.74 JEB		94.6 JEB		99.7 JEB		54.1 JEB	
1,2,3,4,7,8,9-HpCDF	0.01	U	0.0417	2.53 J		2.12 J		44.8		170		21.0	
OCDF	0.0001	EB	0.800 *	8.13 JEB		6.17 JEB		134 EB		119 EB		52.3 EB	
TOTAL TCDD		UJ	0.0544	UJ	0.187	UJ	0.0950	12.8 J		13.0 J		0.269 J	
TOTAL PeCDD		UJ	0.0521	UJ	0.184	UJ	0.0883	1.44 J		1.81 J		UJ	0.0773
TOTAL HxCDD		UJ	0.0345	UJ	0.269	UJ	0.124	5.16 J		3.38 J		UJ	0.0775
TOTAL HpCDD		0.217 JEB		0.792 JEB		0.303 JEB		43.2 JEB		24.0 JEB		1.50 JEB	
TOTAL TCDF		2.33 JEB		167 JEB		33.8 JEB		18100 JEB&		16400 JEB$		289 JEB	
TOTAL PeCDF		0.863 J		39.3 J		17.5 J		1550 J		2450 J		316 J	
TOTAL HxCDF		0.892 JEB		18.0 JEB		12.9 JEB		626 JEB		1040 JEB		230 JEB	
TOTAL HpCDF		0.428 JEB		11.3 JEB		7.91 JEB		145 JEB		270 JEB		100 JEB	
TOXIC EQUIVALENT(1):		0.50 J		20 J		5.2 J		1300 J		1300 J		77 J	
%SOLIDS:		91		80		75		69		86		86	
DILUTION FACTOR:		1		1		1		1		1		1	
DATE SAMPLED:		03/03/2004		03/04/2004		03/04/2004		03/04/2004		03/04/2004		03/03/2004	
DATE OF RECEIPT:		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/06/2004	
SAMPLE EXTRACTION DATE:		03/09/2004		03/09/2004		03/09/2004		03/09/2004		03/09/2004		03/09/2004	
ANALYSIS DATE:		04/03/2004		04/03/2004		04/03/2004		04/04/2004		04/04/2004		04/03/2004	
LAB SAMPLE ID:		54007.09		54007.10		54007.11		54007.12		54007.13		54007.14	

* = The values in this column are either the Estimated Detection Limits (EDL) or the Estimated Maximum Possible Concentration (EMPC). The EMPC results are marked with a "*". The EDL values are unmarked.
The EMPC values are not qualified with a "J", since they are already estimated.
(1) The Toxic Equivalent concentration is calculated with the Toxicity Equivalency Factors (TEFs) found in "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number (12), December 1998, Table 1, page 778.
Concentrations reported by the laboratory below the lowest standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table I.
$ = Concentrations reported from a 0.5g sample analysis.
& = Concentrations reported from a 0.6g sample analysis.

Data Summary Table
Dioxin/Furan Analysis - Soil Samples
Dry Weight

SITE: Chlor-Alkali Facility (Former) - Berlin, NH
CASE NO: DF002; SDG NO: A1C37
LABORATORY: Pace Analytical Services, Inc. - Broken Arrow, OK

SAMPLE NUMBER	Toxicity	A1C49		A1C50		A1C51		A1C52	
STATION LOCATION	Equivalency	SO-13		SO-14		SO-15		SO-16	
MATRIX	Factors (1)	SOIL		SOIL		SOIL		SOIL	
TCDD/TCDF CONC.		ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*	ng/Kg	EDL/EMPC*
2,3,7,8-TCDD	1.0	U	0.0723	2.33		U	0.0943	U	0.280
1,2,3,7,8-PeCDD	1.0	R		0.696 J		R		R	
1,2,3,4,7,8-HxCDD	0.1	U	0.0535	1.10 J		U	0.114	U	0.313
1,2,3,6,7,8-HxCDD	0.1	U	0.0530	1.15 J		U	0.113	U	0.307
1,2,3,7,8,9-HxCDD	0.1	U	0.0537	1.40 J		U	0.114	U	0.314
1,2,3,4,6,7,8-HpCDD	0.01	0.246 JEB		14.5 EB		0.235 JEB		2.87 JEB	
OCDD	0.0001	2.56 JEB		145 EB		3.06 JEB		19.1 EB	
2,3,7,8-TCDF	0.1	4.46 EB		619 EB#		2.03 JEB		123 EB	
1,2,3,7,8-PeCDF	0.05	2.19 J		91.1			1.67 *	45.7	
2,3,4,7,8-PeCDF	0.5	1.60 JEB		76.1 EB		EB	0.751 *	38.0 EB	
1,2,3,4,7,8-HxCDF	0.1	3.12 JEB		89.2 JEB		1.09 JEB		63.5 EB	
1,2,3,6,7,8-HxCDF	0.1	0.937 J		22.0		0.277 J		15.7	
2,3,4,6,7,8-HxCDF	0.1	U	0.0673	7.14		U	0.0919	4.47 J	
1,2,3,7,8,9-HxCDF	0.1	U	0.0789	U	0.395	U	0.0978	1.89 J	
1,2,3,4,6,7,8-HpCDF	0.01	1.44 JEB		73.3 JEB		0.571 JEB		26.4 JEB	
1,2,3,4,7,8,9-HpCDF	0.01	0.452 J		31.2		U	0.0922	11.8	
OCDF	0.0001	1.68 JEB		1570 EB		3.32 JEB		42.5 EB	
TOTAL TCDD		UJ	0.0723	2.83 J		UJ	0.0943	UJ	0.280
TOTAL PeCDD		UJ	0.0627	0.696 J		UJ	0.102	UJ	0.740
TOTAL HxCDD		UJ	0.0530	5.69 J		UJ	0.113	UJ	0.307
TOTAL HpCDD		0.246 JEB		31.7 JEB		0.235 JEB		5.85 JEB	
TOTAL TCDF		5.33 JEB		1260 JEB#		3.65 JEB		187 JEB	
TOTAL PeCDF		6.87 J		347 J		0.658 J		157 J	
TOTAL HxCDF		4.97 JEB		212 JEB		1.36 JEB		134 JEB	
TOTAL HpCDF		1.89 JEB		116 JEB		1.07 JEB		55.2 JEB	
TOXIC EQUIVALENT(1):		1.8 J		120 J		0.81 J		42 J	
% SOLIDS:		89		90		85		70	
DILUTION FACTOR:		1		1		1		1	
DATE SAMPLED:		03/03/2004		03/01/2004		03/02/2004		03/08/2004	
DATE OF RECEIPT:		03/06/2004		03/06/2004		03/06/2004		03/10/2004	
SAMPLE EXTRACTION DATE:		03/09/2004		03/09/2004		03/09/2004		03/12/2004	
ANALYSIS DATE:		04/03/2004		04/04/2004		04/04/2004		03/28/2004	
LAB SAMPLE ID.		54007.15		54007.16		54007.17		54014.01	

* = The values in this column are either the Estimated Detection Limits (EDL) or the Estimated Maximum Possible Concentration (EMPC). The EMPC results are marked with a "*". The EDL values are unmarked. The EMPC values are not qualified with a "J", since they are already estimated

(1) The Toxic Equivalent concentration is calculated with the Toxicity Equivalency Factors (TEFs) found in "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number (12), December 1998, Table 1, page 778.

Concentrations reported by the laboratory below the lowest standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table I

= Concentrations reported from a 1 Kg sample analysis.

Data Summary Table

Dioxin/Furan Analysis - Aqueous Samples

SITE: Chlor-Alkali Facility (Former) -Berlin, NH
CASE NO. DF002, SDG NO. A1C37
LABORATORY: Pace Analytical Services, Inc. - Broken Arrow, OK

SAMPLE NUMBER:	Toxicity Equivalency Factors (1)	A1C59		A1C60		A1C61		A1C62		A1C63		A1C64	
STATION LOCATION		Rig-01		RB-01		RB-02		RB-03		RB-04		RB-05	
MATRIX		AQUEOUS		AQUEOUS		AQUEOUS		AQUEOUS		AQUEOUS		AQUEOUS	
TCDD/TCDF CONC.		pg/L	DL/EMPC*	pg/L	DL/EMPC*	pg/L	DL/EMPC*	pg/L	DL/EMPC*	pg/L	DL/EMPC*	pg/L	DL/EMPC*
2,3,7,8-TCDD	1.0	U	0.803	U	0.818	U	0.423	U	0.445	U	0.633	U	0.493
1,2,3,7,8-PeCDD	1.0	U	0.688	U	0.803	U	0.463	U	0.469	U	0.662	U	0.511
1,2,3,4,7,8-HxCDD	0.1	U	0.536	U	0.809	U	0.389	U	0.386	U	0.528	U	0.361
1,2,3,6,7,8-HxCDD	0.1	U	0.506	U	0.798	U	0.392	U	0.381	U	0.499	U	0.372
1,2,3,7,8,9-HxCDD	0.1	U	0.537	U	0.812	U	0.391	U	0.387	U	0.630	U	0.362
1,2,3,4,6,7,8-HpCDD	0.01	3.68 J		4.71 J		1.66 J		2.27 J		4.81 J		2.01 J	
OCDD	0.0001	51.0 J		54.4 J		19.6 J		35.7 J		48.9 J		20.1 J	
2,3,7,8-TCDF	0.1	U	0.716	U	0.676	3.11 J		1.29 J		U	0.667		2.57 *
1,2,3,7,8-PeCDF	0.05	U	0.692	U	1.24	U	0.463	U	0.514	U	0.736	U	0.599
2,3,4,7,8-PeCDF	0.5	U	0.676	U	1.17		1.63 *	U	0.418	U	0.621	U	0.507
1,2,3,4,7,8-HxCDF	0.1	U	0.428	U	0.557		2.09 *	0.911 J		U	0.502	U	0.346
1,2,3,6,7,8-HxCDF	0.1	U	0.460	U	0.591	U	0.329	U	0.313	U	0.519	U	0.374
2,3,4,6,7,8-HxCDF	0.1	U	0.520	U	0.638	U	0.324	U	0.307	U	0.551	U	0.362
1,2,3,7,8,9-HxCDF	0.1	U	0.530	U	0.742	U	0.383	U	0.313	U	0.664	U	0.396
1,2,3,4,6,7,8-HpCDF	0.01	0.714 J		U	0.684	1.51 J		U	0.266	2.73 J		U	0.330
1,2,3,4,7,8,9-HpCDF	0.01	U	0.586	U	0.870	U	0.458	U	0.365	U	0.536	U	0.421
OCDF	0.0001	3.65 J			5.14 *	3.52 J		3.44 J		7.87 J		2.45 J	
TOTAL TCDD		UJ	0.803	UJ	0.818	UJ	0.423	UJ	0.445	UJ	0.633	UJ	0.493
TOTAL PeCDD		UJ	0.688	UJ	0.803	UJ	0.463	UJ	0.469	UJ	0.662	UJ	0.511
TOTAL HxCDD		UJ	0.506	UJ	0.798	UJ	0.389	UJ	0.381	UJ	0.499	UJ	0.361
TOTAL HpCDD		3.68 J		9.24 J		1.66 J		3.97 J		8.72 J		2.01 J	
TOTAL TCDF		UJ	0.716	UJ	0.676	5.20 J		1.29 J		UJ	0.667	1.39 J	
TOTAL PeCDF		UJ	0.676	UJ	1.17	UJ	0.421	UJ	0.418	UJ	0.621	UJ	0.507
TOTAL HxCDF		UJ	0.428	UJ	0.557	UJ	0.310	0.911 J		UJ	0.502	UJ	0.346
TOTAL HpCDF		0.714 J		2.30 J		3.49 J		UJ	0.266	8.61 J		UJ	0.330
TOXIC EQUIVALENT(1)		0.049 J		0.053 J		1.4 J		0.25 J		0.081 J		0.28 J	
DILUTION FACTOR		1		1		1		1		1		1	
DATE SAMPLED		03/01/2004		03/01/2004		03/02/2004		03/03/2004		03/04/2004		03/08/2004	
DATE OF RECEIPT		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/06/2004		03/10/2004	
SAMPLE EXTRACTION DATE		03/10/2004		03/10/2004		03/10/2004		03/10/2004		03/10/2004		03/10/2004	
ANALYSIS DATE		03/28/2004		03/31/2004		03/31/2004		03/31/2004		03/31/2004		03/31/2004	
LAB SAMPLE ID		54007.18		54007.19		54007.20		54007.21		54007.22		54007.23	

* = The values in this column are either the Estimated Detection Limits (EDL) or the Estimated Maximum Possible Concentration (EMPC). The EMPC results are marked with a "*". The EDL values are unmarked.
The EMPC values are not qualified with a "J", since they are already estimated.
(1) The Toxic Equivalent concentration is calculated with the Toxicity Equivalency Factors (TEFs) found in "Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and Wildlife", Environmental Health Perspectives, Volume 106, Number (12), December 1998, Table 1, page 778.
Concentrations reported by the laboratory below the lowest standard are flagged (J) on the Data Summary Table as estimated values. All other necessary qualifications are defined in Table I.

EPA
Region 1, New England

United States Environmental Protection Agency
Office of Environmental Measurement & Evaluation
11 Technology Drive
North Chelmsford, MA 01863-2431

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Laboratory Report

larch 15, 2004

ls Nancy Smith - HBS
'SEPA New England, Region 1
ne Congress Street
oston, MA 02114 - 2023

roject Number: 04030013
roject: Chlor-alkali Facility, NH
nalysis: Bulk Asbestos Analysis by PLM
nalyst: Dan Boudreau DB 3/15/04

nalytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, ASBES.SOP.

Analytical Method: Polarized Light Microscope (PLM) with Dispersion Staining.

All quantities are estimated volume percent.

Date Samples Received by the Laboratory: 3/5/04

esults relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be produced except in full, without written approval of the laboratory.

you have any questions please call me at 617-918-8333.

ncerely,

03/19/04

. William J. Andrade
lvanced Analytical Chemistry Specialist

US-ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14427	Lab Sample ID:	AA38763
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14428	Lab Sample ID:	AA38764
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14429	Lab Sample ID:	AA38765
Date of Collection:	3/1/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	**<1.0**	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Chrysotile present, but less than 1%.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14430	Lab Sample ID:	AA38766
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

›mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14431	Lab Sample ID:	AA38767
Date of Collection:	3/2/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14432	Lab Sample ID:	AA38768
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophyllite	ND	1.0	
	Chrysotile	**<1.0**	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Chrysotile present, but less than 1%.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14433	Lab Sample ID:	AA38769
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14434	Lab Sample ID:	AA38770
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Trace level of chrysotile present.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14435	Lab Sample ID:	AA38771
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14436	Lab Sample ID:	AA38772
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophyllite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

›mments: Soil sample. Trace level of chrysotile present.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14437	Lab Sample ID:	AA38773
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Trace level of chrysotile present.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14438	Lab Sample ID:	AA38774
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14439	Lab Sample ID:	AA38775
Date of Collection:	3/3/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophyllite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Trace level of chrysotile present.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14440	Lab Sample ID:	AA38776
Date of Collection:	3/1/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophyllite	ND	1.0	
	Chrysotile	**<1.0**	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Soil sample. Chrysotile present, but less than 1%.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14441	Lab Sample ID:	AA38777
Date of Collection:	3/2/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophyllite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

mments: Soil sample. No asbestos found.

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14461	Lab Sample ID:	AA38778
Date of Collection:	3/4/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

omments: Bulk sample. No asbestos found. Sample is ~5% cellulose and 79% mineral wool.

EPA
1, New England

United States Environmental Protection Agency
Office of Environmental Measurement & Evaluation
11 Technology Drive
North Chelmsford, MA 01863-2431

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Laboratory Report

March 15, 2004

Ms Nancy Smith - HBS
USEPA New England, Region 1
One Congress Street
Boston, MA 02114 - 2023

Project Number: 04030021
Project: Chlor-alkali Facility, NH
Analysis: Bulk Asbestos Analysis by PLM
Analyst: Dan Boudreau DB 3/15/04

Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, ASBES.SOP.

Analytical Method: Polarized Light Microscope (PLM) with Dispersion Staining.

All quantities are estimated volume percent.

Date Samples Received by the Laboratory: 3/9/04

esults relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be produced except in full, without written approval of the laboratory.

you have any questions please call me at 617-918-8333.

ncerely,

W J Andrade 03/19/04

. William J. Andrade
dvanced Analytical Chemistry Specialist

US ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND LABORATORY

Chlor-alkali Facility, NH

Bulk Asbestos Analysis by PLM

Client Sample ID:	D14442	Lab Sample ID:	AA38827
Date of Collection:	3/8/2004	Matrix	Soil
Date of Extraction:	3/15/04		
Date of Analysis:	3/15/04		

CAS Number	Compound	Concentration %	RL %	Qualifier
	Actinolite	ND	1.0	
	Amosite	ND	1.0	
	Anthophylite	ND	1.0	
	Chrysotile	ND	1.0	
	Crocidolite	ND	1.0	
	Tremolite	ND	1.0	

Comments: Soil sample. Trace level of chrysotile present.

ATTACHMENT D

CHLOR-ALKALI FACILITY (FORMER)

GROUNDWATER SAMPLE ANALYTICAL RESULTS
WESTON MNH, ON BEHALF OF
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

Samples collected 7 and 8 April 2004

DATA SUMMARY KEY
ORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification. The R replaces the numerical value or SQL.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the SQL or the adjusted SQL.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated SQL.
EB	=	The compound was identified in an aqueous EB that was used to assess field contamination associated with soil/sediment samples.
TB	=	The compound was identified in an aqueous TB that was used to assess field contamination associated with soil/sediment samples.
BB	=	The compound was identified in an aqueous BB that was used to assess field contamination associated with soil/sediment samples.

DATA SUMMARY KEY
INORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The result is rejected due to gross deficiencies in quality control criteria. The result is unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
U	=	The compound was analyzed for but not detected. The associated numerical value is the SDL or the adjusted SDL.
UJ	=	The compound was analyzed for but not detected. The associated numerical value is the estimated SDL.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		TB-040704	MW7-0404	MW2-0404	MW13A-0404
LABORATORY NUMBER:		AG02607	AG02608	AG02609	AG02610
COMPOUND	RL				
2-Butanone	10	10 UJ	10 U	10 U	10 UJ
2-Hexanone	10	10 UJ	10 UJ	10 UJ	10 UJ
4-Methyl-2-Pentanone	10	10 UJ	10 UJ	10 UJ	10 UJ
Acetone	10	10 UJ	18 J	10 UJ	*420 J
Tetrahydrofuran	10	10 UJ	10 UJ	10 UJ	10 UJ
1,1,2,2-Tetrachloroethane	2.0	2.0 UJ	2.0 U	2.0 U	2.0 U
Hexachlorobutadiene	2.0	2.0 UJ	2.0 U	2.0 U	2.0 U
Vinyl Chloride	2.0	2.0 UJ	2.0 U	0.76 J	3.6 J
Chloromethane	3.0	3.0 UJ	3.0 U	3.0 U	0.74 J
1,1,1,2-Tetrachloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
1,1,2-Trichloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
1,1-Dichloroethene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
1,1-Dichloropropene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
1,2,3-Trichlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2,4-Trimethylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	5.0	R	R	R	R
1,2-Dibromoethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
1,2-Dichloropropane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,3-Dichloropropane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
2,2-Dichloropropane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
2-Chlorotoluene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
2-Methoxy-2-Methylbutane (TAME)	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
4-Chlorotoluene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
4-Isopropyltoluene	5.0	5.0 UJ	1.4 J	5.0 U	5.0 U
Benzene	5.0	5.0 UJ	5.0 U	5.0 U	0.95 J
Bromobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Bromochloromethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Bromodichloromethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Bromoform	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Bromomethane	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
Carbon Disulfide	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Carbon Tetrachloride	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Chlorobenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Chloroethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Chloroform	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
cis-1,2-Dichloroethene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
cis-1,3-Dichloropropene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Dibromomethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Dichlorodifluoromethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Diethyl Ether	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Diisopropyl ether (DIPE)	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Ethyl-t-butyl-ether (ETBE)	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
Ethylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	0.53 J
Isopropylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
m,p-Xylene	5.0	5.0 UJ	5.0 U	5.0 U	2.7 J
Methylene Chloride	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		TB-040704	MW7-0404	MW2-0404	MW13A-0404
LABORATORY NUMBER:		AG02607	AG02608	AG02609	AG02610
COMPOUND	RL				
n-Butylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
n-Propylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Naphthalene	5.0	5.0 UJ	5.0 U	5.0 U	28
o-Xylene	5.0	5.0 UJ	5.0 U	5.0 U	1.1 J
sec-Butylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Styrene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
t-Butyl-Methyl Ether	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
tert-Butylbenzene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0	5.0 UJ	12 J	5.0 U	5.0 U
Toluene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
trans-1,2-Dichloroethene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
trans-1,3-Dichloropropene	5.0	5.0 UJ	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0	5.0 UJ	10 J	0.66 J	0.98 J
Trichlorofluoromethane	5.0	5.0 UJ	5.0 U	5.0 U	5.0 UJ
tert-Butanol (TBA)	50	R	R	R	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0/10.0*
DATE SAMPLED:		03/29/04	04/07/04	04/07/04	04/07/04
DATE ANALYZED:		04/14/04	04/14/04	04/14/04	04/14/04

* Result reported from diluted analysis.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		MW13B-0404	MW23A-0404	MW23B-0404	MW14R-0404
LABORATORY NUMBER:		AG02611	AG02612	AG02613	AG02614
COMPOUND	RL				
2-Butanone	10	10 U	10 U	10 U	7.8 J
2-Hexanone	10	10 UJ	10 UJ	10 UJ	10 UJ
4-Methyl-2-Pentanone	10	10 UJ	10 UJ	10 UJ	10 UJ
Acetone	10	30 J	10 UJ	10 UJ	*120 J
Tetrahydrofuran	10	10 UJ	10 UJ	10 UJ	10 UJ
1,1,2,2-Tetrachloroethane	2.0	2.0 U	2.0 U	2.0 U	2.0 U
Hexachlorobutadiene	2.0	2.0 U	2.0 U	2.0 U	2.0 U
Vinyl Chloride	2.0	2.0 U	2.0 U	2.0 U	2.0 U
Chloromethane	3.0	3.0 U	3.0 U	3.0 U	3.0 U
1,1,1,2-Tetrachloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,1,1-Trichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,1,2-Trichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloropropene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2,3-Trichloropropane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trichlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2,4-Trimethylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dibromo-3-Chloropropane	5.0	R	R	R	R
1,2-Dibromoethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichloropropane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,3,5-Trimethylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichloropropane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
2,2-Dichloropropane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
2-Chlorotoluene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
2-Methoxy-2-Methylbutane (TAME)	5.0	5.0 U	5.0 U	5.0 U	5.0 U
4-Chlorotoluene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
4-Isopropyltoluene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5.0	5.0 U	5.0 U	2.1 J	5.0 U
Bromobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Bromochloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Bromodichloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Bromoform	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Bromomethane	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
Carbon Disulfide	5.0	5.0 U	5.0 U	5.0 U	0.58 J
Carbon Tetrachloride	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Chlorobenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Chloroethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Chloroform	5.0	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,2-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
cis-1,3-Dichloropropene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Dibromochloromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Dibromomethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Dichlorodifluoromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Diethyl Ether	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Diisopropyl ether (DIPE)	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Ethyl-t-butyl-ether (ETBE)	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Ethylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Isopropylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
m,p-Xylene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Methylene Chloride	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
VOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		MW13B-0404	MW23A-0404	MW23B-0404	MW14R-0404
LABORATORY NUMBER:		AG02611	AG02612	AG02613	AG02614
COMPOUND	RL				
n-Butylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
n-Propylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Naphthalene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
o-Xylene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
sec-Butylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
t-Butyl-Methyl Ether	5.0	5.0 UJ	5.0 UJ	5.0 UJ	5.0 UJ
tert-Butylbenzene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Tetrachloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Toluene	5.0	5.0 U	5.0 U	5.0 U	1.9 J
trans-1,2-Dichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
trans-1,3-Dichloropropene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Trichloroethene	5.0	5.0 U	5.0 U	5.0 U	5.0 U
Trichlorofluoromethane	5.0	5.0 U	5.0 U	5.0 U	5.0 U
tert-Butanol (TBA)	50	R	R	R	R
DILUTION FACTOR:		1.0	1.0	1.0	1.0/10*
DATE SAMPLED:		04/07/04	04/08/04	04/08/04	04/08/04
DATE ANALYZED:		04/14/04	04/14/04	04/14/04	04/14/04

* Result reported from diluted analysis.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 2
SEMIVOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		MW7-0404	MW2-0404	MW13A-0404	MW13B-0404
LABORATORY NUMBER:		AG02608	AG02609	AG02610	AG02611
COMPOUND	RL				
1,2,4-Trichlorobenzene	10	10 U	10 U	10 U	10 U
1,2-Dichlorobenzene	10	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10	10 U	10 U	10 U	10 U
2,4-Dimethyl phenol	10	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	10	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10	10 U	10 U	10 U	10 U
2-Chlorophenol	10	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10	10 U	10 U	3.5 J	10 U
2-Methylphenol (o-cresol)	10	10 U	10 U	10 U	10 U
2-Nitroaniline	10	10 U	10 U	10 U	10 U
2-Nitrophenol	10	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	10	10 U	10 U	10 U	10 U
4-Chloroaniline	10	10 U	10 U	10 U	10 U
4-Chlorophenyl-phenylether	10	10 U	10 U	10 U	10 U
Acenaphthene	10	10 U	10 U	10 U	10 U
Acenaphthylene	10	10 U	10 U	10 U	10 U
Aniline	10	10 U	10 U	10 U	10 U
Anthracene	10	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10	10 U	10 U	10 U	10 U
Benzo(g,h,i)perylene	10	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10	10 U	10 U	10 U	10 U
Benzyl alcohol	10	10 U	10 U	10 U	2.4 J
Benzylbutylphthalate	10	10 U	10 U	10 U	10 U
Bis(2-ethylhexyl)phthalate	10	10 U	10 U	10 U	10 U
Bis(2-chloroethoxy) methane	10	10 U	10 U	10 U	10 U
Bis(2-chloroethyl) ether	10	10 U	10 U	10 U	10 U
Bis(2-chloroisopropyl) ether	10	10 U	10 U	10 U	10 U
Carbazole	10	10 U	10 U	5.1 J	10 U
Chrysene	10	10 U	10 U	10 U	10 U
Di-n-butylphthalate	10	10 U	10 U	10 U	10 U
Di-n-octylphthalate	10	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10	10 U	10 U	10 U	10 U
Dibenzofuran	10	10 U	10 U	6.6 J	10 U
Diethylphthalate	10	10 U	10 U	10 U	10 U
Dimethylphthalate	10	10 U	10 U	10 U	10 U
Fluoranthene	10	10 U	10 U	3.1 J	10 U
Fluorene	10	10 UJ	10 UJ	4.0 J	10 UJ
Hexachlorobenzene	10	10 U	10 U	10 U	10 U
Hexachlorobutadiene	10	10 U	10 U	10 U	10 U
Hexachlorocyclopentadiene	10	10 UJ	10 UJ	10 UJ	10 UJ
Hexachloroethane	10	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	10 U	10 U	10 U
Isophorone	10	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propyl amine	10	10 U	10 U	10 U	10 U
N-Nitrosodimethylamine	10	10 UJ	10 UJ	10 UJ	10 UJ
N-Nitrosodiphenylamine	10	10 U	10 U	10 U	10 U
Naphthalene	10	10 U	10 U	9.0 J	10 U
Nitrobenzene	10	10 UJ	10 UJ	10 UJ	10 UJ
Phenanthrene	10	10 U	10 U	15	10 U
Phenol	10	10 U	10 U	10 U	10 U
Pyrene	10	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	20	20 U	20 U	20 U	20 U
4-Chloro-3-methylphenol	20	20 U	20 U	20 U	20 U

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 2
SEMIVOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		MW7-0404	MW2-0404	MW13A-0404	MW13B-0404
LABORATORY NUMBER:		AG02608	AG02609	AG02610	AG02611
COMPOUND	RL				
Benzidine	20	20 UJ	20 UJ	20 UJ	20 UJ
2,4-Dinitrophenol	50	50 U	50 U	50 U	50 U
3-Nitroaniline	50	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methylphenol	50	50 U	50 U	50 U	50 U
4-Nitroaniline	50	50 U	50 U	50 U	50 U
4-Nitrophenol	50	50 UJ	50 UJ	50 UJ	50 UJ
Azobenzene	50	50 U	50 U	50 U	50 U
Pentachlorophenol	50	50 U	50 U	50 U	50 U
Benzoic acid	10	3.0 J	10 UJ	2.6 J	3.8 J
3&4-Methylphenol (m&p-cresol)	10	3.4 J	10 U	10 U	10 U
DILUTION FACTOR:		1.0	1.0	1.0	1.0
DATE SAMPLED:		04/07/04	04/07/04	04/07/04	04/07/04
DATE EXTRACTED:		04/13/04	04/13/04	04/13/04	04/13/04
DATE ANALYZED:		04/13/04	04/13/04	04/13/04	04/13/04

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 2
SEMIVOLATILE AQUEOUS ANALYSES
µg/L

SAMPLE LOCATION:		MW23A-0404	MW23B-0404
LABORATORY NUMBER:		AG02612	AG02613
COMPOUND	RL		
1,2,4-Trichlorobenzene	10	10 U	10 U
1,2-Dichlorobenzene	10	10 U	10 U
1,3-Dichlorobenzene	10	10 U	10 U
1,4-Dichlorobenzene	10	10 U	10 U
2,4,5-Trichlorophenol	10	10 U	10 U
2,4,6-Trichlorophenol	10	10 U	10 U
2,4-Dichlorophenol	10	10 U	10 U
2,4-Dimethyl phenol	10	10 U	10 U
2,4-Dinitrotoluene	10	10 U	10 U
2,6-Dinitrotoluene	10	10 U	10 U
2-Chloronaphthalene	10	10 U	10 U
2-Chlorophenol	10	10 U	10 U
2-Methylnaphthalene	10	10 U	10 U
2-Methylphenol (o-cresol)	10	10 U	10 U
2-Nitroaniline	10	10 U	10 U
2-Nitrophenol	10	10 U	10 U
4-Bromophenyl-phenylether	10	10 U	10 U
4-Chloroaniline	10	10 U	10 U
4-Chlorophenyl-phenylether	10	10 U	10 U
Acenaphthene	10	10 U	10 U
Acenaphthylene	10	10 U	10 U
Aniline	10	10 U	10 U
Anthracene	10	10 U	10 U
Benzo(a)anthracene	10	10 U	10 U
Benzo(a)pyrene	10	10 U	10 U
Benzo(b)fluoranthene	10	10 U	10 U
Benzo(g,h,i)perylene	10	10 U	10 U
Benzo(k)fluoranthene	10	10 U	10 U
Benzyl alcohol	10	10 U	10 U
Benzylbutylphthalate	10	10 U	10 U
Bis(2-ethylhexyl)phthalate	10	10 U	3.3 J
Bis(2-chloroethoxy) methane	10	10 U	10 U
Bis(2-chloroethyl) ether	10	10 U	10 U
Bis(2-chloroisopropyl) ether	10	10 U	10 U
Carbazole	10	10 U	10 U
Chrysene	10	10 U	10 U
Di-n-butylphthalate	10	10 U	10 U
Di-n-octylphthalate	10	10 U	10 U
Dibenz(a,h)anthracene	10	10 U	10 U
Dibenzofuran	10	10 U	10 U
Diethylphthalate	10	10 U	10 U
Dimethylphthalate	10	10 U	10 U
Fluoranthene	10	10 U	10 U
Fluorene	10	10 UJ	10 UJ
Hexachlorobenzene	10	10 U	10 U
Hexachlorobutadiene	10	10 U	10 U
Hexachlorocyclopentadiene	10	10 UJ	10 UJ
Hexachloroethane	10	10 U	10 U
Indeno(1,2,3-cd)pyrene	10	10 U	10 U
Isophorone	10	10 U	10 U
N-Nitrosodi-n-propyl amine	10	10 U	10 U
N-Nitrosodimethylamine	10	10 UJ	10 UJ
N-Nitrosodiphenylamine	10	10 U	10 U
Naphthalene	10	10 U	10 U
Nitrobenzene	10	10 UJ	10 UJ
Phenanthrene	10	10 U	10 U
Phenol	10	10 U	10 U
Pyrene	10	10 U	10 U
3,3'-Dichlorobenzidine	20	20 U	20 U
4-Chloro-3-methylphenol	20	20 U	20 U

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: WSB040904A
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 2
SEMIVOLATILE AQUEOUS ANALYSES
µg/L

	SAMPLE LOCATION:	MW23A-0404	MW23B-0404
	LABORATORY NUMBER:	AG02612	AG02613
COMPOUND	RL		
Benzidine	20	20 UJ	20 UJ
2,4-Dinitrophenol	50	50 U	50 U
3-Nitroaniline	50	50 U	50 U
4,6-Dinitro-2-methylphenol	50	50 U	50 U
4-Nitroaniline	50	50 U	50 U
4-Nitrophenol	50	50 UJ	50 UJ
Azobenzene	50	50 U	50 U
Pentachlorophenol	50	50 U	50 U
Benzoic acid	10	10 UJ	10 UJ
3&4-Methylphenol (m&p-cresol)	10	10 U	10 U
	DILUTION FACTOR:	1.0	1.0
	DATE SAMPLED:	04/08/04	04/08/04
	DATE EXTRACTED:	04/13/04	04/13/04
	DATE ANALYZED:	04/13/04	04/13/04

SITE: CHLOR-ALKALI FACILITY
CASE: NLS SDG: WSB040904B
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
INORGANIC AQUEOUS ANALYSES
mg/L

SAMPLE LOCATION:			MW16A-0404	MW16B-0404	MW21-0404	MW9-0404	MW5-0404	MW15-0404	MW8-0404
LABORATORY NUMBER:			AG02597	AG02598	AG02599	AG02600	AG02601	AG02602	AG02603
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (mg/L)							
SILVER	P	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ARSENIC	P	0.01	0.01 U	0.095	0.063	0.044	0.01 U	0.027 J	0.052
BARIUM	P	0.01	0.014 J	0.024	0.028	0.067	0.79	0.016 J	0.011 J
CADMIUM	P	0.003	0.003 U	0.003 U	0.003 U	0.005	0.003 U	0.003 U	0.003 U
CHROMIUM	P	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.012	0.15	0.01 U
MERCURY	CV	0.0002	0.0002 U	0.0002 J	0.00067	0.0002 U	0.00023	0.0002 U	0.33
LEAD	P	0.005	0.005 U	0.014	0.085	0.014	0.024	0.005 U	0.027
SELENIUM	P	0.05	0.05 U	0.05	0.058	0.05 U	0.05 U	0.05 U	0.061

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR

NOTE:
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UJ - VALUE IS NON-DETECTED AND DETECTION LIMIT IS ESTIMATED.
R - VALUE IS REJECTED.

SITE: CHLOR-ALKALI FACILITY
CASE: NLS SDG: WSB040904B
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1 -
INORGANIC AQUEOUS ANALYSES
mg/L

SAMPLE LOCATION:			MW11A-0404	MW11B-0404	MW12-0404	MW7-0404	MW2-0404	MW13A-0404	MW13B-0404
LABORATORY NUMBER:			AG02604	AG02605	AG02606	AG02608	AG02609	AG02610	AG02611
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (mg/L)							
SILVER	P	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ARSENIC	P	0.01	0.01 U	0.024	0.01 U	0.053	0.01 U	0.01 U	0.011
BARIUM	P	0.01	0.049	0.023	0.055	0.065	0.023	0.012 J	0.055
CADMIUM	P	0.003	0.003 U	0.003 U	0.003 U	0.004 J	0.003 U	0.003 U	0.003 U
CHROMIUM	P	0.01	0.01 U	0.01 U	0.01 U	0.011	0.01 U	0.01 U	0.01 U
MERCURY	CV	0.0002	0.0002 U	0.0002 U	0.0002 U	0.022	0.0071	0.0049	0.0002 U
LEAD	P	0.005	0.005 U	0.01	0.005 U	0.087	0.011	0.005 U	0.005 U
SELENIUM	P	0.05	0.05 U	0.05 U	0.05 U	0.062	0.05 U	0.05 U	0.05 U

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR

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SITE: CHLOR-ALKALI FACILITY
CASE: NLS SDG: WSB040904B
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
INORGANIC AQUEOUS ANALYSES
mg/L

SAMPLE LOCATION:			MW23A-0404	MW23B-0404	MW14R-0404	MW19-0404	MW20A-0404	MW20B-0404	MW22-0404
LABORATORY NUMBER:			AG02612	AG02613	AG02614	AG02615	AG02616	AG02617	AG02618
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (mg/L)							
SILVER	P	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ARSENIC	P	0.01	0.01 U	0.01 U	0.33	0.01 U	0.10	0.077	0.01 U
BARIUM	P	0.01	0.083	0.096	0.18	0.046	0.79	0.20	0.015 J
CADMIUM	P	0.003	0.003 U	0.003 U	0.057	0.003 U	0.01	0.003 U	0.003 U
CHROMIUM	P	0.01	0.01 U	0.01 U	0.01 U	0.01 U	0.16	0.082	0.01 U
MERCURY	CV	0.0002	0.0002 U	0.0002 U	0.0051	0.0002 U	0.0038	0.0019	0.0002 U
LEAD	P	0.005	0.005 J	0.005 U	0.016	0.005 J	1.0	0.17	0.011
SELENIUM	P	0.05	0.05 U	0.05 U	0.32	0.05 U	0.05	0.057	0.05 U

ANALYTICAL METHOD
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CV - COLD VAPOR

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SITE: CHLOR-ALKALI FACILITY
CASE: NLS SDG: WSB040904B
LABORATORY: NORTHEAST LABORATORY SERVICES

TABLE 1
INORGANIC AQUEOUS ANALYSES
mg/L

SAMPLE LOCATION:			MW10A-0404	MW10B-0404	MW18A-0404	MW18B-0404	MW17-0404	MW4-0404
LABORATORY NUMBER:			AG02619	AG02620	AG02621	AG02622	AG02623	AG02624
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (mg/L)						
SILVER	P	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
ARSENIC	P	0.01	0.026	0.042	0.01 U	0.015	0.01 U	0.015
BARIUM	P	0.01	0.022	0.095	0.21	0.014 J	0.025	0.029
CADMIUM	P	0.003	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U
CHROMIUM	P	0.01	0.01 U	0.018	0.01 U	0.01 U	0.01 U	0.01 U
MERCURY	CV	0.0002	0.0002 U	0.00032	0.0002 U	0.0002 U	0.0002 U	0.0002 U
LEAD	P	0.005	0.008 J	0.042	0.013	0.005 U	0.005 U	0.005 J
SELENIUM	P	0.05	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U

ANALYTICAL METHOD
P - ICP
CV - COLD VAPOR

NOTE:
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ATTACHMENT E

CHLOR-ALKALI FACILITY (FORMER)

SEDIMENT SAMPLE ANALYTICAL RESULTS
WESTON MNH, ON BEHALF OF
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

Samples collected 4 through 6 December 2001

DATA SUMMARY KEY
INORGANIC DATA VALIDATION

J	=	The associated numerical value is an estimated quantity.
R	=	The result is rejected due to gross deficiencies in quality control criteria. The result is unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
U	=	The compound was analyzed for, but not detected. The associated numerical value is the SDL or the adjusted SDL.
UJ	=	The compound was analyzed for, but not detected. The associated numerical value is the estimated SDL.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: SE120701
LABORATORY: FRONTIER GEOSCIENCES, INC.

TABLE 1
INORGANIC SOIL ANALYSES
ng/g

SAMPLE LOCATION:			RSD1-1	RSD1-2	RSD1-3	RSD2-1	RSD3-1	SHD1-1	SHD1-2
PERCENT SOLIDS:			78.8	83.4	76.5	66.5	90.0	65.4	60.9
SAMPLING DATE:			12/04/01	12/04/01	12/04/01	12/04/01	12/04/01	12/05/01	12/05/01
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (ng/g)							
TOTAL MERCURY	FGS-066/FGS-069	0.13	105 J	286 J	166 J	1210 J	39.4 J	99.1 J	129 J
MONOMETHYL MERCURY	FGS-045/FGS-070	0.010	NA	0.022 J	NA	3.77 J	0.036 J	0.476 J	NA
SSE F1	Bloom Paper	0.8	NA	0.6 J	NA	1.0 J	0.9 J	0.4 J	NA
SSE F2	Bloom Paper	0.8	NA	0.8 UJ	NA	0.80 UJ	0.8 UJ	0.8 UJ	NA
SSE F3	Bloom Paper	1.3	NA	42.5 J	NA	343 J	11.9 J	96.7 J	NA
SSE F4	Bloom Paper	0.9	NA	24.8 J	NA	2370 J	2.9 J	13.2 J	NA
SSE F5	Bloom Paper	0.4	NA	21.3 J	NA	5670 J	0.4 UJ	7.4 J	NA
SSE TOTAL	Bloom Paper	2.2	NA	89.2 J	NA	8390 J	15.7 J	118 J	NA

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SOPs FGS-066/FGS-069
SOPs FGS-045/FGS-070
Bloom Paper - "Application of Selective Extractions to the Determination of Mercury Speciation in Mine Tailings and Adjacent Soils".

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- NA - NOT ANALYZED.

SSE F1 - Preferential extraction fraction of water soluble mercury compounds (e.g.,$HgCl_2$, $HgSO_4$. etc.).
SSE F2 - Preferential extraction fraction of 'stomach acid' soluble mercury compounds (e.g., HgO).
SSE F3 - Preferential extraction fraction of organochelated mercury (e.g., Hg-humics, Hg_2Cl_2, etc.).
SSE F4 - Preferential extraction fraction of elemental mercury (e.g., mineral lattice,Hg_2CL_2, Hg-elemental).
SSE F5 - Preferential extraction fraction of mercuric sulfide compounds (HgS, meta-HgS, HgSe, HgAu, etc.)
SSE TOTAL - Sum of fractions 1 through 5.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: SE120701
LABORATORY: FRONTIER GEOSCIENCES, INC.

TABLE 1
INORGANIC SOIL ANALYSES
ng/g

SAMPLE LOCATION:			SHD1-3	SHD2-1	SHD2-2	SHD2-3	SHD3-1	SHD4-1	SHD4-2
PERCENT SOLIDS:			65.6	60.3	71.2	67.2	70.8	77.8	81.0
SAMPLING DATE:			12/05/01	12/05/01	12/05/01	12/05/01	12/05/01	12/05/01	12/05/01
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (ng/g)							
TOTAL MERCURY	FGS-066/FGS-069	0.13	538 J	163 J	68.0 J	586 J	191 J	797 J	619 J
MONOMETHYL MERCURY	FGS-045/FGS-070	0.010	1.83 J	1.86 J	NA	0.629 J	NA	0.204 J	NA
SSE F1	Bloom Paper	0.8	4.1 J	13.9 J	NA	5.5 J	NA	4.2 J	NA
SSE F2	Bloom Paper	0.8	0.8 UJ	0.8 UJ	NA	0.8 UJ	NA	0.8 UJ	NA
SSE F3	Bloom Paper	1.3	227 J	344 J	NA	163 J	NA	91.9 J	NA
SSE F4	Bloom Paper	0.9	297 J	198 J	NA	423 J	NA	158 J	NA
SSE F5	Bloom Paper	0.4	66.0 J	20.5 J	NA	34.2 J	NA	108 J	NA
SSE TOTAL	Bloom Paper	2.2	593 J	576 J	NA	626 J	NA	362 J	NA

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SOPs FGS-066/FGS-069
SOPs FGS-045/FGS-070
Bloom Paper - "Application of Selective Extractions to the Determination of Mercury Speciation in Mine Tailings and Adjacent Soils".

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NA - NOT ANALYZED.

SSE F1 - Preferential extraction fraction of water soluble mercury compounds (e.g.,$HgCl_2$, $HgSO_4$, etc.).
SSE F2 - Preferential extraction fraction of 'stomach acid' soluble mercury compounds (e.g., HgO).
SSE F3 - Preferential extraction fraction of organochelated mercury (e.g., Hg-humics, Hg_2Cl_2, etc.).
SSE F4 - Preferential extraction fraction of elemental mercury (e.g., mineral lattice,Hg_2CL_2, Hg-elemental).
SSE F5 - Preferential extraction fraction of mercuric sulfide compounds (HgS, meta-HgS, HgSe, HgAu, etc.).
SSE TOTAL - Sum of fractions 1 through 5.

SITE: CHLOR-ALKALI FACILITY
CASE: MNH SDG: SE120701
LABORATORY: FRONTIER GEOSCIENCES, INC.

TABLE 1
INORGANIC SOIL ANALYSES
ng/g

SAMPLE LOCATION:			SMD1-1	SMD1-2	SMD2-1	SMD2-2	SMD3-1	SMD3-2
PERCENT SOLIDS:			81.9	78.9	74.8	81.7	88.0	82.8
SAMPLING DATE:			12/06/01	12/06/01	12/06/01	12/06/01	12/06/01	12/06/01
INORGANIC ANALYTES	METHOD	REPORTING LIMITS (ng/g)						
TOTAL MERCURY	FGS-066/FGS-069	0.13	2.08 J	2.98 J	3.69 J	436 J	3.47 J	3.88 J
MONOMETHYL MERCURY	FGS-045/FGS-070	0.010	0.013 J	NA	NA	NA	NA	0.129 J
SSE F1	Bloom Paper	0.8	NA	NA	NA	NA	NA	NA
SSE F2	Bloom Paper	0.8	NA	NA	NA	NA	NA	NA
SSE F3	Bloom Paper	1.3	NA	NA	NA	NA	NA	NA
SSE F4	Bloom Paper	0.9	NA	NA	NA	NA	NA	NA
SSE F5	Bloom Paper	0.4	NA	NA	NA	NA	NA	NA
SSE TOTAL	Bloom Paper	2.2	NA	NA	NA	NA	NA	NA

NOTE: RESULTS ARE REPORTED ON A DRY WEIGHT BASIS.

SOPs FGS-066/FGS-069
SOPs FGS-045/FGS-070
Bloom Paper - "Application of Selective Extractions to the Determination of Mercury Speciation in Mine Tailings and Adjacent Soils".

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SSE F2 - Preferential extraction fraction of 'stomach acid' soluble mercury compounds (e.g., HgO).
SSE F3 - Preferential extraction fraction of organochelated mercury (e.g., Hg-humics, Hg_2Cl_2, etc.).
SSE F4 - Preferential extraction fraction of elemental mercury (e.g., mineral lattice,Hg_2CL_2, Hg-elemental).
SSE F5 - Preferential extraction fraction of mercuric sulfide compounds (HgS, meta-HgS, HgSe, HgAu, etc.).
SSE TOTAL - Sum of fractions 1 through 5.