SECOND SUPERFUND FIVE-YEAR REVIEW REPORT
CHEMTRONICS SUPERFUND SITE
SWANNANOA, BUNCOMBE COUNTY, NC
EPA ID: NCD 095 459 392

Prepared by
The U.S. Environmental Protection Agency, Region 4
Atlanta, GA

With the Assistance of
Altamont Environmental, Inc.
On behalf of
Chemtronics, Inc., CNA Holdings, Inc. and
Northrop Grumman Systems Corp.

September 2007

EPA Five-Year Review Signature Cover

FIVE-YEAR REVIEW SUMMARY FORM		
SITE IDENTIFICATION		
Site Name: Chemtronics	**EPA ID**: NCD 095 459 392	
Region: 4	**State**: North Carolina	**City/County**: Swannanoa/Buncombe
SITE STATUS		
NPL Status: ☒ Final ☐ Deleted ☐ Other (Specify) _____		
Site Lead: ☐ Fund ☒ PRP		
Remediation status (choose all that apply): ☐ Under construction ☒ Operating ☐ Complete		
Multiple OUs?: ☐ Yes ☒ No	**Construction completion date**: March 25, 1993	
LTRA: ☐ Yes ☒ No	**Has site been put into reuse?** ☐ Yes ☒ No	
REVIEW STATUS		
Lead Agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Review Period: March 2007 to September 2007	**Date(s) of Site Inspection**: May 8, 2007	
Who conducted the review (EPA Region, state, Federal agencies or contractor): EPA-Region 4, North Carolina Department of Environment & Natural Resources, Altamont Environmental, Inc. on behalf of the Potentially Responsible Parties, and Representatives from the Potentially Responsible Parties		
Type of Review: ☒ Statutory ☐ Policy ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Regional Discretion ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead		
Review Number: ☐ 1 (first) ☒ 2 (second) ☐ 3 (third) ☐ Other (specify)_____		
Triggering Action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#___ ☐ Construction Completion ☒ Previous Five-Year Review Report, September 27, 2002 ☐ Other (Specify) _____		
Recycling, reuse, redevelopment site: ☐ Yes ☒ No		
Due Date (five years after triggering action date): September 27, 2007		

Issues:

A list of issues were identified, see attached report Section 10.0 - Issues.

Recommendations:
Recommendations are listed in the attached report, Section 11.0 - Recommendations and Follow-up Actions.

Protectiveness Statement(s):

The areas of soil contamination at the Site where known waste disposal activity occurred have been capped which limits soil exposure and thus, these areas of soil contamination are protective of human health and the environment in the short-term; however, in order for the remedy to be protective in the long-term, the follow-up actions are needed: institutional controls (perpetual land use restrictions) need to be put in place.

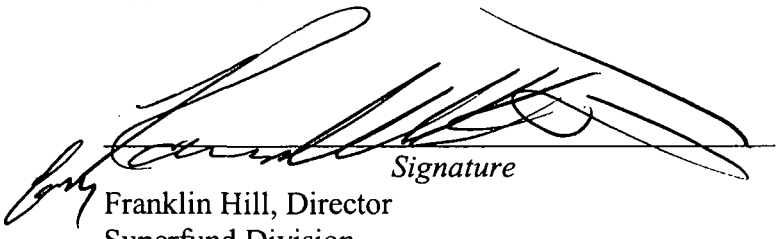
The remedy for groundwater at the Site is protective in the short-term because there is no exposure to contaminated groundwater; however, to be protective in the long-term, follow-up actions need to be taken: institutional controls (perpetual land use restrictions) need to be placed on the property to prevent groundwater use; and improvements to the groundwater monitoring system are needed to ensure complete capture of contaminant plumes.

The next Five-Year Review should be completed no later than five years after the signature date below.

Other Comments:

Once these items are investigated and corrected, long-term protectiveness, operation, and site safety will be improved.

Approved by:



Signature

Franklin Hill, Director
Superfund Division

9/27/07
Date

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List of Acronyms
Chemtronics Site
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ADI	Acceptable Daily Intake
amsl	above mean sea level
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
BRA	Baseline Risk Assessment
BVAS	Back Valley Air Stripper
BVEQT	Back Valley/Equalization Tank
BW	Bedrock Monitoring Well
BZ	3-quinuclidinylbenzilate
COC	Chemical of Concern
CS	o-chlorobenzylidene malononitrile
CSM	Conceptual Site Model
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DA	disposal areas
1,2-DCA	1,2-Dichloroethane
1,2-DCE	1,2-Dicholorethene
4,4-DDD	1,1-dichloro-2,2-di(4-chlorophenyl)ethane
DENR	North Carolina Department of Environment and Natural Resources
DTW	Deep Extraction Well
EA	Endangerment Assessment
EI	Environmental Indicator
EMP	Employment District
EPA	United States Environmental Protection Agency
EW	Extraction Well
FS	Feasibility Study
FVAS	Front Valley Air Stripper
FVCAR-1	Front Valley/Carbon#1
FVCAR-3	Front Valley/Carbon#3
FVEQT	Front Valley/Equalization
GIS	Geographic Information Systems
gpm	gallons per minute
GPRA	Government Performance Results Act
GRL	Groundwater Remediation Level
HNu	Photo ionization analyzer
HSL	Hazardous Substance List
HSMP	Holistic Site Management Plan
HSP	Health & Safety Plan
HSWA	Hazardous Solid Waste Amendments
HWS	Hazardous Waste Section
IW	Intermediate Monitoring Well
MCL	Maximum Contaminant Level
mg/l	milligrams per liter

List of Acronyms
Chemtronics Site
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MRL	method reporting limit
MSD	Metropolitan Sewerage Discharge
MW	Monitoring Well
NAAQS	National Ambient Air Quality Standards
NCAC	North Carolina Administrative Code
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated biphenyls
PCE	Tetrachloroethene
PMCLG	Proposed Maximum Contaminant Level Goal
POP	Project Operations Plan
ppb	parts per billion
PPLV	Preliminary Pollutant Limit Value
ppm	parts per million
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
R_fD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSD	Risk Specific Dose
RW	Sediment/Surface Water Sample Identifier
SDWA	Safe Drinking Water Act
SRL	Soil Remediation Level
STW	Shallow Treatment Well
SW	Shallow Well
TCE	Trichloroethene
TNT	Trinitrotoluene
TSCA	Toxic Substances Control Act
TSD	Treatment, Storage and Disposal
UAO	Unilateral Administrative Order
µg/L	micrograms per liter
USACE	United States Army Corps of Engineers
USAIWQC	US Army Water Quality Criteria
VOC	Volatile Organic Compound
WNCRAQA	Western North Carolina Regional Air Quality Agency

SECOND SUPERFUND FIVE-YEAR REVIEW REPORT
CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

1.0 Introduction

The United States Environmental Protection Agency (EPA), Region 4 has conducted a Five-Year Review of the remedial actions implemented at the Chemtronics Superfund Site (Site) (EPA ID # NCD 095 459 392), which is located in Buncombe County, North Carolina, near the town of Swannanoa. Chemtronics, Inc., CAN Holdings, Inc., and Northrop Grumman Corporation (the Potentially Responsible Parties (PRPs)) are responsible for management of environmental activities at the Site, and have provided information to EPA in support of preparation of this Five-Year Review Report. The review was conducted from March 2007 through September 2007 and incorporates data collected through 2006. This report documents the results of the review.

EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substance Contingency Plan (NCP). CERCLA § 121(c), as amended states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often that each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.*

The NCP Part 300.430(f)(4)(iii) of the Code of Federal Regulations (CFR), states:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."*

This report is prepared with the assistance of the Potentially Responsible Parties (PRPs) in accordance with applicable EPA guidance. While the PRPs and their contractor provided data for the Five-Year Review, EPA, as the lead agency overseeing site activities, prepared the protectiveness statement and finalized the report, not the PRPs or the PRPs' contractor.

The Chemtronics Site consists of one operable unit, encompassing remedies for site soils, surface water, sediment and groundwater. The Site remedy involved leaving hazardous substances in place, capping the waste areas, and groundwater extraction and treatment. The soil, surface water and sediment remedial activities at the site have been completed. The groundwater pump and treat systems are currently in operation and maintenance (O&M). Therefore, a Five-Year Review is required from the date of commencement of construction of the remedial action (RA) to ensure that the remedy continues to provide adequate protection.

Remedial construction began in December 1991 and was completed in January 1993. This is the second Five-Year Review for the Site. Two drafts were prepared on behalf of EPA, one in February 1997**[1]**, and the other in June of 1999**[2]**. However, neither of the two documents was finalized. The first complete Five-Year Review was conducted by the United States Army Corps of Engineers (USACE)**[3]**. The date on the title page of this document is August 2002; however, EPA finalized this document on September 27, 2002. Therefore, this second Five-Year Review Report is based on the September 27, 2002 date.

1.1 Purpose

The purpose of this Five-Year Review is to evaluate the remedy currently operating at the Site in Swannanoa, North Carolina and to determine if the action remains protective of public health and the environment. The methods, findings, conclusions and significant issues found during the review are documented in the Five-Year Review report. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

More specifically, the purpose is:

- to confirm that the remedy as specified in the April 1988 Enforcement Record of Decision (ROD)**[4]**, April 1989 ROD Amendment**[5]**, and/or the Final Design Analysis dated February 1991**[6]**, remains effective at protecting human health and the environment (i.e., the remedy is operating and functioning as designed and is protective), and

- to evaluate whether the groundwater remediation levels (GRLs) specified in the ROD remain protective of human health and the environment.

1.2 Integration With Resource Conservation and Recovery Activities

Historically, there have been concurrent Resource Conservation and Recovery Act (RCRA) and CERCLA assessment and remediation projects at the Chemtronics Site. The Site operated as a Treatment, Storage, and Disposal (TSD) facility from 1980-1984, and entered into a Hazardous Solid Waste Amendments (HSWA) corrective action and an Administrative Order on Consent (AOC) in 1997 with the state of North Carolina. There is multiple groundwater plumes associated with the RCRA units, and some of the plumes co-mingled with the groundwater monitored as part of the CERCLA action.

Regulatory overlap between the two programs and agencies has been acknowledged. As noted in the September 2002 Five-Year Review, the PRP Companies were concerned that unnecessary or inefficient actions would occur unless a concerted effort could be made to address the environmental impacts at the Site in a comprehensive, holistic manner. EPA guidance recognizes that it would be more effective to address Site conditions in a comprehensive manner.

In January 2003, the PRPs prepared an overall plan to manage the various environmental conditions at the Site**[7]**. The plan, referred to as the "Holistic Site Management Plan" (HSMP), provides direction regarding subsequent Site investigation and remediation, and provides a framework to support decision-making. Concepts such as the Conceptual Site Model (CSM), regulatory strategy, and RA objectives/alternatives are addressed in the plan. The plan addresses both RCRA and CERCLA requirements at the Site and is intended to address the recommendations presented in the last Five-Year Review**[3]**.

Specifically, the objectives defined in the HSMP are to:

- manage the Chemtronics Site holistically;
- continue to protect human health and the environment on a site-wide basis;
- maximize the efficient use of resources; and
- achieve the appropriate "Corrective Action Completion Determinations".

In addition, the HSMP presented 11 specific goals, as follows:

1. Define the appropriate end uses of the Site.
2. Complete site characterization.
3. Update the human health and ecological risk assessment.
4. Convert to a single regulatory program and a single lead agency.
5. Develop a corrective measures study.
6. Achieve North Carolina Department of Environment and Natural Resources (DENR) targets of "Yes" on Environmental Indicator (EI) 725 (Human Health) and EI 750 (Groundwater Migration).
7. Establish a structure and schedule for periodic assessment of system performance.
8. Establish appropriate institutional controls for the property.
9. Establish and implement a groundwater and extraction well management program.
10. Revise and implement the compliance monitoring program.
11. Identify potential environmental risks (if any) associated with abandoned structures and other areas.

Since January 2003, the HSMP has been the guiding document for the Chemtronics project and the PRP Companies have focused on meeting these objectives; specifically addressing goals number 4, 9, and 11.

In early 2003, the DENR, EPA, and the Companies agreed that the entire project should be administered by the DENR Hazardous Waste Section (HWS). Between 2003 and 2007 the PRP Companies and DENR attempted to transfer regulatory authority for all environmental activities

at the Site to the HWS, including conducting a public meeting in June 2003 announcing the transfer of authority**[8]**. However, the transfer was not completed.

In March 2007, the DENR HWS notified the EPA that it had determined that it was most advantageous that a CERCLA Federal Authority address corrective action responsibilities at the Chemtronics facility**[9]**. The HWS also specified that when the CERCLA Federal Authority has taken responsibility for the cleanup of the entire facility, the CERCLA Federal Authority will track environmental progress using CERCLA program measures. Therefore, the facility will no longer be tracked on the RCRA program's Government Performance Results Act (GPRA) Baseline of Permit Module.

The EPA and the PRP Companies are currently working together to finalize the administrative documents which will transfer RCRA authority and establish CERCLA authority over all environmental activities at the Site. However, while there are ongoing discussions, to achieve this goal, these administrative actions have not yet been completed.

2.0 Site Chronology

Site chronology is summarized in **Table 2-1**. The Site was first included on the National Priorities List (NPL) in December 1982 with EPA assuming the lead responsibility for the Site. In November 1983, six PRPs were identified, however, only three of the six were found to be viable: Chemtronics, Inc., Hoechst Celanese Corporation, and Northrop Corporation (which are currently known as Chemtronics, Inc., CNA Holdings, Inc., and Northrop Grumman Systems Corporation, respectively). Chemtronics and Northrop signed an AOC in October 1985**[10]** to perform a Remedial Investigation/Feasibility Study (RI/FS). Hoechst Celanese Corporation declined to participate in the RI/FS process.

The EPA approved the Remedial Investigation (RI) Report in April 1987. The Feasibility Study (FS) was approved in March 1988. The original ROD was signed on April 5, 1988**[4]** and an amendment to the ROD was issued on April 26, 1989**[5]**. The ROD amendment specified the deletion of the requirement to solidify the soils in Disposal Area (DA) - 23 as a result of a transcription error made in the RI data which was carried over into the initial ROD.

Negotiation with the three PRP Companies on the remedial design/remedial action (RD/RA) Consent Decree was initiated in June 1988. The EPA issued a Unilateral Administrative Order (UAO) to all three PRPs, dated March 22, 1989**[11]**. All three PRP Companies participated in the RD/RA. Sirrine Environmental Consultants (Sirrine) served as the PRP Companies' consultant, preparing the remedial design (RD) and many of the early monitoring reports. Canonie Environmental Services Corporation out of King of Prussia, PA served as prime environmental contractor for the PRP Companies. Nimmo, the initial Site O&M contractor, was replaced by The Fletcher Group (now known as Altamont Environmental, Inc.) in May 2000. Final design specifications were completed in July 1991 by Sirrine as described in the amended ROD**[5]**. Remedial construction began in December 1991 and was completed in January 1993**[1]**.

3.0 Background

3.1 Site Description and Physical Setting

The Site occupies approximately 1,027 acres of rural land in Buncombe County, North Carolina, near the town of Swannanoa (see Site location map **Figure 3-1**). The Site lies within the Blue Ridge Province of the southern Appalachians with the approximate center of the Site lying at latitude 35° 38' 18" north and longitude 82° 26' 8" west. The Site is bounded by on the east by Bee Tree Road and Bee Tree Creek.

The Site can be divided into two geographical subsections known as the Front Valley and the Back Valley (which is also known as Gregg Valley). The topography of the Site is steep, ranging from 2,200 to 3,400 feet above mean sea level (amsl). The Front Valley contains the Unnamed Stream and Gregg Branch drains the Back Valley. The Site lies on the southeast side of Bartlett Mountain and is moderately to heavily vegetated. All surface water from the Site drains into small tributaries of Bee Tree Creek or directly into Bee Tree Creek. This creek flows into the Swannanoa River, which ultimately empties into the French Broad River (see Site boundary **Figure 3-2**).

3.2 Hydrogeology

Three hydrogeologic units underlie the Site: the shallow saprolite, the transitional saprolite/weathered bedrock, and the bedrock. These units are hydraulically interconnected in both valleys. The first two zones were combined and viewed as one "surficial" zone, since the RI demonstrated that these zones are interconnected**[4]**. The groundwater underlying the Site was classified as Class IIB using EPA Groundwater Classifications Guidelines (December 1986), since there is potential future use for this aquifer as a source of drinking water**[4]**.

Under natural static conditions, groundwater flow in the Front Valley is to the south, toward the Unnamed Stream. The hydrogeology of the Back Valley is similar to that of the Front Valley, however, the surface of the bedrock is shallower and the transitional unit is largely weathered soil although some hard layers are present. Groundwater flow in the Back Valley is primarily to the south and southeast towards Gregg Branch**[4]**.

3.3 Land and Resource Use

The Site has been used for industrial purposes since 1952. According to the Buncombe County Geographic Information Systems (GIS) property information system database, the Site, as of May 1, 2007, is zoned an Employment District (EMP). There are no immediate plans to change the land use. The Site lies within the Blue Ridge Province of the southern Appalachians and is characterized by steep terrain and is heavily wooded. It is bordered to the north and west by sparsely populated woodlands, primarily national forests. Immediately to the south of the Site, there are several industrial facilities, which were once part of the original Oerlikon property (see Section 3.4). Eight miles to the west of the Site lies the city of Asheville, North Carolina.

Potable water at the Site is provided by the City of Asheville public water supply system. Groundwater is not used for any purpose at the Site.

An offsite receptor survey was conducted in the summer of 2003 to identify and locate potable wells and springs located within one-quarter mile in the general down gradient direction of the western, southern, and eastern portions of the Site property boundary. Twenty-eight domestic wells and three springs were identified west of the Site. Five wells were identified south of the Site, and one well was identified east of the Site. There were no public water supply wells identified in the area.

Domestic wells and springs, identified by this survey, were sampled in2006, and the samples were submitted for laboratory analyses of volatile organic compounds (VOCs) and Perchlorate. The analysis of VOC concentrations was in response to historical analytical data obtained during on-site characterization activities and the mobility of VOCs in groundwater relative to other selected site-specific compounds. The analysis for Perchlorate was in response to a request from the EPA in June 2003 to evaluate Perchlorate in association with the site. No water quality impacts were identified. Results of the well survey and sampling program were discussed in detail in the Data Summary Report[**12**].

3.4 History of Contamination

The property was first developed and operated as an industrial facility in 1952. The Site has been owned/operated by Oerlikon Tool and Arms Corporation of America (1952-1959), CNA Holdings, Inc. (Hoechst Celanese Corporation)(1959-1965), Northrop Carolina, Inc. (Northrop Corporation) (1965-1978) operated by Airtronics, Inc., Chemtronics Division from 1971 to 1978, and Chemtronics, Inc. (1978-present). The Site operated under the name of Amcel Propulsion, Inc. (1959-1965) under both Oerlikon and CNA Holdings, Inc. The Site is currently owned by Chemtronics, Inc. and all manufacturing at the site ceased in 1994. The primary products historically manufactured at the Site were explosives, incapacitating agents, and chemical intermediates.

Known waste disposal occurred over a small portion (less than ten acres) of the Site. Twenty-three individual on-Site disposal areas were identified during the RI and by reviewing records and through interviews with former Site employees. Disposal practices prior to 1971 are not well defined. From 1952 to 1971, solid waste materials and possibly solvents were reportedly incinerated in pits dug in the burning ground, also known as the Acid Pit Area. Chemical wastes from the production of the incapacitating, surety agent, 3-quinuclidinyl benzilate (BZ), and the tear gas agent, o-chlorobenzylidene malononitrile (CS), were placed in 55 gallon drums and reportedly covered with a neutralizing "kill" solution and the drum lids sealed. These drums were buried in DA-6, DA-7/8, DA-9, and DA-10/11. Chemical wastes were also disposed of in trenches located in the Acid Pit**[2].** Refer to **Figure 3-3** and **Figure 3-4** for the location of the Disposal Areas.

From 1971-1975, most of the liquid wastes generated on-Site went to the Buncombe County Sewer System following some form of neutralization and equalization. Small volumes were dumped in on-Site pits/trenches. Solid wastes, rocket motors, explosive wastes, etc., were burned in the area that later became known as the Acid Pit Area. From 1975-1979, Chemtronics, Inc. constructed pits/trenches, as needed, for the disposal of spent acid and various organic wastes in the Acid Pit Area**[2].**

In 1979, Chemtronics constructed a 500,000 gallon lined lagoon over an abandoned leach field for biotreatment of wastewaters generated in the main production/processing building (Building 113). After the lagoon was initially filled, the lagoon lost its contents due to incompatibility of the liner with the brominated waste introduced into the lagoon. The biolagoon was reconstructed with a new liner by August 1980 and the lined lagoon was operated until 1984, at which time the unit was deactivated. The biolagoon has since been closed and this area, including the abandoned leach field and the biolagoon, has been designated as DA-23 (see **Figure 3-3**). The leach field also serviced Building 113.

4.0 Media and Contaminants Identified in the Remedial Investigation

The RI for the Site focused on twenty-three individual disposal areas that were identified and grouped into six discrete source areas requiring remediation. These source areas were designated as DA-23 and DA-10/11 (located in the Front Valley) and DA-6, DA-7/8, DA-9 and the Acid Pit Area (located in the Back Valley). See **Figure 3-3** and **3-4** for the DA locations.

The media affected by disposal practices at this Site were: soil, sediment, groundwater, and surface water. During the RI, samples were collected from each medium within and downgradient of the disposal areas and analyzed for compounds on the Hazardous Substance List (HSL) as well as other selected compounds. After reviewing the data, indicator parameters were selected for subsequent samples.

4.1 Air Contamination

During the RI a HNu photoionization analyzer and cyanide sensitive colorimetric indicator tubes were used to monitor the air. The 5 parts per million (ppm) action level for cyanide established in the Chemtronics Project Operations Plan (POP) and Health & Safety Plan (HSP) was exceeded on several occasions. These measurements were taken with the HNu photoionization instrument which does not speciate whether the 5 ppm exceedances were cyanide or any other compound. No cyanide was detected by the colorimetric tube **[4].** No other air data were collected.

4.2 Soil Contamination

To determine the depth of disposed wastes and the vertical and horizontal extent of contamination, test pits were excavated and samples were collected and analyzed for Site

contaminants. The three disposal areas where test pits were not excavated during the RI were DA-9, DA-23 and the Acid Pit Area.

4.2.1 Front Valley

There are two disposal areas in the Front Valley where surface and subsurface soil samples were collected and analyzed: DA-l0/11 and DA-23. At DA-10/11 the analytes detected include volatile organic compounds (VOCs), extractable organic compounds, 1,1-dichloro-2,2-di(4-chlorophenyl)ethane (4,4-DDD), hexahydro-1,3,5-trinitro-1,3,5, triazine (RDX), CS, total organic halide, and cyanide.

The analytes detected at DA-23 included VOCs, explosives, CS, BZ, and their degradation products, total organic halides, and total cyanide**[4].**

4.2.2 Back Valley

The Back Valley contains the following disposal areas: DA-6, DA-7/8, DA-9, and the Acid Pit Area. Soil samples were collected and analyzed from each of these areas.

The analytes detected at these disposal areas include a variety of compounds including VOCs, extractable organic compounds, pesticides, polychlorinated biphenyls (PCBs), explosives, total organic halide, cyanide, metals and the BZ degradation product, benzylic acid/benzophenone**[4].**

4.3 Groundwater Contamination

All monitoring wells were sampled in June 1986 as part of the RI. Twelve of these wells were re-sampled in October 1987 to verify concentrations. Refer to **Figure 3-3** for the locations of the wells and piezometers in the Front Valley. Refer to **Figure 3-4** for the location of the wells and piezometers in the Back Valley.

4.3.1 Front Valley

The following discussion is based on the analytical results of the RI as presented in the 2002 Five-Year Review**[3]**. The extent of the groundwater contamination in the surficial zone in the Front Valley was greatest downgradient of DA-23, in a southerly direction from DA-23. The majority of contaminants (volatiles and BZ degradation products) from this area appeared to be migrating southwards with groundwater flow; a portion of which was discharging locally into a northern tributary of the unnamed branch. Groundwater contamination in other areas within the valley was most likely due to the presence of other old leach fields and sumps (such as that of Buildings 104,107, 113,115, 122, 147 complex and 149) or other past activities not addressed by the RI and 1989 ROD. Finally, no contaminants were detected in groundwater samples collected from wells downgradient and south of DA-10/11, which indicated that contaminants had not moved from this area**[4].**

The RI stated that the only known area of the bedrock aquifer affected by disposal practices in the Front Valley was in the vicinity of monitoring wells BW-4 and BW-5. At the time of the ROD, three compounds had been detected in the bedrock aquifer of the Front Valley: 1,2-dichloroethane, bis(2-ethylhexyl) phthalate, and chloroform. At the time of the ROD, no contamination had been detected in monitoring wells BW-6 and IW-1**[4].**

4.3.2 Back Valley

The 2002 Five-Year Review stated that the RI determined groundwater in the surficial zone of the Back Valley to be primarily contaminated by two VOCs: 1,2-dichloroethane and trichloroethene, likely originating from the Acid Pit Area, DA-7/8 and DA-9. Concentrations of these compounds were highest near the disposal areas. The presence of these two compounds in the groundwater most likely extended further down the center of the valley but not as far as wells BW-11 and IW-3, approximately 600 to 900 feet downgradient, as neither contaminant was detected in either of these wells.

Other contaminants detected in the surficial zone of the Back Valley occurred less frequently and generally in lower concentrations. These contaminants included other VOCs, extractable organic compounds, explosives, metals, cyanide, and BZ degradation products. The distribution of these contaminants in the groundwater did not appear to be widespread or to extend further than 300 feet to the south and southeast from the disposal areas according to analytical data from the downgradient monitor wells.

The data reviewed indicated that contaminants within the surficial zone were migrating downward as well as laterally to the south and southeast and would be expected to enter the bedrock zone. The downgradient lateral extent of this contamination to the south and southeast had not yet reached the confluence of the eastern and western tributaries of Gregg Branch. The limit of contaminant migration based upon the RI analytical data, appeared to be within the area between monitoring wells MW-X3 and BW-11.

Contamination by chemicals other than 1,2-dichloroethane and trichloroethene was thought to be generally limited to portions of the aquifer that are close to DA-7/8, DA-9 and the Acid Pit Area. Finally, during the RI, no contamination of the groundwater was detected downgradient of DA-6.

The bedrock zone in the Back Valley was contaminated by VOCs. The extent of this contamination was more pronounced southeast of the Acid Pit area, in the vicinity of well BW-9, but historic groundwater quality data suggested that these contaminants had not reached wells BW-11 or BW-12. Therefore, the downgradient lateral extent of this contamination was considered to be within 600 feet of the disposal areas.

A trace quantity of benzylic acid/benzophenone, a BZ hydrolysis product, was detected in MW BW-11 in the sample collected during the RI but was absent in the sample taken in October 1987**[4].**

4.4 Surface Water and Sediment Contamination

As discussed in Section 3.1, the Site can be subdivided into two small valleys formed by the Unnamed Branch and the Gregg Branch. These two valleys are referred to as the Front Valley and the Back Valley. The size of the watersheds encompassed in each valley is approximately 221 acres and 691 acres, respectively, and both drain into Bee Tree Creek. Between the two valleys is a ridge of approximately 44 acres draining directly into Bee Tree Creek. An additional small area on the property east of Gregg Branch also drains directly into Bee Tree Creek. These last two areas contain no known disposal areas. It is evident from surface topography that surface runoff from on-Site disposal areas discharge directly to the Unnamed Branch or Gregg Branch only and not directly to Bee Tree Creek**[4]**.

During the RI, surface water and sediment samples were collected from the Unnamed Branch draining the Front Valley, Gregg Branch draining the Back Valley, Bee Tree Creek, and their tributaries. To ensure stream flow was indicative of base flow, sampling was conducted when storm runoff was negligible.

Analysis of surface water and sediment samples indicated contaminated base flow was entering the streams on-site. In all cases, concentrations decreased to levels below detection limits downstream of the suspected sources. Volatilization or dilution may have contributed to the reduced levels of contamination downstream. Concentrations of the contaminants associated with the sediment also decreased downstream indicating erosional transport mechanisms could be at work transporting contaminants away from the disposal areas. In general, metals were detected in sediments from the two on-site branches but not in sediments from Bee Tree Creek. This may be due to depositional differences at these locations.

4.4.1 Front Valley

Surface water data indicated the presence of VOCs and explosives. DA-23 was potentially the source of this contamination.

No explosives were detected in any of the sediment samples**[4]**.

4.4.2 Back Valley

Surface water data collected during the RI may have been contaminated from a volatile organic source at DA-7/8 or DA-9. No migration of VOCs was indicated from the surface water results obtained in the areas of the Acid Pit Area or DA-6.

Sediment samples did not indicate that significant VOC contamination from surface runoff was occurring from any of the disposal areas in the Back Valley**[4]**.

Cyanide was detected in both surface water and sediment samples in the Back Valley. Cyanide that was found in a sediment sample from RW-21 was thought to be the result of runoff or erosion originating from DA-6 or the Acid Pit Area**[4]**.

5.0 Remedial Action Objectives

The following remedial action objectives (RAOs) were established in the 1988 ROD**[4]**. The objectives were based on the regulatory requirements at the time, and the results of the Baseline Risk Assessment (BRA) prepared during the RI. The RAOs are:

- To protect the public health and the environment from exposure to contaminated on-Site soils through inhalation, direct contact, and erosion of soils in surface waters and wetlands;
- To prevent offsite migration of groundwater contamination; and
- To restore contaminated groundwater to levels protective of human health and the environment.

Although no RAOs directly addressed the potential interaction of groundwater and surface water and sediments in Gregg Branch, Bee Tree Creek, and the Unnamed Branch, it is understood that one of the goals of preventing groundwater migration was to prevent contaminated discharge to surface waters**[4]**. As stated in the ROD, the contaminant levels in surface water bodies were expected to decline with the implementation of groundwater and soil remediation. Thus, it was concluded that the direct remediation of surface water was not necessary**[4]**. In addition, as discussed later in Section 6.1, surface water was initially monitored to document that the remediation activities did not have an adverse affect on biota present in the surface water bodies near the Site.

5.1 Risk Assessment Summary

A draft Endangerment Asseessment (EA) was included as Appendix G of the draft FS. The draft document evaluated potential exposure pathways to current/baseline (at that time) and potential future receptors. The draft FS and associated EA were never issued in final form. The EA considered potential risk associated with three possible routes of exposure: ingestion of fish from onsite ponds and rivers downstream of the Site; ingestion of contaminated groundwater; and direct contact with contaminated materials at the Site. The EA did not contain an ecological risk assessment.

For each route of exposure, different scenarios were developed to show the possible magnitude of existing, as well as, future exposures. The potential impact of the exposures on human health were then assessed using one of three approaches. Where possible, simple comparisons were made between contaminant concentrations in a given medium and the relevant or appropriate standards for those contaminants. When standards were not available, as in the

case of contaminants in fish or in soil, scenarios were developed to estimate the human doses of each contaminant via each route of exposure. For contaminants known or suspected to be human carcinogens, the dose estimate were used to calculate the increased lifetime risk of contracting cancer. For noncarcinogenic compounds, the estimated doses were compared to published acceptable daily intake (ADI) for each compound. The EA used EPA's established acceptable risk ranges of $1x10^{-5}$ to $1x10^{-6}$ at the time the report was prepared.

The results of the EA were used to establish the GRLs specified in the ROD.

The draft EA included a Risk and Impact Evaluation that concluded the following:

- Groundwater: No receptors were found located downgradient from contaminated areas. The modeling results indicated that contaminant concentrations should not exceed acceptable drinking water standards within 25 years.

- Soil: Soils in the vicinity of DA-9 are a potential risk for children but minimal risk is expected from exposure at other disposal areas. Ingestion of soil by children playing in contaminated areas could result in exposure.

- Surface water: Minimal risk due to exposure to surface water because it is not used as a drinking water source; minimal exposure via skin contact while fishing or wading in Bee Tree Creek.

- Vapors: Exposure from inhalation of vapors and contaminated particulates poses little threat to human health.

- Fish and Game Animals: No risk is expected from ingestion of fish taken from the Swannanoa River. It is not probable that contamination of specific game animals (squirrels) could become significantly contaminated from living on or adjacent to the Site.

The ROD indicated that two of the human receptor populations considered in the EA were Site workers and future residents.

The presence of several contaminants found on the Site presented some special problems with respect to the establishment of target cleanup levels for soil and groundwater (i.e., remediation levels). Since these chemicals had limited human health standards and supporting physiochemical and toxicological data, groundwater cleanup levels were developed in the FS in the form of "preliminary pollutant limit values (PPLVs)" for critical exposure pathways, using estimates of acceptable daily doses and chemical-specific partition coefficients. The calculations and supporting references for these PPLVs were presented in the draft Feasibility Study, and are included in Appendix A of this report**[13]**.

5.2 Applicable Or Relevant And Appropriate Requirements and Remediation Levels

5.2.1 Applicable Or Relevant And Appropriate Requirements

This section describes criteria in place at the time of the ROD. Section 8.4 presents updates to the standards and criteria. The ROD considered the following applicable or relevant and appropriate requirements (ARARs) for the remedial actions and to establish remediation levels for the Site**[4]**:

- **RCRA** – RCRA specifications/ requirements (40 CFR –264 subparts K-N) for construction of the caps were considered in the remedial design. The ROD Amendment notes that capping of DA-23 would satisfy the post-closure requirements associated with the former biolagoon **[5]**. Also, as noted in Section 1.2, historically there have been separate RCRA corrective actions monitoring activities ongoing.

- **Clean Water Act (CWA)** – (40 CFR part 403)**[14]**. The CWA governs the federal ambient water quality criteria (AWQC) for the protection of human health and aquatic life (or the state of North Carolina's equivalents). AWQC are typically criteria to be considered but are not enforceable as standards for surface water bodies. However, as discussed previously, it was determined in the ROD that direct remediation of surface water was not necessary. It is assumed that in lieu of monitoring surface water concentrations in the water bodies adjacent to the Site and comparing data to the AWQC, toxicity testing of the surface water was performed, as described in Section 6.1.

- **Occupational Safety and Health Administration (OSHA)** – All field and construction activities complied with the regulations of OSHA**[1]**.

- **Safe Drinking Water Act (SDWA) [15]** – Maximum Contaminant Levels (MCLs) for contaminants in groundwater were generally listed as the GRL in the ROD. If either a MCL or proposed MCL Goal (PMCLG) was available, then the MCL or PMCLG was incorporated into the ROD as the GRL. If neither of these were available, the values for the reference dose (R_fD), risk specific dose (RSD), PPLV, US Army Water Quality Criteria (USAIWQC), or the CWA AWQC were compared to one another. The most stringent of these values was then incorporated into the ROD as the GRL for that particular contaminant**[4]**. At the time the ROD was issued, the State of North Carolina had adopted the standards set forth in the federal SDWA. No North Carolina groundwater standards were incorporated into the 1988 ROD since at the time the ROD was issued, the State was employing federal MCLs as its groundwater cleanup criteria**[4]**. This situation has since changed.

- **National Pollutant Discharge Elimination System (NPDES)** – The NPDES requirements are being regulated by the local Metropolitan Sewerage Discharge

(MSD), as discussed in Section 6.4. When the ROD was issued this was not relevant because the discharge of treated groundwater was not part of the selected remedy (although it was a discharge alternative incorporated into the ROD). Treated wastes are discharged through the MSD.

- **Endangered Species Act** – The recommended remedial alternative was determined to be protective of species listed as endangered or threatened. No new information regarding endangered or threatened species potentially relevant to the remedy was prepared or reviewed as part of the Five-Year Review completed in 2002 or described in this document.

- **National Ambient Air Quality Standards** (NAAQS) – The ROD stated that any emissions from either the gas vents and/or the groundwater air strippers must meet all state and federal air standards**[4]**.

5.2.2 Remediation Levels

The GRLs are Site specific and are listed on Table 13 in the ROD**[4]**. The GRLs and list of contaminants of concern for groundwater and soil remediation are summarized in **Tables 5-1** and **5-2,** respectively. All of the GRLs were based on ARARs, not the risk assessment, with the exception of the explosive compounds.

Soil remediation levels (SRLs) were listed in Table 14 of the ROD. The SRL for PCBs was based on the Toxic Substances Control Act (TSCA). The remaining SRLs for other contaminants were developed in the BRA, as part of the PPLVs.

5.3 Trigger Mechanism

The ROD also had the following "trigger" provision regarding groundwater quality**[4]:**

> " Action levels for contaminants in the groundwater will be set with the State of North Carolina's concurrence. If these levels are reached during any sampling episode after the remedial activities achieve (sic, their) goal, this will trigger an immediate permanent remediation of the disposal area responsible for this level of contamination is reached downgradient of that disposal area. The action levels expected to be implemented are MCLs and PPLVs ".

As noted in the O&M Manual**[16]**, the purpose of the "trigger mechanism" is to enact a permanent remedy should capping not prove effective. The interpretation of "after remedial activities achieve (sic, their) goal" is critical, as it implies potentially significant actions would be necessary if there are future exceedances of the GRL. During the Site inspection completed on May 8, 2007 for this Five-Year Review, Mr. Jon Bornholm, the Remedial Project Manager for EPA, confirmed that the trigger mechanism would apply only after all GRLs were met and the pump and treat system is shutoff. Until that time, the trigger mechanism is not applicable.

6.0 Remedy Selection and Implementation

The RA consisted of capping wastes in place in six separate areas, installing and operating two groundwater extraction and treatment systems, (one downgradient of the disposal areas in the Front Valley and a second downgradient of disposal areas in the Back Valley), and long-term monitoring of groundwater. The treatment for the extracted groundwater includes air stripping, filtration through activated carbon filter (Front Valley), pH adjustment (Back Valley), and discharge to the local MSD**[16]**. The components of the remedy are further described below.

6.1 Source Control

The prevention of exposure to contaminated on-Site soils has been achieved by the installation of multi-layer caps in the following areas: DA-6, DA-7/8, DA-9, DA-10/11, DA-23 and the Acid Pit Area. Although there has been no additional soil sampling since the remedy was implemented, the current understanding of Site conditions (based upon the past sampling results) indicates that surficial soil contamination has been adequately addressed. In issuing its approval letter on the Final Remedial Design on June 10, 1991, the Agency accepted the cap system as designed (i.e., without an associated liner). Security fencing, vegetative covers and a gas collection ventilation system (only at the Acid Pit Area), are also components of the implemented capping remedy.

Each capped disposal area is surrounded with a chain-linked fence and a locked gate. Each fence and gate is inspected annually. In addition, each disposal area is identified with signs attached to the fences (see **Appendix B**, photos # 1, #2, and #5). Survey markers were incorporated into the caps so that settling of the caps could be monitored (see **Table 7-1** and **Appendix B**, photo #6). Photos #3 and #4 show the gas venting system installed at the Acid Pit Area. Some localized subsidence has been noted on a portion of the Acid Pit cap as described later in Section 7.2.

The 1988 ROD/1989 ROD Amendment addressed only those source areas that were deemed CERCLA related. Other potential source areas on the Chemtronics property were deemed RCRA as prior to 1994 this was an active facility. EPA anticipates successfully negotiating an AOC with the PRP Companies to complete the investigation of these other (RCRA) source areas under EPA's CERCLA authority. Negotiations of the AOC should begin within the next two months.

As noted above in Section 3.1, groundwater flow in the Front Valley is to the south toward the Unnamed Stream. The groundwater plume from DA-23 is also migrating generally south in all three hydrologic units**[17]**.

A monitoring program was established for the surface water employing bioassays on the Unnamed Stream, Gregg Branch, and Bee Tree Creek. The purpose of this monitoring program was to insure no adverse impact on these streams occurred during implementation of the RA and

to establish a database to measure the progress of the RA once implemented. The initial (baseline) bioassay sampling was conducted in February 1991 at five locations. The second bioassay samples were collected in April 1993, following completion of the remediation construction activities**[1]**. Two organisms were used in each event, *Pimephales promelas* and *Ceriodaphnia dubia*. No effects on the *Ceriodaphnia* were observed in either event, and no effect was observed on the *Pimephales* in the baseline sampling event. The *Pimephales* test in the second sampling showed chronic toxicity effects on growth at one of the five sampling locations. The results of the chronic toxicity on survival were inconclusive**[1]**.

The PRP Companies completed a Site-wide surface water and groundwater sampling event in the summer of 2007. The data are currently undergoing data validation and are expected to be available for review in fall 2007**[18]**.

6.2 Migration Control

The CERCLA groundwater monitoring program is defined in the O&M Manual**[16]**. The effectiveness of the Site-wide groundwater migration control measures cannot be verified using only the CERCLA groundwater monitoring data due to the focused CERCLA monitoring well network. The PRP Companies intend to increase the understanding of Site groundwater conditions by conducting a Site-wide groundwater and surface water sampling event that was initiated in June 2007**[18]**. Data collected during this event will be used to assess groundwater quality impacts and evaluate the adequacy of the current monitoring program.

The original design for the groundwater plume migration control was to intercept, extract/treat, discharge treated groundwater, and monitor groundwater downgradient of the disposal areas in both the Front and Back Valleys. As designed, these two systems work independently of each other. Groundwater from the extraction wells is first sent through the Front and Back Valley air strippers, where it is then discharged by each system to the Metering Manhole. From the Metering Manhole, effluent finally goes to the local sewerage district for further treatment (see **Figure 6-1**).

As of December 2006, a total of approximately 71,456,736 gallons of groundwater had been extracted and treated at the Site (see **Figure 6-2**). The Front Valley design extraction flow rate is approximately 4 gallons per minute (gpm). The Back Valley design extraction flow rate is approximately 19 gpm. Both flow rates vary due to seasonal groundwater elevation changes**[2 and 17]**. Operations of these systems were recently summarized in the System Performance Evaluation submitted in July 2007 for the Site.

6.2.1 Front Valley Extraction System

The Front Valley groundwater extraction system consists of two extraction wells (STW-1 and DTW-1), submersible pumps, and the appropriate piping and electrical/instrumentation controls. Shallow extraction well STW-1 is 55.2 feet deep and screened in the saprolite. The submersible pump in the shallow well is set 40 feet below ground. The screen is 25 feet in

length and the length of the casing is 32.2 feet. The deep extraction well, DTW-1, is 126.5 feet deep. This well consists of 73 feet of casing, a 25 foot screen, 7 feet of blank casing, followed by 20 feet of open borehole in the bedrock. The submersible pump is located within the 7 foot blank casing section. As noted in the System Performance Evaluation[17] all of the extraction wells require frequent maintenance, but the pump in shallow well (STW-1) is particularly susceptible to fouling with silt.

Six (6) monitoring wells are used to monitor groundwater quality; three of which are in bedrock and three are in the saprolite. There are (12) monitoring wells used to monitor the cone of influence created by the extraction system, seven of which are in the saprolite, the other five are in bedrock. There are (3) piezometers used to monitor the cone of influence created by the extraction system, two are in the saprolite zone the other one is in bedrock. **Table 6-1** lists the Front Valley monitoring wells from which groundwater samples are collected for analyses. **Table 6-2** lists wells and piezometers used to monitor the cone of influence created by the Front Valley extraction system. Refer to **Figure 3-3** for the locations of the wells and piezometers in the Front Valley.

In correspondence dated October 23, 1998, the EPA directed the PRPs to include monitoring wells IW-1 and BW-6 into the Front Valley monitoring program. Collecting groundwater samples from monitoring well IW-1 was deemed important because the most down-gradient monitoring well being sampled to evaluate groundwater quality, MW-1S, periodically exhibited concentrations of contaminants above ROD GRLs. The last time well IW-1 was sampled was following its installation in 1986. It was deemed clean in the 1987 RI report.

In a November 25, 1998 response to the EPA directive, the PRPs agreed to take two initial samples from monitoring well IW-1. The samples were analyzed for VOCs and benzophenone. The PRPs' response highlighted the fact that at the time, it was not warranted to include monitoring well BW-6 in the sampling program, since no contamination above the GRLs had been detected in either monitoring wells MW-1BI or MW-1BD. Initially, the EPA agreed with the PRPs' recommendations. However, depending on future analytical results, the EPA may direct the PRPs to incorporate IW-1 and/or BW-6 into the long-term monitoring program for the Front Valley[3]. Well BW-6 was sampled as part of the Site-wide groundwater monitoring program completed during summer 2007 but IW-1 was not sampled because the screen length was determined to be too long to provide comparable quality data[18].

6.2.2 Back Valley Groundwater Extraction System

The Back Valley groundwater extraction system originally consisted of twelve extraction wells (STW-2, DTW-2, EW-2, EW-3, EW-4, EW-5, EW-6, EW-7, EW-8, EW-9, EW-10, and EW-11). In March 2005, after notifying the EPA, well EW-8 was abandoned by grouting and replaced with well EW-15 because the well screen in EW-8 had failed. Details regarding the replacement of well EW-8 were provided in a letter report prepared by Altamont Environmental, Inc. dated July 15, 2005.

Similar to the construction of other Back Valley extraction wells, well EW-8 was constructed with a well screen in saprolite and an open bedrock socket. However, well EW-15 was constructed as a replacement for EW-8 with only a well screen installed in saprolite. The Back Valley groundwater extraction system was installed to capture groundwater impacted primarily by volatile organic compounds (VOCs) released from the area of the former acid pits, disposal area 9, and disposal area 7/8 in the Back Valley. The Back Valley groundwater extraction wells were originally designed to withdraw groundwater from the saprolite, transition zone, and underlying fractured bedrock. Historically, the Back Valley extraction wells have produced relatively low yields for the Blue Ridge area. Review of well construction details for the existing extraction wells showed a section of solid casing located at the base of the transition zone cemented into the top of the bedrock zone. This manner of well construction reduces the ability to recover groundwater from the lowest portions of the transition zone.

Typically, the most productive zones in the granitic gneiss and muscovite schist bedrock formations in the Site vicinity are found in the transition zone between competent bedrock and the overlying saprolite. In addition, the nature of the contaminants present in the Back Valley and the local hydraulic gradients may concentrate chemicals of concern (COCs) within the transition zone. Altamont, therefore, designed the replacement well EW-15 to target groundwater extraction from the transition zone and lower saprolite zone.

Each of the 12 Back Valley extraction wells is fitted with a submersible pump, and the appropriate piping and electrical/instrumentation controls. All extraction wells, with the exception of STW-2 and replacement well EW-15, which only extracts water from the saprolite, were designed to extract groundwater from both the saprolite and bedrock zones of the aquifer. For the extraction wells other then STW-2 and EW-15, the pump is located in the blank casing section located below the screened section and above the open bedrock core hole**[17].**

Currently, 13 monitoring wells are used to monitor groundwater quality in the Back Valley. Six of those wells are in the shallow saprolite zone, three are in the intermediate saprolite zone and four are in the bedrock interface. Refer to **Table 6-3** for a description of the Back Valley monitoring wells.

Fourteen piezometers are used to monitor the cone of influence created by the Back Valley extraction system. Six piezometers are in the shallow saprolite, four are in the deep saprolite zone and four are in bedrock. In addition, there are 19 monitoring wells used to monitor the cone of influence created by the Back Valley extraction system. Eleven of those are in the shallow saprolite, four are in the intermediate/deep saprolite zone and four are in bedrock. **Table 6-4** lists wells/piezometers used to monitor the cone of influence of the extraction system in the Back Valley. Refer to **Figure 3-4** for the location of the wells and piezometers in the Back Valley.

6.3 Groundwater Treatment

The Front Valley Treatment Building houses the groundwater treatment components for the Front Valley. The treatment train includes the following sequence of equipment: equalization

tank (FVEQT), packed column air stripper (FVAS), bag filtration, and three carbon filtration units. **Figure 6-1** provides a process flow diagram of the Front Valley treatment system. Treated groundwater is discharged to a lift station and then pumped to the Metering Manhole where it is mixed with treated effluent from the Back Valley treatment system. The combined flow is then discharged to the MSD.

The Back Valley Treatment Building houses the groundwater treatment components for the Back Valley. The treatment train includes the following sequence of equipment/ technologies: equalization tank (BVEQT), tray air stripper (BVAS), and pH adjustment.

Originally, the Back Valley air stripper was a "Delta" packed tower air stripper. However, due to the relatively quick iron-scaling on the packing material, this type of air stripper was deemed unsatisfactory for the conditions at the Site. With EPA's approval, the PRPs replaced the "Delta" packed air stripper with a tray air-stripping unit during March/April 1995. The tray air stripper consists of five removable stainless steel trays. The tray configuration allows for the removal of iron build-up from the air stripper more expediently, resulting in less downtime for the system**[1]**.

The PRP Companies installed a new tray stripper in April 2007 because the housing of the stripper installed in 1995 was constructed of common steel and was highly corroded. The replacement air stripper was constructed entirely of stainless steel but in all other respects it is a replica of the 1995 unit.

Following air stripping, caustic soda is added to the groundwater to raise the pH to the permissible discharge limit (6-10 standard units) as set by MSD.

6.4 Metropolitan Sewerage District (MSD) Permit

The groundwater extraction and treatment system is regulated by the local sewerage district based on a combination of extraction removal efficiency and effluent discharge limits. The Chemtronics Site applied and was issued a permit to discharge (G-006-91) by the MSD for the discharge of treated and extracted groundwater. **Appendix C** provides a summary of the MSD permit history.

The permit was first issued on June 20, 1991 and renewed May 1993 with no changes. The permit was amended in December 1993 to reduce the frequency of sampling from quarterly to a semiannually basis and in 1994 the Permit was again amended to include modifications to the pretreatment systems. Later that same year the permit expired, but was renewed August 26, 1995. The permit was renewed again October 1, 1998 increasing the discharge limitations and re-classifying Chemtronics as an insignificant user. On May 7, 2001 permit limits for nickel were increased. The permit was renewed again on April 1, 2002 and the compliance sampling location was modified to include only the metering manhole (Pipe 03). On June 19, 2002 the effluent limit was increased for Picric Acid. On March 5, 2007 the permit was extended to October 30, 2007. The current permit is included in **Appendix C**.

6.4.1 Effluent Discharge Limits

The MSD permit issued in 2002 requires compliance sampling at one location, Pipe 03, which is also referred to as the Metering Manhole. Pipe 03 (or the Metering Manhole) is the point at which treated groundwater from the combination of Pipe 01 and Pipe 02 receive treated effluent from the Front and Back Valley systems and is combined for the final effluent flow measurements.

According to the permit effective April 1, 2002 (and subsequent amendments) the Pipe 03 discharge is to be monitored twice per year for the following chemical parameters: 1,2-dichloroethane, trichloroethylene, methylene chloride, trans-1,2-dichloroethene, benzene, toluene, total trihalomethanes, RDX, picric acid, total cyanide, zinc, benzylic acid, and benzophenone.

Table 6-5 provides the MSD Effluent Limitations, and analytical results for the sampling events conducted from December 2002 through December 2006. Compliance with the MSD permit requirements is discussed in **Section 8.2.3.7**.

6.4.2 Removal Efficiency

The MSD permit dated April 1, 2002 does not specify removal efficiency for the treatment systems. Rather, the permit includes maximum allowable concentrations for specific chemicals as noted on **Table 6-5**.

6.5 Institutional Controls

Institutional controls include non-engineering measures such as deed restrictions, water use limitations, fencing, etc., to control or limit potential exposure to receptors when residual contamination remains on a site. Neither the 1988 ROD nor the 1989 ROD Amendment required specific institutional controls. However, the Site is staffed by a security guard 24 hours per day, seven days per week. The Site is serviced by a public water supply. On-Site groundwater and surface water are not used in any capacity.

Perimeter fencing at each DA is inspected annually and they were also inspected during the Site inspection in May 2007 and appeared to be in good condition with the exception of the fencing in the area of the settlement in the Acid Pit. Chemtronics, Inc. is considering placing perpetual land use restrictions on the property using model language developed by DENR as a starting point. These restrictive covenants will help limit potential Site or groundwater uses but this document has not yet been prepared for filing with the appropriate County office.

6.6 System Operation and Maintenance

The latest revision of the O&M Manual for the Site remediation is dated November 1997**[16]**. This manual provides requirements for the groundwater remedial system for the following elements:

Front Valley Remediation System

- Groundwater extraction, treatment and discharge
- Groundwater sampling
- Treatment system sampling
- Caps (DA 10/11, 23)

Back Valley Remediation System

- Groundwater extraction, treatment and discharge
- Groundwater sampling
- Treatment system sampling
- Caps (DA 6, 7/8, Acid Pits)
- Combined metering manhole and automatic sampler
- Automated monitoring and record keeping
- Quality Assurance/Quality Control Requirements
- Permit requirements for discharge to the MSD

The O&M Manual also contains the monitoring and reporting requirements, and the statistical procedure for determining compliance with GRLs and whether the groundwater data are statistical meaningful.

The GRLs for the groundwater contaminants of concern are listed in Table 1.1, page 1-3 of the November 1997 O&M Manual**[16]**. All of the wells/ piezometers that are monitored as per the O&M Manual can be found in **Tables 6-1** through **6-4** of this Five-Year Review.

In the last Five-Year Review**[3]**, the USACE noted that the groundwater extraction and treatment systems had a history of malfunctions. The report also noted the potential lack of sufficient monitoring points to adequately measure groundwater levels (i.e., accurately define the limit of the cone of influence created by each groundwater extraction system). The report went on to describe measures that the PRP Companies had implemented and planned to implement to improve the operation of the extraction and treatment systems. The report noted that the percentage of time that each pump operated increased or was generally the same between January and December 2000.

The percentage of time that each well operated during the period between January 2002 and December 2006 increased over that of the previous five year period. The overall improvement of system operating time is primarily due to a systematic equipment maintenance program that was implemented midway through 2000 and continued through the current reporting period**[17]**. Although the average pumping rates have decreased over time, the annual

total gallons pumped in recent years compares favorably to the pre-1997 volumes, primarily due to increased operating time.

During calendar year 2006, actual average extraction flow rates for the Front Valley and Back Valley were 2.09 and 6.79 gpm, respectively, compared to average extraction rates of 2.14 and 8.47 gpm in 2000. Again, further information on system performance is included in the System Performance Evaluation submitted by the companies in June, 2007.

6.6.1...System Improvements Implemented Since 2001

The PRP Companies have implemented a series of actions since 2001 that are designed to improve the O&M and monitoring of the CERCLA remedy as well as improve overall Site conditions and security. These items included:

- Amended soil on the landfill caps to improve fertility and stimulate the growth of the grass cover;
- Replaced extraction well EW-8 (March 2005);
- Replaced the Back Valley air stripper (April 2007);
- Replaced the 2-inch discharge line from the Back Valley treatment building to the metering manhole with an 4-inch pipe to reduce maintenance and prevent leakage (Fall 2004);
- Installed a concrete settling tank downstream of the air stripper in the Back Valley to collect solids and reduce the risk of plugging the discharge line (Fall 2004);
- Eliminated electronic monitoring of extraction well drawdown and pumping rates to reduce the cost of system operation (Fall 2001);
- Installed 59 permanent monitoring wells to improve the Site groundwater monitoring network (44 in saprolite and 15 in bedrock; see Appendix D details);
- Constructed a new maintenance building to store the Site maintenance equipment;
- Chemtronics Inc. installed barricades at the "back gate" to reduce access to trespassers;
- Chemtronics Inc. implemented a 24-hour per day security; and
- Chemtronics Inc. demolished all buildings and structures, (other than the treatment buildings, maintenance buildings, and guard shack) and disposed of all demolition

debris at the Republic Services, Inc. Subtitle D landfill located in Enoree, South Carolina (2004 through 2006).

6.7 Operation & Maintenance Costs

Part of this Five-Year Review is an evaluation of the costs for the remedy. The annual O&M cost estimate presented in the ROD was $139,500 **[3].** The actual annual costs for all CERCLA related O&M activities (including cap maintenance, sampling, reporting, etc.), expressed as cost per gallon of groundwater treated, is summarized on **Figure 6-6.** Total annual costs for the reporting period are: 2001 - $442,509; 2002 - $213,188; 2003 - $487,622; 2004 - $442,402; 2005 - $455,323; 2006 - $392,938. This Figure shows costs at the Site declined per gallon of water treated over time from 17.6 cents per gallon in 1993 to a low of 3.8 cents per gallon in 2002. Between 2003 and 2006 the annual costs increased due to the maintenance activities described in Section 6.1.1. The treatment cost in 2006 was 8.6 cents per gallon of water treated. From 1994 to 2006, the average total CERCLA cost per year for the Site was $387,196 with a high of $577,983 in 1997.

6.8 Monitoring and Reporting Schedule

According to Section 1.3, "Groundwater Sampling Frequency", in the *Sampling and Analysis Plan* of the 1997 O&M Manual for the Chemtronics Site Remediation; groundwater sampling will be conducted quarterly during the first year of remediation, semiannually during years two through five and annually thereafter until remediation is completed**[16].** The O&M Manual also specifies that a System Performance Evaluation will be completed once every five years following the fifth year of system operation.

According to the schedule defined in the in O&M Manual, a System Performance Evaluation was scheduled to be completed in 2003. However, in 2003 the PRP Companies requested that EPA defer the required report because the companies were attempting to transfer the project to the DENR HWS and the report might not be necessary. The EPA approved the request. In 2006, the EPA notified that PRP Companies that they should proceed with the System Performance Evaluation and that the evaluation should be completed in time to have the results reflected in this Five-Year Review.

The System Performance Evaluation report was completed and submitted to the EPA in July 2007.

6.9 Community Involvement

During the RI/FS, there was considerable community interest in the Site. However, with the issuance of the ROD and the implementation of the remedy, community interest in the Site has waned. The last Fact Sheet was prepared by the EPA in January 1994**[3]**. This Fact Sheet provided the public with an update on the status of the Site. Since the implementation of the remedy, the only inquiries the EPA has received from the community are from various

individuals interested in purchasing homes or property near the Site. The EPA was able to assure these individuals that the property they were interested in has not been adversely affected, and would not be affected by activities that occurred or are occurring at the Site**[3]**.

In June 2003, the EPA and DENR co-sponsored a community meeting to discuss the transfer of the project to the DENR HWS**[8]**. This meeting was sparsely attended by the public.

7.0 Progress Since Last Review

In September 2002, the first Five-Year Review's protectiveness statement was as follows:

> "The portion of the site remedy dealing with potential soil exposures (i.e., the caps) appears to be protective of human health and the environment. Since there are no current onsite groundwater receptors and there is currently no indication of contaminated groundwater or surface water exiting the property, the remedy is considered protective in the short term. However, groundwater, in the long term at the Chemtronics site is not protective of human health and the environment due to the following reasons: the current monitoring well system is insufficient to determine if the plumes are being captured, groundwater is likely migrating to a degree and discharging to adjacent surface water, groundwater performance standards are not being met onsite and groundwater is not currently "restored", as ARARs are lower than the ROD standards, MSD violations have occurred, and there is no documentation of deed restrictions or future groundwater use restrictions for the site.

The next Five-Year Review should be scheduled five years from the date of this Review, in April 2007.

Other Comments:

> Once these items are investigated and corrected, long-term protectiveness, operation, and site safety will be improved."

The first Five-Year Review Report documented several recommendations. These recommendations and actions taken, and the current status of the each recommendation, is documented in **Table 10-1**.

8.0 Five-Year Review Process

The purpose of this Five-Year Review is to evaluate the implementation and performance of the remedy to determine if it is protective of human health and the environment. The evaluation of this remedy and the determination of the protectiveness were based on and supported by the data and observations made as part of this review, per the Five-Year Review guidance**[19]**.

8.1 Team Members

The following individuals were team members for this Five-Year Review process:

- Jon Bornholm, Remedial Project Manager, EPA
- Beth Hartzell, NC DENR, Superfund Section
- Stuart Ryman, Project Coordinator, Altamont Environmental, Inc.
- Mark Spencer, Chemtronics, Inc.
- Stephen Simpson, CNA Holdings, Inc.
- Norm Sealander, Sealander Associates on behalf of Northrop Grumman Systems Corporation

8.2 Administrative Components

The components of the review include:

- Community notification;
- Document review;
- Data review;
- Site inspection;
- Interviews; and
- Five-Year Review Report development and review.

The review team established the following schedule for execution of the Five-Year Review:

Action Item	Date
Document Review	Early Spring 2007
Data Review	Spring and Summer 2007
Site Inspection	May 8, 2007
Five-Year Draft Report	July 24, 2007
Five-Year Final Report	September 2007

8.2.1 Community Notification

EPA, Region 4 conducted the community notification relating to the Second Five-Year Review.

8.2.2 Document Review

This Second Five-Year Review included an examination of relevant Site documents and project files. Documents that were reviewed were related to Site investigations, feasibility studies, remedial design, the ROD, the ROD Amendment, construction reports, O&M plans,

interagency communications, monitoring data and the first Five-Year Review Report. The complete list of documents reviewed is included in Section 13.

Monthly status reports are prepared for this project and submitted to EPA for review. The reports are reviewed on an ongoing basis as part of normal project activities. The information contained in these reports was considered as part of this Five-Year Review.

8.2.3 Data Review

The O&M Manual specifies that performance evaluations will be completed after the first six months and after the first year of operation. Evaluations are also to be conducted after the second, third, and fifth years and then every five years thereafter. The latest *System Performance Evaluation* was prepared on July 5, 2007**[17]**.

This Five-Year Review relies upon information presented in the latest System Performance Evaluation**[17]**. For this review, data collected between 1992 and 2006 were evaluated, with the exception of some data from 1998 and 1999 because that data set was incomplete.

Table 8-1 provides analytical results for VOCs for 1992, 1993, 1994, 1995, 1996, 1997, 1998, 2000, 2001, 2002, 2003, 2004, 2005 and 2006 for the monitoring parameters and locations listed in the O&M Manual (see **Tables 6-1 through 6-4 and Figures 3-3 and 3-4**). **Table 8-2** provides analytical results for metals, explosives, and miscellaneous compounds obtained during the same time period.

In addition to the wells/piezometers listed in the O&M Manual (**Tables 6-1 through 6-4),** the following locations were sampled and analyzed and the data are presented in **Tables 8-1 and 8-2:** Front Valley/Carbon #1 Effluent (FVCAR-1), Front Valley/Carbon #3 Effluent (FVCAR-3), Back Valley Air Stripper (BVAS), Front Valley Air Stripper (FVAS), Back Valley/Equalization (BVEQT), Front Valley Equalization (FVEQT), and the "Metering Manhole".

8.2.3.1 Organics

The method reporting limit (MRL) was greater than the GRL for all of the VOCs analyzed on at least one occasion during the five most-recent sampling events. For example, the GRL for 1,2- dichloroethane (1,2-DCA) is 5 parts per billion (ppb) or microgram per liter (µg/l), and this GRL was exceeded by the method reporting limit on one or more occasion for the following wells: SW-2, MW-1BD, MW-1B1, SW-4, MW-2B, MW-4B, MW-2D, MW-3D, MW-3S, SW-12, and SW-13 (see **Table 8-1**). A review of the analytical reports indicates that often, though not always, the elevated MRL is the result of sample dilution at the laboratory.

There were no VOCs detected above the respective GRL in four of five Front Valley compliance wells during the fall 2006 sampling event (MW-1S, MW-1BI, MW-1BD, and SW-2). VOCs were also not detected above the GRL in five of the 13 Back Valley compliance

monitoring wells during the fall 2006 sampling event (MW-2D, MW-3D, SW-8, SW-12, and SW-13). These results are consistent with historical trends.

The following wells have *not* had an exceedence of any organic constituent for the past two years: MW-1S, MW-1BD, and SW-2 (Front Valley) and MW-2D, MW-3S, MW-3D, SW-8, SW-12, SW-13 (Back Valley).

Wells MW-2B, MW-4B, MW-5S, and MW-1BI were below the GRL for the past two sampling events for all constituents with the following exceptions: 1, 2-dichloroethane at MW-1BI, trichloroethene at MW-2B, and trichloroethene and tetrachloroethene at MW-4B and MW-5S.

Figures 8-1 through 8-8 show the concentration trends for VOCs detected above the GRL in monitoring wells in Back Valley and Front Valley. Time versus concentration trend plots were prepared for all wells where one or more VOCs exceeded the GRL on two or more occasions in the past five years.

8.2.3.1.1 Back Valley

M85L9

Well M85L9 is a Back Valley saprolite monitoring well located to the east of the Acid Pits. The trend plots for this well are shown on **Figures 8-1A and 8-1B.** Five compounds (1,2-DCA, benzene, chloroform, methylene chloride, and trichloroethene) were detected above the GRL in the most recent sampling event (2006). The figure and data summary table (**Table 8-1**) show an overall downward trend for all detected VOCs from 1993 through 2003. In early 2004, the concentration of 1,2-DCA and chloroform began trending up slightly. Between 2005 and 2006 the concentration of 1,2-DCA increased to the highest concentration observed since 1995 but the concentration of chloroform once again decreased slightly during this same period of time. The cause for the recent increase in 1,2-DCA concentration in this well is not known. Also, at well M85L9, the concentrations of benzene and methylene chloride were detected at or above their respective GRL in recent sampling events. Concentrations of these compounds have been relatively stable since 1997 as shown on **Figure 8-1**.

IW-2

Well IW-2 is a saprolite monitoring well located in the Back Valley near the southeast corner of the Acid Pits. VOC concentrations in well IW-2 have shown an overall decreasing trend between 1992 and 2005. However, concentrations for four VOCs (1,2-DCA, benzene, chloroform and trichloroethene) increased above the GRL in the 2006 sampling event. The trend plot for VOCs in well IW-2 is included as **Figure 8-2A** and **8-2B**.

BW-9

Well BW-9 is a bedrock well located southeast of the Acid Pits. Five compounds (1,2-DCA, benzene, chloroform, methylene chloride, and trichloroethene) were detected above the GRL in the most recent sampling event. The concentrations of VOCs detected in BW-9 decreased between 1992 and 2005 and, with the exception of 1,2-DCA and benzene, the overall VOC concentrations have been relatively stable since 2003. The concentrations of 1,2-DCA and benzene have each more than doubled since 2003 but are still well below their all time high concentrations. The trend plot for VOCs in well BW-9 is included as **Figures 8-3A** and **8-3B**.

MW-2B

Well MW-2B is a bedrock monitoring well located south of the Acid Pits. Only one compound, trichloroethene, was detected in this well in the most recent sampling event (**Table 8-1**). The detected concentration of 7 µg/l, which is only slightly over the GRL of 5 µg/l, is consistent with historical data (**Figure 8-4**).

MW-3B

MW-3B is a bedrock monitoring well located south of the Acid Pits, slightly west of the MW-2 well set. Five compounds (1,2-DCA, benzene, chloroform, methylene chloride, and trichloroethene) were detected above the GRL in the most recent sampling event. The VOC trend plot for this well is included as **Figure 8-5**. A review of the plot shows a gradual increase in all VOCs since 1992. Most of the compounds reached an all time high concentration in 2002, then decreased until 2004 and began increasing again in 2005. One compound, 1,2-DCA , is nearing its all time high concentration.

MW-5S

MW-5S is a shallow saprolite monitoring well located due south of the Acid Pits. Two compounds (1,2-DCA and trichlorethene) were detected above their respective GRL during the most recent sampling event. VOC trend plots for MW-5S are shown on **Figures 8-6A** and **8-6B**. As shown, the VOC concentrations in this well peaked in 2002 and the most recent sampling results show concentrations only slightly greater than the respective GRL.

MW-4B

MW-4B is a bedrock well located southwest of the Acid Pits. One VOC, trichloroethene, was detected above the GRL in the most recent sample collected from this well. The trend plot for this well (**Figure 8-7**) shows a steadily decreasing TCE concentration in this well.

8.2.3.1.2 Front Valley

BW-4

Well BW-4 is a bedrock monitoring well located south of DA-23. Only one compound, 1,2-DCA, was detected above the GRL in the sample from this well during the most recent sampling event (2006). However, the concentration of 1,2-DCA in the sample required the laboratory to dilute the sample and resulted in an elevated MRL for all other VOCs that were analyzed. The resultant MRL was above the GRL for all compounds. The concentration trend plot for 1,2-DCA in BW-4 is shown on **Figure 8-8**. As shown, the concentration of 1,2-DCA in this well has decreased steadily since the all time high concentration was detected in 1994.

8.2.3.2 Inorganics

In accordance with the O&M Manual, groundwater samples at the Site are analyzed for the following inorganic compounds: chromium, copper, cyanide, lead, nickel, and zinc. The results of inorganic analyses for the period 1992 – 2006 are summarized in **Table 8-2.**. The following is a summary of the metals detected at or above the GRL at each monitoring well since 2001:

8.2.3.2.1 Back Valley

- M85L9; four detections for lead above the GRL;
- BW-9; one detection of nickel above the above the GRL;
- MW-2D; one detection of chromium above the GRL;
- MW-4B; one detection of chromium above the GRL;
- MW-5S; one detection of chromium above the GRL;
- SW-12; one detections of copper above the GRL;

Since 2001, inorganic compounds have not been detected in the following Back Valley wells at or above a GRL: IW-2, MW-3B, MW-3S, SW-8, and SW-13.

8.2.3.2.2 Front Valley

- SW-2, one detections of chromium above the GRL
- MW-1S, one detection of chromium above the GRL;

Since 2001, inorganic compounds have not been detected in the following wells at or above a GRL: BW-4, MW-1BI, and MW-1BD.

In addition to the wells discussed above, analytical results for samples obtained at the following locations can be found in **Table 8-2**:

- Metering Manhole
- BVAS

- FVCA1I
- FVCAR-1
- FVCAR-3 and FVCA3E

8.2.3.3 Benzophenone and Benzylic Acid

Table 8-2 includes the analytical results for benzophenone and benzylic acid for the years 1992 - 2006, for samples collected from the O&M monitoring wells listed on **Table 6-1.** . Benzophenone is a COC, with a GRL of 152 µg/l but neither benzophenone or Benzylic Acid were reported above the GRL in any well sample collected since 2001.

In addition to the wells listed on **Table 6-1**, benzonphenone and benzylic acid results for the following locations can be found in **Table 8-2**.

- Metering Manhole
- FVAS and FVCA-1I
- FVCAR-1 and FVCA-1E
- FVCAR-2
- FVCAR-3 and FVCA-3E
- FVEQT

8.2.3.4 Explosives

A summary of the explosives analytical data for the years 1992-1997 and 2000-2006 is also provided on **Table 8-2**. The O&M Manual defines the explosives that are to be analyzed in samples from specific wells and include: 2,4,6-trinitrotoluene (TNT), benzylic acid, picric acid, and RDX.

All concentrations for TNT, Picric Acid, and RDX were reported less than the MRL or, if detected, at concentrations less than the GRL, for all annual sampling events and at all sampling locations completed since 2001.

In addition to the wells listed on **Table 6-1**, analytical results for samples obtained at the following locations can also be found in **Table 8-2**:

- Metering Manhole
- FVAS and FVCA-1I
- FVCAR-1 and FVCA-1E
- FVCAR-2
- FVCAR-3 and FVCA-3E
- FVEQT

8.2.3.5 Biodegradation of Chlorinated Solvents

The on-Site disposal of chlorinated solvents during process operations at Chemtronics has caused groundwater contamination at the CERCLA disposal areas discussed in this report. However, a number of processes such as dispersion, dilution and biodegradation can occur over time and under favorable conditions. During biodegradation, contaminants may degrade to other products that may or may not be more harmful than the original contaminants. **Figure 8-9** shows the natural path for biodegradation for chlorinated solvents beginning with tetrachlorethene (PCE) going to trichloroethene, 1,2-dichloroetheme (1,2-DCE) and vinyl chloride, finally to ethane. For this Site, the current O&M analytical protocol does not include some of the intermediate products such as vinyl chloride, ethene or ethane. For future analysis, it may be advisable to include vinyl chloride in future O&M monitoring analyses.

8.2.3.6 Evaluation of Groundwater Capture

As noted in Section 5.0, the RAOs relevant to groundwater at the Site are as follows:

- To prevent offsite migration of groundwater contamination; and
- To restore contaminated groundwater to levels protective of human health and the environment.

As discussed previously in **Section 6.2.1 and 6.2.2,** the groundwater extraction/treatment systems have had a history of operational problems. From 1993 through 1996, both the Front Valley and Back Valley groundwater extraction/treatment systems operated sporadically. The changes/modifications implemented in 1997 and the operator modifications implemented in 2000 have increased the efficiency and reliability of these systems.

Figures 8-10 and **8-11**show the concentration of organic contaminants from the most recent sampling data available (October 2006) for the Front and Back Valleys, respectively. **Figures 8-12** and **8-13** show the groundwater contaminant plume for VOCs as of 2001. **Figures 8-14** and **8-15** show the concentration of metals in groundwater during the most recent sampling event. **Figures 8-16** and **8-17** show groundwater metals concentrations in 2001. Even with the many O&M improvements, the monitoring well network for both valleys is insufficient to make an accurate determination as to whether the extraction system is effectively capturing or containing Site groundwater. Insufficient information is available from the limited number of CERCLA monitoring wells to determine if the plume size is stable, is being reduced as a result of pumping and treating the groundwater, or is growing.

Another RAO and measure of the remedy is whether concentrations of site contaminants in groundwater levels are decreasing to levels that are protective of human health and the environment, (i.e., are meeting the GRLs specified in the ROD), and a demonstration of evidence of groundwater being "restored" (see **Tables 8-1 and 8-2** and Section 8.1, above). This evaluation is to be supported by the statistical procedure which compares monitoring levels to

"baseline", as described in the O&M Manual**[16]** and described in the System Performance Evaluation**[17]**.

As discussed in the System Performance Evaluation**[17]** and described in Section 8.1 of this report, in general, although some contaminant levels in some wells have indicated a decrease, many groundwater concentrations *in situ* (prior to treatment) are still not meeting the GRLs set forth in the ROD. Furthermore, most of the current groundwater ARARs are lower than the existing ROD levels (see **Section 8.2.3.8** below). Thus, on-Site groundwater would not *currently* be considered to be "restored", or protective of human health, per the RAOs, although it may be in the future.

8.2.3.7 Metropolitan Sewerage District Compliance

Table 6-5 provides the MSD Effluent Limitations, and analytical results for the 12 sampling events, including two re-sampling events, completed since the permit was modified in April 2002. Since 2002, the concentration of 1,2-DCA and RDX has each exceeded the MSD permit limit on one occasion.

8.2.3.8 Applicable or Relevant and Appropriate Requirements Update

One of the purposes of the Five-Year Review is to review federal and state requirements promulgated or modified after the ROD to determine if changes are necessary to ensure protection of human health and the environment. Newly promulgated or modified State requirements evaluated included:

- SDWA Maximum Contaminant Levels (40 CFR 141)
- North Carolina Groundwater Standards and Classifications North Carolina Administrative Code (NCAC) (NCAC T15A: 02L.0200), promulgated on November 23, 1993
- North Carolina Water Quality Standards (NCAC T15A: 2B), promulgated on March 3, 1993
- North Carolina Inactive Sites Program, Guidelines for Assessment and Cleanup
- North Carolina Air Quality Standards (NCAC T15A: 2D, promulgated on April 1, 1995 and North Carolina Air Quality Permit Requirements (NCAC T15A: 2Q), promulgated on August 1, 1995**[2]**.

Groundwater/Drinking Water

Table 5-1 lists the GRLs listed in the 1988 ROD as well as the current federal MCLs and the current North Carolina groundwater quality standards. Several new federal MCLs have

been promulgated since the 1988 ROD, the most significant departure from the ROD levels being the MCL for methylene chloride (from 60 to 5 µg/L).

In comparing the ROD specified GRLs to current standards, all Site constituents have new ARARs except for picric acid, benzophenone and benzylic acid. **Table 5-1** is shaded in all incidents where the new ARAR is lower than the original GRL. As shown in **Table 5-1**, all of the new groundwater ARARs are *lower* than the ROD levels, except for trans-1,2-dichloroetheylene and chromium. In all cases where the State of North Carolina has established a groundwater standard for a chemical, the State's groundwater criterion is either equal to, or set at a lower concentration, than the MCL.

Soil

Although the North Carolina *Inactive Sites Program, Guidelines for Assessment and Cleanup* was created since the ROD was signed, these guidelines were considered to affect the evaluation of the remedy since potential soil exposure in the disposal areas has been addressed by the construction of landfill caps. These "Guidelines" do not currently apply to the RCRA related areas as these areas have not been addressed under an RA.

Air

Although new air quality standards have been promulgated in North Carolina since the ROD was issued, these standards were not considered further because in a letter dated March 19, 2001 to the O&M contractor (see **Appendix E**), the Western North Carolina Regional Air Quality Agency (WNCRAQA) had determined that the air strippers no longer required a permit. In their letter, the agency noted that a permit is not required for CERCLA activities carried out entirely onsite, and that the air permit No. 11-GRW-335 for VOCs and Toxic Air Pollutants dated February 8, 1999 would be allowed to expire on March 31, 2001. However, the letter also said that this decision did not relieve the facility of compliance with any substantive standards listed in the WNCRAQA Air Quality Regulations. The Site operations are completed in accordance with all sampling and reporting requirements specified by the regulations.

Surface Water

Although new surface water quality standards have been promulgated in North Carolina since the ROD was issued, these standards were not considered further because the ROD did not specifically address surface water and sediment remediation. These ARARs may be applicable if it is determined that the surface water/sediment pathway needs to be evaluated in future Site actions.

Data included in the documents specified in Section 13 were reviewed. In addition, annual financial records were reviewed to determine the cost of operations.

8.2.4 Site Inspection

A Site inspection was performed by the team members on May 8, 2007. The purpose of the Site inspection was to inspect the general condition of process equipment, monitoring wells, extraction wells, piezometers, disposal area caps, and fencing; review operation, and maintenance records associated with both extraction systems, and identify information that could be used during this Five-Year Review. The Five-Year Review site inspection checklist is found in **Appendix F.**

During the May 8, 2007 Site inspection, the following items were observed to evaluate the effectiveness of the system and present conditions:

- Disposal area caps and vegetation on landfill cover
- Surface water drainage
- Fencing and buildings for signs of vandalism or deterioration requiring repair
- O&M records and other applicable Site records associated with the extraction systems
- Settlement monuments
- Treated discharge location
- Process equipment, monitoring wells, extraction wells, piezometers, and air strippers

The monitoring and extraction wells were inspected and found to be secure and well maintained. However, the extraction wells maintenance records indicated that the extraction system still requires a substantial amount of maintenance in order for it to operate. The PRPs have addressed this issue by employing a full-time on-Site O&M Specialist whose responsibilities include the maintenance of the extraction system. During the inspection, the inspection team interviewed the O&M Specialist regarding the maintenance activities associated with the extraction wells. The operator discussed how the pumps (when necessary) were removed, cleaned/repaired, and placed back into service and how the Back Valley air stripper was periodically cleaned. Although the procedures seemed adequate, the current operating procedures are not reflected in the Operations and Maintenance manual.

Appendix G contains some of the O &M inspection forms now being used. **Appendix B** includes photos taken during the Site inspection. The operator was also questioned regarding the availability of spare parts necessary to keep the extraction system operable. He stated that critical spare parts such as pumps and controllers, which were not available from a local source, were kept on hand.

The treatment systems for both the Front and Back Valley were inspected. The general condition of both treatment systems was good. Spare trays for the Back Valley stripper were available, as were spare controller boards for each treatment system. The Operator stated that he monitored the conditions of the pumps and blowers on a daily basis and the inspections are documented on inspection forms.

Fencing was inspected and appeared to be in good condition. There were no signs of vandalism.

The disposal area caps were inspected and the vegetation on the caps was found to be in very good condition. Areas of "stressed" vegetation and small erosion riffles, as noted in the previous Five-Year Review, were not apparent. The only area of concern noted was in the northwest corner of the Acid Pits where an area of substantial settlement was noted. The PRP Companies have noted this area in the monthly reports submitted to EPA and have retained a consulting engineering firm to evaluate the area and develop recommendations for repair.

Subsidence monuments were observed during the Site inspection. These settlement monuments were surveyed in 1996 and 2006 and the data are summarized on **Table 7-1**. As shown on the table, the most recent survey of the settling markers indicated very little to no settling had occurred in any of the caps. The change in marker elevations ranged from +0.098 feet to -0.88 feet since the initial readings in 1993.

No seeps or evidence of standing water was observed around any of the disposal areas. No evidence of borrowing animals was observed.

8.2.5 Interviews

Activities to involve the community in the Five-Year Review were initiated with a notice that was sent to the local newspaper that a Five-Year Review was to be conducted and completed by September 29, 2007. This notice was posted in the Asheville Citizens-Times on May 7, 2007. A copy of this notice is provided in Appendix E of this report.

Within thirty (30) calendar days of the Five-Year Review finalization, a notice will be published in the same local newspapers announcing that the Five-Year Review Report for Chemtronics site is complete, and the results of the review and the report are available to the public at the information repository which is located at the Pack Memorial Library, 67 Haywood Street, Asheville, North Carolina. This report will also be placed in the Administrative File in the EPA Record Center, 11th Floor, 61 Forsyth Street, Atlanta, Georgia.

EPA conducted interviews with several individuals between the dates of July 16 - 17, 2007. The following questions were asked to each individual:

1. What is your overall impression of the project?
2. Are you familiar with EPA activities at the site over the past years?
3. Do you live near the site?
4. Have you been pleased or displeased with clean-up activities at the site?
5. What effects, if any, have site operations had on the surrounding communities?
6. Do you still have any concerns regarding EPA clean-up activities at the site?
7. Do you think you have been kept adequately informed about clean-up activities at the site?

8. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?
9. Is there someone else that you would like to recommend that we contact for more information?
10. Do you have any suggestions that EPA can implement to improve communication with the public?

Since the initial clean-up, community interest for the Chemtronics site is very minimal. When interviewed, the community stated that they would like notification about anything that happens regarding the site. Approximately two years ago, there was some activities performed there and the community was not notified. Maybe a fact sheet or a news article would be beneficial to keep them informed. There have been inquiries that there will be some redevelopment starting near the property line and there is concern about the safety of these homes/businesses. As stated in the past Five-Year Review EPA was able to assure that this property has not been adversely affected, and would not be affected by activities that occurred or are occurring at the site. It was suggested that even though there was a low turn-out at previous meetings, it would be very beneficial to the community to hold them occasionally.
The community does feel that that the clean-up and on-going monitoring has been very successful and is pleased with EPA's efforts. One success story is that a local college is using the implementation of the ROD that was used to clean the site, as a study for environmental students.

9.0 Technical Assessment

One of the primary purposes of the Five-Year Review is to determine the effectiveness and protectiveness of the remedy. Per the *Five-Year Review Guidance*[19], the review should address the following three questions:

(A) Is the Remedy Functioning as Intended by the Decision Documents?

(B) Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?

(C) Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

For the Site, the assessment of the remedy and answer to these questions is accomplished by comparing Site data and operations to the original RAOs (see Section 5.0) by an:

- Evaluation of the trends for the *in situ* groundwater monitoring well data (untreated) by comparing sampling data to the GRLs defined in the ROD,

- Inspection of caps for effectiveness in controlling potential exposure to soils; as well as, reducing/minimizing the migration of contaminants from the disposal areas to the groundwater,

- Evaluation of the effectiveness of the remedy in capturing the plume, restoring groundwater, and in meeting MSD treatment standards.

- Evaluation of the protectiveness of the current GRLs for groundwater and potential updates to ARARs and criteria since the ROD.

9.1 Assessment Summary

This section provides discussion regarding the three questions defined at the beginning of Section 9.0.

9.1.1 Questions A - *Is the Remedy Functioning as Intended by the Decision Documents?*

Repairs and upgrades to the groundwater extraction and treatment system have improved overall system reliability. With the exception of extraction well EW-5, it appears that past O&M issues have been addressed to an extent that has significantly reduced the variability in the average gallons of water pumped from each well per month. **Figure 6-2** presents yearly and cumulative pumping volumes. It is evident that, since 1997, the treatment system has been under better operational control.

Although the GRLs have not yet been met for many of the monitoring wells, there is, generally speaking, a non-statistical decreasing concentration trend for most Site contaminants, as documented on VOC concentration plots included with this report. As noted in this report, the Site is currently vacant and the only on-site buildings are associated with implementation of the remedy. Therefore, the evaluation of vapor intrusion potential should be considered at the time the site is redeveloped.

As mentioned in the Data Analysis Section (Section 8.2.3 above), the method reporting limit was greater than the GRL for several analytical parameters on numerous occasions due to sample dilution at the analytical laboratory. On these occasions, it is impossible to determine if the GRLs were being met. Also, according to the O&M contractor's contract laboratory, no specific analytical procedure of benzylic acid is available. Thus, on several occasions, benzylic acid has not been analyzed and benzylic acid should be dropped from the list of analytes sampled.

Based on the information provided above, the answer to the question: *(A) Is the Remedy Functioning as Intended by the Decision Documents?* is **NO**.

9.1.2 Question B - *Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?*

Many of the ARARs have changed since the ROD was prepared. Most significant are the North Carolina groundwater standards that are lower than the ROD specified GRLs. However, the treatment system is functioning relatively well and the treated groundwater is meeting the MSD permit limits (see Section 8.2.3.7).

Although it is highly likely that some toxicity factors have changed since the time of the RI, it is also highly likely that the original exposure scenarios have also changed, since there are no current Site workers other than the O&M contractor and security personnel.

If a new risk assessment were completed for the Site, it would likely utilize a different evaluation than the evaluation performed for the RI. However, the new evaluation would likely result in the same finding; that is, that the human exposure pathway is of primary concern (i.e., the potential ingestion of groundwater or surface water by future residents). Although ecological receptors might also be considered, they would likely be of a lower concern.

Based on the information provided above, the answer to the question: *(B) Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and RAOs Used at the Time of Remedy Selection Still Valid?* is **No**.

9.1.3 Question C - *Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?*

The principal assumptions and conditions during the ROD which identified *ex situ* treatment of groundwater as the most appropriate method for remediating the groundwater at the Site have not changed. Since the ROD was signed, many *in situ* treatment technologies have been developed that might be useful in either reducing the amount of water that needs to be extracted, or in eliminating extraction of groundwater from the treatment scheme and, after further characterization, use of these methods may be beneficial.

Once the transfer of authority for the entire Site is transferred to CERCLA, the adequacy of the remedy will need to be considered with respect to the environmental issues that have historically been addressed by RCRA, after the Site has been more fully characterized.

Based on the information provided above, the answer to the question: *(C) Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?* is **Yes**.

10.0 Issues

Table 10-1 documents the status of the issues that were identified in the 2002 Five-Year Review. **Table 10-2** identifies new issues identified during this five year review.

Based on the information provided above, the answer to the question: *(C) Has Any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?* is **Yes.**

10.0 Issues

Table 10-1 documents the status of the issues that were identified in the 2002 Five-Year Review. **Table 10-2** identifies new issues identified during this five year review.

11.0 Recommendations and Follow-up Actions

The status of the each recommendation that was offered as a result of the last Five-Year Review is documented on **Table 11-1**. Recommendations and Action Items for future work are listed on **Table 11-2**.

12.0 Protectiveness Statements and Next Review

The areas of soil contamination at the Site where known waste disposal activity occurred have been capped which limits soil exposure and thus, these areas of soil contamination are protective of human health and the environment in the short-term; however, in order for the remedy to be protective in the long-term, the follow-up actions are needed: institutional controls (perpetual land use restrictions) need to be put in place.

The remedy for groundwater at the Site is protective in the short-term because there is no exposure to contaminated groundwater; however, to be protective in the long-term, follow-up actions need to be taken: institutional controls (perpetual land use restrictions) need to be placed on the property to prevent groundwater use; and improvements to the groundwater monitoring system are needed to ensure complete capture of contaminant plumes.

The next Five-Year Review should be scheduled five years from the date of this Review, in September 2012.

13.0 References

[1] RUST Environmental And Infrastructure Inc., 1997. Draft Five-Year Review Report for Chemtronics Site Remediation Swannanoa, NC to United States Environmental Protection Agency – Region 4, February 1997.

[2] United States Environmental Protection Agency (EPA), 1999. Draft Five-Year Review Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina, June 1999.

[3] US Army Corps of Engineers, Nashville District, (USACE), 2002. FINAL Superfund Five-Year Review Report, Chemtronics Site, Swannanoa, NC, EPA ID: NCD095459392, August 2002

[4] United States Environmental Protection Agency (EPA), 1988. Enforcement Record of Decision Remedial Alternative Selection, Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina, April 5,1988.

[5] United States Environmental Protection Agency (EPA), 1989. Amendment to the Enforcement Record of Decision Remedial Alternative Selection, Chemtronics Site, Swannanoa, Buncombe County, North Carolina, April 26,1989.

[6] Sirrine Environmental Consultants, 1991. Final Design Analysis, Chemtronics Site Remediation, Swannanoa, North Carolina, February 1991.

[7] Chemtronics, Inc, CNA Holdings, Inc., and Northrop Grumman Corporation, 2002. Chemtronics Site, Swannanoa, North Carolina, Holistic Site Management Plan, January 2003.

[8] Altamont Environmental, Inc., 2003. Chemtronics Public Information Meeting, Owen Middle School, 730 Old Highway 70, Swannanoa, North Carolina, June 17, 2003

[9] North Carolina Department of Environment and Natural Resources, Waste Management Division, 2007, Letter from Elizabeth W. Cannon, Chief, Hazardous Waste Section to Mr. Jon D. Johnston, RCRA Programs Branch, US EPA, March 9, 2007

[10] United States Environmental Protection Agency (EPA), 1985. Administrative Order on Consent In the Matter of Chemtronics Site, October 1985.

[11] United States Environmental Protection Agency (EPA), 1989. Unilateral Administrative Order, Chemtronics Inc., March 22, 1989.

[12] Altamont Environmental, Inc., 2006. Data Summary Report, Chemtronics Site, Swannanoa, North Carolina, December 2006.

[13] Sirrine Environmental Consultants, 1988. Draft Feasibility Study, Chemtronics Site, Swannanoa, North Carolina, February 1988.

[14] Clean Water Act (CWA), 40 CFR Part 403.

[15] Safe Drinking Water Act (SDWA), 40 CFR Part 141.

[16] RUST Environmental And Infrastructure, 1997. Operation and Maintenance Manual, Revision Number 4, Chemtronics Site Remediation, Swannanoa, North Carolina, December 1997.

[17] Altamont Environmental, Inc., 2007. CERCLA Remediation System Performance Evaluation, Chemtronics Site, Swannanoa, North Carolina, July 5 2007.

[18] Altamont Environmental, Inc., 2007. Site-wide Groundwater and Surface Water Sampling Plan and Quality Assurance Project Plan, Chemtronics Site, Swannanoa, North Carolina, April, 2007.

[19] United States Environmental Protection Agency (EPA), 2001. Comprehensive Five-Year Review Guidance, EPA 540-R-01-007, June 2001.

TABLES

Table 2-1

Site Chronology
Chemtronics Site
Swannanoa, NC

Date	Event
1952	Chemtronics site first developed and operated as an industrial facility
1952-1959	Site owned and operated by Oerlikon Tool and Arms corporation of America
1959-1965	Site owned and operated by Celanese Corporation of America
1965-1971	Site owned and operated by Northrop Carolina, Inc.
1971-1978	Site owned and operated by Chemtronics, Inc., as part of Airtronics, Inc.,
1978-present	Site owned and operated by Chemtronics, Inc.,
1980	State ordered Chemtronics to discontinue discharges to all disposal trenches
December 1982	Site listed on USEPA's National Priorities List
November 1983	Six PRPs identified
October 1985	Two of the six PRPs identified, Chemtronics and Northrup Corporation signed an Administrative Order of Consent to perform a RI/FS
April 1987	EPA approved the Remedial Investigation Report
March 1988	Feasibility Study Document was approved
April 5, 1988	Record of Decision was signed
June 1988	Negotiations with the three PRPs on the Remedial Design/Remedial Action (RD/RA) Consent Decree were initiated on this date.
March 22, 1989	Unilateral Administrative Order was issued because three PRPs failed to cooperate.
April 26, 1989	The requirement specified in the original ROD, to solidify contaminated soils in DA-23 prior to capping was removed. This change was addressed in the ROD Amendment and signed on this date.
February 1990	The 30% Remedial Design was submitted.
July 1991	Final design specifications were completed.
December 1991	RA construction began.
January 1993	RA construction completed.
March 1993	Preliminary Closeout Report
August 1993	Bioassay Report
January 1994	Annual Report- First Year Monitoring Chemtronics Groundwater Extraction System
February 1994	Second Semi-Annual Groundwater Sampling Event for Samples Collected in December 1994
June 1995	Annual Report-Second Year Monitoring Chemtronics Groundwater Extraction System April 1994-December 1995

Table 2-1

Site Chronology
Chemtronics Site
Swannanoa, NC

August 1995	First Semi-Annual Groundwater samples collected
March 1996	Second Semi-Annual Groundwater samples collected
June 1996	Annual Report-Third Year Monitoring-Chemtronics Groundwater Extraction System
September 1996	Test Results for the First Sample in 1996
April 1997	Draft Five-Year Review Report (not finalized)
October 1997	First Semi-Annual Groundwater Test Results for 1997
March 1998	Second Semi Annual Groundwater Test Results for 1997
May 2000	Site Operation and Maintenance contractor changes
September 2002	Superfund Five Year Review Report completed by USACE
June 2007	Draft Superfund Five Year Review Report prepared by PRP Companies

Table 5-1

Groundwater Remediation Levels (µg/L)
Chemtronics Site
Swannanoa, NC

CHEMICAL OF CONCERN	ROD GROUNDWATER REMEDIATION LEVELS (CLEANUP GOALS) (a)	BASIS OF STANDARD	CURRENT ARAR	
			MCLs (b)	NCAC 2L (c)
VOLATILE ORGANIC COMPOUNDS				
Benzene	5	MCL	5	**1**
Bromoform	100	MCL (TTHM)	100 / 80 **(d)**	**4.4**
Carbon tetrachloride	5	MCL	5	**0.269**
Chloroform	100	MCL (TTHM)	100 / 80 **(d)**	**70**
1,2-Dichloroethane	5	MCL	5	**0.38**
Ethylbenzene	680	PMCLG	700	**550**
Methylene chloride (Dichloromethane)	60	RSD	**5**	**4.6**
Tetrachloroethylene	7	RSD	**5**	**0.7**
Toluene	2,000	PMCLG	**1,000**	**1,000**
trans-1,2-dichloroethylene	70	PMCLG	100	100
Trichloroethylene	5	MCL	5	**2.8**
EXPLOSIVES				
Picric Acid	14,000	PPLV	N/A	N/A
RDX	35	USAIWQC	**2**	N/A
TNT	744	PPLV	**2**	N/A
INORGANICS				
Chromium	50	MCL	100 (total)	50
Copper	1,000	MCL	**1,300 TT(e) (@ tap)**	1,000
Total Cyanide	200	R_fD	200	**70**

Table 5-1

Groundwater Remediation Levels (µg/L)
Chemtronics Site
Swannanoa, NC

CHEMICAL OF CONCERN	ROD GROUNDWATER REMEDIATION LEVELS (CLEANUP GOALS) (a)	BASIS OF STANDARD	CURRENT ARAR	
			MCLs (b)	NCAC 2L (c)
Lead	50	MCL	15	**15**
Nickel	500	R_fD	-------(f)	**100**
Zinc	5,000	WQC	N/A	**1,050**
Benzophenone	152	PPLV	N/A	N/A
Benzylic Acid	21	PPLV	N/A	N/A

All concentrations incorporated into this table are reported as µg/l (micrograms/liter or ppb).

(a) Groundwater Remediation Levels as listed in the 1988 ROD.
(b) MCL - federal Maximum Contaminant Level per the Safe Drinking Water Act-40 CFR part 141, except as noted for Health Advisories.
(c) NCAC 2L - North Carolina Administrative Code - State Groundwater Classification & Standards, as amended 4/01/05
(d) Rule for Disinfectants + Disinfection By-products: Total for all THMs combined cannot exceed the 0.08 level.
(e) TT - regulated by treatment technique; Copper--Action level is 1,300 µg/l ;Lead --Action level is 0.015 µg/l.
(f) Being remanded.
(g) Secondary drinking water standards.

Shading indicates current ARAR is less than ROD level

MCL (TTHM) -- MCL for Total Trihalomethanes
N/A -- No Standard Available
NCAC 2L -- North Carolina Administrative Code - State Groundwater Classification & Standards
PMCLG -- Proposed MCL Goal (50 FR 46936-47022 (November 13, 1985))
PPLV -- Preliminary Pollutant Limit Value
R_fD -- Reference Dose (52 FR 29992-29997 (August 12, 1987))
RSD -- Risk Specific Dose (51 FR 21648-21693)
TTHM -- Total Trihalomethanes
USAIWQC -- US Army Water Quality Criteria
WQC -- Clean Water Act - Water Quality Criteria

Table 5-2

Soil Remediation Levels (mg/kg)
Chemtronics Site
Swannanoa, NC

CHEMICAL OF CONCERN	ROD SOIL REMEDIATION LEVELS (mg/kg) (a)
SEMI-VOLATILE ORGANIC COMPOUNDS	
Benzophenone	9.3
Benzylic Acid	9.3
2-Chlorobenzylidene Malononitrile	43.3
o-Chlorobenzaldehyde	0.31
Malononitrile	----- **(b)**
Polychlorinated Biphenyls	10
3-Quinuclidinol	25.7
EXPLOSIVES	
Picric Acid/Picrate	38,000
RDX	95
TNT	305

(a) All concentrations reported as mg/kg (milligrams/kilogram or ppm). The basis for all values from the 1988 ROD is the calculated PPLV (Preliminary Pollutant Limit Value), except for PCBs, which was from TSCA (Toxic Substances Control Act).

(b) "---" = Malononitrile would not persist in soil based upon K_d partition coefficient.

Table 6-1

Front Valley Monitoring Wells
Chemtronics Site
Swannanoa, NC

Saprolite Wells	
MW-1S	Monitors groundwater quality in the saprolite zone downgradient of DA-23.
SW-2	Monitors groundwater quality in the saprolite zone downgradient of DA-10/11.
SW-4	Monitors groundwater quality in the saprolite zone downgradient of DA-23.
Bedrock Wells	
MW-1BI	Monitors groundwater quality in the bedrock zone downgradient of DA-23.
MW-1BD	Monitors groundwater quality in the bedrock zone downgradient of DA-23.
BW-4	Monitors groundwater quality in the bedrock zone downgradient of DA-23

Table 6-2

Front Valley Wells/Piezometers Used To Monitor the Cone of Influence of the Groundwater Extraction System Chemtronics Site Swannanoa, NC

Saprolite Piezometers/Wells				
P-1S	P-1D	M85L4	M85L10	MW-1S
SW-2	SW-4	SW-5	SW-6	
Bedrock Wells/Piezometers				
P1B	MW-1BI	MW-1BD	BW-3	BW-4
BW-5				

Table 6-3

Back Valley Monitoring Wells
Chemtronics Site
Swannanoa, NC

Shallow Saprolite Monitoring Wells	
M85L9	Monitors saprolite portion of the aquifer downgradient of Acid Pit Area.
MW-3S	Monitors saprolite portion of the aquifer downgradient of all disposal areas and groundwater extraction wells
MW-5S	Monitors saprolite portion of the aquifer between (downgradient of) the Acid Pit Area and (upgradient of) the groundwater extraction wells
SW-8	Monitors saprolite portion of the aquifer downgradient of Acid Pit Area and DA 7/8
SW-12	Monitors saprolite portion of the aquifer downgradient of DA-6
SW-13	Monitors saprolite portion of the aquifer downgradient of DA-6
Intermediate Monitoring Wells (deep saprolite):	
IW-2	Monitors saprolite portion of the aquifer downgradient of Acid Pit Area
MW-2D	Monitors saprolite portion of the aquifer downgradient of all disposal areas and groundwater extraction wells
MW-3D	Monitors saprolite portion of the aquifer downgradient of all disposal areas and groundwater extraction wells
Bedrock Monitoring Wells	
BW-9	Monitors bedrock portion of the aquifer downgradient of Acid Pit Area
MW-2B	Monitors bedrock portion of the aquifer downgradient of all disposal areas and groundwater extraction wells
MW-3B	Monitors bedrock portion of the aquifer downgradient of all disposal areas and groundwater extraction wells
MW-4B	Monitors bedrock portion of the aquifer between (downgradient of) the DA7/8 and DA-9 and (upgradient of) the groundwater extraction wells

Table 6-4

Back Valley Wells/Piezometers Used To Monitor the Cone of Influence of the Groundwater Extraction System Chemtronics Site Swannanoa, NC

Shallow Saprolite Wells/Piezometers								
SW-7	SW-8	SW-9	SW-11	SW-12	SW-13	M85L5	M85L8	M85L9
MW-3S	MW-5S	P-2S	P-3	P-4S	P-5S	P-6	P-7S	
Intermediate (Deep Saprolite) Wells/Piezometers								
IW-2	MW-2D	MW-3B	MW-4B	P-2B	P-4B	P-5B	P-7B	
Bedrock Wells/Piezometers								
BW-9	MW-2B	MW-3B	MW-4B	P-2B	P-4B	P-5B	P-7B	

Table 6-5

Comparison of Analytical Results and MSD Effluent Limits
Chemtronics Site
Swannanoa, NC

Sample Locations	Date	1,2 - Dichloroethane	Trichloroethene	Methylene Chloride	trans - 1,2 - Dichloroethene	Benzene	Ethylbenzene	Tetrachloroethene	Toluene	Carbon Tetrachloride	Total Trihalomethanes	RDX	Picric Acid	Total Cyanide	Chromium	Copper	Lead	Nickel	Zinc	Benzylic Acid/Benzophenone
	(mm/dd/yy)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
Metering Manhole	6/25/02	**5.000**	0.041	0.029	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.045	0.027	0.032	0.0032	0.0033	0.0022	0.0031	0.22	0.038	<0.010
Metering Manhole	7/11/02	0.068	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM
Metering Manhole	10/24/02	0.007	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0013	0.031	0.058	<0.0020	0.0054	0.0022	<0.0050	0.27	0.046	<0.010
Metering Manhole	6/19/03	0.190	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0120	0.028	0.044	0.0140	0.0054	0.0077	<0.0050	0.18	0.036	<0.010
Metering Manhole	11/4/03	0.082	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0063	0.013	0.039	0.0170	0.0020	<0.002	<0.0050	0.15	0.025	<0.01
Metering Manhole	6/18/04	1.200	0.022	0.013	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.032	**0.072**	0.074	0.003	<0.002	<0.002	0.0089	0.15	0.014	<0.012
Metering Manhole	8/19/04	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM	0.0076	DNM	DNM	DNM	DNM	DNM	DNM	DNM	DNM
Metering Manhole	12/15/04	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.024	0.130	0.013	<0.0020	<0.0020	<0.0050	0.110	<0.010	<0.010
Metering Manhole	6/14/05	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.009	0.320	<0.005	<0.002	<0.002	<0.005	0.18	0.045	<0.011
Metering Manhole	12/21/05	0.250	0.0022	0.0043	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.0142	<0.0005	0.005	<0.0020	<0.0020	<0.0050	0.063	0.011	<0.021
Metering Manhole	6/13/06	0.140	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001	0.0013	<0.001	0.007	0.033	0.130	0.021	<0.002	<0.002	<0.005	0.16	0.032	<0.010
Metering Manhole	12/18/06	2.100	0.026	0.019	<0.001	0.0068	<0.001	<0.001	<0.001	<0.001	0.059	0.024	0.180	<0.005	<0.005	<0.005	<0.005	0.098	<0.010	<0.001
Current Effluent Limits		3.397	2.708	0.190	0.100	0.130	0.040	0.040	0.080	0.040	0.120	0.060	0.400	0.130	0.200	0.360	0.020	0.700	0.095	0.160

Notes:

1. All report data and effluent limitations are in milligrams per liter (mg/L).
2. DNM means there was no measurement taken for that parameter.
3. Bold indicates a permit limit exceedance.
4. 4/1/02 permit reissued - Only Metering Manhole effluent limits to be monitored.
5. 4/10/02 permit modified - Metering Manhole effluent limit for nickel increased from 0.042 mg/L to 0.280 mg/L.
6. 4/23/02 permit modified - Metering Manhole effluent limit for nickel increased from 0.280 mg/L to 0.700 mg/L.
7. 6/19/02 permit modified - Metering Manhole effluent limit for picric acid increased from 0.240 mg/L to 0.400 mg/L.
8. 7/11/02 resampled only Volatile Organic Compounds portion of permit parameters.
9. 8/19/04 resampled for RDX only.

Table 7-1

Elevation of Cap Markers
Chemtronics Site
Swannanoa, NC

Disposal Area	Settlement Marker	Northing	Easting	Elevation (Feet)			Elevation Difference (Feet)		
				2006	1996	1993	1993 to 1996	1996 to 2006	Total
Acid Pits	SM-1	703,439.42	979,405.16	2377.86	2378.155	2378.200	-0.045	-0.295	-0.34
	SM-2	703,494.78	979,363.88	2382.23	2382.645	2382.700	-0.055	-0.415	-0.47
	SM-3	703,549.53	979,323.44	2387.57	2388.055	2388.100	-0.045	-0.485	-0.53
	SM-4	703,604.63	979,282.87	2393.43	2393.805	2393.840	-0.035	-0.375	-0.41
	SM-5	703,659.24	979,241.94	2401.14	2401.365	2401.450	-0.085	-0.225	-0.31
	SM-6	703,714.69	979,200.99	2410.68	2411.105	2411.190	-0.085	-0.425	-0.51
	SM-7	703,495.88	979,480.21	2379.65	2380.165	2380.370	-0.205	-0.515	-0.72
	SM-8	703,547.96	979,441.49	2384.72	2385.395	2385.580	-0.185	-0.675	-0.86
	SM-9	703,600.57	979,402.05	2390.46	2390.865	2391.010	-0.145	-0.405	-0.55
	SM-10	703,653.00	979,363.17	2394.11	2394.72	2394.840	-0.12	-0.61	-0.73
	SM-11	703,705.41	979,324.61	2398.92	2399.435	2399.530	-0.095	-0.515	-0.61
	SM-12	703,758.40	979,285.48	2406.87	2407.305	2407.400	-0.095	-0.435	-0.53
	SM-13	703,508.34	979,584.56	2378.65	2379.345	2379.490	-0.145	-0.695	-0.84
	SM-14	703,563.32	979,544.18	2383.42	2384.095	2384.300	-0.205	-0.675	-0.88
	SM-15	703,626.83	979,497.19	2388.38	2388.935	2389.090	-0.155	-0.555	-0.71
	SM-16	703,695.97	979,446.02	2393.25	2393.975	2394.080	-0.105	-0.725	-0.83
	SM-17	703,776.79	979,385.61	2399.00	2399.485	2399.580	-0.095	-0.485	-0.58
	SM-18	703,845.13	979,362.00	2405.63	2406.115	2406.260	-0.145	-0.485	-0.63
6	SM-6-1	704,195.42	979,831.42	2,381.34	2381.565	2381.560	0.005	-0.224	-0.219
	SM-6-2	704,137.26	979,815.63	2,380.05	2380.245	2380.240	0.005	-0.193	-0.188
	SM-6-3	704,079.05	979,799.78	2,377.65	2377.870	2377.870	0	-0.218	-0.218
7/8	SM-7-8-1	703,224.64	979,123.24	2,392.20	2392.640	2392.690	-0.05	-0.436	-0.486
	SM-7-8-2	703,189.80	979,107.34	2,393.05	2393.275	2393.310	-0.035	-0.229	-0.264
	SM-7-8-3	703,154.96	979,091.09	2,393.89	2394.330	2394.350	-0.02	-0.440	-0.460
9	SM-9-1	703,200.74	979,340.62	2,365.36	2365.550	2365.400	0.15	-0.192	-0.042
	SM-9-2	703,213.60	979,362.90	2,366.71	2366.990	2366.850	0.14	-0.279	-0.139
	SM-9-3	703,226.74	979,385.11	2,367.74	2367.900	2367.740	0.16	-0.158	0.002
10/11	SM-10-11-1	699,638.86	977,921.69	2,355.11	2355.315	2355.200	0.115	-0.203	-0.088
	SM-10-11-2	699,716.12	977,913.91	2,367.29	2367.355	2367.250	0.105	-0.064	0.041
	SM-10-11-3	699,661.57	978,016.80	2,349.06	2349.205	2349.006	0.199	-0.143	0.056
	SM-10-11-4	699,732.29	977,997.73	2,358.44	2358.465	2358.340	0.125	-0.027	0.098
	SM-10-11-5	699,699.27	978,090.52	2,339.12	2339.285	2339.130	0.155	-0.169	-0.014
	SM-10-11-6	699,764.01	978,088.78	2,348.80	2348.895	2348.760	0.135	-0.100	0.035
	SM-10-11-7	699,736.36	978,166.38	2,331.27	2331.425	2331.220	0.205	-0.158	0.047
	SM-10-11-8	699,792.55	978,160.19	2,340.52	2340.685	2340.540	0.145	-0.164	-0.019
	SM-10-11-9	699,792.10	978,235.08	2,329.00	2329.065	2328.870	0.195	-0.069	0.126
23	SM-23-1	700,986.52	978,769.47	2,314.68	2314.560	2314.658	-0.098	0.122	0.024
	SM-23-2	700,985.03	978,803.64	2,313.92	2313.900	2313.958	-0.058	0.017	-0.041
	SM-23-3	700,887.33	978,767.45	2,307.94	2307.945	2307.998	-0.053	-0.003	-0.056
	SM-23-4	700,885.77	978,802.77	2,307.55	2307.610	2307.658	-0.048	-0.062	-0.110
	SM-23-5	700,788.72	978,765.44	2,301.38	2301.310	2301.373	-0.063	0.071	0.008
	SM-23-6	700,786.32	978,801.93	2,302.03	2302.000	2302.063	-0.063	0.034	-0.029

Notes:

1. Northing, easting, and 2006 elevation data obtained from WNC Land Surveyors February 8,2006.
2. Settlement marker 1993 and 1996 elevation data from U.S. Corps of Engineers Five Year Summary Report 2002- Table 7.1

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
Manhole	6/1/1993	210	<50	<50	<50	<50	<50	<50	13	<50	<50	**21**
	10/20/1993	70	<50	<50	<50	<50	<50	<50	<50	<50	<50	**6**
	3/15/1994	22	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
	8/23/1994	110	<10	<10	<10	<10	<10	<10	5	<10	<10	**9**
	12/12/1994	1,000	1	<5	<5	<5	<5	<5	22	<5	<5	**99**
	6/27/1995	18	<5	<5	<5	<5	<5	<5	1	<5	<5	2
	12/4/1995	300	<5	<5	<5	<5	<5	<5	5	<5	<5	3
	7/10/1996	42	<2	<2	<2	<2	<2	<2	<2	<2	<2	2.3
	12/12/1996	10	<1	<1	<1	<1	<1	<1	0.9	<1	<1	<1
	8/27/1997	97	<10	<5	9	<5	<10	<10	<5	<7	<10	<5
	12/19/1997	51	<2	<2	5.1	<2	<2	<2	<2	<2	<2	**8**
	10/27/1998	4.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2000	**6.2**	<5	<5	3.2	<5	<1.0	<5	<5	<5	<5	<5
	11/1/2001	**63**	<5	<5	7.8	<5	<1.0	<5	<5	<5	<5	<5
	10/24/2002	**12**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	11/4/2003	**59**	<1.0	<1.0	4.7	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	**14**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/26/2005	**5.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/27/2006	**3,300**	<1.0	13	15	<1.0	76	<1.0	27	<1.0	<1.0	**61**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
FVEQT/ Front Valley/ Equalization Tank	2/15/1993	**5,400**	<500	<500	<500	<500	72	<500	<500	<500	<500	<500
	6/1/1993	**4,100**	<250	<250	<250	<250	72	<250	32	<250	<250	<250
	10/20/1993	**4,200**	16	<10	<10	<10	110	<10	4	43	<10	5
	3/15/1994	**2,900**	8	<10	<10	<10	140	<10	<10	85	<10	**8**
	8/23/1994	**2,500**	5	<10	<10	<10	160	<10	5	130	<10	**7**
	12/12/1994	**5,200**	8	<5	<5	<5	170	<5	4	140	<5	**14**
	6/27/1995	**980**	3	<5	<5	<5	140	<5	2	160	<5	**7**
	12/4/1995	**500**	2	<5	<5	<5	130	<5	3	150	<5	**6**
	7/9/1996	**530**	2.7	0.8	<2	<2	100	<2	0.89	120	<2	**5.5**
	12/12/1996	**570**	<50	<50	<50	<50	64	<50	190	93	<50	<50
	8/27/1997	**310**	<10	<5	<10	<5	47	<10	<5	80	<10	**6**
	12/19/1997	**420**	<10	<10	<25	<10	36	<10	<10	92	<10	<10
	10/27/1998	**65**	<1.0	<1.0	<1.0	<1.0	12	<1.0	<1.0	**64**	<1.0	**5.8**
	12/14/2000	**100**	<5	<5	NA	<5	NA	<5	<5	**26**	<5	**8.1**
	11/1/2001	**410**	<5	<5	<1	<5	19	<5	<5	**15**	<5	**6.8**
	10/24/2002	**1,900**	<50	<50	<50	<50	63	<50	<50	**53**	<50	<50
	11/4/2003	**820**	<1.0	<1.0	<1.0	<1.0	46	<1.0	<2.0	**24**	<1.0	2.9
	10/20/2004	**42**	<1.0	<1.0	<1.0	<1.0	18	<1.0	<2.0	**15**	<1.0	2.6
	10/26/2005	**9.3**	<1.0	<1.0	<1.0	<1.0	4.7	<1.0	<2.0	**7.8**	<1.0	**5.6**
	10/27/2006	**16**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	4.4	<1.0	4.2

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
FVAS/ Front Valley Air Stripper	2/15/1993	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/20/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	14	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	2	<10	<10	<10
	12/12/1994	3	<5	<5	<5	<5	<5	<5	2	<5	<5	<5
	6/27/1995	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/10/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/12/1996	2	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
	10/27/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2000	<5	<5	<5	<1	<5	<1	<5	<5	<5	<5	<5
	11/1/2001	<5	<5	<5	<1	<5	<1	<5	<5	<5	<5	<5
	10/24/2002	**6.1**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	11/4/2003	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/26/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/27/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
FVCAR-1 / Carbon #1 Effluent	2/15/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/20/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	2	<5	<5	<5	<5	<5	<5	3	<5	<5	<5

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
Front Valley/ Carbon #3 Effluent	2/15/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/20/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	4	<5	<5	<5	<5	<5	<5	1	<5	<5	<5
	6/27/1995	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/9/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/12/1996	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1
	8/27/1997	<5	<10	<5	<10	<5	<10	<10	<5	<7	<10	<5
	12/19/1997	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2
	10/27/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/14/2000	<5	<5	<5	<1	<5	<1	<5	<5	<5	<5	<5
	11/1/2001	<5	<5	<5	<1	<5	<1	<5	<5	<5	<5	<5
	10/24/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	11/4/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/26/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/27/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

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Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
SW-2 Front Valley/ Saprolite	12/11/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/17/1993	<10	<10	----	----	<10	<10	----	<10	----	----	<10
	6/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/19/1993	4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/1/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	3	<5	<5	<5	<5	<5	<5	15	<5	<5	<5
	6/27/1995	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/10/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/11/1996	<1	<1	<1	<1	<1	<1	<1	4	<1	<1	<1
	8/27/1997	<5	<10	<5	<10	<5	<10	<10	<5	<7	<10	<5
	12/19/1997	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2
	10/27/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/11/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/24/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

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Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
BW-4/ Front Valley/ Bedrock	12/11/1992	**140**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	**57,000**	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000
	6/2/1993	**62,000**	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000
	10/20/1993	**58,000**	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000
	3/15/1994	**66,000**	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000	<5,000
	8/23/1994	**64,000**	<500	<500	<500	<500	<500	<500	<500	<500	<500	<500
	12/12/1994	**95,000**	20	<5	<5	<5	<5	<5	10	**8**	<5	**62**
	6/27/1995	**63,000**	16	<5	<5	<5	<5	<5	9	**9**	<5	**48**
	12/4/1995	**74,000**	16	3	<5	<5	<5	<5	16	**10**	<5	**56**
	7/10/1996	**79,000**	17	2.6	<2	<2	2.8	<2	12	**12**	<2	**45**
	12/12/1996	**47,000**	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	**3900**	<2,500	<2,500	<2,500
	8/27/1997	**51,000**	<10	<5	<10	<5	3	<10	13	**13**	<10	**39**
	12/19/1997	**23,000**	<200	<200	<500	<200	<200	<200	<200	<200	<200	<200
	10/27/1998	**53,000**	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
	12/12/2000	**59,000**	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500
	10/23/2001	**62,000**	12	<5.0	<5.0	<5.0	<5.0	<5.0	11	**17**	<5.0	**35**
	10/23/2002	**62,000**	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500	<2,500
	10/28/2003	**41,000**	<1.0	<1.0	<1.0	<1.0	5.3	<1.0	2.4	**24**	<1.0	**24**
	10/26/2004	**46,000**	<1.0	2.2	<1.0	<1.0	1.2	<1.0	3.6	**40**	<1.0	**24**
	10/26/2005	**33,000**	<250	<250	<250	<250	<250	<250	<500	<250	<250	<250
	10/27/2006	**31,000**	<200	<200	<200	<200	<200	<200	<400	<200	<200	<200

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-1BI/ Front Valley/ Bedrock Intermediate	12/10/1992	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	3	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/18/1993	4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	2	<5	<5	<5	<5	<5	<5	1	<5	<5	<5
	6/27/1995	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/9/1996	2.1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/12/1996	0.8	<1	<1	<1	<1	<1	<1	3	<1	<1	<1
	8/27/1997	<5	<10	<5	<10	<5	<10	<10	<5	<7	<10	<5
	12/19/1997	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2
	10/27/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/11/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/19/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/18/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/23/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2005	**7.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/24/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-1S/ Front Valley/ Shallow	12/10/1992	**20**	1	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/16/1993	**18**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	**8**	<10	<10	<10	<10	<10	<10	1	<10	<10	<10
	10/19/1993	**8**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	**6**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	**6**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	**8**	<5	<5	<5	<5	<5	<5	2	<5	<5	<5
	6/27/1995	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	**6**	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/9/1996	**45**	1.6	<2	<2	<2	<2	<2	<2	0.85	<2	1.7
	12/11/1996	**55**	4	<5	<5	<5	<5	<5	17	<5	<5	5
	8/27/1997	**92**	<10	<5	<10	<5	<10	<10	<5	<7	<10	5
	12/19/1997	**73**	<2	<2	<5	<2	<2	<2	<2	<2	<2	4.5
	10/27/1998	**47**	<1.0	<1.0	<1.0	<1.0	0.57	<1.0	<1.0	<1.0	<1.0	4.8
	12/11/2000	**9.8**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/19/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/23/2003	3.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/24/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-1BD/ Front Valley/ Bedrock Deep	12/10/1992	**8**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/16/1993	**6**	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/1/1993	4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/18/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/15/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/23/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/12/1994	1	<5	<5	<5	<5	<5	<5	2	<5	<5	<5
	6/27/1995	1	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	12/4/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	710/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/12/1996	<1	<1	<1	<1	<1	<1	<1	4	<1	<1	<1
	8/27/1997	<5	<10	<5	<10	<5	<10	<10	<5	7	<10	<5
	12/19/1997	<2	<2	<2	<5	<2	<2	<2	<2	<2	<2	<2
	10/27/1998	0.63	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/11/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/31/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/21/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/24/2006	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
MW-10	10/19/1993	<10	<10	<10	20	**19**	**21**	<10	<10	<10	<10	**19**
MW-11	10/19/1993	<10	<10	<10	<10	<10	<10	<10	2	<10	<10	<10

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
SW-4	12/11/1992	**180**	1	<10	<10	<10	7	<10	10	10	<10	1
	3/15/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
BVEQT/ Back Valley Equalization Tank	6/1/1993	**12,000**	47	**250**	**110**	**250**	**130**	250	**840**	**250**	250	**11,000**
	10/22/1993	**6,800**	45	**340**	71	**250**	88	250	**960**	**250**	250	**4,500**
	3/18/1994	**11,000**	<500	**280**	<500	<500	<500	<500	**940**	<500	<500	**7,200**
	8/24/1994	**9,400**	56	**1,000**	**330**	<500	**420**	50	**2,000**	<500	<500	**5,600**
	12/13/1994	**18,000**	**110**	**410**	50	**50**	50	37	**1,200**	**50**	15	**13,000**
	6/28/1995	**13,000**	**73**	**440**	9	5	75	20	**1,100**	5	10	**8,600**
	12/5/1995	**12,000**	**76**	**890**	**110**	1	5	30	**1,500**	4	18	**6,700**
	7/11/1996	**12,000**	70	**490**	100	**100**	51	100	**760**	**100**	100	**9,300**
	12/27/1996	**14,000**	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	**3,000**	<1,000	<1,000	**9,000**
	8/29/1997	**12,000**	9	**1,200**	<2,000	2	<2,000	<2,000	**2,000**	6	<2,000	**6,200**
	12/18/1997	**9,800**	<200	**690**	<500	<200	**250**	<200	**890**	<200	<200	**5,600**
	10/28/1998	**4,800**	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	**1,900**
	12/14/2000	**13,000**	**100**	**660**	**410**	<5	**1,600**	18	**760**	**18**	26	**3,000**
	11/2/2001	**15,000**	**97**	**700**	92	<5.0	**710**	10	**710**	**20**	21	**3,000**
	10/24/2002	**19,000**	<500	<500	<500	<500	**1,000**	<500	**700**	<500	<500	**5,000**
	10/23/2003	**12,000**	<1.0	**150**	88	2	**820**	7	**300**	**19**	15	**1,200**
	10/21/2004	**20,000**	<1.0	**460**	92	<1.0	**1,700**	9	**290**	**35**	12	**4,800**
	10/26/2005	**13,000**	<100	**390**	<100	<100	**1,200**	<100	**350**	<100	<100	**2,500**
	10/26/2006	**11,000**	<100	**310**	<100	<100	**730**	<100	**300**	<100	110	**1,600**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
BVAS/ Back Valley Air Stripper	6/1/1993	**10**	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	10/22/1993	**120**	<10	<10	3	<10	<10	<10	5	<10	<10	**7**
	3/17/1994	**40**	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
	8/24/1994	**860**	<200	<200	67	<200	<200	<200	**88**	<200	<200	**100**
	12/13/1994	**900**	1	<5	<5	<5	<5	<5	23	<5	<5	**98**
	6/28/1995	**1,100**	3	**16**	11	<5	13	1	46	<5	<5	**200**
	12/5/1995	**410**	<25	<25	38	<25	<25	<25	21	<25	<25	<25
	7/11/1996	**270**	<20	<20	<20	<20	<20	<20	6.4	<20	<20	<20
	12/27/1996	**300**	<50	<50	<50	<50	<50	<50	**80**	<50	<50	<50
	8/29/1997	**82**	<1	<1	25	<1	<1	<1	0.9	<1	<1	0.9
	12/18/1997	**44**	<2	<2	9.3	<2	<2	<2	<2	<2	<2	<2
	10/28/1998	**20**	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.52
	11/17/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.13
	12/14/2000	**11**	<5	<5	4.1	<5	<1	<5	<5	<5	<5	<5
	11/1/2001	**60**	<5	<5	11	<5	<1	<5	<5	<5	<5	<5
	10/24/2002	**9.6**	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/23/2003	**89**	<1.0	<1.0	13	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	**30**	<1.0	<1.0	3.3	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/26/2005	3.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/26/2006	**7,800**	<1.0	**39**	29	<1.0	**180**	<1.0	59	1.5	1.8	**200**

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Summary of Volatile Organic Compound Detections
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Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
SW-8 / Back Valley/ Shallow	12/8/1992	**48**	5	<10	<10	<10	<10	<10	<10	<10	<10	**14**
	2/1/1993	**29**	3	<10	<10	<10	<10	<10	<10	<10	<10	**6**
	6/1/1993	<5	6	<10	<10	<10	<10	<10	<10	<10	<10	**9**
	10/22/1993	**880**	32	<10	<10	<10	<10	<10	2	<10	<10	**120**
	3/16/1994	**54**	8	<10	<10	<10	<10	<10	<10	<10	<10	**20**
	8/24/1994	1	1	<10	<10	<10	<10	<10	<10	<10	<10	2
	12/13/1994	5	<5	<5	<5	<5	2	<5	2	<5	<5	<2.5
	6/28/1995	4	<5	<5	<5	<5	<5	<5	2	<5	1	2
	12/5/1995	3	2	<5	<5	<5	<5	<5	26	<5	<5	4
	7/11/1996	0.53	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.1
	12/26/1996	<0.5	<1	<1	<1	<1	<1	<1	<2	<1	<1	<0.5
	9/2/1997	**22**	<1	1	<1	<1	1	<1	1	<1	<1	1
	12/17/1997	<1	<2	<2	<5	<2	<2	<2	<2	<2	<2	2.4
	10/28/1998	2.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7.5**
	11/17/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.39
	12/13/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/18/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/23/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
M85L9/ Back Valley/ Shallow	12/10/1992	**39,000**	**940**	<1,000	<1,000	<1,000	**44,000**	<1,000	**990**	<1,000	<1,000	**16,000**
	2/19/1993	**44,000**	**530**	<2,500	<2,500	<2,500	**44,000**	<2,500	**780**	<2,500	<2,500	**12,000**
	6/3/1993	**110,000**	**800**	<5,000	<5,000	<5,000	**89,000**	<5,000	**3,600**	<5,000	<5,000	**47,000**
	10/22/1993	**67,000**	<1,000	<1,000	<1,000	<1,000	**52,000**	<1,000	**820**	<1,000	<1,000	**8,500**
	3/17/1994	**81,000**	<5,000	<5,000	<5,000	<5,000	**63,000**	<5,000	**1,100**	<5,000	<5,000	**9,600**
	8/24/1994	**85,000**	<2,500	<2,500	<2,500	<2,500	**55,000**	<2,500	**1,100**	<2,500	<2,500	**5,600**
	12/13/1994	**120,000**	**81**	**170**	50	**26**	**86,000**	16	**960**	**16**	22	**9,100**
	6/28/1995	**59,000**	50	**57**	6	**11**	**42,000**	2	**1,000**	**9**	7	**3,900**
	12/5/1995	**54,000**	48	**120**	6	5	**40,000**	5	**1,700**	**11**	8	**4,600**
	7/12/1996	**48,000**	<1,000	<1,000	<1,000	<1,000	**34,000**	<1,000	**560**	<1,000	<1,000	**2,800**
	12/26/1996	**41,000**	<2,000	<200	<2,000	<2,000	**30,000**	<2,000	**5,000**	<2,000	<2,000	**3,000**
	9/2/1997	**24,000**	1	**20**	3	**12**	**18,000**	1	<5,000	7	3	**5,000**
	12/17/1997	**38,000**	<200	<200	<500	<200	**26,000**	<200	**640**	<200	<200	**20,000**
	10/30/1998	**30,000**	<100	<100	<100	<100	**19,000**	<100	**290**	<100	<100	**2,100**
	11/17/1999	**17,930**	<5.0	**33.5**	<5.0	<5.0	**13,120**	<5.0	**435**	**13.67**	2.33	**1,602**
	12/13/2000	**15,000**	22	<5.0	<5.0	<5.0	**10,000**	<5.0	**290**	**10**	<5.0	**1,100**
	10/23/2001	**22,000**	21	**53**	<5.0	**6.6**	**15,000**	7	**290**	**11**	<5.0	**1,100**
	10/23/2002	**21,000**	<500	<500	<500	<500	**12,000**	<500	<500	<500	<500	<500
	10/28/2003	**17,000**	<1.0	<1.0	<1.0	<1.0	**11,000**	<1.0	**370**	**11**	NA	**820**
	10/25/2004	**24,000**	<1.0	**77**	<1.0	<1.0	**14,000**	<1.0	**1,300**	**14**	1	**1,100**
	10/26/2005	**33,000**	<200	<200	<200	<200	**19,000**	<200	<400	<200	<200	**910**
	10/27/2006	**80,000**	<200	**240**	<200	<200	**15,000**	<200	**620**	<200	<200	**570**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-3D/ Back Valley/ Deep Saprolite	12/7/1992	4	<10	<10	<10	<10	<10	<10	5	<10	<10	**7**
	2/1/1993	**9**	<10	<10	<10	<10	<10	<10	8	<10	<10	**12**
	6/2/1993	5	<10	<10	<10	<10	<10	<10	6	<10	<10	**9**
	10/22/1993	<10	<10	<10	<10	<10	<10	<10	10	<10	<10	1
	3/18/1994	2	<10	<10	<10	<10	<10	<10	3	<10	<10	**6**
	8/25/1994	**18**	<10	<10	<10	<10	<10	<10	20	<10	<10	**21**
	12/14/1994	**11**	<5	<5	<5	<5	3	<5	6	<5	<5	5
	6/29/1995	**12**	<5	<5	<5	<5	<5	<5	8	<5	<5	**13**
	12/6/1995	5	<5	<5	<5	<5	<5	<5	6	<5	<5	**6**
	7/12/1996	1.8	<2	<2	<2	<2	<2	<2	<2	<2	<2	1.4
	12/26/1996	2	<1	<1	<1	<1	<1	<1	2	<1	<1	5
	8/29/1997	**14**	<1	1	<1	<1	<1	<1	1	<1	<1	.7
	12/18/1997	2.5	<2	<2	<5	<2	<2	<2	<2	<2	<2	2.6
	10/29/1998	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.1
	11/18/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.78
	12/12/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	10/16/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/16/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**7.6**
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	4
	10/21/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	3
	10/20/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	3
	10/25/2006	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	4.9

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
SW-12/ Back Valley/ Shallow Saprolite	12/8/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/2/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/22/1993	1	35	<10	<10	<10	1	<10	<10	<10	<10	<10
	3/17/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/24/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/13/1994	1	<5	<5	<5	<5	<5	<5	2	<5	<5	<5
	6/28/1995	**17**	<5	<5	<5	<5	2	<5	1	<5	<5	1
	12/5/1995	<5	<5	<5	<5	<5	<5	<5	20	<5	<5	<5
	7/11/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/26/1996	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
	9/2/1997	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	12/17/1997	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2
	10/28/1998	**9.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6.1	2.6
	11/17/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	12/13/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/16/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/23/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/23/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-2D/ Back Valley/ Bedrock	12/8/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/2/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/22/1993	5	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/16/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/25/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/14/1994	2	<5	<5	<5	<5	<5	<5	5	<5	<5	<5
	6/29/1995	**8**	<5	<5	<5	<5	<5	<5	2	<5	<5	<5
	12/6/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/11/1996	1	<2	1	<2	<2	<2	<2	<2	<2	1	<2
	12/26/1996	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
	8/29/1997	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	12/18/1997	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2
	10/29/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/18/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	12/12/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	10/16/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**7.4**
	10/17/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**16**
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/24/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/25/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-3B/ Back Valley/ Bedrock	12/7/1992	**24**	<5	**19**	<10	<10	14	<10	6	1	<10	**89**
	2/1/1993	**53**	2	**21**	<10	<10	5	<10	12	<10	<10	**180**
	6/2/1993	**110**	21	**280**	<20	<20	<20	<20	21	<20	6	**160**
	10/22/1993	**25**	1	**7**	<10	<10	2	<10	19	<10	<10	**160**
	3/18/1994	**200**	58	**560**	<100	<100	<100	<100	43	<100	12	**120**
	8/25/1994	**290**	66	**580**	<50	<50	<50	5	**86**	<50	12	**170**
	12/14/1994	**670**	**200**	**1,300**	<50	<50	<50	12	**150**	<50	28	**180**
	6/29/1995	**440**	**100**	**720**	<5	<5	<5	6	**110**	<5	14	**180**
	12/6/1995	**490**	**94**	**680**	<5	<5	<5	5	**150**	<5	12	**290**
	7/12/1996	**970**	55	**900**	<20	<20	<20	8	**310**	<20	18	**270**
	12/27/1996	**400**	<50	**50**	<50	<50	<20	<50	**100**	<50	<50	**400**
	8/29/1997	**1,500**	1	**1,000**	<1	<1	4	8	**370**	<1	18	**400**
	12/1/1997	**400**	<50	**49**	<50	<50	<50	<50	**130**	<50	<50	**440**
	10/29/1998	**2,400**	<200	**1,500**	<200	<200	<200	<200	**390**	<200	<200	**180**
	11/18/1999	**2,489**	<5.0	**2,014**	<5.0	<5.0	20	20	**700.4**	<5.0	43	**158.8**
	12/13/2000	**2,300**	**79**	**1,200**	<5.0	<5.0	39	19	**640**	<5.0	43	**180**
	10/18/2001	**2,500**	**71**	**1,100**	<5.0	<5.0	47	19	**460**	<5.0	43	**120**
	10/17/2002	**3,600**	**73**	**2,300**	<5.0	**7**	71	18	**770**	<5.0	39	**190**
	10/27/2003	**1,600**	<1.0	**780**	<1.0	<1.0	28	8	**220**	<1.0	19	**180**
	10/21/2004	**830**	<1.0	**300**	<1.0	<1.0	<1.0	2	45	<1.0	5	**140**
	10/25/2005	**1,900**	<10	**650**	<10	<10	14	15	**130**	<10	46	**300**
	10/26/2006	**3,100**	<10	**740**	<10	<10	<10	<10	**160**	<10	24	**170**

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Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
SW-13 / Back Valley/ Shallow Saprolite	12/10/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	3	<10	<10	<10	<10	<10	<10	1	<10	<10	<10
	6/2/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/22/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/17/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/24/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/13/1994	9	<5	<5	<5	<5	<5	<5	3	<5	1	<5
	6/28/1995	7	<5	<5	<5	<5	<5	<5	3	<5	<5	2
	12/5/1995	<5	<5	<5	<5	<5	<5	<5	20	<5	<5	<5
	7/11/1996	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	12/26/1996	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
	9/2/1997	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
	12/17/1997	<2	<2	<2	5	<2	<2	<2	<2	<2	<2	<2
	10/28/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/17/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	12/13/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/17/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/23/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/23/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-2B/ Back Valley/ Bedrock	12/10/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	2	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	6/2/1993	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/22/1993	1	<10	<10	<10	<10	<10	<10	<10	<10	<10	1
	3/16/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/25/1994	<10	<10	<10	<10	<10	<10	<10	2	<10	<10	<10
	12/14/1994	2	<5	<5	<5	<5	<5	<5	3	<5	<5	1
	6/29/1995	2	<5	<5	<5	<5	<5	<5	2	<5	<5	3
	12/6/1995	2	<5	<5	<5	<5	<5	<5	3	<5	<5	4
	7/11/1996	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	4
	12/27/1996	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
	8/29/1997	2	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	5
	12/18/1997	2.3	<2	<2	<2.5	<2	<2	<2	<2	<2	<2	4.5
	10/29/1998	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.4
	11/18/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.07
	12/13/2000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/16/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**5.5**
	10/21/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**9.2**
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**9**
	10/22/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	3.1
	10/24/2005	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**7.7**
	10/25/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**7**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-4B/ Back Valley/ Bedrock	12/10/1992	**28**	11	<17	<17	<17	2	<17	6	<17	<17	**220**
	2/1/1993	**52**	12	<10	<10	<10	2	<10	7	<10	<10	**240**
	6/3/1993	6	14	<10	<10	<10	3	<10	2	<10	<10	**260**
	10/22/1993	7	13	<10	<10	<10	3	<10	10	<10	<10	**200**
	3/16/1994	<10	14	<10	<10	<10	6	<10	10	<10	<10	**260**
	8/25/1994	2	15	<20	<20	<20	6	<20	7	<20	<20	**220**
	12/13/1994	**1,000**	20	<50	<50	<50	21	<50	18	<50	<50	**310**
	6/28/1995	3	14	<5	<5	<5	7	<5	1	<5	<5	**180**
	12/5/1995	2	14	<5	<5	<5	5	<5	4	<5	<5	**200**
	7/11/1996	<10	12	<10	<10	<10	3	<10	<10	<10	<10	**140**
	12/26/1996	<5	8	<5	<5	<5	<5	<5	10	<5	<5	**84**
	9/2/1997	<1	<1	<1	<1	<1	3	<1	<1	0.70	<1	**91**
	12/18/1997	<2	<2	<2	<5	<2	3.1	<2	<2	<2	<2	**56**
	10/28/1998	1	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	<1.0	0.87	<1.0	**58**
	11/17/1999	<5.0	10.08	<5.0	<5.0	<5.0	1.48	<5.0	<5.0	<5.0	<5.0	**57.29**
	12/13/2000	<5.0	7	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**39**
	10/18/2001	<5.0	6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**35**
	10/22/2002	<5.0	<2.5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**26**
	10/27/2003	<1.0	8	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	5	<1.0	**78**
	10/22/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	2	<1.0	**30**
	10/24/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	3	<1.0	**46**
	10/26/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	3	<1.0	**34**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
BW-9/ Back Valley/ Bedrock	4/15/1986	**970**	----	**190**	----	----	50	----	50	----	----	**260**
	12/8/1992	**13,000**	110	**3,100**	58	<50	**120**	75	**2,300**	<50	41	**300**
	2/19/1993	**17,000**	<1,000	**2,800**	<1,000	<1,000	**220**	<1,000	**3,100**	<1,000	<1,000	**360**
	6/3/1993	**20,000**	<1,000	**3,200**	<1,000	<1,000	**330**	120	**4,000**	<1,000	<1,000	**540**
	10/22/1993	**13,000**	<1,000	**2,800**	<1,000	<1,000	**200**	<1,000	**3,600**	<1,000	<1,000	**330**
	3/17/1994	**20,000**	<1,000	**3,900**	**140**	<1,000	**520**	120	**6,000**	<1,000	<1,000	**600**
	8/24/1994	**13,000**	<1,000	**3,200**	<1,000	<1,000	**310**	<1,000	**4,400**	<1,000	<1,000	**420**
	12/13/1994	**20,000**	**120**	**4,400**	**300**	<50	**1,000**	210	**6,100**	<50	92	**1,100**
	6/28/1995	**19,000**	66	**4,700**	93	<5	**690**	100	**5,100**	<5	55	**820**
	12/5/1995	**14,000**	61	**3,600**	**120**	<5	**540**	130	**4,200**	<5	67	**640**
	7/12/1996	**14,000**	<500	**4,700**	**1,100**	<500	**1,600**	130	**8,300**	<500	<500	**1,200**
	12/26/1996	**1,200**	40	**400**	100	<50	**400**	70	**300**	<50	40	**400**
	9/2/1997	**15,000**	1	**3,900**	<2,500	1	**1,900**	<2,500	**9,200**	1	<2,500	**<2,500**
	12/17/1997	**8,200**	<500	**2,900**	<1200	<500	**950**	<500	**3,400**	<500	<500	**830**
	10/30/1998	**4,800**	<250	**1,500**	<250	<250	**530**	<250	**930**	<250	<250	**440**
	11/17/1999	**3,459**	<5.0	**1,881**	18.53	<5.0	**123**	33	**1,357**	<5.0	35.48	**248**
	12/13/2000	**5,900**	**72**	**1,500**	50	<5.0	**1,000**	55	**2,000**	<5.0	37	**640**
	10/19/2001	**3,600**	68	**1,100**	18	<5.0	**570**	27	**900**	<5.0	18	**390**
	10/22/2002	**3,700**	31	**1,600**	<5.0	<5.0	**170**	22	**1,300**	<5.0	19	**<500**
	10/28/2003	**2,100**	<1.0	**530**	<1.0	NA	**130**	16	**420**	<1.0	NA	**190**
	10/25/2004	**3,100**	<50	**770**	<50	<50	**250**	<50	**320**	<50	<50	**200**
	10/25/2005	**5,400**	<50	**1,600**	<50	<50	**480**	<50	**250**	<50	62	**380**
	10/26/2006	**5,900**	<50	**1,700**	<50	<50	**420**	<50	**360**	<50	84	**320**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-3S/ Back Valley/ Shallow	12/7/1992	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	2/1/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	10/22/1993	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	3/18/1994	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	8/25/1994	<10	<10	<10	<10	<10	<10	<10	3	<10	<10	<10
	12/14/1994	<5	<5	<5	<5	<5	<5	<5	4	<5	<5	<5
	6/29/1995	2	<5	1	<5	<5	<5	<5	2	<5	<5	1
	12/6/1995	<5	<5	<5	<5	<5	<5	<5	3	<5	<5	<5
	7/12/1996	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	12/26/1996	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1
	8/29/1997	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	12/18/1997	3	<2	<2	<5	<2	<2	<2	<2	<2	<2	4
	10/28/1998	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.1	<1.0
	11/18/1999	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	12/12/2000	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
	10/16/2001	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/16/2002	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	10/24/2003	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/21/2004	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/20/2005	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
	10/25/2006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
MW-5S/ Back Valley/ Shallow Saprolite	12/7/1992	**400**	<10	**8**	<10	<10	2	<10	**170**	<10	<10	**350**
	2/16/1993	**26**	<20	<20	<20	<20	<20	<20	5	<20	<20	**320**
	6/3/1993	**520**	<50	**8**	<50	<50	<50	<50	**140**	<50	<50	**780**
	10/22/1993	**4,100**	<100	<100	<100	<100	<100	<100	**780**	<100	<100	**2,300**
	3/18/1994	**470**	1	<10	<10	1	4	<10	**130**	<10	<10	**1,300**
	8/25/1994	**1,000**	<100	<100	<100	<100	<100	<100	**480**	<100	<100	**1,500**
	12/14/1994	**2,000**	<50	**42**	<50	<50	18	<50	**1,000**	<50	<50	**2,100**
	6/29/1995	**860**	2	**20**	<5	3	9	<5	**340**	<5	<5	**1,500**
	12/6/1995	**500**	1	**20**	<5	1	3	<5	**170**	<5	<5	**650**
	7/12/1996	**2,100**	<100	**64**	<100	<100	30	<100	**510**	<100	<100	**1,300**
	12/27/1996	**2,400**	<200	<200	<200	<200	<200	<200	**500**	<200	<200	**900**
	8/29/1997	**870**	<1	**7**	<1	2	2	1	**120**	<1	<1	**760**
	12/18/1997	**18,000**	<100	**220**	<250	<100	<100	<100	**780**	<100	<100	<1900
	10/28/1998	----	----	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	11/18/1999	**3,988**	<5.0	**86.72**	4.1	2.3	4.7	2.6	**115.7**	<5.0	<5.0	**450.9**
	12/12/2000	**24,000**	5.6	**1,200**	**140**	**5.7**	**130**	26	**2,100**	<5	50	**2,400**
	10/19/2001	**8,000**	<5.0	**350**	83	<5.0	**100**	14	**1,200**	<5.0	33	**1,500**
	10/21/2002	**23,000**	6	**380**	**260**	**6.2**	**250**	27	**3,300**	<5.0	54	**3,700**
	10/28/2003	**140**	<1	2.9	6	<0.5	8	<1.0	25	<1.0	<1.0	**220**
	10/22/2004	**480**	<1.0	**12**	16	<0.5	9	<1.0	43	<1.0	<1.0	**180**
	10/26/2005	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**22**
	10/26/2006	**8.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	**56**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**
1W-2/ Back Valley/ Deep Saprolite	12/8/1992	**25,000**	**270**	**440**	**190**	<50	**640**	130	**5,600**	<50	40	**1,900**
	2/19/1993	**16,000**	**430**	**2,600**	<1,000	<1,000	**630**	<1,000	**3,400**	<1,000	<1,000	**2,200**
	6/3/1993	**12,000**	**510**	**2,000**	**160**	<100	**620**	<1,000	**2,800**	<1,000	<1,000	**2,100**
	10/22/1993	**4,200**	**160**	**630**	31	<250	**220**	<250	**680**	<250	<250	**2,000**
	3/17/1994	**5,600**	**180**	**1,100**	<500	<500	**490**	<500	**1,500**	<500	<500	**1,800**
	8/24/1994	**6,800**	**170**	**1,500**	**320**	<500	**1,100**	74	**3,200**	<500	<500	**1,000**
	12/13/1994	**5,700**	**700**	**1,400**	**190**	<5	**1,600**	48	**1,800**	2	21	**1,700**
	6/28/1995	**2,400**	**630**	**700**	16	<5	**820**	14	**620**	<5	10	**630**
	12/5/1995	**3,400**	**490**	**1,100**	**230**	<5	**810**	28	**1,200**	<5	16	**550**
	7/12/1996	**1,200**	**440**	**300**	<25	<25	**530**	<25	**220**	<25	<25	**570**
	12/26/1996	**1,300**	**300**	**200**	<100	<100	**500**	<100	**200**	<100	<100	**400**
	9/2/1997	**2,000**	1	**380**	<1	<1	**560**	6	**220**	<1	8	**450**
	12/17/1997	**7,800**	<500	**2,000**	<1200	<500	**810**	<500	**2,300**	<500	<500	**630**
	10/30/1998	**3,100**	<250	**1,100**	<250	<250	**430**	<250	**440**	<250	<250	**290**
	11/17/1999	**715**	<5.0	**428**	<5.0	<5.0	89.72	7.34	**141.40**	<5.0	5.03	**71.38**
	12/13/2000	**290**	15	**260**	<5.0	<5.0	50	7	47	<5.0	5	**55**
	10/18/2001	**260**	21	**300**	<5.0	<5.0	45	8	17	<5.0	5.2	**52**
	10/17/2002	**160**	21	**170**	<5.0	<5.0	28	6	<5.0	<5.0	<2.5	**28**
	10/27/2003	**270**	<1.0	**54**	<1.0	<1.0	21	<1.0	<1	<1.0	1	**28**
	10/22/2004	**490**	<1.0	**33**	<1.0	<1.0	11	<1.0	<1	<1.0	<1.0	**23**
	10/25/2005	**510**	<5.0	**92**	<5.0	<5.0	11	<5.0	<10	<5.0	<5.0	**32**
	10/25/2006	**4,500**	<5.0	**830**	<5.0	<5.0	**280**	38	<10	<5.0	45	**280**

Table 8-1
Summary of Volatile Organic Compound Detections
Chemtronics, Inc.
Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected mm/dd/yyyy	VOCs										
		1,2-Dichloroethane µg/L	(cis/trans) 1,2-Dichloroethene µg/L	Benzene µg/L	Bromoform µg/L	Carbon tetrachloride µg/L	Chloroform µg/L	Ethylbenzene µg/L	Methylene chloride µg/L	Tetrachloroethene µg/L	Toluene µg/L	Trichloroethene µg/L
Groundwater Remediation Level		**5**	**70**	**5**	**100**	**5**	**100**	**680**	**60**	**7**	**2,000**	**5**

Notes:

1. µg/L - micrograms per liter
2. mg/L - milligrams per liter
3. Data from 1992 to 1997 are from Tables 1.2 and 2.5, entitled "Baseline Contaminant Concentrations" and "Summary of Volatile Organic Compounds," respectively, originally prepared by RUST Environment & Infrastructure (RUST) for the Fifth Year Monitoring Report, dated July 1998.
4. Altamont Environmental, Inc. (Altamont) has not compared the data from 1992 to 1997 to the original laboratory analytical reports.
5. Data from 1998 and 1999 do not include all the analytes specified in the November 1997 Operation and Maintenance Manual.
6. Data from 1998 to 2006 have been input and quality-assured by Altamont.
7. < means not detected at or above the laboratory method reporting limit. The concentration shown is equal to the reporting limit specified by the Analytical Laboratory.
8. **Bolded** numbers indicate that the concentration is above the Groundwater Remediation Level (GRL) indicated in the 1989 Record of Decision (ROD).
9. The laboratory reporting limit for some compounds in some samples is greater than the respective GRL. These numbers are not shown in bold.
10. ---- means that the parameter was not analyzed, or the data were not available.
11. The concentration of trichloroethene for MW-4B in sample collected on 11/17/1999 was incorrectly reported by Nimmo & Co. Consultants in their February 22, 2000 report to the EPA. The concentration reported by the Analytical Laboratory is shown above.

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
Manhole	06/01/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
	10/20/1993	<25	<25	360	0.0202	0.0122	0.003	0.179	0.0498	0.029	<10	<25
	03/01/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	03/15/1994	----	----	----	<0.006	<0.005	<0.002	0.0534	0.0102	<0.010	----	----
	08/23/1994	----	<4	<1	<0.008	0.016	<0.001	0.0989	0.0343	0.0118	9.7	----
	12/12/1994	<5	<40	**130**	<0.010	<0.010	<0.002	0.051	0.053	0.017	<5	**1,800**
	06/27/1995	1,900	<200	**440**	0.0102	<0.010	0.0028	0.0699	0.0562	<0.010	23	<250
	12/04/1995	<25	<20	**43**	<0.0035	<0.0017	0.0033	0.0553	0.0151	<0.010	21	**3,000**
	02/19/1996	----	----	----	----	----	----	----	----	----	----	<50
	07/09/1996	30.7	<0.57	7.7	<0.010	<0.003	<0.003	0.0259	0.0231	<0.010	<150	<20
	12/12/1996	21.4	<0.57	0.64	<0.006	0.0064	<0.002	<0.020	0.0145	<0.010	<150	<20
	08/27/1997	48	<10	**38**	0.0093	<0.004	<0.002	0.202	0.0514	<0.001	4.3	<10
	12/19/1997	<5	4.5	**44**	<0.005	<0.003	<0.040	0.21	0.039	<0.001	<2	<11
	10/27/1998	----	1.76	10.16	<0.004	<0.004	<0.003	0.0474	0.0105	<0.010	<10	<10
	12/14/2000	3,200	<50	<50	0.0034	0.0085	0.0053	**0.58**	0.079	0.012	<10	----
	11/01/2001	151	<0.26	32.1	0.0073	0.0064	0.0031	0.28	0.041	0.0056	<11	----
	10/24/2002	63	2.9	34	0.0052	<0.0020	0.0038	0.27	0.046	0.0032	<10	----
	11/04/2003	50	----	17	0.0021	<0.0020	<0.0050	0.14	0.023	0.003	<10	----
	10/21/2004	130	<0.26	**90**	<0.0020	<0.0020	<0.0050	0.077	<0.010	0.024	<10	----
	10/26/2005	<0.5	<0.54	14.1	<0.0020	<0.0020	<0.0050	0.14	0.023	0.006	<11	----
	10/27/2006	100	<0.26	16	<0.0050	<0.0050	<0.0050	0.150	0.028	0.014	<13	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
FVEQT/ Front Valley Equalization Tank	02/15/1993	<75	<75	<75	----	----	----	----	----	----	**1,500**	**1,400**
	06/01/1993	<25	<25	<25	----	----	----	----	----	----	**300**	**1,300**
	10/20/1993	<25	<25	**440**	----	----	----	----	----	----	**360**	**1,500**
	03/01/1994	<20	<20	<20	----	----	----	----	----	----	**330**	<20
	08/23/1994	----	<4	<1	----	----	----	----	----	----	140	----
	12/12/1994	<5	<4	<1	----	----	----	----	----	----	**650**	<5
	06/27/1995	<5	<4	7.7	----	----	----	----	----	----	140	<5
	12/04/1995	<5	<4	<1	----	----	----	----	----	----	<5	**36**
	02/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	07/09/1996	24.7	<0.57	<0.57	----	----	----	----	----	----	<150	<20
	12/12/1996	93.3	<0.57	0.92	----	----	----	----	----	----	<150	<20
	08/27/1997	220	<10	<10	----	----	----	----	----	----	55	<10
	12/19/1997	50	<0.6	**180**	----	----	----	----	----	----	100	<6
	10/27/1998	----	<0.2	<0.2	----	----	----	----	----	----	<10	<10
	11/16/1999	<2.6	<1.2	2.7	----	----	----	----	----	----	----	----
	12/14/2000	<100	<50	<50	----	----	----	----	----	----	<10	----
	11/01/2001	<2.6	<0.26	2.83	----	----	----	----	----	----	11	----
	10/24/2002	<2.6	<0.26	3.5	----	----	----	----	----	----	**220**	—
	11/04/2003	<2.6	----	2.9	----	----	----	----	----	----	<10	----
	10/20/2004	<2.6	<0.26	4.1	----	----	----	----	----	----	<11	----
	10/26/2005	<0.5	<0.52	1.1	----	----	----	----	----	----	<10	----
	10/27/2006	<2.6	<0.26	0.87	----	----	----	----	----	----	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
FVAS/ Front Valley Air Stripper	10/27/1998	----	----	----	----	----	----	----	----	----	----	----
	12/14/2000	----	----	----	----	----	----	----	----	----	----	----
	11/01/2001	----	----	----	----	----	----	----	----	----	----	----
	10/24/2002	----	----	----	----	----	----	----	----	----	----	----
	11/04/2003	----	----	----	----	----	----	----	----	----	----	----
	10/20/2004	----	----	----	----	----	----	----	----	----	----	----
	10/26/2005	----	----	----	----	----	----	----	----	----	----	----
	10/27/2006	----	----	----	----	----	----	----	----	----	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
FVCAR-1	12/12/1994	<5	<4	<1	----	----	----	----	----	----	**180**	<5
Front Valley	06/27/1995	----	----	----	<0.010	<0.010	0.0024	<0.020	0.0816	<0.010	----	----
Carbon Unit# 1	06/30/1995	<5	<4	<1	----	----	----	----	----	----	<10	<5
Influent	12/04/1995	<5	<4	<1	<0.0035	0.0028	0.0018	<0.0081	0.0236	<0.010	<5	**39**
	02/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	07/09/1996	13.3	0.331	<0.57	<0.010	<0.003	<0.003	<0.018	0.0119	<0.010	<150	<20
	12/12/1996	29	<0.57	0.53	<0.006	<0.003	<0.002	<0.020	0.0235	<0.010	<150	<20
	08/27/1997	210	<10	<10	<0.005	<0.004	<0.002	<0.020	0.0109	<0.001	<10	<10
	12/19/1997	42	<0.6	**170**	**0.27**	<0.003	<0.040	0.2	<0.004	<0.001	100	<7
	10/27/1998	----	<0.17	3.45	<0.004	0.0075	<0.003	<0.014	<0.005	<0.01	<10	<10
	11/16/1999	<2.6	<1.2	2.9	----	----	----	----	----	----	----	----
	12/14/2000	<100	<50	<50	<0.0020	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	11/01/2001	<2.6	<0.26	2.46	<0.0020	0.011	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	10/24/2002	<2.6	<0.26	2.8	<0.0020	0.0033	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	11/04/2003	<2.6	----	3.3	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0020	<10	----
	10/20/2004	<2.6	<0.26	8.8	<0.0020	0.061	<0.0050	<0.0050	0.074	<0.0050	<11	----
	10/26/2005	<0.5	<0.53	1.2	0.0026	<0.0020	<0.0050	<0.0050	0.042	<0.0050	<10	----
	10/27/2006	<2.6	<0.26	0.78	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
	mm/dd/yyyy	Picric acid *µg/L*	2,4,6-Trinitrotoluene *µg/L*	RDX *µg/L*	Chromium *mg/L*	Copper *mg/L*	Lead *mg/L*	Nickel *mg/L*	Zinc *mg/L*	Cyanide *mg/L*	Benzophenone *µg/L*	Benzylic Acid *µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
FVCAR-1	02/15/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
Front Valley	06/01/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
Carbon Unit# 1	10/20/1993	<25	<25	<25	<0.004	<0.003	<0.003	<0.009	<0.002	<0.010	<10	<25
Effluent	03/01/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	03/15/1994	----	----	----	<0.006	0.005	<0.002	<0.012	0.0037	<0.010	----	----
	08/23/1994	----	<4	<1	<0.008	<0.003	<0.001	<0.006	<0.004	<0.010	----	----
	12/12/1994	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0296	<0.010	<5	----
	12/16/1994	<5	<4	<1	----	----	----	----	----	----	—	<5
	06/27/1995	<5	<4	<1	----	----	----	----	----	----	<10	<5
	06/30/1995	----	----	----	----	----	----	----	----	----	----	----
	12/04/1995	<5	<4	<1	----	----	----	----	----	----	<5	**32**
	02/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	07/09/1996	3.95	<0.57	<0.57	----	----	----	----	----	----	<150	<20
	12/12/1996	40.2	<5.7	<5.7	----	----	----	----	----	----	<150	<20
	08/27/1997	84	<10	<10	----	----	----	----	----	----	<10	<10
	12/19/1997	42	<0.6	130	----	----	----	----	----	----	26	<2
	10/27/1998	----	<0.17	<0.17	<0.004	<0.004	----	<0.014	<0.005	----	<10	<10
	11/16/1999	<2.6	<1.2	1	----	----	----	----	----	----	----	----
	12/14/2000	<100	<50	<50	----	----	----	----	----	----	<10	----
	11/01/2001	<2.6	<0.26	3.3	----	----	----	----	----	----	<10	----
	10/24/2002	<2.6	<0.26	2.7	----	----	----	----	----	----	<10	----
	11/04/2003	<2.6	----	2.9	----	----	----	----	----	----	<10	----
	10/20/2004	<2.6	<0.26	8.5	----	----	----	----	----	----	<10	----
	10/26/2005	<0.5	<0.53	<0.53	----	----	----	----	----	----	<10	----
	10/27/2006	<2.6	<0.26	<0.52	----	----	----	----	----	---	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
FVCAR-3	02/15/1993	<25	<25	<50	----	----	----	----	----	----	<10	<25
Front Valley	06/01/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
Carbon Unit #3	10/20/1993	<25	<25	**280**	<0.004	<0.003	<0.003	<0.009	<0.002	<0.010	<10	<25
Effluent	03/01/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	3/15/1994	----	----	----	<0.006	0.005	<0.002	<0.012	0.0034	<0.010	----	----
	8/23/1994	----	<4	<1	<0.008	<0.003	<0.001	<0.006	<0.004	<0.010	----	----
	12/12/1994	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	0.031	<0.010	<5	<5
	6/27/1995	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	0.0561	<0.010	<10	<5
	12/4/1995	<5	<4	<1	<0.0035	<0.0017	<0.0016	<0.0081	0.01	<0.010	<5	**38**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9/1996	1.12	<0.57	<0.57	<0.010	<0.003	<0.003	<0.018	0.0203	<0.010	<150	<20
	12/12/1996	1.4	<0.57	<0.57	<0.006	<0.003	<0.002	<0.020	0.0167	<0.010	<150	<20
	8/27/1997	6.4	<10	<10	<0.004	<0.003	0.0092	<0.020	0.0084	<0.001	<10	<10
	12/19/1997	<5	<0.6	<0.6	<0.005	<0.003	<0.040	<0.020	0.005	<0.001	<10	<10
	10/27/1998	----	<0.16	<0.16	<0.004	<0.004	<0.0030	<0.014	<0.005	<0.010	<10	<10
	11/16/1999	<2.6	<1.2	<2.6	----	----	----	----	----	----	----	----
	12/14/2000	<100	<50	<50	<0.0020	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	11/01/2001	<2.6	<0.26	0.565	<0.0020	0.0076	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	10/24/2002	<2.6	<0.26	0.51	<0.0020	0.0033	<0.0030	<0.0050	<0.010	<0.0020	<10	----
	11/04/2003	<2.6	----	<0.52	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	0.0036	<10	----
	10/20/2004	<2.6	<0.26	<0.52	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<11	----
	10/26/2005	<0.5	<0.56	<0.56	<0.0020	<0.0020	<0.0050	<0.0050	0.063	<0.0050	<10	----
	10/27/2006	<2.6	<0.26	<0.52	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<10	---

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
SW-2	12/10-11/1992	25	25	25	0.017	<0.010	<0.005	<0.040	0.021	<0.010	<10	20
Front Valley/	2/1/1993	----	----	----	0.0315	0.0427	0.0286	0.0126	0.08	<0.010	----	----
Saprolite	2/17/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
	6/1/1993	<25	<25	<25	**0.204**	0.175	**0.106**	0.0964	0.358	<0.010	<10	<25
	10/19/1993	<25	<25	<25	0.0084	0.0128	0.0067	<0.009	0.0198	<0.010	<10	<25
	3/1/1994	<20	<20	<20	0.0353	0.0287	0.0188	0.0169	0.0898	<0.010	<10	<20
	8/23/1994	----	<4	<1	<0.008	0.0184	<0.001	<0.006	0.0269	<0.010	----	----
	12/12/1994	<5	<4	<1	0.0395	0.0308	**0.0643**	0.0505	0.12	<0.010	<5	<5
	6/27/1995	<5	<4	<1	0.0352	0.0332	0.0222	0.0276	0.148	<0.010	----	<5
	6/30/1995	----	----	----	----	----	----	----	----	----	<9	----
	12/4/1995	<5	<4	<1	0.0153	0.024	0.0158	<0.0081	0.0492	<0.010	<5	**54**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9-10/1996	6.98	<0.57	0.16	**0.0637**	0.0468	0.0401	0.0228	0.151	<0.010	<150	<20
	12/11/1996	5.2	<0.57	<0.57	0.0182	0.0222	0.0124	0.0231	0.0612	<0.010	<150	<20
	8/27/1997	5.6	<10	<10	0.0057	0.0073	0.0039	<0.020	0.0304	<0.001	<12	<12
	12/19/1997	<5.3	<0.6	<0.6	<0.005	<0.003	<0.040	<0.020	0.015	<0.001	<11	<11
	10/27/1998	----	<0.16	<0.16	0.0174	0.0248	0.00946	0.014	0.0373	<0.010	<10	<10
	12/11/2000	<100	<50	<50	0.0079	<0.0020	0.0052	<0.0050	0.014	<0.0020	<10	----
	10/17/2001	<2.6	<0.26	<0.519	0.025	0.024	0.016	0.013	0.064	<0.0020	ND	----
	10/17/2002	<2.6	<0.26	0.88	0.018	0.017	0.013	0.011	0.034	<0.0020	<10	----
	10/24/2003	<2.6	<0.26	0.99	0.0064	0.0047	0.0056	<0.0056	0.011	<0.0020	<10	----
	10/20/2004	<2.6	<0.26	1.4	**0.065**	0.048	0.029	0.032	0.066	<0.0050	<11	----
	10/21/2005	<0.5	<0.54	<0.54	0.0032	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<11	----
	10/24/2006	<2.6	<0.26	<0.52	0.010	0.0094	0.0065	0.0050	0.025	<0.0050	<12	---

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
BW-4	12/10-11/1992	<25	<25	<25	<0.010	<0.010	<0.005	<0.040	<0.020	<0.010	<10	<20
Front Valley/	2/1/1993	----	----	----	<0.005	0.0064	0.01	<0.009	0.0083	<0.010	----	----
Bedrock	2/17/1993	<25	<25	<25	----	----	----	----	----	----	12	21
	6/1/1993	<25	<25	<25	0.007	0.0075	0.0105	<0.010	0.0073	<0.010	6	**36**
	10/20/1993	<25	<25	<25	<0.004	<0.003	<0.003	<0.009	<0.002	<0.010	<10	<25
	3/1/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	3/15/1994	----	----	----	<0.006	<0.005	<0.002	<0.012	0.0038	<0.010	----	----
	8/23/1994	----	<4	<1	<0.008	0.0222	*<0.001*	*<0.006*	*0.0089*	*<0.010*	17	----
	12/12/1994	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	<0.0299	<0.010	----	<5
	12/16/1994	----	----	----	----	----	----	----	----	----	<5	----
	6/27/1995	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	0.0202	<0.010	----	<5
	6/30/1995	----	----	----	----	----	----	----	----	----	<10	----
	12/4/1995	<5	<4	<1	<0.0035	<0.0017	<0.0016	<0.0081	0.0144	<0.010	18	**50**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9/1996	4.29	0.324	0.57	*<0.010*	<0.003	<0.003	<0.018	0.0136	<0.010	1.3	<20
	12/12/1996	7.9	<0.57	<0.57	<0.006	0.0131	0.0159	<0.020	0.0539	<0.010	<150	<20
	8/27/1997	5.1	<10	<10	<0.005	<0.004	<0.002	<0.020	0.0108	<0.001	19	<10
	12/19/1997	8.1	<0.6	<0.6	**0.104**	0.0052	<0.040	0.089	0.032	<0.001	<2	<11
	10/27/1998	----	<0.17	<0.17	<0.004	<0.004	<0.003	<0.014	<0.005	<0.010	14	<10
	11/16/1999	<2.6	<1.2	<2.6	----	----	----	----	----	----	----	----
	12/12/2000	<100	<50	<50	0.014	0.011	0.012	<0.0050	0.028	<0.0020	17	----
	10/23/2001	<2.6	<0.26	<0.519	0.0069	<0.0020	0.0043	<0.0050	0.011	0.0058	11	----
	10/23/2002	<2.6	<0.26	0.34	<0.0020	0.0024	<0.0030	<0.0050	<0.010	<0.0020	12	----
	10/28/2003	<2.6	<0.26	<0.52	0.011	0.0052	0.0064	0.0054	0.15	<0.0020	<10	----
	10/26/2004	<2.6	<0.26	<0.52	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	<10	----
	10/26/2005	<0.5	<0.53	<0.53	<0.0020	<0.0020	<0.0050	<0.0050	0.14	<0.0050	<10	----
	10/27/2006	<2.6	<0.26	<0.52	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-1BI	12/10/1992	<25	<25	<25	0.00787	0.0011	<0.005	0.00989	0.06684	<0.010	<10	<20
Front Valley/	2/1/1993	----	----	----	<0.005	<0.002	0.0033	<0.009	0.0108	<0.010	----	----
Bedrock	2/17/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
Intermediate	6/1/1993	<25	<25	<25	0.0387	0.0109	0.0024	0.0192	0.526	<0.010	<10	<25
	10/18-19/1993	<25	<25	<25	0.007	<0.003	<0.003	<0.009	0.0773	<0.010	<10	<25
	3/1/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	3/15/1994	----	----	----	<0.006	<0.005	<0.002	<0.012	0.0391	<0.010	----	----
	8/23/1994	----	<4	<1	<0.008	0.0072	<0.001	<0.006	0.271	<0.010	----	----
	12/12/1994	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	0.0416	<0.010	<5	<5
	6/27/1995	----	----	----	<0.010	<0.010	<0.002	<0.020	0.105	<0.010	----	----
	6/30/1995	<5	<4	<1	----	----	----	----	----	----	<10	<5
	12/4/1995	<5	<4	<1	<0.0035	0.003	<0.0016	<0.0081	0.253	<0.010	<5	**37**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9/1996	74.6	<0.57	0.282	<0.010	<0.003	<0.003	<0.018	0.131	<0.010	<150	<20
	12/12/1996	<25	<0.57	<0.57	<0.006	0.0112	<0.002	<0.020	0.32	<0.010	<150	<20
	8/27/1997	8.3	<10	<10	**0.0987**	<0.004	<0.002	0.0767	0.0614	<0.001	<10	<10
	12/19/1997	33	<0.6	<0.6	<0.005	0.0067	<0.040	<0.020	0.73	<0.001	<11	<11
	10/27/1998	----	<0.16	<0.16	<0.004	<0.004	<0.003	<0.014	0.0274	<0.010	<10	<10
	11/16/1999	<2.6	<1.2	<2.6	----	----	----	----	----	----	----	----
	12/11/2000	<100	<50	<50	0.015	0.017	0.0048	0.0075	0.74	<0.0020	<10	----
	10/19/2001	<2.6	<0.26	<0.519	0.0032	0.0063	<0.0030	<0.0050	0.44	<0.0020	----	----
	10/18/2002	<2.6	<0.26	<0.52	0.017	0.012	0.0034	0.0064	0.46	<0.0020	<10	----
	10/23/2003	<2.6	<0.26	<0.52	0.013	0.017	<0.0050	0.0099	0.18	<0.0020	<10	----
	10/21/2004	<2.6	<0.26	<0.52	0.0023	0.0048	<0.0050	<0.0050	0.31	<0.0050	<11	----
	10/21/2005	<0.5	<0.53	<0.53	<0.0020	<0.0020	<0.0050	<0.0050	0.084	<0.0050	<10	----
	10/24/2006	<2.6	<0.26	<0.52	<0.0050	<0.0050	<0.0050	<0.0050	0.039	<0.0050	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-1S	12/10/1992	<25	<25	<25	0.0258	0.03936	0.005	0.01872	0.02829	<0.010	**340**	**470**
Front Valley/	2/1/1993	----	----	----	0.0188	0.0097	0.0025	0.0123	0.0328	<0.010	----	----
Shallow	2/15/1993	<25	<25	<25	----	----	----	----	----	----	**230**	**340**
	6/1/1993	<25	<25	<25	0.0364	0.0178	0.005	0.0213	0.0508	<0.010	130	**270**
	10/19/1993	<25	<25	**240**	0.0284	0.015	0.0076	0.0139	0.0513	<0.010	18	**440**
	3/1/1994	<20	<20	<20	----	----	----	----	----	----	100	<20
	3/15/1994	----	----	----	**0.121**	0.0444	0.0244	0.0467	0.209	<0.010	----	----
	8/23/1994	----	<4	<1	**0.203**	0.0282	0.0059	0.14	0.316	<0.010	140	----
	12/12/1994	<5	<4	<1	<0.010	<0.010	0.0021	<0.020	0.07	<0.010	130	<5
	6/27/1995	----	----	----	<0.010	<0.010	<0.002	<0.020	0.1	<0.010	110	----
	6/30/1995	<5	<4	7.3	----	----	----	----	----	----	----	<5
	12/4/1995	<5	<4	<1	0.0115	0.0071	0.0031	<0.0081	0.0526	<0.010	90	**34**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9/1996	29.4	<0.57	<0.57	0.0478	0.0146	0.0101	<0.018	0.104	<0.010	<150	<20
	12/11/1996	92.4	<0.57	<0.57	**0.091**	0.0342	0.0194	0.0397	0.162	<0.010	150	<20
	8/27/1997	180	<10	<10	0.0054	0.0129	<0.002	<0.020	0.0864	<0.001	**290**	2.2
	12/19/1997	39	<0.6	180	<0.005	<0.003	<0.040	<0.020	0.044	<0.001	**240**	<11
	10/27/1998	----	1.41	<0.17	**0.0645**	0.0424	0.0138	0.0159	0.122	<0.010	**260**	<10
	11/16/1999	<2.6	<1.2	<2.6	----	----	----	----	----	----	----	----
	12/11/2000	<100	<50	<50	0.011	<0.0020	<0.0030	<0.0050	0.02	<0.0020	**240**	----
	10/19/2001	<2.6	<0.26	<0.519	**0.061**	0.021	0.016	0.025	0.14	<0.0020	----	----
	10/17/2002	<2.6	<0.26	2.7	0.01	0.0047	0.0068	0.0056	0.036	<0.0020	29	----
	10/23/2003	<2.6	<0.26	<0.52	<0.0020	0.0026	<0.0050	<0.0050	0.019	<0.0020	69	----
	10/21/2004	<2.6	<0.26	0.87	0.0092	0.0064	0.0092	<0.0050	0.054	<0.0050	18	----
	10/21/2005	<0.5	<0.55	<0.55	0.0088	0.0024	<0.0050	<0.0050	0.038	<0.0050	38	----
	10/24/2006	<2.6	<0.26	<0.52	0.011	<0.0050	0.0059	<0.0050	0.030	<0.0050	21	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-1BD	12/10-11/1992	<25	<25	<25	0.013	<0.010	<0.005	<0.040	0.24	<0.010	<10	<20
Front Valley/	2/1/1993	----	----	----	0.0082	<0.002	<0.002	<0.009	0.135	<0.010	----	----
Bedrock Deep	2/15/1993	<25	<25	<25	----	----	----	----	----	----	<10	<25
	6/1/1993	<25	<25	<25	**0.0979**	0.0079	0.0022	0.0495	0.296	<0.010	<10	<25
	10/18-19/1993	<25	<25	<25	0.0219	0.0091	<0.003	0.0117	0.131	<0.010	<10	<25
	3/1/1994	<20	<20	<20	----	----	----	----	----	----	<10	<20
	3/15/1994	----	----	----	<0.006	<0.005	0.0122	<0.012	0.0177	<0.010	----	----
	8/23/1994	----	<4	<1	<0.008	<0.003	<0.001	<0.006	<0.004	<0.010	----	----
	12/12/1994	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	0.0393	<0.010	<5	<5
	6/27/1995	<5	<4	<1	<0.010	<0.010	<0.002	<0.020	<0.0453	<0.010	----	<5
	6/30/1995	----	----	----	----	----	----	----	----	----	<10	----
	12/4/1995	<5	<4	<1	<0.0035	0.0038	<0.0016	<0.0081	0.0174	<0.010	<5	**43**
	2/19/1996	----	----	----	----	----	----	----	----	----	----	<10
	7/9/1996	3.48	<0.57	0.112	<0.010	<0.003	<0.003	<0.0018	0.0344	<0.010	<150	<20
	12/12/1996	1.7	<0.57	<0.57	<0.006	<0.003	<0.002	<0.020	0.0325	<0.010	<150	<20
	8/27/1997	<5	<10	<10	<0.005	<0.004	<0.002	<0.020	0.0492	<0.001	<10	<10
	12/19/1997	25	<0.6	<0.6	<0.005	<0.003	<0.040	<0.020	0.41	<0.001	<11	<11
	10/27/1998	----	<0.17	<0.17	<0.004	<0.004	0.00381	<0.014	0.0922	<0.010	<10	<10
	11/16/1999	<2.6	<1.2	<2.6	----	----	----	----	----	----	----	----
	12/11/2000	<100	<50	<50	0.013	0.0062	0.0073	0.011	1	<0.0020	<10	----
	10/31/2001	<2.6	<0.26	<0.519	0.0033	0.012	<0.0030	<0.0050	0.28	0.0037	<10	----
	10/21/2002	<2.6	<0.26	<0.52	0.0053	0.0056	0.0033	<0.0050	0.32	<0.0020	<10	----
	10/24/2003	<2.6	<0.26	<0.52	0.033	0.014	0.0076	0.017	1.6	<0.0020	<10	----
	10/21/2004	<2.6	<0.26	<0.52	<0.0020	<0.0020	0.006	<0.0050	<0.010	<0.0050	<11	----
	10/21/2005	<0.5	<0.52	<0.52	<0.0020	<0.0020	<0.0050	<0.0050	0.19	<0.0050	<10	----
	10/24/2006	<2.6	<0.26	<0.52	<0.0050	<0.0050	<0.0050	<0.0050	0.036	<0.0050	<11	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
BVEQT Back Valley Equalization Tank	6/1/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	----	----	----	----	----	----	----	----
	3/18/1994	----	----	----	----	----	----	----	----	----	----	----
	8/24/1994	----	----	----	----	----	----	----	----	----	----	----
	12/13/1994	----	----	----	----	----	----	----	----	----	----	----
	6/28/1995	----	----	----	----	----	----	----	----	----	----	----
	12/5/1995	----	----	----	----	----	----	----	----	----	----	----
	7/11/1996	----	----	----	----	----	----	----	----	----	----	----
	12/27/1996	----	----	----	----	----	----	----	----	----	----	----
	8/29/1997	----	----	----	----	----	----	----	----	----	----	----
	12/18/1997	----	----	----	----	----	----	----	----	----	----	----
	10/28/1998	----	----	----	----	----	----	----	----	----	----	----
	11/17/1999	----	----	----	<0.00081	<0.00097	0.0109	0.303	0.0331	0.082	----	----
	12/14/2000	----	----	----	----	----	----	----	----	----	----	----
	11/02/2001	----	----	----	----	----	----	----	----	----	----	----
	10/24/2002	----	----	----	----	----	----	----	----	----	----	----
	10/23/2003	----	----	----	----	----	----	----	----	----	----	----
	10/21/2004	----	----	----	----	----	----	----	----	----	----	----
	10/26/2005	----	----	----	----	----	----	----	----	----	----	----
	10/26/2006	----	----	----	----	----	----	----	----	----	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
BVAS	6/1/1993	----	----	----	----	----	----	----	----	----	----	----
Air Stripper	10/22/1993	----	----	----	0.0411	0.0271	0.003	0.276	2.34	0.032	----	----
Effluent	3/17/1994	----	----	----	<0.006	<0.005	<0.002	0.0512	0.0077	<0.010	----	----
	8/24/1994	----	----	----	**0.247**	0.169	<0.001	1.25	0.0989	0.0634	----	----
	12/13/1994	----	----	----	<0.010	<0.010	<0.002	0.0562	0.0177	<0.010	----	----
	6/28/1995	----	----	----	0.018	<0.010	0.0039	0.198	0.156	<0.010	----	----
	12/5/1995	----	----	----	**0.137**	0.0917	<0.0016	**0.705**	0.102	<0.010	----	----
	7/10/1996	----	----	----	<0.010	<0.003	<0.003	0.101	0.0318	<0.010	----	----
	12/27/1996	----	----	----	<0.005	<0.004	<0.002	0.0799	0.0311	<0.010	----	----
	8/29/1997	----	----	----	0.036	0.0246	0.0049	**0.564**	0.0775	<0.001	----	----
	12/18/1997	----	----	----	0.017	<0.003	<0.040	0.34	0.083	<0.001	----	----
	10/28/1998	----	----	----	0.0105	<0.004	0.00362	0.307	0.0363	0.0126	----	----
	11/17/1999	----	----	----	<0.00081	<0.00097	0.0103	0.31	0.0363	**0.213**	----	----
	12/14/2000	----	----	----	0.0048	0.0063	0.0087	**0.64**	0.085	0.015	----	----
	11/01/2001	----	----	----	0.0088	0.0065	0.0033	0.39	0.057	0.082	----	----
	10/24/2002	----	----	----	0.0056	<0.0020	0.0042	0.31	0.048	<0.0020	----	----
	10/23/2003	----	----	----	0.0046	<0.0020	0.0059	0.29	0.052	<0.0020	----	----
	10/21/2004	----	----	----	<0.0020	<0.0020	<0.0050	0.24	0.021	0.016	----	----
	10/26/2005	----	----	----	<0.0020	<0.0020	0.006	0.23	0.054	0.029	----	----
	10/26/2006	----	----	----	<0.0050	<0.0050	0.0058	0.210	0.057	0.020	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
SW-8	4/15/1986	----	----	----	----	----	----	----	----	----	----	----
Back Valley/	12/8/1992	----	----	----	0.0036	0.005	<0.005	0.0049	0.0093	<0.010	----	----
Shallow	2/1/1993	----	----	----	0.0072	0.0044	0.004	<0.009	0.008	<0.010	----	----
	6/1/1993	----	----	----	0.0091	0.0027	<0.002	0.0109	0.008	<0.010	----	----
	10/22/1993	----	----	----	0.0221	0.0108	0.003	0.0215	0.0195	<0.010	----	----
	3/16/1994	----	----	----	0.0478	0.0448	0.0167	0.0323	0.0461	<0.010	----	----
	8/24/1994	----	----	----	**0.065**	0.0159	0.0029	0.0233	0.074	<0.010	----	----
	12/13/1994	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0925	<0.010	----	----
	6/28/1995	----	----	----	0.0262	<0.010	0.0042	<0.020	0.148	<0.010	----	----
	12/5/1995	----	----	----	**0.0772**	0.0124	0.0048	0.031	0.102	<0.010	----	----
	7/10/1996	----	----	----	**0.0611**	0.0185	0.0058	0.0302	0.0662	<0.010	----	----
	12/26/1996	----	----	----	0.0186	0.014	0.004	<0.020	0.374	<0.010	----	----
	9/2/1997	----	----	----	0.0275	0.0073	0.0024	0.0236	0.023	<0.001	----	----
	12/17/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.032	<0.001	----	----
	10/28/1998	----	----	----	**0.156**	0.139	0.0427	0.0666	0.121	<0.010	----	----
	11/17/1999	----	----	----	0.0437	0.0167	0.0051	0.0203	0.0531	<0.010	----	----
	12/13/2000	----	----	----	0.033	0.019	0.0063	0.017	0.027	0.002	----	----
	10/17/2001	----	----	----	0.0028	<0.0020	<0.0030	0.0054	0.017	<0.0020	----	----
	10/18/2002	----	----	----	0.021	0.024	0.0067	0.088	0.065	<0.0020	----	----
	10/24/2003	----	----	----	0.0075	0.012	<0.0050	0.025	0.012	<0.0020	----	----
	10/20/2004	----	----	----	0.033	0.03	0.008	0.017	0.01	<0.0050	----	----
	10/20/2005	----	----	----	0.0029	0.0021	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/23/2006	----	----	----	0.028	0.02	0.0094	0.017	0.025	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
M85L9 Back Valley/ Shallow	12/10/1992	----	----	----	0.00022	0.00435	0.005	0.02467	0.00141	<0.01	----	----
	2/1/1993	----	----	----	----	----	**0.19**	----	----	<0.010	----	----
	2/19/1993	----	----	----	----	----	----	0.03035	----	----	----	----
	6/1/1993	----	----	----	0.0182	0.0184	**0.221**	0.0314	0.0146	<0.010	----	----
	6/3/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	<0.004	0.0135	1.12	<0.009	0.0038	<0.010	----	----
	3/17/1994	----	----	----	0.006	0.0224	**0.175**	0.0166	0.025	0.012	----	----
	8/24/1994	----	----	----	**0.0781**	0.0169	**0.108**	0.0813	0.0659	<0.010	----	----
	12/13/1994	----	----	----	<0.010	<0.010	0.004	<0.020	0.0178	<0.010	----	----
	6/28/1995	----	----	----	<0.010	<0.010	0.0071	<0.020	0.0406	<0.010	----	----
	12/5/1995	----	----	----	0.0042	0.0063	0.0038	<0.0081	0.0291	<0.010	----	----
	7/11/1996	----	----	----	0.0428	0.0038	0.0133	0.0486	0.0344	<0.010	----	----
	12/26/1996	----	----	----	<0.005	0.0042	0.0062	<0.020	0.0591	<0.010	----	----
	9/2/1997	----	----	----	<0.005	<0.004	0.002	<0.020	0.0284	<0.001	----	----
	12/17/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.048	<0.001	----	----
	10/30/1998	----	----	----	0.0109	0.0193	0.00455	<0.014	0.0446	<0.010	----	----
	11/17/1999	----	----	----	0.002	0.003	0.0028	0.0064	0.0455	<0.01	----	----
	12/13/2000	----	----	----	0.025	0.13	**0.92**	0.047	0.076	0.0083	----	----
	10/23/2001	----	----	----	<0.0020	<0.0020	0.02	0.0082	<0.010	0.0059	----	----
	10/23/2002	----	----	----	0.0061	0.086	**0.43**	0.037	0.018	0.0033	----	----
	10/28/2003	----	----	----	<0.0020	0.01	**0.056**	0.014	<0.010	<0.0020	----	----
	10/25/2004	----	----	----	<0.0020	0.024	**0.21**	0.026	<0.010	<0.0050	----	----
	10/26/2005	----	----	----	<0.0020	0.01	**0.13**	0.019	0.084	<0.0050	----	----
	10/27/2006	----	----	----	<0.0050	<0.0050	0.014	0.012	0.017	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-3D	12/7/1992	----	----	----	0.00381	0.00035	<0.005	0.0053	0.01326	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	0.0214	0.0162	0.0076	0.0099	0.0356	<0.010	----	----
Deep Saprolite	6/1/1993	----	----	----	0.0395	0.0256	0.0097	0.0191	0.0734	<0.010	----	----
	10/22/1993	----	----	----	0.0067	<0.003	<0.003	<0.009	0.0145	<0.010	----	----
	3/18/1994	----	----	----	0.0166	0.0116	0.0038	<0.012	0.0311	<0.010	----	----
	8/25/1994	----	----	----	0.0159	0.015	0.001	0.0153	0.0375	<0.010	----	----
	12/14/1994	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0831	<0.010	----	----
	6/29/1995	----	----	----	<0.010	<0.010	0.002	0.0207	0.0563	<0.010	----	----
	12/6/1995	----	----	----	<0.0035	0.0059	<0.0021	0.0085	0.0637	<0.010	----	----
	7/11/1996	----	----	----	<0.010	<0.003	<0.003	<0.018	0.036	<0.010	----	----
	12/26/1996	----	----	----	0.0078	0.0046	<0.002	<0.020	0.0317	<0.010	----	----
	8/29/1997	----	----	----	0.0397	<0.004	<0.002	0.051	0.0648	<0.001	----	----
	12/18/1997	----	----	----	<0.005	0.013	<0.040	<0.020	0.022	<0.001	----	----
	10/29/1998	----	----	----	0.0331	0.0294	0.00635	0.037	0.0466	<0.010	----	----
	11/18/1999	----	----	----	0.0108	0.0104	0.0027	0.0109	0.0499	<0.010	----	----
	12/12/2000	----	----	----	0.0034	0.0021	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/16/2001	----	----	----	0.0032	0.002	<0.0030	<0.0050	0.021	<0.0020	----	----
	10/16/2002	----	----	----	0.0063	0.0024	0.0033	0.008	0.016	<0.0020	----	----
	10/24/2003	----	----	----	0.0032	<0.0020	<0.0050	<0.0050	<0.010	<0.0020	----	----
	10/21/2004	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/20/2005	----	----	----	0.0043	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/25/2006	----	----	----	<0.0050	<0.0050	<0.0050	<0.0050	0.015	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
SW-12	12/8/1992	----	----	----	0.0017	0.0057	0.0079	0.006	0.0033	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	0.0129	0.0168	0.0086	<0.009	0.0154	<0.010	----	----
Shallow Saprolite	6/1/1993	----	----	----	0.0199	0.0191	0.0105	<0.010	0.0274	<0.010	----	----
	10/22/1993	----	----	----	R	R	R	R	R	<0.010	----	----
	3/17/1994	----	----	----	0.0375	0.103	**0.104**	0.0269	0.0721	<0.010	----	----
	8/24/1994	----	----	----	**0.0753**	0.0302	0.008	0.062	0.126	<0.010	----	----
	12/13/1994	----	----	----	<0.010	<0.010	0.0044	<0.020	0.0307	<0.010	----	----
	6/28/1995	----	----	----	0.011	0.02	0.015	<0.020	0.0708	<0.010	----	----
	12/5/1995	----	----	----	0.0131	0.0172	0.0103	0.0088	0.038	<0.010	----	----
	7/10/1996	----	----	----	**0.0662**	0.0692	**0.0621**	0.0414	0.0816	<0.010	----	----
	12/26/1996	----	----	----	0.0377	0.0768	**0.0865**	0.0247	0.0743	<0.010	----	----
	9/2/1997	----	----	----	0.0176	0.0317	0.0317	0.0236	0.0365	<0.001	----	----
	12/17/1997	----	----	----	<0.005	0.038	0.046	<0.020	0.025	<0.001	----	----
	10/28/1998	----	----	----	0.0184	0.0465	0.029	<0.014	0.0192	<0.010	----	----
	11/17/1999	----	----	----	0.0328	0.0456	**0.0707**	0.0225	0.0611	<0.010	----	----
	12/13/2000	----	----	----	0.023	0.042	0.042	0.015	0.04	<0.002	----	----
	10/17/2001	----	----	----	0.015	0.033	0.029	0.015	0.03	<0.0020	----	----
	10/16/2002	----	----	----	0.044	0.036	0.031	0.03	0.032	<0.0020	----	----
	10/23/2003	----	----	----	0.0066	0.0088	0.0073	<0.0050	<0.010	<0.0020	----	----
	10/20/2004	----	----	----	0.031	0.025	0.011	0.023	<0.010	<0.0050	----	----
	10/20/2005	----	----	----	0.005	**1.3**	<0.0050	0.028	0.21	<0.0050	----	----
	10/23/2006	----	----	----	0.0068	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy.	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-2D	12/8/1992	----	----	----	<0.003	<0.003	0.0011	0.014	0.004	<0.01	----	----
Back Valley/	2/1/1993	----	----	----	0.0131	0.0115	0.005	0.0215	0.0243	<0.010	----	----
Bedrock	6/1/1993	----	----	----	**0.175**	0.22	0.0383	0.16	0.422	<0.010	----	----
	10/22/1993	----	----	----	<0.004	<0.003	<0.003	<0.009	0.0029	<0.010	----	----
	3/16/1994	----	----	----	**0.0804**	0.0891	0.0395	0.066	0.167	<0.010	----	----
	8/25/1994	----	----	----	0.0344	0.0353	0.0129	0.0271	0.119	<0.010	----	----
	12/14/1994	----	----	----	0.0212	0.0252	0.0119	<0.020	0.0935	<0.010	----	----
	6/29/1995	----	----	----	0.0286	0.015	0.0083	0.035	0.0771	<0.010	----	----
	12/6/1995	----	----	----	**0.103**	0.0564	0.0205	0.0807	0.155	<0.010	----	----
	7/10/1996	----	----	----	0.039	0.0213	0.006	0.0306	0.0656	<0.010	----	----
	12/26/1996	----	----	----	**0.0831**	0.0732	0.0319	0.0786	0.167	<0.010	----	----
	8/29/1997	----	----	----	0.0204	0.0201	0.0056	0.0316	0.0501	<0.001	----	----
	12/18/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.012	<0.001	----	----
	10/29/1998	----	----	----	0.0363	0.0601	0.0131	0.0239	0.0719	<0.010	----	----
	11/18/1999	----	----	----	**0.0862**	0.0909	0.0443	0.0707	0.203	<0.010	----	----
	12/12/2000	----	----	----	0.025	0.025	0.011	0.018	0.049	<0.0020	----	----
	10/16/2001	----	----	----	0.043	0.055	0.02	0.042	0.1	0.0041	----	----
	10/17/2002	----	----	----	0.011	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/24/2003	----	----	----	0.034	0.022	0.011	0.024	0.043	<0.0020	----	----
	10/21/2004	----	----	----	0.015	0.0031	<0.0050	0.013	0.011	<0.0050	----	----
	10/24/2005	----	----	----	0.038	0.029	0.017	0.035	0.054	<0.0050	----	----
	10/25/2006	----	----	----	**0.080**	0.067	0.034	0.051	0.120	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-3B	12/7/1992	----	----	----	0.0282	0.00106	0.005	0.00709	0.00234	0.01	----	----
Back Valley/	2/1/1993	----	----	----	0.0088	0.0094	0.0184	0.0028	<0.009	<0.01	----	----
Bedrock	6/1/1993	----	----	----	0.0128	0.0085	<0.002	0.0424	0.0183	<0.01	----	----
	10/22/1993	----	----	----	0.0086	0.0113	<0.003	0.0095	0.0288	<0.01	----	----
	3/18/1994	----	----	----	<0.006	0.0056	0.0023	0.0597	0.0185	<0.01	----	----
	8/25/1994	----	----	----	<0.008	<0.003	<0.001	0.0788	0.0155	<0.01	----	----
	12/14/1994	----	----	----	<0.010	<0.010	0.0049	0.062	0.0273	<0.01	----	----
	6/29/1995	----	----	----	<0.010	<0.010	0.0024	0.0648	0.0938	<0.01	----	----
	12/6/1995	----	----	----	<0.0035	0.0142	<0.0021	0.0599	0.0546	<0.01	----	----
	7/11/1996	----	----	----	<0.010	<0.003	0.0038	0.169	0.0645	<0.01	----	----
	12/26/1996	----	----	----	<0.005	0.0077	<0.002	<0.020	0.0406	<0.01	----	----
	8/29/1997	----	----	----	<0.005	<0.004	<0.002	0.154	0.0414	<0.001	----	----
	12/1/1997	----	----	----	----	----	----	----	----	----	----	----
	12/18/1997	----	----	----	<0.005	<0.003	0.11	0.32	0.13	<0.001	----	----
	10/29/1998	----	----	----	0.0197	<0.004	0.00649	0.344	0.148	<0.01	----	----
	11/18/1999	----	----	----	<0.00081	<0.00097	0.0491	0.425	0.169	0.031	----	----
	12/13/2000	----	----	----	0.0063	<0.002	0.0041	0.29	0.074	0.0029	----	----
	10/18/2001	----	----	----	<0.0020	<0.0020	0.0031	0.26	0.07	<0.002	----	----
	10/17/2002	----	----	----	<0.0020	<0.0020	0.025	0.3	0.1	<0.002	----	----
	10/27/2003	----	----	----	0.0025	<0.0020	0.01	0.13	0.033	<0.002	----	----
	10/21/2004	----	----	----	<0.0020	<0.0020	<0.0050	0.029	<0.010	<0.005	----	----
	10/25/2005	----	----	----	<0.0020	<0.0020	0.007	0.036	0.032	<0.005	----	----
	10/26/2006	----	----	----	0.011	<0.0050	0.0085	0.092	0.024	0.0061	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
SW-13	12/10/1992	----	----	----	0.0166	0.0211	<0.005	0.0157	0.0136	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	**0.182**	0.13	**0.072**	0.103	0.0762	<0.010	----	----
Shallow Saprolite	6/1/1993	----	----	----	**0.0511**	0.0557	0.0307	0.0443	0.0737	<0.010	----	----
	10/22/1993	----	----	----	0.0286	0.0248	0.0166	0.0172	0.0198	<0.010	----	----
	3/17/1994	----	----	----	0.0328	0.031	0.0218	0.0169	0.0208	<0.010	----	----
	8/24/1994	----	----	----	0.0185	0.023	0.0027	0.0168	0.0219	<0.010	----	----
	12/13/1994	----	----	----	<0.010	<0.010	0.0029	<0.020	0.0313	<0.010	----	----
	6/28/1995	----	----	----	0.0104	<0.010	0.005	<0.020	0.0585	<0.010	----	----
	12/5/1995	----	----	----	0.0049	0.0083	0.0061	<0.0081	0.0224	<0.010	----	----
	7/10/1996	----	----	----	<0.010	0.0061	<0.003	<0.018	0.0367	<0.010	----	----
	12/26/1996	----	----	----	0.0111	0.0118	0.0104	<0.020	0.0184	<0.010	----	----
	9/2/1997	----	----	----	0.0148	0.0119	0.0118	<0.020	0.0209	<0.001	----	----
	12/17/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.0083	<0.001	----	----
	10/28/1998	----	----	----	0.0172	0.0313	0.0124	<0.014	0.0126	<0.010	----	----
	11/17/1999	----	----	----	0.076	0.0689	**0.0717**	0.0491	0.193	<0.010	----	----
	12/13/2000	----	----	----	0.028	0.014	0.0089	0.015	0.014	<0.002	----	----
	10/17/2001	----	----	----	0.0054	0.005	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/17/2002	----	----	----	<0.0020	<0.0020	0.0043	<0.0050	<0.010	<0.0020	----	----
	10/23/2003	----	----	----	0.025	0.01	0.012	0.013	0.01	<0.0020	----	----
	10/20/2004	----	----	----	0.0059	0.0051	0.015	<0.0050	0.033	<0.0050	----	----
	10/20/2005	----	----	----	0.0028	0.0031	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/23/2006	----	----	----	0.010	<0.0050	<0.0050	0.0055	<0.010	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-2B	12/10/1992	----	----	----	0.005	0.0084	0.0019	0.0089	0.152	<0.01	----	----
Back Valley/	2/1/1993	----	----	----	<0.005	0.0027	0.0048	<0.009	0.0185	<0.010	----	----
Bedrock	6/1/1993	----	----	----	0.0095	0.0038	<0.002	<0.010	0.0349	<0.010	----	----
	10/22/1993	----	----	----	**0.066**	0.0819	0.0304	0.0669	0.143	<0.010	----	----
	3/16/1994	----	----	----	<0.006	<0.005	<0.002	<0.012	0.0052	<0.010	----	----
	8/25/1994	----	----	----	<0.002	<0.003	<0.001	<0.006	0.013	<0.010	----	----
	12/14/1994	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0188	<0.010	----	----
	6/29/1995	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0593	<0.010	----	----
	12/6/1995	----	----	----	0.006	0.0051	<0.0021	0.0087	0.0414	<0.010	----	----
	7/10/1996	----	----	----	<0.010	<0.003	<0.003	<0.018	0.0191	<0.010	----	----
	12/26/1996	----	----	----	0.0177	0.005	<0.002	<0.020	0.0268	<0.010	----	----
	8/29/1997	----	----	----	<0.005	<0.004	<0.002	<0.020	<0.005	<0.001	----	----
	12/18/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.038	<0.001	----	----
	10/29/1998	----	----	----	<0.004	0.005	<0.003	<0.014	<0.005	<0.010	----	----
	11/18/1999	----	----	----	0.0027	<0.00097	<0.001	0.0014	0.0076	<0.010	----	----
	12/13/2000	----	----	----	0.014	0.011	<0.003	0.012	0.062	<0.0020	----	----
	10/16/2001	----	----	----	<0.0020	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/21/2002	----	----	----	<0.0020	<0.0020	<0.0030	<0.0050	0.018	<0.0020	----	----
	10/24/2003	----	----	----	0.0049	<0.0020	<0.0050	<0.0050	<0.010	<0.0020	----	----
	10/22/2004	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	0.044	<0.0050	----	----
	10/24/2005	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/25/2006	----	----	----	<0.0050	<0.0050	<0.0050	<0.0050	<0.010	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-4B	12/10/1992	----	----	----	**0.0575**	0.084	0.005	0.061	0.0254	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	0.048	0.137	0.01	0.0597	0.0302	<0.010	----	----
Bedrock	6/1/1993	----	----	----	**0.125**	0.221	0.0091	0.142	0.0597	<0.010	----	----
	6/3/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	**0.135**	0.0737	0.0034	0.135	0.0275	<0.010	----	----
	3/16/1994	----	----	----	<0.006	<0.005	<0.002	<0.012	0.0043	<0.010	----	----
	8/25/1994	----	----	----	0.0133	0.021	<0.001	0.0198	0.0201	<0.010	----	----
	12/13/1994	----	----	----	**0.0735**	0.0903	0.0091	0.0925	0.0498	<0.010	----	----
	6/28/1995	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0194	<0.010	----	----
	12/5/1995	----	----	----	0.0456	0.0586	0.0048	0.0441	0.0447	<0.010	----	----
	7/10/1996	----	----	----	0.0318	0.0566	<0.003	0.0403	0.0465	<0.010	----	----
	12/26/1996	----	----	----	0.0082	0.0177	<0.002	<0.020	0.039	<0.010	----	----
	9/2/1997	----	----	----	0.0384	0.0268	<0.002	0.0419	0.0227	----	----	----
	12/18/1997	----	----	----	0.0083	0.0089	<0.040	<0.020	0.038	<0.001	----	----
	10/28/1998	----	----	----	0.0109	0.0367	<0.003	<0.014	0.0059	<0.010	----	----
	11/17/1999	----	----	----	0.0375	0.0815	0.003	0.0586	0.0317	<0.010	----	----
	12/13/2000	----	----	----	**0.082**	0.17	0.0038	0.078	0.05	<0.002	----	----
	10/18/2001	----	----	----	0.048	0.11	0.0046	0.055	0.044	<0.0020	----	----
	10/22/2002	----	----	----	0.02	0.02	<0.0030	0.017	0.012	<0.0020	----	----
	10/27/2003	----	----	----	0.05	0.036	<0.0050	0.044	0.043	<0.0020	----	----
	10/22/2004	----	----	----	0.0032	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/24/2005	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/26/2006	----	----	----	0.050	0.020	<0.0050	0.052	<0.010	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
	mm/dd/yyyy	Picric acid µg/L	2,4,6-Trinitrotoluene µg/L	RDX µg/L	Chromium mg/L	Copper mg/L	Lead mg/L	Nickel mg/L	Zinc mg/L	Cyanide mg/L	Benzophenone µg/L	Benzylic Acid µg/L
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
BW-9	12/8/1992	----	----	----	0.01207	0.003	<0.05	0.399	0.0314	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	----	----	0.0045	----	----	<0.010	----	----
Bedrock	2/19/1993	----	----	----	----	----	----	0.48421	----	----	----	----
	6/1/1993	----	----	----	0.0183	<0.004	<0.002	**1.37**	0.15	<0.010	----	----
	6/3/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	**0.0653**	0.0542	0.0341	0.0381	0.0381	<0.010	----	----
	3/17/1994	----	----	----	<0.030	<0.025	<0.002	**1.11**	0.763	0.021	----	----
	8/24/1994	----	----	----	0.0326	0.0153	<0.001	**1.14**	0.423	0.0139	----	----
	12/13/1994	----	----	----	**0.327**	<0.010	0.0038	**1.13**	0.853	<0.010	----	----
	6/28/1995	----	----	----	<0.010	<0.010	<0.020	**1.18**	0.538	<0.010	----	----
	12/5/1995	----	----	----	**0.134**	0.043	<0.0016	**1.84**	0.629	<0.010	----	----
	7/11/1996	----	----	----	**0.0598**	<0.003	0.0174	**3.73**	1.62	<0.010	----	----
	12/26/1996	----	----	----	0.0142	<0.040	0.0175	**1.53**	0.36	<0.010	----	----
	9/2/1997	----	----	----	0.0442	<0.004	0.0087	**3.4**	1.57	<0.001	----	----
	12/17/1997	----	----	----	0.012	<0.003	**0.15**	**2.6**	0.72	<0.001	----	----
	10/30/1998	----	----	----	0.0231	<0.004	0.0142	**0.992**	0.204	0.0194	----	----
	11/17/1999	----	----	----	0.0163	<0.00097	0.0478	**0.685**	0.242	0.101	----	----
	12/13/2000	----	----	----	0.029	0.057	0.022	**1**	0.2	0.0049	----	----
	10/19/2001	----	----	----	0.015	0.063	0.033	**1.2**	0.22	<0.0020	----	----
	10/22/2002	----	----	----	0.0079	0.028	0.014	0.35	0.08	0.0031	----	----
	10/28/2003	----	----	----	0.021	0.014	0.014	0.24	0.21	<0.0020	----	----
	10/25/2004	----	----	----	0.0029	<0.0020	0.0088	0.032	<0.010	<0.0050	----	----
	10/25/2005	----	----	----	0.0034	<0.0020	0.015	0.023	<0.010	<0.0050	----	----
	10/26/2006	----	----	----	0.014	<0.0050	0.016	0.140	0.031	0.016	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-3S	12/7/1992	----	----	----	0.129	0.039	0.0072	0.08	0.058	<0.010	----	----
Back Valley/	2/1/1993	----	----	----	0.0104	0.0067	0.0026	<0.009	0.0173	<0.010	----	----
Shallow	10/22/1993	----	----	----	0.0337	0.0118	0.0054	0.0195	0.0359	<0.010	----	----
	3/18/1994	----	----	----	**0.056**	0.0333	0.012	0.0344	0.113	<0.010	----	----
	8/25/1994	----	----	----	0.0416	0.0265	0.0054	0.035	0.0858	<0.010	----	----
	12/14/1994	----	----	----	<0.010	<0.010	<0.002	<0.020	0.0435	<0.010	----	----
	6/29/1995	----	----	----	0.0352	0.0208	0.0113	0.0386	0.0968	<0.010	----	----
	12/6/1995	----	----	----	0.0499	0.0332	0.0112	0.0348	0.112	<0.010	----	----
	7/11/1996	----	----	----	0.0219	0.0135	0.0105	<0.018	0.0769	<0.010	----	----
	12/26/1996	----	----	----	0.0169	0.0182	0.0093	<0.020	0.072	<0.010	----	----
	8/29/1997	----	----	----	0.015	0.0088	0.0036	0.0214	0.058	<0.001	----	----
	12/18/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.0083	<0.001	----	----
	10/28/1998	----	----	----	0.0158	0.0117	0.0076	<0.014	0.041	<0.010	----	----
	11/18/1999	----	----	----	0.0214	0.0106	0.0074	0.0146	0.0487	<0.010	----	----
	12/12/2000	----	----	----	0.0069	0.0056	<0.0030	0.006	0.018	<0.0020	----	----
	10/16/2001	----	----	----	<0.0020	<0.0020	<0.0030	<0.0050	0.013	<0.0020	----	----
	10/16/2002	----	----	----	0.015	0.0098	0.0085	0.012	0.041	<0.0020	----	----
	10/24/2003	----	----	----	0.011	0.0057	<0.0050	0.0064	0.016	<0.0020	----	----
	10/21/2004	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/20/2005	----	----	----	0.0022	0.0035	<0.0050	0.0078	<0.010	<0.0050	----	----
	10/25/2006	----	----	----	0.0077	<0.0050	<0.0050	<0.0050	0.033	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
MW-5S	12/7/1992	----	----	----	<0.010	<0.010	<0.005	<0.040	<0.020	<0.010	----	----
Back Valley/	12/8/1992	----	----	----	<0.010	<0.010	<0.005	<0.040	<0.020	----	----	----
Shallow Saprolite	2/1/1993	----	----	----	**0.0613**	0.0298	0.0171	0.0488	0.0851	<0.010	----	----
	2/16/1993	----	----	----	----	----	----	----	----	----	----	----
	6/1/1993	----	----	----	0.0474	0.0217	0.0164	0.0267	0.082	<0.010	----	----
	6/3/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	**0.0544**	0.0319	0.0161	0.0371	0.0803	<0.010	----	----
	3/18/1994	----	----	----	**0.239**	0.149	**0.0989**	0.172	0.392	<0.010	----	----
	8/25/1994	----	----	----	**0.142**	0.101	0.0386	0.112	0.259	<0.010	----	----
	12/14/1994	----	----	----	<0.010	<0.010	0.0195	<0.020	0.0579	<0.010	----	----
	6/29/1995	----	----	----	**0.0588**	0.0342	0.026	0.058	0.109	<0.010	----	----
	12/6/1995	----	----	----	**0.0985**	0.0586	0.0334	0.0655	0.136	<0.010	----	----
	7/11/1996	----	----	----	**0.0865**	0.043	0.0304	0.0521	0.16	<0.010	----	----
	12/26/1996	----	----	----	**0.0607**	0.0236	0.0142	0.041	0.11	<0.010	----	----
	8/29/1997	----	----	----	0.018	0.0079	0.0051	0.0206	0.0368	<0.0010	----	----
	12/18/1997	----	----	----	<0.005	<0.003	<0.040	<0.020	0.016	<0.001	----	----
	10/28/1998	----	----	----	**0.159**	0.081	0.0363	0.0923	0.332	<0.010	----	----
	11/18/1999	----	----	----	0.0069	0.0018	<0.001	0.0127	0.0325	<0.010	----	----
	12/12/2000	----	----	----	*0.016*	*0.004*	*<0.0030*	*0.019*	*0.02*	*0.0029*	----	----
	10/19/2001	----	----	----	**0.12**	0.046	0.031	0.12	0.24	<0.0020	----	----
	10/21/2002	----	----	----	0.011	0.0036	<0.0030	0.028	0.039	<0.0020	----	----
	10/28/2003	----	----	----	0.013	0.0039	<0.0050	0.0082	0.014	<0.0020	----	----
	10/22/2004	----	----	----	0.014	<0.0020	<0.0050	0.015	0.01	<0.0050	----	----
	10/26/2005	----	----	----	0.0024	<0.0020	<0.0050	<0.0050	0.015	<0.0050	----	----
	10/26/2006	----	----	----	0.013	0.0064	<0.0050	0.020	0.022	<0.0050	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21
IW-2 Back Valley/ Deep Saprolite	12/8/1992	----	----	----	0.0038	0.003	0.01	0.137	0.0074	0.01	----	----
	2/1/1993	----	----	----	----	----	0.0064	----	----	<0.010	----	----
	2/19/1993	----	----	----	----	----	----	0.15232	----	----	----	----
	6/1/1993	----	----	----	0.0145	0.0074	<0.010	0.306	0.0258	<0.010	----	----
	6/3/1993	----	----	----	----	----	----	----	----	----	----	----
	10/22/1993	----	----	----	0.0425	0.0104	0.0051	0.054	0.028	<0.010	----	----
	3/17/1994	----	----	----	<0.006	<0.005	0.0026	0.0945	0.0139	<0.010	----	----
	8/24/1994	----	----	----	<0.008	0.0138	0.0036	0.459	0.128	0.012	----	----
	12/13/1994	----	----	----	<0.010	<0.010	0.0025	0.0936	0.189	<0.010	----	----
	6/28/1995	----	----	----	0.0198	<0.010	0.0082	0.0914	0.0892	<0.010	----	----
	12/5/1995	----	----	----	<0.0035	0.0227	0.004	0.245	0.112	<0.010	----	----
	7/11/1996	----	----	----	0.0199	<0.003	<0.003	0.0186	0.0634	<0.010	----	----
	12/26/1996	----	----	----	0.0125	0.0065	<0.002	<0.020	0.0765	<0.010	----	----
	9/2/1997	----	----	----	<0.005	<0.004	<0.002	<0.020	0.145	<0.001	----	----
	12/17/1997	----	----	----	<0.005	<0.003	**0.28**	**1.4**	0.5	<0.001	----	----
	10/30/1998	----	----	----	**0.0841**	0.0142	0.0107	0.211	0.12	<0.010	----	----
	11/17/1999	----	----	----	0.0047	0.0036	0.0036	0.0587	0.0261	<0.010	----	----
	12/13/2000	----	----	----	0.02	<0.002	<0.003	0.013	0.013	0.0059	----	----
	10/18/2001	----	----	----	<0.0020	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/17/2002	----	----	----	<0.0020	<0.0020	<0.0030	<0.0050	<0.010	<0.0020	----	----
	10/27/2003	----	----	----	0.0024	<0.0020	<0.0050	<0.0050	<0.010	<0.0020	----	----
	10/22/2004	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	<0.010	<0.0050	----	----
	10/25/2005	----	----	----	<0.0020	<0.0020	<0.0050	<0.0050	0.01	<0.0050	----	----
	10/25/2006				<0.0050	<0.0050	<0.0050	0.0089	<0.010	0.0056	----	----

Table 8.2
Historic CERCLA Explosives, Metals, and Miscellaneous Compounds Groundwater Analytical Results
Chemtronics, Inc., Swannanoa, North Carolina

Sample ID/ Location Description	Date Collected	Explosives			Metals					Miscellaneous		
		Picric acid	2,4,6-Trinitrotoluene	RDX	Chromium	Copper	Lead	Nickel	Zinc	Cyanide	Benzophenone	Benzylic Acid
	mm/dd/yyyy	*µg/L*	*µg/L*	*µg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*µg/L*	*µg/L*
Groundwater Remediation Level		14,000	44	35	0.050	1	0.050	0.50	5	0.20	152	21

Notes:

1. µg/L - micrograms per liter
2. mg/L - milligrams per liter
3. Data from 1992 to 1997 are from Tables 1.2 and 2.5, entitled "Baseline Contaminant Concentrations" and "Summary of Volatile Organic Compounds," respectively, originally prepared by RUST Environment & Infrastructure (RUST) for the Fifth Year Monitoring Report, dated July 1998.
4. Altamont Environmental, Inc. (Altamont) has not compared the data from 1992 to 1997 to the original laboratory analytical reports.
5. Data from 1998 and 1999 do not include all the analytes specified in the November 1997 Operation and Maintenance Manual.
6. Data from 1998 to 2006 have been input and quality-assured by Altamont.
7. < means not detected at or above the laboratory method reporting limit. The concentration shown is equal to the reporting limit specified by the Analytical Laboratory.
8. **Bolded** numbers indicate that the concentration is above the Groundwater Remediation Level (GRL) indicated in the 1989 Record of Decision (ROD).
9. The laboratory reporting limit for some compounds in some samples is greater than the respective GRL. These numbers are not shown in bold.
10. ---- means that the parameter was not analyzed, or the data were not available.
11. The concentration of trichloroethene for MW-4B in sample collected on 11/17/1999 was incorrectly reported by Nimmo & Co. Consultants in their February 22, 2000 report to the EPA. The concentration reported by the Analytical Laboratory is shown above.

Table 10-1
Status of Issues Identified in August 2002 Five Year Review

Issues	Affects Protectiveness? (Y/N)		Status and Explanation (May 2007)
	Current	Future	
1. No Data Quality Objectives (DQOs) for the site, including intermediate and long-term remedial goals, and the required time frames necessary to evaluate the effectiveness of the treatment system, were identified in any site documents.	N	Y	*DQOs have not yet been developed. The development of DQOs was postponed until the transfer to a single agency was completed.*
2. Corrosion was observed around the base of the Back Valley Air Stripper.	N	N	The Back Valley Air Stripper has been replaced with a new unit.
3. O&M procedures developed over the last several years were not included in the O&M Manual.	N	N	*The 0 & M manual has not been rewritten. Rewriting the document was postponed until the transfer to a single agency was completed.*
4. The monitoring well network was insufficient to make the determinations required as part of this Five Year Review.	Y	Y	*67 new monitoring wells were installed at the site between 2001 and 2007. A site-wide groundwater and surface water sampling event is planned for summer 2007. Data from that sampling event will be used to establish a long-term monitoring program. The CERCLA compliance monitoring program specified in the 0 & M manual will continue to be used until the transfer to a single agency is completed and a new plan is approved by the agency.*
5. Stressed vegetation and minor erosion were observed on many caps.	N	Y	Soil amendments and fertilizer have been applied to the caps and the vegetation is no longer stressed. Areas of erosion have been addressed.
6. Extraction wells still require frequent and intense maintenance.	N	N	The extraction wells still require frequent maintenance. A plan has been developed for a well rehabilitation pilot test.
7. Standing liquid was evident at the base of DA-23.	Y	Y	Surface water control features (e.g., ditches and culverts) have been maintained to prevent standing water. Subsurface sewers that may have contributed flow to this area have been plugged.
8. Air stripping influent water was not monitored for the required water quality parameters (hardness, calcium, Fe+2, TSS, pH, Mn, total solids, and alkalinity)	N	N	The monitoring parameters have not been modified. The monitoring program that is utilized complies with the 1997 CERCLA 0 & M Manual and MSD requirements. The basis for the original statement from 2002 is unclear.

Table 10-1
Status of Issues Identified in August 2002 Five Year Review

Issues	Affects Protectiveness? (Y/N)		Status and Explanation (May 2007)
	Current	**Future**	
22. There are potentially other site contaminants and additional groundwater plumes associated with the RCRA units.	Y	Y	*Site characterization will be completed after the transfer to a single agency occurs.*
23. The current reporting schedule is insufficient.	N	Y	The reporting schedule has not changed.
24. Settlement of Acid Pit Cap is evident.	Y	Y	Settlement of the portion of the Acid Pit cap that has settled is being addressed.

Note:
Bold text indicates that the item has been addressed.
Text in italics indicates that the item has not been addressed because the transfer to a single agency has not been completed.

Table 10-2
Issues Identified in 2007 Review

Issues	Affects Protectiveness? (Y/N)	
	Current	**Future**
1. Analytical methods are not available to detect benzylic acid.	N	Y

Table 11-1

Status of 2002 Recommendations and Follow-up Actions

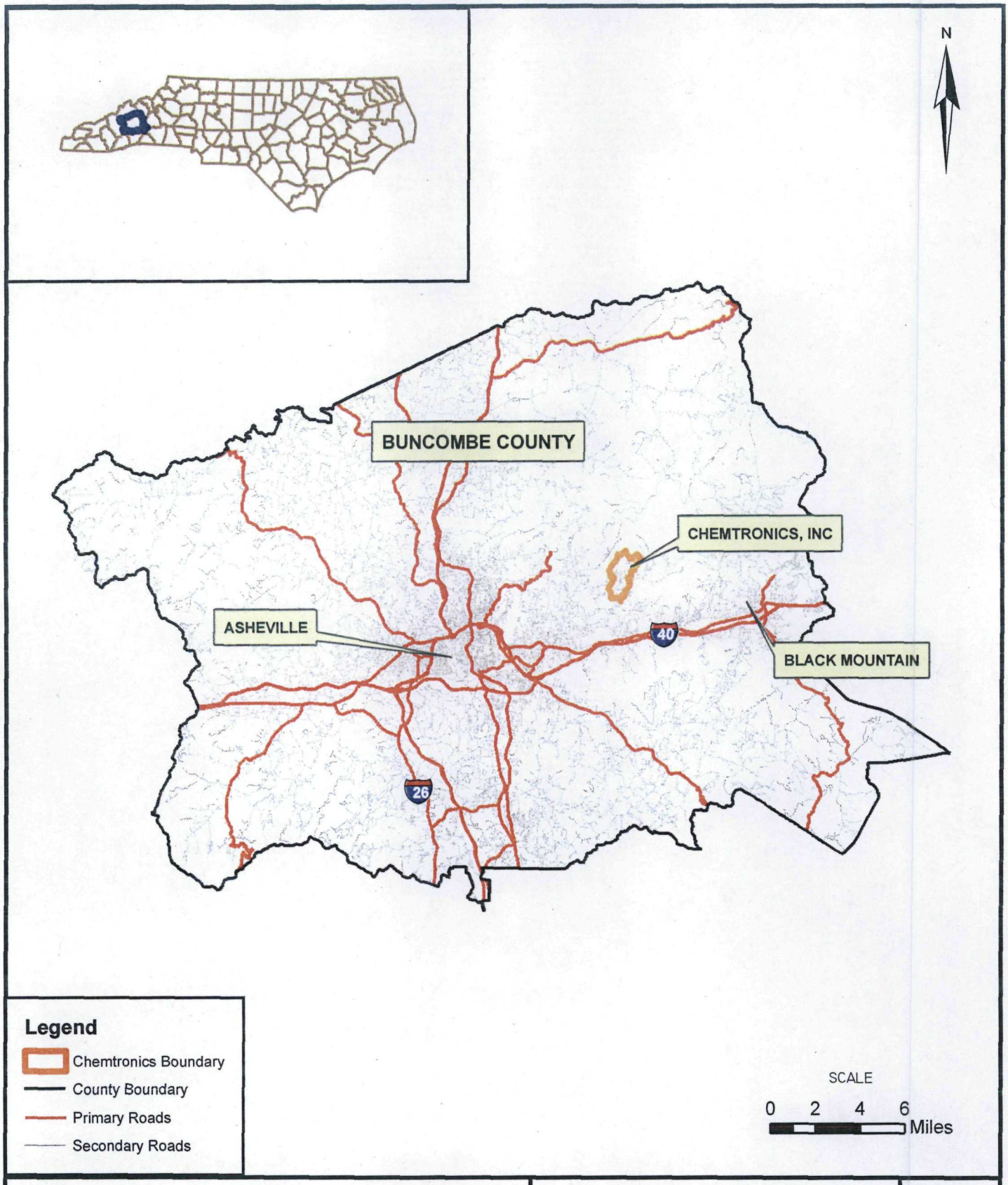
Recommendations			Follow-up Actions: Affects Protectiveness? (Y/N)		Status as of May 2007
	Responsible Party/Agency	Milestone Date	Current	Future	
I. Prepare a Holistic Site Management Plan (HMP) At a minimum, this plan should: • Describe current and anticipated • future site use, including existing or proposed institutional controls or deed restrictions. • Establish a process and schedule for periodically updating the 0 & M manual. • Revise the 0 & M Manual so that activities are not dependent on the operating contractor, and develop a schedule and process for monitoring 1) settlement of landfill caps, 2) erosion, 3) over seeding and vegetative covers, and 4) general maintenance.					Complete
II. Reevaluate the current groundwater remediation levels in light of current ARARs.	PRPs/USEPA	2002	N	N	To be completed once transfer to single agency has occurred.
III. Reevaluate or more clearly define the "trigger mechanism" in the ROD.	PRPs	2003	N	N	To be completed once transfer to single agency has occurred.
IV. Evaluate the need to perform an ecological risk assessment, including the evaluation of the potential presence of endangered and threatened species.	USEPA	2003	Y	Y	To be completed once transfer to single agency has occurred.
V. Review and approve the Holistic Site Management Plan.	USEPA	2003	Y	Y	Complete

Table 11-2 Recommendations and Action Items with Milestones (September 2007)

Number	Recommendations	Responsible Party/Agency	Milestone Date*	Affects Protectiveness? (Y/N) Current	Future
1	Conduct a capture zone analysis for each groundwater extraction system and make recommendations along with a time-frame to address any identified data gaps.	PRPs/EPA	October 31, 2008	Y	Y
2	Re-evaluate the current groundwater remediation levels in light of current ARARs.	PRPs/EPA	October 31, 2008	N	N
3	Re-evaluate or more clearly define the "trigger mechanism" in the ROD.	PRPs/EPA	October 31, 2009	N	N
4	Evaluate the need to perform an ecological risk assessment, including the evaluation of the potential presence of endangered and threatened species.	PRPs/EPA	October 31, 2008	Y	Y
5	Evaluate alternative technologies remedy (such as in-situ chemical oxidation, enhanced in-situ biological reduction, and permeable reactive wall) for the achievement of the groundwater RAOs.	PRPs/EPA	October 31, 2008	N	Y
6	Complete additional analyses to confirm the effectiveness of source control and adequacy of soil cleanup	PRPs/EPA	April 30, 2009	N	Y
7	Place Perpetual Land Use Restriction (Institutional Controls) on the Property	PRPs/EPA/ NCDENR	October 31, 2008	N	Y
8	Revise/Update 1997 O&M Manual. The Revised O&M Manual should include the following additions: A. Assess reporting requirements for monthly and annual monitoring reports B. Assess compliance groundwater monitoring program for evaluating a) groundwater quality, b) contaminant migration, and c) cone of influence C. Coordinating all sampling efforts (CERCLA and RCRA areas) D. Revise O&M Manual so the activities are not dependent on the operating contractor E. Develop a schedule and process for monitoring 1) settlement of landfill caps, 2) erosion, 3) over seeding and vegetative covers, and 4) general maintenance F. Schedule for updating future O&M Manuals	PRPs/EPA	October 31, 2008	N	Y
9	Assess the potential for a vapor intrusion pathway.	PRPs/EPA	Fall 2009	N	Y

*Note: * Target dates are included for reference only. Actual dates will be contingent upon the forthcoming Administrative Order on Consent The AOC will be the controlling document regarding the required Scope of Work (SOW) and schedule.*

FIGURES

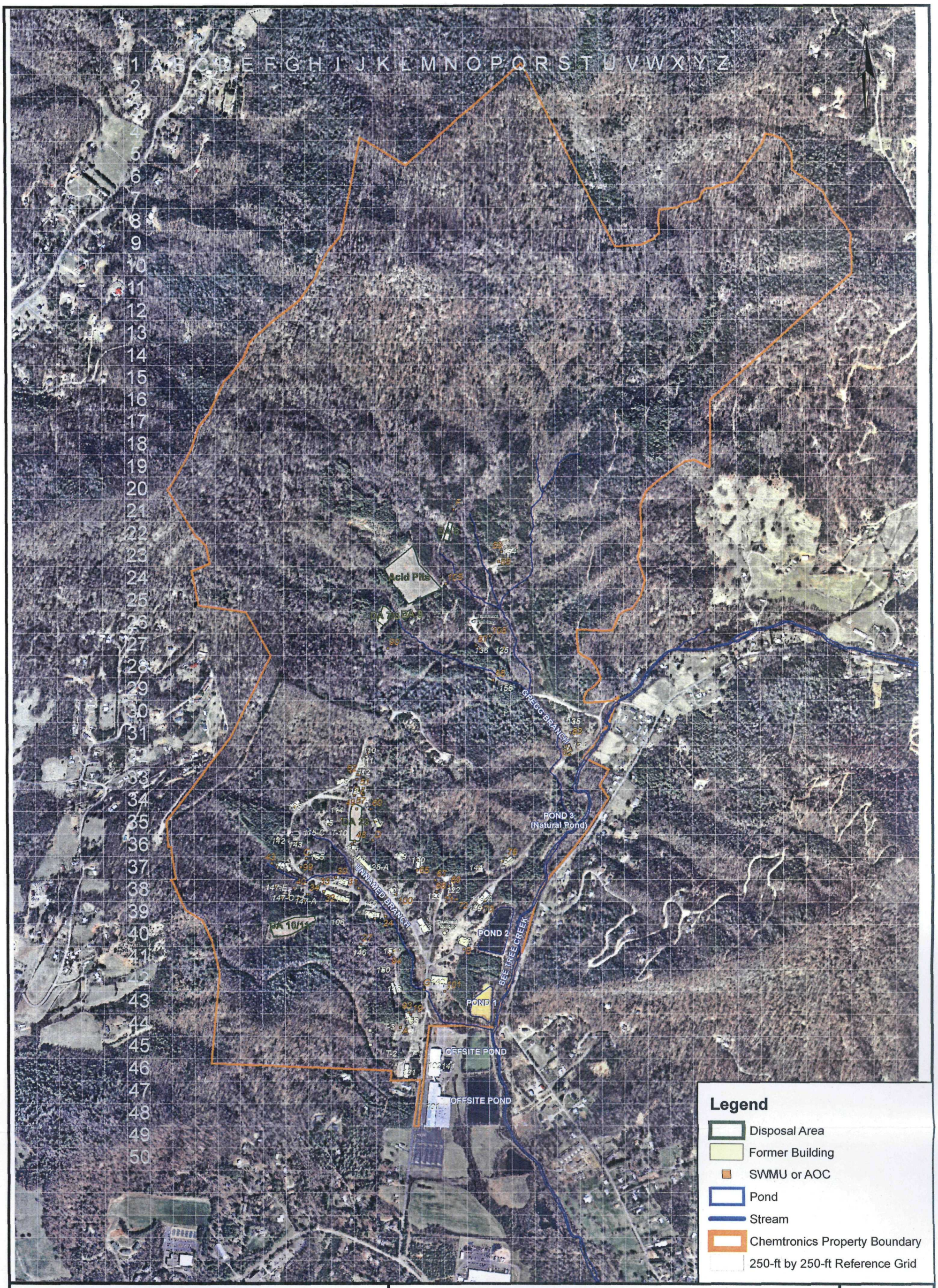


SITE LOCATION MAP

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

3-1



SCALE

0 1,000 2,000 Feet

SITE BOUNDARY

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

3-2

Legend

Monitoring Wells

- Zone A (Water Table)
- Zone B (Intermediate Saprolite)
- Zone C (Transition Zone)
- Zone D (Upper Bedrock)
- Zone E (Intermediate Bedrock)
- Zone F (Deep Bedrock)
- Extraction
- USGS Surface Elevation Contour (25-ft Interval)
- Disposal Area
- Building
- Road
- Stream
- Pond
- Chemtronics Property Boundary
- 250-ft by 250-ft Reference Grid

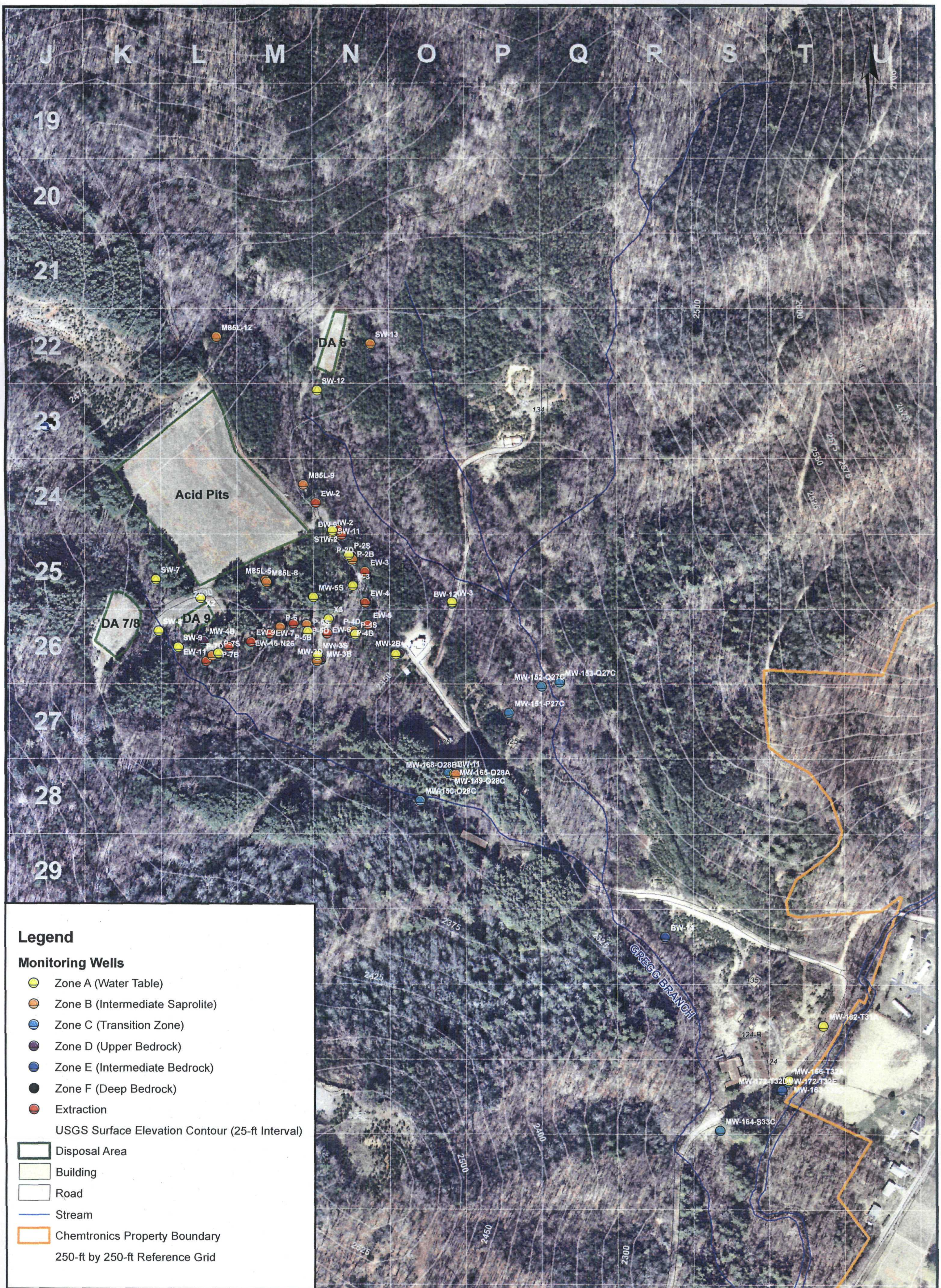
SCALE
0 75 150 225 300
Feet

FRONT VALLEY

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

3-3



SCALE

0 75 150 225 300 Feet

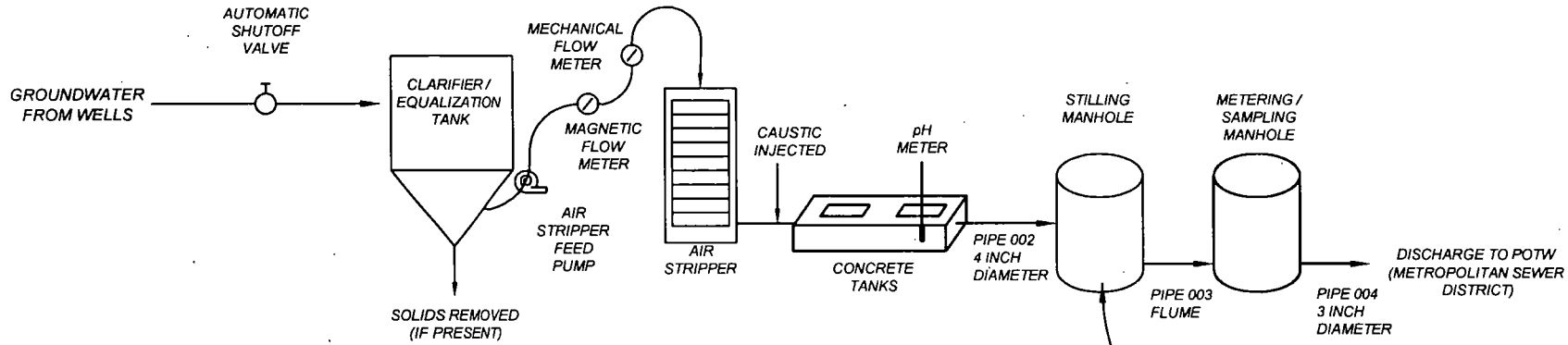
BACK VALLEY

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

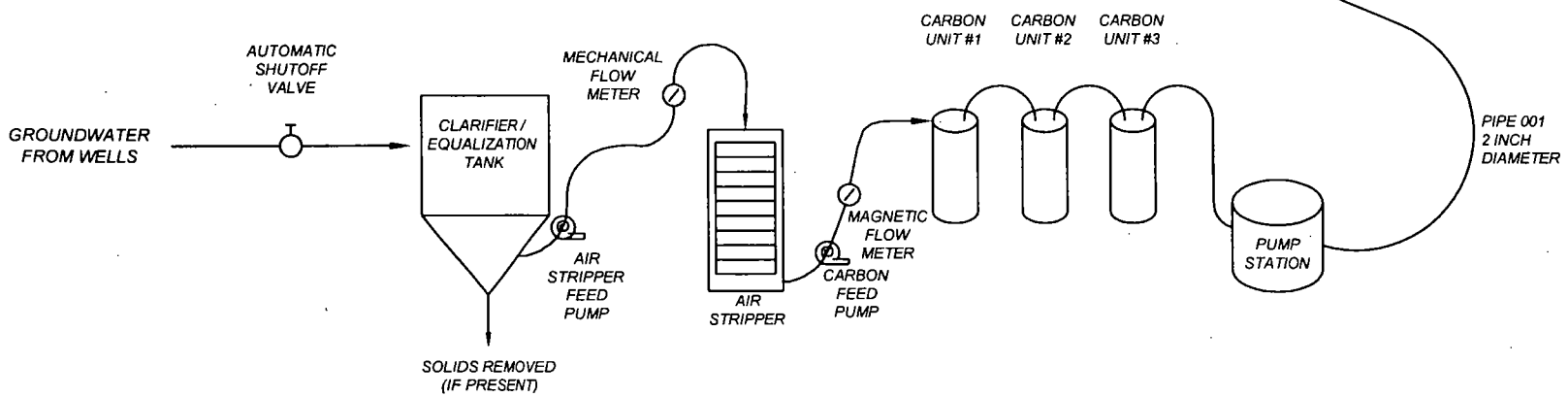
FIGURE

3-4

BACK VALLEY



FRONT VALLEY



PROCESS FLOW DIAGRAM
FOR REMEDIAL SYSTEMS

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

6-1

Year	Amount	Gallons Treated	Cost per Gallon
1991	$378,940.18		
1992	$4,585,935.10		
1993	$1,303,841.00	7,426,798	$0.176
1994	$246,702.55	2,459,499	$0.100
1995	$333,462.53	3,830,376	$0.087
1996	$288,263.66	4,298,449	$0.067
1997	$577,982.75	5,548,966	$0.104
1998	$539,533.75	6,433,472	$0.084
1999	$305,769.46	5,186,537	$0.059
2000	$307,857.70	5,577,421	$0.055
2001	$442,508.42	6,269,664	$0.071
2002	$213,187.52	5,646,670	$0.038
2003	$487,621.63	5,838,073	$0.084
2004	$442,402.00	4,094,049	$0.108
2005	$455,322.83	4,520,839	$0.101
2006	$392,938.11	4,668,634	$0.084

Figure 6-6
Cost per Gallon of Water Treated
(US Dollars)
Chemtronics Site
Swannanoa, North Carolina

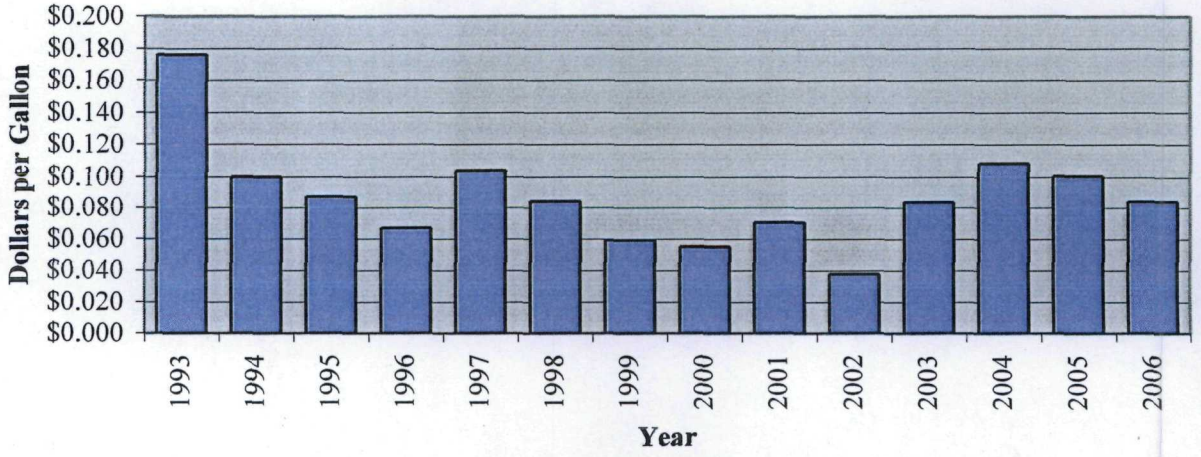
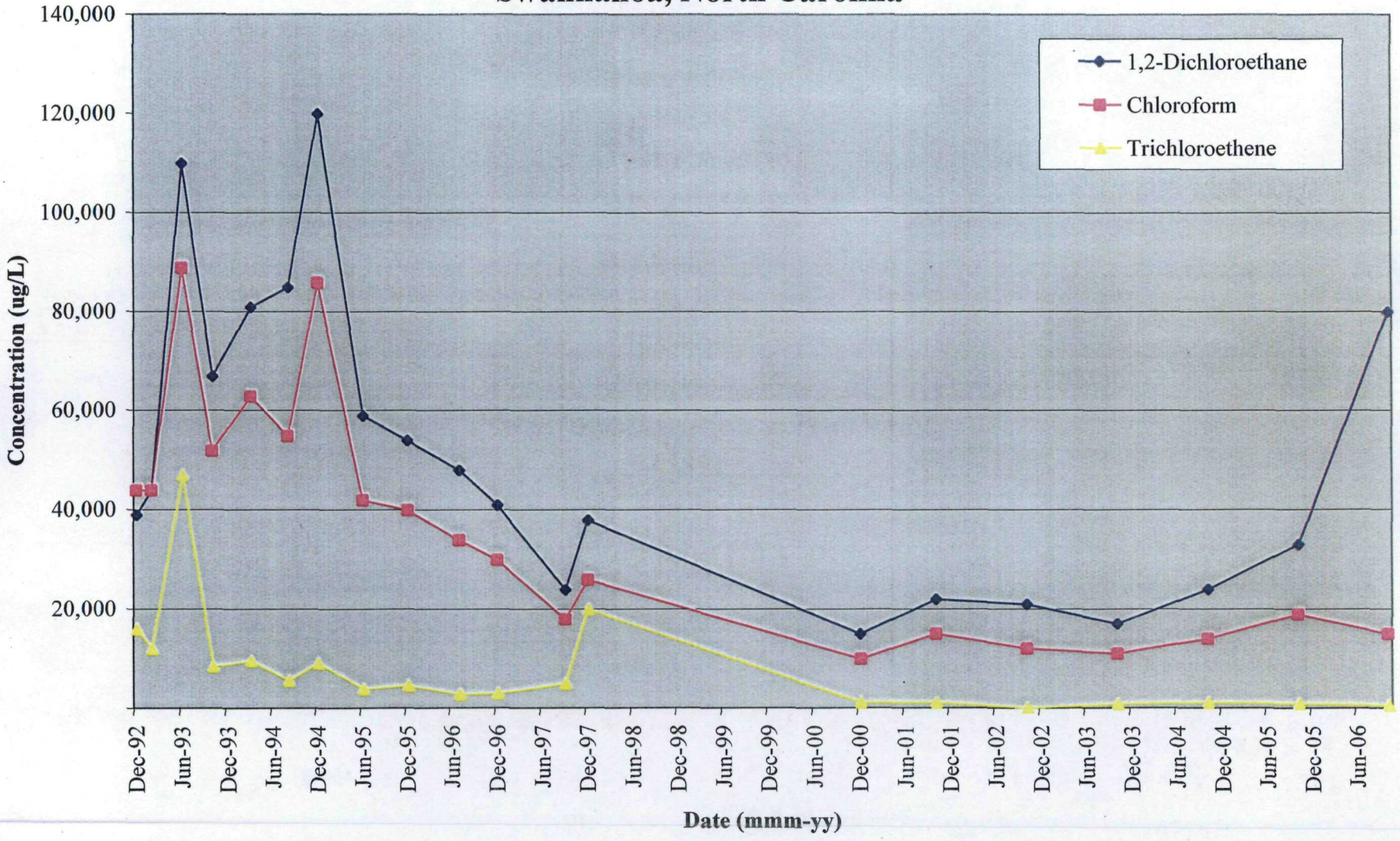
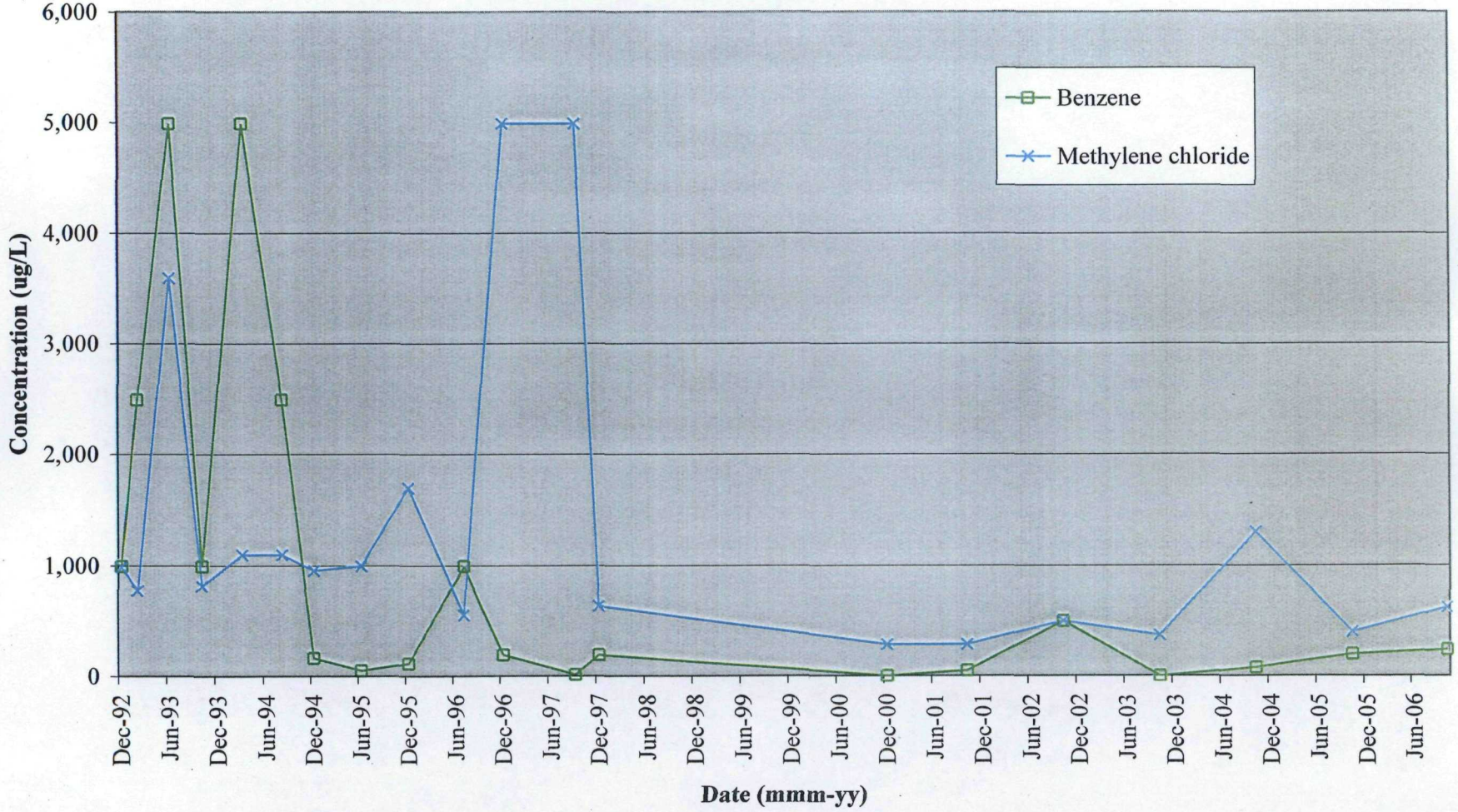


Figure 8-1A
VOC Concentration versus Time
M85L9
Chemtronics
Swannanoa, North Carolina



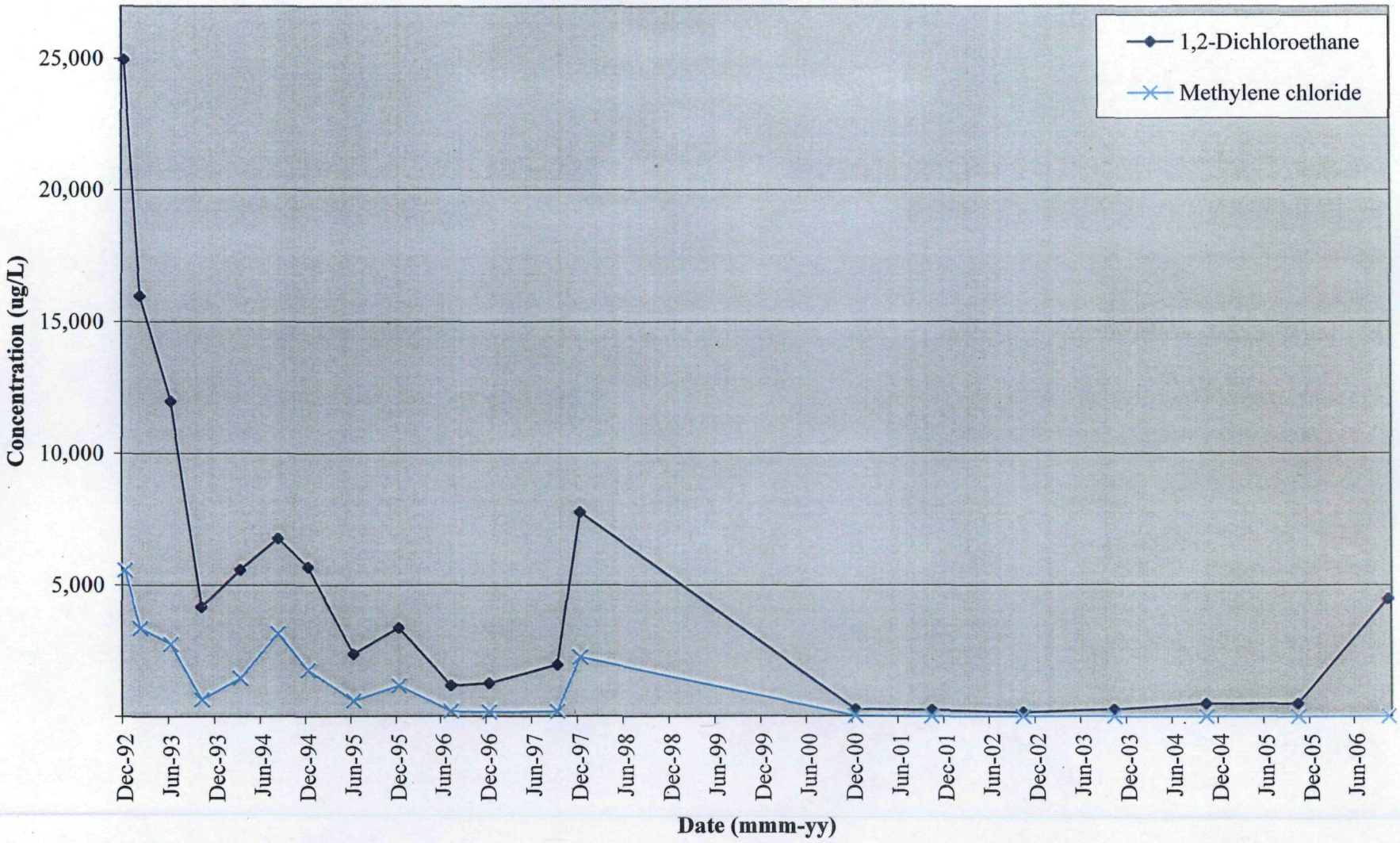
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-1B
VOC Concentration versus Time
M85L9
Chemtronics
Swannanoa, North Carolina



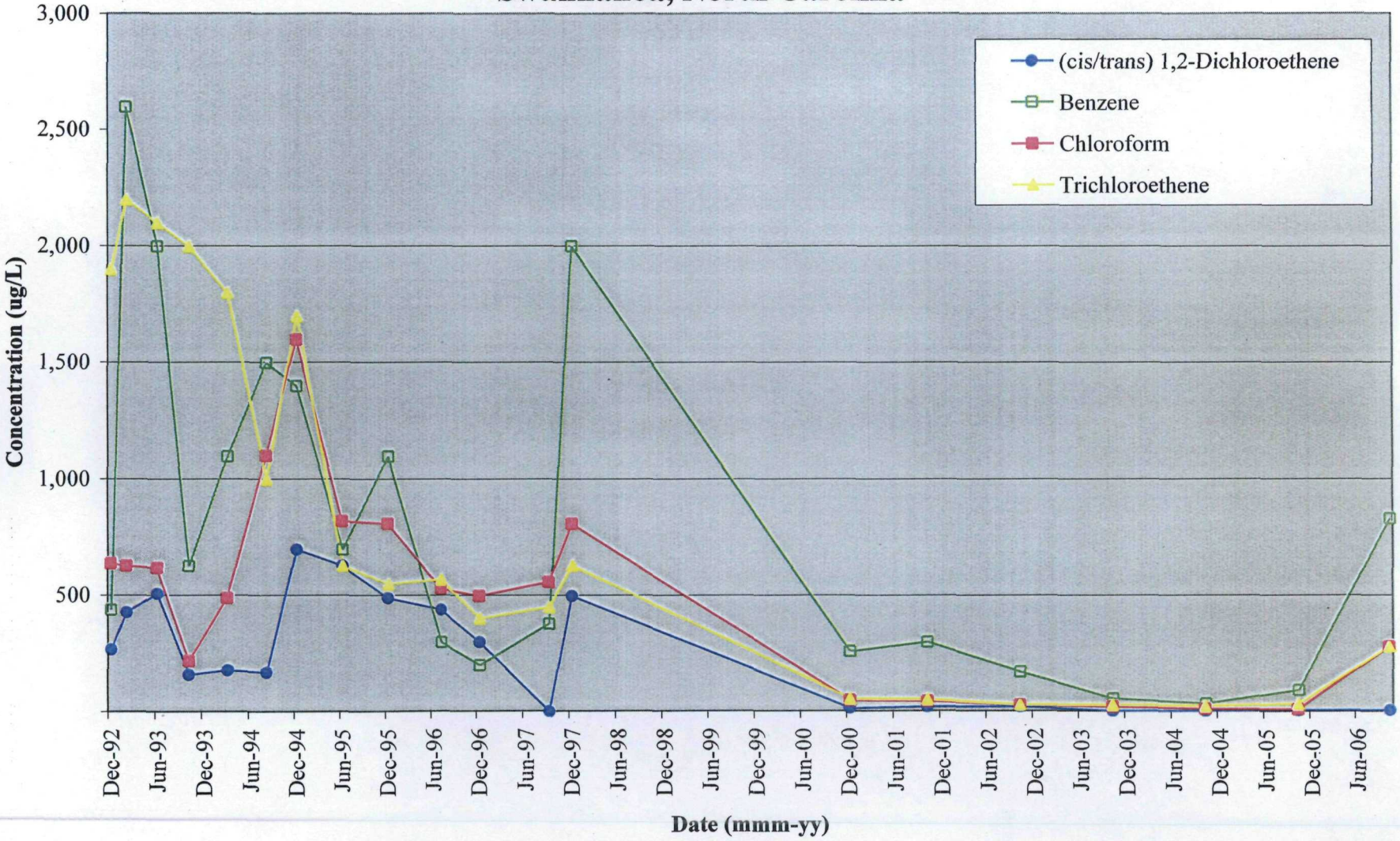
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-2A
VOC Concentration versus Time
IW-2
Chemtronics
Swannanoa, North Carolina



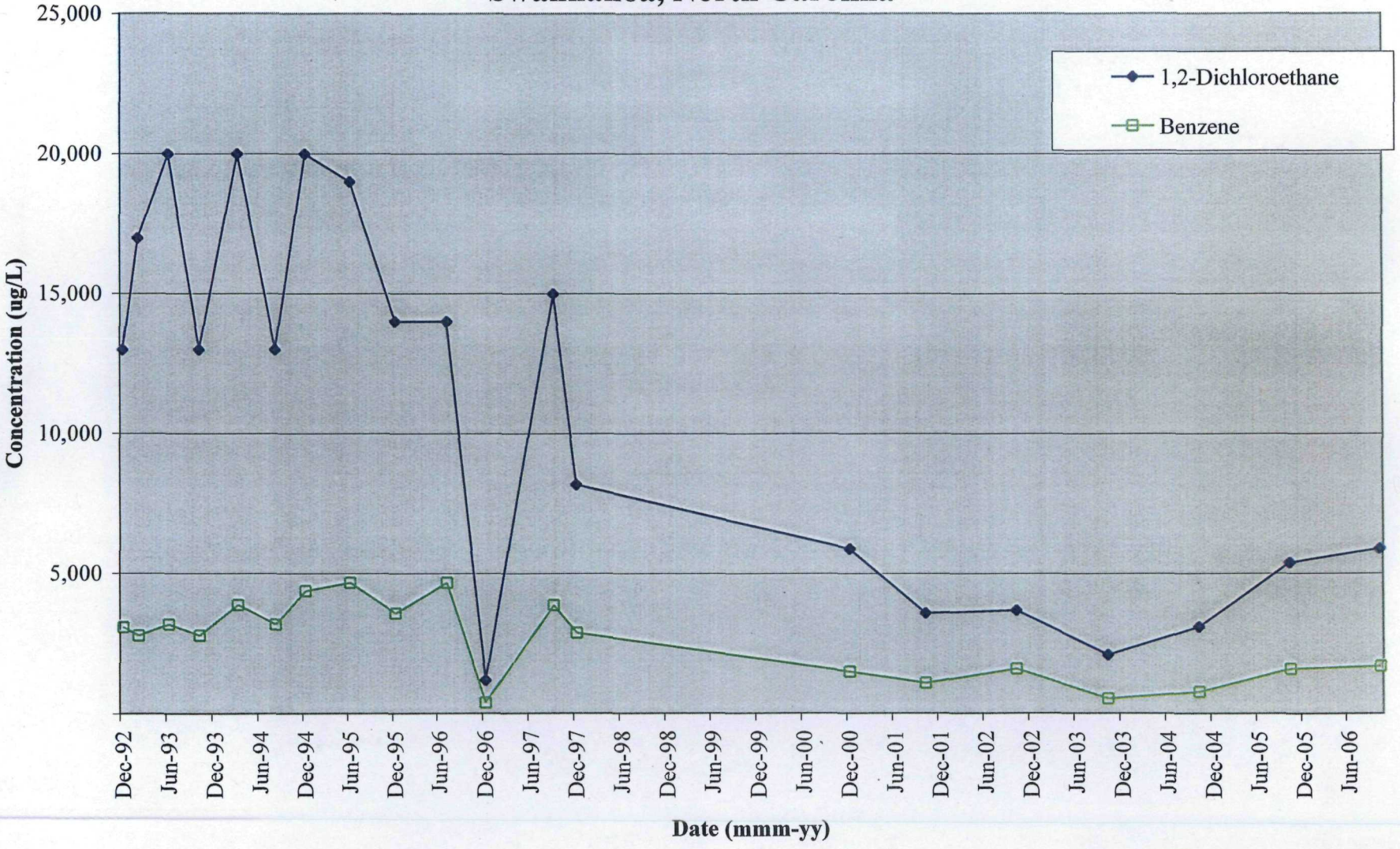
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-2B
VOC Concentration versus Time
IW-2
Chemtronics
Swannanoa, North Carolina



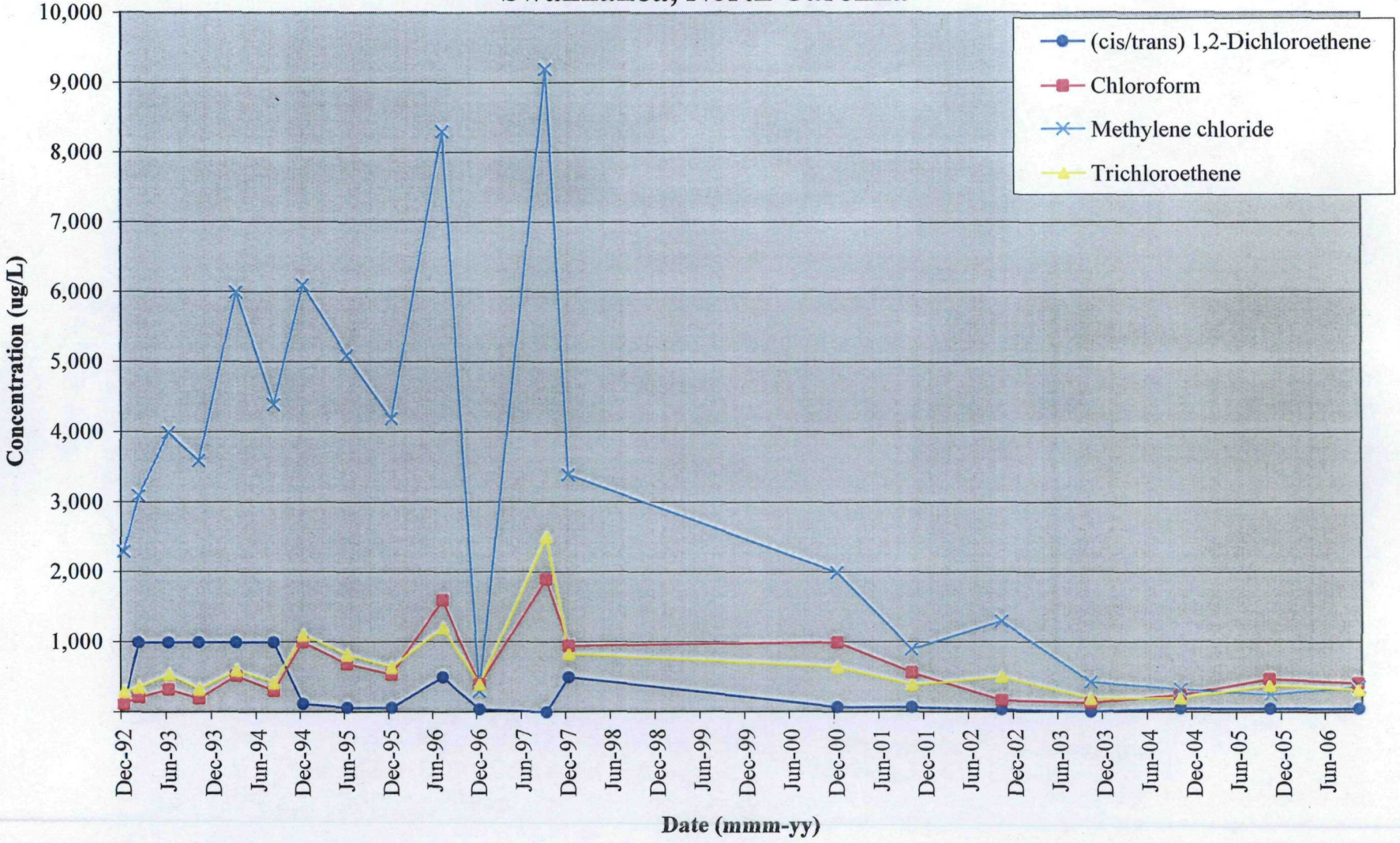
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-3A
VOC Concentration versus Time
BW-9
Chemtronics
Swannanoa, North Carolina



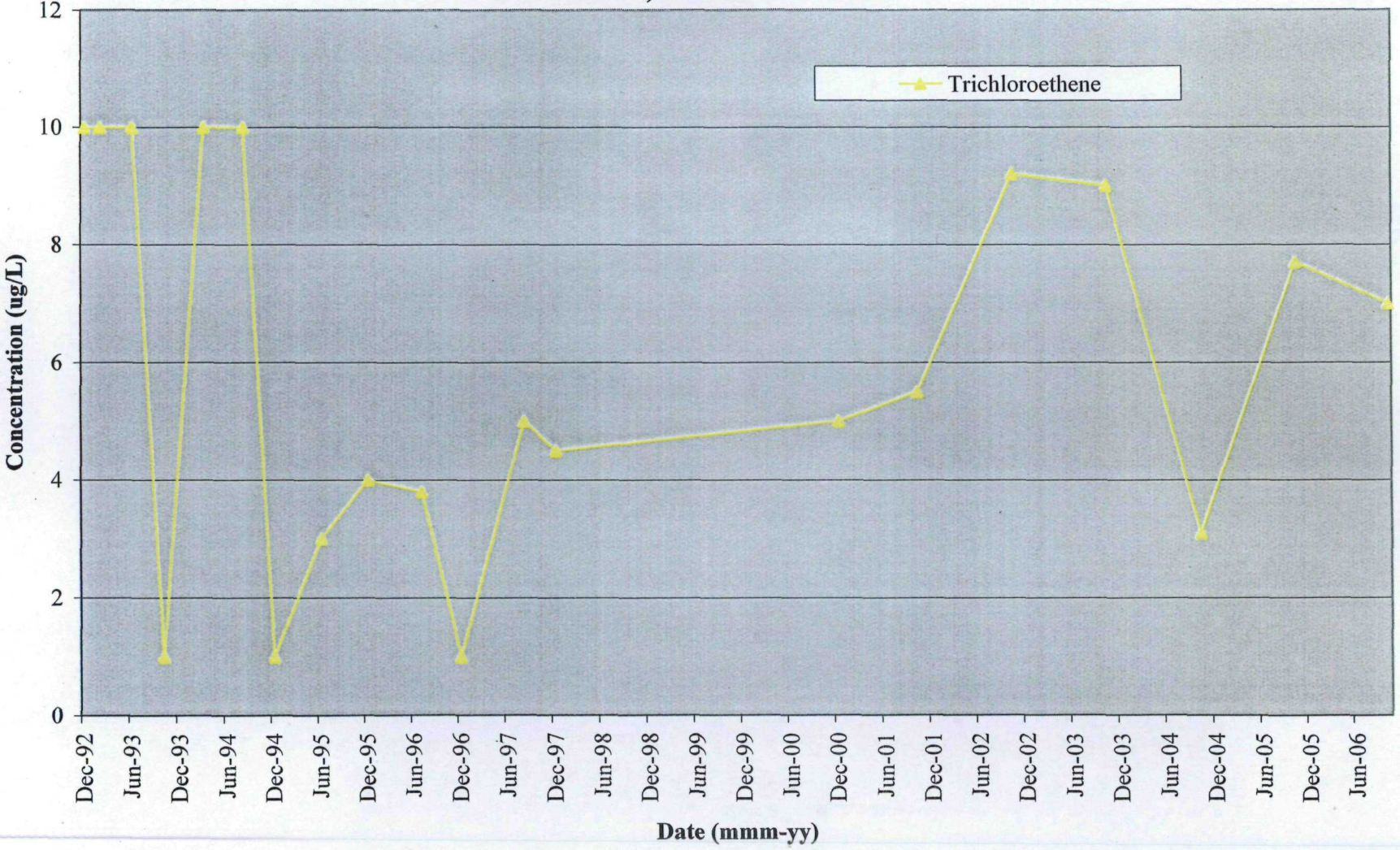
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-3B
VOC Concentration versus Time
BW-9
Chemtronics
Swannanoa, North Carolina



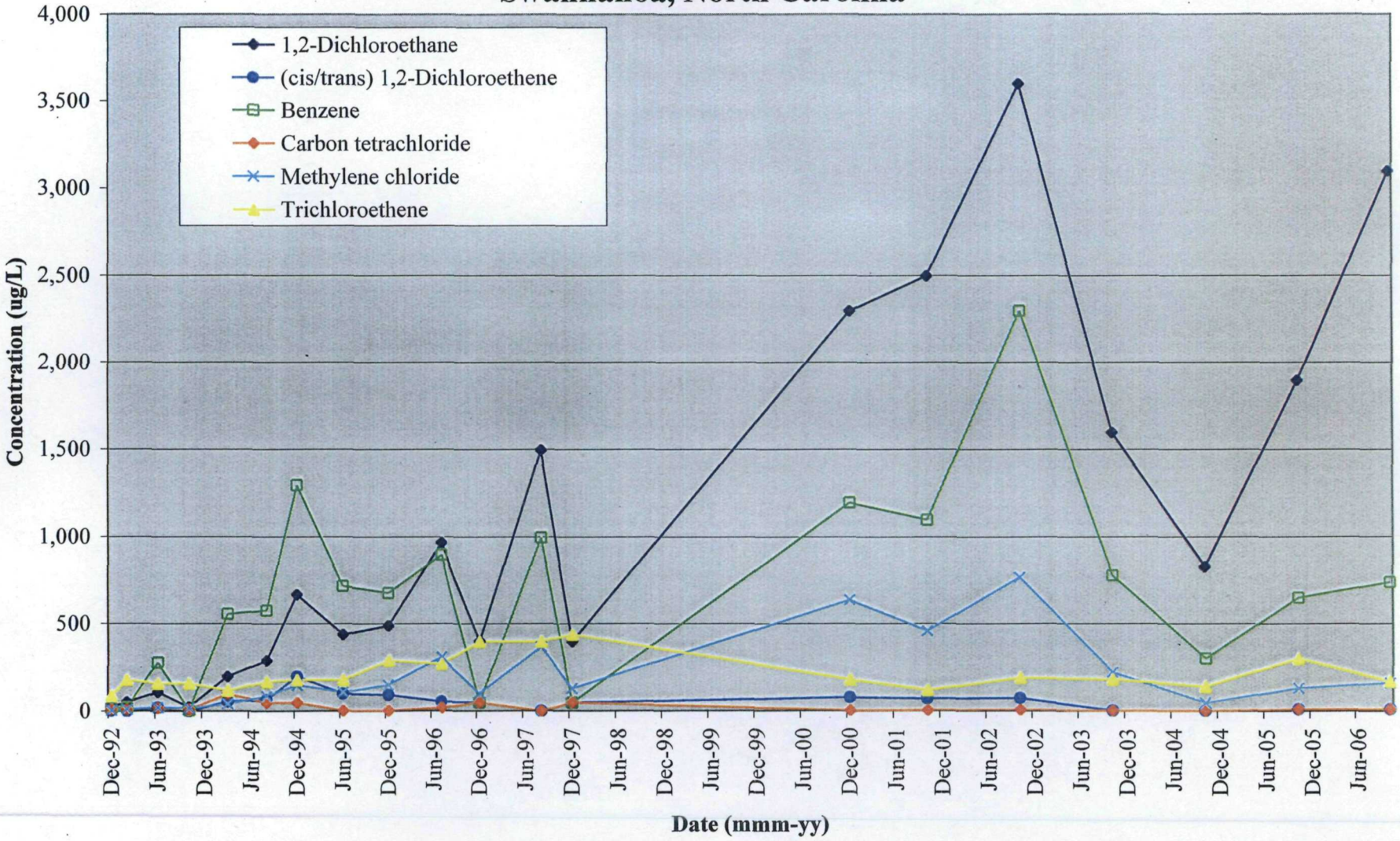
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-4
VOC Concentration versus Time
MW-2B
Chemtronics
Swannanoa, North Carolina



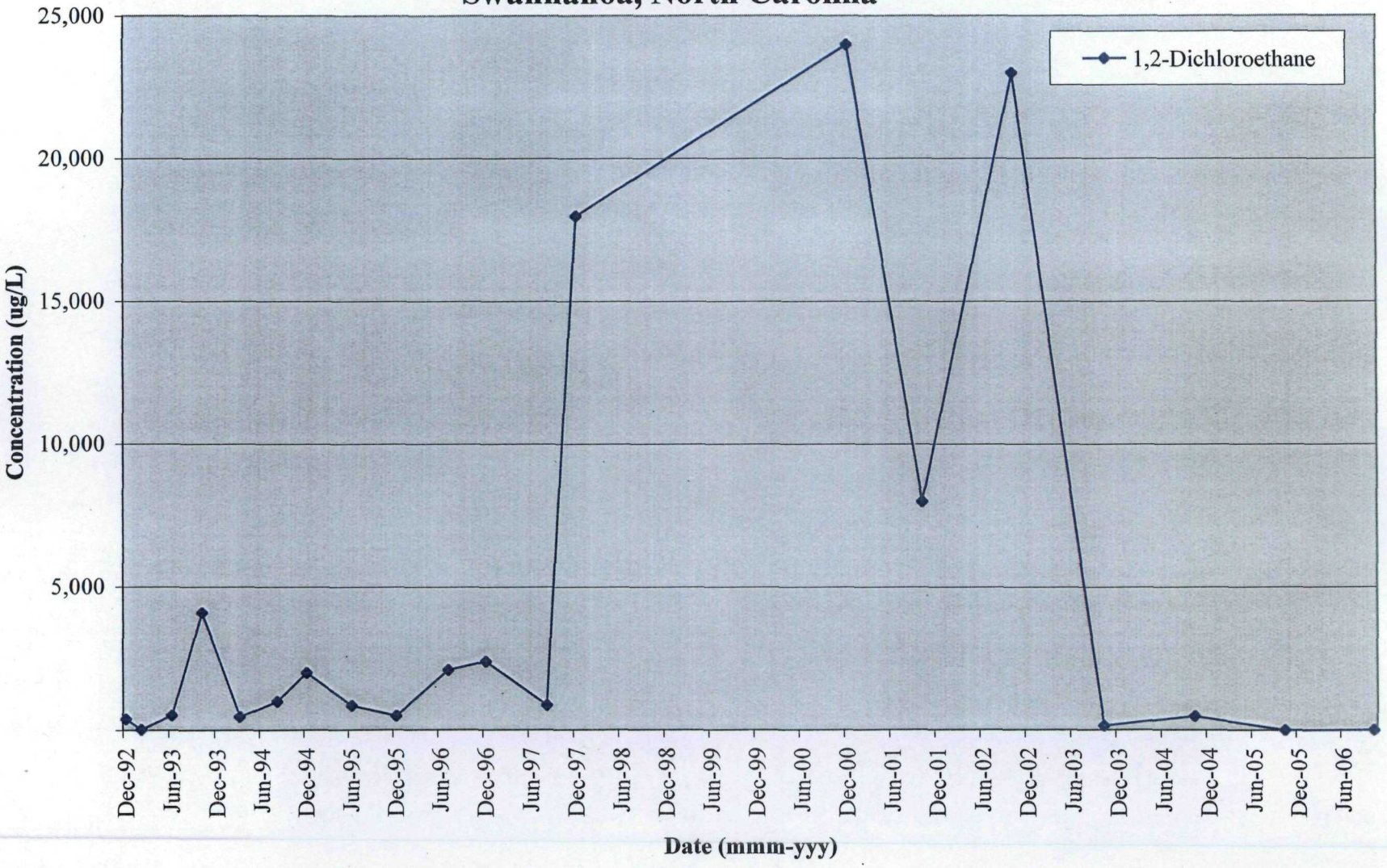
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-5
VOC Concentration versus Time
MW-3B
Chemtronics
Swannanoa, North Carolina



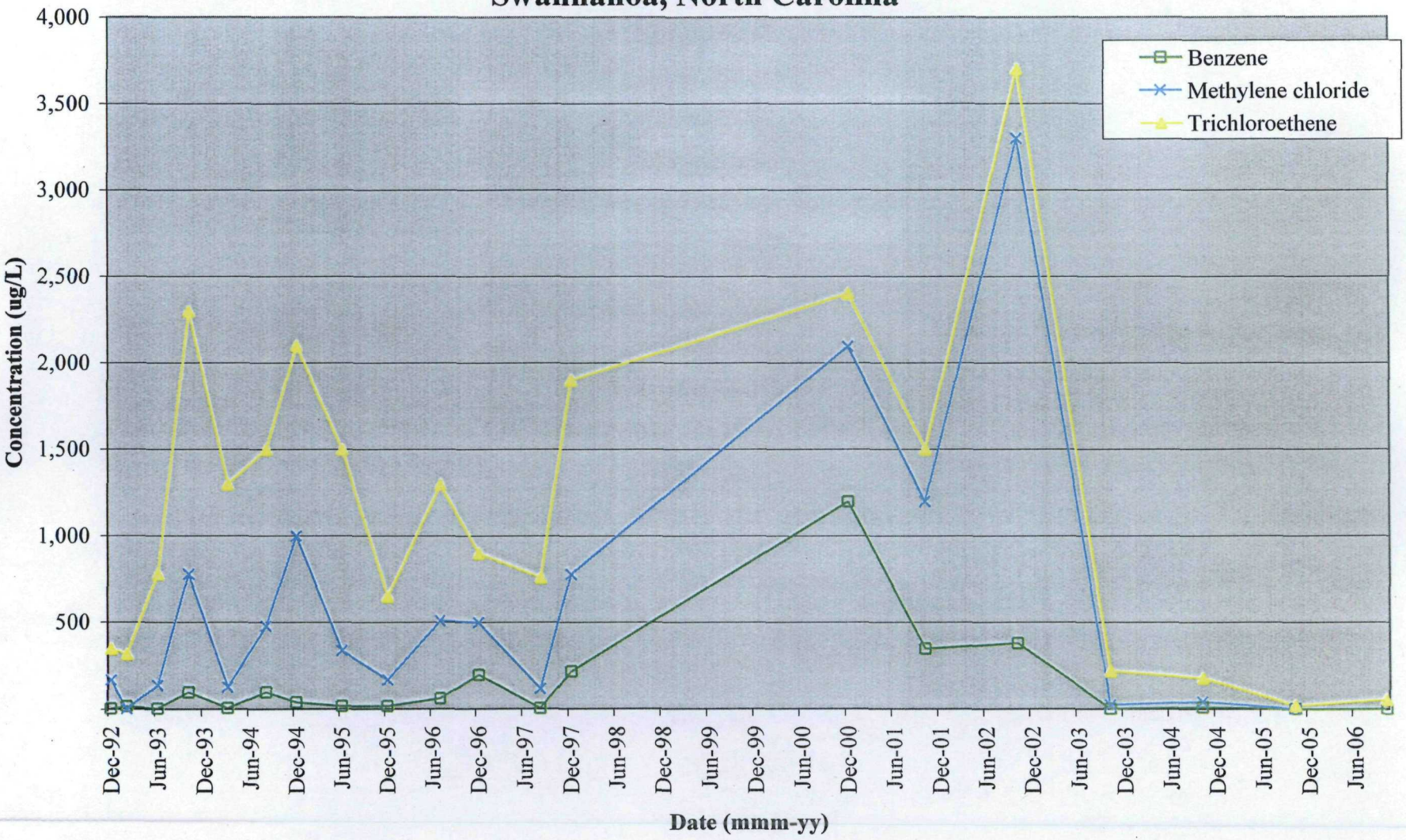
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-6A
VOC Concentration versus Time
MW-5S
Chemtronics
Swannanoa, North Carolina



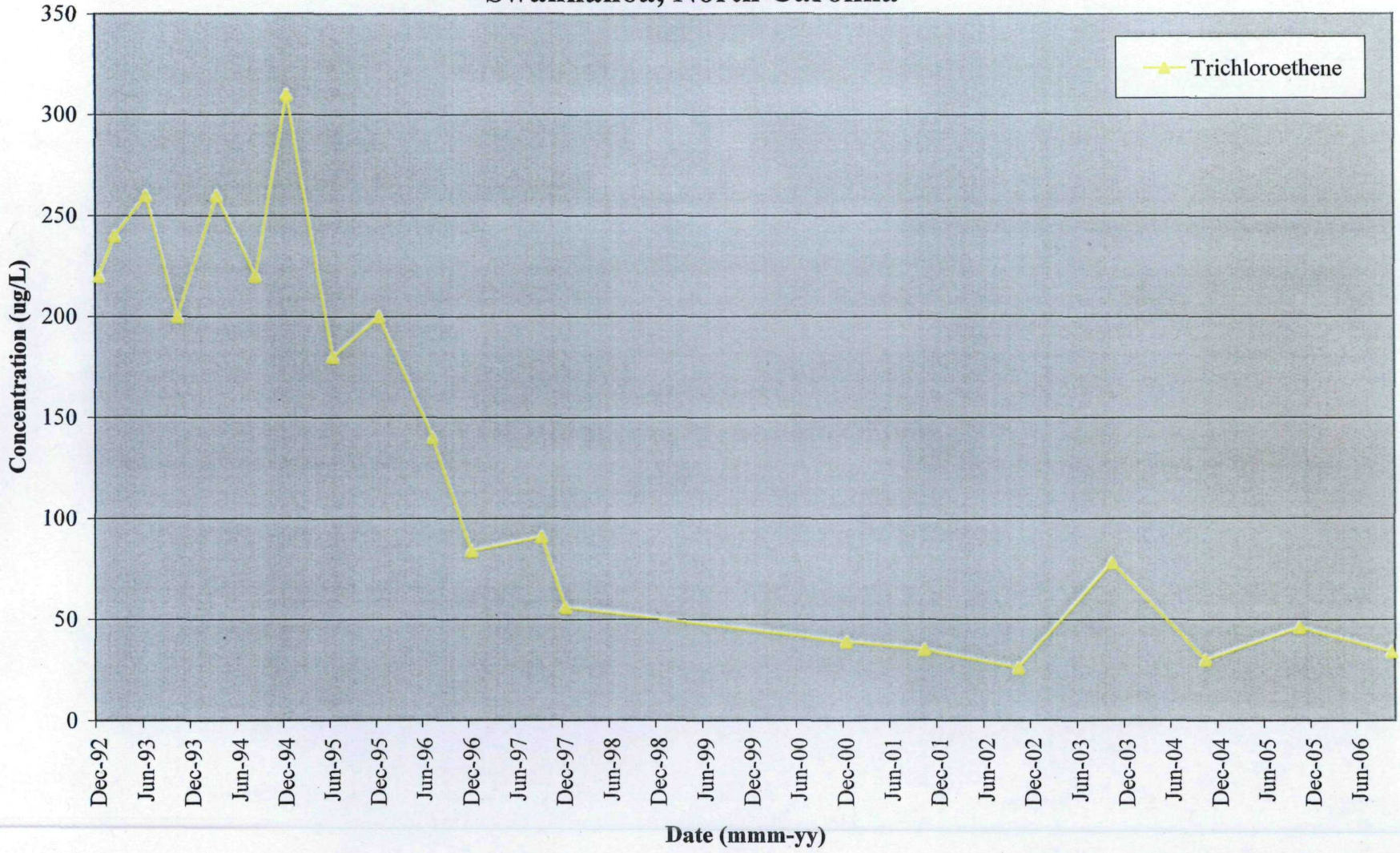
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-6B
VOC Concentration versus Time
MW-5S
Chemtronics
Swannanoa, North Carolina



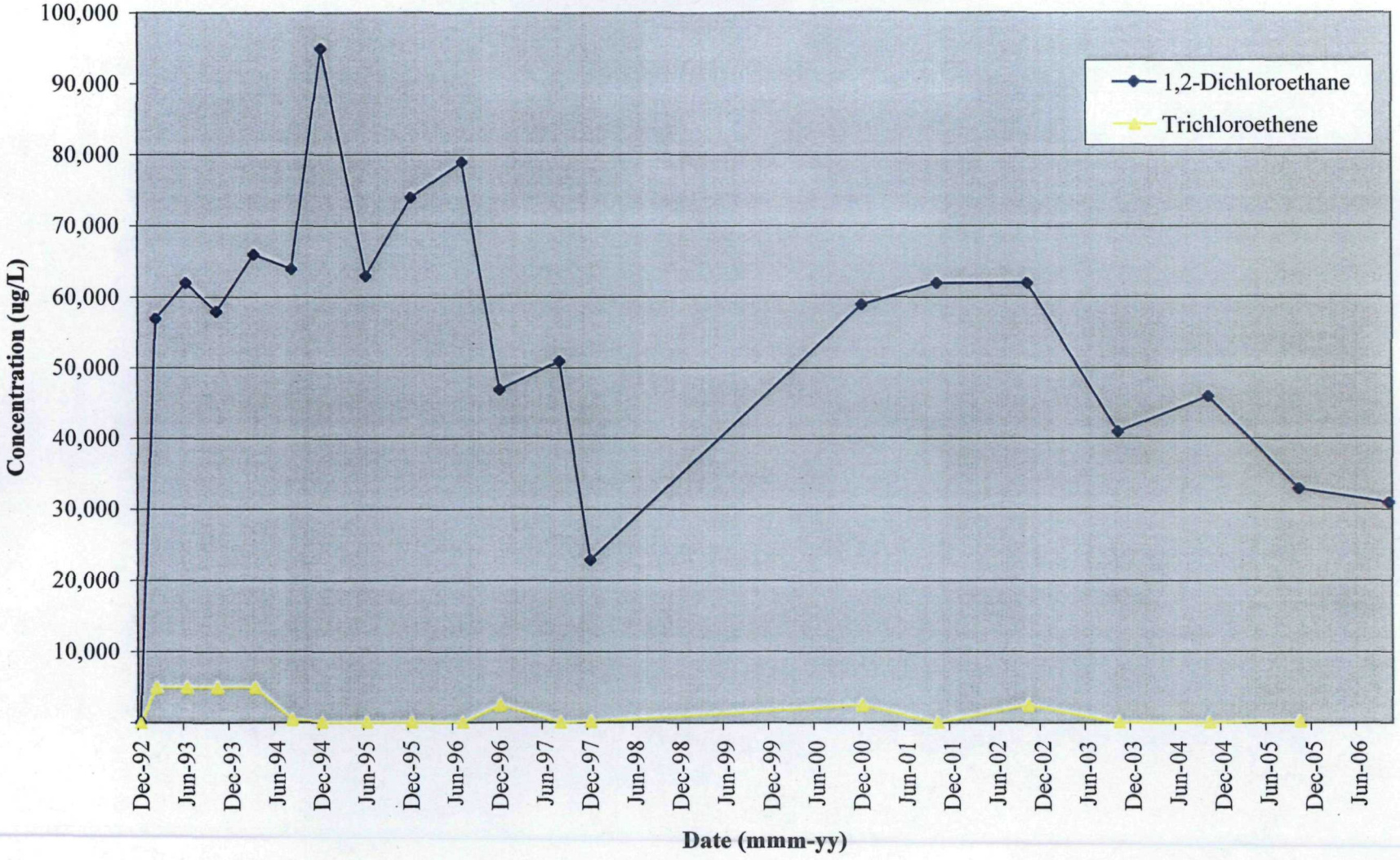
*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-7
VOC Concentration versus Time
MW-4B
Chemtronics
Swannanoa, North Carolina

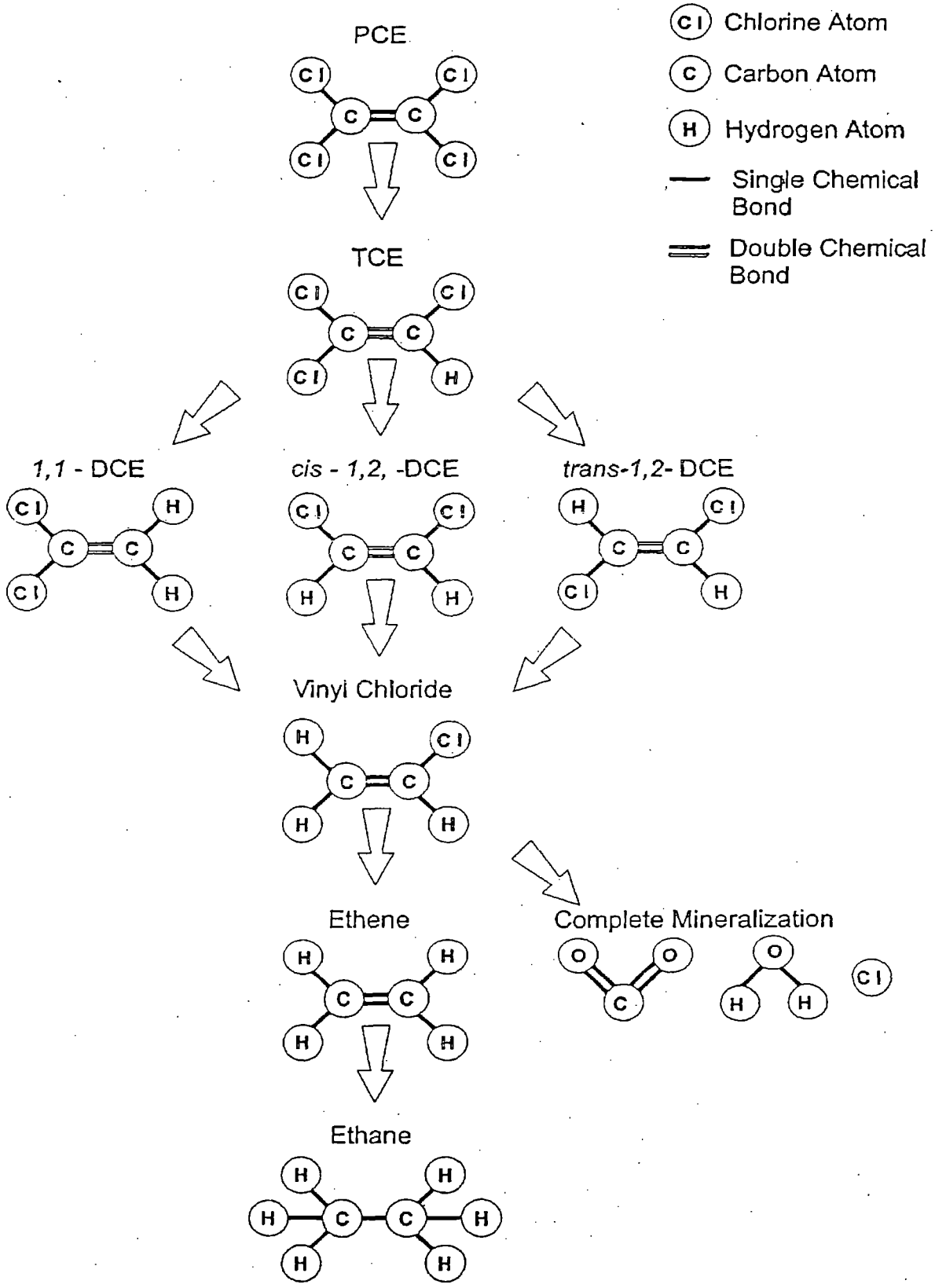


*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999

Figure 8-8
VOC Concentration versus Time
BW-4
Chemtronics
Swannanoa, North Carolina



*Note: Linear projection between 1997 and 2000 because no data were collected in 1998 and 1999



Reductive Dechlorination of Chlorinated Ethenes

FIGURE 8-9

Legend

Monitoring Wells

- Zone A (Water Table)
- Zone B (Intermediate Saprolite)
- Zone C (Transition Zone)
- Zone D (Upper Bedrock)
- Zone E (Intermediate Bedrock)
- Zone F (Deep Bedrock)
- Extraction
- USGS Surface Elevation Contour (25-ft Interval)
- Disposal Area
- Building
- Road
- Stream
- Pond
- Chemtronics Property Boundary
- 250-ft by 250-ft Reference Grid

ug/L = micrograms per liter

SCALE

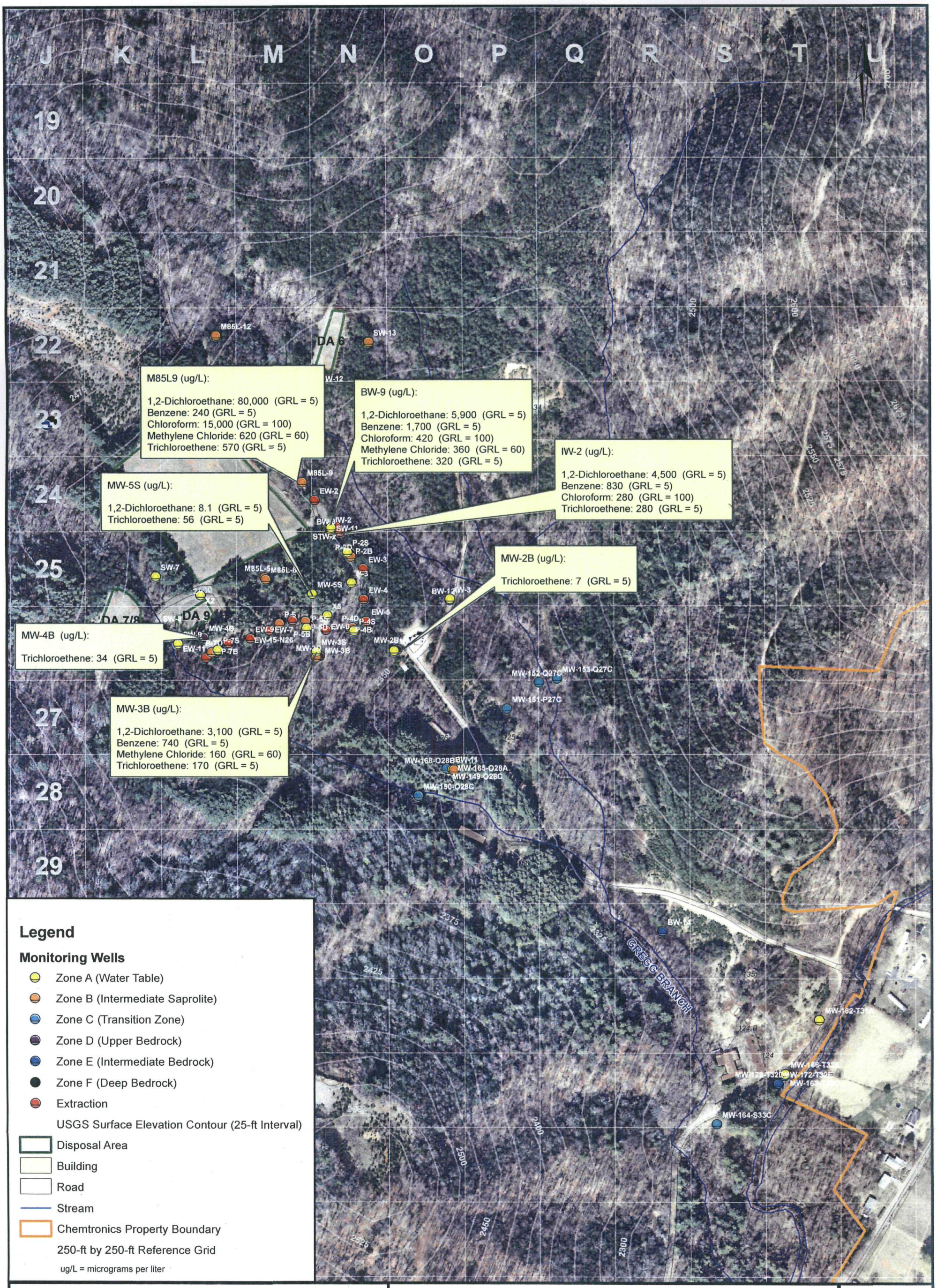
0 75 150 225 300 Feet

FRONT VALLEY
VOCS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2006

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-10



BACK VALLEY
VOCS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2006

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-11

Legend

Monitoring Wells

- Zone A (Water Table)
- Zone B (Intermediate Saprolite)
- Zone C (Transition Zone)
- Zone D (Upper Bedrock)
- Zone E (Intermediate Bedrock)
- Zone F (Deep Bedrock)
- Extraction
- USGS Surface Elevation Contour (25-ft Interval)
- Disposal Area
- Building
- Road
- Stream
- Pond
- Chemtronics Property Boundary
- 250-ft by 250-ft Reference Grid

ug/L = micrograms per liter

SCALE

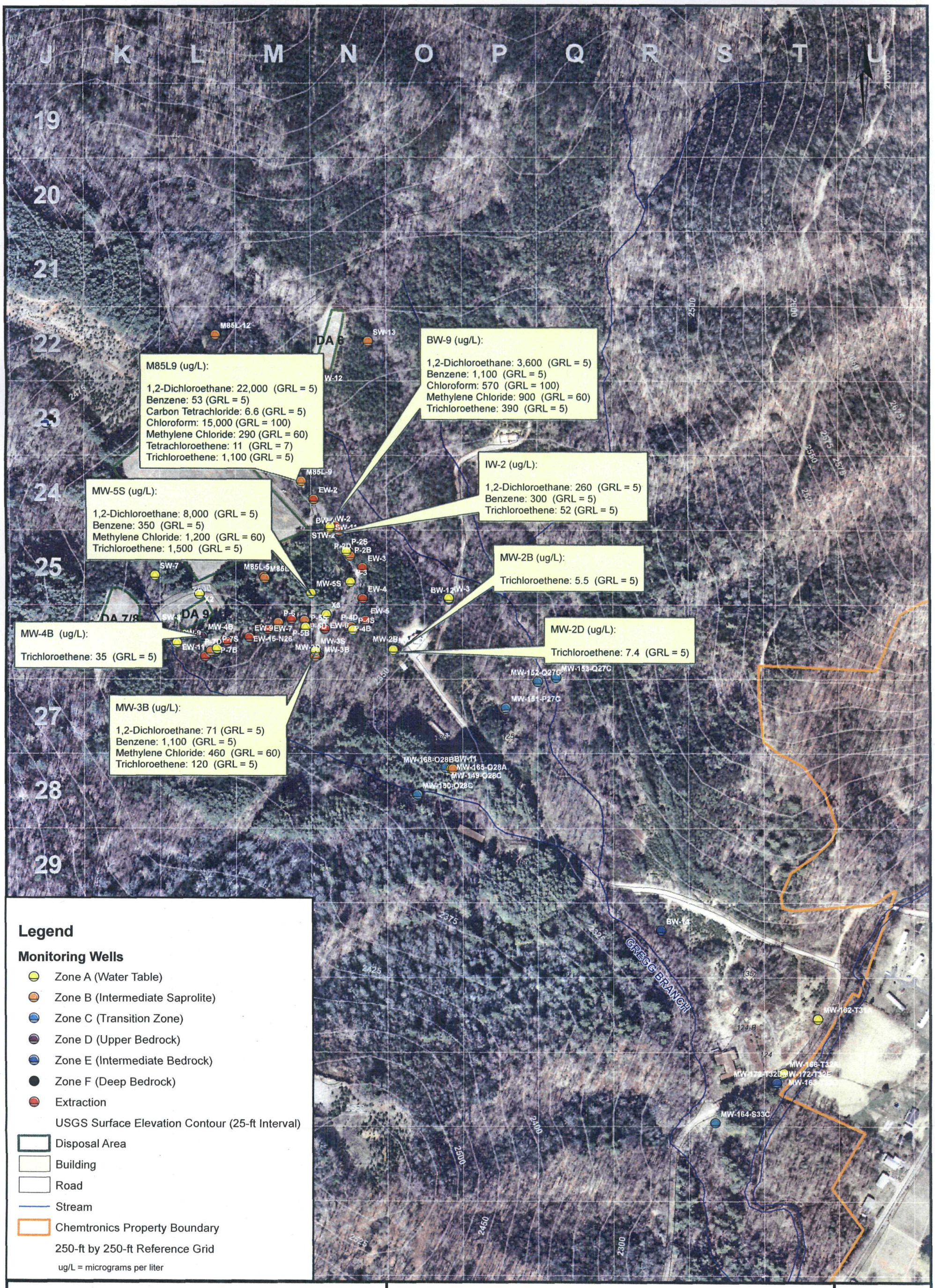
0 75 150 225 300 Feet

FRONT VALLEY
VOCS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2001

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-12



Legend

Monitoring Wells

- Zone A (Water Table)
- Zone B (Intermediate Saprolite)
- Zone C (Transition Zone)
- Zone D (Upper Bedrock)
- Zone E (Intermediate Bedrock)
- Zone F (Deep Bedrock)
- Extraction
- USGS Surface Elevation Contour (25-ft Interval)
- Disposal Area
- Building
- Road
- Stream
- Chemtronics Property Boundary
- 250-ft by 250-ft Reference Grid

ug/L = micrograms per liter

SCALE

0 75 150 225 300 Feet

BACK VALLEY
VOCS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS OCTOBER 2001

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

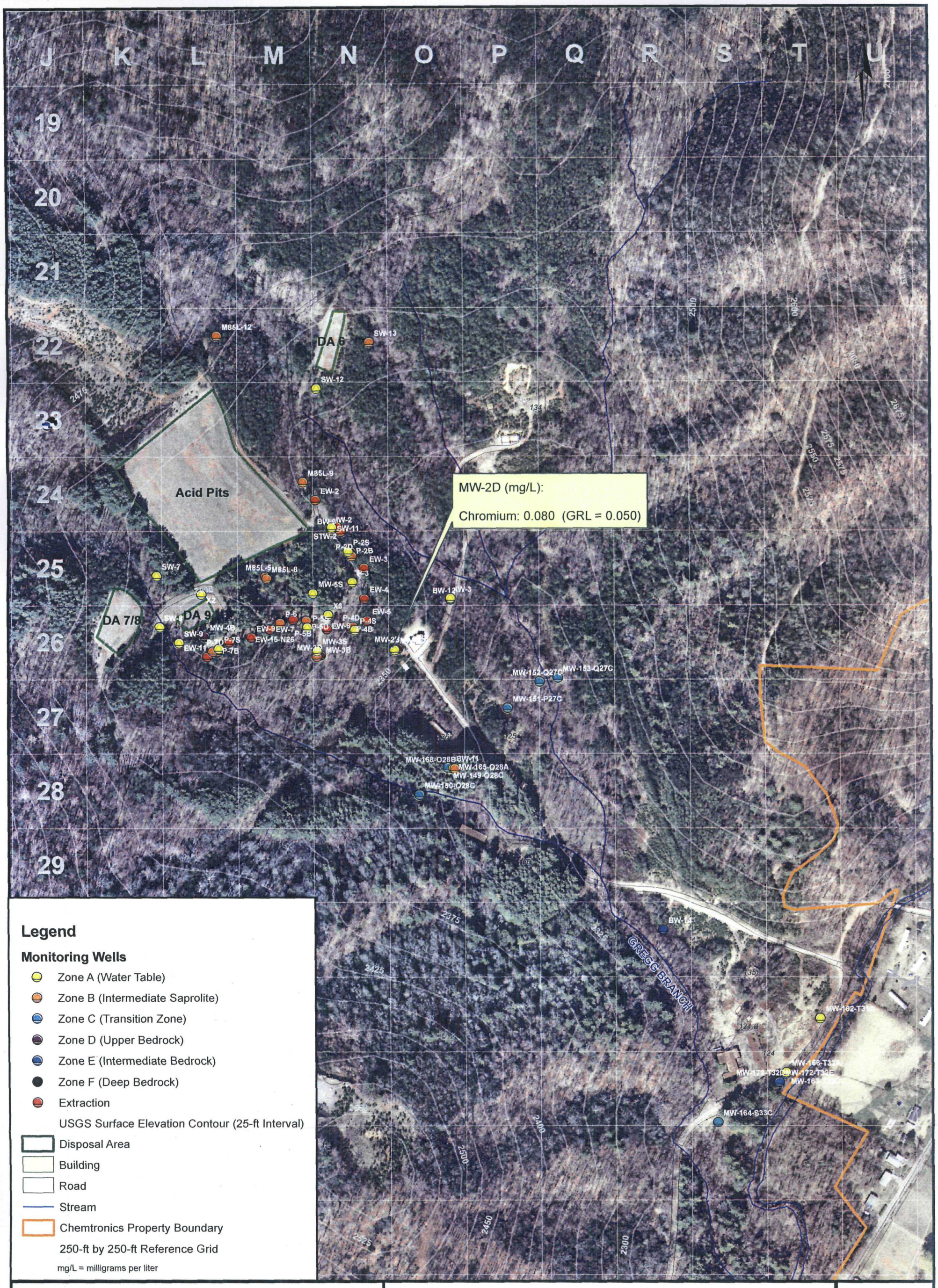
FIGURE

8-13

FRONT VALLEY
METALS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2006

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE
8-14



BACK VALLEY
METALS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2006

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-15

Legend

Monitoring Wells

- Zone A (Water Table)
- Zone B (Intermediate Saprolite)
- Zone C (Transition Zone)
- Zone D (Upper Bedrock)
- Zone E (Intermediate Bedrock)
- Zone F (Deep Bedrock)
- Extraction
- USGS Surface Elevation Contour (25-ft Interval)
- Disposal Area
- Building
- Road
- Stream
- Pond
- Chemtronics Property Boundary
- 250-ft by 250-ft Reference Grid

mg/L = milligrams per liter

SCALE

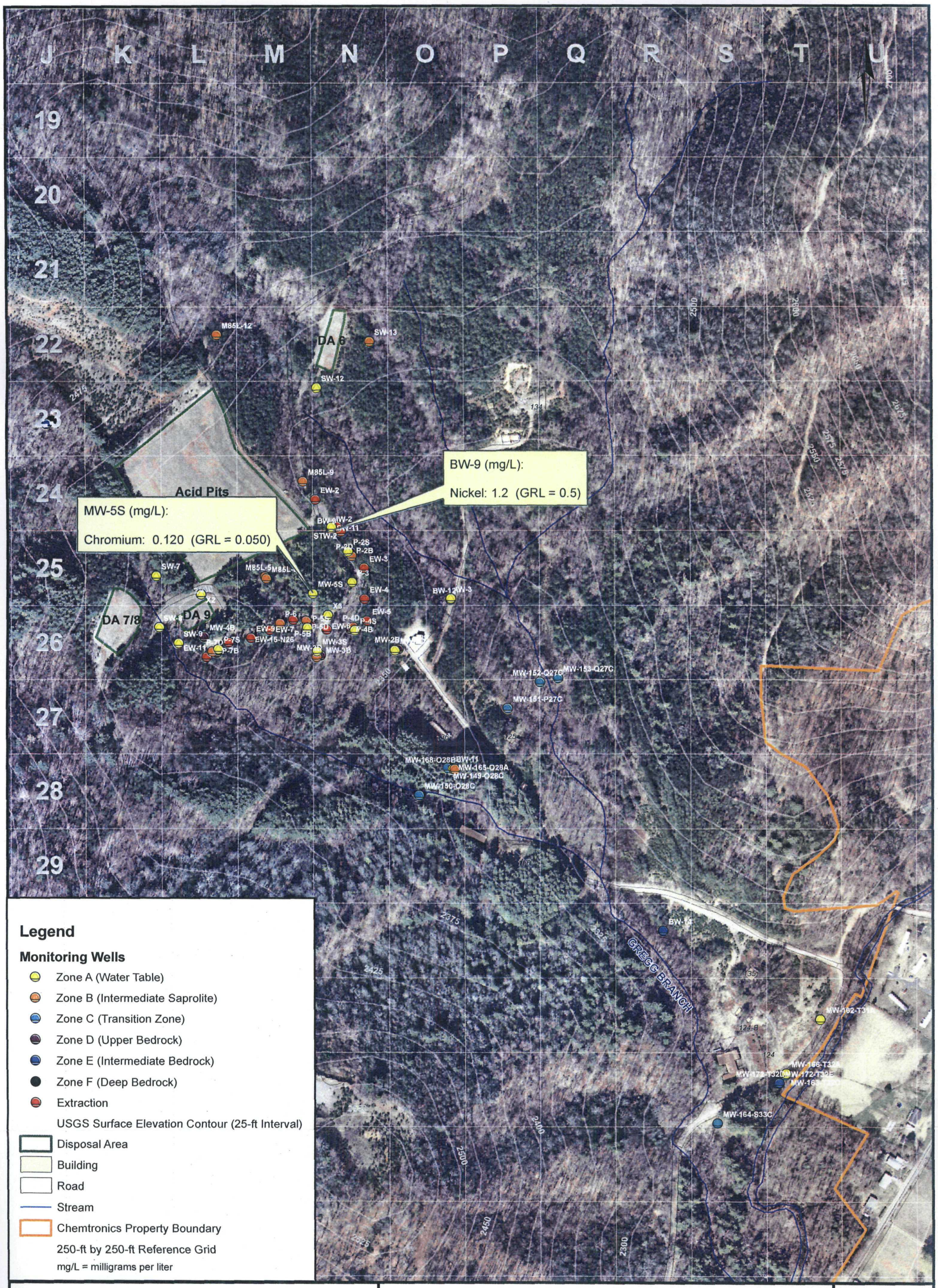
0 75 150 225 300 Feet

FRONT VALLEY
METALS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2001

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-16



Legend

Monitoring Wells

- Zone A (Water Table)
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0 75 150 225 300 Feet

BACK VALLEY
METALS EXCEEDING THE GROUNDWATER REMEDIATION LEVEL (GRL) IN CERCLA COMPLIANCE WELLS
OCTOBER 2001

CHEMTRONICS SITE
SWANNANOA, NORTH CAROLINA

FIGURE

8-17

APPENDIX A

DEVELOPMENTS OF PPLVs FROM FEASIBILITY STUDY

DEVELOPMENT OF PRELIMINARY POLLUTANT LIMIT VALUES FOR CHEMICALS WITH LIMITED TOXICOLOGICAL DATA

The presence of residual contamination from two chemical agents and three explosives on the Chemtronics site presents some special problems with respect to the establishment of target cleanup levels. Since these chemicals either lack or have only limited human health standards and supporting physicochemical and toxicological data, it is necessary to develop preliminary pollutant limit values (PPLVs) for critical exposure pathways, using estimates of acceptable daily doses (D_T) and partition coefficients.

The chemical agents 3-Quinuclidinyl benzilate (BZ) and 2-Chlorobenzalmalononitrile (CS) were known to have been produced on site. Degradation products that were or could be expected to occur on site include 3-Quinuclidinol, Benzilic acid and Benzophenone from BZ, and o-Chlorobenzaldehyde and Malononitrile from CS. Explosives present on site include 2,4,6-Trinitrotoluene (TNT), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) and Picric acid. For each of these chemicals, potentially critical pathways were identified and insignificant pathways excluded by analyses of site characteristics and chemical properties. Preliminary pollutant limit values (PPLVs) were calculated using standard parameter values for chronic human exposure given in Table 1. Maximum concentrations of these chemicals found in soil and water on the site, along with PPLVs calculated for the corresponding exposure pathways are presented in Table 2. Discussions of critical pathways and methods used to develop the respective PPLVs are presented below for each chemical.

BZ

Although BZ was not detected on the Chemtronics site (See Table 2), it is properly characterized as a persistent agent. In soil, it will undergo hydrolysis in interstitial water. Hydrolysis is generally slow, however, subject to solubility limitations and pH effects. Water solubility is <0.054 g/100 ml.

TABLE 1

PARAMETER VALUES FOR CHRONIC HUMAN EXPOSURE

Parameter	Value	Reference
Adult body weight	70 kg	National Research Council, 1977
Adult water intake	2 l/day	National Research Council, 1977
Adult breathing rate	18.5 m^3/24 hr.	Cleland and Kingsbury, 1977
Adult dust inhalation (rural)	0.06 mg/m^3/day	McCormick, 1968
Child body weight (1 to 6 yrs.)	15 kg	LaGoy, 1987
Soil from which contaminants would be removed through skin absorption by child	0.0386 g/day	Rosenblatt and Spirney, 1986
Soil ingestion by 15 kg child	0.1 g/day	USEPA, 1986; LaGoy 1987
De minimis risk for small populations (less than 10 million)	10^{-4}	Travis et al., 1987
Temperature	25°C	

Maximum Site Concentrations and Human Health Limit Values
For Explosives and Chemical Agents at Chemtronics Site

Chemical	Maximum Soil Conc. (mg/kg)	Maximum Groundwater Concentration (mg/l)	Preliminary Polutant Limit Values[1] Soil (mg/kg)	Drinking Water (ppb)
BZ (3-Quinuclidinyl Benzilate)	ND	ND	17.1	4
3-Quinuclidinol	ND	ND	25.7	9
Benzilic Acid[2]	9.3	1.4	56.9	21
Benzophenone[2]	9.3	1.4	15	152
CS (2-Chlorobenzal-malononitrile)	3100	ND	43.3	N/A[3]
Malononitrile	ND	ND	N/A[4]	1
O-Chlorobenzaldehyde	22	ND	0.31	1
TNT	280	0.045	305	112
RDX	220	0.30	95	35
Picrate/Picric Acid	22	0.640	38,000	14,000,000

ND = Not Detected

1. PPLVs for soil based on protection from vapor inhalation, child ingestion of 0.1 g/day, particle inhalation and skin absorption of contaminants from soil.
PPLVs for drinking water based on ingestion of 2 l/d by 70 kg adult.

2. Detection quantities presented for benzilic acid and benzophenone were not differentiated in the sample analyses.

3. CS would not persist in water based upon: CS $t_{1/2}$ = 41 min.; t_{99} = <5 hr.

4. Malononitrile would not persist in soil based upon K_d partition coefficient.

For direct ingestion, the U.S. Army in 1975 developed a provisional Maximum Permissible Concentration for BZ of 0.004 mg/l in drinking water. This converts to an acceptable daily dose (D_T) of 0.008 mg or 1.14×10^{-4} mg/kg. This is considered an acceptable limit based on an estimated ED50 range in humans of 0.0057 to 0.0067 mg/kg. (Rosenblatt et al., 1977.)

The Superfund Public Health Evaluation Manual (1986) rejected the use of pica behavior in estimates of soil ingestion by children and accepts a "normal" consumption estimate of at least 100 mg of soil per day for children between the ages of two and six. The lowest estimate of a child's ingestion rate is used rather than a lifetime average daily intake to ensure that compounds are identified on the basis of their potential to harm a child. Since available toxicity data are usually based upon adult exposure of a test species, whereas the young are generally more sensitive to the toxic effects of chemicals than are adults, the application of the child ingestion rate over a lifetime exposure period is advocated and is used here. This avoids the necessity to apply a conservative safety factor to ensure protection of the most sensitive population. Therefore, for ingestion of soil by a child, the single pathway preliminary pollutant limit value (*SPPPLV*) for BZ in soil is calculated by,

$$\text{SPPPLV for soil ingestion} = \frac{D_T \times \text{body weight}}{\text{amount soil ingested}}$$

$$= \frac{1.14 \times 10^{-4} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$$

$$= 17.1 \text{ mg/kg.}$$

Potential for vapor inhalation is determined initially for the very worst case by comparing the dose resulting from breathing the equilibrium vapor concentration over the pure compound at 25°C with the D_T where,

$$\text{dose} = \frac{\text{saturated vapor concentration} \times \text{breathing rate}}{\text{body weight}}$$

$$= \frac{2.6 \times 10^{-6} \text{ mg/m}^3 \times 18.5 \text{ m}^3\text{/d}}{70 \text{ kg}}$$

$$= 6.87 \times 10^{-7} \text{ mg/kg/d.}$$

Since this maximized dose is well below the D_T for BZ, no vapor pathway is considered to exist.

The calculation for dust inhalation is based upon breathing rate and the concentration of particulates in air. This latter value rarely exceeds 0.06 mg/m^3 in non-urban areas (McCormick, 1968). Therefore,

$$D_T = \frac{\text{breathing rate x dust concentration x soil concentration}}{\text{body weight}}$$

or,

$$\text{SPPPLV for dust inhalation} = \frac{D_T \times \text{body weight}}{\text{breathing rate x dust concentration}}$$

$$= \frac{1.14 \times 10^{-4} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ mg/m}^3 \times 6 \times 10^{-8} \text{ kg soil/m}^3\text{/d}}$$

$$= 6937 \text{ mg/kg}$$

Since BZ is a relative high-melting solid ester (mp 167°C), significant skin penetration will not occur.

Therefore, the soil PPLV, calculated as $1/\sum \frac{1}{SPPPLV_i}$, after Rosenblatt et al. (1982), for the ingestion and particulate inhalation paths, would be:

$$\text{soil PPLV} = \frac{1}{\frac{1}{17.1 \text{ mg/kg}} + \frac{1}{6937 \text{ mg/kg}}}$$

$$= 17.1 \text{ mg/kg.}$$

Thus, the only significant soil pathway would be from direct ingestion.

3 - Quinuclidinol

Quinuclidinol is a mostly charged polar molecule (i.e., a protonated polar molecule in aqueous solution at neutral pH) that is very water soluble. It is, therefore, not likely to be retained in soils and would be expected to be flushed away through interstitial water to groundwater. This is reflected by the absence of this compound in samples at the Chemtronics site (see Table 2).

No human health standard for quinuclidinol has been promulgated. The only toxicity datum found for this chemical is an intravenous LD50 of 179 mg/kg for the rat (Rosenblatt et al., 1977). Using this LD50 value, we can estimate an acceptable daily dose (D_T) after the method of Layton et al. (1987) by multiplying by a factor of 1.5×10^{-6} to obtain a D_T of 2.7×10^{-4} mg/kg/day. This relationship was derived by comparing Acceptable Daily Intakes (ADIs) developed by the World Health Organization and Food and Agriculture Organization (WHO/FAO) expert committee for 96 pesticides and associated LD50 values. The WHO/FAO ADIs were developed by the standard approach of a toxicological evaluation, the identification of an animal no effect level (NOEL), and the selection of a safety factor to extrapolate the safe intake for the animal to a safe intake for humans. An additional safety factor is implicit in the calculation since the ADIs selected were commonly based on toxicity studies using enzyme inhibition as a measure of toxicity; in 95% of the compounds, this results in lower ADIs than would be estimated from studies that address chronic toxic responses.

From the estimated D_T, an estimated groundwater limit value is expressed as:

$$\text{groundwater PPLV} = \frac{D_T \times \text{body weight}}{\text{daily water intake}}$$

$$= \frac{2.7 \times 10^{-4} \text{ mg/kg/day} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.009 \text{ mg/l.}$$

The action level for soil concentration of quinuclidinol to provide reasonable protection for soil ingestion by a 15 kg child is then calculated by:

$$\text{soil ingestion SPPPLV} = \frac{2.7 \times 10^{-4} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$$

$$= 40.5 \text{ mg/kg}$$

Since quinuclidinol is a very soluble polar compound, no vapor would be expected over soils at this site. The vapor inhalation pathway, therefore, is not considered further.

For soil particle inhalation, the single pathway preliminary pollutant limit value would be:

$$\text{particle inhalation SPPPLV} = \frac{D_I \times \text{body weight}}{\text{breathing rate} \times \text{suspended particle conc.}}$$

$$= \frac{2.7 \times 10^{-4} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$$

$$= 17{,}000 \text{ mg/kg.}$$

The particle inhalation SPPPLV is, therefore, an insignificant factor in calculation of the soil PPLV or action level.

Estimation of skin absorption from soil contaminants is based upon Hawley (1985) as elaborated by Rosenblatt and Spinney (1986). The specific pathway preliminary pollutant limit value is calculated as follows, based upon a 10 kg child and that the contaminant contents of only 38.6 mg of soil would be absorbed in a day (assuming that as much as 5,100 mg/M^2 might be loaded on the skin, that a child's exposed skin area is 0.21 M^2, that 24% of a pure compound is absorbed by the skin in a 24-hour period, and that only 15% of that amount would be absorbed from contaminated soil):

$$\text{skin absorption SPPPLV for soil} = \frac{D_T \times \text{child weight}}{\text{kg soil/day}}$$

$$= 259{,}000\ D_T$$

$$= 70\ \text{mg/kg}$$

The soil preliminary pollutant limit value for 3-quinuclidinol, considering additivity of the two significant pathways of ingestion and skin absorption, is calculated by:

$$\text{soil PPLV} = \frac{1}{\frac{1}{40.5} + \frac{1}{70}}$$

$$= 25.7\ \text{mg/kg}$$

Benzilic Acid

Along with 3-quinuclidinol, benzilic acid is a hydrolysis product of BZ. It was found in both soil and groundwater samples from the Chemtronics site (Table 2) but was not differentiated from benzophenone in the analyses. Since benzophenone is a thermolysis product of BZ from the benzilic acid moiety, it is probable that the quantities detected were primarily those of benzilic acid. However, as discussed further in the following section, the presence of benzophenone cannot be ruled out.

As in the case for quinuclidinol, no human health standard is available for benzilic acid. A rat intravenous LD50 of 400 mg/kg (Rosenblatt et al., 1977) can be used to estimate an acceptable daily dose by the method described for quinuclidinol. Thus,

$$D_T = 400 \times 1.5 \times 10^{-6}$$
$$= 6 \times 10^{-4}\ \text{mg/kg/day}$$

and, therefore,

$$\text{Groundwater PPLV} = \frac{D_T \times \text{body weight}}{\text{daily water intake}}$$

$$= \frac{6 \times 10^{-4} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.021 \text{ mg/l.}$$

Since benzilic acid is an acidic polar compound that largely dissociates near neutral pH in interstitial water of soils, no vapor pathway would be expected. The calculations for soil ingestion, particle inhalation and skin absorption, as developed in the preceding discussions, are presented below.

$$\text{Child soil ingestion SPPPLV} = \frac{6 \times 10^{-4} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil/day}}$$

$$= 90 \text{ mg/kg.}$$

$$\text{Particle inhalation SPPPLV} = \frac{6 \times 10^{-4} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$$

$$= 37{,}800 \text{ mg/kg.}$$

$$\text{Skin absorption SPPPLV} = 259{,}000 \times 6 \times 10^{-4} \text{ mg/kg}$$

$$= 155 \text{ mg/kg}$$

Thus, for benzilic acid,

$$\text{soil PPLV} = \frac{1}{\frac{1}{90} + \frac{1}{155}}$$

$$= 56.9 \text{ mg/kg.}$$

Benzophenone

Thermolysis of benzilic acid, as mentioned above, is perhaps the best known reaction that produces benzophenone as a degradation product. Other chemical pathways have been demonstrated in the laboratory, however,

including alkaline hydrolysis of BZ followed by oxidation (Sass et al., 1961). Benzophenone also has been found as an impurity in crude BZ samples (Cogliano and Braude, 1963). In consideration of these other demonstrated sources, and since only limited chemical fate studies have been conducted that are directly applicable to environmental conditions, the presence of benzophenone at the Chemtronics site remains an open question.

Again, no human health standard has been promulgated for this compound. The most appropriate toxicity datum for estimation of an acceptable daily dose is an oral LD50 for the mouse of 2895 mg/kg reported in the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS) (1983 et seq.). The calculations for deriving D_T and groundwater PPLV estimates are as follows:

$$D_T = 2895 \text{ mg/kg} \times 1.5 \times 10^{-6}$$

$$= 4.34 \times 10^{-3} \text{ mg/kg/d;}$$

$$\text{Groundwater PPLV} = \frac{4.3 \times 10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.152 \text{ mg/l.}$$

Benzophenone is a non-polar compound more likely to be retained in the soil than are other compounds in the BZ family. Potential vaporization to the atmosphere from soil concentrations must be considered.

Since chemical data are very limited for benzophenone, vapor pressure at 25°C (298°K) and the saturation concentration of the pure compound were calculated as 1.293×10^{-7} atm and 9.635×10^{-4} mg/l using methods presented in the Handbook of Chemical Property Estimation Methods (Lyman, Reehl and Rosenblatt, 1982).

The equation for equilibrium vapor concentration over soil is then presented as:

$$\text{vapor conc. over soil} = \frac{\text{saturation conc. of pure compound} \times \text{soil conc.}}{\text{water solubility} \times K_d \times \text{unit conversion}}$$

where

K_d (conc. in soil/conc. in water) is calculated by:

Log K_{ow} = (2 x 1.90) - 0.50 = 3.30 (Lyman, Reehl and Rosenblatt, 1982)

Log K_{oc} = 0.779 log K_{ow} + 0.46 = 3.0307 (Lyman and Loreti, 1987)

K_{oc} = antilog 3.0307 = 1073

and, if we assume,

f_{oc} (fraction of organic matter in surface soil) = 0.01,

then Kd = 10.73.

Then, if we assume a soil concentration of 15 mg/kg (by previous comparisons with the D_T to arrive at an inhalation dose just below the estimated D_T),

$$\text{vapor conc. over soil} = \frac{9.635 \times 10^{-4} \text{ mg/l} \times 15 \text{ mg/kg}}{103.87 \text{ mg/l} \times 10.73 \text{ l/kg} \times 0.001 \text{ m}^3\text{/l}}$$

$$= 0.01297 \text{ mg/m}^3.$$

The dose obtained from breathing the equilibrium concentration over soil (a worst case condition) is then calculated by:

$$\frac{18.5 \text{ m}^3\text{/d} \times 0.01297 \text{ mg/m}^3}{70 \text{ kg}} = 3.43 \times 10^{-3} \text{ mg/kg/d}.$$

Comparing this dose with the D_T of 4.34×10^{-3}, it is concluded that a soil concentration of 15 mg/kg is an acceptable SPPPLV for vapor inhalation of benzophenone. This is a very conservative action level since atmospheric dispersion of the off-gased benzophenone is not considered.

Soil ingestion, particle inhalation and skin absorption SPPPLVs are calculated as:

$$\text{child soil ingestion SPPPLV} = \frac{4.34 \times 10^{-3} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$$

$$= 651 \text{ mg/kg};$$

$$\text{particle inhalation SPPPLV} = \frac{4.34 \times 10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$$

$$= 276{,}000 \text{ mg/kg;}$$

$$\text{skin absorption SPPPLV} = 259{,}000 \times 4.34 \times 10^{-3} \text{ mg/kg/d}$$

$$= 1124 \text{ mg/kg.}$$

From these SPPPLV values, it is seen that the potential for vapor inhalation is the dominant consideration in deriving the final soil PPLV or action level. In this case, although additivity effects from the ingestion SPPPLV would decrease the PPLV slightly, the conservative assumptions used in deriving the SPPPLV for vapor inhalation provide an adequate safety margin for protection from all soil-to-man pathways. Thus, 15 mg/kg is the selected soil PPLV or action level for benzophenone.

CS

The distribution of CS into soil and water compartments is about equal. Once in water, however, the compound will tend to sorb to suspended solids and bottom sediments and will be taken up by aquatic biota (Berkowitz et al., 1981). Hydrolysis is rapid, yielding a half life ($t_{1/2}$) for CS in water of 41 minutes and a t_{99} of <5 hours (Demek et al., 1970). Although CS longevity was calculated for seawater, Berkowitz et al. (1981) report that the addition of salt has essentially no effect on reaction rates. It is not surprising, therefore, that CS was found on the Chemtronics site only in soil samples, where it occurred at a maximum concentration of 3100 mg/kg, and was undetected in water samples (Table 2). It is also apparent that a groundwater PPLV for CS would not be applicable and, therefore, has not been calculated.

The only human health standard for CS is a Threshold Limit Value (TLV) Time Weighted Average for air exposure in the workplace. This limit, promulgated by the American Conference of Governmental Industrial Hygienists (1986), is 0.4 mg/m^3. The lowest oral LD50 found was 143 mg/kg for the rabbit

(Ballantyne and Swanston, 1978). In this case, an acceptable daily dose was estimated for a general population (not workers) exposed over a 24-hour day, seven days a week, using the equation from Rosenblatt, et al. (1982) where,

$$D_T = \frac{\text{TLV (in mg/m}^3\text{)}}{810}$$

$$= 4.9 \times 10^{-4} \text{ mg/kg/day.}$$

Since the TLV-based calculation yields a more conservative D_T than the available LD50 datum, the TLV-based value was used to derive an SPPPLV for vapor inhalation. A box model was applied to calculate for exposure to soil-generated CS vapor under realistic indoor conditions. This model was used because it addresses the reasonable worst case possibility of an unrestricted site where a house is constructed directly over the site. The realistic conditions used in the model (e.g., proportioned amount of time spent in basement, allowance for realistic number of air changes per day) yields an SPPPLV for vapor inhalation of 617 mg/kg.

Single pathway preliminary pollutant limit values for other potential soil-to-man pathways, including soil ingestion, particle inhalation and skin absorption are calculated below.

Child soil ingestion SPPPLV $= \dfrac{4.9 \times 10^{-4} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$

$= 73.5 \text{ mg/kg.}$

Particle inhalation SPPPLV $= \dfrac{4.9 \times 10^{-4} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$

$= 31{,}182 \text{ mg/kg.}$

Skin absorption SPPPLV $= 259{,}000 \times 4.9 \times 10^{-4} \text{ mg/kg/d}$

$= 126.9 \text{ mg/kg.}$

Thus, considering the additivity of insignificant soil-to-man pathways for CS,

$$\text{soil PPLV} = \frac{1}{\frac{1}{617} + \frac{1}{73.5} + \frac{1}{126.9}}$$

$$= 43.3 \text{ mg/kg}.$$

Malononitrile

Direct exposure pathways from soil contamination to man is not an applicable consideration in the case of malononitrile at the Chemtronics site. Partitioning strongly favors the water compartment due to its very high water solubility of 130 g/l (Berkowitz et al., 1981), and any malononitrile contamination of soils would have been flushed away through interstitial water to groundwater long before the present study.

Although malononitrile was detected in neither soil nor water samples it is prudent that a toxicity based limit for the compound be established for any potential groundwater occurrence. Since there is no human health standard for malononitrile, an acceptable daily dose must be estimated. The most appropriate toxicity value is an oral LD50 for the mouse of 19 mg/kg (reported in the RTECS data base). The acceptable daily dose and the groundwater preliminary pollutant limit value for direct ingestion are calculated as:

$$D_T = 19 \text{ mg/kg} \times 1.5 \times 10^{-6}$$

$$= 2.8 \times 10^{-6} \text{ mg/kg/day};$$

$$\text{groundwater PPLV} = \frac{2.8 \times 10^{-6} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.001 \text{ mg/l}.$$

o-Chlorobenzaldehyde

Along with malononitrile, o-chlorobenzaldehyde is anticipated as a major

breakdown product of CS. Unlike malononitrile, however, o-chlorobenzaldehyde was found in soil samples but not in water (see Table 2). The lack of any material in water is somewhat surprising since the K_d (2.64 for soil with 1% organic matter) indicates a soil/water partitioning ratio of 2.1 to 1. Results of a fugacity model shows the majority of the chemical in air, reflecting the low water solubility (0.56 g/l) and moderate vapor pressure (0.2 mm Hg) (Berkowitz et al., 1981). In consideration of these estimates, exposure pathways of soil and water are considered below.

The acceptable daily dose for chlorobenzaldehyde is calculated based upon an intraperitoneal LD50 of 10 mg/kg for the mouse obtained from data compiled in RTECS. Thus,

$$D_T = 10 \text{ mg/kg} \times 1.5 \times 10^{-6}$$

$$= 1.5 \times 10^{-5} \text{ mg/kg/day, and}$$

$$\text{groundwater PPLV} = \frac{1.5 \times 10^{-5} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.0005 \text{ mg/l.}$$

A practical limit of 1 ppb (i.e., twice the value calculated above) as a groundwater PPLV is recommended, however, since the intraperitoneal toxicity is expected to be substantially higher than that of an oral dose.

Because of the high partitioning to the air compartment, the box model used above for CS was also used to calculate exposure to soil-generated o-chlorobenzaldehyde vapor. The SPPPLV for vapor inhalation was estimated from this model to be 0.39 mg/kg.

Single pathway preliminary pollutant limit values for other potential soil-to-man pathways, including soil ingestion, particle inhalation and skin absorption are calculated below.

$$\text{Child soil ingestion SPPPLV} = \frac{1.5 \times 10^{-5} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$$

$$= 2.25 \text{ mg/kg.}$$

Particle inhalation SPPPLV $= \dfrac{1.5 \times 10^{-5} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$

$= 954$ mg/kg.

Skin absorption SPPPLV $= 259{,}000 \times 1.5 \times 10^{-5}$ mg/kg/d

$= 3.88$ mg/kg.

Thus, considering the additivity of insignificant soil-to-man pathways for o-chlorobenzaldehyde,

$$\text{soil PPLV} = \frac{1}{\frac{1}{0.39} + \frac{1}{2.25} + \frac{1}{954} + \frac{1}{3.88}}$$

$= 0.31$ mg/kg.

Explosives

Exposure through the vapor inhalation route need not be considered for TNT, RDX and picric acid since all are relatively high melting solids (mp = 80.75, 204.1 and 122.5°C, respectively).

Acceptable daily dose values have been developed for RDX and picric acid by Rosenblatt (1981) using toxicity information from Dacre (1980) for RDX and vanEsch, Vink and vanGenderen (1957) for picric acid. A TNT daily dose is based on a cancer risk of 10^{-4} (de minimis risk for small populations less than 10 million: Travis et al., 1987) and a cancer potency index of 0.031 $(\text{mg/kg/d})^{-1}$ provided by Dr. William Hartley of EPA's Office of Drinking Water.

The D_T values in mg/kg/day are:

TNT	3.2×10^{-3};
RDX	1×10^{-3};
picric acid	0.4.

Groundwater limits are given as:

$$\text{TNT groundwater PPLV} = \frac{3.2 \times 10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.112 \text{ mg/l}$$

$$\text{RDX groundwater PPLV} = \frac{1 \times 10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 0.035 \text{ mg/l}$$

$$\text{Picrate groundwater PPLV} = \frac{0.4 \text{ mg/kg/d} \times 70 \text{ kg}}{2 \text{ liters}}$$

$$= 14{,}000 \text{ mg/l}$$

Despite the high toxicity-based groundwater PPLV, a practical organoleptic limit for taste and color of picrate in drinking water would be 0.5 mg/l.

The calculations of significant SPPPLVs and PPLVs for the soil-to-man pathway for all three explosives are presented below.

TNT

$$\text{Child soil ingestion SPPPLV} = \frac{3.2 \times 10^{-3} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$$

$$= 480 \text{ mg/kg}$$

$$\text{Particle inhalation SPPPLV} = \frac{3.2 \times 10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3\text{/d} \times 6 \times 10^{-8} \text{ kg/m}^3\text{/d}}$$

$$= 203{,}600 \text{ mg/kg}$$

$$\text{Skin absorption SPPPLV} = 259{,}000 \times 3.2 \times 10^{-3} \text{ mg/kg/d}$$

$$= 829 \text{ mg/kg}$$

TNT soil PPLV = $\frac{1}{\frac{1}{480} + \frac{1}{829}}$

= 305 mg/kg

RDX

Child soil ingestion SPPPLV = $\frac{10^{-3} \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$

= 150 mg/kg

Particle inhalation SPPPLV = $\frac{10^{-3} \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3/\text{d} \times 6 \times 10^{-8} \text{ kg/m}^3/\text{d}}$

= 63,600 mg/kg

Skin absorption SPPPLV = $259{,}000 \times 10^{-3}$

= 259 mg/kg

RDX soil PPLV = $\frac{1}{\frac{1}{150} + \frac{1}{259}}$

= 95 mg/kg

Picrate/Picric Acid

Child soil ingestion SPPPLV = $\frac{0.4 \text{ mg/kg/d} \times 15 \text{ kg}}{0.0001 \text{ kg soil}}$

= 60,000 mg/kg

Particle inhalation SPPPLV = $\frac{0.4 \text{ mg/kg/d} \times 70 \text{ kg}}{18.5 \text{ m}^3/\text{d} \times 6 \times 10^{-8} \text{ kg/m}^3/\text{d}}$

= 25 g/kg

Skin absorption SPPPLV = 259,000 x 0.4 mg/kg/d

= 104,000 mg/kg

Picrate/Picric acid PPLV = $\dfrac{1}{\frac{1}{60,000} + \frac{1}{104,000}}$

= 38,000 mg/kg

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APPENDIX B

PHOTOGRAPHS DOCUMENTING SITE CONDITIONS

Photo # 1 - DA-23 Fence and Cap

Photo #2 - DA 10/11 Fence and Cap

Photo #3 - Acid Pit Fence and Cap

Photo #4 – Acid Pit Vent System

Photo #5 – DA 6 Fence and Cap

Photo #6 – Typical Cap Settlement Monument

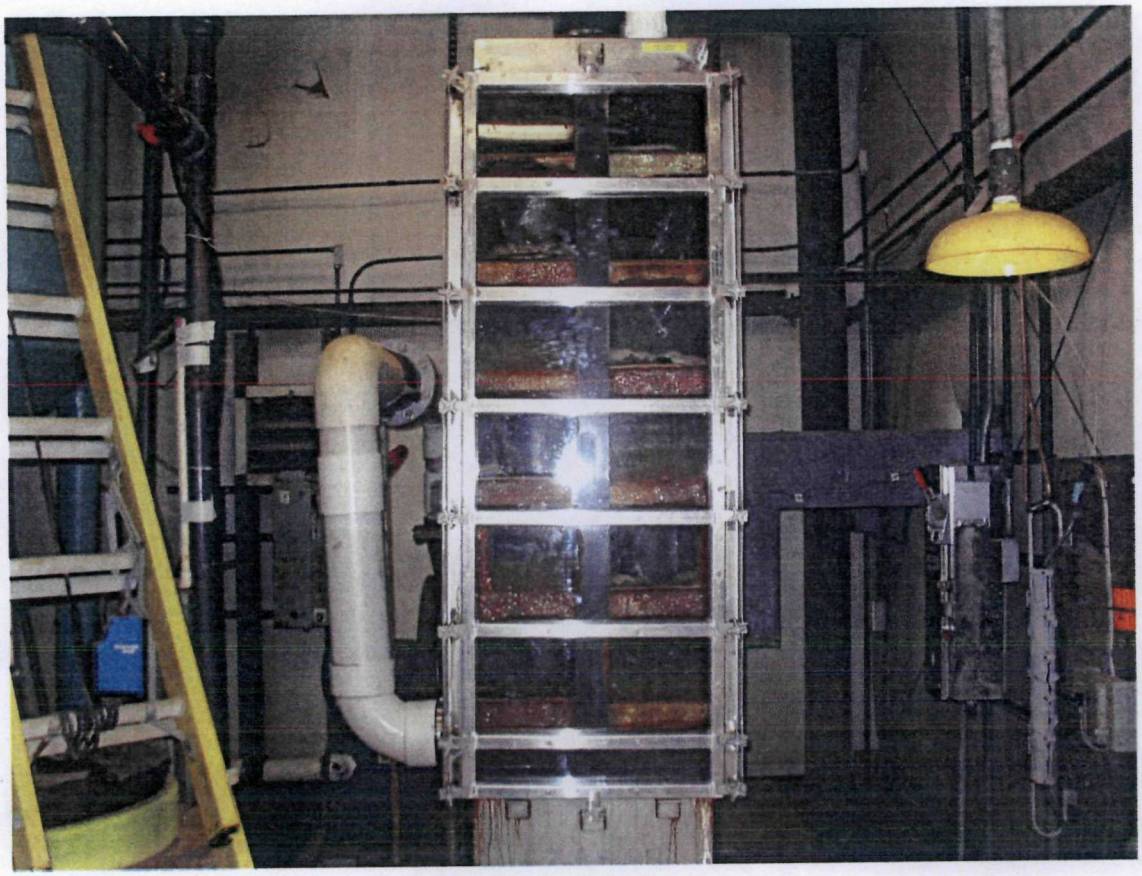

Photo #7 – New Back Valley Air Stripper

APPENDIX C

MSD PERMIT

Metropolitan Sewerage District

OF BUNCOMBE COUNTY, NORTH CAROLINA

March 5, 2007

Mr. Stuart Ryman, Project Coordinator
Altamont Environmental, Inc,
50 College Street
Asheville, North Carolina 28801

Subject: Permit Extension

Dear Mr. Ryman:

In accordance to our meeting on January 11, 2007 and your follow-up letter on January 31, 2007, the Metropolitan Sewerage District (MSD) has agree to extend the duration of the terms and conditions of you current Permit to Discharge Pretreated Wastewater from Groundwater Recovery.

The reason for this extension is based on the information you provided to MSD pertaining to the additional sampling data information will be acquired later in the year. This additional information will pertinent in properly addressing which parameters will require monitoring.

Enclosed, in this correspondence, is a modification of the first two pages of your permit. Please note the extension date for which this permit will remain in effect.

Thank you for your cooperation in properly addressing this issue. If you have any further questions or comments regarding the permit modification, please contact me at (828) 225-8230.

Sincerely,

Jon H. van Hoff
Industrial Pretreatment Inspector

METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA

PERMIT TO DISCHARGE PRETREATED WASTEWATER FROM GROUNDWATER RECOVERY

Permit No. G-006-98 Modification: March 5, 2007

In accordance with all terms and conditions of the Sewer Use Ordinance (SUO) of the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina (MSD), NPDES Permit No. NC0024911 for the operation of the Metropolitan Wastewater Treatment Plant by MSD, North Carolina General Statute 143-215.1, and other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission and the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina:

PERMISSION IS HEREBY GRANTED TO:

CHEMTRONICS CERCLA SITE - CHEMTRONICS, INC.
CNA HOLDINGS, INC.
ALTAMONT ENVIRONMENTAL, INC.
78 1/2 PATTON AVENUE
ASHEVILLE, NORTH CAROLINA 28801

FOR THE

operation of groundwater remediation facilities as specified in this Permit and the discharge of pretreated groundwater into the District Sewerage System of the Metropolitan Sewerage System at 180 Old Beetree Road, Swannanoa, North Carolina 28778. The discharge shall be in accordance with effluent limitations, monitoring requirements and other conditions set forth in this Permit to Discharge Waste ("the Permit")

Effective this **19th** day of ***June, 2002***.

This Permit expires the **30st** day of **October, 2007**.

METROPOLITAN SEWERAGE DISTRICT OF
BUNCOMBE COUNTY, NORTH CAROLINA

THOMAS E. HARTYE, P.E.
GENERAL MANAGER

PART I

CONSTRUCTION AND OPERATION OF MODIFIED PRETREATMENT FACILITIES FOR GROUND WATER REMEDIATION

A. Construction and operation of modified pretreatment facilities set forth below is hereby approved:

NOT APPLICABLE

B. Permit Modification History

June 20, 1991	Issued Permit to discharge from pretreatment systems.
May 28, 1993	Renewed Permit to discharge from pretreatment systems – no changes.
December 28, 1993	Permit amended to reduce effluent monitoring from a quarterly frequency to semiannual.
September 26, 1994	Permit amended to accommodate an authorization to construct modifications to pretreatment system.
August 26, 1995	Permit expired June, 20, 1995. Renewed Permit for three (3) years. Compliance with effluent limitations is being achieved.
October 1, 1998	Reviewed Permit. The discharge amount was reduced to below 0.025 GPD and this facility was re-classified as an "Industrial User".
December 12, 2000	Change in management (not ownership) from Nimmo & Company to The Fletcher Group.
April 4, 2001	Change in management (not ownership) from The Fletcher Group to Altamont Environmental, Inc. Issued Amendment Permit pertaining to this change
May 7, 2001	Met with Altamont Environmental, Inc. and agreed to modify the Permit. The Back Valley (Pipe 02) Nickel limit was increased to 0.70 mg/L. The Metering Manhole (Pipe 03) Nickel limit was increased to 0.105 lbs/day. Actual modifications were not submitted to Altamont Environmental, Inc.
April 1, 2002	Issued new Permit to discharge from pretreatment systems.
May 10, 2002	MSD corrected Permit errors and submitted revised copies.
June 19, 2002	MSD increased Picric Acid effluent limits requirement for Pipe 03.
March 5, 2007	Issued extension date to current permit.

Metropolitan Sewerage District

OF BUNCOMBE COUNTY, NORTH CAROLINA

June 19, 2002

Mr. Stuart Ryman, Project Coordinator
Mr. James Laux, Deputy Project Coordinator
Altamont Environmental, Inc.
78½ Patton Ave.
Asheville, North Carolina 28801

Re: Permit to Discharge Pretreated Wastewater for Groundwater Recovery
Permit Number G-006-02
Asheville North Carolina

Dear Gentlemen:

In response to your request for an effluent limit increase for Picric Acid at Pipe 03, the Metropolitan Sewerage District (MSD) has reviewed the background supporting documentation from which the original established limit was determined. Based on this information and the current conditions of this permit, the MSD has agreed to increase the limit of 0.240 mg/L to 0.400 mg/L for Picric Acid. The appropriate modifications to you Permit to Discharge Remediated Water from Groundwater Recovery (Permit) have been made and are enclosed with this correspondence.

The conditions and requirements included in the Permit, the Permit Application and the Sewer Use Ordinance of the Metropolitan Sewerage District of Buncombe County are integral parts of this Permit.

This modified Permit will become effective **June 19, 2002** and will be valid for a period of five (5) years. If there is a significant change in your wastewater discharge as defined in Section 4 of the MSD Sewer Use Ordinance; or your facility is reassigned, transferred, or sold to a new User, the General Manager of MSD must be notified in writing at least ninety (90) days prior to any of the above events.

If you have any questions regarding the Permit, you may contact Mr. Jon van Hoff at (828) 225-8230.

Very truly yours,

Thomas E. Hartye, P.E.
General Manager

~Protecting Our Natural Resources~

P.O. BOX 8969 ASHEVILLE, NORTH CAROLINA 28814 TELEPHONE: (828)254-9646 FAX: (828)254-3299 WEBSITE: www.msdbc.org

METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA

PERMIT TO DISCHARGE PRETREATED WASTEWATER FROM GROUNDWATER RECOVERY

Permit No. G-006-98 Modification: June 19, 2002

In accordance with all terms and conditions of the Sewer Use Ordinance (SUO) of the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina (MSD), NPDES Permit No. NC0024911 for the operation of the Metropolitan Wastewater Treatment Plant by MSD, North Carolina General Statute 143-215.1, and other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission and the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina:

PERMISSION IS HEREBY GRANTED TO:

CHEMTRONICS CERCLA SITE - CHEMTRONICS, INC.
CNA HOLDINGS, INC.
ALTAMONT ENVIRONMENTAL, INC.
78 1/2 PATTON AVENUE
ASHEVILLE, NORTH CAROLINA 28801

FOR THE

operation of groundwater remediation facilities as specified in this Permit and the discharge of pretreated groundwater into the District Sewerage System of the Metropolitan Sewerage System at 180 Old Beetree Road, Swannanoa, North Carolina 28778. The discharge shall be in accordance with effluent limitations, monitoring requirements and other conditions set forth in this Permit to Discharge Waste ("the Permit")

Effective this 19th day of **June, 2002**.

This Permit expires the 30st day of **April, 2007**.

METROPOLITAN SEWERAGE DISTRICT OF
BUNCOMBE COUNTY, NORTH CAROLINA

THOMAS E. HARTYE, P.E.
GENERAL MANAGER

PART I

CONSTRUCTION AND OPERATION OF MODIFIED PRETREATMENT FACILITIES FOR GROUND WATER REMEDIATION

A. Construction and operation of modified pretreatment facilities set forth below is hereby approved:

NOT APPLICABLE

B. Permit Modification History

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April 1, 2002	Issued new Permit to discharge from pretreatment systems.
May 10, 2002	MSD corrected Permit errors and submitted revised copies.
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PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

B. Efflent Limits, Pipe 03, Metering Manhole (Combined Front and Back Valley)

Effective immediately and lasting until the expiration of the Permit, the User is authorized to discharge pretreated groundwater from Pipe 03. The use of Pipe 03 for any discharge other than from pretreated groundwater flowing from pipes 01 and 02 is prohibited. The discharge shall be limited and monitored as specified below: (For explanation of numbers in parentheses following monitoring frequencies, please see page 12).

EFFLUENT LIMITATIONS **
(mg/L)

Limited Parameter	Daily Maximum	Rate	Sample Type	MSD's Monitoring Frequency	Chemtronics' Monitoring Frequency
Flow	0.029 MGD***	20 gpm	Continuous	ODAN *	Daily
pH	6.0-10.0 su		Grab (5)	ODAN *	Monthly
1,2-Dichloroethane	3.397		Grab	ODAN *	Semiannually
Trichloroethyle	2.708		Grab	ODAN *	Semiannually
Methylene Chloride	0.190		Grab	ODAN *	Semiannually
Trans-1,2-dichloroethene	0.100		Grab	ODAN *	Semiannually
Benzene	0.130		Grab	ODAN *	Semiannually
Ethylbenzene	0.040		Grab	ODAN *	Semiannually
Tetrachloroethene	0.040		Grab	ODAN *	Semiannually
Toluene	0.080		Grab	ODAN *	Semiannually
Carbon Tetrachloride	0.040		Grab	ODAN *	Semiannually
Total Trihalomethanes	0.120		Grab	ODAN *	Semiannually
RDX	0.060		Grab	ODAN *	Semiannually
Picric Acid	0.400		Grab	ODAN *	Semiannually
Total Cyanide	0.130		Grab	ODAN *	Semiannually
Lead	0.020		Grab	ODAN *	Semiannually
Chromium	0.200		Grab	ODAN *	Semiannually
Nickel	0.700		Grab	ODAN *	Semiannually
Copper	0.360		Grab	ODAN *	Semiannually
Zinc	0.095		Grab	ODAN *	Semiannually
Benzylic Acid/Benzophenone	0.160		Grab	ODAN *	Semiannually

* ODAN- Monitoring by MSD will be done *On Demand As Necessary* to judge compliance.
** The scheduled monitoring frequencies are minimum requirements and may be adjusted by MSD.
***Flow measurement of pipe 03 will be combined flow measured at pipe 01 and at pipe 02.

DATE 03/26/02

METROPOLITAN SEWERAGE DISTRICT OF BUNCOMBE COUNTY, NORTH CAROLINA

PERMIT TO DISCHARGE PRETREATED WASTEWATER FROM GROUNDWATER RECOVERY

Permit No. G-006-98

In accordance with all terms and conditions of the Sewer Use Ordinance (SUO) of the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina (MSD), NPDES Permit No. NC0024911 for the operation of the Metropolitan Wastewater Treatment Plant by MSD, North Carolina General Statute 143-215.1, and other lawful standards and regulations promulgated and adopted by the North Carolina Environmental Management Commission and the District Board of the Metropolitan Sewerage District of Buncombe County, North Carolina:

PERMISSION IS HEREBY GRANTED TO:

CHEMTRONICS CERCLA SITE - CHEMTRONICS, INC.
HOECHST-CELANESE CORPORATION AND NORTHROP CORPORATION
ALTAMONT ENVIRONMENTAL, INC.
78 1/2 PATTON AVENUE
ASHEVILLE, NORTH CAROLINA 28801

FOR THE

operation of groundwater remediation facilities as specified in this Permit and the discharge of pretreated groundwater into the District Sewerage System of the Metropolitan Sewerage System at 180 Old Beetree Road, Swannanoa, North Carolina 28778. The discharge shall be in accordance with effluent limitations, monitoring requirements and other conditions set forth in this Permit to Discharge Waste ("the Permit")

Effective this 1st day of **May, 2002.**

This Permit expires the 30st day of **April, 2007**.

METROPOLITAN SEWERAGE DISTRICT OF
BUNCOMBE COUNTY, NORTH CAROLINA

THOMAS E. HARTYE, P.E.
GENERAL MANAGER

PART I

CONSTRUCTION AND OPERATION OF MODIFIED PRETREATMENT FACILITIES FOR GROUND WATER REMEDIATION

A. Construction and operation of modified pretreatment facilities set forth below is hereby approved:

NOT APPLICABLE

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October 1, 1998	Reviewed Permit. The discharge amount was reduced to below 0.025 GPD and this facility was re-classified as an "Industrial User".
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April 1, 2002	Issued Permit to discharge from pretreatment systems.

PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

A. Location and Description of Discharge

Pipe Number	Description
01 *	Effluent of groundwater remediation system for Front Valley. Located in the line after the carbon absorption drums. Groundwater remediation system consists of flow equalization tank, air stripper, vortex flow meter, bag filter, and carbon absorption media.
02 *	Effluent discharge of groundwater remediation system for Back Valley. Located in the line after the caustic feed point and prior to the pH in-line probe. Groundwater remediation system consists of flow equalization tank, magnetic flow meter, air stripper, caustic feed for pH adjustment, and pH in-line probe.
03	Parshall Flume in the manhole where effluent from the Front Valley and the Back Valley converge.

* Pipe 01 and 02: Discharge at Pipe 01 and 02 may be monitored periodically and unannounced by MSD to assess compliance.

LAEMD 4-10-2 PAGE 1/2

PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

B. **Efflent Limits, Pipe 03, Metering Manhole (Combined Front and Back Valley)**

Effective immediately and lasting until the expiration of the Permit, the User is authorized to discharge pretreated groundwater from **Pipe 03**. The use of Pipe 03 for any discharge other than from pretreated groundwater flowing from pipes 01 and 02 is prohibited. The discharge shall be limited and monitored as specified below: (For explanation of numbers in parentheses following monitoring frequencies, please see page 12).

EFFLUENT LIMITATIONS **
(mg/L)

Limited Parameter	Daily Maximum	Rate	Sample Type	MSD's Monitoring Frequency	Chemtronics' Monitoring Frequency
Flow	0.029 MGD	20 gpm	Continuous	ODAN *	Daily
pH	6.0-10.0 su		Grab (5)	ODAN *	Monthly
1,2-Dichloroethane	3.397		Grab	ODAN *	Semiannually
Trichloroethyle	2.708		Grab	ODAN *	Semiannually
Methylene Chloride	0.190		Grab	ODAN *	Semiannually
Trans-1,2-dichloroethene	0.100		Grab	ODAN *	Semiannually
Benzene	0.130		Grab	ODAN *	Semiannually
Ethylbenzene	0.040		Grab	ODAN *	Semiannually
Tetrachloroethene	0.040		Grab	ODAN *	Semiannually
Toluene	0.080		Grab	ODAN *	Semiannually
Carbon Tetrachloride	0.040		Grab	ODAN *	Semiannually
Total Trihalomethanes	0.120		Grab	ODAN *	Semiannually
RDX	0.060		Grab	ODAN *	Semiannually
Picric Acid	0.240		Grab	ODAN *	Semiannually
Total Cyanide	0.130		Grab	ODAN *	Semiannually
Lead	0.020		Grab	ODAN *	Semiannually
Chromium	0.200		Grab	ODAN *	Semiannually
Nickel	0.280		Grab	ODAN *	Semiannually
Copper	0.360		Grab	ODAN *	Semiannually
Zinc	0.095		Grab	ODAN *	Semiannually
Benzylic Acid/Benzophenone	0.160		Grab	ODAN *	Semiannually

* ODAN- Monitoring by MSD will be done ***On Demand As Necessary*** to judge compliance.

** The scheduled monitoring frequencies are minimum requirements and may be adjusted by *MSD.*

ORIGINAL
3-26-2
PAGE

PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

B. **Effluent Limits, Pipe 03, Metering Manhole (Combined Front and Back Valley)**

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EFFLUENT LIMITATIONS **
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Methylene Chloride	0.190		Grab	ODAN *	Semiannually
Trans-1,2-dichloroethene	0.100		Grab	ODAN *	Semiannually
Benzene	0.130		Grab	ODAN *	Semiannually
Ethylbenzene	0.040		Grab	ODAN *	Semiannually
Tetrachloroethene	0.040		Grab	ODAN *	Semiannually
Toluene	0.080		Grab	ODAN *	Semiannually
Carbon Tetrachloride	0.040		Grab	ODAN *	Semiannually
Total Trihalomethanes	0.120		Grab	ODAN *	Semiannually
RDX	0.060		Grab	ODAN *	Semiannually
Picric Acid	0.240		Grab	ODAN *	Semiannually
Total Cyanide	0.130		Grab	ODAN *	Semiannually
Lead	0.020		Grab	ODAN *	Semiannually
Chromium	0.200		Grab	ODAN *	Semiannually
Nickel	0.042		Grab	ODAN *	Semiannually
Copper	0.360		Grab	ODAN *	Semiannually
Zinc	0.095		Grab	ODAN *	Semiannually
Benzylic Acid/Benzophenone	0.160		Grab	ODAN *	Semiannually

* ODAN- Monitoring by MSD will be done ***On Demand As Necessary*** to judge compliance.

** The scheduled monitoring frequencies are minimum requirements and may be adjusted by MSD.

PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

C. Monitoring Requirements

(1) Flow is in million gallons per day (MGD)

(2) Rate is in gallons per minute (gpm)

(3) The pH shall not be less than 6.0 or greater than 10.0 standard units. Deviations from these limits shall be handled in accordance with MSD Pretreatment Program Guidance Policy.

(4) Discharges of Parameters not specifically limited in this Part are limited to Domestic Sewerage Levels as established by the district.

(5) Where continuous pH recording equipment is utilized, the lowest and highest reading shall be taken from a 24-hour chart.

(6) Where Continuous and composite samples shall be at least eight (8) portions collected during a twenty-four (24) hour period or the total period of Waste flow if less than twenty-four (24) hours. Alternate sampling requirements may be established in a User's Permit to Discharge Waste or by the General Manager.

(7) A "grab" sample, for monitoring requirements, is defined as a single "dip" and "take" sample collected at a representative point in the discharge stream.

(8) An "instantaneous" measurement, for monitoring requirements, is defined as a single reading, observation, or measurement.

(9) Once per six (6) months or every other quarter, the User shall notify the MSD seven days in advance of sampling. A MSD staff member may be present during the sample(s) collection. The MSD reserves the right to split the sample(s) and forward the same to an approved laboratory of its choice. The User shall reimburse the MSD for the laboratory analysis. Duplication of analysis by the User is not required.

Test procedures for the analysis of pollutants shall be preformed in accordance with the techniques prescribed in 40 CFR part 136 and amendments thereto unless specified otherwise in the monitoring conditions of the Permit.

The User must retain all records of analyses and measurements performed by the User permanently.

PART II
EFFLUENT LIMITS AND MONITORING REQUIREMENTS

C. Monitoring Requirements, (continued)

(10) User shall immediately cease discharging upon failure of equipment or receipt of chemical analyses showing exceedence of permitted limits. MSD shall immediately be notified by telephone of failure of equipment or data indicating noncompliance with conditions and requirements listed herein or in the MSD Sewerage Use Ordinance (SUO). This requirement is applicable throughout duration of this Permit.

(1) Reporting

a. Monitoring results obtained by the User shall be reported no later than the twentieth day of the month following the month in which the samples were taken. If no discharge occurs during the reporting period, "no discharge shall be indicated. Copies of contract laboratory reports shall be submitted to the MSD at the following address:

Attention: Industrial Waste Coordinator
Metropolitan Sewerage District
2028 Riverside Dr.
Asheville, North Carolina 28814

b. In the event of an accidental discharge or slug loading or self-monitoring indicating non-compliance with the SUO or the Permit, the User hall immediately notify MSD by telephone of the accidental discharge, slug loading, or self-monitoring indicating non-compliance. The telephone numbers to contact are:

8:30 a.m. to 4:30 p.m. Industrial Waste Coordinator (828) 252-7342
4:30 p.m. to 8:30 a.m. Chief Operator on Duty (828) 252-7342

c. Within five (5) days of the accidental discharge, slug loading or other non-compliant discharge, a written report by the authorized representative of the User shall be submitted to the General Manager of the MSD. The report must include as a minimum:

(i) The date, time and duration of the accidental discharge, slug loading or discharge not in compliance with conditions and requirements of the SUO or the Permit;
(ii) The quantity and waste characteristics of the discharge;
(iii) The corrective action taken to prevent future accidental discharges, slug loadings or discharges not in compliance with the SUO or the Permit.

d. If self-monitoring by the User indicates a violation, the User shall repeat the self-monitoring and analysis and submit the results of the repeat analysis to MSD within thirty (30) days after becoming aware of the violation. The requirements of this paragraph are in addition to the requirements set forth in subparagraphs (b) and (c) of this Part.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

A. Duty to Comply

The Industrial User must comply with all conditions of the Permit. Any non-compliance with the Permit constitutes a violation of the SUO and may be grounds for possible enforcement action. The MSD may levy fines of up to $1,000 for a violation of the SUO. The Industrial User may be subject to criminal penalties levied by the State of North Carolina or the United States of America.

B. Duty to Mitigate - Prevention of Adverse Impact

The Industrial User shall take all reasonable steps to minimize or prevent any discharge in violation of the Permit which has a reasonable likelihood of adversely affecting human health, the MSD Treatment Plant, the French Broad River, or the environment.

C. General Prohibitive Standards

In addition to the requirements of the Permit, the Industrial User shall comply with the general prohibitive discharge standards in 40 CFR 403.5(a) and (b) of the Federal pretreatment regulations.

D. Facilities Operation

The Industrial User shall at all times maintain in good working order and operate as efficiently as possible, all control facilities or systems installed or used by the Industrial User to achieve compliance with the terms and conditions of the Permit and the SUO.

E. Bypass

Bypass of treatment facilities is prohibited. MSD may take enforcement action against the Industrial User for bypass unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;

(2) there were no feasible alternatives to the bypass; and

(2) the Industrial User submits prior notice of the bypass to MSD if the Industrial User knows in advance of the need for bypass.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

The Conditions of (2) are not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment down time or preventative maintenance. If the Industrial user does not know of the bypass in advance, it must submit verbal notice to MSD as soon as the Industrial User becomes aware of the bypass. The verbal notice shall be followed with a written submission. The written submission shall describe the bypass and its cause; state how long the bypass occurred including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent reoccurrence of the bypass.

F. Flow Measurement

Flow measuring and recording facilities shall be maintained to provide an accurate measurement of the volume discharged. If it is the determination of the MSD that when, in the opinion of the MSD, the flow measuring and recording facilities are not sufficiently measuring the flow, the MSD may require recalibration or change-out at your expense.

G. Malfunction of Flow Monitoring Equipment

Any malfunction of flow monitoring and recording equipment shall be reported by the Industrial User **immediately** to MSD by phone followed by a written report submitted to the General Manager of MSD within five (5) days of the malfunction. Any malfunction must be corrected within seven (7) days. Certification of accuracy must be provided to MSD within fifteen (15) days of the date of repair.

H. Notification of Production Changes

A minimum of ninety (90) days written notice to MSD is required for:

(1) A projected increase in wastewater volume or strength above the present operation.

(2) Introduction of new wastes or changes in manufacturing processes or pretreatment facilities altering waste characteristics from the present operations.

(3) Proposed discharge of any constituents not specifically permitted in Part II of the Permit.

ORIGINAL 3-26-2 PAGE

PART III

GENERAL CONDITIONS AND REQUIREMENTS

The Conditions of (2) are not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment down time or preventative maintenance. If the Industrial user does not know of the bypass in advance, it must submit verbal notice to MSD as soon as the Industrial User becomes aware of the bypass. The verbal notice shall be followed with a written submission. The written submission shall describe the bypass and its cause; state how long the bypass occurred including exact dates and times, and if the bypass has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate and prevent reoccurrence of the bypass.

F. Flow Measurement

Flow measuring and recording facilities shall be maintained to provide an accurate measurement of the volume discharged. If it is the determination of the MSD that when, in the opinion of the MSD or Rockwell, the flow measuring and recording facilities are not sufficiently measuring the flow, the MSD may require recalibration or change-out at the expense of Rockwell.

G. Malfunction of Flow Monitoring Equipment

Any malfunction of flow monitoring and recording equipment shall be reported by the Industrial User **immediately** to MSD by phone followed by a written report submitted to the General Manager of MSD within five (5) days of the malfunction. Any malfunction must be corrected within seven (7) days. Certification of accuracy must be provided to MSD within fifteen (15) days of the date of repair.

H. Notification of Production Changes

A minimum of ninety (90) days written notice to MSD is required for:

(1) A projected increase in wastewater volume or strength above the present operation.

(2) Introduction of new wastes or changes in manufacturing processes or pretreatment facilities altering waste characteristics from the present operations.

(3) Proposed discharge of any constituents not specifically permitted in Part II of the Permit.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

I. *Right to Discharge*

Discharge of wastewater with changes as indicated in H above shall not begin until a Permit to Discharge Industrial Waste has been issued by MSD for the proposed discharge or until MSD amends an existing Permit.

J. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutants from such materials from entering the sewer system. The Industrial User is responsible for assuring its compliance with any requirements regarding the generation, treatment, storage, or disposal of "Hazardous Waste" as defined under the Federal Resource Conservation and Recovery Act.

K. Upset Conditions

An "Upset" of Pretreatment Facilities means an exceptional incident in which there is an unintentional and temporary noncompliance with the effluent limitations of the Permit because of factors beyond the reasonable control of the Industrial User. An Upset does not include noncompliance to the extent caused by operational error, improperly designed or inadequate treatment facilities, lack of preventative maintenance, or careless or improper operations.

An Upset may constitute an affirmative defense for action brought for the noncompliance. The Industrial User has the burden of proof to provide evidence and demonstrate that none of the factors listed in the preceding paragraph were responsible for the noncompliance.

L. Toxic Pollutants

If a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Federal Clean Water Act or North Carolina General Statutes 143-215.1 for a Toxic Pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation for such pollutant in the Permit, the Permit may be revised or modified in accordance with the toxic effluent standard or prohibition.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

M. Accidental Discharges and Slug Loads

The Industrial User shall provide protection from accidental discharges of prohibited materials or other substances regulated by the Permit. The Industrial User shall develop, obtain MSD approval, and implement a written spill control and countermeasure plan within 120 days of the effective date of the Permit. The plan may include, but is not limited to, the construction of containment dikes around the pretreatment unit, all process units containing water or oil, and the chemical storage area; the rerouting of all floor drains in the manufacturing area to a holding area prior to connection to the pretreatment unit; and the plugging of all floor drains in the chemical storage area.

N. Notice in Event of Accidental Discharge

A Notice shall be permanently posted at a prominent place in the facility for which the Permit has been issued advising employees whom to call in the event of an Accidental Discharge. Users shall insure that all employees who observe or who may cause or suffer such an Accidental Discharge to occur are advised of the emergency notification procedure. The notification procedure outlined in Part II, C, 2, b, c d, page 7 of this Permit shall be followed.

O. Need to Halt or Reduce not a Defense

It shall not be a defense for an Industrial User in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of the Permit.

P. Dilution

The Industrial User shall not increase the use of potable or process water or in any other way attempt to dilute the discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in the Permit.

Q. Right of Entry

The Industrial User shall allow the staff of the Metropolitan Sewerage District, the Approval Authority, the Environmental Protection Agency and/or their authorized representatives, upon the presentation of credentials:

PART III

GENERAL CONDITIONS AND REQUIREMENTS

(1) To enter upon the Industrial User's premises where a real or potential discharge is located or in which records are required to be kept under the terms and conditions of the Permit; and

(2) At reasonable times to have access to and copy records required to be kept under the terms and conditions of the Permit; to inspect any monitoring equipment or monitoring method required in the Permit; and to sample any discharge of pollutants.

R. Monitoring Access

MSD, the Approval Authority and EPA shall have the right to set up on the Industrial User's Property such devices as are necessary to conduct sampling, inspection, compliance monitoring and flow metering operations.

S. Availability of Records and Reports

The Industrial User shall retain records of all monitoring information, including all calibration and maintenance records as well as copies of reports and information used to complete the application for the Permit for at least three (3) years. All records pertaining to any enforcement action shall be retained and preserved by the Industrial User until all enforcement activities have concluded and all periods of limitation with respect to any and all appeals have expired.

Except for data determined to be confidential under the Sewer Use Ordinance, all reports prepared in accordance with terms of the Permit shall be available for public inspection at the Metropolitan Sewerage District. Effluent data shall not be considered confidential.

T. Duty to Provide Information

The Industrial User shall furnish to the General Manger or his designees, within a reasonable time, any information MSD, or its designee, or the North Carolina Department of Environment, Health and Natural Resources may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the Permit or to determine compliance with the Permit. The Industrial User shall also furnish, upon request, copies of records required to be kept by the Permit.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

U. Penalties for Falsification of Reports

The Metropolitan Sewerage District SUO provides that any person who knowingly makes any false statements or representation in any application or report or other document submitted or required to be maintained pursuant to the SUO or the Permit, or who knowingly renders inaccurate any monitoring device or method required under this ordinance, shall upon conviction be punished by a fine of not more than $1,000 for each violation. NCGS 143-215.6 provides that similar offenses may be punished by a fine of up to $10,000 per violation, or by imprisonment for not more than six months or both.

V. Signatory Requirements

All reports or information submitted pursuant to the requirements of the Permit must be signed and certified by the Authorized Representative of the Industrial User as specified in the Application for Permit to Discharge Industrial Waste.

W. Civil and Criminal Liability

Nothing in the Permit shall be construed to relieve the Industrial User from civil or criminal penalties for noncompliance with provisions of the Permit.

X. Federal and State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable Federal and State law or regulation.

Y. Property Rights

The Permit does not convey any property rights in either real or personal property, or any executive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

Z. Severability

The provisions of the Permit are severable and, if any provision of the Permit or the application of any provision of the Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of the Permit shall not be affected thereby.

PART III

GENERAL CONDITIONS AND REQUIREMENTS

AA. Reopener Provision

The Permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under Sections 302(b)(2)(C) and (D), 304(b)(2) and 307(a)(2) of the Clean Water Act, if the effluent standard or limitation so issued or approved:

(1) contains different conditions or is otherwise more stringent than any effluent limitation in the Permit; or

(2) controls any pollutant not limited in the Permit.

The Permit as modified or reissued under this paragraph shall also contain any other requirements of the Clean Water Act then applicable.

BB. Permit Modification, Revocation, Termination

The Permit may be modified, revoked and reissued or terminated in accordance with the requirements of the SUO, North Carolina General Statute 143-215.1 and regulations promulgated thereunder.

The Permit shall be modified, alternatively or revoked and reissued, to comply with any applicable effluent standard or limitation for the control of any pollutant shown to contribute to the toxicity of the MSD Wastewater Treatment Plant effluent or any pollutant that is otherwise limited by the MSD Discharge Permit. The Permit as modified or reissued under this paragraph may also contain any other requirements of State or Federal pretreatment regulations then applicable.

CC. Application for Permit Renewal

The Industrial User is responsible for filing application for reissuance of the Permit within ninety (90) days of its expiration date.

DD. Transferability

The Permit shall not be reassigned or transferred or sold to a new owner, new Industrial User, different premises or a new or changed operation without the written approval of MSD. Any succeeding owner or Industrial User shall also agree in writing to comply with the terms and conditions of the Permit and shall be provided a copy of the Permit.

APPENDIX D

NEW WELL DETAILS

Chemtronics, Inc.
Swannanoa, North Carolina

Wells Installed Since January 2002

Well Name	Front/ Back Valley	Date Installed	Top of Casing Elevation (feet)	Top of Screen Elevation (feet)	Screened Interval (feet bgs)	Screen Length (feet)	Well Total Depth (feet)	Unit Screened	Zone
SW-151-1	FV	3/18/2002	2249.56	2237.72	9.0 - 19.0	10	21.8	water table	A
SW-151-2	FV	3/18/2002	2246.84	2231.18	13.0 - 23.0	10	25.7	water table	A
SW-149	FV	3/19/2002	2262.81	2226.90	33.0 - 43.0	10	45.9	intermediate saprolite	B
SW-152-1	FV	3/19/2002	2249.10	2229.72	17.0 - 27.0	10	29.4	water table	A
SW-152-2	FV	3/19/2002	2236.10	2222.46	11.0 - 21.0	10	23.6	water table	A
SW-152-3	FV	3/19/2002	2217.19	2214.00	3.0 - 13.0	10	13.2	water table	A
DW-152-1	FV	3/20/2002	2249.23	2215.73	31.0 - 41.0	10	43.5	transition zone	C
DW-152-2	FV	3/20/2002	2236.26	2201.77	32.0 - 42.0	10	44.5	transition zone	C
DW-151-2	FV	3/21/2002	2246.74	2187.12	57.0 - 67.0	10	69.6	transition zone	C
IW-151-2	FV	3/21/2002	2245.92	2208.24	35.0 - 45.0	10	47.7	intermediate saprolite	B
DW-151-1	FV	3/22/2002	2248.45	2199.70	46.0 - 51.0	5	53.8	transition zone	C
IW-151-1	FV	3/23/2002	2248.96	2217.90	28.0-38.0	10	40.8	intermediate saprolite	B
DW-104	FV	3/25/2002	2264.27	2204.41	57.0 - 62.0	5	64.9	transition zone	C
DW-139	FV	3/26/2002	2273.56	2231.71	39.0 - 44.0	5	46.8	transition zone	C
DW-152-3	FV	3/26/2002	2217.62	2194.68	20.0 - 25.0	5	27.9	intermediate saprolite	B
IW-104	FV	3/26/2002	2264.00	2225.32	36.0 - 46.0	10	48.7	intermediate saprolite	B
MW146-M43C	FV	11/15/2002	2228.44	2187.00	39 - 44	5	46.1	transition zone	C
MW147-N42C	FV	11/18/2002	2228.15	2196.00	30 - 35	5	38.0	transition zone	C
MW148-L43C	FV	11/18/2002	2246.33	2219.00	25 - 30	5	32.7	transition zone	C
MW149-O28C	BV	11/22/2002	2306.45	2230.00	74 - 79	5	80.8	transition zone	C
MW150-O28C	BV	11/25/2002	2303.46	2268.00	33 - 38	5	40.0	transition zone	C
MW151-P27C	BV	11/26/2002	2304.83	2286.40	15.5 - 20.5	5	23.2	transition zone	C
MW152-Q27C	BV	12/2/2002	2296.31	2270.00	24 - 29	5	30.3	transition zone	C
MW153-Q27C	BV	12/2/2002	2297.41	2272.00	23 - 28	5	29.0	transition zone	C
MW144-M43C	FV	12/5/2002	2227.96	2150.00	76 - 81	5	82.9	transition zone	C
MW145-L43C	FV	12/9/2002	2238.99	2167.00	70 - 75	5	76.9	transition zone	C
MW154-O44C	FV	1/8/2003	2211.88	2180.00	30 - 35	5	37.3	transition zone	C

Chemtronics, Inc.
Swannanoa, North Carolina

Wells Installed Since January 2002

Well Name	Front/ Back Valley	Date Installed	Top of Casing Elevation (feet)	Top of Screen Elevation (feet)	Screened Interval (feet bgs)	Screen Length (feet)	Well Total Depth (feet)	Unit Screened	Zone
MW155-P43C	FV	1/8/2003	2214.15	2195.00	19 - 24	5	26.4	transition zone	C
MW156-P44A	FV	1/9/2003	2209.29	2200.00	7 - 12	5	14.3	water table	A
MW157-M44C	FV	1/10/2003	2228.46	2178.00	49 - 54	5	60.8	transition zone	C
MW158-N44A	FV	1/10/2003	2214.06	2208.60	3.5 - 8.5	5	10.4	water table	A
MW159-L45C	FV	1/13/2003	2246.12	2192.00	52 - 57	5	59.0	transition zone	C
MW160-M44C	FV	1/13/2003	2242.83	2187.00	54 - 59	5	59.5	transition zone	C
MW161-K46C	FV	1/14/2003	2241.45	2196.00	43 - 48	5	50.0	transition zone	C
MW162-T31A	BV	1/14/2003	2265.13	2253.20	9.5 - 14.5	5	15.2	water table	A
MW163-T32C	BV	1/14/2003	2262.07	2248.50	11.5 - 16.5	5	19.6	transition zone	C
MW164-S33C	BV	1/15/2003	2258.93	2240.00	17 - 22	5	23.1	transition zone	C
MW165-O28A	BV	2/18/2003	2306.46	2296.00	8-13	5	14.9	water table	A
MW166-T32A	BV	6/9/2003	2262.57	2256.00	5-10	5	12.3	water table	A
MW167-O44A	FV	6/9/2003	2211.89	2205.00	5-10	5	12.1	water table	A
MW168-O28B	BV	6/13/2003	2307.68	2270.00	35-40	5	42.9	intermediate saprolite	B
EW-15-N26	BV	03/05/05	2354.30	2316.30	38-68	30.0	68.0	int. saprolite & bedrock	B-C-D
MW-113-1	FV	8/3/2005	2316.80	2312.48	5-15	10	15.0	water table	A
MW-147-1	FV	8/3/2005	2298.81	2274.13	25 - 35	10	35.0	intermediate saprolite	B
MW173-G34D	FV	6/20/2006	2359.70	2312.60	43.5-73.5	30	346.0	upper bedrock	D
MW173-G34F	FV	6/20/2006	2359.62	2041.10	315-345	30	346.0	deep bedrock	F
MW170-J23E	BV	7/19/2006	2475.68	2377.71	95-115	20	117.0	intermediate bedrock	E
MW177-M44D	FV	7/22/2006	2233.05	2156.12	74-84	10	291.0	upper bedrock	D
MW177-M44F	FV	7/22/2006	2233.09	1970.12	260-290	30	291.0	deep bedrock	F
MW176-L41D	FV	7/25/2006	2243.91	2189.05	52-62	10	96.0	upper bedrock	D
MW176-L41E	FV	7/25/2006	2244.04	2151.05	90-95	5	96.0	intermediate bedrock	E
MW174-F38E	FV	7/26/2006	2335.56	2212.75	120-130	10	228.0	intermediate bedrock	E
MW174-F38F	FV	7/26/2006	2335.53	2135.75	197-227	30	228.0	deep bedrock	F
MW171-I29F	BV	7/30/2006	2530.00	open	450-495	45	495.0	deep bedrock	F

Chemtronics, Inc.
Swannanoa, North Carolina

Wells Installed Since January 2002

Well Name	Front/ Back Valley	Date Installed	Top of Casing Elevation (feet)	Top of Screen Elevation (feet)	Screened Interval (feet bgs)	Screen Length (feet)	Well Total Depth (feet)	Unit Screened	Zone
MW172-T32D	BV	8/3/2006	2262.78	2228.06	32-42	10	95.0	upper bedrock	D
MW172-T32E	BV	8/3/2006	2262.74	2193.06	64-84	20	95.0	intermediate bedrock	E
MW169-J23F	BV	8/22/2006	2476.47	open	420-475	50	475.0	deep bedrock	F
MW175-Q40E	FV	8/27/2006	2225.68	2129.12	94-124	30	300.0	intermediate bedrock	E
MW175-Q40F	FV	8/27/2006	2225.73	2002.12	221-251	30	300.0	deep bedrock	F

APPENDIX E

AIR STRIPPER QUALITY INFORMATION

Western North Carolina Regional Air Quality Agency

Robert L. Camby, Director

Serving Buncombe County and the City of Asheville

March 19, 2001

Mr. Stu Ryman
The Fletcher Group
48 Patton Avenue, Suite 303
Asheville, NC 28801

Dear Mr. Ryman:

The Western North Carolina Regional Air Quality Agency (WNCRAQA) has recently obtained information regarding the permitting of Superfund sites by State and local air quality programs. As stated in the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (Superfund) (P.L. 96-510) as amended by the Superfund Amendments and Reauthorization Act of 1986 (P.L. 99-499), Section 112(e)(1), "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section." However, this does not relieve the facility of compliance with any substantive requirements listed in the WNCRAQA Air Quality Code.

Based on the aforementioned information, the WNCRAQA has decided to let the February 8, 1999 permit issued for the facility expire on March 31, 2001. No new permit will be re-issued for the facility and no further actions need to be taken by the Fletcher Group at this time.

If you have any questions regarding this matter, please contact Justin G. Greuel or myself.

Sincerely,

Robert L. Camby
Director

RLC/jgg

49 Mount Carmel Road Asheville, NC 28806
Telephone: (828) 255-5655 Fax: (828) 255-5226 Web Address: www.wncair.org E-mail: wncair@co.buncombe.nc.us

APPENDIX F

FIVE YEAR REVIEW CHECKLIST

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: Chemtronics	**Date of inspection:** 5-08-07
Location and Region: Asheville, NC; Region IV	**EPA ID:**
Agency, office, or company leading the five-year review: Altamont Environ.	**Weather/temperature:** Clear 75°

Remedy Includes: (Check all that apply)

- ■ Landfill cover/containment ✓
- ■ Access controls
- ■ Institutional controls
- ■ Groundwater pump and treatment ✓
- ■ Surface water collection and treatment
- ■ Other _____
- ■ Monitored natural attenuation
- ■ Groundwater containment ✓
- ■ Vertical barrier walls

Attachments: ■ Inspection team roster attached ✓ ■ Site map attached ✓

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Stuart Ryman (Name) Project Coordinator (Title) 5-08-07 (Date)
   Interviewed ■ *at site* ■ *at office* ■ *by phone* *Phone no.* _____
   Problems, suggestions; ■ Report attached None

2. **O&M staff** Joey Koor (Name) O&M Specialist (Title) 5.08-07 (Date)
   Interviewed ■ at site ■ at office ■ by phone Phone no. _____
   Problems, suggestions; ■ Report attached None

3. **Local regulatory authorities and response agencies** (*i.e., State and Tribal offices, emergency response* office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

NA

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ■ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ■ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ■ Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ■ Report attached _____

4. **Other interviews** (optional) ■ Report attached.

NA

III. ON-SITE DOCUMENTS & RECORDS VERIFIED *(Check all that apply)*

1. **O&M Documents**
   - ■ O&M manual ✓ ■ Readily available ✓ ■ Up to date ■ N/A
   - ■ As-built drawings ✓ ■ Readily available ✓ ■ Up to date ■ N/A
   - ■ Maintenance logs ✓ ■ Readily available ✓ ■ Up to date ■ N/A

   Remarks O&M MANUAL NOT UP TO DATE

2. **Site-Specific Health and Safety Plan** ■ Readily available ✓ ■ Up to date ✓ ■ N/A
   - ■ *Contingency plan/emergency response plan* ✓ ■ *Readily available* ■ *Up to date* ✓ ■ N/A

   Remarks

3. **O&M and OSHA Training Records** ■ Readily available ✓ ■ Up to date ✓ ■ N/A

   Remarks

4. **Permits and Service Agreements**
   - ■ Air discharge permit – NA ■ Readily available ■ Up to date ■ N/A
   - ■ Effluent discharge – ✓ ■ Readily available ✓ ■ Up to date ✓ ■ N/A
   - ■ Waste disposal, POTW ✓ ■ Readily available ✓ ■ Up to date ✓ ■ N/A
   - ■ Other permits ____ ■ Readily available ■ Up to date ■ N/A

   Remarks

5. **Gas Generation Records** ■ Readily available ■ Up to date ■ N/A

   Remarks (NA)

6. **Settlement Monument Records** ■ Readily available ✓ ■ Up to date ✓ ■ N/A

   Remarks

7. **Groundwater Monitoring Records** ✓ ■ Readily available ✓ ■ Up to date ✓ ■ N/A

   Remarks

8. **Leachate Extraction Records** ■ Readily available ■ Up to date ■ N/A

   Remarks (NA)

9. **Discharge Compliance Records**
   - ■ Air ■ Readily available ■ Up to date ■ N/A
   - ■ Water (effluent) ✓ ■ Readily available ✓ ■ Up to date ✓ ■ N/A

   Remarks

10. **Daily Access/Security Logs** (NA) ■ Readily available ■ Up to date ■ N/A

    Remarks

IV. O&M COSTS

1. **O&M Organization**
   - ▪ State in-house ▪ Contractor for State
   - ▪ PRP in-house ▪ Contractor for PRP
   - ▪ Federal Facility in-house ▪ Contractor for Federal Facility
   - ▪ Other _____

2. **O&M Cost Records**
   - ▪ Readily available ▪ Up to date
   - ▪ Funding mechanism/agreement in place
   - Original O&M cost estimate _____ ▪ Breakdown attached

   Total annual cost by year for review period if available

   From 2000 ~~To~~ → 2006 _____ ▪ Breakdown attached
   (Date / Date / Total cost)
   From _____ To _____ _____ ▪ Breakdown attached
   From _____ To _____ _____ ▪ Breakdown attached
   From _____ To _____ _____ ▪ Breakdown attached
   From _____ To _____ _____ ▪ Breakdown attached

   see details in Report

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: Replace Back Valley Discharge line, Replace one Extraction well, Replace Back Valley Air Stripper

V. ACCESS AND INSTITUTIONAL CONTROLS ▪ Applicable ▪ N/A

A. Fencing

1. **Fencing damaged** ▪ Location shown on site map ▪ Gates secured ▪ N/A
   Remarks Small Area of Damaged Fence At NW Corner of Acid Pit - Associated with Cap Settlement.

B. Other Access Restrictions

1. **Signs and other security measures** ▪ Location shown on site map ▪ N/A
   Remarks Signage is good

C. Institutional Controls (ICs) NA

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ■ Yes ■ No ■ N/A
Site conditions imply ICs not being fully enforced ■ Yes ■ No ■ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) _____
Frequency _____
Responsible party/agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date ■ Yes ■ No ■ N/A
Reports are verified by the lead agency ■ Yes ■ No ■ N/A

Specific requirements in deed or decision documents have been met ■ Yes ■ No ■ N/A
Violations have been reported ■ Yes ■ No ■ N/A
Other problems or suggestions: ■ Report attached

2. **Adequacy** ■ ICs are adequate ■ ICs are inadequate ■ N/A
Remarks ICs NOT implemented

D. General

1. **Vandalism/trespassing** ■ Location shown on site map ■ No vandalism evident
Remarks None

2. **Land use changes on site** ■ N/A
Remarks None

3. **Land use changes off site** ■ N/A
Remarks NA

VI. GENERAL SITE CONDITIONS

A. Roads ■ Applicable ■ N/A

1. **Roads damaged** ■ Location shown on site map ■ Roads adequate ■ N/A
Remarks NA

B. Other Site Conditions

Remarks Overall the site is well maintained and in good condition. Access roads, monitoring well covers and landfill cap vegetation and all improved since the last 5 year review.

VII. LANDFILL COVERS ■ Applicable ■ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ■ Location shown on site map ■ Settlement not evident
Areal extent 50' x 50' Depth 18"
Remarks Acid Pit Settlement

2. **Cracks** ■ Location shown on site map ■ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____

3. **Erosion** ■ Location shown on site map ■ Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Holes** ■ Location shown on site map ■ Holes not evident
Areal extent_____ Depth_____
Remarks_____

5. **Vegetative Cover** ■ Grass ■ Cover properly established ■ No signs of stress
■ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ■ N/A
Remarks_____

7. **Bulges** ■ Location shown on site map ■ Bulges not evident
Areal extent_____ Height_____
Remarks_____

8. **Wet Areas/Water Damage** ▪ Wet areas/water damage not evident
- ▪ Wet areas ▪ Location shown on site map Areal extent N/A
- ▪ Ponding ▪ Location shown on site map Areal extent N/A
- ▪ Seeps ▪ Location shown on site map Areal extent N/A
- ▪ Soft subgrade ▪ Location shown on site map Areal extent N/A

Remarks

9. **Slope Instability** ▪ Slides N/A ▪ Location shown on site map ▪ No evidence of slope instability
Areal extent
Remarks

B. Benches ▪ Applicable ▪ N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ▪ Location shown on site map ▪ N/A or okay
Remarks

2. **Bench Breached** ▪ Location shown on site map ▪ N/A or okay
Remarks

3. **Bench Overtopped** ▪ Location shown on site map ▪ N/A or okay
Remarks

C. Letdown Channels ▪ Applicable ▪ N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ▪ Location shown on site map ▪ No evidence of settlement
Areal extent Depth
Remarks

2. **Material Degradation** ▪ Location shown on site map ▪ No evidence of degradation
Material type Areal extent
Remarks

3. **Erosion** ▪ Location shown on site map ▪ No evidence of erosion
Areal extent Depth
Remarks

4. **Undercutting** ■Location shown on site map ■No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ■No obstructions
■Location shown on site map ~~Areal extent~~_____
Size_____
Remarks_____

6. ~~**Excessive Vegetative Growth**~~ Type_____
■No evidence of ~~excessive growth~~
■ ~~Vegetation~~ in channels does not obstruct flow
■Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ■Applicable ■N/A

1. **Gas Vents** ■Active ■Passive only on Area Pit Cap
■Properly secured/locked ■Functioning ■Routinely sampled ■Good condition
■Evidence of leakage at penetration ■Needs Maintenance
■N/A
Remarks Not routinely sampled

2. **Gas Monitoring Probes**
■Properly secured/locked ■Functioning ■Routinely sampled ■Good condition
■Evidence of leakage at penetration ■Needs Maintenance ■N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
■Properly secured/locked ■Functioning ■Routinely sampled ■Good condition
■Evidence of leakage at penetration ■Needs Maintenance ■N/A
Remarks_____

4. **Leachate Extraction Wells**
■Properly secured/locked ■Functioning ■Routinely sampled ■Good condition
■Evidence of leakage at penetration ■Needs Maintenance ■N/A
Remarks_____

5. **Settlement Monuments** ■Located ■Routinely surveyed ■N/A
Remarks_____

E. Gas Collection and Treatment ▪ Applicable ▪ N/A

1. **Gas Treatment Facilities**
   ▪ Flaring ▪ Thermal destruction ▪ Collection for reuse
   ▪ Good condition ▪ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ▪ Good condition ▪ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ▪ Good condition ▪ Needs Maintenance ▪ N/A
   Remarks_____

F. Cover Drainage Layer ▪ Applicable ▪ N/A

1. **Outlet Pipes Inspected** ▪ Functioning ▪ N/A
   Remarks_____

2. **Outlet Rock Inspected** ▪ Functioning ▪ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ▪ Applicable ▪ N/A

1. **Siltation** Areal extent_____ Depth_____ ▪ N/A
   ▪ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   ▪ Erosion not evident
   Remarks_____

3. **Outlet Works** ▪ Functioning ▪ N/A
   Remarks_____

4. **Dam** ▪ Functioning ▪ N/A
   Remarks_____

H. Retaining Walls ▪ Applicable ▪ N/A

1. **Deformations** ▪ Location shown on site map ▪ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ▪ Location shown on site map ▪ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ▪ Applicable ▪ N/A

1. **Siltation** ▪ Location shown on site map ▪ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. ***Vegetative Growth*** ▪ Location shown on site map ▪ N/A
   ▪ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ▪ Location shown on site map ▪ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ▪ Functioning ▪ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ▪ Applicable ▪ N/A

1. **Settlement** ▪ Location shown on site map ▪ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ▪ Performance not monitored
   Frequency_____ ▪ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES ▪ Applicable ▪ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ▪ Applicable ▪ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
▪ Good condition ▪ All required wells properly operating ▪ Needs Maintenance ▪ N/A
Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
▪ Good condition ▪ Needs Maintenance
Remarks_____

3. **Spare Parts and Equipment**
▪ Readily available ▪ Good condition ▪ Requires upgrade ▪ Needs to be provided
Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines ▪ Applicable ▪ N/A

1. **Collection Structures, Pumps, and Electrical**
▪ Good condition ▪ Needs Maintenance
Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
▪ Good condition ▪ Needs Maintenance
Remarks_____

3. **Spare Parts and Equipment**
▪ Readily available ▪ Good condition ▪ Requires upgrade ▪ Needs to be provided
Remarks_____

C. Treatment System ■Applicable ■N/A

1. **Treatment Train** (Check components that apply)
   ■Metals removal ■Oil/water separation ■Bioremediation
   ■Air stripping ■Carbon adsorbers — FV only
   ■Filters
   ■Additive (*e.g.*, chelation agent, flocculent)
   ■Others — pH ADJUST BV only
   ■Good condition ■Needs Maintenance
   ■Sampling ports properly marked and functional
   ■Sampling/maintenance log displayed and up to date
   ■Equipment properly identified
   ■Quantity of groundwater treated annually
   ■Quantity of surface water treated annually
   Remarks

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ■N/A ■Good condition ■Needs Maintenance
   Remarks

3. **Tanks, Vaults, Storage Vessels**
   ■N/A ■Good condition ■Proper secondary containment ■Needs Maintenance
   Remarks

4. **Discharge Structure and Appurtenances**
   ■N/A ■Good condition ■Needs Maintenance
   Remarks

5. **Treatment Building(s)**
   ■N/A ■Good condition (esp. roof and doorways) ■Needs repair
   ■Chemicals and equipment properly stored
   Remarks New Metal Storage Building Since last five year Design

6. **Monitoring Wells** (pump and treatment remedy)
   ■Properly secured/locked ■Functioning ■Routinely sampled ■Good condition
   ■All required wells located ■Needs Maintenance ■N/A
   Remarks

D. Monitoring Data

1. Monitoring Data
   ■Is routinely submitted on time ■Is of acceptable quality

2. Monitoring data suggests:
   ■Groundwater plume is effectively contained ■Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   - ■ Properly secured/locked
   - ■ Functioning
   - ■ Routinely sampled
   - ■ Good condition
   - ■ All required wells located
   - ■ Needs Maintenance
   - ■ N/A

   Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Pump + TREAT System Functioning well
New Air Stripper installed in Bath Valley in 2007
Limited Area of settlement noted in MW cover of Acid pit Cap.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O+M Measures Are Adequate
Some O+M procedures Are not reflected in the current O+M Manual

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

APPENDIX G

OPERATION AND MAINTENANCE FORMS

Back Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Flow Meter Reading

Date	Time	Magnetic Reading
1		
2		
3		
4		
5		
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8		
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10		
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Back Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Building Conditions

Project CERCLA Site Remediation **Location** Swannanoa, North Carolina

Month:			Building Conditions				
Date	Print Name	Sign	Exterior	Interior	Sump Pump Operation	Exhaust Fan Operation	Files in Order
1							
2							
3							
4							
5							
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31							

Back Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

EQ Tank and Air Stripper Feed Pump Conditions

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		E.Q. Tank			Air Stripper Feed Pumps Condition				
Date	Initials	Condition	Tank Float	pH (Standard Units)	Condition	BV-04 (In Use?)	BV-05 (In Use?)	Flow Rate to Stripper (GPM)	Pump Pressure (PSI)
1									
2									
3									
4									
5									
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Back Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Air Stripper and Chemical Addition

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		Air Stripper				Chemical Addition		Safety Equipment		
Date	Initials	Stripper Tray Condition	Site Glass Condition	Air Flow Rate (CFM)	Differential Pressure (Inches)	Caustic Pump Operation	Volume of Caustic Remaining (GAL)	Eyewash station check	Chemical Shower O.K.?	Fire Extinguisher Pressure O.K.?
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Back Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Outgoing pH readings and Computer Monitoring system

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		Effluent pH readings				Comments
Date	Initials	In-line Probe	Hand-held Probe	Cleaned Inline pH Probe ?	Calibrate Inline pH Meter ?	
1						
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Chemtronics
Rain, Temperature, and Atmospheric Conditions

Month/Year:

Date	Time	Rain	Temp	Atmospheric Conditions
1				
2				
3				
4				
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Chemtronics
Front Valley Daily Flow Meter Readings

Month/Year:

Date	Time	Magnetic Reading	Mechanical Reading
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Front Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Building Conditions

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:			Building Conditions (OK/ NOT OK)				
Date	Print Name	Signature	Exterior	Interior Cleanliness	Sump Pump Operation	Exhaust Fan Operation	Files in Order
1							
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Front Valley Extraction System Information Sheet

Daily Treatment Plant Inspetion

EQ Tank, Air Stripper, and Feed Pump Conditions

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		**E.Q. Tank**		**Feed Pumps**					
Date	Initials	pH (Standard Units)	Condition	FV-04	FV-05	Press. (PSI)	Inst. Flow	Site Glass Condition	Blower Operation
1									
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Front Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Carbon Feed Pumps, Bag Filter, and Granular Activated Carbon Drum Condition

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		Carbon Feed Pumps			Bag Filter		Granular Activated Carbon Drums				
Date	Initials	FV-09 or FV-10 In Use	Pressure (PSI)	Inst. Flow	FV-11 or FV-12 In Use	Condition	Diff. Pressure (PSI)	FV-13 Pressure (PSI)	FV-14 Pressure (PSI)	FV-15 Pressure (PSI)	Drum Conditions
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Front Valley Extraction System Information Sheet

Daily Treatment Plant Inspection

Metering Manhole, and Effluent PH

Project Chemtronics Site Remediation

Location Swannanoa, North Carolina

Month:		**Effluent pH**	**Metering Manhole**		**MMH pH/Comments**
Date	Initials	pH Standerd Units	Chart Recorder	pH	
1					
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5					
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