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April 27, 2005

Mr. Thomas Taccone
Western New York Remediation Section
New York Remediation Branch
Emergency and Remedial Response Division
U.S. Environmental Protection Agency, Region II
290 Broadway, 20th Floor
New York, NY 10007-1866

RE: OPERATIONS AND MAINTENANCE PLAN - NECCO PARK, NIAGARA FALLS, NY

Dear Mr. Taccone:

The enclosed Operations & Maintenance Plan (O&M) was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by USEPA. Specifically, this plan describes in detail the O&M activities for components of the remedial actions for the DuPont Necco Park site in Niagara Falls, New York. Monitoring activities required for long-term operations of the remedial action components are also described in this plan.

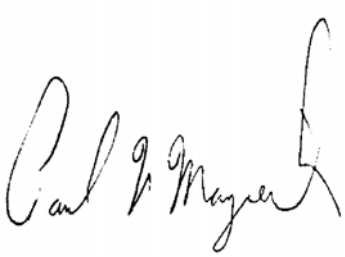
The O&M Plan includes 10 appendices which describe procedures and other related information for the various O&M activities related to the operations of groundwater hydraulic control system and landfill cap upgrade. The appendices are listed below.

Appendix A – Cap Maintenance and Monitoring Plan
Appendix B – Long-Term Groundwater Monitoring Plan (LGMP)
Appendix C – Groundwater Treatment O&M Manual
Appendix D – DNAPL Monitoring and Recovery Plan
Appendix E – Site Management Plan
Appendix F – Sampling, Analysis, and Monitoring Plan (SAMP)
Appendix G – Quality Assurance Project Plan (QAPP)
Appendix H – Health and Safety Plan (HASP)
Appendix I – Waste Management Plan (WMP)
Appendix J – Emergency Actions and Contingency Plan

The Long-Term Groundwater Monitoring Plan was previously submitted and approved on December 1, 2004. Please note that list of wells for hydraulic monitoring and the comprehensive DNAPL survey have been modified to reflect the wells that were abandoned in April 2005. Considering the groundwater pump and treat system has been in operation for less than one month, some of the operation instructions (OIs) included in Appendix C are in draft form. Final OIs will be provided after agency review of the draft O&M plan.

Please contact me at (716) 278-5496 if you have any questions.

Sincerely,
Corporate Remediation Group



Paul F. Mazierski
Principal Project Leader

PFM/mac
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cc: DEC/George A. Shanahan (1),
DEC/Buf/Michael Hinton (1+CD),
TAMS/J. Kaczor (1)

OPERATIONS AND MAINTENANCE PLAN
DUPONT NECCO PARK REMEDIAL PROGRAM
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

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FIGURES

APPENDICES

LIST OF ACRONYMS

AGM	alternative grading material
ANSI	American National Standards Institute
AO	Administrative Order
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
BFI	Browning-Ferris Industries
BL	barrier layer
BPL	Barrier Protection Layer
BUD	beneficial use determination
C & D	construction and demolition
CAA	Clean Air Act
CAMP	Community Air Monitoring Plan
CBS	Chemical Bulk Storage
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
CL	clay
CHMM	Certified Hazardous Materials Manager
CQA	Construction Quality Assurance
CQAPP	Construction Quality Assurance Project Plan
CRG	Corporate Remediation Group
DNAPL	dense nonaqueous-phase liquid
E & S	erosion and sediment
FRP	fiber reinforced pipe
GDC	geosynthetic drainage composite
GM	geomembrane
GPM	gallons per minute
GTF	groundwater treatment facility
HVAC	heating, ventilation and airconditioning
IDS	investigation derived soils
ITPP	Initial Testing Program Plan
ITS	Interim Treatment System
LGMP	Long-term Grounwater Monitoring Plan
NAD	North American Datum
NAPL	nonaqueous-phase liquid
NAVD	North American Vertical Datum
NIMO	Niagara Mohawk
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
O & M	operations and maintenance
PDI	pre-design investigation
PE	Professional engineer

PID	photoionization detection
PM	project manager
POTW	publicly owned treatment works
PPE	personal protective equipment
PVC	polyvinyl chloride
PSM	process safety management
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	remedial action
RAC	Remedial Action Contractor
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation Recovery Act
RDWP	Remedial Design Work Plan
RI	remedial investigation
RI/FS	remedial investigation/ feasibility study
ROD	Record of Decision
SFR	Subsurface Formation Repair
SI	site investigation
SMP	site management plan
SOP	Standard Operating Procedure
SOW	Statement of Work
TCE	trichloroethylene
USCS	Unified soil classification system
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analyte
VOC	volatile organic compound
WCC	Woodward-Clyde Consultants
WWTP	wastewater treatment plant

1.0 INTRODUCTION

This Operations and Maintenance (O&M) Plan identifies and describes tasks necessary for operations and maintenance of the landfill cap upgrade and groundwater hydraulic control remedial actions at the DuPont Necco Park site in located Niagara Falls, New York. Final remedial designs for the landfill cap upgrade and hydraulic control system were approved by United States Environmental Protection Agency (USEPA) on September 30, 2003 and April 8, 2004, respectively. Groundwater hydraulic control system construction will precede construction of the landfill cap upgrade. Construction of the groundwater hydraulic control system will include all elements to achieve and maintain hydraulic control of the A-zone overburden and B through F bedrock flow zones. These elements include installation of the extraction pumps, subsurface conveyance system, and groundwater treatment facility. The landfill cap upgrade will meet the substantive requirements of 6 NYCRR Part 360 standards.

This plan was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by USEPA. Specifically, this plan describes in detail the O&M activities for components of the remedial actions. Monitoring activities required for long-term operations of the remedial action components are also described in this plan.

This document has been organized as follows:

- Section 1 provides an overall summary of the project including site description and background, existing remedial components, selected remedial actions, design and construction tasks completed to date, and an overview of the operations and maintenance program for remedial actions.
- Section 2 provides a summary of the O&M Plan Objectives
- Section 3 and Appendix A describe the O&M Plan for Cap
- Section 4 and Appendix B describe the O&M Plan for Hydraulic and Chemical Monitoring of the contaminant source and Far-Field Areas
- Section 5 and Appendix C describe the O&M Plan for the On-site Groundwater Treatment Facility
- Section 6 and Appendix D describe the O&M Plan for DNAPL Monitoring and Recovery
- Section 7 describes the O&M Plan for Institutional Controls
- Section 8 and Appendices E to J describe Other Work Plans specified in the order
- Section 9 describes Notification Requirements for Pumping Well Downtime
- Section 10 describes Contingency for System Modifications
- Section 11 describes the O&M Schedule and reporting requirements
- Section 12 provides applicable references.

1.1 Site Background

The following sections present the history of the DuPont Necco Park site, including a site description, site background, previous investigations, and existing response actions.

1.1.1 Site Description and History

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York. Necco Park is located off Niagara Falls Boulevard in the City of Niagara Falls (Parcel 296, Liber 138, page 571) and the Town of Niagara (southwest part of Lot 13, Township 13, Range 9), New York (see Figure 1-1). The site is located approximately ½ mile northwest from the Niagara Falls Boulevard exit of Interstate Highway I-190.

Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Browning-Ferris Industries /Allied (BFI/Allied). Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a Conrail (Niagara Junction Railway Company) right-of-way bound the site to the west. Land in the vicinity of the site is almost exclusively zoned for commercial or industrial use. Manufacturing facilities located within one mile of the site include the Niacet Company and Durez Chemical Company located 1,800 feet and 1,100 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.

Local topography at and around the site has been modified significantly by landfill activities and industrial operations. Prior to disposal activities at Necco Park, BFI/Allied, and CECOS, average natural ground surface elevation was about 575 feet above mean sea level (MSL). The natural local gradient was southeast toward the Niagara River. Local topography is now dominated by a number of topographic highs coincident with the BFI sanitary landfill directly east of the site and the CECOS secure hazardous waste landfill cells directly south of the site. The peak elevations of the BFI and CECOS landfills are approximately 665 feet and 630 feet above MSL, respectively.

Prior to placement of alternate grading material (AGM) for the landfill cap upgrade, ground surface at Necco Park sloped from two topographic highs near the center of the landfill (peak elevations of 595 and 593 feet above MSL) to the edges of the site (average 580 feet above MSL). Modification of landfill topography is ongoing with the importation and grading of AGM. A system of drainage swales along the edges of Necco Park collects surface runoff from Necco Park and, to a greater degree, adjacent landfills east and north of Necco Park.

Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company (from which Necco is derived). The site was sold to DuPont in 1930.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on DuPont records and an interpretation of historic aerial photographs. During that period, the site received a

number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill.

Documentation of activities at Necco Park prior to 1964 is limited. The following wastes were disposed of in the largest quantities:

- ❑ Flyash
- ❑ Building demolition and miscellaneous plant debris
- ❑ Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- ❑ Sodium cell rubble (i.e., thermal brick, corroded steel)
- ❑ Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- ❑ Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- ❑ Liming residues [i.e., sludge saturated with tri- and tetrachloroethene (TCE and PCE)]
- ❑ Scrap organic mixtures, off-grade product
- ❑ Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)
- ❑ Refined adiponitrile wastes (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

1.1.2 Existing Remedial Components

Several interim response actions were implemented to mitigate the impact and spread of contamination. These remedial actions are described in the following paragraphs.

During 1978 and 1979, a clay cap was constructed over the 24-acre site. The final compacted cover consisted of a minimum of 18-inches of clay (Unified Soil Classification System Class SC and CL soil). The cap is overlain by a 6-inch cover of topsoil and grass.

In 1982, two existing monitoring wells (D-12 and 52) were converted to recovery wells (RW-1 and RW-2) to control off-site migration of contaminated groundwater in the upper bedrock fracture zones. Wells RW-1 and RW-2 have been used as recovery wells from 1982 to 2005. In 1992, a third recovery well, RW-3, began operation at Necco Park. Well RW-3 penetrates the D, E, and F zones; is located at the center of the southern site boundary; and was pumped at an average rate of 3 to 4 gpm.

Up until April 2004, extracted groundwater was pumped to the adjacent CECOS facility where it was treated and discharged to the Niagara Falls publicly owned treatment works (POTW). DuPont installed an interim treatment system (ITS) in August 2004. The ITS used skid-mounted air stripping equipment to remove volatile organic compounds prior to discharging to the Niagara Falls POTW.

Under normal conditions, wells RW-1 and RW-2 were pumped at an average rate of 10 to 15 gallons per minute (gpm) and 4 to 8 gpm, respectively. Initial evaluations of the recovery well network's effectiveness indicated that continuous operation of the wells created a hydraulic barrier across the entire southern perimeter of the site in the first two bedrock water-bearing zones, the B and C zones (Weston 1982). However, after additional wells were installed during subsequent investigations, a re-evaluation of the recovery well system's effectiveness revealed that some off-site flow from these two zones was occurring, particularly along the eastern site boundary in the C zone (WCC 1984). The primary influence of well RW-2 was observed in the B zone and the primary influence of well RW-1 was observed in the C zone.

To enhance the effectiveness of the groundwater pumping system, the Subsurface Formation Repair (SFR), consisting of a bedrock grout curtain was constructed from July 1988 through September 1989. The grout curtain consisted of a single line of pressure-grouted borings, spaced 10 feet on center and installed, in general, from the top of the bedrock to a depth of 80 feet below grade. The grout curtain extends along the entire west and north perimeter of Necco Park and to just over one-half of the east perimeter. The southeastern and southern perimeters were left ungrouted to allow for the recovery of contaminated groundwater that had migrated beyond the property boundary. To reduce the potential for upgradient increase in the water-table elevation in the overburden, the upper 10 feet of bedrock were not grouted on the northern side of the SFR.

The hydraulic impact of the SFR was evaluated by comparing hydraulic conditions prior to and for several months following installation of the grout curtain. The *SFR Interim Performance Report* (WCC 1990) concluded that the SFR was performing as designed. When operating continuously, the cones of depression associated with wells RW-1 and RW-2 (at rates comparable to pre-SFR) were found to have been significantly enhanced, effecting a nearly complete hydraulic barrier extending throughout the southern boundary of Necco Park in the B and C zones.

A program of dense nonaqueous phase liquids (DNAPL) recovery was initiated in 1989. The program includes the removal of DNAPL from wells where a recoverable thickness of DNAPL is observed. DNAPL recovery rates varied widely from April 1989 through December 1990, ranging from approximately 100 to 400 gallons per month. However, near the end of 1990, a fairly consistent drop in DNAPL recovery rates was observed. Current monthly DNAPL recovery rates have typically been between 15 and 20 gallons with a total of 7,375 gallons of DNAPL recovered as of March 2005.

1.2 Selected Remedy

In March 1998, DuPont and the USEPA agreed upon the statement of work (SOW) defining the scope and performance standards for remedial design and remedial action activities at the Necco Park site. On September 18, 1998, a Record of Decision (ROD)

was issued by the USEPA for the Source Area Operable Unit. Prepared by the USEPA to be consistent with the SOW, the ROD includes:

- containment of the Source Area by upgrading the existing cap;
- utilizing hydraulic measures (pumping of wells and treating groundwater) and/or physical containment to prevent the movement of contaminated groundwater in the overburden;
- utilizing hydraulic measures to prevent contaminated groundwater in the bedrock from migrating beyond the Source Area boundary; treatment of extracted groundwater and DNAPLs; and
- long-term operation and maintenance of the constructed systems.

On October 15, 1998, the USEPA issued the administrative order (AO) requiring DuPont to conduct remedial design and remedial action at the Necco Park site. Pursuant to the AO, the work to be performed shall, at a minimum, achieve the requirements of the SOW and be performed in a manner consistent with the AO.

1.3 Design and Construction Summary

Pre-design investigations were completed to obtain data to support design of an extraction system to achieve and maintain control of the A through F groundwater flow zones and to design a landfill cap that meets the substantive requirements of New York State Part 360. The remedial actions have been designed to meet the objectives and performance standards of the ROD and SOW.

The following final design reports were approved by USEPA:

- ❑ Remedial Design Work Plan for the DuPont Necco Park site in Niagara Falls, New York, submitted February 9, 2000 and approved by USEPA on July 20, 2000 (CRG, 2000).
- ❑ Final (100%) Design Submittal for Cap Upgrade for the DuPont Necco Park site in Niagara Falls, New York, submitted September 12, 2003 and approved by USEPA on September 30, 2003 (CRG, 2003).
- ❑ Final (100%) Design Submittal for Bedrock and Overburden Source Area Hydraulic Controls for the DuPont Necco Park site in Niagara Falls, New York, submitted March 17, 2004 and approved by USEPA on April 8, 2004 (CRG, 2004).

With the approvals of the Final (100%) Design Submittals for the Cap Upgrade and Bedrock and Overburden Source Area Hydraulic Controls, remedial design requirements described in the SOW were fulfilled. The construction sequence for the remedy will be to install the hydraulic controls first, followed by the cap upgrade. A detailed description of the construction activities was provided in the Remedial Action Work Plan (RAWP - CRG, 2004a).

The drawings and specifications included in the contract for the groundwater hydraulic controls were of sufficient detail that construction of the system will meet the design

objectives. Construction of the hydraulic controls portion of the remedy began in August 2004 and were completed April 2005.

Data collected during the pre-design investigations indicated that hydraulic control of the A-zone overburden may be achieved through pumping of the upper bedrock (B/C-zone) wells, thus eliminating the need to construct a physical barrier to control the A Zone overburden. Hydraulic head monitoring of the A-zone is ongoing (for the existing system) and will continue during long-term monitoring to further assess the effectiveness of A-zone control by pumping the B/C-zone wells.

DuPont has elected to construct a treatment facility on the Necco Park site to treat groundwater from the new extraction system. Construction of the groundwater treatment facility is part of the hydraulic controls contract completed in April 2005. The Niagara Falls POTW has issued DuPont a discharge permit for acceptance of the treated groundwater (Niagara Falls Water Board Wastewater Facilities: Discharge Permit SIU #64, re-issued March 2005). The permit is provided with the Site Management Plan (Appendix E).

The cap upgrade portion of the remedy started in 2002 with placement of subgrade materials to achieve minimum slopes specified in the approved design. Placement of cap subgrade materials is on-going. Upon completion of construction activities for the hydraulic controls, the final phase of the cap upgrade portion of the remedy will be completed. Final completion of the cap construction activities is anticipated in Spring/Summer of 2006.

1.4 Final Remedy Performance Standards

DuPont will conduct monitoring to assure the final remedy performance standards are met. The performance standards were provided in Section A.7 of the SOW and are included in this section for reference:

The work to be performed by the DuPont Corporation shall achieve all performance standards for the design, implementation, and operation and maintenance of the remedial system(s) and all requirements set forth in this SOW. The following minimum performance standards shall be met:

a. The existing cap shall be upgraded to satisfy the substantive requirements of NYCRR Part 360 standards to the satisfaction of the NYSDEC and EPA.

b. Contaminated groundwater in the overburden (a.k.a. the A zone) shall be prevented from migrating away from the source area to the far-field. The source area boundary shall be defined for specific groundwater flow zones (aquifer or aquifers which possess similar physical and/or hydraulic characteristics) by utilizing the same criteria developed for the delineation of the source area in the Investigation and Analysis of Alternative (I/AOA): 1) the extent in those zones where free-phase and residual DNAPL is observed in extraction wells, monitoring wells or otherwise; and 2) the extent in those zones where the concentration of contaminants in the groundwater may indicate the presence of DNAPL. The following solubility criteria shall be utilized to indicate that DNAPL may be present: a) one percent of a given compound's pure-phase solubility, and b) one

hundred percent of the effective solubility for a given compound. (EPA publication 9355.4-07FS) Based on numerous hydrogeologic investigations at the site, a source area will be identified for three distinct flow zones: 1) the overburden (A zone), 2) the upper bedrock (B and C zones), and 3) the lower bedrock zones (D, E and F zones).

Contaminated groundwater in the overburden (A zone) shall be prevented from migrating from the source area through hydraulic (e.g., installation and operation of a groundwater extraction system) and/or physical (e.g., sheet pile, slurry wall) methods. If a hydraulic system is employed, it shall be demonstrated that contaminated groundwater does not flow from the source area into the far-field by establishing hydraulic control. (For all zones, hydraulic control is defined as: the containment or control of the contaminated source area groundwater in such a manner as to prevent movement or migration of the contaminated source area groundwater beyond the downgradient boundary of the source area to the far-field. Success in obtaining hydraulic control will be defined as: the achievement of hydrodynamic control at the outer limits of the contaminated source area groundwater such that hydraulic gradients are inward to the pumping system(s). Methods for verifying that an inward gradient has been established are identified in the appropriate sections below.) Evidence of source area hydraulic control in the overburden shall be established through the installation, operation, maintenance, and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or other means. If a physical barrier system is employed, it shall be demonstrated that contaminated groundwater in the overburden (A zone) does not flow through, beneath, or around the barrier system. This shall be demonstrated through the installation, operation, maintenance and monitoring of groundwater monitoring wells/piezometers and/or other means.

c. Contaminated groundwater in the upper and lower bedrock flow zones (a.k.a. the B/C and D/E/F zones) shall be prevented from migrating from the applicable source area (The source areas shall be defined as per A.7.b, above) by hydraulic methods. It shall be demonstrated that contaminated groundwater flow does not occur from the source area to the far-field. Evidence of source area hydraulic control shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or other means.

d. A hydraulic monitoring program shall be developed, implemented and maintained to verify that hydraulic control of the source area has been created, stabilized and maintained in the overburden and bedrock (A through F zones). (To verify that hydraulic control is achieved, several hydraulic methods shall be utilized including, but not limited to, the following: 1) Comparing hydraulic heads in paired piezometers/monitoring wells; 2) Capture zone analysis incorporating aquifer test and potentiometric surface data; 3) Calculating capture zones using the appropriate method(s) (e.g., semianalytical or numerical modeling to compute capture zones, groundwater pathlines, and associated travel times); 4) Generating potentiometric surface maps developed using all available

comparable (i.e., hydraulic head measurements in extraction wells shall not be compared to hydraulic head measurements in piezometers/monitoring wells without correction or justification) hydraulic head data (measured in wells within and outside the containment area). All of the aforementioned methods shall be used in conjunction with groundwater chemistry monitoring (see below) to determine that hydraulic control has been established. In addition, equipment such as flowmeters, colloidal borescopes or tracers may also be used to assist in determining groundwater flow directions. The hydraulic monitoring program shall utilize the existing monitoring well network, where appropriate. Installation of additional groundwater monitoring wells/piezometers may be required to verify the establishment of hydraulic control.

e. Treatment of all extracted contaminated groundwater, either on-Site or off-Site, shall be performed to meet all appropriate federal and State discharge standards;

f. A chemical monitoring program that includes sampling and analysis of the groundwater shall be developed, implemented and maintained to monitor the following:

i. Status of the extent of source area as defined in this SOW.

ii. The effectiveness of the remedial measures after implementation. Long-term groundwater sampling and analysis shall be conducted in conjunction with hydraulic monitoring and other methods, to verify and measure the effectiveness of the hydraulic/physical systems in containing the source area. Trends in contaminant concentrations shall be monitored, measured and recorded to evaluate whether the remedial measures are functioning as designed.

iii. The long-term effects of the remedial measures on the groundwater quality in the far-field shall be assessed. Groundwater sampling and analysis shall also be conducted in the far-field to evaluate trends in contaminant concentrations over time.

The minimum chemical monitoring program elements, discussed above, shall utilize the existing monitoring well network as appropriate. Installation of additional groundwater monitoring wells/piezometers may be required.

g. Monitoring for the occurrence of free-phase DNAPL shall be conducted within the source area and in the far-field. DNAPL monitoring shall be performed utilizing the existing monitoring well network as appropriate. Installation of additional DNAPL monitoring wells shall be required. As appropriate, these DNAPL monitoring wells may be the same as the groundwater monitoring wells installed to fulfill the aforementioned groundwater monitoring requirements. When recoverable DNAPL is encountered, it shall be removed by bailing, installation of a DNAPL extraction well or other means.

h. Institutional controls shall be developed, implemented and maintained to: limit and control Site access; prevent the use of, and exposure to, groundwater beneath the Necco Park facility; and prevent the development and/or transfer of the Necco Park facility for any use incompatible with the remedy selected. EPA and

NYSDEC shall determine whether any proposed use of the property is protective of human health and the environment based on Site conditions. Controls shall be implemented through deed restrictions (e.g., covenants and easements) or other appropriate means.

i. Once the remedial systems have been installed and, are determined to be operational and functional (see K.1.b.v., below), DuPont shall operate the systems as designed on a continuous basis. If any well in the pumping system is not operating ("down") for a period of more than three (3) days consecutively or five (5) days in a thirty (30) day period, DuPont shall notify EPA and NYSDEC. The notification will include a plan for restoring system operation as quickly as possible.

j. In the event that operation of the remedial system(s) is discontinuous, or if, based on the review of the hydraulic monitoring data, chemical monitoring data, or DNAPL monitoring data any of the following conditions occur:

- *the hydraulic/physical containment systems do not establish hydraulic control as defined in A.7.b., above, on a consistent basis;*
- *free phase DNAPL is discovered in areas outside the hydraulic/physical containment system(s), or contaminant concentrations in the groundwater in areas outside the hydraulic/physical containment system(s) indicate that DNAPL may be present on a consistent basis;*
- *chemical monitoring indicates that: 1) the estimated total contaminant mass in the groundwater beyond the containment perimeter increases with time or, 2) retarded contaminants that were previously restricted to the containment area are detected in perimeter monitoring wells on a consistent basis or, 3) concentrations of contaminants in the groundwater downgradient of the hydraulic/physical containment systems do not show a substantial decrease over time;*
- *after installation, the remedial systems do not consistently achieve the Performance Standards, as specified in this SOW;*

then complete source area containment will be in question and additional assessment of the above condition(s) will be required. Following such assessment by DuPont, DuPont will submit to EPA the assessment, including a contingency plan for modification of the system as constructed and for the implementation of further actions determined necessary to meet the performance standards. Modifications may include: the redefinition of the source area, additional groundwater extraction, or other measures. EPA will either approve the contingency plan, or will require modification of such plan, in accordance with the procedures set forth in the AO. Following EPA approval of the contingency plan, DuPont shall implement the modifications to the remedial measures to meet the performance standards as outlined in the plan.

1.5 Operations and Maintenance Program Objectives

Operation and maintenance activities are necessary to assure the remedial actions meet performance standards. The primary objectives of the Necco Park O&M program are to:

- ❑ Maintain effectiveness of cap upgrades and surface water controls
- ❑ Operate and maintain the groundwater extraction and treatment systems
- ❑ Operate and maintain the DNAPL recovery program
- ❑ Develop and implement a long-term groundwater and DNAPL monitoring program
- ❑ Implement institutional controls

This Plan describes the elements of the Necco Park O&M program.

2.0 O&M PLAN OBJECTIVES

This plan was prepared to meet the overall O&M objectives of the site. DuPont has operated and maintained remedial actions at the site since the closure of the landfill in 1977. Therefore, the key elements to transition from construction to the O&M phase are essentially in place. The overall O&M program elements have been updated in this plan to reflect the final remedy components and to meet the O&M plan requirements specified in Section K.2.a of the SOW. This plan has been organized to include the following summary sections in the body of the O&M plan and supporting detailed work plans provided as Appendices:

- Section 3 and Appendix A describe the O&M Plan for Cap
- Section 4 and Appendix B describe the O&M Plan for Hydraulic and Chemical Monitoring of the contaminant source and Far-Field Areas
- Section 5 and Appendix C describe the O&M Plan for the Groundwater Treatment Facility
- Section 6 and Appendix D describe the O&M Plan for DNAPL Monitoring and Recovery
- Section 7 describes the O&M Plan for Institutional Controls
- Section 8 and Appendices E to J describe other work plans specified in the SOW
- Section 9 describes Notification Requirements for Pumping Well Downtime
- Section 10 describes the contingency plan for the site.
- Section 11 describes the O&M Schedule and reporting requirements

3.0 O&M PLAN FOR CAP

The O&M Plan for the cap is provided in Appendix A and describes the activities required to assure the cap and surface water control for the site are properly maintained. O&M activities will include maintenance of the vegetative cover, periodic inspections, and repairs to the cap or surface water controls.

4.0 MONITORING OF CONTAMINANT SOURCE AND FAR-FIELD AREAS

Hydraulic and chemical monitoring of the contaminant source and far-field areas is covered in the Long-Term Groundwater Monitoring Plan (LGMP) provided as Appendix B. The LGMP was included with the Final (100%) Design Submittal for Bedrock and Overburden Source Area Hydraulic Controls (CRG, 2004b), and was approved by USEPA on December 1, 2004.

5.0 GROUNDWATER TREATMENT FACILITY

The O&M manual for the on-site Groundwater Treatment Facility (GWTF) is provided as Appendix C. This manual has been prepared in accordance with DuPont Process Safety Management (PSM) guidelines and includes a technology description and standard operating procedures for the groundwater extraction and treatment system.

The groundwater O&M manual, in conjunction with vendor O&M manuals, describes normal operation and shut-down procedures, emergency shut-down procedures, alarm conditions, and trouble-shooting and preventative maintenance procedures.

6.0 DNAPL MONITORING AND RECOVERY

The O&M plan for DNAPL Monitoring and Recovery is provided as Appendix D. The DNAPL monitoring and recovery, and disposal procedures have been in effect since the 1990's and have been updated as part of this O&M Plan.

7.0 INSTITUTIONAL CONTROLS

Institutional controls have been developed, implemented, and maintained to:

- limit and control Site access;
- prevent the use of, and exposure to, groundwater beneath the Necco Park facility; and
- prevent the development and/or transfer of the Necco Park facility for any use incompatible with the remedy selected.

USEPA and NYSDEC shall determine whether any proposed use of the property is protective of human health and the environment based on Site conditions. Controls shall be implemented through deed restrictions (e.g., covenants and easements) or other appropriate means.

Institutional controls have been in-place at the Necco Park site since the 1970's and will remain in effect throughout the O&M phase. Site security is maintained through site control measures in place at the surrounding facilities. Groundwater and deed restrictions are also in place. These land use deed restrictions will remain in effect if the property is transferred to another party.

8.0 OTHER WORK PLANS

Other supporting work plans specified in Section K.2.a of the SOW are provided in the Appendices, including:

- Site Management Plan (Appendix E)
- Sampling Analysis and Monitoring Plan (Appendix F)
- Quality Assurance Project Plan (Appendix G)
- Health and Safety Plan (Appendix H)
- Waste Management Plan (Appendix I)
- Emergency Action and Contingency Plan (Appendix J)

9.0 NOTIFICATION OF PUMPING WELL DOWNTIME

Once the remedial systems have been installed and are determined to be operational and functional, DuPont shall operate the systems as designed on a continuous basis. If any well in the pumping system is not operating ("down") for a period of more than 48 hours consecutively or five (5) days in a thirty (30) day period, DuPont shall notify USEPA and NYSDEC. The notification will include a plan for restoring system operation as quickly as possible.

10.0 CONTINGENCY FOR SYSTEM MODIFICATIONS

In the event that operation of the remedial system(s) is discontinuous, or if, based on the review of the hydraulic monitoring data, chemical monitoring data, or DNAPL monitoring data any of the following conditions occur:

- the hydraulic containment systems do not establish hydraulic control as defined in the performance standards, on a consistent basis;
- free phase DNAPL is encountered in areas outside the area of hydraulic control, or contaminant concentrations in the groundwater in areas outside the area of hydraulic control indicate that DNAPL may be present on a consistent basis;
- chemical monitoring indicates that: 1) the estimated total contaminant mass in the groundwater beyond the area of hydraulic control increases with time or, 2) retarded contaminants that were previously restricted to the containment area are detected in perimeter monitoring wells on a consistent basis or, 3) concentrations of contaminants in groundwater downgradient of the hydraulic/physical containment systems do not show a decrease over time;
- after installation, the remedial systems do not consistently achieve the Performance Standards, as specified in the SOW;

Then complete source area containment will be in question and additional assessment of the above condition(s) will be warranted. The scope of the assessment to address potential modifications to the remedial system may include installation of additional monitoring wells and pumping tests.

Following such assessment by DuPont, DuPont will submit to USEPA the assessment, including a contingency plan for modification of the system as constructed and for the implementation of further actions determined necessary to meet the performance standards. Modifications may include: the redefinition of the source area, additional groundwater extraction, or other measures.

USEPA will either approve the contingency plan, or will require modification of such plan, in accordance with the procedures set forth in the AO. Following USEPA approval of the contingency plan, DuPont will implement the modifications to the remedial measures to meet the performance standards as outlined in the plan.

11.0 SCHEDULE AND REPORTING

Assuming a full-scale system operation start date of April 5, 2005, the following monitoring will be conducted in 2005:

Task	**Duration**
Comprehensive DNAPL Survey	April 25th to May 4th
First Semi-Annual Groundwater Sampling Event	May 4th to May 13th
Second 2005 Semi-Annual Groundwater Event	October 31st to November 9th

In addition to the key events included above, monthly water levels and DNAPL observations conducted in 2004 will continue in 2005.

Quarterly reports, to be submitted 30 days after the end of the quarter, will include the following:

- ❑ Water levels
- ❑ Potentiometric surface maps contoured at one foot intervals
- ❑ DNAPL observation and removal summary
- ❑ Summary of system operations

Assuming a system operation start date of April 5, 2005, the first quarterly report will be submitted to USEPA at the end of July.

12.0 REFERENCES

DuPont Corporate Remediation Group (CRG), 2004a. *Initial Testing Program Plan,* Necco Park, Niagara Falls, New York.

_____. 2004b. *Remedial Action Work Plan,* Necco Park, Niagara Falls, New York.

_____. 2004c. *Final (100%) Design Report Bedrock and Overburden Source Area Hydraulic Controls,* Necco Park, Niagara Falls, New York.

_____. 2003. *Final (100%) Design Submittal – Cap Upgrade,* Necco Park, Niagara Falls, New York.

_____. 2000. *Remedial Design Work Plan,* Necco Park, Niagara Falls, New York.

Woodward-Clyde Consultants (WCC). 1984. *Site Assessment Studies,* Necco Park Volumes I and II.

Roy F. Weston, 1982. *Evaluation of Proposed Recovery Well System,* Necco Park Landfill.

Niagara Falls Water Board Wastewater Facilities: Discharge Permit SIU #64A, April 2004.

New York State Department of Environmental Conservation approval letter, by Lawrence Stiller to Paul Mazierski, May 27, 2004.

FIGURES

DUPONT

Corporate Remediation Group

An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1

APPENDICES

APPENDIX A
CAP MAINTENANCE & MONITORING PLAN
REMEDIAL PROGRAM
DUPONT NECCO PARK
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD Project No.:18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

TABLE OF CONTENTS

EXHIBITS

1.0 INTRODUCTION

This Cap Operation and Maintenance Plan (O&M Plan) is a required element of the remedial action at the Necco Park Landfill. The O&M Plan is a "living" document; that can be continually revised and enhanced to reflect repairs and modifications made to the completed work.

This plan was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by United States Environmental Protection Agency (USEPA). Specifically, this plan describes the requirements for long term operation and maintenance, as well as inspections and reporting, for the Necco Park Landfill Cap Upgrade.

This Cap O&M Plan has been prepared in accordance with the requirements of the Necco Park Landfill Statement of Work (SOW), Section K.2.9 "Operation and Maintenance Plan", pursuant to the AO. The specific SOW requirements in this regard are stated in the O&M Plan. This Cap O&M Plan, together with the O&M Plan for the site remedy (main document), meet the requirements set forth in the New York State Department of Environmental Conservation (NYSDEC) Official Compilation of Codes, Rules, and Regulations (6 NYCRR Part 360) and the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) dated April 20, 1992 for Operation, Maintenance and Monitoring Manuals for Hazardous Waste Sites.

1.1 Purpose and Organization of Plan

This Cap O&M Plan contains requirements for the final cover including gas vents and the surface water control system. Operation and maintenance requirements for the remaining components or the remedy (groundwater collection and treatment) are described in the O&M Plan.

This plan has been organized as follows:

- Section 1.0 provides an overall summary of the purpose and key components of the Cap O&M Plan.
- Section 2.0 describes the components of the landfill cap upgrade. Those components, which will require regular long-term maintenance, are the final landfill cover, gas vents, and surface water control features.
- Section 3.0 describes the requirements and outlines the process for regular site inspections and routine (scheduled) maintenance planned for the landfill cap upgrade.
- Section 4.0 contains the requirements for reporting the results of operations, maintenance, and inspections to the agencies.
- Section 5.0 provides definition of applicable references used in this plan.

2.0 SITE REMEDIATION

2.1 Site Background

A detailed summary of the site description, history, required remedial action, and the status of remedial actions implemented to date are described in Section 1.0 of the O&M Plan. The use of alternate grading material (AGM) for cap subgrade grading fill was approved with the USEPA and NYSDEC acceptance of the November 2001 and March 2002 BUD/AGM applications. As described in these applications, AGM is physically suitable for subgrade grading fill and will not adversely impact human health and safety and/or the environment. In addition, AGM for cap subgrade grading fill also meets the requirements noted in the following 6 NYCRR Part 360-2.13 (i)(1). The cap upgrade will be constructed in 2005 to 2006. This O&M plan addressed post-closure activities conducted after the cap construction is complete.

2.2 Cap Upgrade Existing Conditions

This section describes components of the Final Cap Upgrade that are currently being conducted. The completed Final Design and As-Constructed Conditions for the Cap Upgrade portion of the Site Remedy are, or will be, fully detailed in the following documents:

1. Final Design Submittal, Cap Upgrade, Necco Park Site, Niagara Falls, New York, submitted September 12, 2003 and approved by USEPA on September 30, 2003;
2. Remedial Action Work Plan, DuPont Necco Park Remedial Program, Niagara Falls, New York submitted August 11, 2004 and approved by USEPA on August 18,2004;
3. Final Construction Report, Cap Upgrade, Necco Park Site, Niagara Falls, New York (to be submitted after construction).

2.2.1 Cap Cross Section

There are three types of multi-layer cap cross sections, depending on the cap slope. Cap cross sections are as follows, layers shown are from the top downward (see Record Construction Drawings):

- Type 1 (2 to 5 Percent Slope)
  - Vegetative layer (6-inch thickness)
  - Barrier Protection Layer (BPL) (12-inch thickness)
  - Cushion geotextile
  - Smooth 40-mil Linear Low Density Polyethylene (LLDPE) geomembrane
  - Prepared subgrade (Alternative Grading Material [AGM] or existing clay cap soil)

- ❑ Type 2 (6 to 20 Percent Slope)
  - Vegetative layer (6-inch thickness)
  - BPL (12-inch thickness)
  - Geosynthetic Drainage Composite (GDC)
  - Textured 40-mil LLDPE geomembrane
  - Prepared subgrade (AGM or existing clay cap soil)

2.2.2 Cap Components

Vegetative Layer

The vegetative layer protects the underlying BPL from erosion. The vegetative layer consists of the existing on-site soil that currently supports a vigorous growth of grass, supplemented with topsoil supplied from an off-site source.

Barrier Protection Layer (BPL)

The BPL protects the underlying geosynthetics from damage. The BPL is 1-foot in thickness and consists partially of on-site clay material, which was stripped prior to grading. An off-site BPL soil source will also be used to supplement the volume of BPL available on-site. The BPL will be placed in a single lift to protect the underlying geosynthetics. The BPL also possesses sufficient moisture retention to promote establishment of vegetation in the overlying vegetative layer.

Based on the pre-design investigations, the existing clay was found to contain a maximum particle size of about 1-inch. Therefore, a cushion geotextile was installed below the BPL on the Type 1 Cap, where GDC is not present to protect the geomembrane.

Cushion Geotextile

The cushion geotextile for the Type 1 cap system is a nonwoven needle-punched fabric with a mass per unit area of 16 ounces/square yard. This is a common application for this geotextile in the landfill industry. The cushion provides a higher degree of confidence in protection of the geomembrane if the BPL contains larger stones. Without the cushion, the maximum allowable stone in the BPL would be limited to about a 1/2-inch, requiring very costly screening of existing site soils and perhaps rejection of onsite soil for use as BPL all together.

Geosynthetic Drainage Composite (GDC)

The GDC, in the Type 2 cap system, consists of a 3-layer system of geonet bonded on both sides to a lightweight nonwoven needle-punched geotextile. The lower geotextile provides veneer stability against the underlying geomembrane. The upper geotextile acts as a filter preventing fines from migrating to the geonet core. The geonet core transmits water infiltrating through the BPL, thereby preventing any head build-up and related lateral seepage within the BPL. Drainage of the GDC to the perimeter ditch system is an important factor in the long-term performance of the Type 2 cap. By evaluating the proper GDC drainage will be evaluated during each inspection by assessing the degree of

saturation of side-slopes in comparison to the TOW or scope area (where GDC drains). Saturated TOE of scope areas will be an indication of inadequate GBC drainage.

Geomembrane

The geomembrane is a 40-mil LLDPE in accordance with 6NYCRR Part 360. The Type 1 cap system contains a smooth geomembrane, while the Type 2 cap system incorporates a textured geomembrane. The textured geomembrane is textured on both sides to provide veneer stability against the overlying GDC and the underlying subgrade (AGM and/or existing clay).

Cap Subgrade

The subgrade on which the geomembrane is placed consists of AGM or existing clay soil depending upon the proposed subgrade elevation. AGM and existing clay with loose particles sizes larger than a 1/2-inch were removed from the surface of the subgrade. A maximum particle size of 1/2-inch is generally the recommended industry standard for geomembrane subgrades. Some hand-picking of stones from the existing clay was necessary. AGM with large sizes such as C&D debris was limited to the deeper depths of AGM fill areas to a minimum depth of 1-foot below the geomembrane so as not to compromise the cap.

Gas Vents

Based on air monitoring results and gas generation calculations, it was determined that a gas collection/venting layer was not required for proper performance of the landfill cap. However, gas vents were installed as a precaution against unforeseen gas emissions that could rise through the waste and become trapped below the geomembrane, potentially causing uplift.

The gas venting wells are constructed of a 6-inch diameter PVC pipe, with a slotted PVC pipe extending a minimum of 3-feet below the geomembrane. The top of the wells extend 4-feet above the final elevation of the landfill and will be finished with two 90-degree elbows to prevent precipitation from entering and passing below the liner. The geomembrane is sealed to the vent pipes outer circumference to prevent the precipitation from penetration through the cap.

During completion of the design the USEPA and NYSDEC requested the evaluation of contingent treatment for sulfide surface odors that could emanate from the AGM, particularly from waste calcium sulfate. The venting system will allow gas treatment at the vents with carbon canisters to remove odors, should they occur. Gas vent inspections will determine whether or not odors are present.

3.0 SITE MAINTENANCE

3.1 General Maintenance and Inspections

Site maintenance covers the routine inspection and upkeep of all of the major site components and their respective functions throughout the post-closure care period. The minimum initial frequency of regular inspections will be four times per year, although personnel will be onsite and informal inspections will be conducted of the site on a continuous basis. Inspection frequency (documentation) may be reduced or increased based on the general condition of site features and maintenance history, with concurrence of the USEPA and NYSDEC. Snow cover during winter months will preclude the completion of regular scheduled inspections. All general inspection and maintenance activities will be documented as discussed in Section 4.0.

The scheduled maintenance activities presented in this section should be adequate to maintain the landfill cap in proper operating condition.

The DuPont O&M Team or a contracted maintenance firm will perform the required routine maintenance, which will include:

- Cutting of the vegetation on the final cover and grass-lined ditches and swales three times a year (late spring, mid-summer, and late autumn). To prevent the invasion of weeds and brush, the seed mix specified for the final cover is designed for the infrequent mowing.
- Fertilization and liming will be conducted on re-seeded areas resulting from erosion, washouts, etc. The level of fertilization and liming will be selected for the grass species, soil type, and setting. The seeding requirements are provided in the Record Construction Specifications.
- Cleaning the swales and ditches of accumulated leaves, twigs, and sediment will be conducted on an annual basis. Due to site conditions, the runoff in the perimeter ditch cannot attain "scouring velocity" which would otherwise allow the ditch to become self-cleaning with respect to sediment. As a result of this low-sloped ditch, sediment buildup will be closely monitored and removed as necessary.

Inspections of the remedial components will be performed immediately after scheduled maintenance tasks, and will be done by a qualified inspector experienced in the construction and function of a multi-layered cover system. In addition, further inspections will be performed following abnormally long duration or high intensity rain events (5-yr storm event). As appropriate, inspections will also be performed to evaluate erosion following heavy snowmelt. The purpose of these inspections will be to identify any potential problems with the remedial system that are not being addressed adequately by routine maintenance, and to document runoff and erosion control of the system. The inspector will complete the site inspection checklist during or immediately following each inspection.

For each inspection, the inspector will evaluate the following items and will estimate the nature and extent of corrective action required:

- ❑ Surface Water Control Features - Channel cross-sections must be inspected to ensure that sideslopes are stable. Inspection will be made for scour, sediment deposition, breaches, rodent holes, and other damage.
- ❑ Leachate Seeps - Any areas of leachate seeps will be noted and monitored. The need for adding remedial controls in any such areas will be assessed. The inspector will be thoroughly familiar with the location of the GDC drainage and will be able to identify abnormal seepage as well as normal GDC drainage.
- ❑ Landscaping - The vigor and density of the vegetative cover on the cap, ditches, and swales will be assessed. The location and extent of bare, sparse, and undernourished areas will be noted. Areas of significant weeds, woody brush, or deep-rooted vegetation will be noted. The need for vegetation removal in any such area will be assessed.
- ❑ Vermin Control - The cap will be inspected for damage due to vectors and/or burrowing animals. Any damaged areas will be flagged and noted.
- ❑ Erosion - The presence and extent of any rills or other signs of erosion of the final cover or perimeter ditches will be noted.
- ❑ Gas Vents - The condition of all gas vents will be inspected and noted. Visual inspection will be made for clogging of the vent opening by birds or insects.
- ❑ Settlements - Visual evidence of differential settlement of the final cover will be noted and its impact on the integrity of the final cover, swales, or required drainage patterns will be assessed.
- ❑ Access Roads -Vehicular traffic across the landfill cap will be restricted to travel on the engineered access roads. These vehicles will be necessary to inspect and maintain the site, and to perform necessary services. Rutting, cracking, or other damage to the access roads across the landfill will be noted. Damage caused to the cap by vehicles leaving the improved roadways will be documented and repaired.

3.2 Mowing

The landfill cap will be mowed at a frequency designed to minimize the likelihood of the accumulation of clippings, which could smother the vegetative cover. It is anticipated that mowing will be completed three times a year. Any undesirable species will be removed if their presence is suspected of having the potential to harm the geomembrane within the cap. The seed mix utilized for the landfill cap is designed for infrequent mowing, and the minimum necessary to prevent the invasion of weeds and brush. A fertilizer, consisting of a minimum percentage of 12 percent nitrogen of which 50 percent is organic, 12 percent available phosphoric acid and 12 percent potash, will be applied to newly repaired areas, and as needed to promote growth of the vegetative layer.

3.3 Landfill Cap System

The landfill cap is a multi-layer system consisting of soils and synthetic materials so judgement will be necessary to determine the condition of underlying/hidden layers.

Any signs of erosion, settling, cracking or other site maintenance problems detected during routine site inspections will be evaluated, and, if deemed necessary, corrected as soon as possible. All eroded areas will be brought back to original grade according to the procedures described for constructing the final cover. Settling which results in ponding of water will be regraded and re-vegetated as necessary to eliminate the ponding. All bare spots in the final cover will be reseeded and fertilized as necessary, but not less than once every year. Seed and fertilizer will be of the same quality as specified in Section 3.2.

The need for cover repairs due to subsidence and/or settling will be determined based on an evaluation of whether the functions of the landfill cap components in the affected area has been impaired. Those areas where the function has been impaired, or will be impaired, will be repaired to ensure that the integrity of the final cover is maintained. These repair actions may include:

- ❑ Strip and stockpile topsoil from the affected area.
- ❑ Strip and stockpile barrier protection soil from the affected area to expose geosynthetics.
- ❑ Repair, remove, or replace the geomembrane and/or overlying drainage composite in accordance with the manufacturer's directions.
- ❑ Repair gas vent riser then reinstall the geomembrane and GDC.
- ❑ Regrade the affected area to blend in with the existing slopes and the general configuration of the grading plan, using barrier protection soil.
- ❑ Replace topsoil and re-vegetate affected areas in accordance with required practice.

In the event that damage to the final cover is observed during the inspection, corrective action to repair the damaged area will be performed promptly in accordance with the following sections. The USEPA and NYSDEC will be notified of the damage and the date of the corrective action.

3.3.1 Significant Bare or Sparse Areas

Any significant areas on the final cover that are bare or sparsely vegetated will be prepared, reseeded, mulched, and maintained.

3.3.2 Rill Erosion of the Final Cover

An insufficient vegetative cover can cause rill erosion. If left unchecked, the rills will deepen and could compromise the integrity of the final cover. The eroded topsoil must be scarified, regraded, and/or replaced as necessary. The topsoil then must be seeded, mulched, and fertilized. The seeding, mulching, and fertilization requirements are

contained in the Construction Specifications. Additional grading may also be necessary of the surrounding areas to prevent future runoff concentration and erosion.

3.3.3 Differential Settlement of the Final Cover

Areas of differential settlement of the cap will be repaired where the settlement would cause ponding of precipitation, or concentrated flows that could erode the cover. Repair will consist of placing earth fill (topsoil) to return the area to existing (adjacent) grades, restoring the original drainage patterns. The area will then be seeded, mulched, and fertilized to restore the vegetative cover.

3.3.4 Geosynthetic Drainage Composite Repair

Drainage composites tend to be susceptible to clogging by fines as well as to deterioration when the overlying soil has eroded and sediment-laden runoff washes over the surface of the exposed composite. Any exposed geocomposite will be required to be cut open in a minimum of three places along flow direction (perpendicular to grade contours) to facilitate thorough inspection of the drainage net. If possible, the cut geotextile will then be repaired by sewing a patch of geotextile of the same type as the original/cut geotextile. The geotextile is typically bonded to geonet so replacement of geonet along with geotextile will be necessary if the repair is deemed a "major" repair by the inspector. If the inspection requires replacement of drainage composite then the extent of sediment-clogged composite will be uncovered, removed, and replaced using methods required by the Record Construction Specifications.

3.3.5 Geomembrane Liner Repair

Repair of defective area(s) of the geomembrane liner may involve exposure, brooming, and washing. If the geomembrane is penetrated and comprised, a patch will be cut from like materials and seamed into the repair area.

All seams created in the repairing procedure will be fabricated in accordance with the manufacturer's directions and will be subjected to the same non-destructive test procedures specified in the Record Construction Specifications.

The following tasks must be performed for proper repair of the geomembrane liner:

- ❑ Strip topsoil and barrier protective soil surrounding the damaged area
- ❑ Remove geosynthetic drainage system (if present)
- ❑ Remove damaged geomembrane liner and inspect underlying subgrade (remove objectionable materials, if necessary)
- ❑ Backfill, grade, and compact subgrade, as necessary, to form a uniform surface for placement of new geosynthetics
- ❑ Place and seam cushion geotextile underlying geomembrane, liner as necessary
- ❑ Place and weld geomembrane liner

- ❑ Place and seam geosynthetic drainage composite, or cushion geotextile (if necessary)
- ❑ Perform all required quality assurance/quality control (QA/QC) testing, as outlined in the Record Construction Specifications, to provide certification that the final cover has been repaired adequately
- ❑ Replace barrier protection soil, topsoil, and restore vegetative cover

3.4 Vermin Control

Rodent control will be done in strict accordance with the applicable laws and requirements. Based on recent history, however, no vermin problem is expected and therefore, no special precautions will be implemented. Animal burrows are normally surrounded by a natural earthen dam to direct surface runoff away from the burrow. Filling the hole with soil, regrading the surface, and re-vegetating can readily repair damage caused by burrowing animals. Special attention will be paid to inspecting for any damage to geosynthetics and ascertaining the entire length of burrow.

3.5 Stone Drainage Aprons

The landfill cap perimeter is constructed with a stone-filled apron outlet, which releases any infiltration above the geomembrane to surface drainage structures. Proper maintenance of this outlet is critical to preventing infiltration from backing up into the cap and creating seepage instability. This outlet will be kept free of debris and sediment. Evidence of improper drainage would be soft, saturated cap areas, with potentially shallow surficial sloughing of soil above the synthetics. Any such areas will be closely monitored and documented for widespread developments of similar conditions. A soft area may be indicative of clogging of drainage composites further down the slope, clogging of the apron stone, or just poor initial construction/compaction. A problem area may require replacement of the underlying drainage composite, the stone apron itself, or the geotextile material lining the upslope edge of the apron.

3.6 Gas Venting System

The purpose of the landfill gas venting system is to release landfill gases passively, in an environmentally safe manner, using cost-effective design, and without damaging the effectiveness of the landfill cover system. The passive gas venting system, consisting simply of gas venting risers, was designed to comply with the requirements of NYCRR Part 360. The gas-venting risers require routine inspection and maintenance.

Gas venting risers are installed for the purpose of venting landfill gases from beneath the liner, and are installed at a frequency of approximately one gas vent per acre of landfill cover. The vents extend through the landfill cover at least four feet into the existing waste and project three feet above the top surface of the landfill cover. The risers are constructed of 6-inch diameter Schedule 80 PVC pipe. The lower four-foot portion of each vent (beneath the liner) is slotted to allow migration of the gas into the gas risers. The geomembrane is attached to the gas venting riser using pre-fabricated boot seals to

prevent channeling of surface water through the cap and gas emissions around the outside of the vent pipe.

Gas vents will be inspected for clogging of the opening by birds or insects. Also, plumbness will be observed to determine if settlement has compromised the seal between the vent boot and the geomembrane, and if there is a seepage conduit formed around the vent for erosive, sediment-carrying runoff. Gas vents and adjacent areas, which require maintenance, will be restored to the original design configuration, re-using the existing materials to the extent possible.

3.7 Leachate Seeps

Historic site information indicates that groundwater is generally below the level of the landfill toe and historic leachate seeps from the landfill have been localized and minimal. The installation of an impermeable cap to prevent infiltration of rainwater into the fill material further minimizes the potential for leachate seeps to the ground surface. Although the possibility of a seep is unlikely, a visual survey for seeps will be performed quarterly. If seeps are observed, then an interim collection sump will be excavated and the seep water will be pumped to a container from transport to groundwater treatment building for disposal. This interim collection of seep water would continue until either the seep has stopped or more permanent engineering controls are designed and installed.

3.8 Other Problems

Significant problems other than those discussed in this section, may require an event-specific solution. In these events, a qualified civil/environmental engineer must:

- ❑ Determine the nature and extent of the problem
- ❑ Identify the cause of the problem and the steps required to address the problem
- ❑ Resolve the problem

This process should begin immediately upon discovery of the problem. As appropriate, agencies will be notified of the nature and extent of the problem within 30 days of its discovery.

3.9 Inspection and Maintenance Check Lists

The results of all regularly scheduled inspections, other formal inspections, and cursory inspections resulting in the discovery of situations requiring immediate maintenance will be documented on check list forms as shown in the attached exhibits. This information will be presented to the USEPA and NYSDEC as discussed in Section 4.0.

3.10 Disposal of Used Material and Waste

The management of waste materials is described in the Waste Management Plan (Appendix I). Materials removed from remediation areas may be reused back onsite provided they are uncontaminated and have not been significantly altered from their required originally-constructed state. Products such as stone and drainage net

contaminated with sediments may be washed free of sediments. Geotextile material used in landfill cap construction must be new since degradation and clogging may not be visible to the human eye. Geotextile is typically bonded to drainage net in GBC applications, therefore, in general, the geonet will be replaced along with any replaced geotextile. Geomembrane can be re-used provided it appears to be in good condition and excessive strain has not occurred.

Earthen materials may be re-used in the repair provided they are not commingled with adjacent materials. Surplus material that cannot fit back into the repair will be relocated on-site or disposed of off-site. All materials to be disposed of off-site will be disposed of at an appropriately licensed facility in accordance with the Waste Management Plan (WMP).

4.0 REPORTING

Inspection and/or maintenance checklists will be prepared by DuPont or its' representative, after performing an inspection and/or implementing any necessary repairs. Sample checklists for inspections and maintenance are presented as Exhibits A and B, respectively.

Inspection reports will consist of the checklist provided as Exhibit A, as well as documentation of any corrective measures that are needed or have been implemented since the previous inspection. Additional information will be included with the inspection report, as needed. This may include unusual or abnormal weather conditions during the reporting period, condition of monitoring wells, descriptions of repairs and maintenance activities and survey data.

Maintenance reports will consist of the checklist provided as Exhibit B, as well as any other documentation, sketches, drawings, and data required to adequately detail the repair extent and location of the repair. Additional documentation will also include QA/QC inspections, testing, and results to ensure compliance with the Construction Specifications.

Since USEPA/NYSDEC will be included in regularly scheduled inspections and maintenance, these checklists will be appended to the Annual Site Report and formally submitted under that cover.

5.0 REFERENCES

Roy F. Weston. 1982. Evaluation of Proposed Recovery Well System, Necco Park Landfill.

Woodward-Clyde Consultants (WCC). 1984. Site Assessment Studies, Necco Park Volumes I and II.

_____. 1990. SFR Interim Performance Report.

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_____, 2004a. *Final (100%) Design Report Bedrock and Overburden Source Area Hydraulic Controls*, Necco Park, Niagara Falls, New York. January 7, 2004.

_____, 2004b. *Remediation Action Work Plan, DuPont Necco Park Remediation Program*, Niagara Falls, New York. August 11, 2004.

EXHIBITS

Exhibit A

Inspection Checklist

EXHIBIT A
NECCO PARK LANDFILL
CAP AND SURFACE WATER DRAINAGE
INSPECTION CHECKLIST

DATE: _____
INSPECTOR: _____
WITNESSES: _____
_____

EMERGENCY CONTACT:
GERALD SHEPARD
716.278.5149

CONDITION: (Check) (Not Acceptable or Not Present require comments below)

	Acceptable	Not Acceptable	Present	Not Present	Remarks
1) Vegetative Cover, Ditches, Culverts					
a) Sediment Build-Up/Debris					
b) Pooling or Ponding					
c) Slope Integrity					
d) Overall Adequacy					
e) Culvert Condition					
2) Access Roads					
3) Landfill Cover System					
a) Erosion Damage					
b) Leachate Seeps					
c) Settlement					
d) Stone Aprons					
e) Vegetation					
f) Animal Burrows					
4) Slope Stability					
a) Landfill Top Soil					
b) Landfill Side Slope					
5) Gas Vents					
6) Monitoring Wells					

COMMENTS:
DESCRIPTION OF CONDITION:

_____
_____
_____

DESCRIPTION OF CONCERN:

_____
_____
_____

DESCRIPTION OF REMEDY:

_____
_____
_____

Exhibit B

Maintenance Checklist

EXHIBIT B
NECCO PARK LANDFILL
CAP AND SURFACE WATER DRAINAGE
MAINTENANCE CHECKLIST

DATE: _____ EMERGENCY CONTACT:
INSPECTOR: _____ GERALD SHEPARD
WITNESSES: _____ 716.278.5149
_____

Maintenance Performed (Check)	Item	Performed by:	Remarks
	1) Vegetative Cover:		
_____	a) Seeding	_____	_____
_____	b) Fertilizing	_____	_____
_____	c) Topsoil Replaced	_____	_____
_____	d) Removal of Undesirable Vegetation	_____	_____
	2) Drainage Ditches		
_____	a) Sediment Removal	_____	_____
_____	b) Fill	_____	_____
_____	c) Regrading	_____	_____
_____	d) Stone Apron Repair	_____	_____
_____	e) Vegetative Cover Placement	_____	_____
_____	f) Liner Replacement	_____	_____
	3) Access Road		
_____	a) Excavation	_____	_____
_____	b) Fill	_____	_____
_____	c) Grading	_____	_____
_____	d) Stone Paving	_____	_____
	4) Landfill Cap		
_____	a) Excavation	_____	_____
_____	b) Cover Materials	_____	_____
_____	- topsoil	_____	_____
_____	- barrier protection layer	_____	_____
_____	- drainage composite	_____	_____
_____	- geomembrane	_____	_____
_____	- geotextile	_____	_____
_____	c) Testing	_____	_____
_____	d) Barrier Protection Layer	_____	_____
_____	e) Vegetative Cover	_____	_____
	5) Gas Vents		
_____	- Pipes	_____	_____
_____	- Bedding and Adjacent Media	_____	_____
_____	6) Other	_____	_____

DESCRIPTION OF MAINTENANCE ACTIVITIES: _____
_____

APPENDIX B
LONG TERM GROUNDWATER MONITORING PLAN
DUPONT NECCO PARK
NIAGARA FALLS, NY

Date: April, 2005

Project No.: 18983203
DuPont No.: 7410

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

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APPENDICES

1.0 INTRODUCTION

This Long-Term Groundwater Monitoring Plan (LGMP) has been developed for groundwater monitoring of the A-zone overburden and bedrock flow zones (B- through F-zones) at the DuPont Necco Park landfill located in Niagara Falls New York. This LGMP also addresses EPA comments concerning performance monitoring of the A-zone as described in the letter from EPA dated August 8, 2003.

This plan was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by the United States Environmental Protection Agency (USEPA). Specifically, this plan describes monitoring required to evaluate the effectiveness of the groundwater extraction system in meeting the Performance Standards included in the Statement of Work (SOW), attached as Appendix B to the AO. In accordance with Section F.2.f of the SOW, the objective of the long-term monitoring is to evaluate groundwater quality in the source area and far-field through chemical analysis of groundwater samples and monitoring of hydraulic heads to evaluate extraction effectiveness. The monitoring will be implemented when the groundwater extraction system is operational.

This plan includes:

- ❑ Site description and background
- ❑ Site geology and hydrogeology
- ❑ Description of performance monitoring specific to assessing the effectiveness of B/C-zone pumping in controlling the A-zone source area including the installation of additional A-zone piezometers
- ❑ Description of performance monitoring, consisting of hydraulic and chemical measurements, to evaluate the effectiveness of the extraction system in achieving source area control in the A- through F-zones
- ❑ Description of the ongoing DNAPL observation and removal program

The existing well/piezometer network supplemented with additional A-zone piezometers (see below) will be used to meet the objectives of the LGMP. The hydraulic and chemistry data will be used to assess the extent of hydraulic control.

Detailed field and laboratory QA/QC program and analytical methods are described in the Necco Park Quality Assurance Project Plan. The Quality Assurance Project Plan (QAPP) was provided as Appendix A of the Necco Park Remedial Work Plan (RDWP, CRG, 2000).

This LGMP is dynamic in that modifications to monitoring locations may be made based on monitoring results and or performance of the extraction system. Changes to the LGMP will be documented in addenda to this plan.

2.0 SITE BACKGROUND

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York. Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company (from which Necco is derived). Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Allied Waste. Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a CSX right-of-way bound the site to the west. Land in the vicinity of the site is predominately zoned for commercial or industrial use. Several major manufacturing facilities are located within one mile of the site, and two manufacturers – Durez Chemical and the Carbide/Graphite Group (formerly Airco Carbon) - are 2,000 feet and 300 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on records and an interpretation of historic aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill.

Documentation of activities at Necco Park prior to 1964 is limited. The following wastes were disposed of in the largest quantities:

- ❑ Flyash
- ❑ Building demolition and miscellaneous plant debris
- ❑ Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- ❑ Sodium cell rubble (i.e., thermal brick, corroded steel)
- ❑ Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- ❑ Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- ❑ Liming residues [i.e., sludge saturated with tri- and tetrachloroethene (TCE and PCE)]
- ❑ Scrap organic mixtures, off-grade product
- ❑ Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)

- Refined adiponitrile wastes (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

3.0 SITE GEOLOGY AND HYDROGEOLOGY

3.1 Site Geology

Overburden materials at the site consist of reworked native glacial deposits intermixed with waste and fill materials. Fill materials south of the landfill consist primarily of slag with an average thickness of 8 feet. Undisturbed glaciolacustrine silts, sands and clay have been identified beneath the properties adjacent to Necco Park. Overburden thickness at the site ranges from less than 2 feet in the southwest area to greater than 25 feet in the southeast portion. A glacial till consisting of a silty to sandy clay with varying amounts of gravel and lesser amounts of large boulders underlies the glaciolacustrine deposits. The till and glaciolacustrine deposits have a characteristically low permeability. The saturated zone within the overburden is referred to as the A-zone. A discontinuous top-of-clay water zone is present in the slag waste above the native sediments. Horizontal flow direction in the A-zone is generally across the site from the north to the south. The vertical gradient is generally downward from the A-zone to the upper bedrock zones (WCC, 1993).

Bedrock at the site is classified as the Middle Silurian Lockport Formation. The Lockport is subdivided into five principle members: Oak Orchard Member, Eramosa Member, Goat Island Member, Gasport Member, and Decew Member. The Lockport is generally described as a brownish gray to dark gray, fine to medium grained dolomite which contains vugs and carbonaceous partings, stylolites and poorly preserved fossil remnants (Zenger, 1965).

3.2 Site Hydrogeology

The geologic makeup of A-zone overburden materials south of the landfill are such that groundwater capacity and transmissivity are very low. The materials are comprised of glaciolacustrine silts and clays overlying a glacial till consisting of a stiff clay with varying amounts of silt, sand, and gravel. The till and glaciolacustrine clay south of the landfill have characteristically low hydraulic conductivities, ranging from 1×10^{-4} to 1×10^{-6} cm/sec. This is precisely the reason the CECOS secure cells utilized the existing lacustrine clay layer in the design of their cells. As a result, the predominant hydraulic gradient in the A-zone is downward to the more transmissive underlying B-zone.

The vertical distance between the bottom of the A-zone and the B-zone is only on the order of 3 to 5 feet. The pre-design investigations revealed that a strong degree of connection exists between these zones as a result of their close proximity. Considering the relative closeness of these zones and their existing connectiveness, groundwater extraction from the B-zone will only enhance preexisting conditions. As discussed in Section 4.0, a comprehensive hydraulic monitoring program will be implemented to evaluate the long-term effectiveness of the controlling the A-zone source area by pumping the upper bedrock.

A series of water-bearing horizontal bedding plane fracture zones have been identified during previous site investigations. These fracture zones, designated as hydrogeologic zones B through G (after Johnson, 1964), can be traced horizontally for miles and correspond well with bedding plane fracture zones identified during construction of the New York Power Authority (NYPA) conduits. Pumping tests conducted in these zones indicate groundwater flow beneath the site occurs primarily through these horizontal fracture zones. In general, these zones are characterized by relatively high horizontal hydraulic conductivity and semi-confined response to hydraulic stress. Vertical fractures are most prevalent in the upper 30 feet of the Lockport Formation where stress relief and solutioning have been the most pronounced. The underlying Rochester Shale Formation generally acts as a confining layer and restricts further downward groundwater migration.

Outside the influence of the existing site groundwater recovery wells and grout curtain, groundwater in the upper bedrock (B-and C-zones) generally flows to the south and groundwater in the lower bedrock (D, E and F-zones) generally flows to the west and southwest. Groundwater flow in the B and C-zones is toward the Falls Street tunnel storm sewer, located approximately 2,400 feet south of the site. Studies of regional groundwater flow in the Niagara Falls area by the United States Geological Survey (USGS) indicate this tunnel acts as a line discharge for the upper Lockport groundwater along its entire length. Groundwater from the D- though G-zones discharges to the NYPA conduit drain system located approximately 3,700 feet west of the site.

4.0 OVERBURDEN HYDRAULIC MONITORING

Results of pumping tests conducted during the pre-design investigation show that hydraulic control of the A-zone can be achieved through pumping of the B/C-zone upper bedrock. A key element of the long-term monitoring program will include comprehensive measures to monitor the effectiveness of controlling the A-zone source area by pumping the upper bedrock. These measures include:

- ❑ Installation of additional top-of-clay piezometers to monitor the saturated zone which may be present above the top-of-clay in the eastern portion of the site.
- ❑ Installation of two additional A-zone piezometers
- ❑ Hydraulic monitoring at new and existing A-zone and top-of-clay zone piezometer locations

As discussed in Section 4.1, the additional piezometers will be installed and monitored before the new extraction system is operational to establish baseline A-zone hydraulic head data.

4.1 Additional Piezometer Installation

To sufficiently monitor the top-of-clay zone in the eastern portion of the site, thirteen additional piezometers will be installed at a spacing of approximately 100 feet. As shown on Figure 4-1, the additional top-of-clay piezometers will be paired with existing A-zone piezometers installed during the Pre-Design Investigations (PDI's). To attain the 100-foot spacing of paired piezometers, two additional A-zone piezometers will be installed (186A and 195A). As indicated on Figure 4-1, some piezometers installed during the PDI have been given new ID numbers. With the installation of the additional piezometers, overburden hydraulic head data will be collected at 37 locations along the southern portion of the site. Hydraulic monitoring will be conducted in accordance with the site-specific QAPP.

The piezometers will be installed in accordance with the procedures used to construct piezometers during the Phase 3 PDI. A well construction diagram for the top-of-clay piezometers is provided on Figure 4-2. The piezometers will be constructed of PVC if DNAPL is not encountered. If DNAPL is encountered, the piezometers will be constructed using stainless steel. The piezometers will be constructed and developed so that samples can be collected for chemical analysis. All drilling equipment will be decontaminated between boring locations.

4.2 Hydraulic Monitoring

The additional top-of-clay piezometers will be installed approximately 6 months before start-up of the new extraction system. This will facilitate the collection of baseline A-zone and top-of-clay zone hydraulic head data. The existing extraction system will be shut down three months before the startup of the new system to establish baseline

conditions and observe recovery and unstressed conditions in the overburden and bedrock zones.

Using an electronic water level indicator, monthly water levels will be collected at locations included in Table 5-1. Water levels will be collected monthly for a period of 6 months before system start-up. Once the new system is operational, water levels will be collected monthly for a period of one year. Hydraulic monitoring will include an assessment of atmospheric influences (e.g., pressure fronts or precipitation) on the top-of-clay zone by continuous monitoring at selected top-of-clay piezometers during precipitation events. Subsequent water levels for long term monitoring of the A-zone overburden will be collected on a quarterly basis. More frequent monitoring may be conducted, as appropriate.

5.0 PROPOSED GROUNDWATER MONITORING PROGRAM

The groundwater monitoring program will consist of the following elements:

- ❑ Hydraulic monitoring
- ❑ Chemical monitoring
- ❑ DNAPL monitoring

Locations where monitoring will be conducted are shown on Figure 5-1. Because the Plan is dynamic, modifications to monitoring locations may be made based on monitoring results and or performance of the groundwater extraction system.

5.1 Hydraulic Monitoring Program

Following implementation of additional remedial actions designed to further reduce migration of groundwater from the source area (zones A-F) to the far-field, a long-term hydraulic monitoring program will be implemented. The objective of the long-term monitoring will be to verify that hydraulic control of the source areas is maintained throughout the duration of the remedial action. Monitoring procedures, frequency, locations, and reporting schedule are described below.

See Section 4.2 for specific overburden monitoring schedules.

5.1.1 Monitoring Procedures and Frequency

Water levels will be measured to the nearest one hundredth of a foot using an electronic water level indicator. Wells and piezometers have a permanent mark placed on top of the well casing to identify the surveyed reference point and to standardize the measuring point for depth to water measurements. The water level indicator probe will be decontaminated between wells following the procedures described in the site-specific QAPP.

The frequency of hydraulic monitoring will be monthly for the first year of system operation. Thereafter, monitoring will be conducted on a quarterly basis. Groundwater level measurements will be collected from the wells and piezometers identified in Table 5-1. Water levels will be recorded at all the well locations immediately before system start-up to determine static levels. A schedule will be developed such that:

- ❑ The sequence of wells measured following the same order that will be from least to most contaminated
- ❑ The measurements will be taken over a two hour period
- ❑ Measurements shall not be taken less than two days after any monitoring well purging or sampling operations.
- ❑ Unless noted, measurements will not be taken within 48 hours of any time period during which pumping wells were not operating.

To account for observed tidal-like effects resulting from the New York Power Authority water withdrawal schedule, water level measurements at all wells which monitor the F and G-zones will be collected between the hours of 11:00 AM and 4:00 PM Eastern Standard Time. To monitor influence from the conduits, water levels from wells 136F and 136G will be recorded at the beginning and end of the monitoring round. Pumping rates from all pumping wells will be recorded at the beginning and end of groundwater level measurements events.

The following information will be recorded in the field notebook:

- ❑ Well number and letter designation.
- ❑ Date and time of each measurement.
- ❑ Depth to water (DTW) from the top of casing (to the nearest 0.01 foot).
- ❑ Well condition (i.e. bent casing, broken lock, etc.).

5.2 Chemical Monitoring Program

As described in the RDWP, an extensive database of groundwater analytical data has been accumulated during many years of hydrogeologic investigation at Necco Park. Quarterly and semi-annual groundwater sampling rounds from as many as 104 monitoring wells were conducted from the mid-1980s to 1993 pursuant to the investigative requirements of a 1986 Consent Decree and 1989 Administrative Consent Order (ACO). However, even after the 1989 ACO investigative requirements had been fulfilled, groundwater sampling and analysis continued through 1998. Groundwater sampling at 38 bedrock monitoring wells and the three bedrock groundwater recovery wells (RW-1, RW-2, RW-3) was continued on an annual basis from 1994 to 1998. The annual groundwater sampling program was designed to facilitate continued evaluation of the conceptual model for groundwater flow and contaminant transport developed for the AOA.

Groundwater sampling conducted during the pre-design investigations (2000 baseline event and 2002 source area re-assessment sampling), utilizing existing and new wells, have resulted in the establishment of a network of wells that will be used to meet the following objectives as defined in the SOW:

- ❑ Monitor the effectiveness of the extraction wells in reducing chemical concentrations in the zone-specific source areas
- ❑ Monitor the far-field groundwater chemistry to determine if the extraction system is controlling off-site migration of chemical constituents associated with the Necco Park site
- ❑ Monitor natural attenuation and intrinsic bioremediation in the source area and far-field
- ❑ Continue to evaluate the effectiveness of the remedial action

Using the 2000 baseline and 2002 source area reassessment results (CRG, 2001 and 2003), a list of wells that will be used for long-term monitoring has been prepared and is included in Table 5-2. The wells included in Table 5-2 will be sampled on a semi-annual

basis during the first three years of system operation. Sampling frequency thereafter will be annually. Analytical parameters are included in Table 5-3. The first semi-annual event will occur within one month of system startup to establish baseline chemistry. Based on the annual sampling results, the wells used for chemical monitoring may be modified over the course of the remedial action.

5.2.1 Monitored Natural Attenuation

Wells to be used to monitor natural attenuation processes in the source area and far-field are included on Table 5-4. The monitored natural attenuation (MNA) parameters are included in Table 5-5. Based on an enhanced understanding of the physical, chemical, and processes that influence natural attenuation and intrinsic bioremediation, DuPont has modified the list of MNA parameters provided in the RDWP. This contemporary analyte list is a standard protocol for natural attenuation and intrinsic bioremediation remedy evaluations conducted by DuPont. The list of analytes includes a patented genetic marker identification technique that is used to determine the presence of dechlorinating microbes.

Results from the MNA sampling conducted in 2000 as part of the RD baseline sampling showed that natural attenuation of site constituents is occurring under anaerobic degradation processes. The continued effectiveness of natural attenuation (and intrinsic bioremediation) will be defined by a "lines of evidence" approach explained below. Annual monitoring be conducted over a five year period to monitor and evaluate natural attenuation in this complex fractured bedrock system. During the first year, chemical and geochemical parameters should be analyzed twice (semi-annually) to afford an "improved" baseline monitoring condition.

First, chlorocarbon concentration decreases along the longitudinal, downgradient direction of the plume will be monitored and evaluated. This includes parent compounds and daughter products within the various groundwater zones. As appropriate, the molar flux in the downgradient direction will be reviewed and evaluated. In situ attenuation rates will be calculated and evaluated using the spatial technique of Buscheck (1993), et.al. (as described in Appendix A). Moreover, downgradient wells near the plume periphery will also be monitored to evaluate plume status (static, shrinking, etc.).

Second, geochemical indicators of natural attenuation will be monitored and evaluated. This includes redox conditions, evidence of conditions conducive to biodegradation, and overall redox state of the groundwater zones.

Third, biological evidence of the dehalorespiring organism *Dehalococoides Ethenogenese*, (DHE), will be obtained for the various groundwater zones. This entails utilization of DuPont's patent pending 16SrRNA genetic identification technique for DHE. Such analysis will be conducted twice during the recommended five year sampling regime, once at the beginning and once in the third year to confirm the continuing presence of these microbes.

5.3 DNAPL Monitoring Program

Monitoring for the occurrence of DNAPL has been conducted routinely at the Necco Park site since the early 1980's. A monitoring and recovery program was instituted in 1989 to remove free-phase DNAPL from monitoring and extraction wells. A total of approximately 7,000 gallons of DNAPL have been recovered to date. As part of the 2000 pre-design activities, a comprehensive DNAPL survey utilizing over 150 wells was conducted. Results of the survey were provided in the *Necco Park Source Area Report* (CRG 2001). Based on findings of subsequent pre-design investigations, a second comprehensive DNAPL survey will be conducted at all new and existing wells where any of the DNAPL criteria has historically been exceeded. The well locations are provided on Table 5-6. Based on the DNAPL observations made during the supplemental DNAPL evaluation, a list of wells and observation frequencies will be prepared and provided as an addendum to this plan.

DNAPL observations will be conducted as described in Section 4.4.2.1 of the QAPP. As such, the observations will be completed at least one week prior to the baseline groundwater chemistry sampling. Recovery of DNAPL will be conducted at locations where recoverable quantities of DNAPL are observed. DNAPL removal will be conducted to the extent technically feasible.

5.4 Reporting

Quarterly reports, to be submitted 30 days after the end of the quarter, will include the following:

- ❑ Water levels
- ❑ Potentiometric surface maps contoured at one foot intervals
- ❑ DNAPL observation and removal summary
- ❑ Summary of system operations

The quarterly report will not include an interpretation of the results. Data analysis and interpretation will be provided in the annual report. The annual report will include the following:

- ❑ Groundwater and DNAPL monitoring data from the previous year's sampling event
- ❑ An analysis of the sampling results to determine whether groundwater contaminant migration has been effectively prevented or stabilized
- ❑ Time versus concentration plots for contaminants and wells to represent reductions or changes in the concentration of contaminants in groundwater
- ❑ An evaluation of whether the concentration trends in the groundwater plume are consistent with the predictions of groundwater movement in the Remedial Design and AOA

Annual reports will be submitted to EPA no later than 90 days after the end of the calendar year in which the data was collected.

6.0 REFERENCES

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Buscheck, Timothy E.; K.T. O'Reilly; S.N. Nelson. 1993. *Evaluation of Intrinsic Bioremediation at Field Sites,* Proceedings of the Conference on Petroleum Hydrocarbon and Organic Chemicals in Ground Water: Prevention, Detection, and Restoration, Nov. 1993.

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TABLES

Table 5-1: Hydraulic Monitoring List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

Well ID	Zone	Monitoring Frequency	Well ID	Zone	Monitoring Frequency	Well ID	Zone	Monitoring Frequency
53	A	Monthly	102B	B	Quarterly	139C	C	Quarterly
111A	A	Monthly	112B	B	Quarterly	145C	C	Quarterly
117A	A	Monthly	115B*	B	Quarterly	146C	C	Quarterly
119A	A	Monthly	116B	B	Quarterly	149C	C	Quarterly
123A	A	Monthly	118B	B	Quarterly	150C	C	Quarterly
129A	A	Monthly	119B	B	Quarterly	151C	C	Quarterly
130A*	A	Monthly	120B	B	Quarterly	159C	C	Quarterly
131A	A	Monthly	129B	B	Quarterly	160C	C	Quarterly
137A	A	Monthly	130B	B	Quarterly	161C	C	Quarterly
139A	A	Monthly	136B	B	Quarterly	162C	C	Quarterly
146AR	A	Monthly	137B	B	Quarterly	168C	C	Quarterly
150A	A	Monthly	138B	B	Quarterly	105D	D	Quarterly
159A	A	Monthly	139B	B	Quarterly	111D**	D	Quarterly
163A	A	Monthly	145B	B	Quarterly	115D	D	Quarterly
173A	A	Monthly	146B	B	Quarterly	129D	D	Quarterly
174A	A	Monthly	149B	B	Quarterly	130D	D	Quarterly
175A	A	Monthly	150B	B	Quarterly	136D	D	Quarterly
176A	A	Monthly	151B	B	Quarterly	137D	D	Quarterly
178A	A	Monthly	159B	B	Quarterly	139D	D	Quarterly
179A	A	Monthly	160B	B	Quarterly	145D	D	Quarterly
184A+	A	Monthly	161B	B	Quarterly	148D	D	Quarterly
185A+	A	Monthly	163B	B	Quarterly	149D	D	Quarterly
186A	A	Monthly	167B	B	Quarterly	158D	D	Quarterly
187A+	A	Monthly	168B	B	Quarterly	159D	D	Quarterly
188A+	A	Monthly	169B	B	Quarterly	163D	D	Quarterly
189A+	A	Monthly	170B	B	Quarterly	164D	D	Quarterly
190A+	A	Monthly	171B	B	Quarterly	165D	D	Quarterly
191A+	A	Monthly	172B	B	Quarterly	RW-8	D/E/F	Quarterly
192A+	A	Monthly	BZTW-1	B	Quarterly	RW-9	D/E/F	Quarterly
193A+	A	Monthly	BZTW-2	B	Quarterly	129E	E	Quarterly
194A+	A	Monthly	BZTW-4	B	Quarterly	136E	E	Quarterly
D-11	A	Monthly	D-23	B	Quarterly	145E	E	Quarterly
D-9	A	Monthly	D-10	B/C	Quarterly	146E	E	Quarterly
RDB-3	A	Monthly	D-14	B/C	Quarterly	150E	E	Quarterly
RDB-5	A	Monthly	RW-1	B/C	Quarterly	163E	E	Quarterly
D-13	A	Monthly	RW-10	B/C	Quarterly	164E	E	Quarterly
119AT	AT	Monthly	RW-2	B/C	Quarterly	165E	E	Quarterly
129AT	AT	Monthly	RW-4	B/C	Quarterly	112F**	F	Quarterly
180AT	AT	Monthly	RW-5	B/C	Quarterly	130F	F	Quarterly
184AT	AT	Monthly	TRW-6	B/C	Quarterly	136F	F	Quarterly
185AT	AT	Monthly	TRW-7	B/C	Quarterly	145F	F	Quarterly
186AT	AT	Monthly	105C	C	Quarterly	146F	F	Quarterly
187AT	AT	Monthly	112C	C	Quarterly	148F	F	Quarterly
188AT	AT	Monthly	115C	C	Quarterly	150F	F	Quarterly
189AT	AT	Monthly	123C	C	Quarterly	163F	F	Quarterly
190AT	AT	Monthly	129C	C	Quarterly	164F	F	Quarterly
191AT	AT	Monthly	130C	C	Quarterly	165F	F	Quarterly
192AT	AT	Monthly	136C	C	Quarterly	130G	G	Quarterly
193AT	AT	Monthly	137C	C	Quarterly	141G**	G	Quarterly
194AT	AT	Monthly	138C	C	Quarterly	143G	G	Quarterly

* Well Abandoned ** Well added after approval of LTGMP +Well Renamed AT = Top-of-clay

Note: All B, B/C, D, E, F, and G zone wells will be monitored monthly during the first year of new system operation. Water levels will be recorded quarterly thereafter.

Table 5-2: Chemical Monitoring List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

MONITORING WELL	ZONE	MONITORING WELL	ZONE
D-11	A	**105D**	D
D-13	A	123D	D
D-9	A	136D	D
137A	A	**137D**	D
145A	A	145D	D
146AR	A	148D	D
150A	A	**139D**	D
111B	B	147D	D
136B	B	149D*	D
137B	B	156D	D
139B	B	165D	D
141B	B	136E	E
145B*	B	145E	E
146B	B	146E	E
149B*	B	150E	E
150B	B	156E	E
151B*	B	165E	E
153B	B	136F	F
168B	B	146F	F
171B	B	147F	F
172B	B	150F*	F
105C	C	156F	F
136C	C	147G1	G1
137C	C	147G2	G2
141C*	C	147G3	G3
145C*	C		
146C*	C		
149C	C		
150C*	C		
151C	C		
168C	C		

*Well does not meet bedrock zone water bearing criteria ($k<10^{-4}$ cm/sec).

Wells shown in **bold** are used solely for the MNA evaluation and will not be used for Long-term chemistry monitoring.

Table 5-3: Indicator Parameter List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

INORGANIC AND GENERAL WATER QUALITY PARAMETERS	VOLATILE ORGANIC COMPOUNDS	SEMIVOLATILE ORGANIC COMPOUNDS
pH*	Vinyl chloride	Hexachloroethane
Specific conductivity*	1,1-dichloroethene	Hexachlorobutadiene
Temperature*	Trans-1,2-dichloroethene	Phenol
Turbidity*	Cis-1,2-dichloroethene	2,4,6-trichlorophenol
Dissolved oxygen *	Chloroform	2,4,5-trichlorophenol
Redox potential*	Carbon tetrachloride	Pentachlorophenol
Chloride	1,2-dichloroethane	Hexachlorobenzene
Dissolved barium	Trichloroethene	4-methlyphenol
	1,1,2-trichloroethane	TIC-1
	Tetrachloroethene	
	1,1,2,2-tetrachloroethane	

*Field parameter

Table 5-4: Wells to be used for Monitoring Natural Attenuation
DuPont - Necco Park
Niagara Falls, NY

111B	137D
137B	139D
139B	147D
141B	148D
145B	149D
151B	156D
153B	165D
105C	136E
137C	145E
141C	146E
145C	156E
149C	146F
151C	150F
105D	
136D	

Table 5-5: Monitored Natural Attenuation Parameter List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

Primary Analytes for Groundwater	Analytical Method	Holding Time	Sample Volume	Reason for Analysis
Alkalinity	310.1	14 days	100 ml	CO_2 and CO_3/HCO_3 buffering capacity
Chloride	325.3	28 days	100 ml	End product of chlorinated organic reduction
Dissolved oxygen	Field	-	-	Electron acceptor
Temperature (C^o)	Field	-	-	Affects rate of microbal metabolism
Ethene, ethane, methane, propane	GC-0019	14 days	40 ml	Intermediate product of degradation
Iron (dissolved)	6010B/200.7	180 days	1 Liter	Growth - electron acceptor
Nitrate/nitrite (total)	353.2	28 days	500 ml	Electron acceptor
pH	Field	-	-	Optimum range 5 to 9
Redox (mv)	Field	-	-	Reducing environment
Sulfate	375.4	28 days	100 ml	Electron acceptor
Volatile organics (all isomers)	8260B	14 days	40 ml	Original contaminants and degradation compounds
Sulfide	376.2	7 days	250 ml	Reducing environment
Total organic carbon	415.1	28 days	100 ml	Substrate available
Manganese (dissolved)	6010B/200.7	180 days	1 Liter	Electron acceptor
DNA* (16S rRNA probes)	DuPont Ex Station or Silrem	Ship overnight	500 ml	Determine if dechlorinating microbes are present

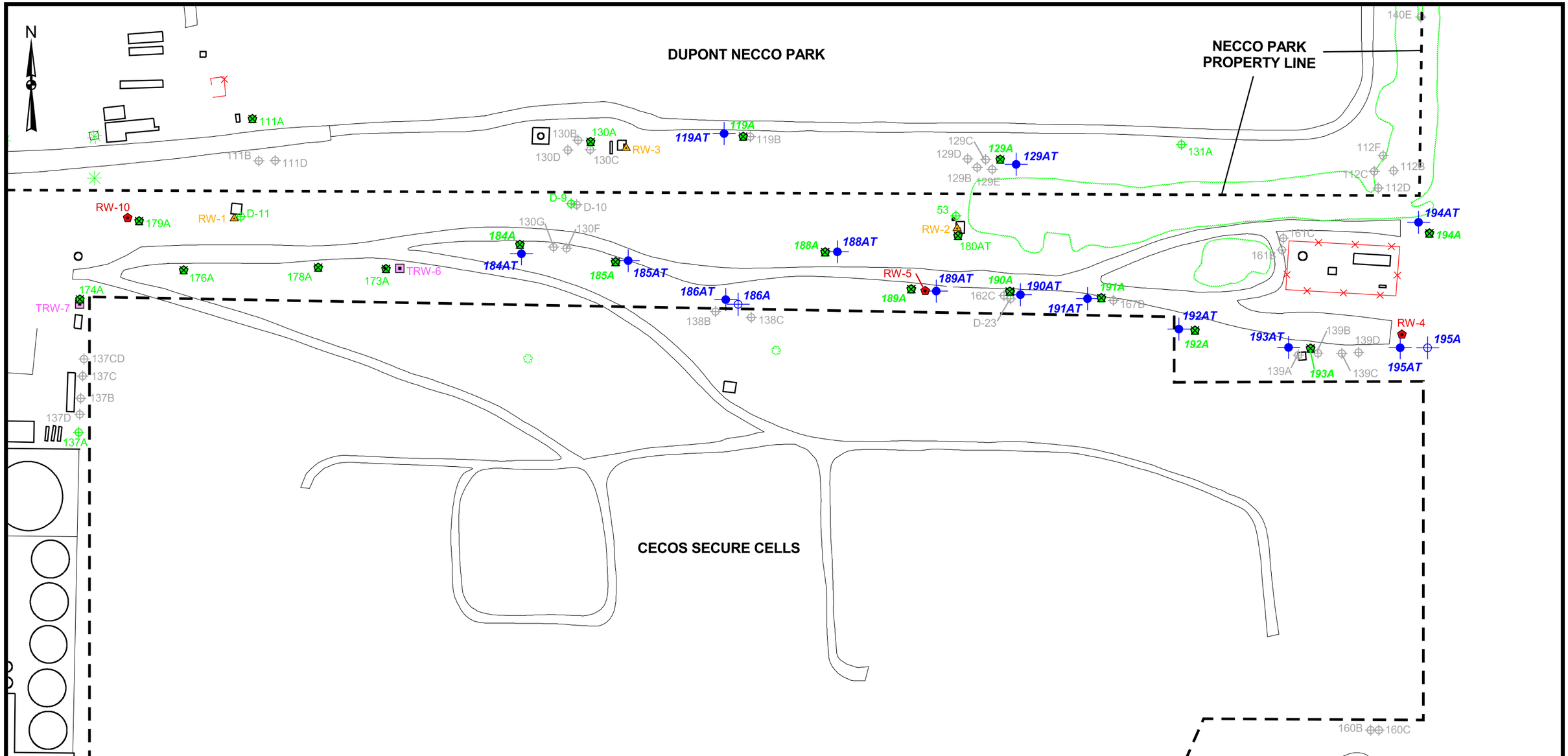
* Analyzed twice during monitoring regime.

Table 5-6: Supplemental DNAPL Observation Locations
DuPont - Necco Park
Niagara Falls, NY

105C	136G	147D	160B
105CD	137A	147F	160C
105D	137B	147G1	161B
111B	137C	147G2	161C
111D	137D	147G3	168B
112A	138B	148D	168C
112B	138C	149A	171B
112C	139A	149D	172B
112D*	139B	150E	145D
112F	139D	150F	145G3
112J*	140A	153D	145J
117A	140B	153FG	146AR
117C	140C	153G3	147B
117E*	140E	155ER	148B
123D	141B	156A	149B
128A+	141C	156E	149C
129B	141D	53	150A
129C	141E*	C-72	150B
129D	141G	D-11	150C
129E	141J*	D-13	151C
129F	142A*	D-14	152A
129G	142B*	D-23	152BC
130B	142C*	D-3	153E
130C	143G	D-7	153G2
130D	145A	RW-1	155A
130G	145B	RW-2	155D
131A	145C	RW-3	156F
136B	145E	RW-4	C-83
136C	145G2	RW-5	D-9
136D	146C	TRW-6	130G
136E	146E	TRW-7	116CD2*
136F	146F	RW-8	136F
136J	147C	RW-10	189A
			193A

* Well abandoned April, 2005. No DNAPL present in well prior to abandonment.
+ Well destroyed

FIGURES



Legend

- New Top-of-Clay A Zone Piezometer
- New A Zone Piezometer
- Existing A Zone Piezometer/Well
- Monitoring Well
- New Extraction Well
- Existing Extraction Well
- PDI Test Extraction Well

Piezometer ID Conversions	
Former ID	New ID
RDB-12	184A
177A	185A
RDB-15	188A
166A	189A
181A	190A
167A	191A
182A	192A
183A	193A
RDB-22	194A

100 0 100 Feet

DUPONT - NECCO PARK
ADDITIONAL A ZONE PIEZOMETER LOCATIONS

URS

FIGURE 4-1

N:\18983203.00005\DB\GIS\locations.apr PROPOSED MONITORING WELL LOCATIONS
9/10/2003

DRILLING SUMMARY

Geologist:

Drilling Company:

Driller:

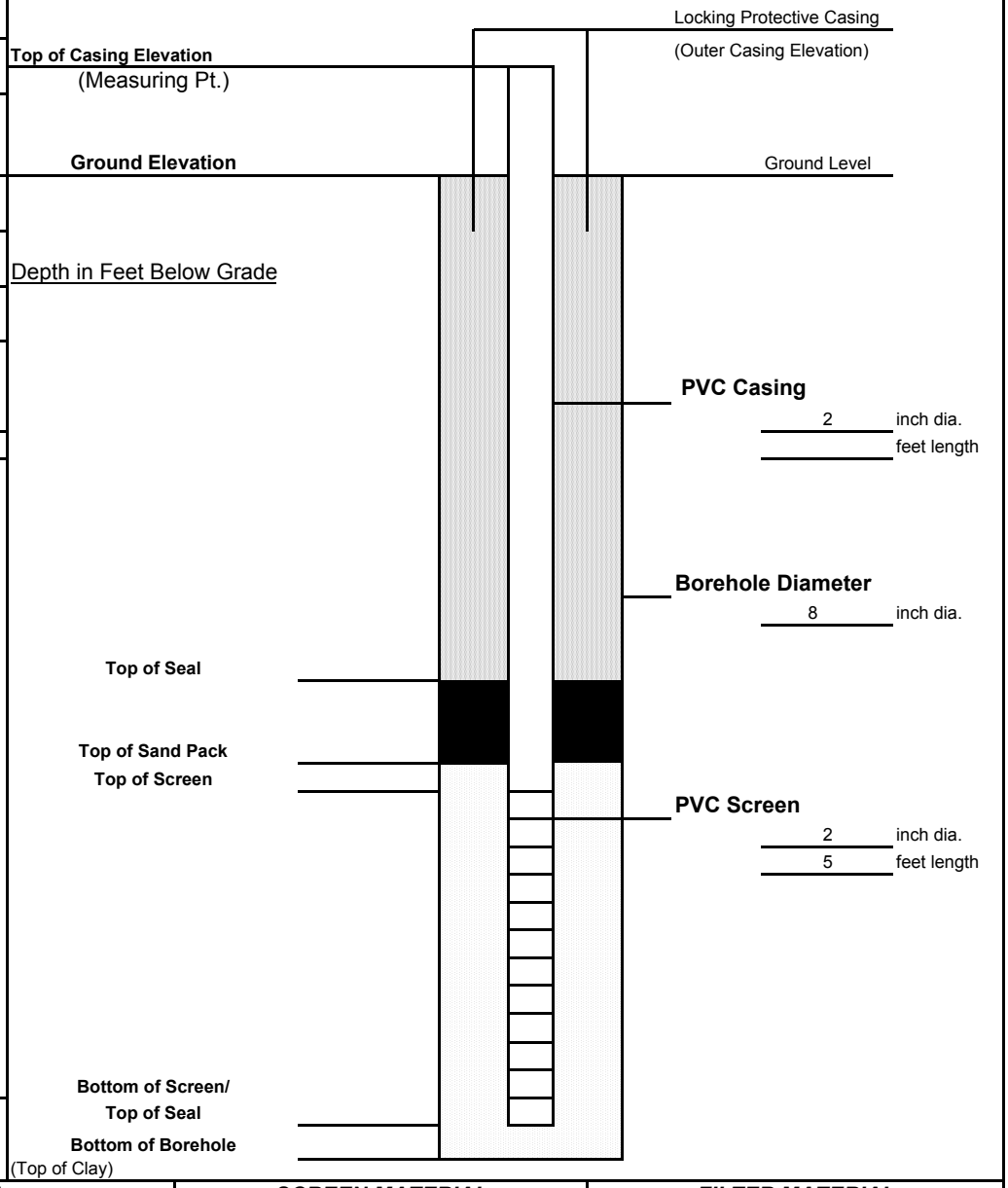
Rig Make/Model:

Date:

GEOLOGIC LOG

Depth(ft.)	Description

WELL DESIGN



CASING MATERIAL	*SCREEN MATERIAL*	*FILTER MATERIAL*
Surface: Steel protective cover (Stick Up)	**Type:** Schedule 40 PVC	**Type:** Morie "O" well sand **Setting:**
Monitor: PVC	**Slot Size:** 0.020"	***SEAL MATERIAL*** **Type 1:** Bentonite pellets **Setting:**

COMMENTS:

LEGEND

- Cement Grout
- Bentonite Seal
- Sand Pack

Client: DuPont CRG	**Location: Necco Park**	**Project No.: 18983996**
URS Diamond	**TOP-OF-CLAY PEIZOMETER CONSTRUCTION DETAILS**	**Well Number:** **FIGURE 4-2**

necco LTGMP fig 4-2.xls/typ top-of clay peizo

Legend

- DuPont Monitoring Well
- Well Abandoned
- Allied Waste Monitoring Well
- DuPont Extraction Well
- DuPont Peizometer

Peizometer ID Conversions	
New ID	Former ID
184A	RDB-12
185A	177A
187A	RDB-15
188A	166A
189A	181A
190A	167A
191A	182A
192A	183A
193A	RDB-22

WARNING

IT IS VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON OTHER THAN WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

N:\18983203.00005\DB\GIS\locations.apr WELL/PIEZOMETER LOCATIONS
4/13/2005

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: SPM
DRAWN BY: CNE
CHECKED BY: XXX
PROJ. ENGR.: XXX

URS

Group Consultants
77 Goodell Street, Buffalo, New York 14203
(716)856-5636 - (716)856-2545 fax

JOB No. 18983203.00005

DUPONT NECCO PARK

NIAGARA FALLS NEW YORK

WELL AND PEIZOMETER LOCATIONS DUPONT NECCO PARK

175 0 175 350 Feet

Scale: 1" = 175' - 0'

Date: APR 2005

FIGURE 5-1

APPENDICES

APPENDIX A

IN SITU ATTENUATION RATE CALCULATIONS

Buscheck et.al.(1993) developed a simplified technique to quantify natural attenuation (including intrinsic bioremediation) of PCE, TCE, and BTEX plumes in groundwater at several field sites. Their evaluation included plots for concentration versus time (temporal) and concentration versus distance (spatial) that defined apparent first order decay rates for steady state plumes. For temporal regression analysis, their data indicate apparent first order decay rates for PCE ranging from 0.34% (k= -0.0034) to 0.46% (k= -0.0046) per day and TCE ranging from 0.26% (k= -0.0026) to .3% (k= -0.003) per day. Additionally, for spatial regression analysis of data, Weaver, et.al. (1996) estimated apparent decay rates for TCE ranging from (k= -0.0076/week) to (k= -0.024/week) (half-life ranging from 638 days to 186 days) using a similar method. The Buscheck et. al. technique involved semi-log plots of chlorocarbon concentration versus time(temporal regression) and chlorocarbon concentration versus distance (spatial regression). The apparent first order decay rates were then calculated from the slope of the regression line plot. For this formulation, aquifer sorption sites were assumed to be saturated and steady state plume equilibria existed. A first order equation was used as follows to derive the various estimates of biodegradation:

$$dC/dt = -kC \quad \text{..... 1}$$

where t is time

k is the first order decay rate (per time)

C is the dissolved plume concentration

The solution for this differential equation was given for the two cases under study, namely for the temporal and then the spatial cases.

Temporal:

$$C(t)= e^{-kt} \quad \text{..... 2}$$

where; C(t) is concentration as a function of time(t)

Co is the concentration at t=0

k is the decay rate (per time)

Spatial:

$$C(x) = Co\ e^{-k(x/v)} \quad \text{..... 3}$$

where; C(x) is concentration as a function of distance(x)
Co is the concentration at x=0
k is the decay rate(per time)
x/v is the distance(x)/pore water velocity (v)

These authors concluded that at the four sites studied, apparent first order decay rates were demonstrated and measurements of other analytes (dissolved oxygen, redox potential, and alternative electron acceptors) were also indicative of intrinsic bioremediation.

APPENDIX C
GROUNDWATER TREATMENT O&M MANUAL
DUPONT NECCO PARK
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD Project No.:18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SECTION I TABLE OF CONTENTS

I. Process Description Section

Per the Niagara Plant PSM manual as a guide, this section includes the following at a minimum:

- History and References - The history of the Groundwater Remediation System, including all documented PCRs.
- Process Flow Diagram - Indicates normal flow path and major equipment pieces.
- Principles of the Process - Explains how the process works, what it is supposed to do, and the function of the major equipment pieces. A brief description of the chemistry of the process and significant chemical reactions are included.
- Maximum Intended Inventories - The maximum intended inventory of all hazardous substances is discussed.

A. HISTORY AND REFERENCE

References

A11 references are in the Environmental Central Files except for the Operating Manual, which is available in the ESO control room:

General History

The landfill was used from the mid-1930s until 1977 when the site was closed. The primary wastes disposed of in Necco Park were fly ash, inorganic salts, and chlorinated organic chemicals. The site is covered by a clay cap and surrounded on three sides by a grout curtain extending approximately 80 feet below ground surface into bedrock. Groundwater is pumped from three recovery wells and piped to CECOS for treatment. DuPont has conducted extensive soil and groundwater contamination investigations at Necco Park. In addition, extensive data has been collected from air monitoring programs conducted at Necco Park. These programs have included periodic monitoring of the ambient conditions at Necco Park, as well as extensive monitoring during prior drilling operations.

The primary objective of the current plant GWRS is to control non-point source releases of contamination through the overburden by creating a hydraulic control. Previous groundwater contamination studies have indicated that contaminants are migrating off-plant in both the overburden and bedrock.

I. Process Description Section (continued)

A. HISTORY AND REFERENCE (continued)

Background

Necco Park is a 24-acre closed hazardous waste landfill located approximately three miles from the Niagara Plant (see Figure 1 for site location). DuPont disposed of Niagara Plant industrial wastes at Necco Park from the late 1930's until 1977. In 1977, groundwater contamination had been found at and in the vicinity of Necco Park. Many of the organic contaminants found in the groundwater are similar to the wastes disposed at Necco Park. Waste disposal at Necco Park stopped in 1977. In 1978 a clay cap was placed over the landfill. Many studies have been conducted since 1977 to find out more about the contaminated groundwater. For example, to find out what the groundwater is contaminated with, where the contamination is, and how the contaminated groundwater moves. This type of information is necessary before any actions can be taken in response to the knowledge that there is a groundwater contamination problem.

In 1982, two upper bedrock zone recovery wells (B and C zone) began operating at Necco Park: R-1 and R-2. The intent of operating R-1 and R-2 was to keep most of the groundwater in the B and C zones from leaving Necco Park by creating what is called a hydraulic barrier. By pumping R-1 and R-2 at target rates (10-15 gpm for R-1; 5-10 gpm for R-2), studies indicated that most of the B and C zone groundwater that would naturally flow out of Necco Park would be stopped (thus the term "hydraulic barrier").

When pumped, the water level in each well and in the bedrock zones around each well is drawn down to form what is called a cone of depression. The intent is to capture water around the well; in other words, to get the water to flow toward the well rather than in its natural direction. The area in which this happens is called a capture zone. The bigger the capture zone, the better control of groundwater leaving Necco Park. Maintaining a capture zone and a hydraulic barrier are dependent on continuous optimal operation of the recovery wells; if the wells are not pumping, the water is not being captured.

I. Process Description Section (continued)

A. HISTORY AND REFERENCE (continued)

Background (continued)

A grout curtain was installed at Necco Park in 1989 to reduce the amount of groundwater that entered Necco Park; the less that gets in, the less that is exposed to Necco Park, and the less there is to pump.

A third recovery well, R-3, began operating in March 1992. R-3 collects groundwater from the middle bedrock zones (D, E, and F) and prevents it from entering Necco Park. Previous to R-3, there was no control over the flow of groundwater in these zones. The intent of R-3 was to capture groundwater in these zones and reduce the amount of groundwater leaving Necco Park.

In addition to the contamination that has been found dissolved in the groundwater at and near Necco Park, another type of contamination has been found: Dense Non-Aqueous Phase Liquids, which are called DNAPLs or NAPLs.
This is a separate phase of contamination that is made up of concentrated organics. DNAPL is heavier than water so when it enters a well, it sinks and collects on the bottom. Since 1989, our contract laboratory has removed DNAPL from various monitoring wells and one recovery well, R-2. The intent of the DNAPL removal program is to reduce the amount of organic contamination at Necco Park that is a continuing source of contamination. The observed NAPL would possibly move farther away from Necco Park if not removed.

The response actions listed above were done cooperatively with the regulatory agencies; a final remedy for the Necco Park site has not yet been determined. See Figure 2 for an illustration of the response actions to date at Necco Park. The Operating Instructions Manual will be updated as necessary as the final remedy is implemented.

B. SCOPE

Contractors execute the NAPL program. Other activities conducted by contractors include maintaining the clay cap, maintaining the integrity of the monitoring wells, and collecting and analyzing groundwater samples. Contractors complete these tasks in accordance with detailed scopes of work and stringent safety and health plans. The scope of this operating manual is focused on those activities conducted by Niagara Plant personnel: safely operating and maintaining the recovery well systems at Necco Park.

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS

General

Groundwater Treatment Facility Process Description

The Necco Park Groundwater Pumping and Treatment system consists of standard remediation technologies. A detailed process description is provided in the following sections. Groundwater is extracted from five extraction wells and sent to an on-site treatment facility. Additional wells may be added in the future if hydraulic control of the source area is not achieved. The treatment facility consists of two parallel treatment trains for the upper (overburden and B/C bedrock) and the lower (D/E/F bedrock) groundwater zones. Bench scale studies indicated that barium sulfide will be formed by mixing the groundwater from the different zones. The parallel treatment trains will prevent mixing until the majority of the organic compounds are removed. Each treatment train consists of an equalization tank and air stripper. The air stream is discharged to an 8-foot stack. Following treatment, the two groundwater streams are mixed in an effluent mixing tank and discharged to the sanitary sewer line connected to the Niagara Falls POTW.

The design for treatment of the organic contaminants concentrated on the development of a process that would efficiently remove the volatile organic compounds (VOCs) while also considering the semi-volatiles that are present in the groundwater. The two primary treatment methods that were evaluated for organic removal were air stripping and aqueous phase carbon adsorption. Air stripping was determined to be the most effective organics treatment removal technology. The VOCs requiring treatment in both the B-C and D-E-F groundwater are chlorinated hydrocarbons of the methane and ethane families. These compounds are generally strippable. The semi-volatile organics in the process feed stream include hexachlorobutadiene and hexachloroethane, which are partially removed by air stripping, and phenols, which are not generally removed because of their high solubility. The air exiting an air stripper contains the organics that have been removed from the water.

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Groundwater Treatment Facility Process Description (continued)

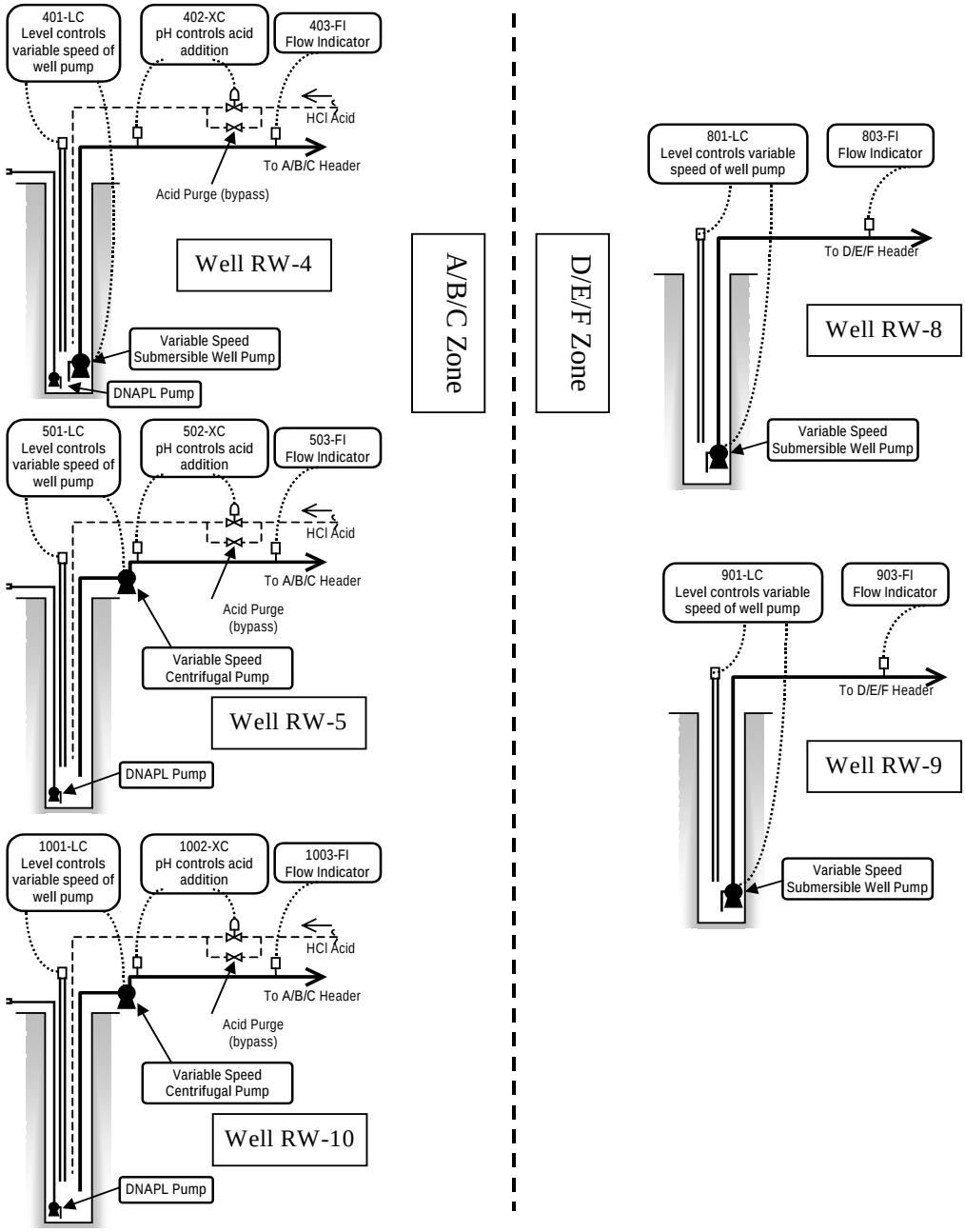
The primary chemical of concern to result in the formation of solids is barium sulfate. Barium sulfate has an extremely low solubility in water, a high specific gravity, and would be expected to settle relatively quickly. Significant quantities of barium sulfate are expected to form minimally in the B-C water, but much more pronounced when the B-C zone water is mixed with D-E-F zone water.

Upon extensive evaluation, the Necco Park project team determined that the most effective manner to control solids is to mix B-C and D-E-F water after treatment of the organics. This option involves the separate treatment of the organics in the B-C and D-E-F waters. The effluent from these two systems is then be fed to a common mix tank. This tank is equipped with a center-mounted agitator, and is also capable of serving as a final pH adjustment tank. Precipitating the solids at this stage of the process offers more flexibility with respect to waste classification, handling, and disposal options.

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Process Flow Diagrams

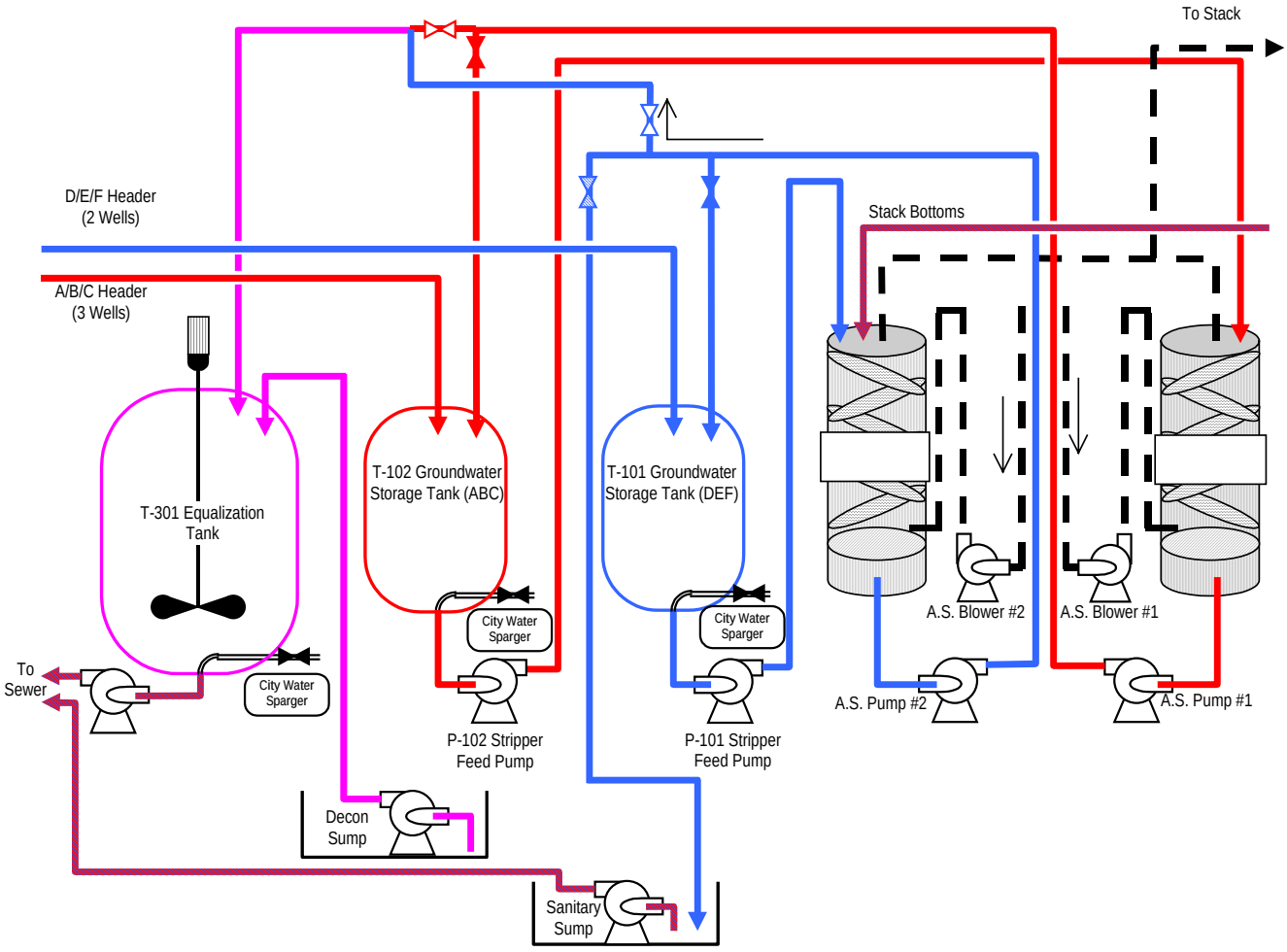


NECCO PARK WELL SYSTEM NPSK0001

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Process Flow Diagrams (continued)



NECCO PARK GROUNDWATER TREATMENT NPSK0004

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Remediation Objectives

The remediation objective of the groundwater treatment system includes overburden and bedrock hydraulic control to achieve pumping and the performance standards as indicated in the Statement of Work (SOW) submitted to the New York State Department of Environmental Conservation (NYSDEC) on December 19, 2003. Performance standards for hydraulic control of the overburden (A-zone) from Section A.7.b. of the SOW are as follows:

"Contaminated groundwater in the overburden (a.k.a. the A-zone) shall be prevented from migrating away from the source area to the far-field….."

"Contaminated groundwater in the overburden (A-zone) shall be prevented from migrating from the source area through hydraulic (e.g., installation and operation of a groundwater extraction system) and/or physical (e.g., sheet pile, slurry wall) methods. If a hydraulic system is employed, it shall be demonstrated that contaminated groundwater does not flow from the source area into the far-field by establishing hydraulic control. (For all zones, hydraulic control is defined as: the containment or control of the contaminated source area groundwater in such a manner as to prevent movement or migration of the contaminated source area groundwater beyond the downgradient boundary of the source area to the far-field. Success in obtaining hydraulic control will be defined as: the achievement of hydrodynamic control at the outer limits of the contaminated source area groundwater such that hydraulic gradients are inward toward the pumping system(s). Methods for verifying that an inward gradient has been established are identified in the appropriate sections below) Evidence of source area hydraulic control in the overburden shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or other means. If a physical barrier system is employed, it shall be demonstrated that contaminated groundwater in the overburden (A-zone) does not flow through, beneath, or around the barrier system. This shall be demonstrated through the installation, operation, maintenance and monitoring of groundwater monitoring wells/piezometers and/or other means."

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Remediation Objectives (continued)

Performance standards for hydraulic control of the bedrock (B-zone through F-zone) from Section A.7.c. of the SOW are as follows:

"Contaminated groundwater in the upper and lower bedrock flow zones (a.k.a. B/C and D/E/F zones) shall be prevented from migrating from the applicable source area (the source areas shall be defined as per Section A.7.b) by hydraulic methods. It shall be demonstrated that contaminated groundwater flow does not occur from the source area to the far field. Evidence of source area hydraulic control shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or other means."

As described in the Remedial Design Work Plan (RDWP), submitted to NYSDEC in 2000, pre-design investigations of overburden and bedrock were performed in a phased approach. This allowed interpretation of the findings of each phase of the Pre-Design Investigation (PDI) to be done prior to implementing a succeeding phase. The phased approach facilitated identification of data gaps and optimization of field efforts. The ultimate goal of this approach was to provide the design of an appropriate remedial system that meets the objectives of the SOW, specifically hydraulic control of source area groundwater.

I. Process Description Section (continued)

C. PRINCIPLES OF THE PROCESS (continued)

Technical Basis

Groundwater (also referred to as leachate) is pumped from five recovery wells (R-4, R-5, and R-10 for ABC Zone; R-8 and R-9 for DEF Zone) to the treatment facility for treatment and disposal.

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps pump ground water from A/B/C zones while two pumps pump ground water from D/E/F zones. 32% HCl is added to the ABC wells to control carbonate precipitation. The groundwater is collected in separate storage tanks and then processed through two separate air strippers, which reduce the amount of organics. The treated groundwater from the two strippers is then combined in an equalization tank, where it is mixed before discharging to the city sewer. The process is controlled in such a way that levels in the wells and tanks are monitored and this data controls variable speed pumps throughout the process, allowing the process to run continuously.

The chemistry of the groundwater in A/B/C is prone to foul the pumping and piping systems with inorganics. Groundwater analyses have shown high bicarbonate alkalinity. During operation of the A/B/C pumping systems, calcium carbonate precipitates out. Calcium carbonate solubility equilibrium is:

$$CaCO_3(s) \rightleftarrows Ca^{2}+(aq) + CO_3^{2-}(aq)$$

To control calcium carbonate precipitation, groundwater bicarbonate is destroyed with acid (32% HCl):

$$HCO_3^- + H^+ \rightarrow CO_2 + H_2O$$

This reduces the amount of carbonate formed during operation, thereby reducing the calcium carbonate ion product. The carbon dioxide generated as a result of HCl addition is liberated when the leachate free-falls from the leachate piping into the A/B/C leachate holding tank.

Thirty-two percent HCl from a 2,000-gallon storage tank is automatically added to A/B/C leachate streams via metering systems.

I. Process Description Section (continued)

D. MAXIMUM INTENDED INVENTORIES

Materials	Average Rate (gpm)	Maximum Rate (gpm)	Maximum Rate (lb/hr)	Maximum Intended Inventory (gallons)
Groundwater				
A/B/C Header	15	30		
D/E/F Header	10	20		
A/B/C Tank				7,500 Cap.
D/E/F Tank				7,500 Cap
Equalization Tank				15,000 Cap.
Effluent Discharge	25	50		
32% HCl				
Storage Tank				2,000 Cap.

SECTION II TABLE OF CONTENTS

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II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards

This section documents pertinent physical and chemical property data for hazardous substances associated with the Necco Park Groundwater Remediation System (GWRS). Necco Park groundwater, condensed organics phase liquid, and 32% hydrochloric acid (HCl) are addressed in this section. The groundwater and DNAPL contain organic chemicals that are known carcinogens. HCl is on the OSHA 1910.119 hazardous substance list (although less than the threshold quantity is ever present at the Necco GWTF system).

Materials Used in the Process

A. Groundwater

1. References

MSDS No.: 12511003
Title: Necco Park Groundwater

2. General

Necco Park groundwater is removed by 5 pumping wells. Collected groundwater is piped to two receiving tanks delineated by zones (A/B/C tank and D/E/F tank) and then fed to the associated air stripper for that zone.

Groundwater is approximately 98% water, 1% silt, and less than 1% organic compounds. The concentration of the total organics and the composition of the organics changes over time and differs from location to location on the site. The principle components of the organic fraction are C-1 and C-2 chlorinated organics, hexachlorobutadiene, and other chlorinated organics. More detailed information can be found on Material Safety Data Sheet (MSDS) No. 12511003 entitled “Necco Park Groundwater”.

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards Groundwater **(continued)**

The hazards associated with groundwater are from the organic constituents. Individual components of groundwater are listed on the MSDS and in this manual. The potential health effects of the groundwater are as follows:

- Chlorinated hydrocarbons are mild to severe skin irritants and mild to severe eye irritants.
- Skin contact with wastewater may cause skin irritation with discomfort or rash. Prolonged or repeated skin contact may cause defatting of the skin, resulting in redness, drying, or peeling of the skin.
- Eye contact with the liquid waste may cause eye irritation with discomfort, tearing, or blurring of vision.
- Inhalation or ingestion may cause temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, loss of consciousness, or cardiac arrhythmia. Higher exposure may cause liver, lung, or kidney effects.

Several of the components are listed as carcinogens including chloroform, tetrachloroethene, arsenic, methylene chloride, vinyl chloride, hexachloroethane, hexachlorobutadiene, and carbon tetrachloride.

Material	CAS Number	Concentration*	MSDS No.
Water	7732-18-5	98-100%	
Silt		1-5%	
cis-1,2-Dichloroethene	156-59-2	30	NA
Trichloroethylene	79-01-6	50	04210064
Chloroform	67-66-3	20	04211003
Tetrachloroethylene	127-18-4	100	34310017
Methylene Chloride	75-09-2	1	10616024
Vinyl Chloride	75-01-4	1	GLSN6716
1,1,2,2-Tetrachloroethane	79-34-5	20	04210094
Hexachloroethane	67-72-1	1	73210028
Hexachlorobutadiene	71-55-6	2	NA
1,1,1-Trichloroethane	71-55-6	1	04210052
Carbon Tetrachloride	56-23-5	1	04211000
Trans-1,2-Dichloroethylene	156-60-5	1	00000065
1,4-Dichlorobutane	110-56-5	1	NA
Tetrahydrothiophene	110-01-0	50	73210039
1,1-Dichloroethane	75-34-3	1	00001028
Heavy Metal Trace Components (<.00001 WGT. %)			
Arsenic	7440-38-2	<0.1	
Barium	7440-39-3	0.2	
Copper	7440-50-8	<0.1	
Selenium	7782-49-2	<0.1	
Silver	7440-22-4	<0.1	

*Shown in ppm unless otherwise noted. Organic and inorganic constituents vary over time and location. The concentrations listed are close to maximum concentrations.

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards Groundwater **(continued)**

3. Toxicity Data

Chlorinated hydrocarbons are mild to severe skin irritants and mild to severe eye irritants.

Skin contact with the wastewater may cause skin irritation with discomfort or rash. Prolonged or repeated skin contact may cause defatting of the skin resulting in redness, drying, or peeling of the skin.

Eye contact with the liquid waste may cause eye irritation with discomfort, tearing, or blurring of vision.

Inhalation or ingestion may cause temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, loss of consciousness, or cardiac arrhythmia. Higher exposure may cause liver, lung, or kidney effects.

Carcinogenicity Information

The following components are listed carcinogens:

Chloroform	Hexachloroethane
Tetrachloroethylene	Hexachlorobutadiene
Methylene Chloride	Carbon Tetrachloride
Vinyl Chloride	Arsenic

4. Permissible Exposure Limits (PEL)

The PELs for individual compounds are listed in the MSDS. A half- or full-face organic vapor/acid respirator is required when exposure to groundwater is likely, as historic air monitoring data have documented that some compounds can be present at levels above the PEL.

The most toxic component is vinyl chloride which has a PEL of 1 ppm over an 8-hour time-weighted average (TWA) and 5 ppm averaged over any 15 minute period; Action level = 0.5 ppm, 8-hour TWA.

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards Groundwater **(continued)**

5. Physical Data

pH:	6-9
Odor:	pungent, skunk-like odor
Form:	liquid
Color:	clear, light gray/tan
Specific Gravity:	1.0
Boiling Point:	100°C (212°F) Water
Freezing Point:	0°C (32°F) Water
Flash Point:	None

6. Reactivity Data

Inorganic constituents in groundwater react with oxygen to form carbonate precipitates. These precipitates clog the pumping system and stripper system resulting in impaired performance.

7. Corrosivity Data

Noncorrosive under ambient conditions.

8. Thermal and Chemical Stability Data

Stable at normal temperatures and storage conditions.

9. Hazardous Effects of Inadvertent Mixing of Chemicals

No foreseeable incompatibility with other materials.

10. Other

RCRA hazardous waste, handling of groundwater is OSHA 29 CFR 1910.120 and USEPA Administrative Order No. II CERCLA – 98-0215.

DuPont Code: NF-77 / NF-79
EPA ID: NYD980536288
EPA Code: F039

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards (continued)

B. DNAPL

1. References

MSDS No.: 12511005
Title: NECCO MULTI-SOURCE LEACHATE

2. General

See DNAPL Management Plan located in Appendix D of the Necco Park O&M Plan.

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards (continued)

C. 32% HCl

1. References

MSDS No.: 1251NF26
Title:

2. General

HCl (32%) is stored at GWRS in a 2,100-gallon tank and is used in the acid addition phase of the process. It is added to the groundwater at wells RW-4, RW-5, and RW-10.

The hazards associated with 32% HCl include:

- Potential burns of the eyes and skin (corrosive).
- Potential irritation to nose and throat if inhaled.
- Potential burns of mouth, throat, esophagus, and stomach if ingested.

3. Toxicity Data

HCl is regulated as a toxic chemical under Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR Part 372.

4. Permissible Exposure Limits (PELs)

The OSHA PEL and the ACGIH TLV are 5.00 ppm. DuPont AEL is 5.0 ppm under a 15-minute, time-weighted average exposure.

5. Physical Data

Form:	Liquid
Boiling Point:	183°F
Freezing Point:	<-5°F (-62.5°F)
Specific Gravity:	1.16 (compared to water); 9.67 lbs/gal
pH:	<1
Solubility:	Completely soluble in water
Color:	Colorless to light yellow
Flash Point:	Will not burn
Odor:	Acid, pungent
Density:	9.67 pounds per gallon (lbs/gal)

II. Safety, Occupational Health & Environmental - SHE Section

Properties and Hazards 32% HCl **(continued)**

6. Reactivity Data

   MSDS shows the material to be stable. Avoid open containers. Hazardous polymerization will not occur. May generate flammable, potentially explosive hydrogen gas on contact with most metals.

   Hydrogen may accumulate inside metal equipment. Hydrochloric acid fumes may be released from heating under fire conditions.

7. Corrosivity Data

   The pH of the material is <1; it is very corrosive.

8. Thermal and Chemical Stability Data

   The material is stable. Hazardous polymerization will not occur. Thermal decomposition may release corrosive hydrogen chloride. Contact with oxidizers will produce chlorine gas.

9. Hazardous Effects of Inadvertent Mixing of Chemicals

   Avoid oxidizing substances, common metals, alkali, or active metal. Contact with most common metals produces hydrogen, which may form explosive mixtures with air. The addition of water to acid results in heat generation.

   - Releases chlorine when in contact with most oxidizing agents.
   - Releases hydrogen cyanide when in contact with cyanide.
   - Releases hydrogen sulfide when in contact with sulfides.
   - Releases bischloromethylether (an OSHA-regulated carcinogen) when in contact with formaldehyde.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention

Operating instructions have been prepared to minimize exposure to groundwater, 32% HCl, and DNAPL. Handling of the acid, groundwater, and DNAPL is covered in operator training and OSHA 29 CFR 1910.120-required 40-hour training and annual refresher training.

Only trained employees are allowed to work with the contaminated groundwater and DNAPL. Proper care and handling of respiratory equipment is crucial to preventing exposure to hazardous chemicals. Equally important is proper use of personal protective equipment (PPE) and proper decontamination of PPE and personnel. Site control measures are also employed to control employee exposure to hazardous materials. Finally, engineering controls are in place to prevent the release of hazardous materials to the environment. The topics below are discussed in the sections that follow:

- Personal Hygiene
- Housekeeping and Work Conditions
- Hose Guidelines
- Process Lines
- Training
- PPE
- Air Monitoring
- Respiratory Equipment
- Decontamination
- Site Control Measures
- Engineering Controls

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Personal Hygiene

The rules below concerning personal hygiene must be followed:

- Eating is permitted only in the Necco Park Control Room or Field Office Trailer. Always wash hands before eating.
- Each employee is responsible for maintaining the cleanliness and usability of his own safety equipment (i.e., replacement of goggles, hard hat support bands, safety glasses, safety shoes, clothing, etc.).
- Any area of the body that comes in contact with any process materials should be thoroughly washed with water, immediately. Do not hesitate to use a safety shower. Remove contaminated clothing.
- No process materials or samples are permitted in the Control Room.
- Work gloves should not be carried into the Control Room.

Housekeeping and Work Conditions

The rules below concerning housekeeping and work conditions must be followed:

- Good housekeeping will help to reduce injuries. Each employee must maintain housekeeping standards by keeping his work area clean and orderly.
- Recognized unsafe conditions should be corrected immediately if possible; if not, they must be reported promptly to supervision, the area should be roped off, and warning signs should be posted.
- Store supplies and materials in a neat and safe manner, but only in areas where such storage is permitted.
- In case of leaks from equipment or piping, post warning signs and rope off area. Notify supervision immediately.
- Maintain a clear passageway to all safety equipment.
- Chains or gates must always be left in the closed position at the top of permanent ladders to equipment and platforms when there is more than one access to the area.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Hose Guidelines

When using hoses, the guidelines below must be followed:

- Only hoses specified for the job may be used (i.e., air, water, nitrogen, steam, process hoses). [See Standard 11.6 of the Safety and Health (S&H) Manual.]
- The maximum pressure for steam hoses is 50 pounds per square inch gauge (psig).
- Hoses dedicated to groundwater service shall not be used in other areas.
- Inspect the hose for defects before using it, such as cracks, fraying, or loose fittings.
- Whenever possible, hoses in use should be hung overhead to reduce tripping hazards; otherwise, they must be protected by appropriate safety signs.
- Hoses used for temporary connections to processes must be removed and washed out immediately after the need for them is over.
- When not in use, hoses must be stored on racks.
- Fire hoses and hydrants cannot be used without prior permission of the Safety Office.
- Fire hoses are not to be used for purposes other than fighting fires.

Process Lines

The preparation of process lines and equipment for maintenance must be conducted as described in Standard 10.1, Cleaning and Preparing Equipment and Piping, of the S&H Manual. See S&H Manual Section 10.2 and Safe Work Practices of this document for lock, tag, and try requirements.

When unplugging process lines, the guidelines below must be followed:

- Wear protective equipment as described in Section 2.B.7.
- When using steam or water pressure as an aid, provide a means for venting off pressure from connecting hose. Be careful of excess heat when working with steam.
- Protect the area at the spot where pluggage may be released by roping off and posting warning signs.
- Be cautious, avoid booby traps.

Tools or equipment that are damaged or due for inspection must not be used and must be tagged with an "unsafe condition tag."

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Process Lines (continued)

Whenever an operation cannot be conducted in accordance with established procedures, consult supervision.

Whenever work is to be done in an area that requires an auxiliary supply of breathable air, use only approved portable breathing apparatus.

Before opening process lines or equipment, review specific instructions for minimum PPE.

Any container, including samples, being filled with process materials must be properly identified by a label. The container should be identified before filling.

Any area made hazardous by an unusual condition (i.e., leaks, spills, work in progress, etc.), must be protected by appropriate "caution" or "danger" signs and roped off with safety tape.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Training

A. 1910.120 Training Requirements

1. Basic Training

Prior to performing any job tasks required for the Necco Park Groundwater Treatment Facility, all Groundwater Treatment Facility personnel must receive a minimum of 40 hours of health and safety training, consistent with the requirements of OSHA 29 CFR 1910.120 and the worker's job function and responsibilities. Topics required in this 40-hour course include PPE, decontamination procedures, heat stress monitoring, and many other topics specific to the Groundwater Treatment Facility. Workers shall not be permitted to work on GW equipment until they have completed this training. Workers shall also receive a minimum of three days of on-site field experience under the direct supervision of a trained, qualified supervisor.

Employees who can show through explicit documentation, by their work experience, and/or prior training that they have had prior training equivalent to that as specified above will be considered as meeting the minimum of 40 hours of health and safety training required under OSHA 1910.120.

Workers shall also receive 8 hours of refresher training annually, per OSHA 1910.120 requirements. Documentation that workers have received required training shall be kept in the area files.

2. Site Supervisors Training

Supervisors directly responsible for or who supervise employees working in this operating area shall receive 40 hours of initial training, 3 days of supervised field experience, and at least 8 additional hours of specialized training at the time of job assignment. These are the requirements as outlined under OSHA 1910.120.

Topics for this specialized training include the area safety and health program, PPE program, spill containment program, health hazard monitoring program, and other relevant topics specific to the Groundwater Treatment Facility.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

3. Site-Specific Training

Prior to initiation of field activities, all field personnel will attend training sessions taught specifically to address the Groundwater Treatment Facility. These sessions will include, but are not necessarily limited to, the following:

- Work rules and safety policies
- Proper use, storage, and care of PPE
- Types of potential hazardous chemicals
- Location and use of emergency equipment
- Importance/urgency of mandatory reporting of injuries and illnesses
- Emergency procedures
- Job assignments
- Personal hygiene
- Motor vehicular equipment

All field personnel will be informed of the nature and potential hazards of the chemicals present in the area.

B. Resource Conservation and Recovery Act (RCRA) Training

Area-specific RCRA training is required of all operators and supervisors before they can work unsupervised in this area. This training must be updated annually. Documentation of this training shall be kept in area files.

C. Training and Upkeep of the Plan

All Necco Park Groundwater Treatment Facility operators are to be trained on the operating instructions. Training on this plan is to be reviewed and documented at least annually by the FLS. Documentation of the training will be kept in the area files. The FLS and ATO are responsible for maintaining this plan by reviewing it once every three years for accuracy.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Personal Protective Equipment

A. Minimum Requirements

- Safety shoes are required for all employees.
- Hard hats must be worn in all operating areas and on all plant walkways. The only exceptions are: control rooms, offices, lunchrooms, and restrooms.*
- Approved safety spectacles are the minimum eye protection required in all areas. The only exceptions are: control rooms, offices, lunchrooms, and restrooms.*
- Gloves appropriate for the work being done must be worn at all times while doing the work; examples are:

    - Leather Gloves - while using hand tools, operating valves, or handling dry chemicals (unless restricted by other rules).
    - Nitrile Gloves - while handling groundwater or concentrated organics.
    - Surgical Gloves - worn under Nitrile gloves as extra protection while handling groundwater or concentrated organics.

- Goggles must be carried at all times. Wear goggles when:

    - Any area is posted as a goggle area.
    - Adjusting packing glands on pumps and valves.
    - Operating valves.
    - Handling any process material (i.e., taking samples, filling containers, opening lines or equipment, etc.) unless restricted by other rules.
    - Looking into any open piece of equipment or line that may contain hazardous material.

- Wear a half-face or full-face respirator with cartridges for organic and acid vapors and particulates when working on any open piece of equipment or line that may contain groundwater. If the material present is the DNAPL, then a SCBA must be worn or bottled breathable air must be used.

* The exceptions listed above for wearing hard hats and spectacles will be rescinded whenever work being done in these areas may create an abnormal hazard.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention **(continued)**

B. Minimum Personal Protective Equipment Requirements when Working at Certain Points in the Process or with Certain Materials

1. Contaminated Groundwater

- Safety glasses, hard hat, and goggles
- Saranex® suit with hood
- Nitrile gloves and surgical gloves
- Rubber boots
- Half-face or full-face respirator with cartridges for organic and acid vapors and particulates

2. DNAPL

- Hard hat
- Saranex® suit with hood
- Nitrile gloves and surgical gloves
- Rubber boots
- SCBA or bottled breathable air

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

4. Rinsing a Well Pump at the Pumping Well

   - Safety glasses, hard hat, and goggles
   - Saranex® suit with hood
   - Nitrile gloves and surgical gloves
   - Rubber boots
   - Half-face or full-face respirator with cartridges for organic and acid vapors and particulates

5. Sampling Groundwater Containing 32% HCl

   - Safety glasses, hard hat, and goggles
   - Full-length face shield
   - Half-face or full-face respirator with cartridges for organic and acid vapors and particulates
   - Rubber gloves
   - Saranex® suit with hood
   - Rubber boots

6. Working on Open Lines and Equipment Containing 32% HCl, including the HCl Tank Ventsorb Canister

   - Complete acid suit with hood, gloves, boots
   - Half- or full-faced respirator with acid vapor cartridges

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention **(continued)**

C. Safety Equipment Required for Entry into a Closed Chamber

- Safety harness with life line rope or tripod
- Fog horn, flashlight
- SCBA
- Portable air blower with elephant trunk
- Electrical ground fault detector
- Portable extension light
- Straight ladder with scaffold plank
- Explosimeter
- Dummy test

Have all disconnects as close to vessel as possible.

Air Monitoring

A. Explosimeters and Oxygen Analyzers

Standard 7.3 from the S&H Manual describes the use of and responsibilities for explosimeters and oxygen analyzers. All persons using these instruments must be familiar with and follow this standard.

B. Guidelines for Respiratory Protection

The respiratory protection guidelines are based on prior monitoring. Use the following table to determine respiratory protection for non-routine monitoring:

OVA Reading	Respiratory Protection Required
<1 ppm	None
>1 ppm <5 ppm	Half-face or Full-face Air Purifying respirator (Scott-O Vista or MSA) with combination acid gases and organic vapors cartridge
>5 ppm <500 ppm	Supplied air using air lines or SCBA
>500 ppm	Stop work, shut down process, and notify Supervision

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Respiratory Equipment

A. Bottled Breathable Air

Bottled breathable air is to be used when necessary to break into the stripper column, primary condenser, secondary condenser, and the decanter. It must also be used when process samples are required from any of these pieces of equipment.

B. Self-Contained Breathing Apparatus Respirators

They are to be used when necessary to do emergency work in an atmosphere containing unknown concentrations of air contaminants or in atmospheres that could be deficient in oxygen. They can also be used when breaking into a line or vessel containing organic material and when connecting, disconnecting, or loading the tank truck.

Each operator must know the location of this equipment and demonstrate their ability to use it as part of their job training. Review of SCBA use is required every six months.

SCBAs are to be inspected by the user before each use.

C. Buddy System

The buddy system is to be used to assist with the removal of SCBA equipment. Whenever a person is required to wear a SCBA, another person equipped with all the required PPE for the work zone will be present. This additional person will aid the person when donning the SCBA and when removing the SCBA. After each use, SCBAs are to be sent to the Safety Office for cleaning the masks and for refilling the air tanks.

No person(s) should enter a contaminated area wearing this equipment unless a person with another SCBA readily available (should have equipment beside him) is standing by in case assistance is needed.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

D. Half- or Full-Facepiece Filter and Organic Cartridge Respirators

No one may use these respirators without having first received proper training and fit testing as outlined in Standard 6.2, Respiratory Protection, of the S&H Manual. These devices may only be used for those jobs specifically approved by area supervision. They must not be used in oxygen-deficient atmospheres. They should be worn when sampling the secondary condenser vent, when changing carbon canisters, and when taking stripper column influent and effluent process samples.
Prior to donning, inspect respirator to be sure that:

- Respirator is clean.
- Facepiece is free of cracks, tears, or distortion.
- Rubber inhalation and exhalation valves are in place and not stuck in closed position.
- Exhalation valve cover is in position.
- Filters/cartridges are secure (gasket in place is required).
- Head straps are in proper position and in good condition.

Damaged respirators should be discarded. Fit testing will be required for a new respirator. These respirators can only be worn by persons who are clean shaven in the seal area (where the rubber contacts the face). To don respirator, use the following procedure:

- Place respirator on face with narrow end on nose and wide end under chin.
- Place bottom strap around head (under ears) and top strap around head (over ears).
- Tighten straps as necessary to obtain good seal.
- Check facepiece seal by holding hand over exhalation valve cover and exhaling rapidly several times. If air leakage is detected around the seal, tighten straps and repeat check procedure until a good seal is obtained.

The filter or cartridge elements must be suited for organic and acid vapors and particulates (i.e., MSA combination cartridges for combination acid gases and organic vapors) and should be changed whenever breathing becomes difficult or the odor or taste of the contaminant is detected.

The respirator should be cleaned after each day's use or more often if necessary. To clean, remove air purifying elements, gaskets, straps, valves, and valve covers. Immerse facepiece in warm water and scrub with soap and soft brush. Then rinse, dry, reassemble, and inspect the respirator.

Respirators should be stored in approved locations that are clean and dry. Place in a plastic bag when not in use.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Decontamination

A. Personal Protective Equipment Decontamination

All decontamination equipment and procedures are to be in place before entering a work zone (see Section 2.B.11, Site Control Measures, for specific work zones). As required under OSHA 1910.120, decontamination will take place in the work zone to isolate and remove any hazardous substances and to prevent any contaminated material from leaving the work zone.

A portable water container and a water tub are to be used for rinsing contaminated boots, gloves, and other PPE while in a work zone. The water tub will contain any run-off of contaminated water. After the PPE (boots, gloves, Saranex® suit) has been rinsed, it can be removed. Water used for decontamination is to be transported from the work zone to the decon station in the tank truck loading area where it will be recycled back through the Groundwater Treatment Facility. If boots are grossly contaminated, they should be removed very carefully (gloves should remain on person removing the boots) and placed in a plastic bag which is to be sealed and carried to a proper drum used for PPE disposal.

Contaminated gloves and Saranex® suits are to be removed very carefully after they have been rinsed off with clean water so as not to cause any exposure of contaminants to the skin. The suits and gloves should be taken off inside out. They should then be placed in plastic bags and transported to a proper drum used for disposal of PPE.

B. Personnel Decontamination

Exposure to chemicals can occur in several ways:

- Contact through inhalation
- Contact through skin
- Contact through ingestion
- Contact through eyes

Injuries from chemical inhalation, ingestion, and contact with eyes can only be treated by qualified physicians. If the contaminant is on the skin or in the eyes, immediate measures must be taken to counteract its effect. First aid treatment usually involves flooding the affected area with water for at least 15 minutes. Combination eyewash/safety showers are located at each of the Groundwater Well houses and three in the Necco Park Treatment Building (see Section 2.D - Exposure Control).

Shower facilities are located in the Necco Park Treatment Building. The first change room is used to change out of work clothes and the second change room or "clean room" is used to store clean street clothes. This type of shower facility is spelled out in the OSHA 1910.120 regulations.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention (continued)

Site Control Measures

Site control measures are required under OSHA 1910.120 and are necessary to control employee exposure to hazardous materials. Personnel wearing PPE that has the potential for contamination are required to remove the contaminated PPE before leaving the work zone. Employees must enter and exit the work zone through the same section or area where PPE decontamination is to take place. Before work begins in a work zone, decontamination procedures will be in place, and the area must be posted to prevent unauthorized access. Listed below are separate work zones within the Groundwater Treatment Facility.

A. Pumping Well Work Zone

When it is necessary to pull a pump from a pumping well or work on other instrumentation that will require contact with groundwater, the appropriate PPE, as outlined in Section 2.B.7, must be worn. The PPE worn must be removed before leaving the pumping well work zone, which is an area around the well with a radius of approximately 10 feet. See Section 2.B.10 for decontamination and disposal procedures for contaminated PPE. All people entering the pumping well work zone when groundwater is present must don the appropriate PPE.

B. When filling DNAPL drums

No persons without all required PPE are allowed to enter this area when work is being conducted. This area contains the concentrated organics stream, which is a flammable, hazardous material; thus, breathable air is required to be used. A safety shower is located in this area. After work is completed in this area, the operator must remove and dispose of any contaminated PPE before leaving the work zone. See Section 2.B.10 for decontamination and disposal procedures for contaminated PPE.

The nearest medical assistance for all personnel is Niagara Falls Memorial Medical Center on 10th Street.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Prevention **(continued)**

Engineering Controls

The Necco Park GWTF system has been designed to minimize exposure or release of 32% HCl, contaminated groundwater, and concentrated organics to the environment.

The HCl tank is vented through a conservation vent located on top of the HCl tank. The vent is designed to reduce gassing from the HCl tank.

Spill Control

Reporting Procedures

Upon learning of a spill or release of 32% HCl, groundwater, or concentrated organics to the environment (air, water, land), the Environmental Technician takes immediate corrective action to stop or contain the leak with due attention to normal safety precautions.

The Environmental Technician notifies the Operations Manager of the problem. The Environmental Technician also calls the DuPont Project Director.

Call the Operations Manager for any spill or release of process material from its normal containment and alert them as to what and how much has been spilled or released and what steps have been taken or what steps can be taken.

If the spill or release is an immediate hazard to the neighboring plants, notify BFI site guard immediately.

II. Safety, Occupational Health & Environmental - SHE Section

Spill Control (continued)

Clean-Up Procedures

The following chart describes the chemical spill clean-up procedures for the Groundwater Treatment Facility. These procedures are to be followed after as much material as possible has been put back into the process.

Material	Safety Equipment	Clean-up Method
Contaminated Groundwater	Goggles Surgical gloves under nitrile gloves Rubber boots Saranex® suit Half- or full-face respirator*	Use spill pads to contain spill. Absorb material with speedi-dry. Shovel to proper container for disposal.
Dense Non-Aqueous Phase Liquid (DNAPL)	Surgical gloves under nitrile gloves Rubber boots Saranex® suit SCBA or bottled breathable air	Use spill pads to contain spill, and dilute spill with water. Absorb material with speedi-dry. Shovel to proper container for disposal.
Organic Vapors	Goggles Nitrile gloves Half- or full-face respirator*	Shut off process to stop leak. Use OVA monitor to determine where leak is originating.
32% HCl in Tank Containment Pad	Complete acid suit with hood, gloves, boots, and breathing air supply	Neutralize spill with lime or soda ash. Pump neutralized material to equalization tank with sump pump.
32% HCl to Ground	Complete acid suit with hood, gloves, boots, and breathing air supply	Dike spill to prevent material from entering sewers or waterways. Apply speedi-dry on spill to absorb material. Shovel to proper disposal container.
Low pH Groundwater	Goggles Surgical gloves under nitrile gloves Rubber boots Saranex® suit Half- or full-face respirator*	Dike spill to prevent material from entering sewer drain. Neutralize spill with lime or soda ash. Flush neutralized material to sewer.

* When using a half- or full-face respirator, the cartridges must be rated for organic and acid vapors and particulates.

II. Safety, Occupational Health & Environmental - SHE Section

Exposure Control

If personal exposure to either groundwater, DNAPL, or 32% HCl occurs, follow the procedures outlined below based on exposure route.

Groundwater and DNAPL

NOTE: Required by law, all site personnel that have been potentially exposed to groundwater or condensed organics are required to take a shower when they leave the area.

Exposure Route	Control Procedure
Eye Contact	Flush eyes with water immediately and transfer to Medical.
Skin Contact	Wash affected area immediately. Remove all wet clothing in contact with skin immediately. Get medical help if irritation or redness develops. Protective clothing should be washed off as rapidly as possible and carefully removed.
Inhalation	Remove exposed individual to uncontaminated atmosphere. Call for medical help.
Ingestion	Get medical help. Personnel shall be taken to Niagara Falls Memorial Medical Center.

32% HCl

Exposure Route	Control Procedure
Eye Contact	Flush eyes with water for at least 15 minutes and transfer to Medical. Apply cool packs on eyes during transport, but avoid freezing.
Skin Contact	Shower with large quantities of water for at least 15 minutes. Remove all PPE, clothing, and shoes while in shower. Get medical help. Keep affected area cool without freezing.
Inhalation	Remove exposed individual to uncontaminated atmosphere. Call for medical help.
Ingestion	Give large quantities of water. Get medical help. DO NOT INDUCE VOMITING.

Safety Showers

Each operator must be familiar with the location of all safety showers and their operations.

There are eight combination eyewash/safety showers in the Groundwater Treatment Facility at the following locations:

- Three inside the Treatment Building
- One at each of the well houses

Before performing any work that will cause exposure to hazardous materials (i.e., breaking lines or opening equipment), a person must locate and test the nearest safety shower. Safety showers are to be tested each shift during the field inspection.

II. Safety, Occupational Health & Environmental - SHE Section

Special or Unique Hazards

Heat Stress

In addition to protecting against chemical exposure, PPE will decrease body ventilation potentially resulting in heat stress. Heat stress can result in serious injury or death. As part of the 40-hour safety and health training required under OSHA 1910.120, area personnel are instructed in the identification of symptoms of heat stress, the first-aid treatment procedures for the victim, and the prevention of heat stress casualties.

Symptoms potentially indicative of the onset of heat stress include elevated heart beat, profuse perspiration, muscle cramps, or fatigue. Heat stress, if allowed to persist, may result in the dangerous conditions described below.

Heat Exhaustion

A. Symptoms

Usually begins with muscular weakness, dizziness, nausea, and a staggering gait. Vomiting is frequent. The bowels may move involuntarily. The victim is very pale, their skin is clammy, and they may perspire profusely. The pulse is weak and fast, their breathing is shallow. They may faint unless they lie down. This may pass, but sometimes it remains and death could occur.

B. First Aid

Immediately move the victim to a cool and shady area with good air circulation. Remove all protective outerwear. Take measures as necessary to cool the victim, including spraying or splashing with water. Call a physician. Treat the victim for shock. (Make them lie down and raise their feet 6-12 inches.) If the victim is conscious, it may be helpful to give them sips of a salt water solution (1 teaspoon of salt to 1 glass of water). Transport victim to a medical facility as soon as possible.

II. Safety, Occupational Health & Environmental - SHE Section

Special or Unique Hazards (continued)

Heat Stroke

A. Symptoms

This is the most serious of heat casualties due to the fact that the body excessively overheats. Body temperatures often are between 107°F-110°F. First there is often pain in the head, dizziness, nausea, oppression, and the skin is dry, red, and hot. Unconsciousness follows quickly and death is imminent if exposure continues. The attacks will usually appear to occur suddenly. Lack of perspiration may differentiate heat stroke from heat exhaustion.

B. First Aid

Call professional medical personnel immediately. Immediately move the victim to a cool and shady area. Remove all protective outerwear and loosen/remove clothing. Lay them on their back with the head and shoulders slightly elevated. It is imperative that the body temperature be lowered immediately. This can be accomplished by applying cold wet towels, ice bags, etc., to the head. Sponge off the bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water. The main objective is to cool them without chilling them to the point where shock is induced. Give no stimulants.

Prevention of Heat Stress

One of the major causes of heat casualties is the depletion of body fluids. Personnel should replace water and salt loss from sweating. Salts can be replaced by either a 0.1% salt solution, heavily salted foods, or commercial mixes such as Gatorade. The commercial mixes are advised for personnel on low sodium diets.

The work/rest guideline for personnel using a respirator with supplied air or SCBA while wearing a Saranex® suit is as follows:

Ambient Temperature	Maximum Wearing Time
Above 90°F	<1 hour
80-90°F	1 hour
70-80°F	2 hours
60-70°F	3 hours
50-60°F	4 hours
40-50°F	5 hours
30-40°F	6 hours
Below 30°F	8 hours

A sufficient period will be allowed for personnel to "cool down."

II. Safety, Occupational Health & Environmental - SHE Section

Special or Unique Hazards (continued)

32% HCl Corrosion

Addition of HCl to the GWR Treatment Facility introduces a potential for severe equipment and piping corrosion concerns if the acid feed is excessive. Low pH material is highly corrosive to carbon steel. The piping associated with the system is comprised of three materials: stainless steel, polypropylene-lined, Teflon-lined steel pipe and HDPE/PP plastic pipe. Consult the drawings to determine the type of material for a specific pipe section.

Design steps have been taken to install a sophisticated acid metering control system and appropriate interlocks to prevent excessive acid feed. However, immediate action must be taken to ensure acid feed is ceased in the event low pH (below established control limits) material exits the influent/effluent tank(s).

Fire Protection

A. Fire Hazards

Although no areas of Necco Park GWTF are classified flammable, fire protection eqiupment is provided to combat general fires from debris or electrical malfunction.

B. Fire Fighting

The first step in fighting a fire is to turn in a fire alarm (to the Niagara Falls Fire Department).

If the fire is controllable, attempt to put it out with a portable extinguisher. If the fire is electrical, it is best to cut off the power to the burning unit first.

If smoke or fumes are present, get help and wear SCBA before attempting to put out the fire.

If fire is not controllable, stay clear of the area and wait for the fire department so you can direct them to the fire.

II. Safety, Occupational Health & Environmental - SHE Section

Special or Unique Hazards (continued)

C. Fire Equipment Locations

Fire extinguishers are located in each recovery well shed and in various areas throughout the process.

The fire extinguishers are for dry chemical - ABC powder extinguisher, and are suitable for this process:

D. Fire Extinguishers

When using a fire extinguisher:

- Check to see if inspection is up-to-date for use. Area is responsible for inspecting all extinguishers monthly.
- Check to see if the fire extinguisher is pressurized.
- Check nozzle to see if it has been used. Nozzle should be clear.
- Start at the base of the fire near the ground and move up the fire to eliminate the oxygen so the fire will go out.
- Be cautious of a burn potential.

The effectiveness of a fire extinguisher in putting out fires will depend on the use of the proper equipment for the type of fire. Fires are classified A, B, C, and D.

- Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics, where a quenching cooling effect is required for extinguishment.
- Class B fires are fires in flammable liquids, gases, and greases where oxygen exclusion and flame interruption effect is required for extinguishment.
- Class C fires are fires in energized electrical equipment where the electrical nonconductivity of the extinguishing media is of importance. (When electrical equipment is de-energized, extinguisher for Class A or B fires may be used.)
- Class D fires are fires in combustible metals such as magnesium, titanium, zirconium, sodium, potassium, and lithium.

II. Safety, Occupational Health & Environmental - SHE Section

Special or Unique Hazards (continued)

The type of fire extinguishers found in the Groundwater Treatment Facility are dry chemical - ABC powder extinguishers. Smothering is the principle extinguishing effect for this type and they are effective for class A, B, and C fires.

Emergency recharging of discharged fire extinguishers is accomplished as follows:

- Monday through Friday - 8 a.m. to 4:30 p.m.: Call Fire Equipment Services
- All other times (including holidays): Call the Operations Manager and/or Project Director.

II. Safety, Occupational Health & Environmental - SHE Section

Environmental and Regulatory Restrictions and Precautions

Spill/Release Reporting Requirements

Upon learning of a spill of process material or of a release of organic vapors to the air, the Environmental Technician must take immediate corrective action to stop or contain the leak with due attention to normal safety precautions. The Environmental Technician must notify the Operations Manager of the problem. All spills of materials from their normal containment and all releases to land, water, and air are to be reported immediately to the Operations Manager and the Project Director so that a prompt determination as to what regulatory agencies should be notified can be made.

The following are specific situations that could exist and the proper notification procedures to be followed by Environmental Technicians:

A. Releases to Air

The HCl tank vent emissions are regulated under NYSDEC. A conservation vent is the means by which the HCl vapors are controlled at the Necco Park HCl tank.

B. Releases to the City Sewer

SIU Permit No. 64 with the Niagara Falls Wastewater Facilities limits Necco Park's discharge. If sampling of this outfall reveals a permit violation, the City POTW (publicly owned treatment works) must be notified immediately. If there is reason to suspect that a process upset (interlock failure) has occurred and untreated groundwater gets sent to the POTW, a sample should be taken and analyzed, and the Operations Manager should be contacted in order to notify the City POTW.

If an upset occurs with the acid metering system, there exists a potential for Groundwater Treatment to cause a violation of the pH limits established by the POTW (pH less than 5).

II. Safety, Occupational Health & Environmental - SHE Section

Environmental and Regulatory Restrictions and Precautions (continued)

Air stripper effluent must be analyzed in order to allow discharge to the city sewer and to meet specific permit limits. Environmental Technicians should sample the effluent as required and the analysis should be performed by a contract laboratory. Quarterly sampling must take place by the approved contract laboratory.

If any of the results exceed permit limits, it may be necessary to cease discharging to the sewer. The Operations Manager must be notified of any suspected permit violation.

NOTE:	If there are ever any questions or concerns surrounding environmental regulations, procedures, or any environmental issues, contact the Operations/Environmental Manager. They are here to assist all areas in complying with environmental regulations and procedures.

C. Hydrochloric Acid Spills/Leaks

The 32% HCl storage tank is a registered Chemical Bulk Storage (CBS) tank. If a spill occurs, a calculation must be made to determine the amount of HCl spilled (as 100% HCl). Based on the number of gallons spilled, the calculation to determine pounds as 100% HCl is:

Number of gallons 32% HCl x 9.67 pounds x 0.32 gallon

Per CBS regulations, a spill from this tank is reportable if the quantity of HCl spilled is:

- 5,000 pounds to the air
- 100 pounds to the land
- 100 pounds to the water

Per Superfund regulations, a spill from this tank is Superfund reportable for:

- 5,000 pounds to the air, water, or land per 24 hours

II. Safety, Occupational Health & Environmental - SHE Section

Environmental and Regulatory Restrictions and Precautions (continued)

According to Title III regulations, a spill from this tank is Title III reportable for:

- 5,000 pounds to air per 24 hours

In the event of a spill that may be reportable, the Operations/Environmental Manager must be contacted immediately to make the appropriate agency calls.

D. DNAPL Stream Spills/Leaks

The DNAPL stream is a hazardous waste and is classified as NF-86 (DuPont code). It has a RQ of 0.1 pounds (or 0.125 gallons). If a spill of this quantity reaches the ground (soil), sewer, or water, the following agencies must be notified immediately: NYSDEC, Niagara County Health Department, and National Response Center (Superfund).

E. Groundwater Spills

The groundwater is a hazardous waste and is classified as NF-77 (DuPont code). Any spills/leaks of groundwater should be reported to the Operations Manager immediately.

Consent Order Requirements

The Order on Consent (No. B9-0206-87-09) regulates the operation of the Necco Park Groundwater Remediation Program. The specific objective of this program is to maintain a hydraulic control in the overburden and bedrock beneath Necco Park to reduce off-site migration of contaminated groundwater. This hydraulic control is maintained through operation of the 5 pumping wells on the site.

In the event of long-term outages, notification must be made to the NYSDEC [851-7220 (M-F 8-3:30); Fax - 851-7226] by the Necco Park GWTF Operations Manager. It is recommended that notification be made by fax. This will document the notification. A copy of the fax and information regarding the reason the well/process is down is to be sent to the DuPont Project Director.

II. Safety, Occupational Health & Environmental - SHE Section

Environmental and Regulatory Restrictions and Precautions (continued)

Medical Surveillance Requirements

A. Baseline Monitoring

As regulated by OSHA 1910.120, employees working in this area must have had a pre-employment medical examination to establish the individual's state of health and baseline physiological data and ability to wear PPE. The medical examination shall be based on many parameters determined by the attending physician. Employees' medical examination records must be kept on file in the DuPont Niagara Medical Department.

B. Periodic Monitoring

Employees must be in a periodic medical monitoring program. The frequency and type of examination to be conducted is determined by medical personnel knowledgeable in the area of toxicology and occupational exposure. For field personnel, an annual physical is required.

C. Non-Routine Monitoring

Whenever an incident occurs that may pose a significantly increased health risk to personnel or whenever personnel exhibit an apparent job-related medical condition, the supervisor shall recommend that any such individual consult with the examining physician or physician group for examination and treatment in accordance with good medical practice.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices

The following standards from the Niagara Plant's S&H Manual must be followed in the Groundwater Treatment Facility just as they are to be followed in all areas of the plant:

- Standard 1.1 - The DuPont Approach to Safety and Health
- Standard 1.2 - Responsibility for Safety and Health
- Standard 1.3 - Job Location Assignment
- Standard 4.1 - General Safety Rules

Lock, Tag & Try (Reference Site S&H Manual 10.2)

1. Purpose

This standard (along with Site S&H Manual 10.2) covers the servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machine or equipment could cause injury to employees.

2. Compliance Requirements

All employees are required to comply with S&H 10.2 and the information provided here.

3. Periodic Inspection

Management is required to conduct periodic inspection of the Lock, Tag & Try procedure at least annually to ensure that the procedure and the requirements of this standard are being followed. This is to be accomplished through the use of the Area Safety Audits formally conducted on a monthly basis.

a. Purpose
Inspections are conducted to identify and correct inadequacies any deviation from or in the Lock, Tag & Try procedure.

b. Scope
Inspection shall include a review between the inspector and employee who performed the Lock, Tag & Try procedure, of that employee's responsibilities surrounding this standard, and the job being inspected.

c. Certification
The inspector shall document that the inspection was completed and identify in writing the machine or equipment in which the Lock, Tag & Try vas being used, the date of the inspection, and the employees involved in the inspection.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

4. Training and Communication

Training shall be provided to ensure that the Lock, Tag & Try purpose, function, and application is understood by employees.

a. Initial Training
Training shall include the recognition of applicable hazardous energy sources, type, and magnitude of the energy found in the workplace, and the methods and means necessary for isolation and control in order to perform maintenance or service to machines or equipment.

b. Refresher Training
Retraining shall be provided and documented whenever there is a change in job assignment; change of machines, equipment, or processes that present a new hazard; or when there is a change in the Lock, Tag & Try procedure.
Additional retraining and documentation shall also be conducted whenever a periodic inspection reveals that there are deviations from or inadequacies in the employee's knowledge or use of the Lock, Tag & Try procedure.

c. Certification
The Operations Group maintains records that certify employees have been trained and that training is kept current. This certification contains each employee's name and training date.

5. Lock and Tag Device

If a lockout is to remain in place for an extended period (greater than 90 days), the Environmental Technician must recheck the credibility of the lockout and retag the application. This would be repeated every 90 days if necessary.

a. Lockout Devices
Use only approved lockout devices. Approved locks are red with "Lock, Tag & Try" imprinted in white letters. Lockout devices are not to be used for any other purpose.

b. Tags
Tags shall be clearly marked with the name of employee placing the lockout device on, the date, and the reason the lock is on.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Break & Enter (Reference Site S&H Manual 10.9)

1. Purpose
   This standard (along with Site S&H Manual Section 10.9) provides direction to all employees involved in the preparation, opening, hazard removal, closing, and integrity checking of a given system in hazardous material service prior to restarting.

2. Compliance Requirements
   All employees are required to comply with the Site S&H Manual, Area Safety Rule concerning Lock, Tag & Try, and the information provided here.

3. Break and Enter Permit
   a. Purpose
      The permit is intended to serve as a means to communicate to all employees involved in the break and enter procedure. It is in checklist format and denotes which steps are to be followed to complete a specific break and enter job. The permit is posted at the job site for the duration of the job.
   b. A11 break and enter permits shall be retained for at least one year to facilitate review of the break and enter program. Any problems encountered during the break and enter shall be noted on the permit so that revisions to the program can be made. all cancelled permits shall be sent to the Operations Manager for retention.
   c. Periodic Inspection
      Management is required to conduct periodic inspection of the Lock, Tag & Try procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

      a. Purpose
      Inspections are conducted to identify and correct any deviation from or inadequacies in the Lock, Tag & Try procedure.
      b. Scope
      Inspection shall include a review, between the inspector and employee who performed the Lock, Tag & Try procedure, of that employee's responsibilities surrounding this standard and the job being inspected.
      c. Certification
      The inspector shall document that the inspection was completed and identify in writing the machine or equipment in which the Lock, Tag & Try was being used, the date of inspection, and the employees involved in the inspection.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Confined Space Entry (Reference S&H Manual Section 10.3)

A. Purpose

This standard (along with Site S&H Manual Section 10.3) covers the procedures required for an employee to enter a confined space. A list of all designated confined spaces in the Groundwater Remediation Area is provided on Table 1.

SAFETY NOTE:	CAUTION - A confined space is potentially one of the most hazardous environments you may enter; attention to every detail is imperative. Do not enter any confined space without approval from Supervision.

Table 1
Confined Space Vessels – Necco Park

Vessel Name	Equipment I.D.
A/B/C Tank	T-102
D/E/F Tank	T-101
A/B/C Air Stripper	AS-202
D/E/F Air Stripper	AS-201
Equalization Tank	T-301
32% HCl Storage Tank	NP001
Decon Sump	Decon Area

B. Compliance Requirements

All employees are required to comply with S&H 10.3 and the information provided here.

C. Confined Space Entry Permit

An entry permit must be completed for all confined space entries. This permit is canceled when the job has been completed or when any conditions arise (Site Emergency, inability to work within the requirements set forth on the permit, etc.) that pose a risk to the entrants.

A vessel entry checklist must be completed prior to filling out the closed chamber entry permit. Examples of each checklist are found in Attachment 3.

All canceled permits shall be retained at least one year to facilitate review of the confined space entry program. Any problems encountered during an entry shall be noted on the permit so that revisions to the program can be made. All canceled permits shall be sent to the Operations Manager for retention.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Confined Space Entry (Reference S&H Manual Section 10.3)

D. Training and Communication

Training shall be provided to ensure that all employees involved in confined space entry acquire the understanding, knowledge, and skills necessary to perform the assignment in a safe manner.

1. Initial Training

Training shall be provided and documented before the employee is assigned to perform tasks required under the confined space entry program. Proficiency will also be established.

2. Refresher Training

Retraining shall be provided and documented whenever there is a change in job assignment, change in the permit space operations that presents a hazard of which the employee was previously not trained on, or when there is evidence indicating lack of proficiency or understanding on the part of the employee in regard to the requirements of the confined space entry program.

3. Certification

The Operations Group maintains records that certify employees have been trained and that training is kept current. This certification contains each employee's name and training date.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Process Safety Interlocks (Reference S&H Manual 10.6 and Corporate Interlock Standard DX3S)

A. Purpose

A process safety interlock is defined as a system which detects a condition outside of specified limits or improper sequence and either terminates further action, starts corrective action, or prevents start-up of equipment. Table 2 lists the Process Safety Interlocks found in GWTF.

Table 2

Process Safety Interlocks – Necco Park Groundwater Treatment Facility

Description	Action
Equalization tank Hi-Hi level	Shuts down all recovery wells.
pH to treatment system wells	Shuts off metering acid valve
T-101 and T-102 Hi-Hi level	Shuts down wells feeding the associated tank.

B. Compliance Requirements

Site S&H Manual 10.6 requires that each area maintain an up-to-date list of safety interlocks and their settings. A brief description explaining the significance of each setpoint shall also be included and the list shall be available at all times to operating personnel.

C. Bypassing a Safety Interlock

If it is necessary to bypass a process safety interlock for normal start-up of equipment, then the procedure to do so will be included in the approved operating instructions for that piece of equipment.

An Interlock Bypass Permit must be completed and authorized by the Operations Manager per Site S&H Manual 10.6 for any other cases whereby a process safety interlock needs to be bypassed.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Work and Flame Permit (Reference Site S&H Manual Sections 9.1 and 10.8)

A. Purpose

The work and flame permit is a communication tool to describe and authorize work to be performed and to specify safety requirements deemed necessary to perform the work.

B. Work Permits

These specific permits are required for all contract work and any other work that is performed by employees who are not assigned on a regular basis to the business. Work permits are not required for personnel in the Corporate Remediation Group.

C. Flame Permits

Flame permits are required for any and all personnel and contractors whenever using a spark-producing tool/equipment in a Class I, Division I or II area; whenever there is an open flame, burning, or welding; or where there is the potential for flammable vapors to be present.

Contact supervision regarding any work which may require a flame permit. Test the air in the work space with an explosimeter before beginning work.

Forklift Operation (Reference Site S&H Manual 12.4)

A. General

Only those employees who are certified may operate a forklift truck.

B. Inspection

Prior to use each shift, the driver must check to make sure the forklift is in safe operating condition and complete the Forklift Truck Safety Checklist card. If there are any deficiencies observed, notify supervision.

II. Safety, Occupational Health & Environmental - SHE Section

Safe Work Practices (continued)

Pickup Truck (Reference Site S&H Manual 4.2)

A. General

Follow site traffic rules. Never leave the truck unattended while it is running. Shut engine off, put in park, and apply emergency brake before exiting.

B. Inspection

Prior to use each shift, the driver must check to make sure the truck is in safe operating condition. If there are any deficiencies observed, notify supervision.

SECTION III TABLE OF CONTENTS

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III. Equipment Description, Design Basis & Instrumentation Section

Equipment List and General Information

The guidelines outlined in DuPont standards and guideline manuals are applicable to the Dupont Necco Park Groundwater Treatment System including, but not limited to, the DuPont Safety & Health Manual, Necco Park Waste Management Plan, and Necco Park Health & Safety Plan (HASP).

Descriptions and design basis for each of the following pieces of equipment are found in Section VII.

TABLE 1 – Necco Park Wells Descriptions

Well No.	Zones	Pump Type	DNAPL	Set Point Percent	Well Depth (ft.)	Water Depth at 100% Level
RW-4	A/B/C	Grundfos Submersible, 1 HP	Yes	10	51.3	11 ft.
RW-5	A/B/C	Above ground; centrifugal; 7.5 HP	Yes	10	42.6	13 ft.
RW-8	D/E/F	Grundfos Submersible, 1 HP	No	10	71.3	26 ft.
RW-9	D/E/F	Grundfos Submersible, 1 HP	No	10	73.3	16 ft.
RW-10	A/B/C	Above ground; centrifugal; 3 HP	Yes	10	21.6	8 ft.

Equipment List	Equipment Piece No.
A/B/C Groundwater Storage Tank	T-102
A/B/C Stripper Feed Pump	P-102
A/B/C Air Stripper	AS-202
A/B/C Effluent Pump	P-202
A/B/C Air Stripper Blower	AB-202
D/E/F Groundwater Storage Tank	T-101
D/E/F Stripper Feed Pump	P-101
D/E/F Air Stripper	AS-201
D/E/F Effluent Pump	P-201
D/E/FAir Stripper Blower	AB-201
Equalization Tank	T-301
Equalization Tank Agitator	A-301
Equalization Tank Effluent Pump	P-301
Decon Sump Pump	P-1200
Sump Pump	P-1100

III. Equipment Description, Design Basis & Instrumentation Section

Piping and Instrument Diagrams

The engineering drawings that depict the Necco Park Groundwater Remediation processes and equipment follow. Vendor print files (VPF) and blueprint files (BPF) are referenced on the diagrams. Vendor instruction manuals for various piping, pumps, heat trace, instrumentations, structures, and safety equipment can be found from the P&ID drawings. VPFs and BPFs are kept by Operations and Design.

These drawings may be obtained from the Niagara Plant Design Group.

Drawing No.	Title
W1573799	Necco Park Layout Plan – Civil
EE40-9806	Well 4 P & ID
EE40-9807	Well 5 P & ID
EE40-9808	Wells 8 & 9 P & ID
EE40-9810	Well 10 P & ID
EE40-9923	P & ID – Groundwater Storage
EE40-9924	P & ID – Pumping and Air Stripping
EE40-9928	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical
EE40-9932	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical

Area Electrical Classification

Engineering Drawing.

Ventilation Systems

The Necco Park GWTF does not have ventilation systems critical to safety.

III. Equipment Description, Design Basis & Instrumentation Section

Relief Systems

There are no pressure relief devices associated with Necco Park GWTF.

Design Codes and Standards Employed

The codes and standards employed in the GWTF are identified in the Bid Specifications. In general, DuPont's Engineering Standards were followed along with other national standards and codes (i.e., ASTM, NFPA, ANSI).

Copies of the Bid Specifications can be found at the Niagara Site and in the Corporate Information Science files in the Brandywine Building in Wilmington, Delaware.

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps collect ground water from A/B/C zones while two pumps collect ground water from D/E/F zones.

A/B/C Zones Recovery - Wells 4, 5, 10

- Recovery Wells 4, 5, and 10 recover groundwater from the A, B and C fracture zones.
- Recovery Wells 4 and 10 are equipped with variable speed Grundfos Submersible, 1 HP pumps – Model 16E9.
- Recovery Well 5 is equipped with an above ground variable speed; centrifugal; 7.5 HP pump.
- The speed of the above pumps are regulated by radar level controllers in each well.
- Recovery Wells 4, 5, and 10 each have pH controllers which regulate the amount of 32% HCl added to the groundwater.
- Recovery Wells 4, 5, and 10 are equipped with air operated DNAPL pumps; Geopump – Model 51019.

D/E/F Zones Recovery - Wells 8 & 9

- Recovery Wells 8 and 9 recover groundwater from the D, E and F fracture zones.
- Recovery Wells 8 and 9 are equipped with variable speed Grundfos Submersible, 1 HP pumps – Model 16E9.
- The speed of the above pumps are regulated by radar level controllers in each well.

III. Equipment Description, Design Basis & Instrumentation Section

Hydrochloric Acid Tank

FAA No.	794-8277-40
Ref. Drawings	990370FS-D1, D2, D3
P&I Drawing No.	Necco Park HCl Tank Drawings #1, 2, 3, 4
Year Built	1999
Other	Air Permit NP001 CBS Facility No. 9-000273, CBS Tank No. NP001 Bison contract LN97041 (acid supplier)

Service Description

The HCl tank provides bulk storage of 32% HCl, which is automatically added to Necco Park leachate streams to prevent system fouling. Acid is obtained via tank truck delivery from contract vendor. Design basis was to provide a minimum one-month supply of HCl to allow continued use of HCl during normal recovery well operations.

Materials of Construction

The double-walled tank is constructed of fiberglass-reinforced plastic (FRP). The nozzles and nozzle flanges are FRP. Flange bolts are ASTM A-307; flange nuts are ASTM A-194.

The dip tube on the inhibitor addition flange is 3-inch CPVC and extends to 4 inches above the tank bottom.

The acid-filling flange contains a 4” diameter FRP inlet pipe that extends about 18” into the tank. The fill line contains a 45° bend to convey the acid to the internal wall of the tank.

Dimensions/Description

Shell:	est. 78” O.D. x 8’2 15/16” high (inner tank diameter 72” I.D.)
Wall Thickness:	0.387"
Capacity:	2,000 gallons
Design Temperature:	Ambient
Operating Temperature:	Ambient
Design Pressure:	Atmospheric
Operating Pressure:	1.5 inches water when filling, 1.5 inches water vacuum while operating

III. Equipment Description, Design Basis & Instrumentation Section

Nozzle Schedule

Mk	ID	Service	Location
A	4"	Spare w/ ½" thick blind	Top
D	2"	Siphon drain	Side wall, 1' from base
G	2"	Grounding	Side wall, 3' from base
K	6"	Siphon drain mount	Side wall, 1' from base
L	2"	Level control	Top
M	24"	Access way with dished blind	Side wall, 2'6" (center) from base
N	2"	Leak detection	Base
U	3"	Overflow	Side wall, 9'6" from base
V	4"	Vent	Top
Y	4"	Inlet	Top

Acid Tank Major Modifications

In 1990, a conservation vent was added to the original open vent to minimize casual evaporation of HCl fumes.

In 1991, the piping to R-1 was changed from PVC to P660E for pipe code compliance.

In 1999, the FRP tank was placed into service replacing a rubber-lined steel tank. Some sections of the existing piping were replaced due to the new location of the acid tank and resulting piping configuration. All new and replaced piping is one-inch polypropylene-lined steel (P660E).

Conservation Vent

The computation sheet and vendor vent sizing reference packet used for design basis is in Appendix A.

Air Permit

A copy of the air permit for the tank is in Appendix A, which includes all pertinent calculations.

III. Equipment Description, Design Basis & Instrumentation Section

Hydrochloric Acid Piping

HCl is piped from the HCl tank to R-4, R-5 and R-10. HCl is piped approximately 700 feet to the R-4 approximately 400 feet to the outside of the R-5 enclosure and approximately 200 feet to R-10 through 1-inch diameter polypropylene-lined steel (P660E) pipe. Inside the well enclosures, piping is fusion-welded Schedule 80 polypropylene pipe (SP77P). The P660E and SP77P piping have given good service in original recovery wells.

Leachate Piping

Leachate is piped to GWTF from the recovery wells in belowground 2-inch-diameter piping sited below frost line. Exception is R-9, where the first 300-feet is aboveground, heat traced with 5wpf self-limiting heat trace and insulated with polyolefin insulation. The piping outside of the sheds is 2-inch high-density polyethylene piping (Schedule 80 150-pound). Piping inside all sheds are Schedule 80 polypropylene, 150 pound.

Critical Service

All equipment associated with direct contact with the 32% HCl at Necco Park is considered part of the Critical Service Program. All new or replacement equipment (piping, pumps, valves, fasteners, gaskets, etc.) that is delivered must be inspected for correct material of construction for HCl service by Operations.

The 32% HCl storage tank; piping to Recovery Wells 4,5 and 10 from the tank with all associated valves, gaskets, and fasteners are a part of the Critical Service Program.

III. Equipment Description, Design Basis & Instrumentation Section

Instrumentation List

Name	Instrument No.
RW-4 Level	401LC
RW-4 pH	402XC
RW-4 Flow	403FI
RW-5 Level	501LC
RW-5 pH	502XC
RW-5 Flow	503FI
RW-8 Level	801LC
RW-8 Flow	803FI
RW-9 Level	901LC
RW-9 Flow	903FI
RW-10 Level	1001LC
RW-10 pH	1002XC
RW-10 Flow	1003FI
ABC Storage Tank Level	8006LG
ABC Stripper Level	8017LT
ABC Influent Flow	8020FT
DEF Storage Tank Level	8008LG
DEF Stripper Level	8015LT
DEF Influent Flow	8021FT
Air Flow to Vent Stack	8018FG
Decon Sump Level	8010LT
Sanitary Sump level	8005Lt
Equalization Tank Level	8002LG

III. Equipment Description, Design Basis & Instrumentation Section

Extraction System Flowrates

The five extraction wells listed in this section were installed during the three-Phase PDI and represent the proposed groundwater extraction system. During each phase of the PDI, the test extraction wells that were installed and others that had been installed previously, were pump tested and evaluated to determine their respective value to the overall remedial system. The tests were monitored, using groups of groundwater monitoring wells and piezometers, to determine the extent of drawdown in the immediate vicinity of the pumping well, measure the influence of the pumping well on vicinity monitoring wells, and determine the extent of influence for each pumping well. The proposed wells will be referred to as recovery wells (RWs) rather than the TRW abbreviation used during the PDI phase. Those listed, reflect the wells that had the greatest influence upon monitoring wells within the source area, had areas of influence which overlapped that of adjacent extraction wells, and achieved hydraulic control of the source area boundary in each respective flow zone.

Optimization of the extraction system, as far as long term pumping rates and drawdown levels, will be performed beginning at extraction system startup and will continue until the remedial objectives are met (until source area hydraulic control is achieved). Extraction wells may be added or removed from the exttraction well network to achieve hydraulic control.

Pump test hydrogeologic data indicate the following design pumping rates and drawdown for the bedrock groundwater extraction wells:

Extraction Well	Design Drawdown (elevation)	Surface Elevation	Static Groundwater Elevation	Pump Inlet Elevation	Expected Sustainable Pumping Rate (gpm)
RW-4 (B/C)	549	581.4	~573	~555	0.4
RW-5 (B/C)	560	578.8	~575	~565	4
RW-10 (B/C)	556	577.8	~572	~561	8
RW-8 (D/E/F)	558	585.5	~565	~568	13
RW-9 (D/E/F)	565	575.0	~555	~575	15

As illustrated through pumping test analysis, adequate drawdown, inward gradient, and hydraulic control of the respective source area boundaries is accomplished at these rates. While utilized to design most aspects of the remedy including pipe, pumps, meters, instrumentation and controls, and well details, these rates may be adjusted during the optimization period to provide the best balance between water generation and hydraulic control. The network of wells intended for monitoring of the operation and effectiveness of the extraction system was designed/selected to facilitate demonstration of hydraulic control in each of the bedrock zones.

III. Equipment Description, Design Basis & Instrumentation Section

Extraction System Flowrates (continued)

Each well head consists of a prefabricated, 10-foot by 10-foot fiberglass primary enclosure, installed upon a 6-inch thick concrete pad. As suggested by operations, the well is located outside of the primary enclosure, and the well piping enters the enclosure through one of the walls. Once inside the enclosure, the flowrate is metered, total volume is measured (totalizer), and the discharge pipe then turns down and runs below ground (through the concrete slab) toward the treatment system.

City water will also be available at each well house. The city water is used for the emergency eyewash station, forcemain flushing, and other maintenance needs. This water supply will not be used for consumption or regular hygiene purposes.

Two of the three B/C-zone (RW-4 and RW-5) wells contain an aboveground horizontal shaft centrifugal pump that located within the respective pump house. Each pump has a 1.5-inch suction dip tube that extends to below the proposed drawdown elevation, in order to maintain submergence. The down well suction piping is constructed of HDPE with mechanical couplings to facilitate removal, when necessary. RW-4, which has a very low groundwater production rate, utilizes a submersible groundwater pump rather than a suction pump. The submersible pump is connected to the pump house piping via a 1.5-inch HDPE discharge pipe.

The B/C-zone wells include an acid addition system. The acid is added to the well above the pump inlet line. Acid is stored at the existing acid tanks.

The D/E/F-zone wells (RW-8 and RW-9) and B/C-zone well (RW-10) contain a submersible well pump (Grundfos) that are set below the drawdown elevation. These pumps have a 1.5-inch discharge pipe that brings groundwater up into the pump house and through the same mechanical system that is described above. However, the D/E/F-zone wells do not require acid addition and therefore this portion of the mechanical system is not included in these wells. These well pumps are also variable speed controlled based on the well water elevation.

III. Equipment Description, Design Basis & Instrumentation Section

Extraction System Flowrates (continued)

Once above ground, the HDPE pipe transitions to polypropylene (common to all wells), which has been continued for all interior piping. Immediately prior to leaving the pump house, the discharge piping is transitioned once again to HDPE, which is used for all underground piping. The mechanical components contained within the pump house include the following:

- Groundwater pump manufactured by Goulds Pumps (RW-5 and RW-10) or Grundfos (RW-4), which are driven by variable speed controllers. The pump motor speed is controlled based on the water level in the well;
- Flow control valve, which is designed to operate in either fully open or fully closed position. The flow control valve is intended to replace a back flow preventer or check valve assembly. When the pump shuts off a signal is sent which closes the flow control valve;
- In-line pH probe, designed to monitor well water pH, and indicate when acid addition is necessary. Acid addition is designed to be either an automatic or manual operation;
- Flow indicator and flow transmitter, and;
- Acid addition equipment which consists of a manual valve (containing a 5 minute open time limit) and an automatic control valve (opens based on the pH signal from the pH probe.

Recovery wells RW-4 and RW-5 are equipped with air-operated bladder pumps for evacuation of DNAPL. These pumps are set at or near the bottom of the well and are able to be hooked-up (to air) and run manually. DNAPL collection and transfer is not intended to be an automated operation.

III. Equipment Description, Design Basis & Instrumentation Section

Electrical and Instrumenetation for the Extraction System

Regarding the electrical system designed for the groundwater hydraulic controls, all power is supplied from the new Electrical Control Room (ECR) in the new Treatment Facility. Contained in the design is a 13.2KV, Three (3) Phase, 60 Hertz Utility Power Supply being stepped down in Voltage to 480 Volt, three (3), Phase, 60 Hertz via 500 KVA Transformer which will feed a Common 480 Volt Motor Control Center in the ECR. The 480 Volt Common Motor Control Center is used to power the Treatment Facility as well as the Pump Houses. Each Pump House has its own 100-Ampere Disconnect Switch (Five (5) Switches for 5 Pump Houses) in the Water Treatment Facility Common Motor Control Center.

Direct Burial Cable in conduit has been installed below ground in a common utility trench common to the groundwater forcemain, instrumentation and control wiring, maintenance water and compressed air.

Once inside a Well Pump House (5 pump houses), electrical power terminates in a 480 Volt, Three (3) Phase, 60 Hertz Power Terminal Box which branches off to two (2) Fused Disconnect Switches. One (1) 480 Volt, 60 Ampere three (3) Pole Fused Disconnect Switch (Connected Single Phase) feeds a 25KVA, 480 Volt per 120/240 volt, Single Phase Transformer. The 25 KVA Single Phase Transformer feeds a Lighting Panel for Instrumentation, Lighting, Heating, Ventilation and other appliances. The other 480V, 30 Ampere Three Pole Disconnect Switch feeds the Allen Bradley variable Speed Drive unit in the Pump House.

The Well Pump House contains control and instrumentation components for well operation. The well operator manually operates the groundwater pump simply by engaging a start/run/stop switch. The operator holds the switch in the start position in order to operate the pump manually. Once the switch is let go, it returns to the run position. In the run position, the pump continues to run only if the programmable logic controller is transmitting a run signal. An Allen Bradley Human Interface Module on the variable speed drive unit controls the speed of each of the well house pump motors. The Variable Speed Drive control unit is mounted in the Well Pump House. The logic governing operation of the groundwater pumping system is described in the following paragraphs.

III. Equipment Description, Design Basis & Instrumentation Section

Electrical and Instrumenetation for the Extraction System (continued)

The well pumps are basically designed to operate as follows:

- "Field start" bypasses all interlocks when the hand switch in the pumphouse is moved to the "start" position. When switch is released to "run" from "start' the drive will continue to run only if all interlocks are satisfied.
- Each of the well(s) contain a level element with an input to the Digital Control System (DCS). The DCS has a level controller with an output to the variable speed drive (VSD) to control the pump speed in proportion to the water level in the well.
- When the VSD starts, the computer level controller automatically opens the discharge valve (backflow prevention device) via a digital output. The valve will then send a signal back to the computer that the valve is open.
- The VSD may be hand operated to bypass all interlocks at the well pump house.
- A "Power On" light is located at the well pump motor.
- When the VSD stops, the computer level controller automatically closes the groundwater discharge valve via a digital output. The valve then sends a signal to the computer that the valve is closed.
- The VSD starts automatically if the level in the well is above its set point ranges.

Description of Operation – pH Probe & HCL from Storage Tank

- The pH probe monitors discharge leachate via a pH transmitter. If the pH probe senses a high or above normal pH, it sends a signal to the DCS pH controller. The controller in turn sends an output signal to the hydrochloric acid valve to open in proportion to the input to the pH probe signal.
- To manually add Hydrochloric Acid (HCL) to the well, there is a local hand selector switch labeled "close/ready/open". The operator has the ability to add acid to the well in 5-minute increments via a timer and the DCS.
- Wells RW-8 and RW-9 have been equipped for pH monitoring only. Acid addition components are not included in the design for these wells.

Flow is monitored on the discharge line of the well pumps via a flow transmitter input signal to the DCS.

III. Equipment Description, Design Basis & Instrumentation Section

Water Treatment System Brief Description of Operation:

1. The **B, C Zone (RW-4, 5 & 10)** Flow (Line#1100) to Groundwater Storage Tank T-102 is monitored by an Ultra-Sonic Flow Transmitter **8020FT** (EE40-9948-C) with a 4-20ma signal to the Process Control Room (PCR) Distributive Control System Monitor.
2. The **D, E, & F Zone (Rw-8 & 9)** Flow (Line#1101) to Groundwater Storage Tank T-101 is monitored by an Ultra-Sonic Flow Transmitter **8021FT** (EE40-9949-A) with a 4-20ma signal to the Process Control Room (PCR) Distributive Control System Monitor.
3. The **Groundwater Storage Tank (T-101) Level** is monitored with the radar level transmitter **8008LT** (EE40-9947-A) with a 4-20ma signal to the DCS & via the DCS is interlocked to shutdown on high level or low level and as a permissive to start Air Stripper Feed Pump P-101.
4. The **Groundwater Storage Tank (T-101) Hi-Hi Level** is monitored by capacitance level switch **8009LS** (EE40-9947-B) with a Digital 120VAC signal to the DCS. For Alarm purposes only in the Process Control Room (PCR).
5. **Air Stripper Feed Pump (P-101),** pumps from the Ground Water Storage Tank T-101 via 2" Line #1105 to Air Stripper AS-201 via Line #1201. A start/run/stop switch 8013PB (EE40-9941-2) at the motor or at the PCR controls the motor by the DCS, which has Ready, Status & Output signals. As mentioned in item #3 the pump is controlled as a permissive and shutdown from limit switches **8015LSL, 8015LSH & 8015LSHH** (EE40-9958) on Air Stripper AS-201. Should Feed Pump P-101 shutdown motorized operation valve **8013MOV** (EE40-9941-2) shall de-energize and close to shut-off flow from Tank T-101.
6. On Air Stripper AS-201 is **Air Stripper Pump #1**. It pumps effluent to the Equalization Tank T-301 via 2" Line #1202. A start/run/stop switch 8014PB (EE40-9942-1) at the motor or at the PCR shall control the motor by the DCS, which has Ready, Status & Output signals. The pump motor is controlled as a permissive and shutdown from limit switch **8015LSL, 8015LSH and 8015LSHH** (EE40-9958).
7. On the **Air Stripper Pump #1 Effluent** 2" Line #1202 to the Equalization Tank T-301 or Storage Tank T-102 is an Ultra-Sonic Flow Transmitter **8023FT** (EE40-9949-C) with a 4-20ma Signal to the Process Control Room (PCR) Distributive Control System computer monitor.
8. On Air stripper AS-201 is **Air Stripper Blower #1** it blows air through the stripper filter & exhausts to a stack via Line #1204. A start/run/stop switch 8015PB (EE40-9943-1) at the motor or at the PCR shall control the motor by the DCS, which has Ready, Status & Output signals. The blower is interlocked as a permissive to start and as a shutdown for the blower via limit switches **8015LSL, 8015LSH & 8015LSHH** (EE40-9958).
9. On **Air Stripper Blower #1** is Pressure Switch **8015PS** (EE40-9958) to indicate at the DCS and alarm for low air pressure.
10. The velocity of airflow from Air stripper AS-102, **Air Blower #1** is measured in line #1204 with Flow transmitter **8018FT** (EE40-9948-A).

III. Equipment Description, Design Basis & Instrumentation Section

Water Treatment System Brief Description of Operation: (continued)

11. The Equalization Storage Tank (T-301) level is monitored with the radar level transmitter **8002LT (EE40-9945-B)** with a 4-20ma signal to the DCS & via the DCS is interlocked to shutdown on high level or low level and as a permissive to start or stop Equal. Tank Effluent Pump Motor P-301.
12. The Groundwater Storage Tank (T-301) Hi-Hi level is monitored by capacitance level switch **8000LS** (EE40-9945-A) with a Digital 120VAC signal to the DCS. For Alarm purposes only in the Process Control Room (PCR).
13. **Equalization Tank Effluent Pump Motor (P-301)** pumps from the Equalization Storage Tank T-301 via 2" Line #1107 to the public sewer. The motor shall be controlled by a start/run/stop switch **8003PB** (EE40-9940—3**)** at the motor or at the PCR by the DCS, which has Ready, Status & Output signals. As mentioned in item #12 the pump is interlocked to shutdown on high level or low level and as a permissive to start Equalization Tank Effluent Pump motor (P-301).
14. From the Effluent of the **EqualizationTank Effluent Pump Motor (P-301)** via Line #1107 the flow rate to the public sewer is monitored with Ultra-Sonic Flow Transmitter **8019FT** (EE40-9948-B).
15. The **Equalization Tank T-301 Mixer** is controlled by a local start/run/stop switch **8001PB** (EE40-9940-1) at the mixer or at PCR by the DCS which has Ready, Status & Output signals. This motor is not interlocked.
16. The Groundwater Storage Tank (T-102) level is monitored with the radar level transmitter **8006LT** (EE40-9946-B) with a 4-20ma signal to the DCS & via the DCS is interlocked to shutdown on high level or low level and as a permissive to start Air Stripper Feed Pump P-102.
17. The Groundwater Storage Tank (T-102) Hi-Hi level is monitored by capacitance level switch **8007LS** (EE40-9946-B) with a Digital 120VAC signal to the DCS. For Alarm purposes only in the Process Control Room (PCR).
18. **Air Stripper Feed Pump (P-102),** pumps from the Ground Water Storage Tank T-102 via 2" Line #1104 to Air Stripper AS-202 via Line #1200. A start/run/stop switch 8012PB (EE40-9941-3) at the motor or at the PCR shall control the motor by the DCS, which has Ready, Status & Output signals. As mentioned in item #16 the pump is controlled as a permissive and shutdown from limit switches **8017LSL, 8017LSH & 8017LSHH** (EE40-9958) on Air Stripper AS-202. Should Feed Pump P-102 shutdown, a motorized operating valve **8012MOV** (EE40-9941-3) shall de-energize and close to shut-off flow from Tank T-102.
19. On Air Stripper AS-202 is **Air Stripper Pump #2.** It pumps effluent to the Equalization Tank T-301 via 2" Line #1203. A start/run/stop switch 8016PB (EE40-9942-2) at the motor or at the PCR shall control the motor by the DCS, which has Ready, Status & Output signals. The pump motor is controlled as a permissive and shutdown from limit switch **8017LSL, 8017LSH and 8017LSHH** (EE40-9958).

III. Equipment Description, Design Basis & Instrumentation Section

Water Treatment System Brief Description of Operation: (continued)

20. On the **Air Stripper Pump #2 Effluent** 2" Line #1203 to the Storage Tank T-101 or Sanitary Sump P-1100 is an Ultra-Sonic Flow Transmitter **8022FT** (EE40-9949-B) with a 4-20ma Signal to the Process Control Room (PCR) Distributive Control System computer monitor.
21. On Air stripper AS-202 is **Air Stripper Blower #2** it blows air through the stripper filter & exhausts to a stack via Line #1204. A start/run/stop switch 8017PB (EE40-9943-2) at the motor or at the PCR shall control the motor by the DCS, which has Ready, Status & Output signals. The blower is interlocked as a permissive to start and as a shutdown for the blower via limit switches **8017LSL, 8017LSH & 8017LSHH** (EE40-9958).
22. On **Air Stripper Blower #2** is Pressure Switch **8017PS (EE40-9958)** to indicate at the DCS and alarm for low air pressure.
23. **Sanitary Sump Pump in Sump P-1100** Pumps directly to the sewer via Line #1103. A start/run/stop switch **8004PB (EE40-9940-@)** at the motor controls the motor (or at the PCR by the DCS), which has Ready, Status & output signals. The pump motor is also interlocked with the Sump P-1100 Ultrasonic Level transmitter **8005LT (EE40-9946-A)**. See item #24 below.
24. The **Sanitary Sump P-1100 Level** is monitored with an Ultrasonic Level Transmitter **8005LT** (EE40-9946-A**)** with a 4-20ma signal to the DCS & via the DCS is interlocked to shutdown on high level or low level and as a permissive to start or stop Sanitary Sump Pump Motor P-1100.
25. **Decon Sump Pump in Sump P-1200** Pumps directly to Equalization Tank T-301 via Line #1106. A start/run/stop switch **8011PB** (EE40-9941-1) at the motor shall control the motor or at the PCR by the DCS, which has Ready, Status & output signals. The pump motor is also interlocked with the Sump P-1200 Ultrasonic Level transmitter **8010LT** (EE40-9947-C). See item #26 below.
26. The **Decon Sump P-1200 Level** is monitored with an Ultrasonic Level Transmitter **8010LT** (EE40-9947-C) with a 4-20ma signal to the DCS & via the DCS is interlocked to shutdown on high level or low level and as a permissive to start or stop Decon Sump Pump Motor P-1200.
27. **Safety Shower 8024SS** is located in the Watertreatment Facility. It shall have a flow switch **8024FS** (EE40-9945-C) to alarm at the DCS when it is in use.
28. **Safety Shower 8025SS** is located in the Watertreatment Facility. It shall have a flow switch **8025FS** (EE40-9945-C) to alarm at the DCS when it is in use.
29. **Safety Shower 8026SS** is located in the Watertreatment Facility. It shall have a flow switch **8026FS** (EE40-9945-C) to alarm at the DCS when it is in use.
30. **Safety Shower 8027SS** is located at the Acid Tank. It shall have a flow switch **8027FS** (EE40-9945-D) to alarm at the DCS when it is in use.

SECTION IV

SOC's / Operating Instructions

A. Standard Operating Conditions (SOC) and Safe Operating Limits (SOL) (See Yellow Tabs)

NPSOC001	ABC Wells pH
NPSOC002	RW-4 Level
NPSOC003	RW-5 Level
NPSOC004	RW-10 Level
NPSOC005	RW-8 Level
NPSOC006	RW-9 Level
NPSOC007	RW-4 Flow
NPSOC008	RW-5 Flow
NPSOC009	RW-10 Flow
NPSOC010	RW-8 Flow
NPSOC011	RW-9 Flow
NPSOC012	ABC Influent Flow
NPSOC013	DEF Influent Flow
NPSOC014	ABC Storage Tank Level
NPSOC015	DEF Storage Tank Level
NPSOC016	ABC Stripper Level
NPSOC017	DEF Stripper Level
NPSOC018	Equalization Tank Level
NPSOC019	Air Flow to Vent Stack
NPSOC020	Decon Sump Level
NPSOC021	Sanitary Sump level

SECTION IV

SOC's / Operating Instructions

B. Operating Instructions (See White Tabs)

NORMAL STARTUP AND SHUTDOWN

NP3000	Startup & Shutdown of Groundwater Collection
NP3001	Startup & Shutdown of Groundwater Processing

NORMAL OPERATION

NP3000	Startup & Shutdown of Groundwater Collection
NP3001	Startup & Shutdown of Groundwater Processing
NP4000	Well Operations
NP4001	DNAPL Operations
NP4002	Air Stripper Operations
NP4003	Filling 32% HCl Tank
NP4004	Acid Addition to Pumping Wells
NP5000	Control Room Operations
NP5001	Equipment Cleanout/Decontamination
NP6000	Effluent Sampling
NP6001	Air Monitoring

EMERGENCY OPERATION

NP7000

SECTION IV

SOC's / Operating Instructions

B. Operating Instructions (Continued) (See White Tabs)

EMERGENCY SHUT DOWN

TEMPORARY OPERATION

OTHER - MISCELLANEOUS

PROCESS CONTROL AND/OR QUALITY SAMPLING

NP6000	Effluent Sampling
NP6001	Air Monitoring

SECTION IV

Ground Water
SOC's / Operating Instructions

C. Spills and Process Upsets Procedures(See Blue Tabs) are found in each equipment piece section.

D. Maintenance Procedures (See Orange Tabs)

MAINTENANCE	
NPM100	pH Meter Loop Check
NPM101	Well Level Loop Check
NPM102	Flow Meter Loop Check
NPM103	Process Tank Level Loop Check

DuPont Necco Park Operating Instruction Manual

Table of Contents

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1.0 GENERAL DESCRIPTION

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps collect ground water from A/B/C zones while two pumps collect ground water from D/E/F zones.

Section 7.1 Normal Startup
Section 7.2 First-Time Start-Up or Startup After Maintenance
Section 7.3 Shut Down Groundwater Processing/Start Raw Water Flush
Section 7.4 Emergency Shutdown

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

Flashlight

5.0 PREREQUISITES

None

6.0 REFERENCES

TABLE 1 – Necco Park Wells Descriptions

Well No.	Zones	Pump Type	DNAPL	Set Point Percent	Well Depth (ft.)	Water Depth at 100% Level
RW-4	A/B/C	Grundfos Submersible, 1 HP	Yes	10	51.3	11 ft.
RW-5	A/B/C	Above ground; centrifugal; 7.5 HP	Yes	10	42.6	13 ft.
RW-8	D/E/F	Grundfos Submersible, 1 HP	No	10	71.3	26 ft.
RW-9	D/E/F	Grundfos Submersible, 1 HP	No	10	73.3	16 ft.
RW-10	A/B/C	Above ground; centrifugal; 3 HP	Yes	10	21.6	8 ft.

NOTES: Depths are measured in Feet from Top of Casing
Each 10% increment equates to 1 foot

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater
1251NF26	32% HCl

Operating Instructions:

NP5001, “Equipment Cleanout/Decontamination”

Sketches:

NPSK0001, “Necco Park Well System”

Drawings:

W1573799	Necco Park Layout Plan – Civil
EE40-9806	Well 4 P & ID
EE40-9807	Well 5 P & ID
EE40-9808	Wells 8 & 9 P & ID
EE40-9810	Well 10 P & ID

7.0 INSTRUCTIONS

Starting Up Well Pump:

7.1 START UP well pump, as follows:

7.1.1 IF well has been put into automatic mode, PROCEED as follows:

a. From control room, VERIFY automatic control valve is OPEN by setting level control to a predetermined set point.

NOTE:	Refer to Table 1 – Necco Park Wells Descriptions

b. PROCEED to designated well.

c. Visually INSPECT area and piping.

d. VERIFY electrical disconnect box is in "ON" position.

e. CHECK following manual valve position are closed:

- manual discharge
- bypass
- drain
- manual HCl isolation valve

f. START pump at push button station.

g. VISUALLY check pressure gauge.

h. Visually INSPECT for pipe leaks.

i. OPEN manual discharge valve.

j. VERIFY that well level has dropped.

NOTE:	If level does not drop, open and close bypass valve to prevent airlocking in line. Level can be checked in control room or with a flashlight at the sump.

k. IF A/B/C Well, OPEN manual HCl isolation valve.

7.0 INSTRUCTIONS

Starting Up Well Pump: (continued)

7.1.2 IF well has been put into manual mode, PROCEED as follows:

a. PROCEED to designated well.

b. Visually INSPECT area and piping.

c. VERIFY pump electrical cord is plugged in.

d. VERIFY electrical disconnect box is in "ON" position.

e. OPEN manual discharge valve(s).

f. TURN pump on to "AUTO" position.

g. Visually CHECK pressure gauge.

h. Visually INSPECT pipe for leaks.

i. VERIFY well level has dropped.

k. IF A/B/C Well, OPEN manual HCl isolation valve.

Isolating Pumping Well From Header:

7.2 ISOLATE pumping well from header as follows:

ENVIRONMENTAL NOTE:	In the event a pumping well level exceeds 90%, the affected pumping well must be valved closed IMMEDIATELY.

7.2.1 PROCEED to affected well.

7.2.2 SET pump to OFF position.

7.2.3 CLOSE Inlet and outlet manual valves.

7.2.4 IF A/B/C Well, CLOSE manual HCl isolation valve.

7.2.5 RECORD following in shift logbook:

- The time of the high-level event
- Which RW is affected
- The highest level the well experienced
- Field condition of the RW (verification that groundwater did not spill to ground area around the affected well)

7.2.6 NOTIFY Supervision of spill immediately so that Supervision can determine if a phone call to NYSDEC is warranted.

7.0 INSTRUCTIONS (continued)

Shut Down Well Pump:

7.3 SHUT DOWN well pump as follows:

7.3.1 PROCEED to designated well.

7.3.2 TURN pump starter to "OFF" position.

7.3.3 CLOSE manual well outlet valve(s).

7.3.4 IF A/B/C Well, CLOSE manual HCl isolation valve.

Preparing Well Pump For Maintenance:

7.4 PREPARE well pump for Maintenance as follows:

SAFETY NOTE:	PPE requirements--wear Tyvek® suit with rubber boots, half- or full-facepiece respirator with cartridges for organic and acid vapors and particulates, surgical and neoprene gloves, goggles, hard hat, and safety shoes.

7.4.1 AFTER pump is locked out, disconnected, and ready for removal, DRAIN pump into well.

7.4.2 After draining pump, PLACE pump in plastic tub and TRANSPORT pump to decon sump area.

NOTE:	Refer to NP5001, "Equipment Cleanout/Decontamination".

7.4.3 In sump area WATER CLEAN and RINSE pump.

7.4.4 WHEN sump is full, PUMP contents to Equalization Tank.

NOTE:	Run the sump pump in manual or automatic mode.

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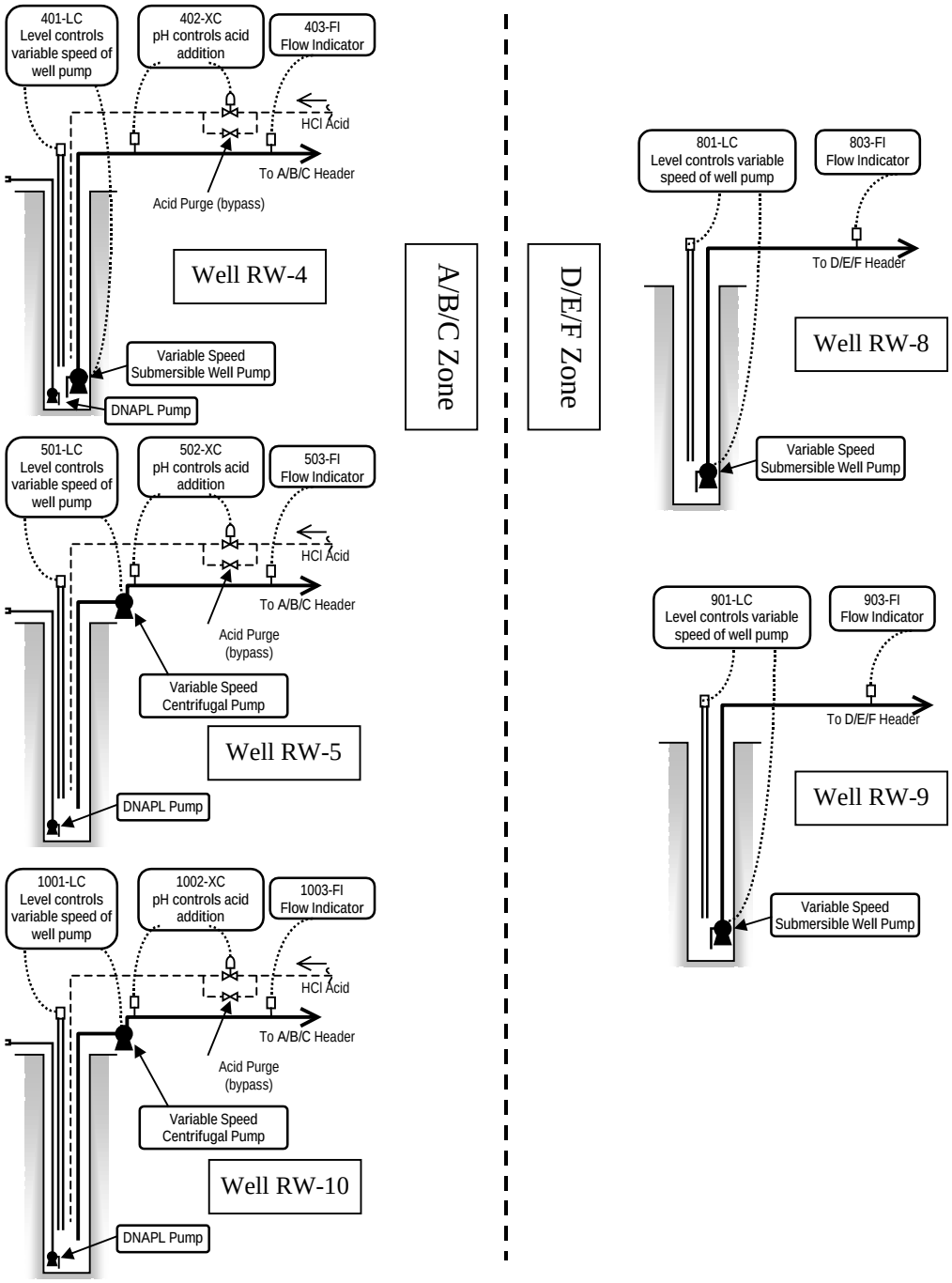


Sketch Title: **NECCO PARK WELL SYSTEM**	Sketch No.: **NPSK0001**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

1.0 GENERAL DESCRIPTION

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps pump ground water from A/B/C zones while two pumps pump ground water from D/E/F zones. This groundwater is collected in separate storage tanks and then processed through two separate air strippers. The treated groundwater from the two strippers is then combined in an equalization tank, where it is mixed before discharging to the city sewer. The process is controlled in such a way that levels in the wells and tanks are monitored and this data controls variable speed pumps throughout the process, allowing the process to run continuously.

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

None

5.0 PREREQUISITES

Well Recovery System operating in accordance with NP3000, “Startup & Shutdown Of Groundwater Collection” and NP4000, “Well Operations”

6.0 REFERENCES

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater
1251NF26	32% HCl

Operating Instructions:

NP3000	Startup & Shutdown Of Groundwater Collection
NP4000	Well Operations
NP4003	Air Stripper Operations

Standard Operating Conditions and Safe Operating Limits

NPSOC001	A/B/C Wells pH
NPSOC002	RW-4 Level
NPSOC003	RW-5 Level
NPSOC004	RW-10 Level
NPSOC005	RW-8 Level
NPSOC006	RW-9 Level
NPSOC007	A/B/C Storage Tank Level
NPSOC008	D/E/F Storage Tank Level
NPSOC009	A/B/C Stripper Level
NPSOC010	D/E/F Stripper Level
NPSOC011	A/B/C Stripper Air Flow
NPSOC012	D/E/F Stripper Air Flow
NPSOC013	Equalization Tank Level

Sketches:

NPSK0002	Necco Park A/B/C Treatment System
NPSK0003	Necco Park D/E/F Treatment System

Drawings:

W1573799	Necco Park Layout Plan – Civil
EE40-9923	P & ID – Groundwater Storage
EE40-9924	P & ID – Pumping and Air Stripping
EE40-9928	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical
EE40-9932	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical

7.0 INSTRUCTIONS

7.1 MONITOR groundwater processing from Control Room in accordance with NP5000, "Control Room Operations".

7.2 VERIFY well pumps are operating in accordance with NP3000, "Startup & Shutdown Of Groundwater Collection and NP4000 "Well Operations".

7.3 MONITOR storage tank levels in accordance with NPSOC007, "A/B/C Storage Tank Level" and NPSOC008, "D/E/F Storage Tank Level".

7.4 START UP BOTH A/B/C and D/E/F Air Stripper blowers.

NOTE:	Both Air Stripper blowers should be running whenever stripper operations are taking place, even if only one of the strippers is operating.

7.5 SET following pumps to "Auto":

- Equalization Tank effluent pump (P-301)
- BOTH Air Stripper pumps (P-201 & P-202)
- BOTH Groundwater Storage Tank pumps (P-101 & P-102)

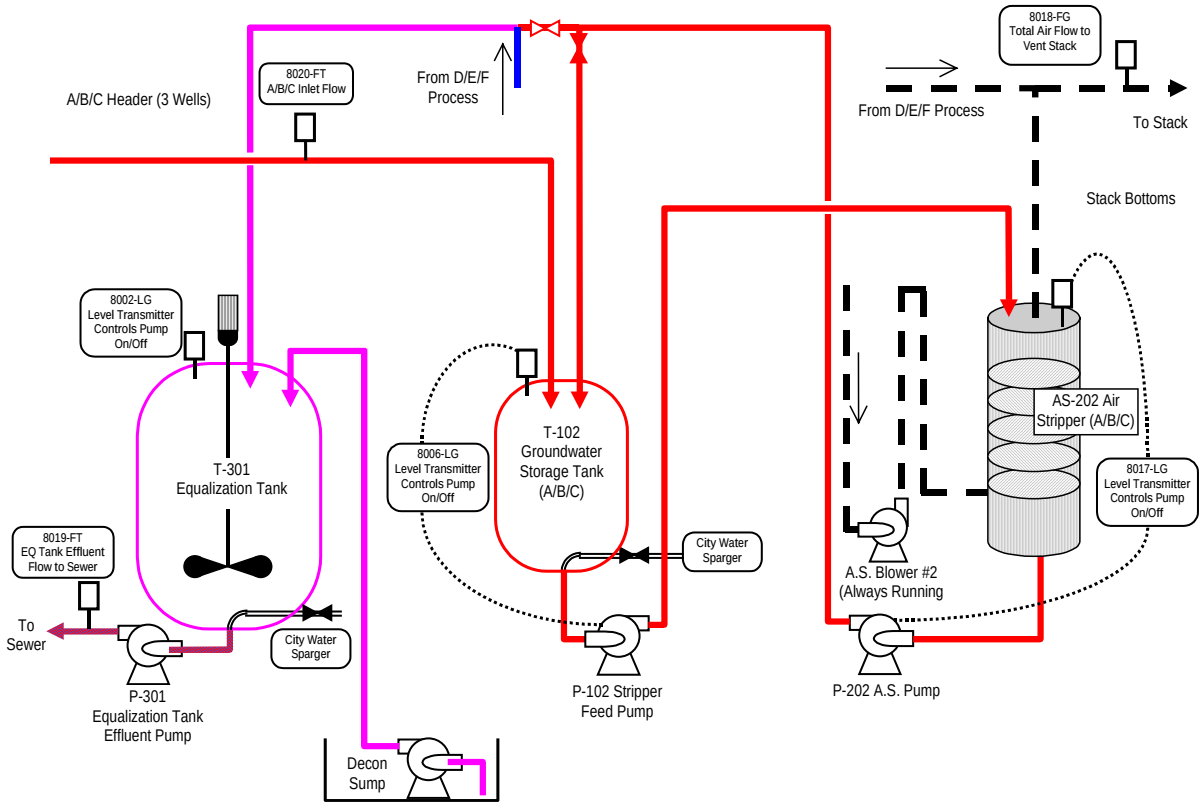
NOTE:	When set to "Auto" the pumps will start and stop based on the levels in their respective vessels.

7.6 From Control Room MONITOR process variables in accordance with following SOCs:

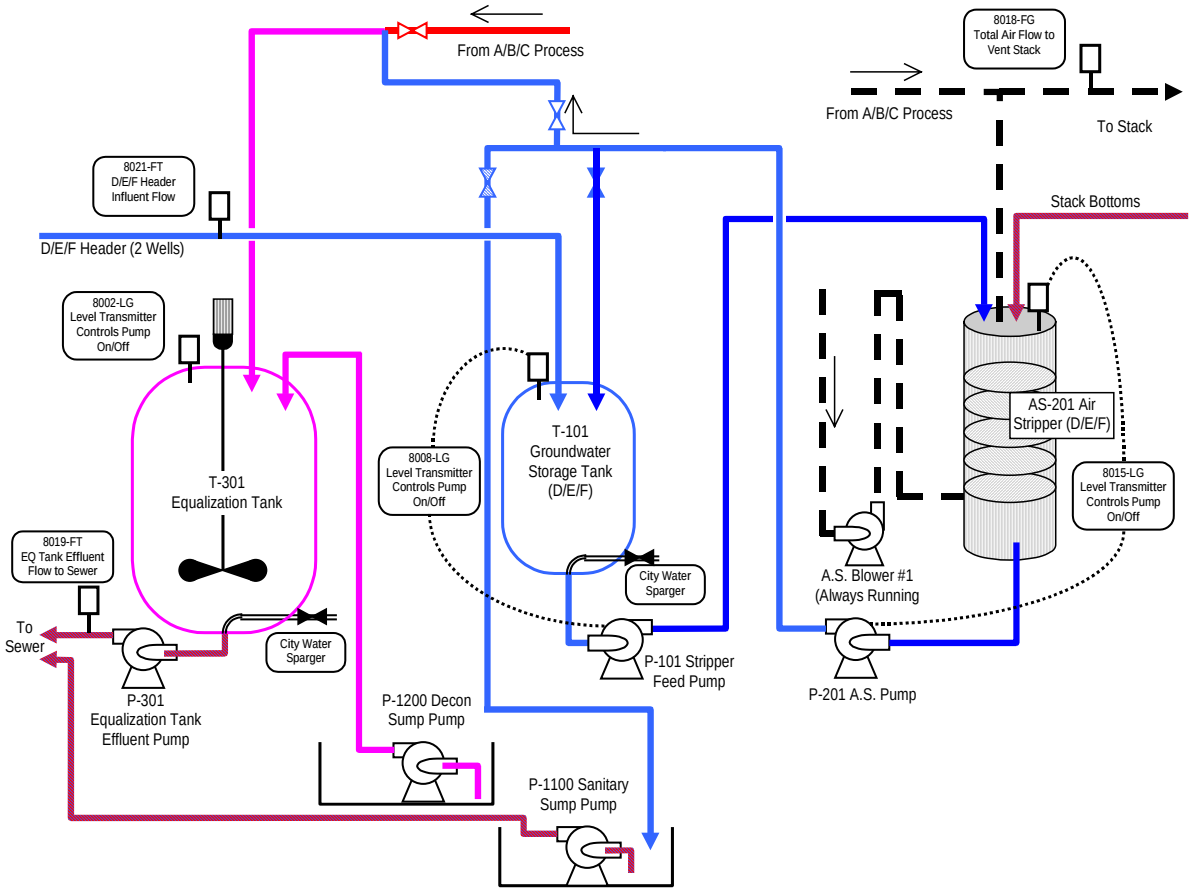
- NPSOC012, "A/B/C Influent Flow"
- NPSOC013, "D/E/F Influent Flow"
- NPSOC014, "A/B/C Storage Tank Level"
- NPSOC015, "D/E/F Storage Tank Level"
- NPSOC016, "A/B/C Stripper Level"
- NPSOC017, "D/E/F Stripper Level"
- NPSOC018, "Equalization Tank Level"
- NPSOC019, "EQ Tank Effluent Flow"
- NPSOC020, "Air Flow to Vent Stack"

7.7 IF any process variables are not within proper ranges, TROUBLESHOOT and REPAIR as necessary.

oOo



Sketch Title: **NECCO PARK A/B/C TREATMENT SYSTEM**	Sketch No.: **NPSK0002**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK D/E/F TREATMENT SYSTEM**	Sketch No.: **NPSK0003**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

1.0 GENERAL DESCRIPTION

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps pump ground water from A/B/C zones while two pumps pump ground water from D/E/F zones. This groundwater is collected in separate storage tanks and then processed through two separate air strippers. The treated groundwater from the two strippers is then combined in an equalization tank, where it is mixed before discharging to the city sewer. The process is controlled in such a way that levels in the wells and tanks are monitored and this data controls variable speed pumps throughout the process, allowing the process to run continuously.

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

Flashlight

5.0 PREREQUISITES

None

6.0 REFERENCES

Well No.	Zones	Pump Type	DNAPL	Set Point Percent	Well Depth (ft.)	Water Depth at 100% Level
RW-4	A/B/C	Grundfos Submersible, 1 HP	Yes	10	51.3	11 ft.
RW-5	A/B/C	Above ground; centrifugal; 7.5 HP	Yes	10	42.6	13 ft.
RW-8	D/E/F	Grundfos Submersible, 1 HP	No	10	71.3	26 ft.
RW-9	D/E/F	Grundfos Submersible, 1 HP	No	10	73.3	16 ft.
RW-10	A/B/C	Above ground; centrifugal; 3 HP	Yes	10	21.6	8 ft.

NOTES: Depths are measured in Feet from Top of Casing
Each 10% increment equates to 1 foot

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater
1251NF26	32% HCl

Operating Instructions:

NP4000	Well Operations
NP4003	Air Stripper Operations

Standard Operating Conditions and Safe Operating Limits

NPSOC001	A/B/C Wells pH
NPSOC002	RW-4 Level
NPSOC003	RW-5 Level
NPSOC004	RW-10 Level
NPSOC005	RW-8 Level
NPSOC006	RW-9 Level
NPSOC007	A/B/C Storage Tank Level
NPSOC008	D/E/F Storage Tank Level
NPSOC009	A/B/C Stripper Level
NPSOC010	D/E/F Stripper Level
NPSOC011	A/B/C Stripper Air Flow
NPSOC012	D/E/F Stripper Air Flow
NPSOC013	Equalization Tank Level

6.0 REFERENCES (continued)

Sketches:

NPSK0001	Necco Park Groundwater Treatment System
NPSK0002	Necco Park Groundwater Well System

Drawings:

W1573799	Necco Park Layout Plan – Civil
EE40-9928	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical
EE40-9806	Well 4 P & ID
EE40-9807	Well 5 P & ID
EE40-9808	Wells 8 & 9 P & ID
EE40-9810	Well 10 P & ID

7.0 INSTRUCTIONS

7.1 MONITOR groundwater processing from Control Room in accordance with NP5000, “Control Room Operations”.

7.2 MONITOR well pumps in accordance with following:

- NP4000 “Well Operations”
- NPSOC001, “A/B/C Wells pH”
- NPSOC002, “RW-4 Level”
- NPSOC003, “RW-5 Level”
- NPSOC004, “RW-10 Level”
- NPSOC005, “RW-8 Level”
- NPSOC006, “RW-9 Level”

7.3 MONITOR storage tank levels in accordance with NPSOC007, “A/B/C Storage Tank Level” and NPSOC008, “D/E/F Storage Tank Level”.

7.4 MONITOR air strippers in accordance with following:

- NP4003, “Air Stripper Operations”
- NPSOC009, “A/B/C Stripper Level”
- NPSOC010, “D/E/F Stripper Level”
- NPSOC011, “A/B/C Stripper Air Flow”
- NPSOC012, “D/E/F Stripper Air Flow”

7.5 MONITOR HCl Tank level and RE-ORDER as necessary.

7.6 IF any process variables are not within proper ranges, TROUBLESHOOT and REPAIR as necessary.

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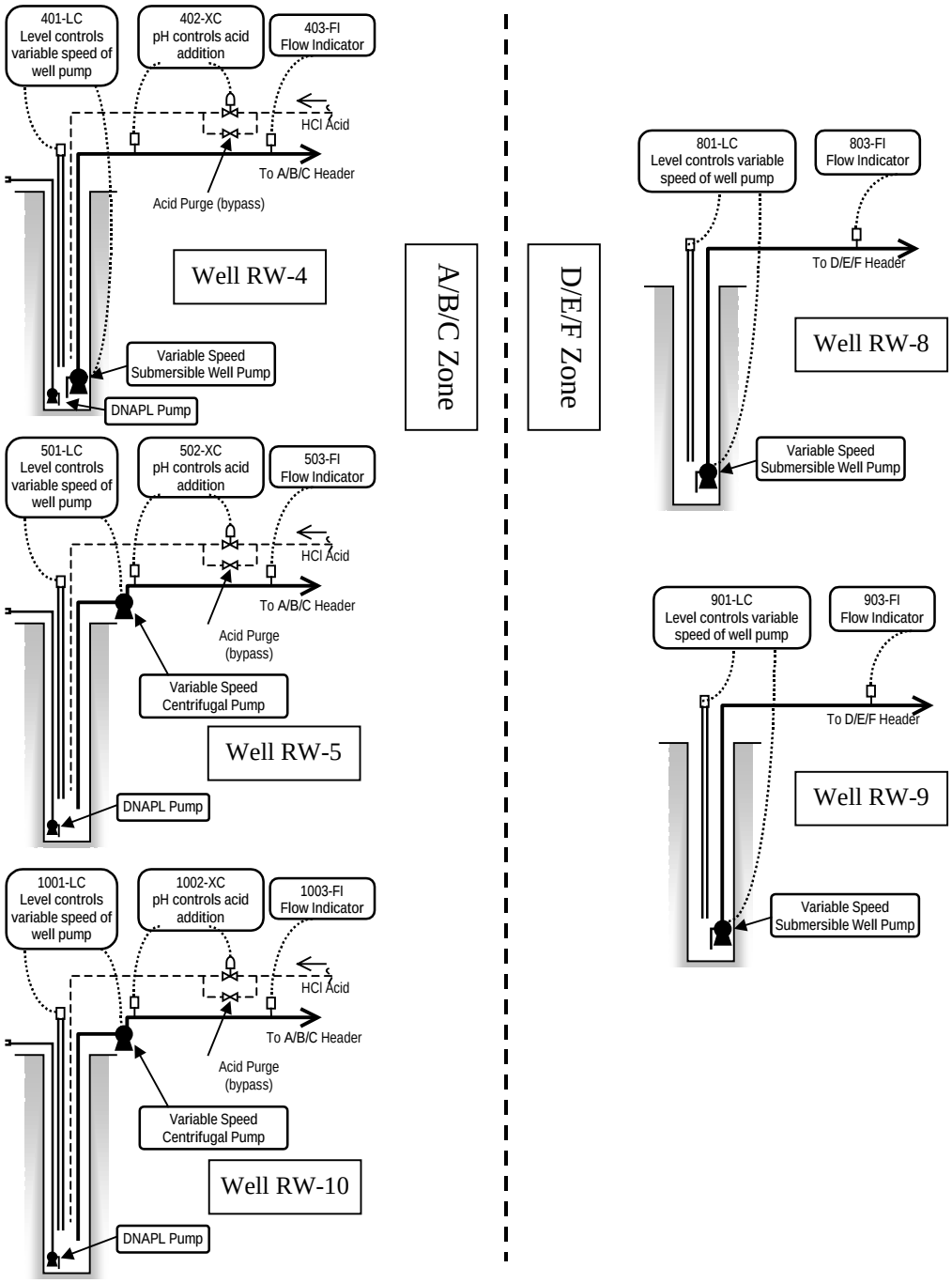
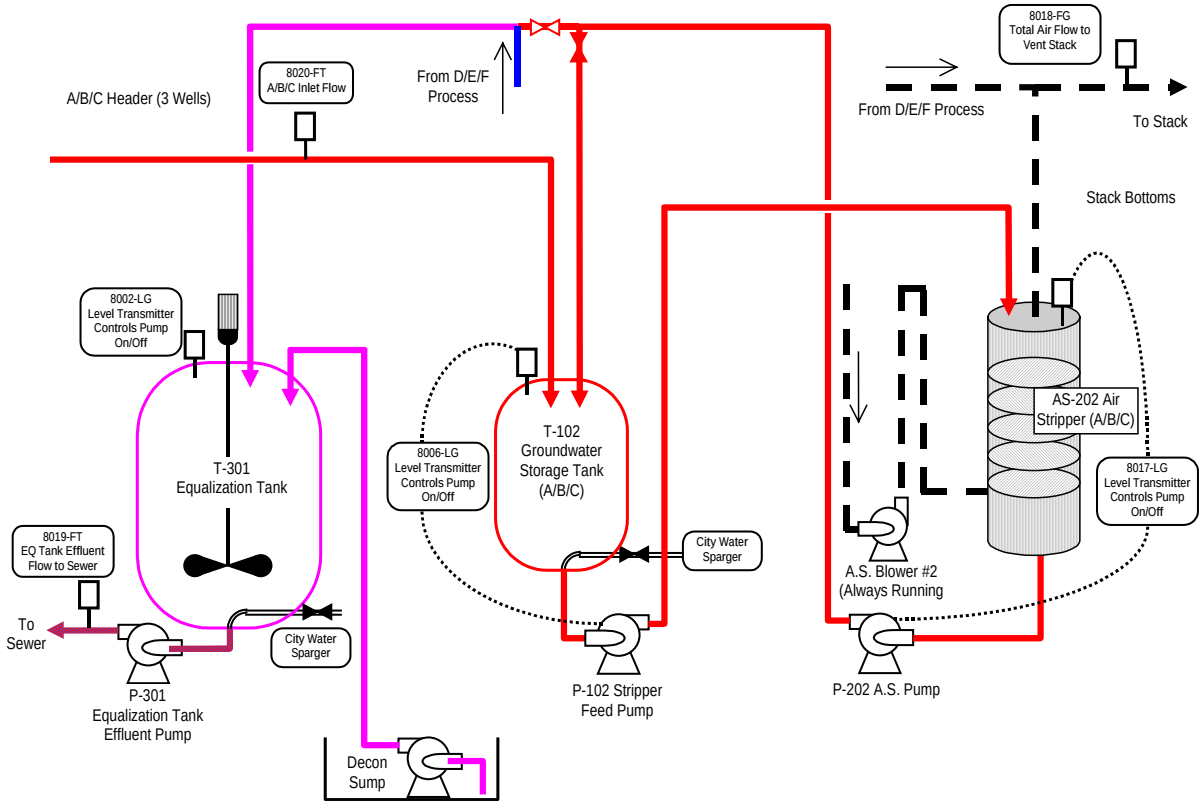
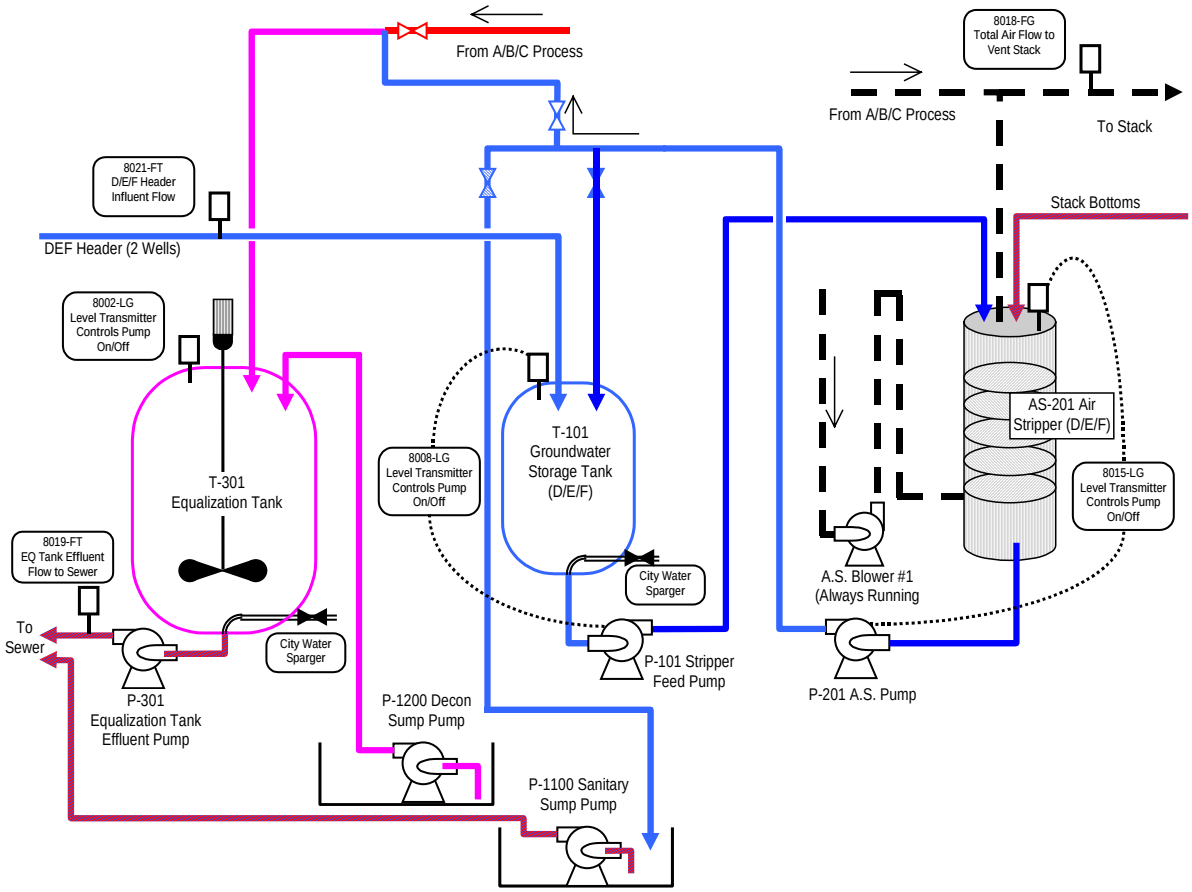

401-LC
Level controls variable speed of well pump
402-XC
pH controls acid addition
403-FI
Flow Indicator
HCl Acid
To A/B/C Header
Acid Purge (bypass)
Well RW-4
Variable Speed Submersible Well Pump
DNAPL Pump
501-LC
Level controls variable speed of well pump
502-XC
pH controls acid addition
503-FI
Flow Indicator
HCl Acid
To A/B/C Header
Acid Purge (bypass)
Variable Speed Centrifugal Pump
Well RW-5
DNAPL Pump
1001-LC
Level controls variable speed of well pump
1002-XC
pH controls acid addition
1003-FI
Flow Indicator
HCl Acid
To A/B/C Header
Acid Purge (bypass)
Variable Speed Centrifugal Pump
Well RW-10
DNAPL Pump
A/B/C Zone
D/E/F Zone
801-LC
Level controls variable speed of well pump
803-FI
Flow Indicator
To D/E/F Header
Well RW-8
Variable Speed Submersible Well Pump
901-LC
Level controls variable speed of well pump
903-FI
Flow Indicator
To D/E/F Header
Well RW-9
Variable Speed Submersible Well Pump



Sketch Title: **NECCO PARK A/B/C TREATMENT SYSTEM**	Sketch No.: **NPSK0002**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK D/E/F TREATMENT SYSTEM**	Sketch No.: **NPSK0003**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

1.0 GENERAL DESCRIPTION

Five well pumps are used to pump ground water from recovery wells via 2 separate collection headers to two separate processing systems. Three pumps collect ground water from A/B/C zones while two pumps collect ground water from D/E/F zones.

Section 7.1 Starting Up Well Pump
Section 7.2 Isolating Pumping Well From Header
Section 7.3 Shut Down Well Pump
Section 7.4 Preparing Well Pump For Maintenance

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

Flashlight

5.0 PREREQUISITES

None

6.0 REFERENCES

TABLE 1 – Necco Park Wells Descriptions

Well No.	Zones	Pump Type	DNAPL	Set Point Percent	Well Depth (ft.)	Water Depth at 100% Level
RW-4	A/B/C	Grundfos Submersible, 1 HP	Yes	10	51.3	11 ft.
RW-5	A/B/C	Above ground; centrifugal; 7.5 HP	Yes	10	42.6	13 ft.
RW-8	D/E/F	Grundfos Submersible, 1 HP	No	10	71.3	26 ft.
RW-9	D/E/F	Grundfos Submersible, 1 HP	No	10	73.3	16 ft.
RW-10	A/B/C	Above ground; centrifugal; 3 HP	Yes	10	21.6	8 ft.

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater

Operating Instructions:

NP5001, “Equipment Cleanout/Decontamination”

Sketches:

NPSK0001, “Necco Park Well System”

Drawings:

W1573799	Necco Park Layout Plan – Civil
EE40-9806	Well 4 P & ID
EE40-9807	Well 5 P & ID
EE40-9808	Wells 8 & 9 P & ID
EE40-9810	Well 10 P & ID

7.0 INSTRUCTIONS

Starting Up Well Pump:

7.1 START UP well pump, as follows:

7.1.1 IF well has been put into automatic mode, PROCEED as follows:

a. From control room, VERIFY automatic control valve is OPEN by setting level control to a predetermined set point.

b. PROCEED to designated well.

c. Visually INSPECT area and piping.

d. VERIFY electrical disconnect box is in "ON" position.

f. CHECK following manual valve position are closed:

- manual discharge
- drain

g. START pump at push button station.

h. VISUALLY check pressure gauge.

i. Visually INSPECT for pipe leaks.

j. OPEN manual discharge valve.

k. VERIFY that well level has dropped.

NOTE:	If level does not drop, open and close bypass valve to prevent airlocking in line. Level can be checked in control room or with a flashlight at the sump.

l. IF A/B/C-Zone well, OPEN manual valves on HCl addition line.

7.0 INSTRUCTIONS

Starting Up Well Pump: (continued)

7.1.2 IF well has been put into manual mode, PROCEED as follows:

a. PROCEED to designated well.

b. Visually INSPECT area and piping.

c. VERIFY pump electrical cord is plugged in.

d. VERIFY electrical disconnect box is in "ON" position.

e. OPEN manual discharge valve(s).

f. TURN pump on to "AUTO" position.

g. Visually CHECK pressure gauge.

h. Visually INSPECT pipe for leaks.

i. VERIFY well level has dropped.

j. IF A/B/C-Zone well, OPEN manual valves on HCl addition line.

Isolating Recovery Well From Header:

7.2 ISOLATE recovery well from header as follows:

ENVIRONMENTAL NOTE:	In the event a recovery well level exceeds 70%, the affected pumping well must be valved closed IMMEDIATELY.

7.2.1 PROCEED to affected well.

7.2.2 SET pump switch to "OFF" position.

7.2.3 CLOSE manual valve.

7.2.4 IF A/B/C-Zone well, CLOSE manual valves on HCl addition line.

7.2.5 RECORD following in logbook:

- If applicable, time of the high-level event
- Which PW is affected
- The highest level the well experienced
- Field condition of the PW (verification that groundwater did not spill to ground area around the affected well)

7.2.5 NOTIFY Supervision of spill immediately so that Supervision can determine if a phone call to NYSDEC is warranted.

7.0 INSTRUCTIONS (continued)

Shut Down Well Pump:

7.3 SHUT DOWN well pump as follows:

7.3.1 PROCEED to designated well.

7.3.2 TURN pump starter to "OFF" position.

7.3.3 CLOSE manual well outlet valve(s).

7.3.4 IF A/B/C-Zone well, CLOSE manual valves on HCl addition line.

Preparing Well Pump For Maintenance:

7.4 PREPARE well pump for Maintenance as follows:

SAFETY NOTE:	PPE requirements--wear Tyvek® suit with rubber boots, half- or full-facepiece respirator with cartridges for organic and acid vapors and particulates, surgical and neoprene gloves, goggles, hard hat, and safety shoes.

7.4.1 AFTER pump is locked out, disconnected, and ready for removal, DRAIN pump into well.

7.4.2 After draining pump, PLACE pump in plastic tub and TRANSPORT pump to decon sump area.

NOTE:	Refer to NP5001, "Equipment Cleanout/Decontamination".

7.4.3 In sump area CLEAN and RINSE pump.

7.4.4 WHEN sump is full, PUMP contents to equalization tank.

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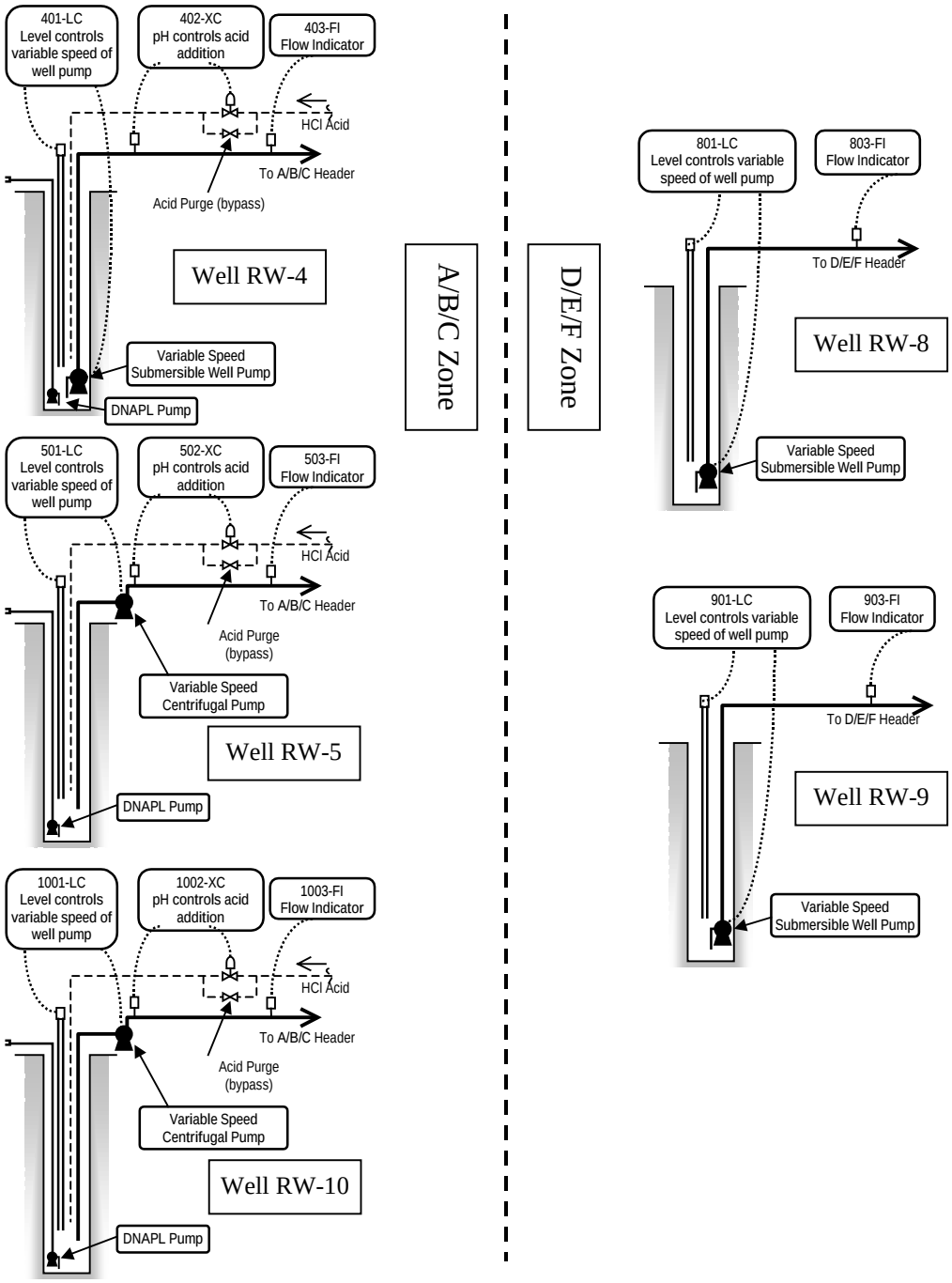
GWTF Operations Level Probe Settings

Recovery Well	Set Point Percent	Well Depth Feet from Top of Casing	Water Depth at 100% Level Feet from Top of Casing
4	10	51.3	11
5	10	42.6	13
8	10	71.3	26
9	10	73.3	16
10	10	21.6	8



Sketch Title: **NECCO PARK WELL SYSTEM**	Sketch No.: **NPSK0001**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

1.0 GENERAL DESCRIPTION

The three wells that pump from A/B/C zones (RW-4, RW-5, RW-10) are equipped with air operated DNAPL (Dense, Non-Aqueous Phase Liquid) pumps. The DNAPL pumps discharge into drums, which are sent off-site for treatment and disposal.

2.0 USER

Environmental Technician (Contract)

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

Closed top 55-gallon drums
Compressed air supply

5.0 PREREQUISITES

None

6.0 REFERENCES

Material Safety Data Sheets:

MSDS #	NAME
12511007	Necco Park RQ Hazardous Waste Liquid (NAPL)

Operating Instructions:

GW5000, “Equipment Cleanout/Decontamination”

Drawings:

W-951176 Remediation Pumping Well Collection System

7.0 INSTRUCTIONS

7.1 See DNAPL Management Plan (O&M Plan Appendix D).

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1.0 GENERAL DESCRIPTION

The groundwater is collected in separate storage tanks and then processed through two separate air strippers. The treated groundwater from the two strippers is then combined in an equalization tank, where it is mixed before discharging to the city sewer. The air from the strippers exits through the vent stack, discharging to the atmosphere. The process is controlled in such a way that levels in the tanks are monitored and this data controls operation of the pumps, allowing the process to run continuously.

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Tyvek® Suit with Rubber Boots
Half- or full-face respirator with cartridges for organic and acid vapors and particulates
Surgical and Neoprene Gloves
Goggles

4.0 REQUIRED EQUIPMENT

Flashlight

5.0 PREREQUISITES

None

6.0 REFERENCES

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater
1251NF26	32% HCl

Operating Instructions:

NP4003	Air Stripper Operations

Standard Operating Conditions and Safe Operating Limits

NPSOC007	A/B/C Storage Tank Level
NPSOC008	D/E/F Storage Tank Level
NPSOC009	A/B/C Stripper Level
NPSOC010	D/E/F Stripper Level
NPSOC013	Equalization Tank Level
NPSOC019	Air Flow to Vent Stack

Sketches:

NPSK0002	Necco Park A/B/C Treatment System
NPSK0003	Necco Park D/E/F Treatment System

Drawings:

W1573799	Necco Park Layout Plan – Civil
EE40-9928	EQ & PPG Arrgt – Treatment Bldg. Process/Mechanical
EE40-9806	Well 4 P & ID
EE40-9807	Well 5 P & ID
EE40-9808	Wells 8 & 9 P & ID
EE40-9810	Well 10 P & ID

7.0 INSTRUCTIONS

Air Stripper Startup:

7.1 START UP Air Stripper as follows:

7.1.1 START Air Stripper Blowers #1 (D/E/F) and #2 (A/B/C) in "RUN" mode.

ENVIRONMENTAL NOTE:	Both blowers must remain running at all times when the process is operating to maintain a minimum air flow to the vent stack in compliance with environmental regulations. Refer to NPSOC019, "Air Flow to Vent Stack".

NOTE: The pumps listed below will start and stop, based on levels monitored in their respective vessels. Refer to following SOCs:

- NPSOC007 "A/B/C Storage Tank Level"
- NPSOC008 "D/E/F Storage Tank Level"
- NPSOC009"A/B/C Stripper Level"
- NPSOC010 "D/E/F Stripper Level"
- NPSOC013"Equalization Tank Level"

7.1.2 SET Equalization Tank pump P-301 to "AUTO" mode.

7.1.3 SET Air Stripper pumps P-202 and P-201 to "AUTO" mode.

7.1.4 SET Stripper Feed pumps P-102 and P-101 to "AUTO" mode.

7.2 MONITOR Air Stripper operations from Control Room in accordance with NP5000, "Control Room Operations" and SOCs listed in notes above.

7.2.1 IF any process variables are not within proper ranges, TROUBLESHOOT and REPAIR as necessary.

7.0 INSTRUCTIONS (continued)

7.3 SHUT DOWN Air Stripper as follows:

7.3.1 SET Stripper Feed pumps P-102 and P-101 to “OFF” mode.

7.3.2 SET Air Stripper pumps P-202 and P-201 to “OFF” mode.

7.3.3 SET Equalization Tank pump P-301 to “OFF” mode.

7.3.4 AFTER above listed pumps have been shut down for 5 minutes, SHUT DOWN Air Stripper Blowers #1 (D-E-F) and #2 (A-B-C) in “OFF” mode.

7.3.5 As necessary, LOCK OUT equipment for Maintenance and DECONTAMINATE in accordance with NP5001, “Equipment Cleanout/Decontamination”.

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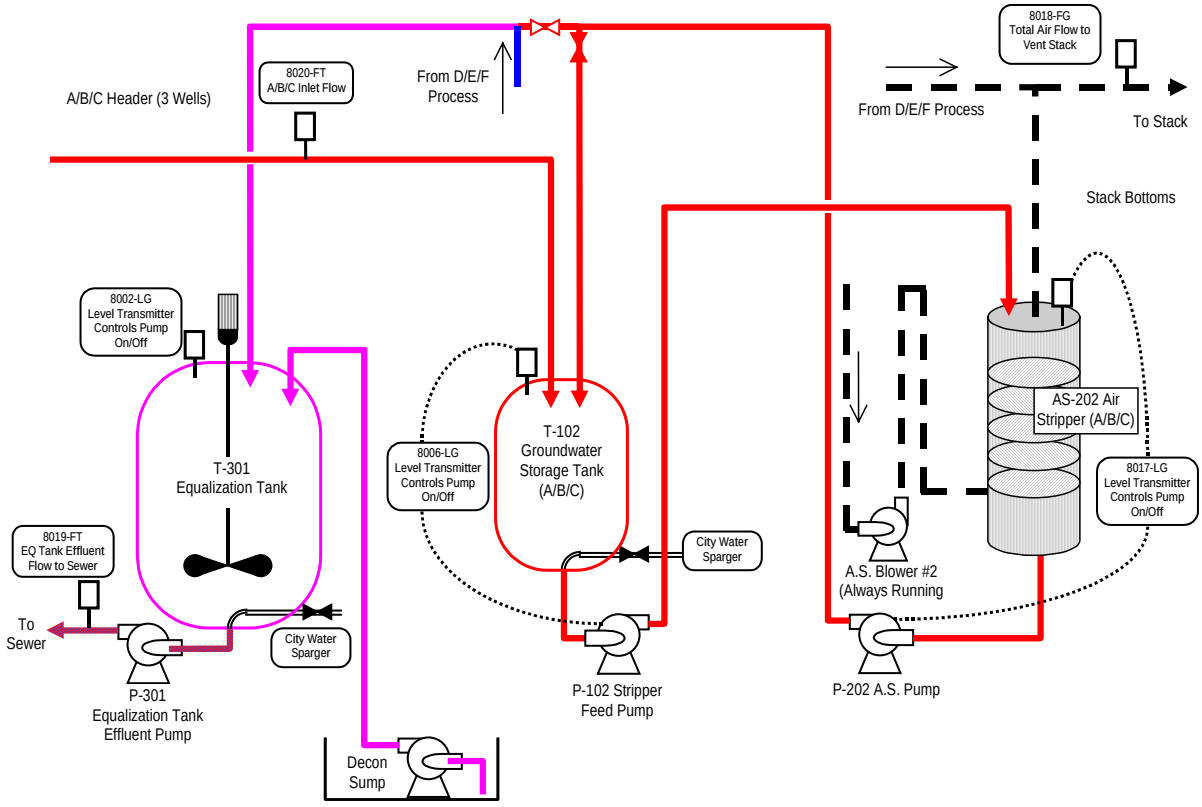
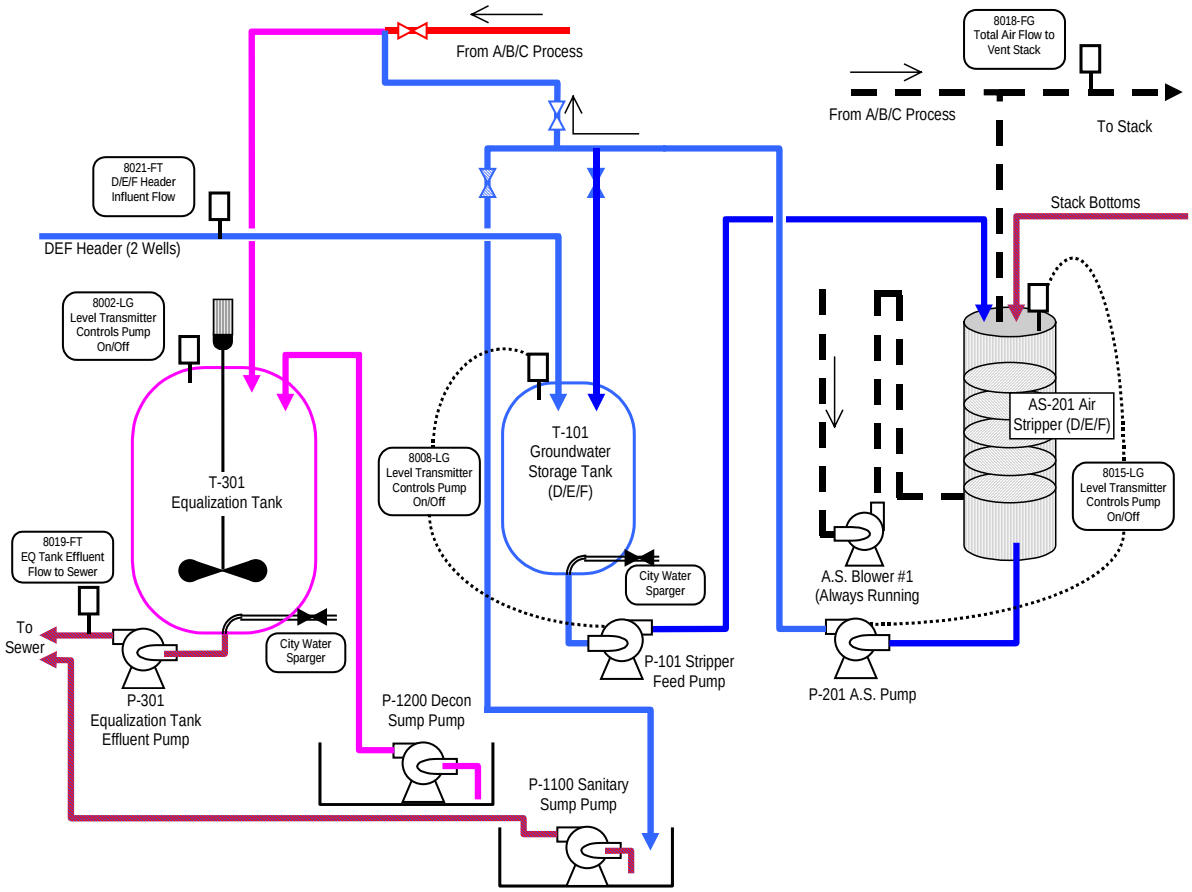


Sketch Title: **NECCO PARK A/B/C TREATMENT SYSTEM**	Sketch No.: **NPSK0002**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK D/E/F TREATMENT SYSTEM**	Sketch No.: **NPSK0003**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

1.0 GENERAL DESCRIPTION

The purpose of this procedure is to provide detailed instructions for cleaning and decontaminating equipment in the decon area, located in the Groundwater Treatment Building. As required under OSHA 1910.120, decontamination will take place in the work zone to isolate and remove any hazardous substances and to prevent any contaminated material from leaving the work zone.

2.0 USER

Operations Technician

3.0 SAFETY

Standard Safety Equipment for Necco Park Site
Goggles
Saranex® suit or Tyvek® Suit
Surgical Gloves and Neoprene Gloves
Rubber Boots

4.0 REQUIRED EQUIPMENT

None

5.0 PREREQUISITES

None

6.0 REFERENCES

Necco Park Facility Control Room Log Sheet

Material Safety Data Sheets:

MSDS #	NAME
12511005	Necco Park Groundwater
1251NF26	32% HCl

Standard Operating Conditions (SOC) and Safe Operating Limits (SOL):

(%) Level Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
		20.		***70***	
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
				100	
Interlocks	Lower				Upper

Sketches:

NPSK003, “Necco Park D/E/F Treatment System”

7.0 INSTRUCTIONS

7.1 CLEAN and DECONTAMINATE equipment in decon area as follows:

7.1.1 LOCK OUT and REMOVE equipment from service.

SAFETY NOTE:	Don the appropriate PPE as listed in Section 3.0, Safety, to prevent exposure to chemicals.

7.1.2 Using appropriate drain valve, DRAIN any contaminated equipment into a pail, drum or other suitable container.

NOTE:	Well pumps can be drained into the well.

7.1.3 TRANSPORT equipment and container to decon station.

7.1.4 EMPTY container into tank at bottom of decon station.

7.1.5 Using City Water hose, RINSE container and equipment UNTIL all contaminated residue is removed.

7.1.6 WHEN equipment is cleaned, SHUT OFF water and PUMP contents of tank at bottom of decon station to equalization tank.

ENVIRONMENTAL NOTE:	If the equalization tank has been isolated from the system, any collected material will need to be placed in the sump or pumped in a tank truck if necessary.

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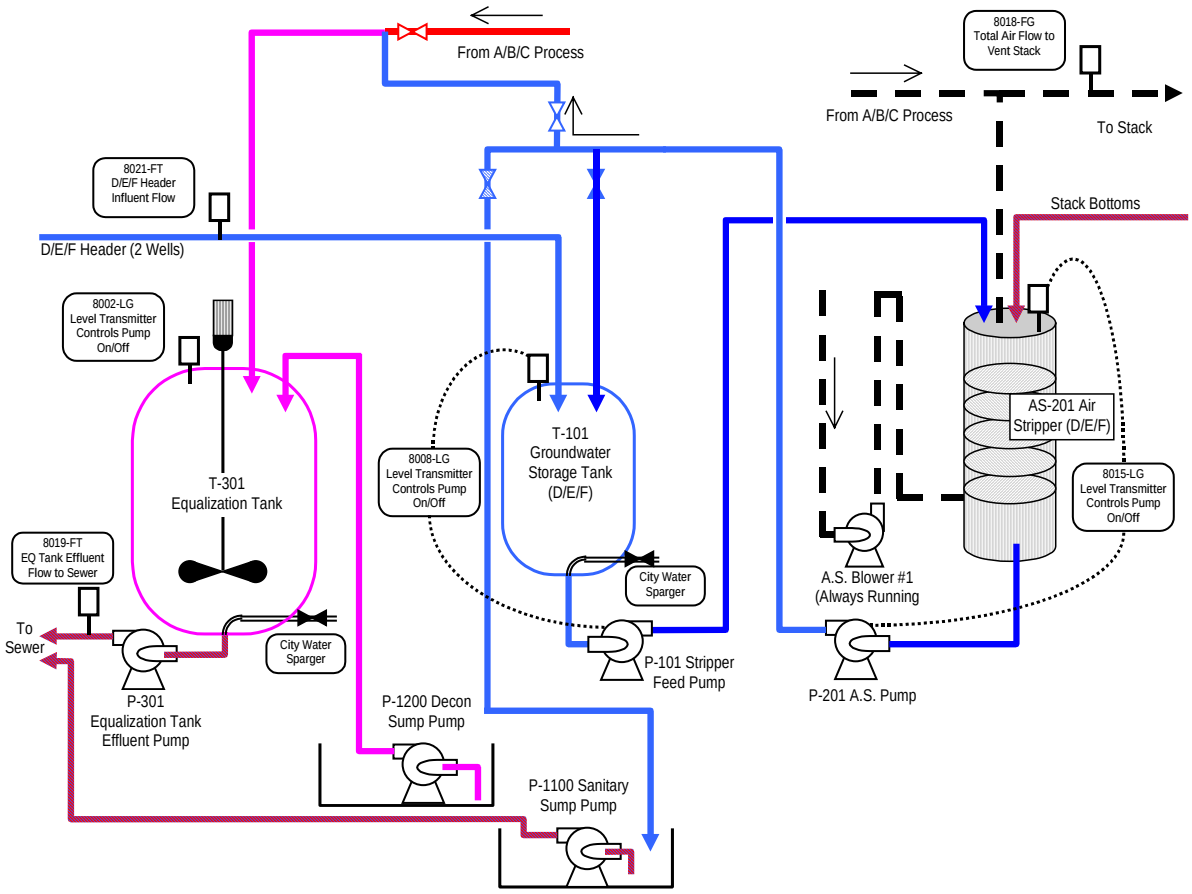


Sketch Title: **NECCO PARK D/E/F TREATMENT SYSTEM**	Sketch No.: **NPSK0003**
Approved By: T. J. Pezzino	Date:
Authorized By: ?????	Date:

DuPont Necco Park Operating Instruction Manual

Standard Operating Conditions and Safe Operating Limits

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Wells (RW-4, RW-5, RW-10)
Process Variable (Units): pH
Instrument Number: 402XC RW-4
502XC RW-5
1002XC RW-10
Control Status: Diagnostic
Type: Environmental

(pH) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	5.5	***6.0***	***6.5***	***7.0***	***7.5***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	5.5			***None***	
Interlocks	Lower				Upper
	5			***None***	

Control Scheme A pH meter measures the pH in the discharge line of each of the A/B/C Wells. The interlocks associated with this variable regulates the amount of HCl acid that is added to this stream. The HCl neutralized carbonates and sulfates associated with this stream. pH is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Wells (RW-4, RW-5, RW-10)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify pH setpoint.
- Confirm flow from well
- Verify acid level in HCl tank and control valve operational.
- Operate HCl acid purge to add more acid to well

Minimum SOC:

- Verify pH setpoint.
- Confirm flow from well
- Close HCl control valve.

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: Interlocks the HCl control closed to prevent additional acid from being added to the groundwater stream.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the maximum operating pH to control scale formation in the treatment equipment. Exceeding that pH will allow severe calcium carbonate precipitation in the treatment system. The maximum SOL is the maximum pH that Necco Park can discharge to the city sewer without causing a pH excursion.

Minimum:
The minimum SOC and SOL is the minimum operating pH that balances preventing scale formation versus equipment corrosion potential. Exposure to low pH material may cause severe corrosion. Low pH may cause pH excursion to city sewer.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 4 (RW-4)
Process Variable (Units): Percent
Instrument Number: 401LC
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	0			***80***	
Interlocks	Lower				Upper
	None			***100***	

Control Scheme A level detector measures the depth in each of the A/B/C Wells. The interlocks associated with this variable regulates the speed of the variable speed well pump to maintain a constant level in the well. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 4 (RW-4)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify level setpoint.
- Verify well pump operating correctly
- Verify flow from well

Minimum SOC:

- Verify level setpoint.
- Confirm flow from well
- Close HCl control valve.

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the highest level of groundwater in the well. A high level can indicate that the pump is not operating properly or there is an unusually great amount of water entering the well.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 5 (RW-5)
Process Variable (Units): Percent
Instrument Number: 501LC
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	0			***80***	
Interlocks	Lower				Upper
	None			***100***	

Control Scheme A level detector measures the depth in each of the A/B/C Wells. The interlocks associated with this variable regulates the speed of the variable speed well pump to maintain a constant level in the well. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 5 (RW-5)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify level setpoint.
- Verify well pump operating correctly
- Verify flow from well

Minimum SOC:

- Verify level setpoint.
- Confirm flow from well
- Close HCl control valve.

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the highest level of groundwater in the well. A high level can indicate that the pump is not operating properly or there is an unusually great amount of water entering the well.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 10 (RW-10)
Process Variable (Units): Percent
Instrument Number: 1001LC
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	0			***80***	
Interlocks	Lower				Upper
	None			***100***	

Control Scheme A level detector measures the depth in each of the A/B/C Wells. The interlocks associated with this variable regulates the speed of the variable speed well pump to maintain a constant level in the well. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 10 (RW-10)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify level setpoint.
- Verify well pump operating correctly
- Verify flow from well

Minimum SOC:

- Verify level setpoint.
- Confirm flow from well
- Close HCl control valve.

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the highest level of groundwater in the well. A high level can indicate that the pump is not operating properly or there is an unusually great amount of water entering the well.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 8(RW-8
Process Variable (Units): Percent
Instrument Number: 81LC
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	0			***80***	
Interlocks	Lower				Upper
	None			***100***	

Control Scheme A level detector measures the depth in both of the D/E/F Wells. The interlocks associated with this variable regulates the speed of the variable speed well pump to maintain a constant level in the well. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 8 (RW-8)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify level setpoint.
- Verify well pump operating correctly
- Verify flow from well

Minimum SOC:

- Verify level setpoint.
- Confirm flow from well

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the highest level of groundwater in the well. A high level can indicate that the pump is not operating properly or there is an unusually great amount of water entering the well.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 9 RW-9
Process Variable (Units): Percent
Instrument Number: 901LC
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	0			***80***	
Interlocks	Lower				Upper
	None			***100***	

Control Scheme A level detector measures the depth in both of the D/E/F Wells. The interlocks associated with this variable regulates the speed of the variable speed well pump to maintain a constant level in the well. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 9 (RW-9)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify level setpoint.
- Verify well pump operating correctly
- Verify flow from well

Minimum SOC:

- Verify level setpoint.
- Confirm flow from well

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC is the highest level of groundwater in the well. A high level can indicate that the pump is not operating properly or there is an unusually great amount of water entering the well.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 4 (RW-4)
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 403FI
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the well to the processing area.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 4 (RW-4)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pump operating correctly
- Verify flow from well and piping is intact
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

Minimum SOC:

- Verify well pump operating correctly
- Confirm flow from well
- Close HCl control valve
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the well could eventually cause A/B/C Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 5 (RW-5)
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 503FI
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the well to the processing area.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 5 (RW-5)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pump operating correctly
- Verify flow from well and piping is intact
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

Minimum SOC:

- Verify well pump operating correctly
- Confirm flow from well
- Close HCl control valve
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the well could eventually cause A/B/C Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 10 (RW-10)
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 1003FI
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the well to the processing area.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 10 (RW-10)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pump operating correctly
- Verify flow from well and piping is intact
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

Minimum SOC:

- Verify well pump operating correctly
- Confirm flow from well
- Close HCl control valve
- Compare flow with A/B/C Influent Flow minus flow from other 2 A/B/C wells

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the well could eventually cause A/B/C Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 8 (RW-8)
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 803FI
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the well to the processing area.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 8 (RW-8)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pump operating correctly
- Verify flow from well and piping is intact
- Compare flow with D/E/F Influent Flow minus flow from other D/E/F well

Minimum SOC:

- Verify well pump operating correctly
- Confirm flow from well
- Close HCl control valve
- Compare flow with D/E/F Influent Flow minus flow from other D/E/F well

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the well could eventually cause D/E/F Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 9 (RW-9)
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 903FI
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the well to the processing area.

Process System: NP – Necco Park Groundwater
Process Equipment: Recovery Well 9 (RW-9)

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pump operating correctly
- Verify flow from well and piping is intact
- Compare flow with D/E/F Influent Flow minus flow from other D/E/F well

Minimum SOC:

- Verify well pump operating correctly
- Confirm flow from well
- Close HCl control valve
- Compare flow with D/E/F Influent Flow minus flow from other D/E/F well

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the well could eventually cause D/E/F Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Influent
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 8020FT
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the A/B/C Header to the A/B/C Storage Tank.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Influent

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pumps are operating correctly
- Verify flow from well and piping is intact
- Compare flow with combined flow from all A/B/C wells

Minimum SOC:

- Verify well pumps are operating correctly
- Close HCl control valves
- Compare flow with combined flow from all A/B/C wells

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the wells could eventually cause A/B/C Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Influent
Process Variable (Units): Gallons per Minute (GPM)
Instrument Number: 8021FT
Control Status: Diagnostic
Type: Environmental

(GPM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	1	***3***	***5***	***7***	***10***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A flow meter measures the flow of water from the D/E/F Header to the D/E/F Storage Tank.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Influent

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify well pumps are operating correctly
- Verify flow from well and piping is intact
- Compare flow with combined flow from all D/E/F wells

Minimum SOC:

- Verify well pumps are operating correctly
- Close HCl control valves
- Compare flow with combined flow from all D/E/F wells

ACTIONS OF INTERLOCKS

Upper Trip Point: None.

Lower Trip Point: None.

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Excessive flow from the wells could eventually cause D/E/F Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Storage Tank
Process Variable (Units): Percent
Instrument Number: 8006LG
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A level detector measures the depth in the A/B/C Storage Tank. The interlocks associated with this variable regulates the operation of the Air Stripper Feed Pump (P-102) pump to maintain a predetermined level in the storage tank. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Storage Tank

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify feed pump is operating correctly
- Verify flow from A/B/C header
- Shut down A/B/C well pumps

Minimum SOC:

- Verify well pumps are operating correctly
- Verify low level interlock

ACTIONS OF INTERLOCKS

Upper Trip Point: Starts feed pump

Lower Trip Point: Shuts down feed pump

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Insufficient flow to the Air Stripper could eventually cause A/B/C Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Storage Tank
Process Variable (Units): Percent
Instrument Number: 8008LG
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme A level detector measures the depth in the D/E/F Storage Tank. The interlocks associated with this variable regulates the operation of the Air Stripper Feed Pump (P-101) pump to maintain a predetermined level in the storage tank. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Storage Tank

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify feed pump is operating correctly
- Verify flow from D/E/F header
- Shut down D/E/F well pumps

Minimum SOC:

- Verify well pumps are operating correctly
- Verify low level interlock

ACTIONS OF INTERLOCKS

Upper Trip Point: Starts feed pump

Lower Trip Point: Shuts down feed pump

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Insufficient flow to the Air Stripper could eventually cause D/E/F Storage tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Stripper
Process Variable (Units): Percent
Instrument Number: 8017LG
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***Level Float Switch***	

Control Scheme A level detector measures the depth in the A/B/C Stripper. The interlocks associated with this variable regulates the operation of the Air Stripper Discharge Pump (P-202) pump to maintain a predetermined level in the stripper. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: A/B/C Stripper

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify feed pump is operating correctly
- Verify flow from A/B/C Storage Tank
- Shut down A/B/C Storage Tank pump

Minimum SOC:

- Verify storage tank pump is operating correctly
- Verify low level interlock

ACTIONS OF INTERLOCKS

Upper Trip Point: Starts discharge pump

Lower Trip Point: Shuts down discharge pump

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Insufficient flow to the Equalization Tank could eventually cause A/B/C Stripper to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Stripper
Process Variable (Units): Percent
Instrument Number: 8015LG
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***50***	***70***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***Level Float Switch***	

Control Scheme A level detector measures the depth in the D/E/F Stripper. The interlocks associated with this variable regulates the operation of the Air Stripper Discharge Pump (P-201) pump to maintain a predetermined level in the stripper. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: D/E/F Stripper

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify feed pump is operating correctly
- Verify flow from D/E/F Storage Tank
- Shut down D/E/F Storage Tank pump

Minimum SOC:

- Verify storage tank pump is operating correctly
- Verify low level interlock

ACTIONS OF INTERLOCKS

Upper Trip Point: Starts discharge pump

Lower Trip Point: Shuts down discharge pump

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Insufficient flow to the Equalization Tank could eventually cause D/E/F Stripper to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller.

Process System: NP – Necco Park Groundwater
Process Equipment: Equalization Tank
Process Variable (Units): Percent
Instrument Number: 8002LG
Control Status: Diagnostic
Type: Environmental

(percent) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	10	***30***	***40***	***50***	***90***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	10				***85***
Interlocks	Lower				Upper
	None			***95****	

*** Independent Level Switch**

Control Scheme A level detector measures the depth in the Equalization Tank. The interlocks associated with this variable regulates the operation of the Equalization Tank Discharge Pump (P-301) pump to maintain a predetermined level in the Equalization Tank. The level is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Equalization Tank

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify feed pumps from Air Strippers are operating correctly
- Verify flow from Air Strippers
- Shut down Air Strippers

Minimum SOC:

- Verify Equalization Tank discharge pump is operating correctly
- Verify low level interlock

ACTIONS OF INTERLOCKS

Upper Trip Point: Starts discharge pump

Lower Trip Point: Shuts down discharge pump

Lo-Lo Trip Point: Shuts down agitator

REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
Insufficient flow from the Equalization Tank could eventually cause Equalization Tank to overfill.

Minimum:
The minimum SOC may be an indication of control problems with the pump controller. Operation of the agitator with the tank empty, could damage the agitators bearings.

Process System: NP – Necco Park Groundwater
Process Equipment: Vent Stack
Process Variable (Units): SCFM (Standard Cubic Feet per Minute)
Instrument Number: 8018FG
Control Status: Diagnostic
Type: Environmental

(SCFM) Limits	Minimum SOL	Minimum SOC	Normal	Maximum SOC	Maximum SOL
	100	***200***	***350***	***600***	***600***
Alarms	Lo / Lo	Lo		Hi	Hi / Hi
	None			***None***	
Interlocks	Lower				Upper
	None			***None***	

Control Scheme Two 500 scfm blowers force air through each of the Air Strippers. The air flow is displayed in the control room.

Process System: NP – Necco Park Groundwater
Process Equipment: Vent Stack

CORRECTIVE ACTIONS AND TROUBLE SHOOTING

Maximum SOC:

- Verify **BOTH** blowers from the Air Strippers are operating correctly
- Verify air flow from Air Strippers
- Verify air flow meter is working properly

Minimum SOC:

- Verify **BOTH** blowers from the Air Strippers are operating correctly
- Shut down Air Stripper feed pumps
- Verify air flow meter is working properly

ACTIONS OF INTERLOCKS

Upper Trip Point: None

Lower Trip Point: Shuts down Stripper Feed Pumps

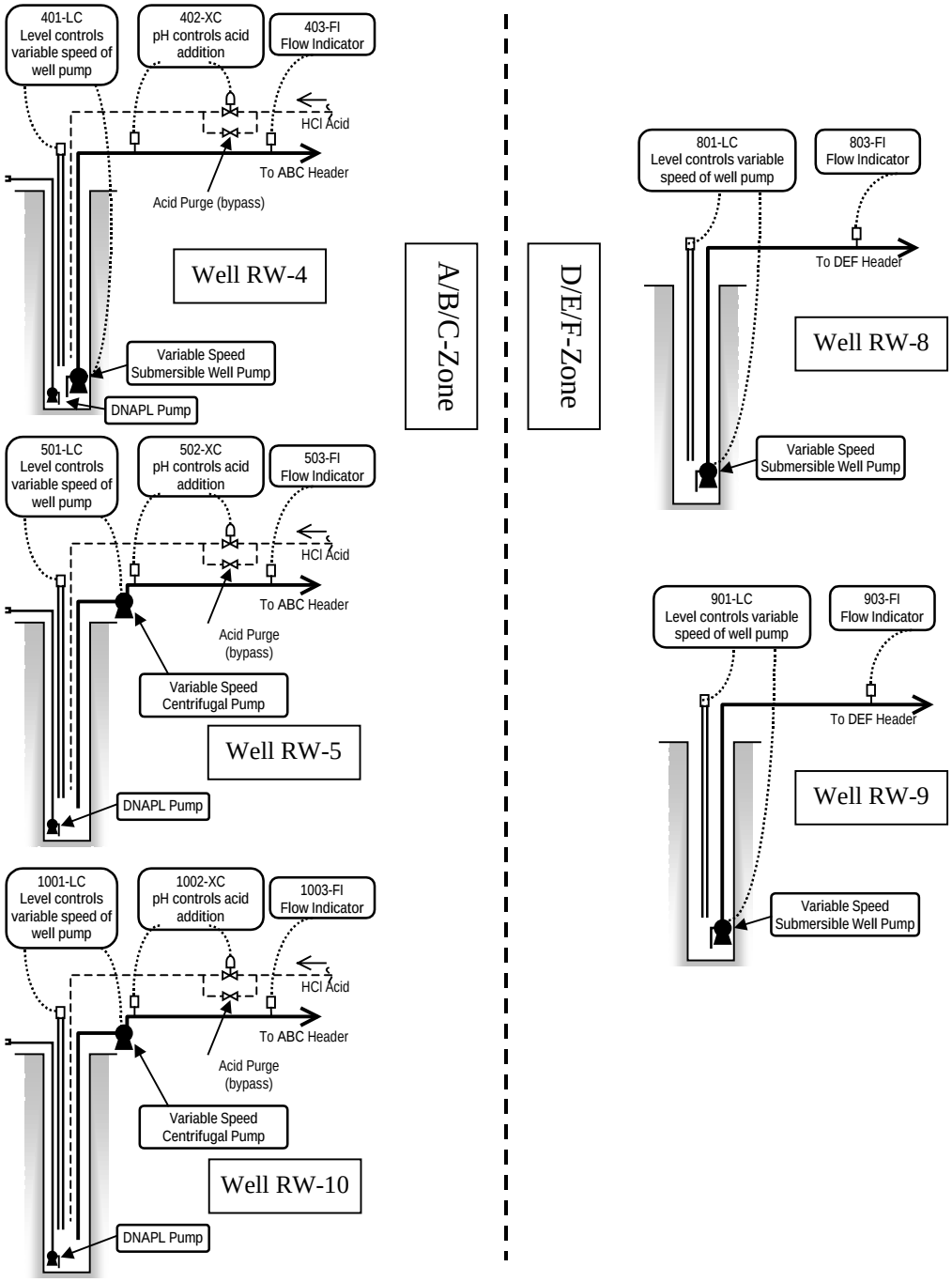
REASONS FOR LIMITS OR CONSEQUENCES OF DEVIATION

Maximum:
The maximum SOC may be an indication of problems with the Air Flow meter.

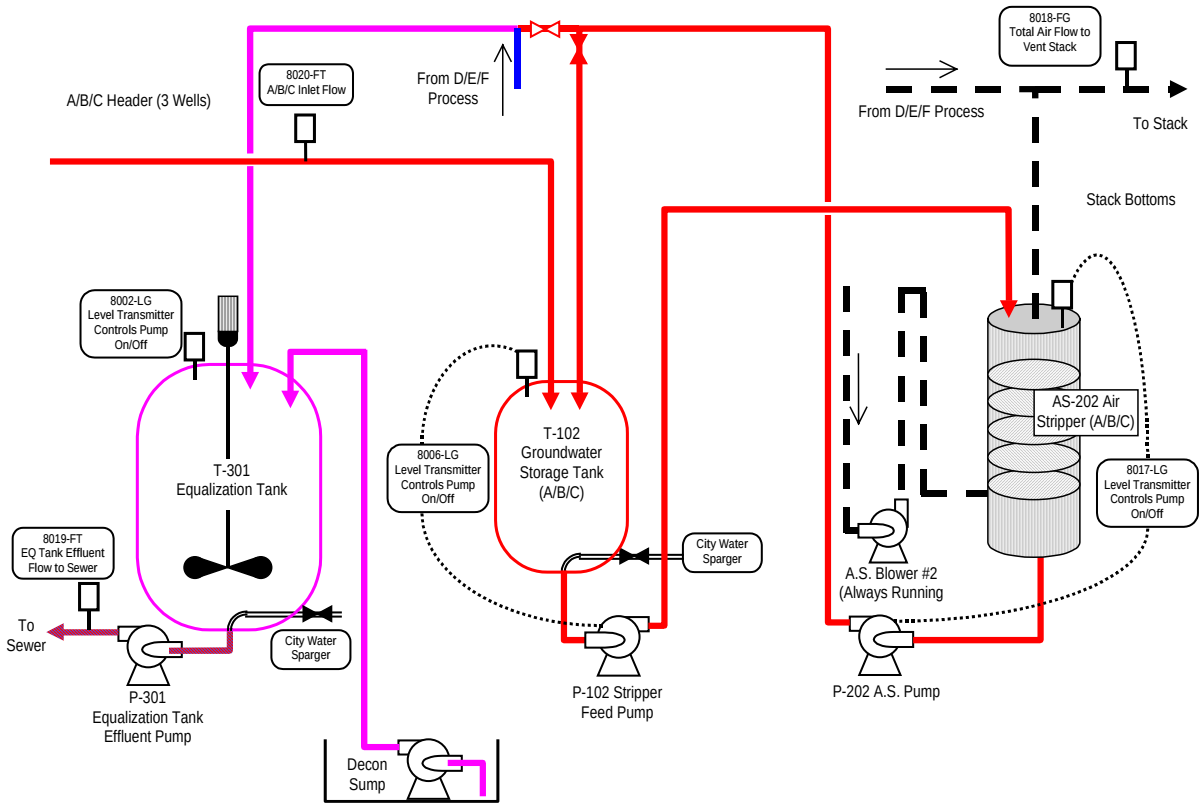
Minimum:
The minimum SOC may be an indication of problems with the Air Flow meter. Insufficient air flow to the Vent Stack could cause a regulatory permit violation.

DuPont Necco Park Operating Instruction Manual

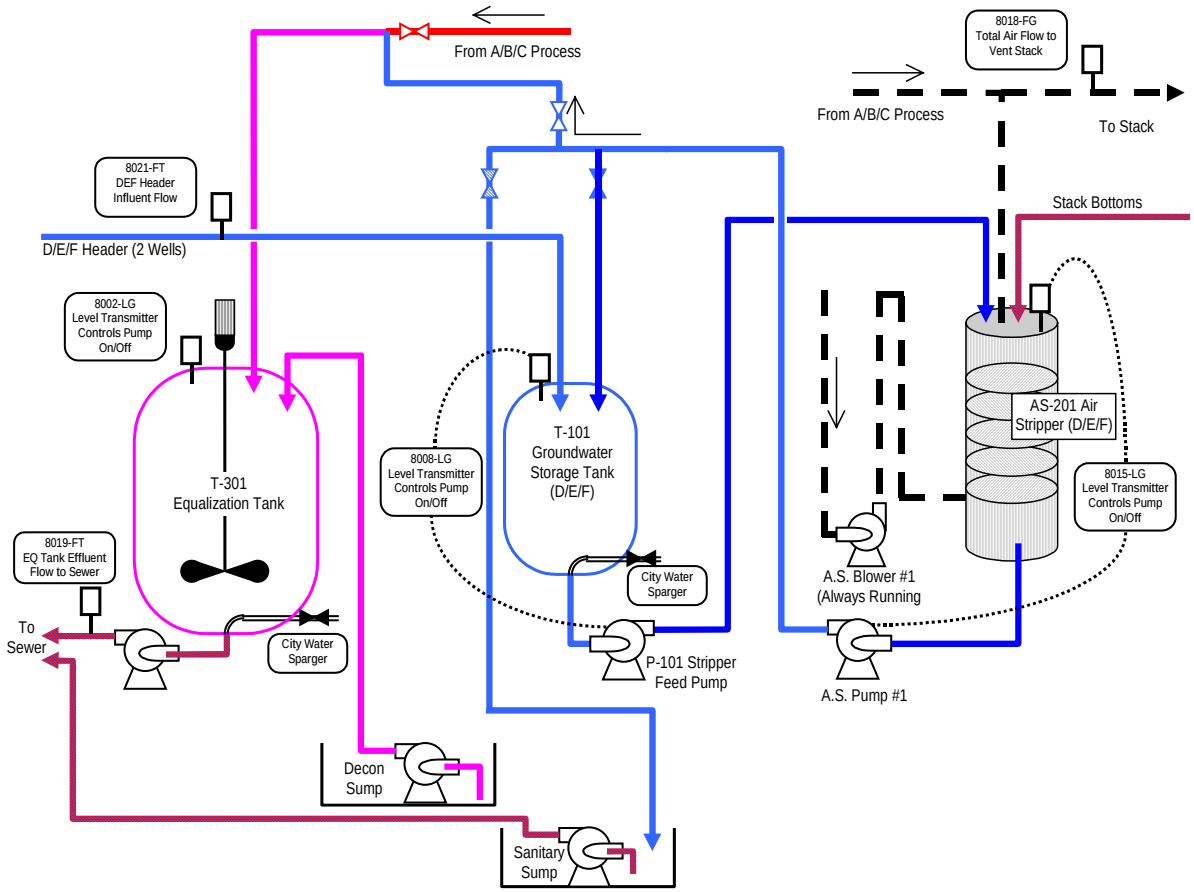
Sketches



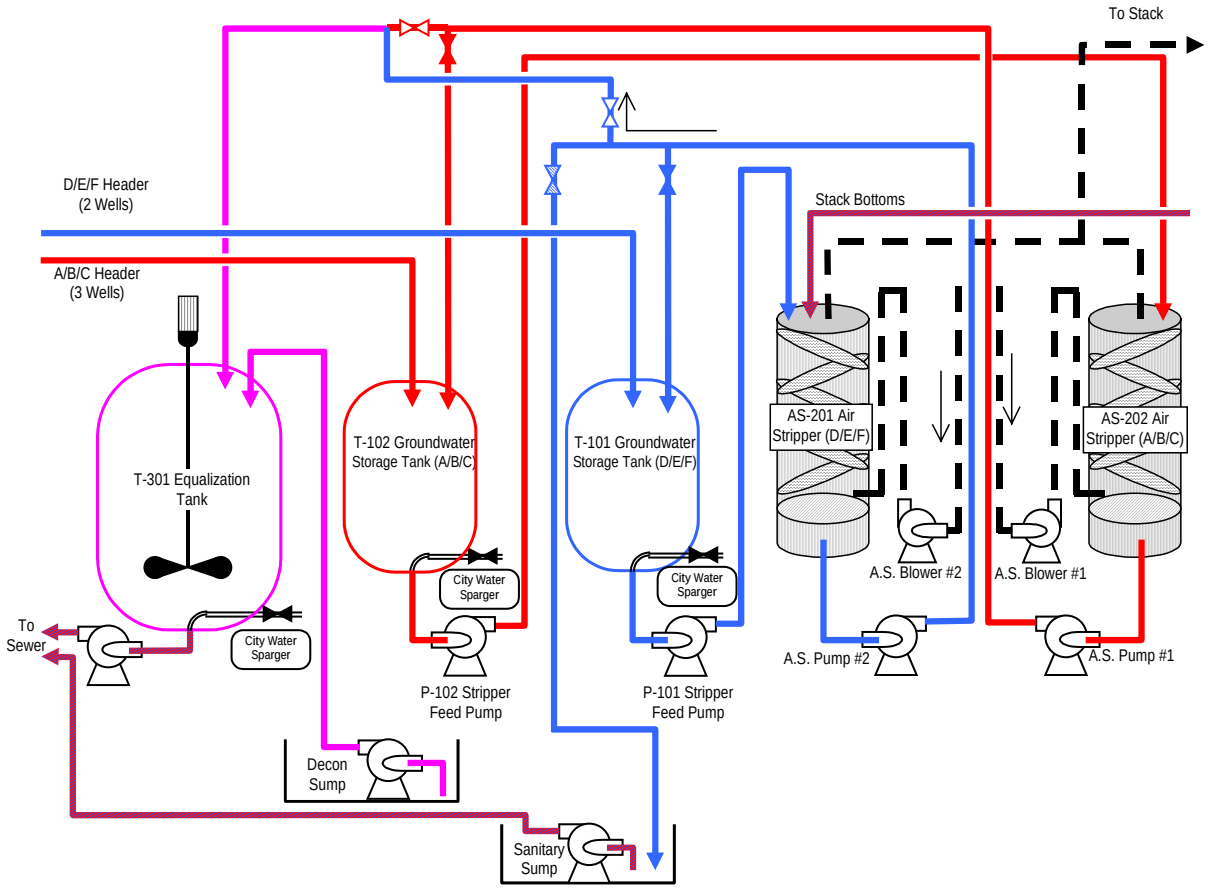
Sketch Title: **NECCO PARK WELL SYSTEM**	Sketch No.: **NPSK0001**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK GROUNDWATER TREATMENT**	Sketch No.: **NPSK0002**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK GROUNDWATER TREATMENT**	Sketch No.: **NPSK0003**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:



Sketch Title: **NECCO PARK GROUNDWATER TREATMENT**	Sketch No.: **NPSK0004**
Approved By: T. J. Pezzino	Date:
Authorized By:	Date:

APPENDIX D

DNAPL MONITORING AND RECOVERY PLAN FOR DUPONT NECCO PARK REMEDIAL PROGRAM NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD No. 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
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TABLES

1.0 INTRODUCTION

DuPont implemented a program to recover dense non-aqueous phase liquid (DNAPL) from wells at its Necco Park landfill in 1989. Monitoring for the presence of DNAPL in monitoring wells began in 1984.

This DNAPL Monitoring and Recovery Plan establishes the procedures and requirements for DNAPL handling and accumulation at Necco Park for compliance with state and federal regulations. All employees involved in the handling and storage operations will be required to read this plan and will be given specific instruction regarding its implementation.

1.1 Site Description

The Necco Park site is approximately 24 acres and is bordered on the north and east side by the BFI/Allied solid waste landfill and on the south by the CECOS secure hazardous waste landfill. The western edge of the site is bordered by an access road leading to BFI/Allied sanitary landfills located north of Necco Park.

Necco Park had been used for landfilling operations from the late 1930s until the landfill was closed in 1977. Disposed in the landfill were industrial waste, large quantities of fly ash, and building and miscellaneous dismantled waste (including segregated asbestos). Industrial waste consisted of materials from various DuPont Niagara Plant processes. These wastes included sodium salts and cell bath (barium, calcium, and sodium chlorides); contaminated discarded cell rubble; chloromethanes, chloroethanes, and adiponitrile process residuals and tars; polyvinyl acetate; alcohol process residues and off-grade process filters; cloths with filter aids; products; and polymer and calcium salts. Liquid wastes were generally disposed in shallow eastern lagoons in the southeast portion of the site, the remainder of the site functioned primarily as a solid waste landfill.

1.2 DNAPL Characterization

During the environmental investigations at Necco Park, DNAPL has been observed in bottom samples from some groundwater monitoring wells. The majority of the wells that contained DNAPL are located on the landfill and a small number of wells directly south of the landfill.

In May 1987, DNAPL samples were obtained from eight Necco Park monitoring wells by Woodward-Clyde Consultants (WCC) and submitted for chemical analysis. Results indicated that the DNAPL is composed primarily of hexachlorobutadiene (47 to 85 percent), hexachloroethane (4.4 to 13.8 percent), and hexachlorobenzene (1.9 to 2.8 percent). In addition, carbon tetrachloride, chloroform, tetrachloroethylene, 1,1,2,2-tetrachloroethane, and trichloroethylene were detected in at least one sample at substantial levels (greater than 1 percent).

PCB-1248 has been identified in a single sample of DNAPL taken from existing extraction Well RW-2 in 1987 and as an estimated positive result in very few surrounding monitoring wells. Since there are no records of disposal of PCB-containing material at

Necco Park, confirmation sampling was performed. DuPont re-sampled DNAPL from all wells currently scheduled for involvement in this program in 1999 and no PCBs were detected in the samples.

2.0 DNAPL MONITORING AND RECOVERY PROGRAM

The current DNAPL program utilizes the wells included on Table 1 for DNAPL observations. The wells consist of monitoring and pumping wells maintained by DuPont and monitoring wells maintained by BFI/Allied Waste. As indicated on Table 1, DNAPL observations are conducted monthly at most locations and semi-annually at a small subset of wells. The observation recovery program was modified based on the findings of the pre-design investigation for overburden and bedrock hydraulic control. DNAPL observations are made by either a weighted cotton string or a well bottom sampler. Removal of DNAPL is performed, as much as is technically feasible, at one to two wells where DNAPL is typically present. In general, DNAPL quantities greater than one to two-inches are recoverable.

As described in the Necco Park Long Term Groundwater Monitoring Plan (Appendix B), a comprehensive DNAPL survey will be completed in April 2005. Results of the DNAPL survey, to be conducted within one month of the new groundwater extraction system start-up will be used to develop a list of wells where long-term DNAPL monitoring will be performed.

DNAPL is recovered using dedicated Teflon® bladder pumps and tubing. The contractor is responsible for documenting the total volume of DNAPL evacuated from each well. DNAPL volume shall be expressed to the nearest one-half gallon. Recovered DNAPL quantities and source wells are documented in the Necco Park monthly progress reports that are provided to USEPA. DNAPL is currently pumped directly into a 30-gallon steel drum and will be transported to the RCRA storage area of the groundwater treatment building. An absorbent mat is used to protect the ground surface from any spillage during DNAPL recovery. A maximum quantity of 60 gallons of DNAPL is permitted in the RCRA storage area at any one time. The 30-gallon drums of DNAPL will be accumulated on site for a period not exceeding 90 days.

Following completion of the construction of the hydraulic controls, the drums will be stored in a 90-day RCRA containment pad located in the Groundwater Treatment Facility (GWTF). The new B/C zone extraction wells (RW-4, RW-5, and RW-10) are equipped with Teflon® bladder pumps and tubing for DNAPL recovery.

The remainder of this document presents the regulatory requirements pertaining to these activities and the methods DuPont will use to comply with these requirements.

3.0 REGULATORY REQUIREMENTS

The regulatory authority for this program is with the New York State Department of Environmental Conservation (NYSDEC). Specifically, the program must comply with 6 NYCRR Subpart 373-1 Hazardous Waste Treatment, Storage, and Disposal Requirements.

The program must also comply with the requirements of the Occupational Safety and Health Administration (OSHA), specifically 29 CFR 1910.

3.1 NYSDEC Requirements

Since DNAPL will be accumulated at Necco Park for less than 90 days, DuPont will qualify for the exemption described in 6 NYCRR 373-1.1(d)(1)(iii):

"*Hazardous waste generated on site will be stored in containers or tanks for a period not exceeding 90 days from the date of generation. Generation date becomes effective once a 30-gallon drum has been filled. The "90-day clock" starts ticking once a drum is filled. Storage areas that are exempt must comply with the following requirements:*

A. For storage in containers, the total amount of hazardous waste stored in exempt storage areas at one time is 8,800 gallons or less. Waste stored in areas exempted by subparagraphs (vi) and (xiv) of this paragraph is excluded from this volume.

B. For storage in tanks, the total volume of hazardous waste stored in tanks in exempt storage areas is 20,000 gallons or less. Waste stored in areas exempted by subparagraphs (vi) and (xii) of this paragraph is excluded from this volume.

C. The following requirements are met:

1. The waste is placed either in containers that are managed in accordance with Section 373-3.9 or in tanks that are managed in accordance with Section 373-3.10.

2. The date on which each period of accumulation begins is clearly marked and visible for inspection on each container.

3. A label or sign stating "Hazardous Waste" must identify all areas, tanks, and containers used to accumulate hazardous waste.

4. Each container is properly labeled and marked according to 6 NYCRR paragraphs 372.2(a)(5) and 372.2(a)(6).

5. *The generator complies with the requirements for Personnel Training in Section 373-3.2, Preparedness and Prevention in Section 373-3.3, and Contingency Plans and Emergency Procedures in Section 373-3.4."*

3.2 TSCA Requirements for PCBs

There has been a detection of polychlorinated biphenyl (PCB) compounds in a single DNAPL sample taken from existing extraction well RW-2. DuPont re-sampled DNAPL from all wells currently scheduled for involvement in the DNAPL recovery program in 1999 and no PCBs were detected in the samples. If PCBs are detected in future analysis of DNAPL recovered from program wells, the Federal Toxic Substances Control Act (TSCA), 40 CFR Part 761, would be applicable for storage and disposal of DNAPL.

The TSCA requirements for PCBs will apply to the Necco Park DNAPL recovery program if PCBs are found to be present in DNAPL at concentrations of 50 ppm or higher. The TSCA regulations (40 CFR 761.2) state that PCBs at concentrations of 50 ppm or greater may be processed for disposal in accordance with 40 CFR 761.60. The TSCA regulations that may be applicable to the Necco Park DNAPL recovery program (depending on analytical results) require:

1. *"Storage facilities meeting the following criteria (40 CFR 761.65):*
   - ❑ *Adequate roof and walls to prevent rain water from reaching the stored PCBs and PCB items.*
   - ❑ *An adequate floor that has continuous curbing with a minimum six-inch high curb. The floor and curbing must provide a containment volume equal to at least two times the internal volume of the largest PCB article or PCB container stored therein or 25 percent of the total internal volume of all PCB articles or PCB containers stored therein, whichever is greater.*
   - ❑ *No drain valves, floor drains, expansion joints, sewer lines, or other openings that would permit liquids to flow from the curbed areas.*
   - ❑ *Floors and curbing constructed of continuous smooth and impervious materials, such as Portland cement, concrete, or steel, to prevent or minimize penetration of PCBs.*
   - ❑ *Not located at a site that is below the 100-year flood water elevation.*

   The 90-Day RCRA facility located in the new GWTF building meets the storage facility TSCA criteria.

2. *PCB Spill Cleanup Policy (40 CFR 761.125) including provisions for:*
   - ❑ *Reporting of spills*
   - ❑ *Disposal of cleanup debris and materials*
   - ❑ *Determination of spill boundaries*
   - ❑ *Requirements for cleanup*
   - ❑ *Requirements for post-cleanup sampling*

3. *Records and Monitoring Requirements. The owner of a PCB storage facility must prepare and maintain a document that includes:*

   - ❑ *For the previous calendar year, the dates of receipt for storage and the dates of transfer to the off-site disposal facility.*
   - ❑ *A summary of the total weight in kilograms of PCBs handled at the facility.*
   - ❑ *The total number of PCB articles or PCB equipment not in PCB containers received during the calendar year or transferred for disposal."*

The document must be retained on site for at least five years after the facility is no longer operational.

3.3 OSHA Requirements

A health and safety plan (HASP) has been prepared for the Necco Park site in accordance with OSHA 1910.120 requirements. The HASP describes procedures to ensure that activities associated with the DNAPL program are conducted in a safe manner and addresses the following OSHA requirements:

- ❑ Hazard communication
- ❑ Medical surveillance
- ❑ Health and safety programs
- ❑ Air monitoring
- ❑ Decontamination
- ❑ Personnel training

All personnel working on this project are required to read the plan (as submitted in the Health and Safety Plan) and sign a compliance agreement. Contract employees must also adhere to the Health and Safety Plan included in the contract.

As described in the HASP, monitoring for DNAPL will be conducted in Level C PPE, DNAPL removal will be conducted in Level B PPE.

4.0 DNAPL MANAGEMENT PLAN

4.1 Container Management

DNAPL will be stored in 30-gallon UN specification steel drums. The drums will be new and inspected prior to use. The drums will be closed at all times during storage or transport except when DNAPL is added or removed. The drums will be stored in a 90-day RCRA containment area located in the GWTF. The new containment area has the capacity for eight drums.

4.2 Hazardous Waste 90-Day Accumulation Area

The 90-Day Accumulation Area within the groundwater treatment building consists of a recessed concrete pad overlain with metal grating. The storage area is located in the southwest corner of the groundwater treatment building. Visible weatherproof signs are posted that identify the area as a "Hazardous Waste 90-Day Accumulation Area." There is sufficient access around the containment area to allow movement by workers and equipment.

The 90-Day Accumulation Area will be inspected weekly by the field project coordinator for leaking or damaged containers and deterioration of the pad or metal grating. Contractors are responsible for notifying the Field Project Coordinator if a drum is found to be deteriorating. The Field Project Coordinator will ensure that the DNAPL drum is immediately transferred to a secure container.

The Field Project Coordinator is responsible for arranging for transport and off-site disposal as soon as a 30-gallon drum is filled in the 90-day area. Transport from the 90-Day Accumulation Area to the off-site RCRA or TSCA-approved facility will be in accordance with U.S. Department of Transportation (D.O.T.) regulations.

4.3 Container Labeling and Marking

All DNAPL drums are labeled and marked as described below. Some of the information required on the labels may be obtained from the waste characterization form (WCF) for DNAPL, which is included in the Waste Management Plan. Labeling requirements are as follows:

1. Drums are to be stenciled with:
   - ❑ The DuPont NF code, NF-86 (NF-86P in the event DNAPL contains PCBs)
   - ❑ The EPA waste number
   - ❑ "Necco Park organic phase leachate"

2. A hazardous waste sticker must be affixed with the following information:

   Address: 56th Street and Pine Avenue, Niagara Falls, NY 14303
   D.O.T. Shipping Name: (see Section VII on WCF)
   NA/UN Number: (see Section VII on WCF)
   EPA/State Waste Number: (see Section I on WCF)
   Accumulation Start Date: The date the drum is full or put in storage

3. Label - Affix D.O.T. label as required by Section VII on the WCF. An "ORM-E" on the hazardous waste sticker is required.

4. A Material Safety Data Sheet for DNAPL will be attached to the manifests provided with all shipments of waste off-site.

4.4 Preparedness and Prevention

The Necco Park DNAPL recovery program will be conducted in a manner designed to minimize the possibility of spillage of DNAPL and will be conducted in accordance with the Emergency Action and Contingency Plan. This plan is designed to minimize hazards to human health or the environment from fires, explosions, tornado's, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, surface or groundwater. In addition, the plan will outline facility specific emergency procedures needed for medical emergencies and/or natural disasters.

TABLES

TABLE 1
DNAPL Observation Locations & Monitoring Schedule

Wells Monitored Monthly	Wells Monitored Semi-Annually
RW-1	131A
RW-2	139A
RW-4*	139C
RW-5*	CECOS52SR
RW-6*	CECOS18SR
RW-7*	CECOS-53
D-23	
123A	
129A	
129C	
160B*	
160C*	
161B*	
161C*	
162C*	
167A*	
167B*	
168B*	
168C*	
169B*	
170B*	
171B*	
172B*	

*Well added to the program based on PDI results.

Table 2
Highest Chemical Concentrations Detected in DNAPL at Necco Park*

Chemical	Concentration (ppm)
Hexachlorobenzene	28,200
Hexachloroethane	136,000
Carbon tetrachloride	61,500
Tetrachloroethylene	35,300
Hexachlorobutadiene	854,000
1,1,2,2-Tetrachloroethane	49,200
Trichloroethylene	54,600

*Source: Analytical report to E.I. duPont de Nemours, "Analysis of Necco Park DNAPL, May 1987," Environmental Testing Certification, Edison, New Jersey

APPENDIX E
SITE MANAGEMENT PLAN
FOR DUPONT NECCO PARK
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URS Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

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1.0 INTRODUCTION

This Site Management Plan (SMP) has been prepared in accordance with the Necco Park Statement of Work (SOW). The SMP establishes the provisions for access, security, contingency procedures, management responsibilities, and waste disposal to be taken by DuPont during the operations and maintenance phase of the remedial actions at the Necco Park site. Pollution control and mitigation provisions and waste management procedures required for O&M are also described in this plan and the site specific Waste Management Plan (O&M Plan – Appendix I) and Emergency Action and Contingency Plan (O&M Plan – Appendix J).

2.0 SITE ACCESS AND SECURITY

The existing site access roads will be used during the O&M phase of the project. Access to the Necco Park site is through the BFI/Allied entrance as shown in Figure 1. Subcontractors, equipment vendors, regulatory personnel, and site visitors will also sign in at the groundwater treatment building located at the Necco Park site.

At a minimum, existing site security measures will be maintained during the O&M phase of the project. The scale house gate, manned by the adjacent property owner, BFI/Allied, controls access to the site. DuPont has a Master Service Agreement with BFI/Allied to provide these services. The BFI/Allied security personnel will be advised of potential deliveries or visitors for the Necco Park site. BFI/Allied will stop vehicles before entering the site to assure they are authorized to enter the premises. Authorized personnel will be directed to report and sign in at the Necco Park groundwater treatment facility.

The groundwater treatment building and other supporting facilities will be secured when operating personnel are not present on site. In addition, the gate leading to the Necco Park site will be locked during off-hours. As part of the construction of the hydraulic controls, additional lighting was installed.

Any theft, vandalism, or other site security issue will be reported immediately to an on-site URS representative. Site security during working and non-work hours (evenings, weekends, holidays, etc.) will be maintained through the security measures in place at the BFI/Allied site entrance. BFI/Allied personnel are stationed at the site entrance at all times. BFI/Allied will contact Gerald Shepard of URSD if any security issues arise that would impact the Necco Park site during non-working hours. Mr. Shepard is the Operations Technician for the O&M project. Contact information for Mr. Shepard is included in Table 1.

3.0 EMERGENCY ACTION AND CONTINGENCY PLAN

DuPont has developed an Emergency Action and Contingency Plan for the site in accordance with RCRA regulations to address emergency response procedures (O&M Plan – Appendix J). DuPont has also developed a Health and Safety Plan (HASP) for the O&M activities at the Necco Park site in accordance with OSHA 1910.120 requirements (O&M Plan – Appendix H). The HASP addresses protection of health and safety for the public and on-site workers.

During O&M activities, the possibility of potential impacts to the surrounding community will be much lower than during construction activities. As such, the community air monitoring program required for the remedial design investigations and remedial actions will no longer be implemented. However, air monitoring will be conducted to establish the proper personal protective equipment (PPE) for O&M activities or as required by NYSDEC to demonstrate compliance with NYCRR air regulations.

Spill reporting for the site will be conducted in accordance with NYCRR regulations. Regulatory contacts are included in Table 1.

4.0 OPERATIONS AND MAINTENANCE (O&M) PROJECT TEAM

To assist in operations and maintenance (O&M) of the remedial actions, DuPont has contracted URS as the Project Manager (PM). The Remedial Action Contractor (RAC) for hydraulic control and groundwater treatment facility construction was selected in July 2004. Mark Cerrone, Inc. of Niagara Falls, New York has been awarded this phase of the RA construction. Construction of the hydraulic controls and groundwater treatment building was completed in April 2005. Because the landfill upgrade will not begin until 2005, a RAC for the landfill cap construction phase of the remedial work will be identified at a later date. An organizational chart of the O&M project team for the site is presented as Figure 2. Roles and responsibilities of the team members and agencies involved in the projects are described in the following sections. Contact information for key team members are provided in Table 1.

4.1 DuPont

Mr. Paul Mazierski will serve as Site Project Coordinator for the operations and maintenance of the hydraulic control system and landfill cap upgrade remedial actions. Mr. Mazierski will be the primary point of contact for DuPont in communications with the USEPA Remedial Project Manager.

Procurement of contractors to complete the remedial construction (including QA/QC testing) and equipment will be the responsibility of DuPont. URS will assist DuPont in establishing and implementing the contracts.

4.2 URS

Mr. Timothy J. Pezzino will serve as the Project Manager for the O&M phase of the project. The Project Manager will report directly to the Site Project Coordinator and is responsible for overall technical quality control and project oversight. The Project Manager is responsible for overall project implementation and has authority to commit resources necessary to meet project objectives and requirements. He has overall responsibility for ensuring that the project team meets USEPA objectives and DuPont quality standards.

Mr. Timothy Pezzino will also serve as Operations Manager and will be the point of contact for the O&M projects. Responsibilities of the Operations Manager include scheduling O&M activities, identifying resources, and budgeting. The Operation Manager will also interface directly with DuPont, agency representatives, utility companies, adjacent property owner, and subcontractors. The Operations Manager will assist DuPont in administrating the O&M contracts.

Mr. Daniel Sheldon will serve as the project geologist. The Project Geologist is responsible for developing and implementing the hydraulic control and chemical monitoring programs for the site.

Mr. Gerald Shepard will serve as the site Operations Supervisor. The Operations Supervisor is responsible for the day-to-day activities for the facility and will report directly to the Operations Manager. The Operations Supervisor will be responsible for performing or coordinating O&M activities and oversight of subcontractor field work.

Mr. Gerald Shepard will also serve as the lead groundwater treatment facility operator. The lead groundwater treatment facility operator will be responsible for operating the treatment facility and conducting maintenance and repair activities.

4.3 O&M Contractors

DuPont will hire other contractors to conduct operations and maintenance activities. Other service contractors may include grass cutting, snow removal, road maintenance/repair, sampling, analytical, electricians, or pipefitters. DuPont or URS personnel will supervise these contractors.

4.4 Regulatory Agencies

4.4.1 USEPA

The lead agency for the remedial projects is USEPA. Mr. Thomas Taccone is USEPA's Remedial Project Manager for the RD/RA work.

Earth Tech (formerly TAMS Consultants) will serve as USEPA contracted representative and will provide periodic oversight of the work. USEPA and Earth Tech will be kept abreast of O&M status and progress through monthly progress reports prepared by DuPont. The Project Manager for Earth Tech is Mr. James Kaczor.

4.4.2 NYSDEC

The NYSDEC will support USEPA in the remedial projects. Mr. Michael Hinton is the current NYSDEC representative for the project.

5.0 PERMITTING AND ACCESS AGREEMENTS

DuPont has obtained or will obtain permits or permit equivalents, and access agreements prior to operation and maintenance of the cap upgrade and hydraulic control system construction projects.

A portion of the cap and hydraulic control system construction were or will be conducted in Niagara Mohawk's right of way, located within both the Niagara Recycling (Allied/BFI) and DuPont properties. The work will be performed in accordance with the amendment to the March 26, 2004 Assent agreement between DuPont and Niagara Mohawk (amendment dated May 5, 2004), which includes compliance with the High Voltage Proximity Act. Work will also be performed within an easement with BFI/Allied as governed by and amendment to the Master Service Agreement between DuPont and BFI/Allied. Amendments to the Niagara Mohawk and BFI/Allied agreements will be made at a future date to allow for construction and operation of the landfill cap upgrade.

The permits or permit equivalents associated with operations and maintenance of hydraulic control and groundwater treatment systems include:

- Discharge permit from the Niagara Falls POTW (Wastewater Discharge Permit SIU# 64A) for discharge of treated groundwater (interim and final streams) and water related to system construction. The discharge permit is included as Attachment E-1.
- Approval of air emissions for the new groundwater treatment system by NYSDEC. The letters from DuPont describing the air emissions and the approval letter from NYSDEC are included as Attachment E-2.

The groundwater treatment facility will be operated in accordance with these permits or permit equivalents.

6.0 POLLUTION CONTROL AND MITIGATION

Measures will be taken during operations and maintenance to prevent off-site release of hazardous substances, pollutants, and contaminants. Existing plans prepared during remedial design and remedial actions that describe actions to prevent off-site migration of contaminants have been updated for O&M and include:

- Waste Management Plan (O&M Plan – Appendix I)
- Emergency Action and Contingency Plan (O&M Plan – Appendix J)
- DNAPL Monitoring & Recovery Plan (O&M Plan – Appendix D)
- Health and Safety Plan (O&M Plan – Appendix H) and task-specific addenda

As described in the Necco Park SOW, this section outlines preventive measures and processes to be employed during O&M and integrates protective measures described in the documents listed above. Because this plan is for O&M activities, the control measures described below will be implemented during construction activities during the O&M phase of the project.

6.1 Dust Control

The potential for off-site release of air-borne contaminants is much less during O&M activities as compared to construction activities. Any dust generated will be controlled by wetting roads and covering excavation spoils.

If warranted for intrusive activities, site perimeter monitoring will be conducted to comply with NYSDEC's Community Air Monitoring Plan (CAMP). Management of unacceptable dust conditions during non-working hours (weekends and holidays) will be conducted through communications with BFI/Allied personnel and a DuPont representative. The contact person for DuPont will be Gerald Shepard of URSD. Mr. Shepard and the O&M contractors will take appropriate measures to control dust emissions as needed. Contact information for Mr. Shepard is included in Table 1.

6.2 Vapor Emission Control

In accordance with the HASP, real-time monitoring for VOC's will be conducted during intrusive activities. If the action level for VOC's (5 ppm) is exceeded, work will be stopped to assess conditions. VOC emissions may be suppressed by placing fill material or suppressive foam on the VOC source. PPE will be upgraded if VOC's are still above action levels after corrective measures have been undertaken. Exceedance of the action level may also invoke site perimeter monitoring as required by NYSDEC CAMP.

6.3 Site Control

Consistent with procedures described in the HASP, control measures at work areas (excavations) will be implemented to prevent potential contaminated material from leaving the work area. This will be accomplished by establishment of three distinct work

zones: Support Zone, Contamination Reduction Zone, and Exclusion Zone. Decontamination of equipment and removal of used PPE will be done in the Contamination Reduction Zone, thus controlling migration of potentially contaminated material outside work zones.

6.4 Spill Response

The procedures described in the Necco Park WMP and the Emergency Action and Contingency Plan address management of non-hazardous and hazardous substances during O&M activities. The following materials may be used or generated during O&M and have the potential for spills:

- Petroleum products (gasoline, diesel fuel, hydraulic fluids)
- Groundwater
- Hydrochloric Acid
- DNAPL

The O&M contractors will perform work in a manner that prevents contamination of soil, surface water, groundwater, atmosphere, structures, and equipment.

The potential for groundwater spills has been reduced by providing secondary containment piping and secondary containment within the groundwater treatment facility. In the event a groundwater spills on soil, the impacted soil may be excavated and consolidated under the cap or disposed off-site.

Hydrochloric (HCl) acid is used to prevent solids build-up in the extraction piping from the B/C-zone recovery wells (RW-4, RW-5, and RW-10). A 2,000-gallon tank is used for storage of the HCl acid. In accordance with the New York State chemical bulk storage regulations (CBS), the tank is provided with secondary containment (double wall FRP tank), overflow prevention devices, and overflow alarms. The tank is located on an epoxy coated concrete containment pad. The acid distribution piping to each well is Teflon lined carbon steel above-ground piping. This piping will be visually inspected as part of the daily O&M activities.

In the event of an acid spill, DuPont has an existing emergency response contract with National Vacuum. The phone number for the response contractor is provided in Table 1. The emergency response contractor has appropriate resources, materials, and equipment to respond to chemical acid spills. In addition, the site has a spill response kit available to manage small spills. In the event of HCL spills on soil, the impacted soil may be neutralized in-place or excavated for on-site consolidation under the cap or disposal off-site.

Spill reporting for the site will be conducted in accordance with NYCRR regulations. Regulatory contact information is provided in Table 1.

7.0 REMEDIAL WASTE MANAGEMENT

The O&M activities will take place on a site where hazardous materials exist, therefore waste management plans prepared during the remedial design and construction phase of the project have been updated for O&M activities. The procedures are described in the O&M Waste Management Plan (O&M Plan – Appendix I).

The only off-site disposal of waste generated from routine O&M activities is DNAPL. DuPont has been collecting DNAPL for off-site disposal since the 1970's. Procedures for collecting, storing, and shipping DNAPL are described in the DNAPL Monitoring and Recovery Plan (O&M Plan – Appendix D).

During maintenance of the cap, hazardous materials may be encountered. Consistent with waste management procedures followed during the pre-design investigations and construction, material uncovered will be consolidated under the geomembrane cap.

As part of the landfill cap upgrade, existing leachate lines and other structures and materials associated with the existing groundwater extraction system, will be decontaminated and left on site for ultimate placement under the final cap.

Prior to demobilization, all equipment that came in contact with potentially contaminated material will be decontaminated using a high temperature/high pressure cleaner. Decontamination of equipment will be conducted on a pad that has a sump for collection of decontamination water. Solids that accumulate in the pad will be collected and managed appropriately. Decontamination water will be disposed of at the groundwater treatment facility.

8.0 REFERENCES

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New York State Department of Environmental Conservation approval letter, by Lawrence Stiller to Paul Mazierski. May 27, 2004.

U.S. Environmental Protection Agency (USEPA). 1998. E.I DuPont Necco Park Site; Administrative Order, Index No. II CERCLA-98-0215

_____. 1998a. Statement of Work, DuPont, Necco Park Site, Niagara Falls, New York

TABLES

TABLE 1 - CONTACT INFORMATION
NECCO PARK – OPERATIONS & MAINTENANCE

DUPONT/CRG PERSONNEL

Niagara Plant		Phone Number	Alternate Number	Fax	Email
Gary Britt	PM & Safety Officer	278-5447	570-5720 (cell)	408-9458	Gary.e.britt@usa.dupont.com
Paul Mazierski	Project Director	278-5496		408-9469	Paul.f.mazierski@usa.dupont.com
Tim Pezzino	Operations Manager	278-5239	480-5555 (cell)	408-9462	Timothy.j.pezzino@usa.dupont.com
Dan Sheldon	Project Geologist	278-5170	570-1180 (cell)	278-5238	Daniel.m.sheldon@usa.dupont.com
Don Gwizdowski	Project Staff/Safety	278-5321	570-5726 (cell)	408-9436	Donald.j.gwizdowski@usa.dupont.com
Mary Cedeno	Admin. Assistant	278-5447		408-9475	Mary.a.cedeno@usa.dupont.com
Jerry Shepard	Operations Technician	278-5406	536-1269 (cell)	408-9435	Gerald.m.shepard@usa.dupont.com
Dawn Walczak	Project Scientist	278-5569	570-5672 (cell)	524-6305	Dawn.m.walczak@usa.dupont.com
Remote					
Joe McCarthy	Project Manager	302-992-6904		302 892-7637	Joseph.m.mccarthy@usa.dupont.com
Kathy Sova	H & S Manager	973-492-7708			Kathryn.a.sova@usa.dupont.com
Regulatory Offices					
Thomas Taccone – USEPA					taccone.tom@epamail.epa.gov
Mike Hinton - NYSDEC		851-7220			mjhinton@gw.dec.state.ny.us
James Kaczor (EPA Consultant – Earthtech)		716.836.4506 ext 11			james.kaczor@earthtech.com
Tami Raby (EPA Consultant - Earthtech)		716-836-4506	716-870-3446		Tamara.Raby@earthtech.com
Emergency Contact					
Charlie Litton - National Vacuum		773-1167			
Contract Personnel					
	Environmental Standards				
	Gaines Electric				
	J.W. Danforth				
	STL				
	Mark Cerrone, Inc.				
	Chopra Lee				

FIGURES

DUPONT

Corporate Remediation Group

An Alliance between DuPont and URS Diamond

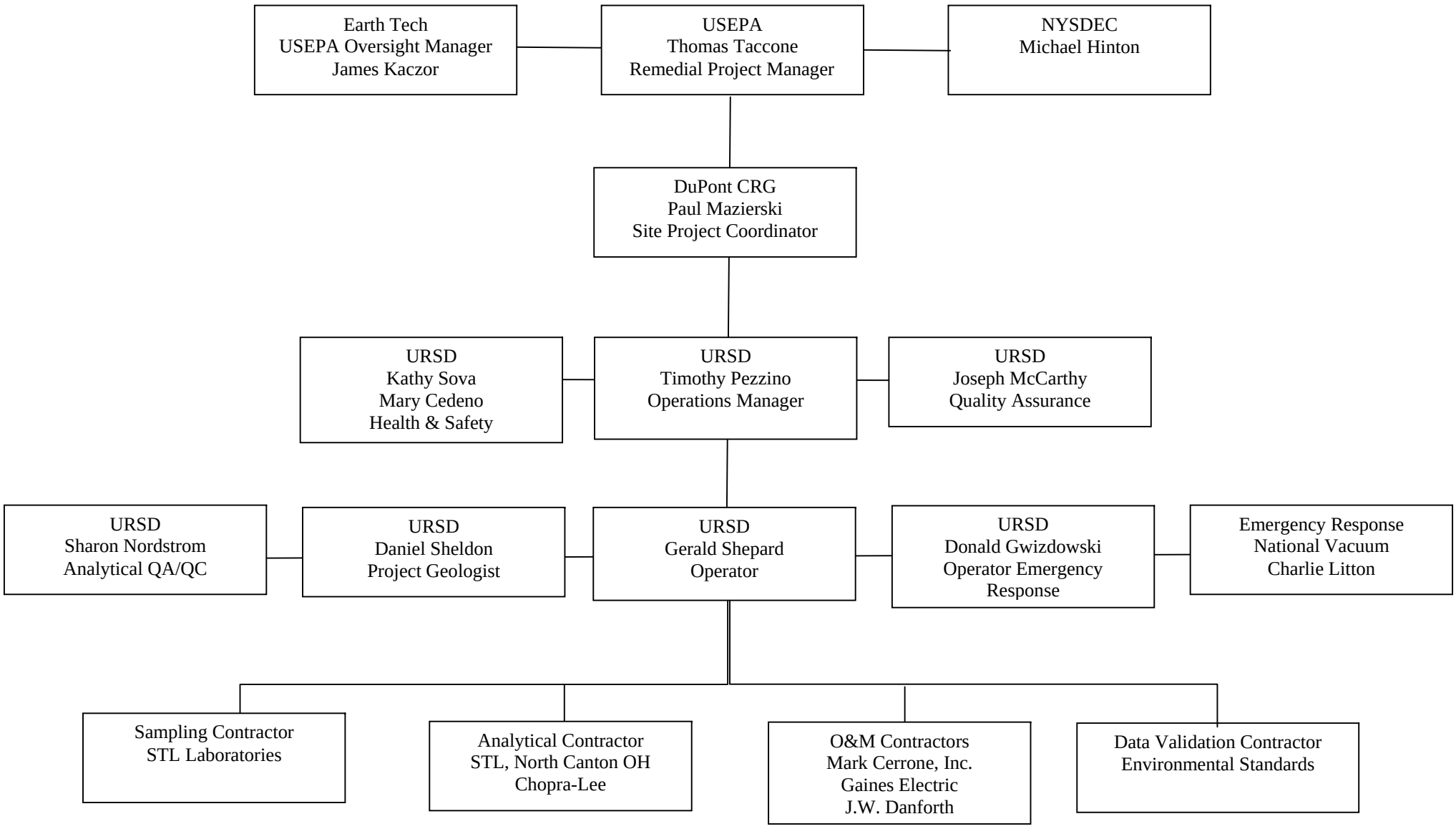
Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1

Figure 2
Remedial Action Organizational Chart
DuPont Necco Park Monitoring and O & M
Groundwater Pumping and Treatment System



ATTACHMENTS

NIAGARA FALLS WATER BOARD

RECEIVED 3/7/05

March 4, 2005

Mr. Paul Mazierski
Principal – Project Leader
DuPont Corporate Remedial Group
Necco Park Groundwater Treatment Facility
DuPont Niagara Plant, Bldg 38
Buffalo Avenue & 26th Street
Niagara Falls NY 14302

Dear Mr. Mazierski:

The Niagara Falls Water Board has received and reviewed your 1st quarter Self Monitoring Report and offers the following comments.

The annual average as defined in the SIU permit is the calculated average of the data collected from the last four (4) monitoring quarters. The SIU permit was established effective May 1st 2004. Consequently, insufficient data has been collected to calculate an annual average as defined in the permit. Therefore, no violations of the permitted annual average limits occurred.

The result for barium was reported as total barium. The intent of the permit was to establish a limit for soluable barium so that the results could be compared to NYS ambient water quality standards. The insoluable portion of barium (barium sulfate) was assumed to be captured as suspended solids. This was incorporated in the Total Suspended Solids limitations in the permit. The Niagara Falls Water Board erroneously required monitoring for t. barium (page 11, Section G). The permit will be modified to read soluable barium in Sections F and G.

In addition, your letter dated 2/25/05 discusses anticipated problems meeting existing permit limits for barium, zinc and 1,1,2-Trichloroethane. The current permit limits were established on limited data and based on assumptions regarding the removal efficiency of the proposed interim treatment system. The additional data collected since that time indicates some pollutant loads are higher than expected.

To resolve this issue so that adequate data is collected, the wastewater is properly treated and resources are not spent on unnecessary enforcement actions, the following limits will be modified temporarily until the final treatment system goes on line and steady state discharge is established:

New Limits	Annual Average	Daily Maximum
Soluable barium	10.0	12.0
Total zinc	0.1	0.4
1,1,2-Trichloroethane	0.75	0.95

A copy of the modified permit is attached. If you have any questions I may be contacted at 716-283-9770 ext. 106.

Sincerely,
NIAGARA FALLS WATER BOARD
WASTEWATER FACILITIES

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ: vr

Enc.

Cc: File – 64A

NIAGARA FALLS WATER BOARD
DEPARTMENT OF WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 64 DUPONT CORPORATE REMEDIAL GROUP – NECCO PARK GROUNDWATER TREATMENT FACILITY

In accordance with all terms and conditions of Niagara Falls Water Board Wastewater Regulations Part 1960 and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: DuPont Corporate Remedial Group – Necco Park Groundwater Treatment Facility

Located at: 5600 Niagara Falls Blvd. Niagara Falls, NY 14304

Classified by SIC No(s):

For the contribution of wastewater into the Niagara Falls Water Board Publicly-Owned Treatment Works (POTW).

Effective this 1st day of May 2004

To expire this1st day of May 2009
Permit modified 3/4/05

Richard R. Roll, P.E., DEE
Director of Technical and Regulatory Services

Signed this 4th day of March 2005

DISCHARGE IDENTIFICATION

OUTFALL	DESCRIPTION	LOCATION	RECEIVING
MS #1	Main Outfall	Packard Road	Construction water, interim and final pretreated landfill leachate.

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
A. Discharges to the Niagara Falls Water Board (NFWB) Sewer		
1. Identification of all discharges to the NFWB Sewer System on a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED
2. Identification of each contributing waste stream to each discharge to the NFWB Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED
3. Elimination of all uncontaminated discharges to the NFWB Sewer System. All uncontaminated flows should be clearly identified on a current sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED
4. Establishment of a control manhole that is continuously and immediately accessible for each discharge to the NFWB Sewer System.	NONE	SUBMISSION RECEIVED
B. Wastewater Discharge Management Practices		
1. Identification of a responsible person(s) (day to day and in emergencies).	NONE	SUBMISSION RECEIVED

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:

C. Slug Control Plan**

Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the Niagara Falls Water Board will evaluate the permittee, a minimum of once every two years for the need for a "Slug Control Plan." If a plan is required by the Niagara Falls Water Board, then the plan will contain, at a minimum, the following elements:

a) Description of discharge practices, including non-routine batch discharges;
b) Description of stored chemicals;
c) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow-up written notification within five days;
d) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.

**This section applies to all pollutants limited by the Niagara Falls Water Board SPDES Permit and all prohibited wastewater discharges (See Section 1960.5 of the Niagara Falls Water Board - Wastewater Regulations).

D. General Wastewater Discharge Permit Conditions

1. Flow monitoring should be performed concurrently with any Wastewater Discharge Permit sampling and should be reported at the same time as analytical results. If it is not feasible to perform flow monitoring, an estimate of flow (method of estimated flow preapproved by the Niagara Falls Water Board) should be submitted with the analytical results.

2. All sampling for billing and pretreatment compliance purposes will be coordinated through the Niagara Falls Water Board Industrial Monitoring Coordinator.

3. All analysis must be performed by a State certified laboratory using analytical methods consistent with 40 CFR 136 and quality control provisions as required by the Niagara Falls Water Board Laboratory Technical Director. The permittee will report the results as directed in Section G of this permit. Results should be reported using the Method Detection Limit (MDL). Reporting results less than MDL will be indicated in the report by a less than sign (<) followed by the numeric MDL concentration reported by the laboratory. In these cases the pollutant load will be calculated and reported as zero (0). The MDL will be defined as the level at which the analytical procedure referenced is capable of determining with a 99% probability that the substance is present. The value is determined in reagent water. The precision at this level is +/- 100%.

4. An estimate of relative production levels for wastewater contributing processes at the time of any pretreatment compliance sampling will be submitted upon request of the Director of Niagara Falls Water Board-Wastewater Facilities.

5. All samples will be handled in accordance with EPA approved methods. Chain of Custody records will be submitted with all sampling results.

6. All conditions, standards and numeric limitations of the Niagara Falls Water Board Wastewater Regulations are hereby incorporated into this permit by reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said regulations constitutes a violation and is subject to enforcement actions(s) described in Section 1960.9 of said Regulations, and in the Niagara Falls Water Board Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide." Violators are subject to all applicable Civil and Criminal penalties. In the event of a violation, including slug discharges or spills, the Niagara Falls Water Board must be notified immediately by phone and confirmed by letter within five (5) working days.

   Any person adjudicated of violating any provision in the Niagara Falls Water Board Wastewater Regulations shall be assessed a fine in the amount of up to $10,000. This amount is available for each violation, and each day of a violation is a separate incident for which penalties may be sought.

6. The person violating any of the provisions of the Niagara Falls Water Board Wastewater Regulations will be liable for any expense, loss, or damage occasioned by reason of such violation. The expense, loss or damage will be taken to be to the extent determined by the Director.

   In addition, any person who knowingly makes any false statements; representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to the Niagara Falls Water Board Wastewater Regulations or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under the Niagara Falls Water Board Wastewater Regulations will, upon conviction be punished by a fine up to $5,000. Furthermore, the Niagara Falls Water Board may recover reasonable attorney's fees, court costs, court reporting fees, and other expenses of litigation by appropriate suit at law against the person found to have violated applicable laws, orders, rules and permits required by the Niagara Falls Water Board Wastewater Regulations.

7. In accordance with Federal Regulation CFR 40, Part 403.12(g), any exceedance of a numeric limitation noted by the SIU must be re-sampled, analyzed and resubmitted to the Niagara Falls Water Board - Wastewater Facilities within 30 days.

   Specifically, if any limit that is listed in Section F of this permit is exceeded, then the permittee will undertake a short term monitoring program for that pollutant. Samples will be collected identical to those required for routine monitoring purposes and will be collected on each of at least two (2) operating days and analyzed. Results will be reported in both concentration and mass, and will be submitted within 30 days of becoming aware of the exceedance.

8. Sampling frequency for any permitted compounds may be increased beyond the requirements set forth in Section F and G of this permit. If the permittee monitors (sample and analysis) more frequent than required under this permit, **all** results of this monitoring must be reported.

9. As noted in Section 1960.5g of the Niagara Falls Water Board Wastewater Regulations, "Personnel as designated by the Director will be permitted at any time for reasonable cause to enter upon all properties served by the Niagara Falls Water Board – Wastewater Facilities for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Regulations."

10. As noted in Section 1960.5c of the Niagara Falls Water Board Regulations, significant changes in discharge characteristics or volume must be reported immediately to the Niagara Falls Water Board – Wastewater Facilities.

11. As noted in Section 1960.6b of the Niagara Falls Water Board Regulations, samples required to be collected via a 24-hour composite sampler must be retained refrigerated for an additional 24 hour plus unrefrigerated an additional 48 hours (total 72 hours).

12. As noted in Section 1960.5d of the Niagara Falls Water Board Wastewater Regulations, all "SIU's will keep on file for a minimum of three (3) years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the Niagara Falls Water Board – Wastewater Facilities."

13. As noted in Section 1960.6g of the Niagara Falls Water Board Wastewater Regulations, "Permits are issued to a specific user for a specific monitoring station. A permit will not be reassigned or transferred without the approval of the Director which approval will not be unreasonably withheld. Any succeeding owner or user to which a permit has been transferred and approved will also comply with all the terms and conditions of the existing permit."

14. The Annual Average Limitation is equivalent to the specific SIU allocation, and will be defined as the permissible long-term average discharge of a particular pollutant. These limitations are listed in Section F of this permit. The computation of the Annual Average will be as follows; for each compound listed in Section G of this permit, the Annual Average will be the average of the present monitoring quarter and three previous quarters' data.

15. The Daily Maximum Limitation will be defined as the maximum allowable discharge on anyone day. The Daily Maximum Limitation will allow for periodic short term discharge fluctuations. These specific limitations are listed in Section F of this permit.

16. Enforcement of the Annual Average Limitation will be based on the reported average of the last four quarters data vs. the Annual Average Limited listed in Section F of this permit. Enforcement of the Daily Maximum Limitation will be based on individual analysis results vs. the Daily Maximum Limit listed in Section F of this permit. These results may be obtained from self- monitoring (Section G), Niagara Falls Water Board Verification, incident investigation or billing samples.

17. The Niagara Falls Water Board Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the Niagara Fall Water Board – Wastewater Facilities SPDES Permit. The limits defined in the procedure are values which are based on the quantity of substances discharged which can be easily related to the Treatment Plant's removal capacity.

    The pollutants listed in this procedure which are <u>not</u> specifically listed in Section F and G of this permit may be present in the permittee's wastewater discharge, but at levels which do not require specific permit limitations. Consequently, if any of the limits listed in this procedure, for pollutants <u>not</u> identified in Section F and G of this permit, are exceeded then the permittee will undertake a short-term, high intensity monitoring program for that pollutant. Samples identical to those required for routine monitoring purposes will be collected on each of at least three operating days and analyzed. Results will be expressed in terms of both concentration and mass, and will be submitted no later than the end of the third month following the month when the limit was first exceeded.

    If levels higher than the limit are confirmed, the permit may be reopened by the Niagara Falls Water Board for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

a) Determination of quantities of TSS and SOC at MS #1 shall be made at the Niagara Falls Water Board's expense and shall be based on five (5) representative 24-hour composite samples from Monitoring Station MS #1.

b) Quantity of flow shall be based on monthly flow reports submitted by the permittee.

c) Substances of Concern shall be based on the permittee's Quarterly Self-Monitoring Report results.

F. Discharge Limitations & Monitoring Requirements

During the Period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) will be limited and monitored by the permittee as specified below.

OUTFALL NUMBER/ EFFLUENT PARAMETER	DISCHARGE LIMITATIONS		UNITS	MINIMUM MONITORING REQUIREMENTS	
	ANNUAL AVERAGE	DAILY MAXIMUM		MEASUREMENT FREQUENCY	SAMPLE TYPE
Flow	0.087	0.125	MGD	Continuous	N/A
Total Suspended Solids	300	400	lbs/day	None	7
Soluable Organic Carbon	90	320	lbs/day	None	7
Total Phenols	0.5	1.0	lbs/day	1/Qtr	2
T. Chromium	0.01	0.02	lbs/day	1/Qtr	3
T. Nickel	0.05	0.40	lbs/day	1/Qtr	3
T. Zinc	0.10	0.40	lbs/day	1/Qtr	3
T. Cyanide	0.6	3.0	lbs/day	1/Qtr	2
Fluoride	0.30	1.0	lbs/day	1/Qtr	3
Soluable Barium	10.0	12.0	lbs/day	1/Qtr	3
Carbon Tetrachloride	0.25	0.6	lbs/day	1/Qtr	2
Chloroform	0.6	1.50	lbs/day	1/Qtr	2
1,1-Dichloroethylene	0.02	0.05	lbs/day	1/Qtr	2
1,2-Dichloroethylene	0.50	1.0	lbs/day	1/Qtr	2
1,1,2,2-Tetrachloroethane	1.6	2.50	lbs/day	1/Qtr	2
Tetrachloroethylene	0.40	1.0	lbs/day	1/Qtr	2
1,1,2-Trichloroethane	0.75	0.95	lbs/day	1/Qtr	2
Trichloroethylene	0.70	1.70	lbs/day	1/Qtr	2
Methylene Chloride	0.15	0.35	lbs/day	1/Qtr	2
Vinyl Chloride	0.10	0.20	lbs/day	1/Qtr	2
Hexachlorobutadiene	0.20	0.41	lbs/day	1/Qtr	3
Trichlorophenol	0.15	0.25	lbs/day	1/Qtr	3
Pentachlorophenol	2.0	3.0	lbs/day	1/Qtr	3
Hexachloroethane	0.015	0.15	lbs/day	1/Qtr	3
1,2-Dichloroethane	0.03	0.06	lbs/day	1/Qtr	3
4-Methyl phenol	0.054	0.08	lbs/day	1/Qtr	3

F. DISCHARGE LIMITATIONS & MONITORING REQUIREMENTS CONTINUED

SAMPLE TYPE FOOTNOTES

(1) Each sample will consist of four (4) grabs collected spaced throughout the **batch** discharge, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.

(2) Each sample will consist of four (4) grabs collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. The four (4) grabs will be **composited in the laboratory** and analyzed as one sample.

(3) Each sample will consist of a 24-hour, **flow proportioned** composite sample collected from the monitoring point.

(4) Flow will be monitored continuously with the use of a water meter or another acceptable flow metering device.

(5) Each sample will consist of a 24-hour, **time proportioned** composite sample collected from the monitoring point.

(6) Reserved

(7) Same as (3), however, five (5) samples will be collected per quarter from the monitoring point and analyzed by and at the Niagara Falls Water Board expense.

(8) Four (4) grab samples will be collected spaced over the 24-hour period, such that they are representative of the effluent being discharged pursuant to 40CFR 403.12.b5iii. Each grab will be **analyzed and reported separately**.

(9) A grab sample is defined as an aliquot collected over a period of not more than 15 minutes.

G. Discharge Monitoring Reporting Requirements

During the period beginning the effective date of this permit and lasting until its expiration date, discharge monitoring results will be summarized and reported by the permittee; Monthly - 14 days after monitoring period, Quarterly - by the last day of the monitoring period = February 28, May 31, August 31, November 30. Semiannual reports will be submitted on the last day of the monitoring period = February 28, August 31. The annual average for each parameter listed in Section F, will be computed and reported quarterly. The individual sample analysis for present quarter will also be reported quarterly unless directed otherwise in this permit.

OUTFALL NO	PARAMETER	REPORTING FREQUENCY
MS #1	T. Phenols	Quarterly
MS #1	T. Chromium	Quarterly
MS #1	T. Nickel	Quarterly
MS #1	T. Zinc	Quarterly
MS #1	T. Cyanide	Quarterly
MS #1	Fluoride	Quarterly
MS #1	Soluable Barium	Quarterly
MS #1	Carbon Tetrachloride	Quarterly
MS #1	Chloroform	Quarterly
MS #1	1,1 and 1,2-Dichloroethylene	Quarterly
MS #1	1,1,2,2-Tetrachloroethane	Quarterly
MS #1	Tetrachloroethylene	Quarterly
MS #1	Methylene Chloride	Quarterly
MS #1	Vinyl Chloride	Quarterly
MS #1	Hexachlorobutadiene	Quarterly
MS #1	Trichlorophenol	Quarterly
MS #1	Pentachlorophenol	Quarterly
MS #1	Hexachloroethane	Quarterly
MS #1	1,2-Dichloroethane	Quarterly
MS #1	4-Methyl phenol	Quarterly
MS #1	Flow	Monthly

H. Comments/Revisions

Effective 3-4-05 permit limits for zinc, barium, trichloroethane modified to reflect current discharge status. Monitoring requirement t. barium corrected to read soluable barium.

Attachment E-2

NYSDEC Correspondence

New York State Department of Environmental Conservation
Division of Air Resources, Region 9
270 Michigan Avenue, Buffalo, New York, 14203-2999
Phone: (716) 851-7130 • **FAX:** (716) 851-7134
Website: www.dec.state.ny.us

Erin M. Crotty
Commissioner

May 27, 2004

RECEIVED 6/1/04

Mr. Paul F. Mazierski
E. I. DuPont
Dupont Corporate Remediation Group
Buffalo Avenue & 26th Street
Building 38/ 2nd floor
Niagara Falls, NY 14302

Dear Mr. Mazierski:

NEECO PARK GROUNDWATER TREATMENT SYSTEM

The New York State Department of Environmental Conservation, Region 9 office, Division of Air Resources, has received and reviewed correspondence dated 11/4/03 and 2/27/04 concerning the Necco Park Groundwater Treatment Facility. Approval is hereby given for both the interim (air stripping with cat-ox unit) and permanent (air stripping) treatment systems as discussed in the above referenced correspondences. Once the permanent treatment system is installed, a final approval for the operation and maintenance plans for the system will be required by the Department.

Very truly yours,

Lawrence Stiller, P.E.

Lawrence Stiller P.E.
Environmental Engineer II

LS/ed

cc: Mr. Michael Hinton, NYSDEC
Mr. Larry Sitzman P.E., NYSDEC, Regional Air Pollution Control Engineer

DuPont Corporate Remediation Group
Buffalo Avenue & 26th Street
Building 38 2nd Floor
Niagara Falls, NY 14302
(716) 278-5100

January 17, 2005

Mr. Larry Stiller
NYSDEC Region 9
270 Michigan Avenue
Buffalo, NY 14203-2999

Re: Air Emissions Compliance Monitoring for the Permanent Necco Park Groundwater Treatment Facility (GWTF)

Dear Mr. Stiller:

Per our discussion last week, enclosed is the main text and two tables for the Necco Park Initial Testing Program (ITP) Plan. USEPA and NYSDEC comments have been received on the ITP and it is scheduled for final submission on 1/21/05.

In your May 27, 2004 letter approving air emission conditions for both the interim treatment system (air stripping with catox) and the permanent Groundwater Treatment Facility (air stripping with discharge to 82' stack) you stipulated that final approval was also necessary for the permanent system operations and maintenance plans. There are two documents which will address air emission compliance monitoring for the Necco Groundwater Treatment Facility (GWTF): 1) the attached Initial Testing Plan and 2) a Sampling and Analysis Plan (SAMP) as part of a site Operations and Maintenance (O&M) Plan. The O&M Plan is currently scheduled to be submitted for agency review by the end of January 2005. You will be included on the O&M Plan distribution list for review. Since Mike Hinton will also be reviewing the O&M Plan, I would encourage all comments you may have to be coordinated with Mike.

With respect to air compliance monitoring, the ITP Plan covers the period of time during GWTF equipment functionality testing, system operability testing, and continuous operations until the O&M Plan is approved. GWTF equipment functionality testing is scheduled to begin in early February. Continuous GWTF operations are currently scheduled for the first week of March.

As indicated during our discussion last week, a mass balance approach is utilized for air compliance monitoring in the ITP as well as the draft SAMP to be submitted later this month. The most relevant sections of the ITP regarding aqueous sample collection (locations, frequencies, analysis parameters) for air compliance are Section 2.2, Section 2.3 and the two attached tables. The plan includes collection of aqueous samples from the two influent tanks, the effluent tank, and our POTW monitoring station. Since the GWTF is a relatively simple system,

we believe it is reasonable that subtracting the total mass exiting the GWTF to our POTW monitoring station from the total mass entering the air strippers must be equivalent to the air emissions exiting the air strippers to the emission stack.

Please feel free to contact me at (716) 278-5496 if you have any questions on the attached.

Sincerely,

Paul F. Mazierski
Principal Project Leader

PFM/pfm
cc: USEPA/T. Taccone
NYSDEC/M. Hinton

INITIAL TESTING PROGRAM PLAN
DUPONT NECCO PARK
REMEDIAL PROGRAM
NIAGARA FALLS, NEW YORK

Date: November 3, 2004

Project No.: DuPont No. 7407
URSD No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

TABLE OF CONTENTS

LIST OF ACRONYMS

AGM	alternative grading material
ANSI	American National Standards Institute
AO	Administrative Order
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
BFI	Browning-Ferris Industries
BL	barrier layer
BPL	Barrier Protection Layer
BUD	beneficial use determination
C & D	construction and demolition
CAA	Clean Air Act
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
CL	clay
CHMM	Certified Hazardous Materials Manager
CQA	Construction Quality Assurance
CQAPP	Construction Quality Assurance Project Plan
CRG	Corporate Remediation Group
DNAPL	dense nonaqueous-phase liquid
E & S	erosion and sediment
GDC	geosynthetic drainage composite
GM	geomembrane
GPM	gallons per minute
HVAC	heating, ventilation and airconditioning
IDS	investigation derived soils
ITPP	Initial Testing Program Plan
NAD	North American Datum
NAPL	nonaqueous-phase liquid
NAVD	North American Vertical Datum
NIMO	Niagara Mohawk
NIOSH	National Institute for Occupational Safety and Health
NYSDEC	New York State Department of Environmental Conservation
O & M	operations and maintenance
PDI	pre-design investigation
PE	Professional engineer
PID	photoionization detection
POTW	publicly owned treatment works
PPE	personal protective equipment
PVC	polyvinyl chloride

QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	remedial action
RAC	Remedial Action Contractor
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation Recovery Act
RDWP	Remedial Design Work Plan
RI	remedial investigation
RI/FS	remedial investigation/ feasibility study
ROD	Record of Decision
SFR	Subsurface Formation Repair
SI	site investigation
SOP	Standard Operating Procedure
TCE	trichloroethylene
USCS	Unified soil classification system
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
VOA	Volatile Organic Analyte
VOC	volatile organic compound
WWTP	wastewater treatment plant

1.0 INTRODUCTION

This Initial Testing Program Plan (ITPP) identifies and describes tasks necessary for initial testing of the landfill cap upgrade and groundwater hydraulic controls remedial actions at the DuPont Necco Park site in located Niagara Falls, New York. Final remedial designs for the landfill cap upgrade and hydraulic control system were approved by United States Environmental Protection Agency (USEPA) on September 30, 2003 and April 8, 2004, respectively. Groundwater hydraulic control system construction will precede construction of the landfill cap upgrade. Construction of the groundwater hydraulic control system will include all elements to achieve and maintain hydraulic control of the A Zone overburden and B through F flow zones. These elements include installation of the extraction pumps, subsurface conveyance system, and groundwater treatment facility. The landfill cap upgrade will meet the substantive requirements of 6 NYCRR Part 360 standards.

This plan was prepared pursuant to Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by USEPA. Specifically, this plan describes in detail the initial testing activities for components of the remedial actions. Monitoring required for long-term operations of the remedial action components will be described in the Operations and Maintenance Plan (O&MP).

This document has been organized as follows:

- Section 1.0 provides an overall summary of the project including site description and background, existing remedial components, selected remedial actions, design and construction tasks completed to date, and an overview of the initial testing program for remedial actions.
- Section 2.0 describes initial testing activities associated with remedial actions.
- Section 3.0 describes the schedule and reporting for the initial testing program.
- Section 4.0 provides applicable references.

1.1 Site Background

The following sections describe the history of the DuPont Necco Park site, including a site description, site background, previous investigations, and existing response actions.

1.1.1 Site Description and History

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York. Necco Park is located off Niagara Falls Boulevard in the City of Niagara Falls (Parcel 296, Liber 138, page 571) and the Town of Niagara (southwest part of Lot 13, Township 13, Range 9), New York (see Figure 1-1). The site is located approximately 1/2 mile northwest from Niagara Falls Boulevard exit of Interstate Highway I-190.

Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Browning-Ferris Industries /Allied (BFI/Allied). Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a Conrail (Niagara Junction Railway Company) right-of-way bound the site to the west. Land in the vicinity of the site is almost exclusively zoned for commercial or industrial use. Manufacturing facilities located within one mile of the site include the Niacet Company and Durez Chemical Company located 1,800 feet and 1,100 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.

Local topography at and around the site has been modified significantly by landfill activities and industrial operations. Prior to disposal activities at Necco Park, BFI/Allied, and CECOS, average natural ground surface elevation was about 575 feet above mean sea level (MSL). The natural local gradient was southeast toward the Niagara River. Local topography is now dominated by a number of topographic highs coincident with the BFI sanitary landfill directly east of the site and the CECOS secure hazardous waste landfill cells directly south of the site. The peak elevations of the BFI and CECOS landfills are approximately 665 feet and 630 feet above MSL, respectively.

Prior to placement of alternate grading material for the landfill cap upgrade, ground surface at Necco Park sloped from two topographic highs near the center of the landfill (peak elevations of 595 and 593 feet above MSL) to the edges of the site (average 580 feet above MSL). Modification of landfill topography is ongoing with the importation of alternate grading material. A system of drainage swales along the edges of Necco Park collects surface runoff from Necco Park and the other nearby landfills east and north of Necco Park.

Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company (from which Necco is derived). The site was sold to DuPont in 1930.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on DuPont records and an interpretation of historic aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill.

Documentation of activities at Necco Park prior to 1964 is limited. The following wastes were disposed of in the largest quantities:

- ❑ Flyash
- ❑ Building demolition and miscellaneous plant debris

- ❑ Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- ❑ Sodium cell rubble (i.e., thermal brick, corroded steel)
- ❑ Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- ❑ Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- ❑ Liming residues [i.e., sludge saturated with tri- and tetrachloroethene (TCE and PCE)]
- ❑ Scrap organic mixtures, off-grade product
- ❑ Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)
- ❑ Refined adiponitrile wastes (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

1.1.2 Existing Remedial Components

Several interim response actions were implemented to mitigate the impact and spread of contamination. These remedial actions are described in the following paragraphs.

During 1978 and 1979, a clay cap was constructed over the 24-acre site. The final compacted cover consisted of a minimum of 18-inches of clay (Unified Soil Classification System Class SC and CL soil). The cap is overlain by a 6-inch cover of topsoil and grass.

In 1982, two existing monitoring wells (D-12 and 52) were converted to recovery wells (RW-1 and RW-2) to control off-site migration of contaminated groundwater in the upper bedrock fracture zones. Wells RW-1 and RW-2 have been used as recovery wells from 1982 to the present. Extracted groundwater was pumped to the adjacent CECOS facility where it was treated and discharged to the Niagara Falls publicly owned treatment works (POTW). DuPont installed an interim treatment system (ITS) in August 2004. The ITS uses skid-mounted air stripping equipment to remove volatile organic compounds prior to discharging to the POTW.

Under normal conditions, wells RW-1 and RW-2 are pumped at an average rate of 10 to 15 gallons per minute (gpm) and 4 to 8 gpm, respectively. Initial evaluations of the recovery well network's effectiveness indicated that continuous operation of the wells created a hydraulic barrier across the entire southern perimeter of the site in the first two bedrock water-bearing zones, the B and C zones (Weston 1982). However, after additional wells were installed during subsequent investigations, a re-evaluation of the recovery well system's effectiveness revealed that some off-site flow from these two zones was occurring, particularly along the eastern site boundary in the C zone (WCC 1984). The primary influence of well RW-2 was observed in the B zone and the primary influence of well RW-1 was observed in the C zone.

To enhance the effectiveness of the groundwater pumping system, the Subsurface Formation Repair (SFR), consisting of a bedrock grout was curtain constructed from July 1988 through September 1989. The grout curtain consisted of a single line of pressure-grouted borings, spaced 10 feet on center and installed, in general, from the top of the bedrock to a depth of 80 feet below grade. The grout curtain extends along the entire west and north perimeter of Necco Park and to just over one-half of the east perimeter. The southeastern and southern perimeters were left ungrouted to allow for the recovery of contaminated groundwater that had migrated beyond the property boundary. To reduce the potential for upgradient increase in the water-table elevation in the overburden, the upper 10 feet of bedrock were not grouted on the northern side of the SFR.

The hydraulic impact of the SFR was evaluated by comparing hydraulic conditions prior to and for several months following installation of the grout curtain. The *SFR Interim Performance Report* (WCC 1990) concluded that the SFR was performing as designed. When operating continuously, the cones of depression associated with wells RW-1 and RW-2 (at rates comparable to pre-SFR) were found to have been significantly enhanced, effecting a nearly complete hydraulic barrier extending throughout the southern boundary of Necco Park in the B and C zones.

In 1992, a third recovery well, RW-3, began operation at Necco Park. Well RW-3 penetrates the D, E, and F zones; is located at the center of the southern site boundary; and is pumped at an average rate of 3 to 4 gpm.

A program of dense nonaqueous phase liquids (DNAPL) recovery was initiated in 1989. The program includes the removal of DNAPL from wells where a recoverable thickness of DNAPL is observed. DNAPL recovery rates varied widely from April 1989 through December 1990, ranging from approximately 100 to 400 gallons per month. However, near the end of 1990, a fairly consistent drop in DNAPL recovery rates was observed. Current monthly DNAPL recovery rates have typically been between 15 and 20 gallons with a total of 7,297 gallons of DNAPL recovered to date.

1.2 Selected Remedy

In March 1998, DuPont and the USEPA agreed upon the SOW, defining the scope and performance standards for remedial design and remedial action activities at the Necco Park site. On September 18, 1998, a Record of Decision (ROD) was issued by the USEPA for the Source Area Operable Unit. Prepared by the USEPA to be consistent with the SOW, the ROD includes: containment of the Source Area by upgrading the existing cap; utilizing hydraulic measures (pumping of wells and treating groundwater) and/or physical containment to prevent the movement of contaminated groundwater in the overburden; utilizing hydraulic measures to prevent contaminated groundwater in the bedrock from migrating beyond the Source Area boundary; treatment of extracted groundwater and DNAPLs; and long-term operation and maintenance of the constructed systems.

On October 15, 1998, the USEPA issued the AO requiring DuPont to conduct remedial design and remedial action at the Necco Park site. Pursuant to the AO, the work to be performed shall, at a minimum, achieve the requirements of the SOW and be performed in a manner consistent with the AO.

The key components of the remedial actions for the DuPont Necco Park Site were summarized in the ROD (USEPA 1998c). The major components are as follows:

1. *Containment of the Source Area by:*
    - *Upgrading the existing cap to meet New York State Part 360, or equivalent standards;*
    - *Using hydraulic measures in the overburden (A zone) to maintain an inward gradient within the Source Area or installing a physical barrier (e.g., slurry wall, sheet pile) on the southern, and portions of the eastern and western Necco Park property boundaries; and*
    - *Using hydraulic measures in the bedrock (B-F zones) to maintain an inward gradient within the Source Area and prevent the movement of contaminated groundwater beyond the Source Area boundary.*

The control of the contaminated groundwater will be achieved through the installation, operation, and maintenance of the groundwater extraction wells (and, optionally, a physical barrier in the overburden). The exact number, size, depth, and pumping rates of these wells will be determined in the remedial design of the selected remedy.

2. *Treatment of the contaminated groundwater from the Source Area, either on-site or off-site, to achieve the appropriate discharge requirements. Currently, groundwater extracted from the Site is treated at the adjacent CECOS wastewater treatment plant. Expansion of the CECOS facility would likely be required to accommodate the increased volume of water to be treated under this remedy. The need to either expand the CECOS facility, build an on-site facility, or utilize another off-site facility for groundwater treatment will be determined during the design.*

3. *Collection of DNAPL in the Source Area by:*
    - *Utilizing the existing monitoring wells network;*
    - *Utilizing any groundwater recovery wells placed in the Source Area; and*
    - *The installation of additional dedicated DNAPL recovery well (s).*

Collected DNAPL would be disposed of off-site at an appropriate facility.

4. *Operation and maintenance (O &M) of the existing systems and the systems constructed under this selected remedy.*

5. *Comprehensive monitoring to verify hydraulic control, identify DNAPL occurrence, demonstrate the effectiveness of the remedial measures, and assess the impact of such measures on far-field groundwater quality. Existing monitoring wells on the Necco Park property will be used to monitor the performance of the groundwater extraction system and establish that sufficient control occurs. Additional monitoring wells may be required. The need for such additional wells will be determined during the design and implementation of the groundwater extraction system.*

6. *Additional characterization of the Site to assess whether natural attenuation will be effective in addressing far-field contamination.*

7. *Development and implementation of institutional controls to restrict Site access, the use of groundwater at the Site, and control land use such that it is consistent with Site conditions.*

In addition to the Consent Order driven deliverables and work activities completed, two projects were undertaken in support of the remedial actions.

The utility installation project will be completed in June 2004, during which the public utilities needed for the hydraulic control portion of the remedial action were extended to the site. The utility installation project included the installation of underground potable water, natural gas, electric, sanitary sewer forcemain, and telecommunications services.

Design of the groundwater treatment facility was completed in April 2004. The groundwater treatment facility is currently being installed by Mark Cerrone Incorporated as part of the contract to install the conveyance system for groundwater hydraulic controls. Construction of the groundwater pumping and treatment system is expected to be complete by March 2005

1.3 Design and Construction Summary

Pre-design investigations were completed to obtain data to support design of an extraction system to achieve and maintain control of the A through F groundwater flow zones and to design a landfill cap that meets the substantive requirements of New York State Part 360. The remedial actions have been designed to meet the objectives and performance standards of the SOW.

The following final design reports were approved by USEPA:

- Remedial Design Work Plan for the DuPont Necco Park site in Niagara Falls, New York, submitted February 9, 2000 and approved by USEPA on July 20, 2000.
- Final (100%) Design Submittal for Cap Upgrade for the DuPont Necco Park site in Niagara Falls, New York, submitted September 12, 2003 and approved by USEPA on September 30, 2003.
- Final (100%) Design Submittal for Bedrock and Overburden Source Area Hydraulic Controls for the DuPont Necco Park site in Niagara Falls, New York, submitted March 17, 2004 and approved by USEPA on April 8, 2004.

With the approvals of the Final (100%) Design Submittal for the Cap Upgrade and Bedrock and Overburden Source Area Hydraulic Controls, remedial design requirements described in the SOW have been fulfilled. The construction sequence for the remedy will be to install the hydraulic controls first, followed by the cap upgrade. A detailed description of the construction activities was provided in the Remedial Action Work Plan (RAWP - CRG, 2004A).

The drawings and specifications included in the contract for the groundwater hydraulic controls are of sufficient detail that construction of the system will meet the design objectives. Construction of the hydraulic controls portion of the remedy began in August 2004 and is scheduled for completion in March 2005.

Data collected during the pre-design investigations indicated that hydraulic control of the A Zone overburden may be achieved through pumping of the upper bedrock (B/C Zone) wells, thus eliminating the need to construct a physical barrier to control the A Zone overburden. Hydraulic head monitoring of the A Zone is ongoing (for the existing

system) and will continue during long-term monitoring to further assess the effectiveness of A Zone control by pumping the B/C zone wells.

DuPont has elected to construct a treatment facility on the Necco Park site to treat groundwater from the new extraction system. Construction of the groundwater treatment facility is part of the hydraulic controls contract scheduled for completion in March 2005. The Niagara Falls POTW has issued DuPont a discharge permit for acceptance of the treated groundwater (Niagara Falls Water Board Wastewater Facilities: Discharge Permit SIU #64A, April 2004). The permit is provided as Appendix A. Additionally, NYSDEC approved air emissions from operation of the system (See Appendix B).

The cap upgrade portion of the remedy started in 2002 with placement of subgrade materials to achieve minimum slopes specified by NYSDEC. Placement of cap subgrade materials is on-going. Upon completion of construction activities for the hydraulic controls, the final phase of the cap upgrade portion of the remedy will be completed. Final completion of the cap construction activities is anticipated in Spring/Summer of 2006.

1.4 Final Remedy Performance Standards

DuPont will conduct monitoring to assure the final remedy performance standards are met. The performance standards were provided in Section A.7 of the SOW and are included in this section for reference:

The work to be performed by the DuPont Corporation shall achieve all performance standards for the design, implementation, and operation and maintenance of the remedial system(s) and all requirements set forth in this SOW. The following minimum performance standards shall be met:

a. The existing cap shall be upgraded to satisfy the substantive requirements of NYCRR Part 360 standards to the satisfaction of the NYSDEC and USEPA.

b. Contaminated groundwater in the overburden (a.k.a. the A-zone) shall be prevented from migrating away from the source area to the far-field. The source area boundary shall be defined for specific groundwater flow zones (aquifer or aquifers which possess similar physical and/or hydraulic characteristics) by utilizing the same criteria developed for the delineation of the source area in the Investigation and Analysis of Alternative (I/AOA): 1) the extent in those zones where free-phase and residual DNAPL is observed in extraction wells, monitoring wells or otherwise; and 2) the extent in those zones where the concentration of contaminants in the groundwater may indicate the presence of DNAPL. The following solubility criteria shall be utilized to indicate that DNAPL may be present: a) one percent of a given compound's pure-phase solubility, and b) one hundred percent of the effective solubility for a given compound. (EPA publication 9355.4-07FS) Based on numerous hydrogeologic investigations at the site, a source area will be identified for three distinct flow zones: 1) the overburden (A zone), 2) the upper bedrock (B and C zones), and 3) the lower bedrock zones (D, E and F zones).

Contaminated groundwater in the overburden (A zone) shall be prevented from migrating from the source area through hydraulic (e.g., installation and operation of a groundwater extraction system) and/or physical (e.g., sheet pile, slurry wall) methods. If a hydraulic system is employed, it shall be demonstrated that contaminated groundwater does not flow from the source area into the far-field by establishing hydraulic control. (For all zones, hydraulic control is defined as: the containment or control of the contaminated source area groundwater in such a manner as to prevent movement or migration of the contaminated source area groundwater beyond the downgradient boundary of the source area to the far-field. Success in obtaining hydraulic control will be defined as: the achievement of hydrodynamic control at the outer limits of the contaminated source area groundwater such that hydraulic gradients are inward to the pumping system(s). Methods for verifying that an inward gradient has been established are identified in the appropriate sections below.) Evidence of source area hydraulic control in the overburden shall be established through the installation, operation, maintenance and monitoring wells/piezometers and/or other means. If a physical barrier system is employed, it shall be demonstrated that contaminated groundwater in the overburden (A-zone) does not flow through, beneath, or around the barrier system. This shall be demonstrated through the installation, operation, maintenance and monitoring of groundwater monitoring wells/piezometers and/or other means.

c. Contaminated groundwater in the upper and lower bedrock flow zones (a.k.a. the B/C and D/E/F zones) shall be prevented from migrating from the applicable source area (The source areas shall be defined as per A.7.b, above) by hydraulic methods. It shall be demonstrated that contaminated groundwater flow does not occur from the source area to the far-field. Evidence of source area hydraulic control shall be established through the installation, operation, maintenance and monitoring of groundwater extraction wells, monitoring wells/piezometers and/or other means.

d. A hydraulic monitoring program shall be developed, implemented and maintained to verify that hydraulic control of the source area has been created, stabilized and maintained in the overburden and bedrock (A through F zones). (To verify that hydraulic control is achieved, several hydraulic methods shall be utilized including, but not limited to, the following: 1) Comparing hydraulic heads in paired piezometers/monitoring wells; 2) Capture zone analysis incorporating aquifer test and potentiometric surface data; 3) Calculating capture zones using the appropriate method(s) (e.g., semianalytical or numerical modeling to compute capture zones, groundwater pathlines, and associated travel times); ; 4) Generating potentiometric surface maps developed using all available comparable (i.e., hydraulic head measurements in extraction wells shall not be compared to hydraulic head measurements in piezometers/monitoring wells without correction or justification) hydraulic head data (measured in wells within and outside the containment area). All of the aforementioned methods shall be used in conjunction with groundwater chemistry monitoring (see below) to determine that hydraulic control has been established. In addition, equipment such as flowmeters, colloidal borescopes or tracers may also be used to assist in

determining groundwater flow directions. The hydraulic monitoring program shall utilize the existing monitoring well network, where appropriate. Installation of additional groundwater monitoring wells/piezometers may be required to verify the establishment of hydraulic control.

e. Treatment of all extracted contaminated groundwater, either on-site or off-site, shall be performed to meet all appropriate federal and State discharge standards;

f. A chemical monitoring program that includes sampling and analysis of the groundwater shall be developed, implemented and maintained to monitor the following:

i. Status of the extent of source area as defined in this SOW.

ii. The effectiveness of the remedial measures after implementation. Long-term groundwater sampling and analysis shall be conducted in conjunction with hydraulic monitoring and other methods, to verify and measure the effectiveness of the hydraulic/physical systems in containing the source area. Trends in contaminant concentrations shall be monitored, measured and recorded to evaluate whether the remedial measures are functioning as designed.

iii. The long-term effects of the remedial measures on the groundwater quality in the far-field shall be assessed. Groundwater sampling ad analysis shall also be conducted in the far-field to evaluate trends in contaminant concentrations over time.

The minimum chemical monitoring program elements, discussed above, shall utilize the existing monitoring well network as appropriate. Installation of additional groundwater monitoring wells/piezometers may be required.

g. Monitoring for the occurrence of free-phase DNAPL shall be conducted within the source area and in the far-field. DNAPL monitoring shall be performed utilizing the existing monitoring well network as appropriate. Installation of additional DNAPL monitoring wells shall be required. As appropriate, these DNAPL monitoring wells may be the same as the groundwater monitoring wells installed to fulfill the aforementioned groundwater monitoring requirements. When recoverable DNAPL is encountered, it shall be removed by bailing, installation of a DNAPL extraction well or other means.

h. Institutional controls shall be developed, implemented and maintained to: limit and control Site access; prevent the use of, and exposure to, groundwater beneath the Necco Park facility; and prevent the development and/or transfer of the Necco Park facility for any use incompatible with the remedy selected. EPA and NYSDEC shall determine whether any proposed use of the property is protective of human health and the environment based on Site conditions. Controls shall be implemented through deed restrictions (e.g., covenants and easements) or other appropriate means.

i. Once the remedial systems have been installed and, are determined to be operational and functional (see K.1.b.v., below), DuPont shall operate the systems as designed on a continuous basis. If any well in the pumping system is not operating ("down") for a period of more than three (3) days consecutively or five (5) days in a thirty (30) day period, DuPont shall notify USEPA and NYSDEC. The notification will include a plan for restoring system operation as quickly as possible.

j. In the event that operation of the remedial system(s) is discontinuous, or if, based on the review of the hydraulic monitoring data, chemical monitoring data, or DNAPL monitoring data any of the following conditions occur:

- *the hydraulic/physical containment systems do not establish hydraulic control as defined in A.7.b., above, on a consistent basis;*
- *free phase DNAPL is discovered in areas outside the hydraulic/physical containment system(s), or contaminant concentrations in the groundwater in areas outside the hydraulic/physical containment system(s) indicate that DNAPL may be present on a consistent basis;*
- *chemical monitoring indicates that: 1) the estimated total contaminant mass in the groundwater beyond the containment perimeter increases with time or, 2) retarded contaminants that were previously restricted to the containment area are detected in perimeter monitoring wells on a consistent basis or, 3) concentrations of contaminants in the groundwater downgradient of the hydraulic/physical containment systems do not show a substantial decrease over time;*
- *after installation, the remedial systems do not consistently achieve the Performance Standards, as specified in this SOW;*

then complete source area containment will be in question and additional assessment of the above condition(s) will be required. Following such assessment by DuPont, DuPont will submit to USEPA the assessment, including a contingency plan for modification of the system as constructed and for the implementation of further actions determined necessary to meet the performance standards. Modifications may include: the redefinition of the source area, additional groundwater extraction, or other measures. USEPA will either approve the contingency plan, or will require modification of such plan, in accordance with the procedures set forth in the AO. Following USEPA approval of the contingency plan, DuPont shall implement the modifications to the remedial measures to meet the performance standards as outlined in the plan.

1.5 Initial Testing Program Objectives

Initial testing will be conducted, prior to full-scale operations, maintenance, and monitoring, to assure the remedial action components are operating and functioning as designed. Long-term testing and monitoring necessary to demonstrate the performance

standards are met will be described in the O&M plan. The primary objectives of the initial testing program are to:

- Confirm system components are operating and functioning as designed
- Confirm design assumptions are representative of full-scale final remedy installation
- Assure compliance with regulatory permits and permit equivalents

The initial testing will focus on demonstrating operational effectiveness for mechanical and electrical components of the groundwater hydraulic controls and treatment components of the remedy. The initial testing program for these components of the remedy are described in detail in Section 2.0. Initial testing will not be necessary for the civil components of the remedy (i.e., buildings, structures, cap upgrade) or components that involve strictly manual activities (i.e., DNAPL recovery). Functionality of the civil engineering components of the remedy has been assured by designs that meet regulatory requirements and engineering standards. The construction quality assurance and quality control program described in the RAWP will monitor compliance with design of civil components of the remedy.

2.0 INITIAL TESTING PROGRAM

The objectives of the initial testing program for the groundwater hydraulic controls and groundwater treatment portion of the remedy are to:

- Confirm the groundwater pumping wells and treatment system are operating and functioning as designed
- Confirm design assumptions are representative of final remedy installation
- Confirm the treatment system is achieving wastewater discharge and air emission requirements

The following sections describe the activities that will be conducted to meet these objectives.

2.1 Equipment Functionality and Process Operability Testing

The initial testing program for the groundwater pumping and treatment system will include equipment functionality tests and a process operability test. The equipment functionality test will be conducted on mechanical and electrical components of the system including pumps, mixers, instrumentation, HVAC systems, and the skid-mounted air strippers. An equipment checklist will be prepared prior to conducting the test to assure all components are checked for functionality. The checklist will include mechanical rotation checks and interlock tests to the extent practical. The treatment equipment functionality tests will be conducted using potable water. The groundwater well pump equipment functionality test will be conducted by pumping groundwater from the wells to the influent tanks.

A process operability test will be conducted after successful completion of the equipment functionality tests. The process operability test will include operation of the entire system to assure the system is operating as designed. The test will be conducted with groundwater from the extraction well network. The pumps will be operated at design flow rates for approximately three days. The treatment system uses conventional air stripping equipment to remove volatile organic compounds (VOCs) from the extracted groundwater. This technology has been proven effective in removing VOCs found in site groundwater. DuPont is successfully operating similar equipment for the interim treatment system. Therefore, the process operability test will be performed on a continuous basis with treated effluent sent to the sanitary sewer.

Sample collection activities conducted during the process operability test are described in Section 2.2.

After successful completion of the process operability test, the system will continue operations. Treatment process and hydraulic monitoring conducted during the process operability test and initial operations are described in the following sections.

2.2 Initial In-Process Sampling and Hydraulic Monitoring Program

In-process samples and hydraulic monitoring will be conducted during the operability tests and initial operations to confirm assumptions made in the design phase of the project. During the process operability test, in-process samples will be collected daily from each well, the influent tanks, and the effluent tank (see Table 1). The samples will be analyzed for the Necco Park indicator list (See Table 2). The analytical results will be compared to concentrations estimated from the pre-design investigation pump tests. Actual treatment removal efficiencies will also be compared to design and vendor supplied air stripping model programs.

In-process monitoring samples will be collected daily during the process operability test. After successful completion of the process operability test, in-process samples will be collected weekly for the first month of operations from the influent and effluent streams only. After the first month of operation, in-process monitoring will be on an as-needed basis, depending on system operational issues or compliance monitoring results.

The initial testing program for hydraulic monitoring will follow the proposed long-term monitoring program (See long-term monitoring plan in Appendix C). Groundwater levels will be monitored at pre-determined well locations using either hand held water level probes or continuous data loggers. Prior to conducting the process operability test, the list will be reviewed and agreed upon with EPA and NYSDEC. After completion of the process operability test, hydraulic monitoring will be conducted in accordance with the long-term monitoring plan.

2.3 Compliance Monitoring for Wastewater Discharge and Air Emissions

Compliance monitoring will be conducted on the treatment system to assure the system is meeting regulatory requirements for wastewater discharges and air emissions. An SIU permit with the Niagara Falls POTW (See Appendix A) regulates the treated groundwater effluent from the site. A compliance monitoring station has been installed at the site. The compliance monitoring station includes an automatic ISCO sampler for collection of composite samples. Manual grab samples are collected for VOC analyses. In accordance with the SIU permit, samples are collected each quarter and analyzed for the parameters in Section F of the SIU Permit. A SIU permit compliance-monitoring sample will be collected at the end of the process operability test or during initial operations.

Air emissions from the air stripper vent have been estimated to be below NYSDEC regulatory limits within the landfill boundary (See Appendix B). In-process water sample results will be compared to the estimated results to assure this system is operating below regulatory limits. Air emissions will be calculated from a mass-balance of the in-process samples collected during the process operability test and initial operations. After the initial testing program, DuPont proposes quarterly monitoring to demonstrate compliance with air regulations. The quarterly sampling program will be conducted in conjunction with the SIU permit quarterly sampling program. Air emissions will be calculated from a mass-balance of in-process influent and effluent water sample results.

3.0 SCHEDULE AND REPORTING

The initial testing program will be conducted after construction activities are complete for the hydraulic controls and groundwater treatment components of the final remedy. Assuming construction is complete by March 21, 2005, the following are expected milestones for initial testing and operations:

- Equipment Functionality Tests March 21, 2005 to March 28, 2005
- Process Operability Test March 29, 2005 to March 31, 2005
- Initial Operations April 1, 2005 to April 30, 2005

USEPA will be informed of the exact schedule within 14 days of the start of the equipment functionality tests.

The completed checklists from the equipment functionality tests will be submitted to USEPA and NYSDEC within 7 days of successful completion of the final equipment test.

Analytical results from the process operability tests will be requested from the lab within 14 days. The analytical results will be forwarded to USEPA within 7 days of receipt from the lab.

The results of the process operability and initial operations testing programs will be summarized in a letter report. The letter report will be submitted to USEPA and NYSDEC within 45 days of the completion of initial operations phase of the project.

4.0 REFERENCES

DuPont Corporate Remediation Group (CRG), 2004. *Remedial Action Work Plan,* Necco Park, Niagara Falls, New York.

_____. 2004a. *Final (100%) Design Report Bedrock and Overburden Source Area Hydraulic Controls,* Necco Park, Niagara Falls, New York.

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_____. 1990. SFR Interim Performance Report.

Roy F. Weston. 1982. *Evaluation of Proposed Recovery Well System,* Necco Park Landfill.

Niagara Falls Water Board Wastewater Facilities: Discharge Permit SIU #64A, April 2004.

New York State Department of Environmental Conservation approval letter, by Lawrence Stiller to Paul Mazierski. May 27, 2004.

Table 1
Summary of Initial Testing Program Samples

Test Phase	Location	Frequency	Duration	Parameters
Process Operability	RW-4 RW-5 RW-8 RW-9 RW-10 B/C-Zone Influent Tank D/E/F-Zone Influent Tank B/C-Zone Effluent D/E/F-Zone Effluent	Daily	3 days	Necco Park Indicator List
First Month Operations	B/C-Zone Influent Tank D/E/F-Zone Influent Tank Combined Effluent Tank	Weekly	3 weeks	VOAs & SVOAs
Compliance Monitoring	B/C-Zone Influent Tank D/E/F-Zone Influent Tank Combined Effluent Tank	Quarterly	Each Year of O&M	VOAs & SVOAs VOAs & SVOAs POTW List

Notes:
1. Necco Park Indicator List – See Table 2
2. See Table 2 for Volatile Organic Compounds (VOCs) and semi-volatile organic compounds (SVOAs) from the Necco Park Indicator List
3. POTW List – See Section F of the Niagara Falls Wastewater Discharge Permit SIU No. 64

Table 2: Indicator Parameter List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

INORGANIC AND GENERAL WATER QUALITY PARAMETERS	VOLATILE ORGANIC COMPOUNDS	SEMIVOLATILE ORGANIC COMPOUNDS
pH*	Vinyl chloride	Hexachloroethane
Specific conductivity*	1,1-dichloroethene	Hexachlorobutadiene
Temperature*	Trans-1,2-dichloroethene	Phenol
Turbidity*	Cis-1,2-dichloroethene	4-methylphenol
Dissolved oxygen *	Chloroform	2,4,6-trichlorophenol
Redox potential*	Carbon tetrachloride	2,4,5-trichlorophenol
Chloride	1,2-dichloroethane	Pentachlorophenol
Dissolved and total barium	Trichloroethene	Hexachlorobenzene
	1,1,2-trichloroethane	TIC-1
	Tetrachloroethene	
	1,1,2,2-tetrachloroethane	

*Field parameter

DuPont Corporate Remediation Group
Buffalo Avenue & 26th Street
Building 38 2nd Floor
Niagara Falls, NY 14302
(716) 278-5100

November 4, 2003

Mr. Larry Stiller
NYSDEC Region 9
Michigan Avenue
Buffalo, NY

Re: Necco Park Landfill GWTF Discharge from Air Stripper

Dear Mr. Stiller:

Thank you for meeting with us on September 19, 2003 to discuss the ongoing groundwater remediation project at Necco Park. The purpose of this letter is to summarize our understanding of the applicable regulatory requirements for the anticipated air emission source associated with a groundwater treatment facility (GWTF) currently being designed for the Necco Park Landfill. Estimated air emission rates of volatile organic compounds are:

- approximately 0.1 pounds per hour for Class A (High) toxicity compounds,
- less than 1 pound per hour for Class B (Moderate) toxicity compounds, and
- less than 1 pound per hour for all volatile and semi-volatile organic compounds expected to be included in GWTF emissions.

With this letter, DuPont requests NYSDEC review of information provided in this correspondence to determine whether air emission treatment is necessary to address this source.

Information provided in this letter is based on anticipated groundwater well flow rates and projected volatile organic compounds (VOCs) concentrations observed during pump tests and groundwater sampling events conducted in association with bedrock hydrogeologic studies at the site. The preliminary design, which has been completed over the past few months, included this assessment of the impact of water treatment on air emissions (See attached draft Process Flow Diagram). The primary treatment method for groundwater is air stripping with two parallel shallow tray units. To minimize the potential impact of the air emissions on air quality, the discharge from the two air strippers will be combined and exhausted from an 80-foot high stack outside the northeast corner of the GWTF building.

Based on our meeting, it is our understanding that DuPont will not be required to apply for a formal air permit but may be subject to air emission limitations. The GWTF is exempt from permitting requirements in accordance with NYCRR Part 201.6 because the work is being performed as a remediation activity under a consent order with the United States Environmental Protection Agency (USEPA). Additionally, these air strippers would also be classified as trivial

sources as described in 6NYCRR Part 201, paragraph 3.3(c) (29). This regulatory citation allows such equipment to be constructed and operated without an air permit.

However, as discussed at our meeting, the emissions from the proposed air stripping equipment will be subject to limitations as described in NYCRR Part 212 and New York State Division of Air Resources (DAR-1) Guidelines for the control of Toxic Ambient Air Contaminants. As such, DuPont has compared the expected emissions to Annual Guideline Concentration (AGC) values for each compound. In addition, costs to provide additional air treatment were estimated for several technologies.

Based on the DAR-1 dispersion model, many of the VOCs are projected to be below their respective NYS Annual Guideline Concentration (AGC) values (See attached Tables). However, three compounds will exceed their respective AGC values: carbon tetrachloride (a Class A chemical) and chloroform and 1,1,2,2 tetrachloroethane (both Class B chemicals). The carbon tetrachloride emissions will exceed the AGC guideline value by less than 40%. Even though the AGC guidance values are exceeded for these three compounds, DuPont requests that NYSDEC allow this source to be operated without additional air treatment because the emissions are relatively low and the costs to provide additional air treatment are significant.

As presented in the attached table, Class A VOC emissions from the GWTF will be approximately 0.1 pounds per hour. Based on operating 24 hours per day, 365 days per year, the potential to emit from this source is approximately 0.45 tons per year. The emissions are well below the major stationary source threshold values for hazardous air pollutants and volatile organic compounds. Per NYCRR Part 201, a major source is defined as any stationary emission unit that emits or has the potential to emit 10 tons per year or more of any hazardous air pollutant, 25 tons per year or more of total hazardous air pollutants, or 50 tons per year or more of total volatile organic compounds.

The attached table also shows that Class B (i.e., moderate toxicity contaminants) chemical emissions will total 0.84 pounds per hour. These less hazardous chemicals, based on 24 hours per day, 365 days per year operation, have the potential to emit approximately 3.65 tons per year. This value, as well as the site total emissions of 4.1 tons per year, are well below the regulatory major stationary source threshold of 25 tons per year for total hazardous air pollutants; and 50 tons per year total volatile organic compounds. Therefore, the GWTF would not be considered a major source if a permit were required.

Costs to provide air treatment for these emissions were calculated for vapor phase carbon and thermal oxidation technologies. Vapor phase carbon has the lowest capital costs but has significantly higher operating costs due to the poor adsorption of the smaller chlorinated compounds (i.e., chloroform and methylene chloride). Therefore, thermal oxidation was determined to be the most cost-effective air treatment technology to remove the VOCs. Catalytic oxidation was determined to be the most effective thermal oxidation technology. The estimated capital cost for air treatment ranged from $210,000 (without scrubbing to remove hydrogen chloride) to $380,000 (with scrubbing to remove hydrogen chloride). Estimated annual operating costs ranged from $70,000 (without scrubbing to remove hydrogen chloride) to $100,000 (with scrubbing to remove hydrogen chloride).

Based on this evaluation, DuPont requests NYSDEC approval to operate this groundwater treatment process without air treatment for the following reasons:

- Total VOCs are less than one pound per hour.
- Total Class A compounds are less than 0.1 pounds per hour.
- The properties surrounding the site are predominantly industrial.
- The process is needed to meet mandated remediation goals for at least the next 30 years.
- The cost to install and operate air treatment technologies will be a minimum of two million dollars over the expected life of the project.

We look forward to your response to this request. Please feel free to contact me at (716) 278-5496 if you have any questions.

Sincerely,

Paul F. Mazierski, PG
Principal Project Leader

Attach: Table I, Table II, Process Flow Diagram

cc: USEPA/T. Taccone
NYSDEC/M. Hinton

\\ \ \ \ \Necco Park\7441 GW Trt Design\Correspondence\To Regulator\GWTF Emissions Letter.doc

Table I
Necco Park Stream Characterization

Scenario III	POTW	Ave	Max	TRW-4 Phs 1,2 Update 4/3/2003	TRW-5 Phs 1,2 Update 4/3/2003	TRW-10 Phase 1II End 5/2/2003	Total BC	Ave Load #/d	TRW-8 Phs 1,2 Update 4/3/2003	TRW-9 Phs 1,2 Update 4/3/2003	Total DEF	Ave Load #/d	Hypo. Stream	Ave Load #/d
Flow (gpm)	1	139	208	0.4	5.0	8.0	13.4		13.0	15.0	28.0		41.4	
Metals (mg/L)														
Aluminum				0.00	0.20	1.00	0.67	0.11	0.00	0.00	0.00	0.00	0.22	0.11
Barium, Dissolved				0.51	0	0.85	1	0	0.00	0.00	0.00	0.00	0	
Barium, Total *				0.57	20.00	0.81	7.96	1.28	0.00	0.00	0.00	0.00	2.58	1.28
Cadmium, Total	6	0.1	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calcium				725	2,020	563	1,111	179	187	201	195	65.4	491.3	244.4
Chromium, Total	7	0.088	0.67	0.04	0.04	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Copper, Total	8	0.766	5.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Iron, Dissolved				0.00	0.00	2	1.25	0.20	1.10	0.00	0.51	0.17	0.75	
Iron, Total				0.33	1.60	2.90	2.34	0.38	0.40	0.00	0.19	0.06	0.88	0.44
Lead, Total	9	0.289	2.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Magnesium				80.60	92.40	35	57.9	9.3	22.10	29.60	26.1	8.8	36.40	18.11
Manganese				0.10	0.65	0.23	0.38	0.06	0.22	0.13	0.17	0.06	0.24	0.12
Mercury, Total	10	0.007	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nickel, Total	11	2.05	5.06	0.04	0.71	0	0.29	0.05	0.00	0.00	0.00	0.00	0.09	0.05
Potassium				120.00	130.00	58.60	87.1	14.0	14.80	12.60	13.6	4.58	37.40	18.61
Sodium				1,270.00	3,070.00	892	1,716	276	110	105	107	36.1	628	312.4
Zinc, Total	12	0.696	5.23	0.00	0.00	0	0.04	0.01	0.00	0.00	0.00	0.00	0.01	0.01
Subtotal	(#/day)							481				115		596

Value at end of TRW-5 pump test during Phase 2 PDI was 2,020

Table I
Necco Park Stream Characterization

Scenario III	POTW	Ave	Max	TRW-4 Phs 1,2 Update 4/3/2003	TRW-5 Phs 1,2 Update 4/3/2003	TRW-10 Phase 1II End 5/2/2003	Total BC	Ave Load #/d	TRW-8 Phs 1,2 Update 4/3/2003	TRW-9 Phs 1,2 Update 4/3/2003	Total DEF	Ave Load #/d	Hypo. Stream	Ave Load #/d
Flow (gpm)	1	139	208	0.4	5.0	8.0	13.4		13.0	15.0	28.0		41.4	
Misc Parameters (mg/L)														
Alkalinity				180	348	573	477	76.9	128	175	153	51.5	258.1	128.4
Ammonia Nitrogen				67.0	85.0	120	105	17.0	9.80	11.00	10.4	3.51	41.2	20.5
Chloride				4,520	10,400	2,460	5,484	883	340	280	308	104	1,983	987
Conductivity*				11.0	24.0	0.00	9.28	1.49	1.60	1.50	1.55	0.52	4.05	2.02
Cyanide, Total	5	3	6	0.00	0.13	5	3.15	0.51	0.14	0.05	0.09	0.03	1.08	0.54
Fluoride				0.00	0.00	0.00	0.00	0.00	0.00	1.30	0.70	0.23	0.47	0.23
Hardness				2,400	5,100	2,100	3,228	520	590	590	590	199	1,444	718
Orthophosphate				0.40	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
pH (Electrometrics)				0.01	0.01	0.00	0.01		0.01	0.01	0.01		0.01	
Phenolics				0.58	1.10	1.90	1.56	0.25	0.58	0.30	0.43	0.14	0.80	0.40
Phosphorous, Total	17	7	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Soluble Organic Carbon	3	1000	1800	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sulfate				390	220	190	207	33.4	270	320	297	100	267.8	133.2
Total Dissolved solids				8,700	23,000	5,900	12,364	1,991	0.00	980	980	330	4,665	2,321
Total Organic Carbon				68.00	250	630	471	76	39.00	9.00	22.9	7.72	168	84
Total Susp Solids	2	310	2000	36.00	500	30.00	205.6	33.1	7.00	0.00	3.25	1.09	68.7	34.2
Subtotal	(#/day)							3,633				796.5		4,429
PCB's, Pesticides (mg/L)														
PCB's	46	0.008	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dechlorane Plus	49	0.008	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan I	48	0.008	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan II				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Endosulfan Sulfate				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heptachlor	50	0.008	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heptachlor Epoxide				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexachlorocyclohexane	M			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mirex	47	0.008	0.012	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtotal	(#/day)							0.00				0.0		0

Table I
Necco Park Stream Characterization

Scenario III	POTW	Ave	Max	TRW-4 Phs 1,2 Update 4/3/2003	TRW-5 Phs 1,2 Update 4/3/2003	TRW-10 Phase 1II End 5/2/2003	Total BC	Ave Load #/d	TRW-8 Phs 1,2 Update 4/3/2003	TRW-9 Phs 1,2 Update 4/3/2003	Total DEF	Ave Load #/d	Hypo. Stream	Ave Load #/d
Flow (gpm)	1	139	208	0.4	5.0	8.0	13.4		13.0	15.0	28.0		41.4	
Semivolatiles (ug/L)														
Acenaphthene	35	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Benzo (a) Anthracene	39	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Butyl Benzyl Phthalate	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Chrysene	37	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Di-N-Butyl Phthalate	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Dichlorobenzenes	33	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Dichlorobenzotrifluoride	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Dichlorophenol	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Dichlorotoluene	34	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Diethyl Phthalate	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Dimethyl Phthalate	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Di-N-Octyl Phthalate	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Fluoranthene	36	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Hexachlorobenzene	42	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Hexachlorobutadiene	41	0.5	0.5	870	710	0	291	0.05	0	0	0	0.00	94.2	0.05
Hexachlorocyclopentadiene	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Hexachloroethane				0	510	0	190	0.03	0	0	0	0.00	61.6	0.03
3-Methylphenol				0	260	0	97	0.02	0	0	0	0.00	31.4	0.02
4-Methylphenol				0	260	0	97	0.02	0	0	0	0.00	31.4	0.02
Monochlorocresol	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Monochlorophenol	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Naphthalene	38	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Nitrosodiphenylamine	32	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Pentachlorophenol	45	2.5	2.5	0	0	9,100	5,433	0.87	7,000	0	3,250	1.09	3,957	1.97
Phenanthrene	43	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Phenol	4	8.7	14.8	0	250	0	93	0.02	0	0	0	0.00	30.2	0.02
Pyrene	40	0.03	0.05	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Tetrachlorobenzene	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Trichlorobenzene	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
2,4,5-Trichlorophenol	44	1.5	1.5	0	0	0	0	0.00	0	120	64	0.02	43.5	0.02
2,4,6-Trichlorophenol	44	1.5	1.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Trichlorotoluene	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00

Table I
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Scenario III	POTW	Ave	Max	TRW-4 Phs 1,2 Update 4/3/2003	TRW-5 Phs 1,2 Update 4/3/2003	TRW-10 Phase 1II End 5/2/2003	Total BC	Ave Load #/d	TRW-8 Phs 1,2 Update 4/3/2003	TRW-9 Phs 1,2 Update 4/3/2003	Total DEF	Ave Load #/d	Hypo. Stream	Ave Load #/d
Flow (gpm)	1	139	208	0.4	5.0	8.0	13.4		13.0	15.0	28.0		41.4	
Subtotal	(#/day)							1.00				1.12		2.11

Table I
Necco Park Stream Characterization

Scenario III	POTW	Ave	Max	TRW-4 Phs 1,2 Update 4/3/2003	TRW-5 Phs 1,2 Update 4/3/2003	TRW-10 Phase 1II End 5/2/2003	Total BC	Ave Load #/d	TRW-8 Phs 1,2 Update 4/3/2003	TRW-9 Phs 1,2 Update 4/3/2003	Total DEF	Ave Load #/d	Hypo. Stream	Ave Load #/d
Flow (gpm)	1	139	208	0.4	5.0	8.0	13.4		13.0	15.0	28.0		41.4	
Volatiles (ug/L)														
Benzene	18	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Bromoform	26	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Carbon Tetrachloride	19	0.2	0.5	330	7,000	3,700	4,831	0.78	7,900	0	3,668	1.23	4,044	2.01
Chlorodibromomethane	20	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Chloroform	15	2.4	6	2,700	21,000	30,000	25,827	4.16	9,600	0	4,457	1.50	11,374	5.66
Dichlorobromomethane	23	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,1-Dichloroethane				0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,2-Dichloroethane				0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,1 Dichloroethene	24	0.4	1	0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,2 Dichloroethene	25	0.4	1	2,900	7,200	3,700	4,982		4,300	8,500	6,550		6,043	3.01
cis-1,2-Dichloroethene				2,100	6,000	3,500	4,391	0.71	4,200	8,100	6,289	2.12	5,675	
trans-1,2-Dichloroethene				830	1,300	0	510	0.08	0	350	188	0.06	292	
Ethylbenzene	27	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Methylene Chloride	16	3.2	8	810	2,000	4,100	3,218	0.52	0	420	225	0.08	1,194	0.59
Monochlorobenzene	21	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
Monochlorotoluene	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
Monochlorobenzotriflouride	M			0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,1,2,2 Tetrachloroethane	28	1	5	5,000	14,000	4,500	8,060	1.30	2,000	380	1,132	0.38	3,374	1.68
Tetrachloroethene	29	0.8	1.5	940	2,100	11,000	7,379	1.19	12,000	0	5,571	1.87	6,156	3.06
Toluene	3	0.2	0.5	0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,1,1 Trichloroethane	13	1	2.6	0	0	0	0	0.00	0	0	0	0.00	0	0.00
1,1,2 Trichloroethane	14	2	5	200	8,200	2,900	4,797	0.77	1,500	590	1,013	0.34	2,237	1.11
Trichloroethene	31	2	5	2,400	14,000	25,000	20,221	3.26	16,000	890	7,905	2.66	11,892	5.92
Vinyl Chloride	32	0.2	0.5	4,500	1,300	0	619	0.10	0	1,900	1,018	0.34	889	0.44
Subtotal	(#/day)							12.9				10.6		23.5

Metals	(#/day)							481				115		596
Misc Parameters	(#/day)							3,633				797		4,429
PCB's, Pesticides	(#/day)							0.00				0.00		0.00
Semivolatiles	(#/day)							1.00				1.12		2.11
Volatiles	(#/day)							12.9				10.6		23.5
Total	(#/day)							4,127				923		5,050

Table II
Air Stripper
Mass Balance

BC Stream												
	Stack	=	317	scfm	H	=	81	ft	T_{Amb}	=	50	^0F
	Flow	=	300	acfm	ID	=	8	in	T_{Exit}	=	70	^0F

Scenario III	Incoming Steam			Air Stream					Water Stream			
	Ave Conc ug/l	Ave Load #/day	Strip Effic	Ave Load #/day	Ave Load #/yr	Max Actual Impact (ug/m3)	AGC (ug/m3)	% of AGC %	Ave Conc ug/l	Ave Load #/day	POTW Ave #/day	% of POTW
Flow (gpm)	**13.4**										**139**	
SemiVolatiles												
Hexachlorobutadiene	291	0.05	100.0%	0.047	17.1	0.002	0.045	4.3%	0.00	0.00	0.50	0.0%
Hexachloroethane	190	0.03	100.0%	0.031	11.2	0.001	0.250	0.50%	0.02	0.00		
3-Methylphenol	97.0	0.02	0.0%	0.000	0.00	0.000	180	0.00%	97.0	0.02		
4-Methylphenol	97.0	0.02	0.0%	0.000	0.00	0.000	180	0.00%	97.0	0.02		
Pentachlorophenol	5,433	0.87	0.0%	0.000	0.00	0.000	0.200	0.00%	5,433	0.87	2.50	35%
Phenol	93.3	0.02	0.0%	0.000	0.00	0.000	45	0.00%	93.3	0.02		
2,4,5-Trichlorophenol	0.00	0.00	0.0%	0.00	0.00	0.000	350	0.00%	0.00	0.00		
SVOC's Subtotal (#/day)		**1.00**		**0.08**	**28.3**					**0.92**	**3.0**	
Volatiles												
Carbon Tetrachloride	4,831	0.78	100.0%	0.78	284	0.032	0.067	48%	0.00	0.00	0.20	0.0%
Chloroform	25,827	4.16	100.0%	4.16	1,518	0.170	0.043	**396%**	0.00	0.00	2.40	0.0%
1,2 Dichloroethene									0.00	0.00	0.40	0.0%
cis-1,2-Dichloroethene	4,391	0.71	100.0%	0.71	258	0.029	1,900	0.00%				
trans-1,2-Dichloroethene	510	0.08	100.0%	0.08	30.0	0.003	0.100	3.4%				
Methylene Chloride	3,218	0.52	100.0%	0.52	189	0.021	2.100	1.0%	0.00	0.00	3.20	0.0%
1,1,2,2 Tetrachloroethane	8,060	1.30	57.9%	0.75	274.19	0.031	0.017	**181%**	3,395	0.55	1.00	54.7%
Tetrachloroethene	7,379	1.19	100.0%	1.19	434	0.049	1.000	5%	0.00	0.00	0.80	0.0%
1,1,2 Trichloroethane	4,797	0.77	98.3%	0.76	277	0.031	0.063	49%	81.5	0.01	2.00	0.7%
Trichloroethene	20,221	3.26	100.0%	3.26	1,189	0.133	0.450	30%	0.00	0.00	2.00	0.0%
Vinyl Chloride	619	0.10	100.0%	0.10	36.4	0.004	0.020	20%	0.00	0.00	0.20	0.0%
VOC's Subtotal (#/day)		**12.9**		**12.3**	**4,489**					**0.56**	**12.2**	
Total		**13.9**		**12.4**	**4,517**					**1.48**	**15.2**	

Table II
Air Stripper
Mass Balance

DEF Stream	Stack	=	317	scfm	H	=	81	ft	T_{Amb}	=	50	^0F
	Flow	=	300	acfm	ID	=	8	in	T_{Exit}	=	70	^0F

Scenario III	Incoming Steam			Air Stream					Water Stream			
	Ave Conc ug/l	Ave Load #/day	Strip Effic	Ave Load #/day	Ave Load #/yr	Max Actual Impact (ug/m3)	AGC (ug/m3)	% of AGC %	Ave Conc ug/l	Ave Load #/day	POTW Ave #/day	% of POTW
Flow (gpm)	**28.0**										139	
SemiVolatiles												
Hexachlorobutadiene	0.00	0.00	100.0%	0.00	0.0	0.000	0.045	0.0%	0.00	0.00	0.50	0.0%
Hexachloroethane	0.00	0.00	100.0%	0.00	0.0	0.000	0.250	0.0%	0.00	0.00		
3-Methylphenol (m-Cresol)	0.00	0.00	0.0%	0.00	0.00	0.000	180	0.0%	0.00	0.00		
4-Methylphenol (p-Cresol)	0.00	0.00	0.0%	0.00	0.00	0.000	180	0.0%	0.00	0.00		
Pentachlorophenol	3,250	1.09	0.0%	0.00	0.00	0.000	0.200	0.0%	3,250	1.09	2.50	44%
Phenol	0.00	0.00	0.0%	0.00	0.00	0.000	45	0.0%	0.00	0.00		
2,4,5-Trichlorophenol	64.3	0.02	0.0%	0.00	0.00	0.000	350	0.0%	64.3	0.02		
SVOC's Subtotal (#/day)		**1.12**		**0.00**	**0.0**					**1.12**	**3.0**	
Volatiles												
Carbon Tetrachloride	3,668	1.23	100.0%	1.23	450	0.051	0.067	**75%**	0.00	0.00	0.20	0.0%
Chloroform	4,457	1.50	100.0%	1.50	547	0.061	0.043	**143%**	1.34	0.00	2.40	0.0%
1,2 Dichloroethene									10.1	0.00	0.40	0.8%
cis-1,2-Dichloroethene	6,289	2.12	99.8%	2.11	771	0.086	1,900	0.00%				
trans-1,2-Dichloroethene	188	0.06	100.0%	0.06	23.0	0.003	0.100	2.6%				
Methylene Chloride	225	0.08	98.8%	0.07	27.3	0.003	2.100	0.1%	2.63	0.00	3.20	0.0%
1,1,2,2 Tetrachloroethane	1,132	0.38	0.00%	0.00	0.00	0.000	0.017	0.0%	1,132	0.38	1.00	38.1%
Tetrachloroethene	5,571	1.87	100.0%	1.87	684	0.077	1.000	8%	0.00	0.00	0.80	0.0%
1,1,2 Trichloroethane	1,013	0.34	69.4%	0.24	86	0.010	0.063	**15%**	310	0.10	2.00	5.2%
Trichloroethene	7,905	2.66	100.0%	2.66	971	0.109	0.450	**24%**	0.00	0.00	2.00	0.0%
Vinyl Chloride	1,018	0.34	100.0%	0.34	125.0	0.014	0.020	**70%**	0.00	0.00	0.20	0.0%
VOC's Subtotal (#/day)		**10.6**		**10.1**	**3,686**					**0.49**	**12.2**	
Total		**11.7**		**10.1**	**3,686**					**1.61**	**15.2**	

Table II
Air Stripper
Mass Balance

	Stack	=	634	scfm	ID	=	8	in
Combined Air Stream	Flow	=	600	acfm	T_{Amb}	=	50	^0F
	H	=	81	ft	T_{Exit}	=	70	^0F

Scenario III	Air Stream				
	Ave Load			Max Actual Impact (ug/m3)	AGC (ug/m3)
	#/hr	#/day	#/yr		
Flow (gpm)	**41.4**				
SemiVolatiles					
Hexachlorobutadiene	1.95E-03	0.05	17.1	0.00	0.045
Hexachloroethane	1.28E-03	0.03	11.2	0.00	0.250
3-Methylphenol	0.00E+00	0.00	0.00	0.00	180
4-Methylphenol	0.00E+00	0.00	0.00	0.00	180
Pentachlorophenol	0.00E+00	0.00	0.00	0.00	0.200
Phenol	0.00E+00	0.00	0.00	0.00	45
2,4,5-Trichlorophenol	0.00E+00	0.00	0.00	0.00	350
SVOC's Subtotal (#/day)	**3.23E-03**	**0.08**	**28.3**		
Volatiles					
Carbon Tetrachloride	0.08	2.01	734	0.09	0.067
Chloroform	0.24	5.66	2,065	0.25	0.043
1,2 Dichloroethene	0.00				
cis-1,2-Dichloroethene	0.12	2.82	1,029	0.12	1,900
trans-1,2-Dichloroethene	0.01	0.15	53.0	0.01	0.100
Methylene Chloride	0.02	0.59	216	0.03	2.100
1,1,2,2 Tetrachloroethane	0.03	0.75	274.19	0.03	0.017
Tetrachloroethene	0.13	3.06	1,118	0.13	1.000
1,1,2 Trichloroethane	0.04	1.00	363	0.04	0.063
Trichloroethene	0.25	5.92	2,159	0.26	0.450
Vinyl Chloride	0.02	0.44	161.4	0.02	0.020
VOC's Subtotal (#/day)	**0.93**	**22.4**	**8,175**		
Total	**0.94**	**22.5**	**8,203**		

Table II
Air Stripper
Mass Balance

Combined Water Stream

Scenario III	Water Stream		
	Ave Conc	Ave Load	
	ug/L	#/day	#/yr
Flow (gpm)	**41.4**		
SemiVolatiles			
Hexachlorobutadiene	0.00	0.00	0.0
Hexachloroethane	0.00	0.00	0.0
3-Methylphenol	0.03	0.02	5.70
4-Methylphenol	0.03	0.02	5.70
Pentachlorophenol	3.96	1.97	718
Phenol	0.03	0.02	5.48
2,4,5-Trichlorophenol	0.04	0.02	7.90
SVOC's Subtotal (#/day)		**2.04**	**743**
Volatiles			
Carbon Tetrachloride	0.00	0.00	0.00
Chloroform	0.00	0.00	0.16
1,2 Dichloroethene			
cis-1,2-Dichloroethene	0.00	0.00	0.00
trans-1,2-Dichloroethene	0.00	0.00	0.00
Methylene Chloride	0.00	0.00	0.32
1,1,2,2 Tetrachloroethane	1.86	0.93	339
Tetrachloroethene	0.00	0.00	0.00
1,1,2 Trichloroethane	0.24	0.12	42.8
Trichloroethene	0.00	0.00	0.00
Vinyl Chloride	0.00	0.00	0.00
VOC's Subtotal (#/day)		**1.05**	**382**
Total		**3.08**	**1,125**

Table III
Chemicals of Concern
Stack Height Effects

NY State **DAR-1** **Prep:EFD** **11/4**

Combined Effluent Stream

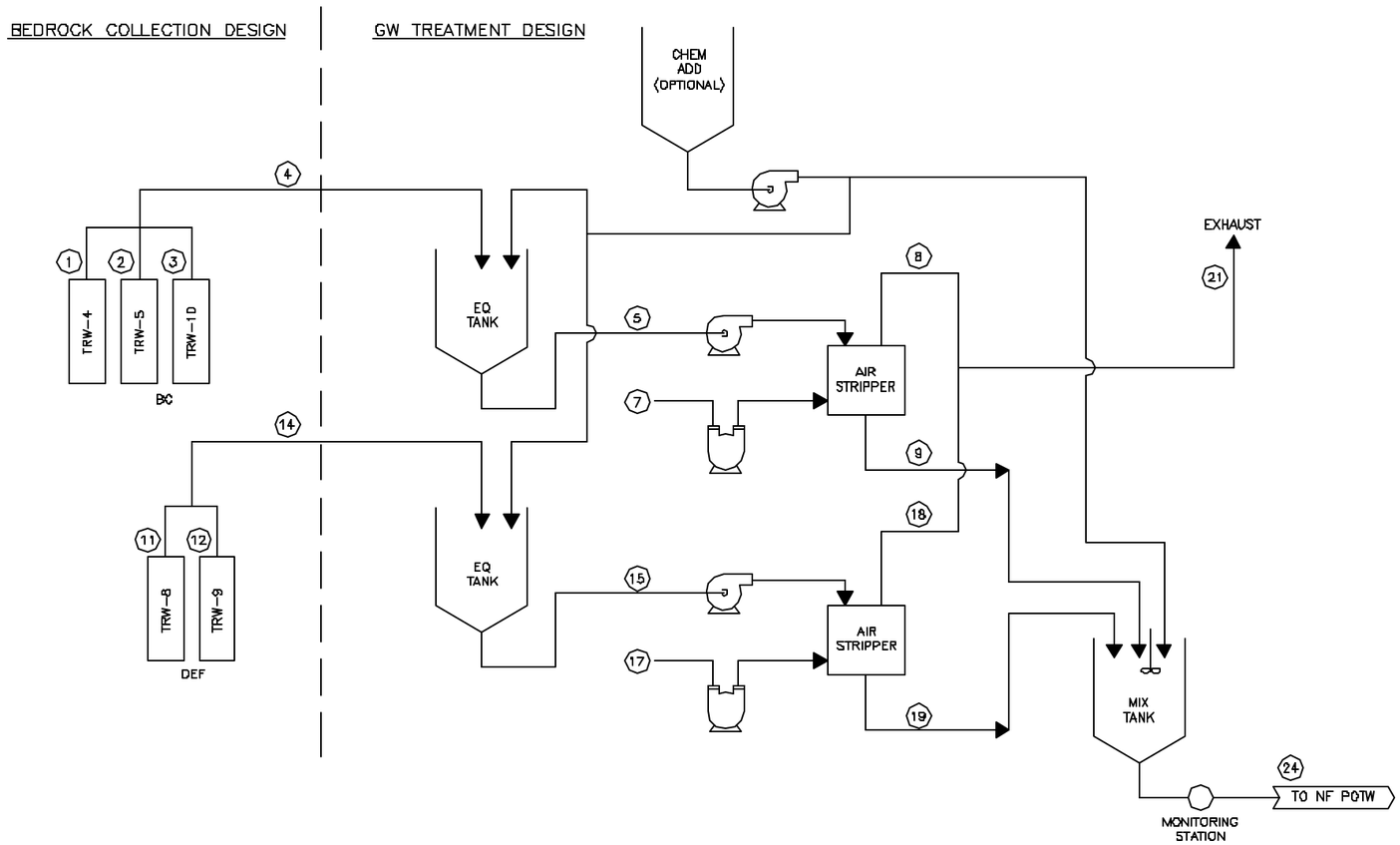
Ambient Temp	50	^{0}F	=	509.6	^{0}R	Bldg Height	15	ft	
Effluent Temp	70	^{0}F	=	529.6	^{0}R	Stack diameter	8	in	in
Air Flow Rate	634	scfm	=	600	acfm	Air Exit Velocity	28.6	ft/sec	

Stack Height (ft)	**25**	**35**	**45**	**55**	**65**	**75**	**85**	**Min Ht**
h_s/h_b	1.67	2.33	3.00	3.67	4.33	5.00	5.67	
F_m	87.72	87.72	0.03	0.03	0.03	0.03	0.03	
h_e	29.89	39.89	45.54	55.54	65.54	75.54	85.54	
Impact Reduction	0.75	0.75	0.40	0.40	0.40	0.40	0.40	

Semi-Volatiles	**AGC**	**#/day**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**100% AGC**
Hexachlorobutadiene	0.045	0.05	81.8%	42.7%	16.9%	10.8%	7.5%	5.4%	4.1%	22.5
Hexachloroethane	0.250	0.03	9.6%	5.0%	2.0%	1.3%	0.9%	0.6%	0.5%	10.6
3-Methylphenol	180	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
4-Methylphenol	180	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Pentachlorophenol	0.200	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Phenol	45	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
2,4,5-Trichlorophenol	350	0.00	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Total SVOC's	(#/day)	**0.08**								

Volatiles	**AGC**	**#/day**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**% AGC**	**100% AGC**
Carbon Tetrachloride	0.067	2.01	**2359%**	**1232%**	**488%**	**312%**	**215%**	**156%**	**118%**	92
Chloroform	0.043	5.66	**10336%**	**5399%**	**2137%**	**1367%**	**942%**	**684%**	**517%**	177
1,2 Dichloroethene										
cis-1,2-Dichloroethene	1,900	2.82	0%	0%	0%	0%	0%	0%	0%	
trans-1,2-Dichloroethene	0.10	0.15	114%	60%	24%	15%	10%	8%	6%	27
Methylene Chloride	2.10	0.59	22%	12%	5%	3%	2%	1%	1%	
1,1,2,2 Tetrachloroethane	0.017	0.75	**3471%**	**1813%**	**718%**	**459%**	**316%**	**230%**	**174%**	109
Tetrachloroethene	1.00	3.06	**241%**	**126%**	50%	32%	22%	16%	12%	37
1,1,2 Trichloroethane	0.063	1.00	**1242%**	**649%**	**257%**	**164%**	**113%**	82%	62%	69
Trichloroethene	0.45	5.92	**1033%**	**539%**	**213%**	**137%**	94%	68%	52%	63
Vinyl Chloride	0.02	0.44	**1737%**	**907%**	**359%**	**230%**	**158%**	**115%**	**87%**	80
Total VOC's	(#/day)	**22.4**								
Total	(#/day)	**22.5**								

NECCO PARK STREAM CHARACTERIZATION				
#	DESCRIPTION	MATRIX	GPM	CFM
1	TRW-4	GW	0.4	
2	TRW-5	GW	5.0	
3	TRW-10	GW	8.0	
4	BC	GW	13.4	
5	BC TO AIR STRIPPER	WATER	13.4	
6				
7	AIR TO AIR STRIPPER	AIR		300
8	AIR STRIPPER EXHAUST	AIR		300
9	AIR STRIPPER DISCHARGE	WATER	13.4	
10				
11	TRW-8	GW	13.0	
12	TRW-9	GW	15.0	
13				
14	DEF	GW	28.0	
15	DEF TO AIR STRIPPER	WATER	28.0	
16				
17	AIR TO AIR STRIPPER	AIR		300
18	AIR STRIPPER EXHAUST	AIR		300
19	AIR STRIPPER DISCHARGE	WATER	28.0	
20				
21	COMBINED AIR STRIPPER EXHAUST	AIR		600
22				
23				
24	DISCHARGE TO POTW	WATER	41.4	
25				
26				
27				
28				
29				



THESE DRAWINGS HAVE BEEN REDUCED TO HALF-SIZE

DRAFT PRELIMINARY DESIGN

URS Corporation
Group Consultants
540 Elliott Street, Buffalo, New York 14203 (716)856-5636

REV. NO. –

NO.	REVISIONS	BY	DATE

JAMES LANZO
N.Y. PROFESSIONAL ENGINEER NO. 080448

	DESIGNED	INITIALS
	ED DINSMORE	ED
DRAWN	KAREN A. HARTNETT	KAH
CHECKED	JOHN WOKASIEN	JCW
APPROVED(DESIGN)	JAMES LANZO	JL
APPROVED(CONSTRUCTION)	–	

Corporate Remediation Group
An Alliance between DuPont and The M-I Diamond Group
Barley Mill Plaza, Building 27
Wilmington, Delaware 19880-0027

PROCESS FLOW DIAGRAM

DUPONT NECCO PARK
NIAGARA FALLS NEW YORK
GROUNDWATER TREATMENT
FACILITY DESIGN

SCALE	DATE	DRAWING NO.	SHEET
NONE	SEPT. 2003	1	N/A

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N

EASEMENT FOR
NIAGARA MOHAWK
POWER CORP.
TRANSMISSION LINE
R.O.W.

PROPOSED BFI/ALLIED
EASEMENT

ASPHALT PAVING

UNPAVED ROAD

DIRT ROAD

CITY OF NIAGARA FALLS
TOWN OF NIAGARA

120' 0 120'

SCALE: 1"= 120'

NIAGARA MOHAWK AND BFI/ALLIED
EASEMENT LOCATIONS

URS

FIGURE 3-3

APPENDIX F

SAMPLING, ANALYSIS AND MONITORING PLAN DUPONT NECCO PARK REMEDIAL PROGRAM NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

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FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This Sampling, Analysis, and Monitoring Plan (SAMP), prepared in accordance with Administrative Order (AO) Index No. II CERCLA-98-0215 dated September 28, 1998 issued by USEPA describes analysis and monitoring that will be conducted during the operation and maintenance (O&M) activities for the Necco Park site. As described in the Long-Term Groundwater Monitoring Plan (LGMP), hydraulic and chemical monitoring to assess the effectiveness of source area control will be conducted. The LGMP also describes DNAPL monitoring. The LGMP is included as Appendix B. This SAMP also describes sampling required by Niagara Falls POTW to remain compliant with the existing discharge permit. Discharge under this permit began in May 2004. Self-Monitoring reports are submitted to the POTW on a quarterly basis. Compliance with NYSDEC air emission regulations will be maintained during operation of the Groundwater Treatment Facility (GWTF) by the measures described in this SAMP.

Other sampling associated with the GWTF (influent, effluent, and extraction well sampling) is described in this SAMP. Initial in-process sampling conducted to confirm assumptions made in the design phase of project are described in the Necco Park Initial Testing Program Plan. The in-process sampling procedures will be conducted in accordance with this SAMP.

1.1 SAMP Organization

This SAMP is divided into three sections:

- Section 1 provides an introduction to the SAMP
- Section 2 provides a description of sampling program tasks
- Section 3 describes the monitoring and sampling procedures

Detailed field and laboratory QA/QC program and analytical methods are described in the Necco Park Quality Assurance Project Plan (QAPP). The QAPP is provided as Appendix G.

1.2 Hydraulic Monitoring

Hydraulic monitoring will be conducted to assess the effectiveness of the groundwater extraction system in achieving hydraulic of the source area as described in the Necco Park SOW. Performance standards defined in the SOW require that the extraction system maintain an inward gradient in the A-zone overburden and B through F bedrock flow zones. Monitoring will include routine recording of water levels from wells and piezometers in the source area and far field as described in the LGMP.

Results of pumping tests conducted during the pre-design investigation and monthly monitoring conducted during construction of the new extraction system continue to show hydraulic control of the A-zone can be achieved through pumping of the B/C-zone upper bedrock. A key element of the long-term monitoring program includes comprehensive

measures to monitor the effectiveness of controlling the A-zone source area by pumping the upper bedrock.

As requested by USEPA, an assessment of the effectiveness of the system fully controlling the A-zone source area will be submitted to USEPA within six months of the system start-up. The assessment will include all relevant performance data collected to date.

1.3 Chemical Monitoring

Chemical monitoring will include:

- ❑ Collection of groundwater samples from monitoring wells
- ❑ Collection of aqueous samples from the extraction and treatment system
- ❑ Collection of aqueous samples from the discharge to the POTW monitoring station

Groundwater sampling conducted during the pre-design investigations (2000 baseline event and 2002 source area re-assessment sampling), utilizing existing and wells installed during the pre-design investigation, have resulted in the establishment of a network of wells that will be used to meet the following objectives as defined in the SOW:

- ❑ Monitor the effectiveness of the extraction wells in reducing chemical concentrations in the zone-specific source areas
- ❑ Monitor the far-field groundwater chemistry to determine if the extraction system is controlling off-site migration of chemical constituents associated with the Necco Park site
- ❑ Monitor natural attenuation and intrinsic bioremediation in the source area and far-field
- ❑ Continue to evaluate the effectiveness of the remedial action

A list of wells that will be used for long-term chemistry monitoring has been prepared and is presented in the LGMP. The first compliance monitoring event will occur within one month of system startup to establish baseline chemistry. The wells used for chemical monitoring may be modified over the course of the remedial action based on the data compiled over the first few years of system operation. As described in the LGMP, long-term chemistry monitoring will include an assessment of natural attenuation processes in the source area and far-field.

To maintain compliance with the existing discharge permit with the City of Niagara Falls POTW, discharge sampling will continue. Current discharge includes treated groundwater from the GWTF and untreated surface water from the AGM cells located on the landfill. In addition, samples from the individual extraction wells and influent/effluent samples will be collected. The frequency of the treatment system sampling is discussed in Sections 2.2.2 and 2.2.3.

Air emission compliance monitoring for the GWTF will be conducted during O & M activities. Interim approval of the operation of the GWTF (air stripping with discharge to

an 82-foot stack) was given by NYSDEC on May 27, 2004. Monitoring to be conducted during the O & M activities are described in Section 2.2.3.

1.4 DNAPL Monitoring and Recovery

Monitoring for the occurrence of DNAPL has been conducted routinely at the Necco Park site since the early 1980's. A monitoring and recovery program was instituted in 1989 to remove free-phase DNAPL from monitoring and extraction wells. A total of approximately 7,332 gallons of DNAPL have been recovered to date. The majority of DNAPL has been removed from two wells in close proximity to each other: existing extraction well RW-2 and monitoring well VH-129C.

As part of the 2000 pre-design activities, a comprehensive DNAPL survey utilizing over 150 wells was conducted. Results of the survey were provided in the *Necco Park Source Area Report* (CRG 2001). Based on findings of subsequent pre-design investigations, a second comprehensive DNAPL survey will be conducted at all new and existing wells where any of the DNAPL criteria has historically been exceeded or has been observed in bottom samples. As described in the LGMP, a comprehensive DNAPL survey will be conducted in 2005 prior to the baseline groundwater sampling event. Based on the DNAPL observations made during the supplemental DNAPL evaluation, a list of wells and observation frequencies will be prepared and submitted to USEPA for approval.

Detailed description of DNAPL monitoring and recovery procedures are provided in the DNAPL Monitoring and Recovery Plan (Appendix D).

1.5 Schedule and Reporting

Assuming a full-scale system operation start date of April 5, 2005, the following monitoring will be conducted in 2005:

Task	**Duration**
Comprehensive DNAPL Survey	April 25th to May 4th
First Semi-Annual Groundwater Sampling Event	May 4th to May 13th
Second Semi-Annual Groundwater Event	October 31st to November 9th

In addition to the key events included above, monthly water levels and DNAPL observations conducted in 2004 will continue in 2005.

Quarterly reports, to be submitted 30 days after the end of the quarter, will include the following:

- ❑ Water levels
- ❑ Potentiometric surface maps contoured at one foot intervals
- ❑ DNAPL observation and removal summary
- ❑ Summary of system operations
- ❑ Air emissions monitoring results

Assuming a system operation start date of April 5, 2005, the first quarterly report will be submitted to USEPA at the end of July.

The quarterly report will not include an interpretation of the results. Data analysis and interpretation will be provided in the annual report. The annual report will include the following:

- Groundwater and DNAPL monitoring data from the previous year's sampling event
- An analysis of the sampling results to determine whether groundwater contaminant migration has been effectively prevented or stabilized
- Time versus concentration plots for contaminants and wells to represent reductions or changes in the concentration of contaminants in groundwater
- An evaluation of whether the concentration trends in the groundwater plume are consistent with the predictions of groundwater movement in the Remedial Design and AOA

Annual reports will be submitted to EPA no later than 90 days after the end of the calendar year in which the data was collected.

In addition to the quarterly reports, submitted in 2005 (2Q05 and 3Q05), DuPont will submit a letter report containing an assessment of the effectiveness of the system in controlling the A-zone source area. Assuming a system start-up date of April 5, 2005, the report will be submitted to USEPA by October 5, 2005. The report will include all relevant performance data collected to date.

2.0 SAMPLING SUMMARY

2.1 Hydraulic Monitoring

2.1.1 Monitoring Frequency and Procedures

Water levels will be recorded at the locations included in Table 5-1 of the LGMP. Water levels will be recorded monthly during the first year of system operation and quarterly thereafter. Hydraulic monitoring will include an assessment of atmospheric influences (e.g., pressure fronts or precipitation) on the top-of-clay zone by continuous monitoring using data loggers at select A zone and top-of-clay piezometers during precipitation events. Continuous monitoring will also be conducted at select bedrock well locations. Assessment of the top-of-clay zone began in 2004 following the Phase 3 PDI and will continue to be monitoring during O & M activities.

2.2 Chemical Monitoring

2.2.1 Monitoring Well Sampling

Using the 2000 baseline and 2002 source area reassessment results (CRG, 2001 and 2003), a list of wells and analytical parameters that will be used for long-term monitoring has been prepared and is included in the LGMP. Samples from a subset of the wells will be also be analyzed or additional parameters as part of a natural attenuation assessment. Samples will be collected at fifty-six well locations. Based on the sampling results, the wells used for chemical monitoring may be modified over the course of the remedial action.

Consistent with groundwater sampling conducted during the pre-design investigations, samples will be collected using USEPA low-flow procedures as described in the RD Work Plan. The samples will be collected using a bladder pump equipped with Teflon®-lined HDPE tubing and Teflon® bladder. Sampling procedures and frequency are described in Section 2.2.4.

2.2.2 Groundwater Treatment System and POTW Compliance Monitoring

In accordance with the discharge permit issued by the City of Niagara Falls POTW, discharge from Necco Park is routed to Niagara Falls wastewater treatment facility. Monitoring of discharge (flow and water quality) is conducted at a City of Niagara Falls manhole (Manhole MS#1). Continuous flow and composite sampling is conducted at MS#1.

Current discharge to the POTW includes treated groundwater from the GWTF and untreated surface water from the AGM cells. Samples are collected on a quarterly basis and the results are submitted in a self-monitoring report to the Niagara Falls Water Board. Sampling and reporting under this permit began in 2004 and will continue

throughout the duration of the permit. The samples are analyzed for the parameters listed in the POTW discharge permit included as attachment E-1 in Appendix E (Site Management Plan).

In addition to the POTW-required sampling, system process sampling will be conducted during system startup as described in the Initial Testing Program Plan (ITPP). Because of the different chemical make-up between the upper and lower bedrock zones, separate influent/effluent samples will be collected from B/C and D/E/F systems. Analytical parameters are provided in Table 1 of the ITPP. Sampling procedures and frequency are described in Section 2.2.4.

2.2.3 Air Emissions Compliance Monitoring

Given the relatively straightforward design of the GWTF, air emissions will be calculated by subtracting the total mass exiting the GWTF to the POTW monitoring from the total mass entering the air strippers.

2.2.4 Monitoring Frequency and Procedures

The monitoring wells included in Table 5-2 of the LGMP will be sampled on a semi-annual basis during the first three years of system operation to monitor the effectiveness of the remedy for hydraulic control. Sampling frequency thereafter will be annually. The first semi-annual event will occur within one month of system startup to establish baseline chemistry. Groundwater samples will be collected using low-flow procedures as described in detail in Section 3.4.2. Purge water will be disposed at the GWTF as described in the WMP (Appendix I).

Sampling frequency associated with the POTW discharge permit and treatment system will continue to be collected on a quarterly basis. Treated discharge from the monitoring station (MS#1) will continue to be collected with an automated composite sampler. Treatment system sampling, including influent/effluent and extraction well sampling will be collected from in-line sample ports. Influent/effluent sampling will be conducted quarterly. Process operability samples will be collected during system startup at the frequency described in the ITPP.

Using analytical data from the influent and POTW discharge sampling, mass balance calculations will be completed to determine air emissions of volatile organic from the GWTF. Results of the monitoring will be included in the quarterly compliance monitoring reports.

2.3 DNAPL Monitoring and Recovery

2.3.1 Existing DNAPL Program

The existing DNAPL program includes monthly observations at twenty-three well and piezometer locations. In addition, observations are conducted at six well locations on a semi-annual basis. The list of wells where DNAPL observations are conducted includes the wells listed in Table 1 of the DNAPL Monitoring and Recovery Plan (see Appendix

D). Observations at the pre-design well locations were observed on only a few occasions shortly after installation and have not accumulated DNAPL in over three years at some locations.

There are only two locations where DNAPL is routinely encountered and removed: recovery well RW-2 and nearby monitoring well VH-129C. The annual average quantity removed from these two wells over the past three years is approximately 180 gallons. DNAPL is removed from the wells on a monthly basis using dedicated air-lift pumps. Since recovery activities began in 1989, over 7,375 gallons of DNAPL has recovered and disposed of. Detailed descriptions of DNAPL monitoring and removal procedures are provided in the DNAPL Monitoring and Recovery Plan (Appendix D).

2.3.2 Long Term DNAPL Program

DNAPL monitoring and recovery at the Necco Park conducted over the past 16 years has shown that DNAPL in recoverable quantities is limited to a few B/C-zone bedrock wells located in the southeast corner of the site. The results of the comprehensive DNAPL survey described in the LGMP will determine the list of wells to be used for long term monitoring. Using the survey results, and historical observations, a list of well locations where DNAPL observations will be conducted will be prepared. Monitoring will be conducted either monthly of semi-annually based on the frequency it which DNAPL has been historically observed.

3.0 SAMPLING PROCEDURES

3.1 General Field Procedure Guidelines

The Field Team Leader and sampling contractor with review the sampling locations, prior to proceeding with field activities. To ensure that sampling is implemented correctly and safely, the following steps will be followed prior to commencing field activities:

- ❑ The quality assurance officer will notify the laboratory of the upcoming sampling event so that the laboratory can prepare the appropriate type and number of sample containers. The anticipated number of samples, list of analytes, replicate requirements, and the number of extra bottles needed for quality control testing will be specified to the laboratory manager.
- ❑ The sampling subcontractor will inspect all sample bottle shipments and equipment to be used during the sampling event.
- ❑ The sampling subcontractor will check water quality meters to be used during sampling (i.e., pH, temperature, dissolved oxygen, specific conductance, and redox meters) to ensure proper calibration and precision response.
- ❑ The field sampling team and/or the quality assurance officer will assemble all forms to be used in the field (including the field logbook, chain-of-custody (COC) sheets and seals, and sample analysis request forms).
- ❑ Laboratory personnel will pre-label bottles during the mobilization phase of the sampling event to reduce confusion in the field. Certain information (e.g., well number, sample location, sample identification number, preservative, and type of parameters) will be affixed to the label with permanent ink during pre-field activities. Other information (e.g., sample time and date, name of sampler collector) will be added to the label only after the sample is collected. A cross-reference to information contained on the label will be documented in the field notebook and will correspond with the sampling location.
- ❑ Prior to sampling, sampling personnel will review proper sampling protocols provided in this SAMP. In addition, proper health and safety protocols as identified in the site specific HASP (see Appendix H) will be reviewed prior to sampling.
- ❑ Scheduling and coordination of the sampling team will be completed prior to field mobilization and then reviewed periodically. Equipment calibration and inspection will be completed at least once per day (when the equipment is used). Review of procedures and protocols will be completed as required.

In general, samples will be collected in the following order to reduce the loss of volatile components:

- ❑ Volatile organics
- ❑ Volatile gases (for MNA samples)
- ❑ Extractable organics
- ❑ MNA Analytes (where applicable)
- ❑ Dissolved Metals
- ❑ Chloride
- ❑ DNA (for MNA samples)
- ❑ Field parameters

Detailed field and laboratory QA/QC procedures to be followed during sampling are included in the QAPP (Appendix G.)

3.2 Calibration Procedures

Calibration is the process of establishing a relationship of a measured output to a known input and provides a point of reference to which other sample analyses can be correlated. Each instrument will be calibrated prior to its first use each day. More frequent calibration will be conducted as necessary, based on instrument performance checks and operator judgment. All calibrations will be performed using standard industry practices or equipment manufacturer recommendations.

3.2.1 Field Procedures

Field meters used during sampling (i.e., PID, pH, conductivity, temperature, and water level) will be checked for calibration consistent with manufacturer-recommended procedures. Where the manufacturer has not specified a calibration interval for an instrument, it will be established based on industry practice or by the sampling team. The sampling team will supply and maintain field equipment.

The pH meter calibration will be checked at each well by using at least two different buffer solutions that bracket the expected range of pH in the wells to be sampled. The meter will be calibrated daily in accordance with the manufacturer's specifications and SW-846 standards. The probe of the meter and sampling cups will be thoroughly rinsed with deionized water before and after use. Additional calibration procedure details are described in the manufacturer’s guidelines for this instrument.

The specific conductivity meter will be checked daily against a laboratory-prepared potassium chloride (KCl) standard solution. When the meter exhibits unacceptable error (greater than 5 percent), it will be recalibrated according to the procedure defined in the manufacturer’s guidelines for this instrument. The probe of the meter and the sampling cups will be thoroughly rinsed with deionized water before and after use.

The static water level in a well will be measured by using an electric water level meter. The water level will be measured from a scribed mark at the top of the steel or PVC well

casing. As a reference, the forms used to record water levels will include the water levels from the previous water level event. If the water level varies by more than 1.5 feet, the water level will be taken again to verify the first recorded reading.

A PID will be used for health and safety monitoring in accordance with the site specific HASP. The calibration will be in accordance with manufacturer's specifications. The PID will be calibrated using a zero air gas and appropriate calibration indicator gas. The PID must be quipped with a 11.7 eV lamp.

3.2.2 Standards

For the pH meter, buffers will be at pH 4, pH 7, and pH 10. Two of the three buffers will be used to calibrate the meter. The third buffer will be used for periodic calibration checks. The pH 7 buffer will always be one of the calibration buffers. The buffers will be purchased from a laboratory chemical supply manufacturer, and the exact pH will be noted on a calibration form.

For the conductivity meter, reference solutions will be in the range of 500 micromhos per centimeter (µmhos/cm). Three known reference solutions will be used for each calibration. The median standard will be used for calibration checks. Reference solutions will be purchased from a chemical supply manufacturer.

For the PID, span gases will be purchased from chemical suppliers. These gases will be in the 10 to 100 parts per million (ppm) range. Calibration procedures for all health and safety related equipment are specified in the HASP (Appendix H).

3.3 Decontamination of Field Equipment

Sampling equipment used will be non-dedicated and therefore will require decontamination between sample locations. The following decontamination procedures will be followed.

Soil sampling equipment, such as carbon-steel split-spoon samplers and stainless-steel scoops will be decontaminated prior to use in the field, between sampling points, and at the completion of sampling. All field equipment will be decontaminated in a manner appropriate to the matrix being sampled, the type and anticipated concentration of chemicals, and the anticipated quantity of sample material. Equipment will be decontaminated using the following general sequence: high pressure/hot water cleaning, hexane rinse, distilled/deionized water rinse, and air dry.

If there is a significant lapse of time between decontamination of the sampling equipment and collection of the sample, then the decontaminated sampling equipment will be protected from additional contamination by wrapping the decontaminated equipment in clean bags and placing the clean bags in clean containers for transport or storage. Decontamination fluids will be collected and disposed of at the GWTF.

Groundwater sampling equipment, such as the Kemmerer bottom samplers or bladder pumps, will be decontaminated prior to use in the field, between sampling points, and at the completion of sampling to prevent cross contamination and introduction of contaminants from an external source. Non-dedicated bladder pumps will be

decontaminated internally and externally daily. All field equipment will be decontaminated in a manner appropriate to the matrix being sampled, the type and anticipated concentration of chemicals, the required detection limit, and the anticipated quantity of sample material. Equipment will be decontaminated as follows:

- ❑ Electronic water levels, pressure transducers and cables used for hydraulic head measurements will be decontaminated by scrubbing in a bucket of potable water and non-phosphate soap followed by a distilled/deionized water rinse. Kemmerer sampler used to take well bottom samples steam cleaned thoroughly and rinsed with hexane and distilled/deionized water.
- ❑ Non-dedicated bladder pumps used for low-flow groundwater sampling will be decontaminated by operating the pump in a clean vessel containing potable water and non-phosphate soap followed by operating the pump in a container of distilled/deionized water. If the Teflon® bladder can not be sufficiently decontaminated (i.e., evidence of sediment residue at bladder/pump connections), a new bladder will be installed. The external portions of the pump will be decontaminated by scrubbing the pump housing with water and soap and rinsing with distilled/deionized water. At well locations known or suspected to contain NAPL the decontamination procedures for new pumps (see below) will be employed. Following decontamination, the pump will be wrapped in aluminum foil and placed in a polyethylene bag for transport to the well.
- ❑ New bladder pumps received from the supplier will be decontaminated (internally and externally) as follows:
  - Wash and scrub in non-phosphate soap and potable water
  - Rinse with potable water
  - Rinse with 10% nitric acid
  - Rinse with potable water
  - Rinse with hexane
  - Rinse with analyte-free deionized water
  - Air dry

Decontamination fluids will be collected and disposed of at the GWTF.

3.4 Groundwater Sampling Procedures

3.4.1 Low Flow Purging and Sampling

A detailed description of the low-flow purging and sampling procedures are provided in Attachment F-1. A summary of the procedures is provided below.

A bladder pump will be used to purge and sample each groundwater monitoring well. The pump will be lowered into the well to a depth corresponding to the center of the well screen for A-zone wells and the fracture elevation for bedrock wells. Pumping of the well will be initiated at 200 to 1,000 milliliters per minute (ml/min). The objective is to minimize water level draw-down in the well (less than 0.3 feet). The flow rate will be adjusted as necessary to achieve this objective. Optimum pumping rate for the A-zone overburden wells is 300 to 500 ml/min and 500 to 1,000 ml/min for bedrock wells.

During purging, in-line water quality indicator parameters (turbidity, temperature, specific conductance, pH, oxidation-reduction potential, and dissolved oxygen) will be monitored every three to five minutes. Groundwater is considered stabilized and ready for sample collection once all the field indicator parameter values remain within plus or minus 10 percent for three consecutive readings (measured three to five minutes apart), with the exception of plus or minus 0.2 units for pH.

When each well has been adequately purged, groundwater samples will be collected using the bladder pump. Groundwater samples for VOCs will be collected first, then followed by the remaining analyte groups as described in the Section 3.1. A flow rate of 100 to 250 ml/min will be maintained during sampling.

Any remaining sample containers will be filled to the container shoulder with sufficient headspace to allow for the addition of preservative, if necessary. Field filtering will be conducted for dissolved metals analysis using a 0.45-micron (µm) membrane filter immediately after collection, but prior to preservation. After the sample containers are filled, they will be labeled appropriately and placed in a cooler containing wet ice.

The instrument used to determine the field parameters will be appropriately calibrated before being used. The results of each analysis will be recorded in the field documentation. To prevent cross-contamination between wells, the bladder pump will be cleaned as described in Section 3.3 and dedicated tubing will be used. Purge water will be disposed of at the GWTF.

3.4.2 Extraction Well Sampling

Following the process operability sampling described in the ITPP, extraction wells will be sampled annually. Purging before sampling will not be required when the wells have been operational for at least 24 hrs before sampling.

Samples will be collected from the in-line ports situated with the well pump house. The samples will be analyzed for the parameters included on the Necco Park indicator list. Field parameters (pH, temperature, redox potential and specific conductance) will be recorded.

3.4.3 Influent/Effluent Sampling

Following the process sampling described in the ITPP, quarterly sampling of the GWTF influent and effluent will be conducted. Two influent samples, one from the B/C-zone influent tank and one from the D/E/F influent tank will be collected. One effluent sample will be collected from the combined effluent tank. Samples will be collected from in-line sample ports on the tanks. Consistent with ITPP, samples will be analyzed for the indicator list VOA's and SVOA's. Additional parameters, such as total barium, dissolved barium, and sulfates may be analyzed periodically. Field parameters (pH, temperature, redox potential and specific conductance) will be recorded.

3.5 Hydraulic Monitoring

3.5.1 Water Level Measurements

The depth to groundwater in the well will be measured using an electronic water level indicator. This instrument is capable of measuring the depth to water to an accuracy of 0.01 foot. The depth to water will be measured from the top of the surveyed inner well casing at wells that have a inner casing (i.e., the A-zone wells/piezometers). Water levels from the bedrock zone wells will be measured from the top of the well casing. The surveyed reference point is marked on the top of the well casing. Water level measurements will be recorded in the field log book. The field records will note which reference point was used for the measurement at the well. The following information will be recorded in the field notebook:

- ❑ Well number and letter designation.
- ❑ Date and time of each measurement.
- ❑ Depth to water from the top of casing (to the nearest 0.01 foot).
- ❑ Well condition (i.e. bent or modified casing, broken lock, etc.).

As a reference, the forms used to record water levels will include the water levels from the previous water level event. If the water level varies by more than 1.5 feet, the water level will taken again to verify the first recorded reading. The contractor will ensure that the well is locked after recording the water level. The contractor will provide a copy of the water level measurements to the DuPont site representative before leaving the site.

The frequency of hydraulic monitoring will be monthly for the first year of system operation. Thereafter, monitoring will be conducted on a quarterly basis. Groundwater level measurements will be collected from the wells and piezometers identified in LGMP. The well locations are shown on Figure 2-1.

Water levels will be recorded at all the well locations immediately before system start-up to determine static levels. A schedule will be developed such that:

- ❑ The measurements will be taken over a two hour period
- ❑ Measurements shall not be taken less than two days after any monitoring well purging or sampling operations.
- ❑ Unless noted, measurements will not be taken within 48 hours of any time period during which pumping wells were not operating.

To account for observed tidal-like effects resulting from the New York Power Authority water withdrawal schedule, water level measurements at all wells which monitor the F and G-zones will be collected between the hours of 11:00 AM and 4:00 PM Eastern Standard Time. To monitor influence from the conduits, water levels from wells 136F and 136G will be recorded at the beginning and end of the monitoring round. Pumping rates from all pumping wells will be recorded at the beginning and end of groundwater level measurements events.

Based on the measured groundwater levels, poteniometic maps will be prepared for the A-zone overburden and bedrock flow zones. These maps will allow for the interpretation of groundwater gradient and flow direction and will be included in the compliance monitoring reports.

To prevent cross-contamination between wells, the instrument used to measure the depth-to-water will be decontaminated before being taken to the site and between each well. Decontamination procedures are discussed in Section 3.3.

3.6 DNAPL Monitoring Program

3.6.1 Observations

Well bottom samples for visual examination shall be collected from each monitoring well to be sampled prior to purging activities to determine if DNAPL is present. The sampling will be performed at least one week prior to any low flow sampling event to allow ample time for stabilization of sediments that may have been disturbed during well bottom sampling. DNAPL is generally present as a brown-black heavy oil (denser than water) usually associated with sediment in the sample, tends to adhere to the glass bottle and exhibits immiscibility in water. Previous analyses have shown that a major portion of the DNAPL is hexachlorobutadiene, a compound with a very low threshold limit value (TLV) (0.02 parts per million (ppm)) in air based on an eight-hour time weighted average (TWA). The Health and Safety Plan (HASP) describes appropriate personal protection for this task.

Bottom samples from four-inch diameter wells will be collected with a 2-inch Kemmerer sampler. Bottom samples from two-inch diameter wells will be collected with weighted tubing attached to a peristaltic or centrifugal pump. The Kemmerer will be decontaminated between well locations as described in Section 3.3.

Bottom samples shall be placed in a clear wide-mouth glass jar and left for at least one hour to allow sediment settlement. Samples will then be visually examined for the presence of DNAPL. If DNAPL can not be distinguished from sediment based on visual inspection, a micro pipette will be used to transfer a sample of bottom material to a clear glass flask containing deionized/distilled water. If the bottom material disperses, it will be assumed to be sediment. If it does not disperse, it will be recorded as DNAPL. If DNAPL is observed, a DNAPL thickness measurement of the well will be recorded prior to purging activities using a weighted cotton string or an oil/water interface probe (IFP). If any DNAPL sampling or purging activities are to be performed, this work will be conducted using supplied breathing as described in the HASP (Appendix H).

3.6.2 Recovery

DNAPL is removed from the wells using dedicated Teflon® bladder pumps and tubing. The contractor is responsible for documenting the total volume of DNAPL evacuated from each well. DNAPL is pumped directly into a 30-gallon steel drum and transported to the 90-day RCRA storage area located in the new GWTF.

3.7 Waste Management

Waste generated from sampling activities (purge water, used tubing, PPE) will be managed by the procedures described in the Waste Management Plan (Appendix I). The sampling contractor will adhere to the procedures described in the Waste Management Plan. Any waste requiring off-site disposal will be conducted by DuPont.

4.0 REFERENCES

DuPont Corporate Remediation Group (CRG), 2005. *Initial Testing Program Plan*, Necco Park, Niagara Falls, New York. January 21, 2005.

FIGURES

Legend

- DuPont Monitoring Well
- Well Abandoned
- Allied Waste Monitoring Well
- DuPont Extraction Well
- DuPont Peizometer

Peizometer ID Conversions

New ID	Former ID
184A	RDB-12
185A	177A
187A	RDB-15
188A	166A
189A	181A
190A	167A
191A	182A
192A	183A
193A	RDB-22

WARNING
IT IS VIOLATION OF SECTION 7209, SUBDIVISION 2, OF THE NEW YORK STATE EDUCATION LAW FOR ANY PERSON OTHER THAN WHOSE SEAL APPEARS ON THIS DRAWING, TO ALTER IN ANY WAY AN ITEM ON THIS DRAWING. IF AN ITEM IS ALTERED, THE ALTERING ENGINEER SHALL AFFIX TO TO THE ITEM HIS SEAL AND THE NOTATION "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

NO.	DATE	DESCRIPTION	NO.	DATE	DESCRIPTION

REVISIONS

DESIGNED BY: SPM
DRAWN BY: CNE
CHECKED BY: XXX
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JOB No. 18983203.00005

DUPONT
NECCO PARK
NIAGARA FALLS NEW YORK

WELL AND PEIZOMETER LOCATIONS
DUPONT NECCO PARK

175 0 175 350 Feet
Scale: 1" = 175' - 0'
Date: APR 2005
FIGURE 2-1

N:\18983203.00005\DB\GIS\locations.apr WELL/PIEZOMETER LOCATIONS
4/13/2005

ATTACHMENTS

Low-Flow Groundwater Sampling Procedures
Necco Park Landfill Remedial Design Investigation

Introduction

These procedures describe low-flow groundwater purging and sampling criteria that will be employed at the Necco Park site during the baseline and subsequent routine groundwater sampling events. Criteria included in this plan meet the objectives of EPA's Standard Operating Procedures for low-flow sampling (March 1998) which is to attain groundwater samples that are representative of groundwater conditions in the geologic formation. These objectives can be met through purging/sampling techniques that minimize disturbance to the geologic formation.

To determine the appropriate low-flow techniques for the site a low-flow pilot test was performed in 2000 before the pre-design baseline event. Low-flow purging and sampling utilizing a bladder pump and a flow through cell to measure parameter stabilization was performed at wells representing typical groundwater flow zones. Results of the pilot test, in conjunction with EPA standard low-flow procedures, have been utilized in the development of the procedures described herein. Groundwater purging/sampling for the baseline chemistry event will be conducted using non-dedicated bladder pumps. The flow rate of the pumps will be adjusted as needed using a variable speed flow controller.

As a quality control/quality assurance measure, groundwater purging/sampling will be conducted systematically from well cluster locations with the lowest level of chemical constituents through to locations with the highest level of chemical constituents. Historical groundwater chemistry data has been evaluated to determine the appropriate sampling sequence. This evaluation was used to categorize well locations reporting low, medium, and high chemical constituent levels. The chemical constituent categories are defined as follows:

Low	0 to 1ppm
Medium	1 to 15 ppm
High	>15ppm

These concentration-based criteria will be redefined as appropriate to reflect changes in groundwater chemistry over time. To further reduce the potential for cross-contamination, separate pumps (or pump groups) will be utilized for each of the three groundwater chemistry categories.

Procedures

Well Purging

- Record groundwater level using an electronic water level indicator using great care to minimize disturbance of the water column. DO NOT measure well depth, as this will disturb sediment on the well bottom that could prolong purging time for turbidity

equilibration. Well bottom observations for the presence of DNAPL will be performed at least 24 hours before low-flow purging.

- Slowly lower the bladder pump into the well and position the pump intake at the midpoint of the water column for overburden (A zone) wells or at the depth of the major water bearing fracture for open hole bedrock wells. The attached table identifies the target sample depth for each well. The pump intake will be kept at least 2 feet above the well bottom to prevent disturbance and resuspension of any sediment or DNAPL on the well bottom. The pump will be fitted with small diameter (1/4 or 3/8-inch ID) Teflon-lined polyethylene tubing.

- Attach an in-line flow through cell on the pump discharge line to monitor stabilization of groundwater indicator parameters. The discharge tubing from the well will be equipped with an in-line sample valve ahead of the flow through cell. Parameters that will be measured are pH, specific conductance, temperature, redox potential, dissolved oxygen and turbidity. The flow through cell parameter instrumentation should be calibrated daily, at a minimum.

- Begin well purging at a rate of 300 to 1000 ml/min. Results of the pilot test indicate that an optimal purge rate for A zone (overburden) wells is 300 to 500 ml/min and 500 to 1000 ml/min for bedrock wells. Purge rates will be determined by collecting the discharge in a graduated bucket or by using a graduated laboratory cylinder. Record parameter measurements and water level measurements at 3-minute intervals. The low-flow pilot test determined that these are the optimum flow rates that result in minimal water level draw down (i.e., < 0.3 feet). Frequent water level measurements will be recorded during purging to ensure that excessive draw-down does not occur. If water level draw down exceeds 0.3 feet the purge rate will be adjusted accordingly. Purging will be considered complete when the indicator parameters have stabilized for three consecutive readings as follows:

  +/- 0.2 for pH
  +/- 10% for specific conductance
  +/- 10 mv for redox potential
  +/- 10% for dissolved oxygen and turbidity

- Stabilization of dissolved oxygen readings, the <u>key</u> indicator parameter for samples to be analyzed for VOCs, was achieved during the low flow pilot test. The purge rate may be reduced to 200 - 500 ml/min if parameter stabilization is not achieved within 30 minutes. If one or more of the <u>key</u> indicator parameters fails to stabilize after 4 hours, the steps outlined in Section III of the EPA low flow procedures will be followed. Water level draw down and pumping rate information will also be used to determine when stabilization of groundwater conditions and the appropriate time for sample collection. All purge water will be containerized for disposal at the site groundwater treatment facility.

Well Sampling

Remove the in-line flow through cell and collect the groundwater sample from the pump discharge tubing. A flow rate of 100 to 250 ml /min will be maintained during sample collection. The discharge should be directed toward the inside wall of the sample container to minimize volatilization. Sample collection sequence will be as follows:

Volatile organics, semi-volatile organics, gas sensitive parameters (i.e. all dissolved gases for natural attenuation evaluation), sulfide, sulfate, TOC, and DNA), other inorganic parameters, and lastly dissolved metals. All samples to be analyzed for volatile constituents and dissolved gases will be filled and sealed so that no air space remains in the container. Sample preservation and shipping procedures are described in the QAPP.

Decontamination

Sample pump decontamination procedures are described in Section 2.2.2 of the QAPP. Decontamination fluids will be collected and disposed of at the site groundwater treatment facility.

Documentation

The following information will be recorded on the sampling log for each monitoring well after purging/sampling:

- Start and end time for purging
- Purge method
- Purge rate
- Total volume purged
- Groundwater quality parameters (as described above) during purging and sampling
- Sampling flow rate

Any comments regarding field observations during groundwater sampling (i.e., slow recharge, odor, sheen, and PID/FID readings) should also be recorded.

APPENDIX G
QUALITY ASSURANCE PROJECT PLAN
DUPONT NECCO PARK
REMEDIAL PROGRAM
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

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FIGURES

ATTACHMENTS

TITLE & APPROVAL PAGE

Site Name:	DuPont Necco Park
Site Location:	Niagara Falls, New York
Document Title:	Quality Assurance Project Plan for the Remedial Program
Revision #:	0
Lead Organization:	DuPont Corporate Remediation Group (CRG)
Preparer:	URS Diamond
Date of Preparation:	March 4, 2005

Approvals:

Paul F. Mazierski, Project Director	Date
Timothy J. Pezzino, Project Manager	Date
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Thomas Taccone, EPA Region II	Date
Opal Davis-Johnson, Laboratory Mgr. STL – North Canton	Date

1.0 PROJECT MANAGEMENT

This Quality Assurance Project Plan (QAPP) presents policies, project organization, functional activities, and Quality Assurance/Quality Control (QA/QC) measures intended to achieve the project data quality objectives for sampling activities associated with the Sampling, Analysis, and Monitoring Plan (SAMP) for the remedial program for the DuPont Necco Park site, Niagara Falls, New York. The SAMP is provided as Appendix F. This QAPP is intended to meet requirements for conducting the work in accordance with QA/QC field and laboratory procedural protocols for environmental measurement data.

This QAPP has been prepared in general accordance with the following U.S. Environmental Protection Agency (USEPA) documents:

- EPA Requirements for Quality Assurance Project Plans, USEPA QA/R-5 (EPA/240/B-1/003, March 2001)
- EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5 (EPA/240/R-02/009, December 2002)
- Region II CERCLA Quality Assurance Manual, EPA Region II, October 1989

1.1 Site Description and Project Background

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York. Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company (from which Necco is derived). Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Allied Waste. Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a CSX right-of-way bound the site to the west. Land in the vicinity of the site is predominately zoned for commercial or industrial use. Several major manufacturing facilities are located within one mile of the site, and two manufacturers – Durez Chemical and the Carbide/Graphite Group (formerly Airco Carbon) - are 2,000 feet and 300 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west. A map of the Necco Park site is presented in Figure 1.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on records and an interpretation of historic aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid

waste landfill. In 1977 the landfill was closed, and a clay cap was constructed over the site in 1978-79. An extensive series of site assessment and remediation studies have been conducted following site closure to determine the extent of groundwater contamination and to evaluate/implement response actions. Groundwater monitoring has been conducted to assess the effectiveness of response actions implemented to date.

1.2 Project Task Description and Schedule

In accordance with the requirements of U.S. EPA Administrative Order (AO) Index No II CERCLA-98-0215, dated September 28, 1998, hydraulic and chemical monitoring will be conducted to assess the effectiveness of source area controls in place at the site.

Hydraulic monitoring will be conducted to assess the effectiveness of the groundwater extraction system in achieving hydraulic control of the source area.

Chemical monitoring will include:

- ❑ Collection of groundwater samples from the existing network of monitoring wells
- ❑ Collection of aqueous samples from the extraction and treatment system
- ❑ Collection of aqueous samples from the discharge to the POTW monitoring system

Based on the results of the baseline sampling conducted in 2000, and the source area reassessment conducted in 2002, A list of well locations proposed for long-term monitoring has been established, and is presented in Table 1. The first compliance monitoring event will occur within one month of system start-up to establish the baseline chemistry. The monitoring wells will be sampled on a semi-annual basis during the first three years of system operation to monitor the effectiveness of the remedy for hydraulic control. Following the first three years of operation, the monitor wells will be sampled on an annual basis. Based on the sampling results, the wells selected for chemical monitoring may be modified over the course of the remedial action.

Sampling frequency associated with the POTW discharge permit and treatment system will continue to be collected quarterly. Treated discharge from the monitoring station (MS#1) will continue to be collected with an automated composite sampler. Treatment system sampling, including influent/effluent and extraction well sampling will be collected from in-line sample ports. Influent/effluent sampling will be conducted quarterly. Process operability samples will be collected during system startup at the frequency described in the ITPP.

The sampling schedule for both the chemical monitoring and the discharge monitoring is further described in Section 1.5 of the SAMP, and outlined in Tables 1 and 2.

1.3 Project Organization

An organizational chart for the project is shown in Figure 2 and contact information is provided in Attachment G.1. Responsibilities for key project team members are summarized below:

1.3.1 Management Responsibilities

The **DuPont Project Director, Paul Mazierski,** is the primary point of contact with DuPont, and is responsible the execution of all phases of the project the project, including correspondence with and coordinating activities with EPA Region II.

The **URS Diamond Project Manager**, **Timothy Pezzino**, will manage URS personnel involved in the project and will be responsible for cost and schedule tracking. The Project Manager will also provide technical review of project deliverables.

1.3.2 Quality Assurance Responsibilities

The **Project Chemist/Quality Assurance Officer, Sharon Nordstrom,** will be responsible for developing and administering the Quality Assurance Project Plan; assisting in day–to-day QA activities; and coordination of subcontract laboratory analysis. In addition, the Project Chemist will review and maintain the analytical data generated for the project, and coordinate independent data validation.

The **Health and Safety Officer, Kathy Sova,** will be responsible for developing and implementing the Project Health and Safety Plan, and ensuring that the plan is consistent with all applicable state and federal regulations, and will provide oversight and guidance for any Health and Safety issues associated with the program.

The **Waste Management Officer, Timothy Pezzino,** is responsible for developing and implementing the project Waste Management Plan, and providing oversight for all waste management issues.

Independent analytical data validation will be provided by **Environmental Standards, Inc., Valley Forge, PA. David Blye** will serve as the Environmental Standards QA Manager, and will be responsible for ensuring that all DuPont procedures and requirements for this project with respect to sample analysis are being followed. The data validation procedures proposed for the project are further described in Section 4.0.

1.3.3 Field Responsibilities

The **Project Geologist, Daniel Sheldon** will be responsible for the management and implementation of field activities in accordance with the project SAMP. The Project Geologist will oversee sample collection, supervise all on-site work, and will update the Project Manager on the status of sampling efforts and project progress, and will work with the Project Chemist to coordinate the transportation of samples to the analytical laboratory.

1.3.4 Laboratory Responsibilities

The contract analytical laboratory proposed for the off-site analysis of the project long-term monitoring samples is **Severn-Trent Laboratories (STL), North Canton, Ohio**. **Nathan Pietras** is the STL -North Canton Project Manager and point-of-contact who will be responsible for the day-to-day coordination with the Project Chemist; ensuring that project technical and contractual requirements are relayed to laboratory management and operations personnel; and tracking project deliverables. STL-North Canton's key

management and associated responsibilities, facilities, and operating structure are further described in their Laboratory Quality Assurance Plan (copy maintained by the Project Chemist).

Chopra-Lee Associates, Grand Island, New York, will provide the analysis of routine discharge monitoring samples, due to the laboratory's close proximity to the Necco Park site and historical familiarity with the Necco Park discharge operations. The Chopra-Lee Project Manager and point-of-contact will be **Dave Porter**. Additional information describing the laboratory facilities and management is presented in their Laboratory Quality Assurance Plan (copy maintained by the Project Chemist).

Both STL North Canton and Chopra-Lee are accredited by the National Environmental Laboratory Accreditation Conference (NELAC) and hold New York certification. STL North Canton's certification is # 10975, Chopra-Lee's certification number is 10954.

1.4 Quality Objectives

The data quality objectives (DQOs) for this project have been developed in general accordance with the seven-step process outlined in U.S. Environmental Protection Agency (EPA) document "Data Quality Objectives for Hazardous Waste Site Investigations" (EPA QA/G-4HW, January 2000). The steps in this process, as listed below, ensure that the data will be collected or developed in accordance with procedures appropriate for its intended use and that the data will be of known and documented quality that will withstand legal and scientific scrutiny.

Step 1 – State the problem

Step 2 – Identify the decision

Step 3 – Identify inputs to the decision

Step 4 – Define the boundaries of the study

Step 5- Develop a decision rule

Step 6 – Specify tolerable limits on decision errors

Step 7 – Optimize the design for obtaining data

The sampling and analytical program will target the following primary DQO objectives:

- ❑ Monitor the effectiveness of the extraction wells in reducing contaminant of concern (COC) concentrations in the zone-specific source areas
- ❑ Monitor the far-field groundwater chemistry to determine if the extraction system is controlling off-site migration of COCs associated with the Necco Park Site
- ❑ Monitor natural attenuation and intrinsic bioremediation in the source area and far-field
- ❑ Continue to evaluate the effectiveness of the remedial action program
- ❑ Analytical results will be obtained from the most current versions of analytical methods contained in the following documents:

Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), Third Edition with Updates, June 1997, USEPA Office of Solid Waste and Emergency Response.

Methods for the Chemical Analysis of Water and Wastes, U.S. EPA Environmental Monitoring and Support Laboratory, EPA-600/4-79-020, March 1983 and updates.

1.4.1 Measurement Performance Criteria

To ensure that the data generated for the program is consistent with the stated project quality objectives, Measurement Performance Criteria have been established and are presented in Tables 3 and 4. These criteria address the specific analytical methods, field and laboratory quality control checks that will be performed and/or quality control samples that will be analyzed to determine compliance with the following Data Quality Indicators (DQI): Precision, Accuracy/Bias, Representativeness, Completeness, Comparability, and Sensitivity. These indicators, referred to as PARCC, as related to the project objectives, are discussed below.

Precision

Precision is defined as the agreement between numeric values for two or more assessments that have been obtained in an identical manner. Precision will be quantitatively assessed through the evaluation of relative percent difference (RPD) values for two measurements and relative standard deviation (RSD) values for three or more measurements. The equations to be used for precision for this project are included in Section 4.3

Field Precision Objectives

Duplicate analyses will be performed in the field for the field parameters pH, dissolved oxygen, specific conductivity, and turbidity. The DQO for duplicate precision for field parameters in indicated on Table 3.

Field precision will also be assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 10 investigative samples of a similar matrix. The DQO for field duplicate precision is indicated in Table 4.

Laboratory Precision Objectives

Laboratory precision will be assessed through the analysis of matrix spike/matrix spike duplicate samples (MS/MSD) and/or laboratory duplicate samples (LD). One MS/MSD pair and/or LD will be prepared and analyzed for every 20 or fewer investigative samples of the same matrix per sampling event (excluding ambient air samples) The DQOs for MS/MSD and LD precision are indicated in Tables 4 and 5.

Accuracy/Bias

Accuracy/bias is defined as the degree of agreement of a measurement with its accepted or true value.

Field Accuracy/Bias Objectives

The analysis of blanks and control standards will be performed in the field for the field parameters pH, Eh, and specific conductivity. The DQOs for blanks and control standards for field parameters are indicated in Table 4.

Accuracy in the field will be assessed through the use of equipment/field blank and trip blank samples, and will be ensured through the adherence to all sample handling, preservation, and holding time requirements.

Laboratory Accuracy/Bias Objectives

Laboratory accuracy will be assessed through the analysis of sample surrogates (organics analyses), MS/MSD/LDs, and laboratory control samples (LCSs), and the determination of percent recoveries. One MS/MSD pair and/or MS/LD pair will be prepared and analyzed for every 20 or fewer investigative samples of the same matrix. The laboratory will compare the percent recoveries to the control limits for the particular analysis, and apply corrective action, as needed. The equation to be used for the calculation of accuracy in this project is given in Section 4.3. The DQOs for MS.MSD/LD, Surrogate spike, and LCS recoveries are indicated in Tables 4 and 5.

Completeness

Completeness is a percentage of the quantity of valid data obtained from the measurement system compared to the quantity that was expected based on the sampling plan.

Field Completeness Objective

Field completeness is a measure of the number of valid measurements obtained from all the field measurements planned for the project. The equation for completeness is presented in Section 4.3 of this document. The DQO for field completeness for this project is 90%.

Laboratory Completeness Objective

Laboratory completeness is a measure of the amount of valid measurements obtained from all the laboratory measurements planned for the project. The DQO for laboratory completeness for this project is 90%.

Representativeness

Representativeness qualitatively expresses the degree to which the sample collection and analytical protocols adequately reflect the environmental conditions present at the sampling location.

Measures to Ensure Representativeness of Field Data

Representativeness is dependent on the proper design of the sampling program and will be satisfied by ensuring that the SAMP is followed and that the proper sampling techniques are used. The sampling network was designed to provide data representative of the groundwater conditions at the Necco Park Site and the far field. During development of this network, consideration was given to past operations and waste disposal practices, the analytical data obtained during previous sampling and

investigation activities, and the physical setting. The rational of the sampling network is further described in the SAMP.

The method to be used for groundwater sampling, EPA's procedures for low-flow sampling, are specifically tailored to obtain groundwater samples that are representative of hydraulic flow zones.

Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, attaining the quantitative DQOs, and meeting sample holding times. The holding time requirements for this project are given in Table 6. The quantitation limits for the project are listed in Table 2 and the applicable laboratory SOPs for the analyses of interest in this project are included in Attachment G.4.

The collection and analysis of field duplicate samples, and evaluation of newly obtained results as compared with previous data for the site, will be also used to assess both field and laboratory representativeness.

Comparability

Comparability expresses consistency in sampling and analytical procedures so that one data set can be compared to another.

Measures to Ensure Comparability of Data

For this project, all measurement data will be calculated and reported in units consistent with standard practice to allow comparability of data. In addition, sampling procedures, and where possible, field-sampling personnel will be consistent for the collection of all samples.

Sensitivity

Sensitivity is the ability of the method and/or instrument to detect the contaminants of concern and other target compounds at the level of interest.

Measures to Ensure Sensitivity of Data

The laboratory will be required to maintain and submit the results of current MDL studies for the required analyses and address any sample preparation and/or analysis difficulties with the Project Chemist. In addition, a representative cross section of the data generated for each matrix type will be submitted for independent summary-level data validation.

1.5 Training/Certification

A discussion of training requirements for field personnel is presented in Section 8 of the project Health and Safety Plan (HASP). Laboratory-specific training procedures are documented in the Laboratory Quality Assurance Plan on file with the Project Chemist. A section addressing training has been provided in each of the Environmental Standards data validation SOPs attached to this document (Attachment G.5).

Current OSHA HAZWOPER certification is maintained by all project field personnel. The subcontract laboratory is required to maintain the required state/agency certifications and accreditation for the provided analytical services. If applicable certifications should

lapse during the period of performance, the laboratory must notify the Project Chemist immediately so that alternative arrangements for analytical services can be made.

1.6 Documentation and Records

The Project Director and Project Manager shall approve all revisions to the work plan documents. Any modification or addenda to the QAPP will be initiated by the Project Chemist, and circulated to the project management team for approval prior to the final distribution. Whenever revisions are made or addenda added to the QAPP, Work Plan, SAMP, or associated documents, a document control system shall be put into place to ensure 1) all parties holding a copy of the document receive the revisions or addenda, and 2) outdated material is removed from circulation. Project personnel holding copies of the QAPP and Work Plan documents will provide certification that they have read, understood and updated their copies of these documents. This certification will be maintained in the project files.

1.6.1 Field Logbooks

Each sampling team will maintain a detailed logbook. The signature of the author and the date of entry, the project name and number and the location will accompany all entries in this log. At the beginning of each sampling day, the designated team member will start the daily log by entering the date and time, the locations to be sampled, weather conditions, field team present, and any potential problems. Other information to be entered into the field logbook includes observations of field activity taking place, progress, and any problems, summary of equipment preparation procedures and a description of any equipment problems (including corrective action). At the completion of each sampling event, the completed logs will be submitted to the Project Geologist. The Project Geologist will ensure all field data for the sampling event is transferred onto the electronic reporting logs used for entering field data into the CRG Envista database (see Attachment G-3). The electronic spreadsheets will be checked for accuracy and completeness, and provided to the Project Chemist for loading into the database.

1.6.2 Sample Log

The Project Geologist or designated representative will be responsible for keeping a sample log to record information regarding each sample. The sample log may be maintained in the field logbook. The required information will include but is not limited to:

- ❑ Project number, Facility location
- ❑ Sample location description
- ❑ Sample ID
- ❑ Sample Depth
- ❑ Analyses requested
- ❑ Time, date, sampler name,

- ❑ Equipment used to collect the sample

1.6.3 Laboratory Deliverables

Long-Term Monitoring data will be provided by the laboratory in full, "CLP-type" documentation data packages described below to the Project Chemist within the specified turn-around time. Each data package should contain a case narrative, custody forms, and the reportable and supporting data described in the following sections. Discharge monitoring data will be provided in "standard commercial-type" laboratory reports, which will include a narrative, custody forms, and the data for the investigative and associated QC samples, including laboratory method blanks and spike recoveries.

Completed Documentation

The data package should include the completed field chain-of-custody forms (original or copy) and documentation, and should also include any forms that the laboratory uses to document sample condition upon receipt.

Sample Identification Cross-Reference

Sample identification cross-reference information facilitates the correlation of field and laboratory sample IDs as well as the association of field samples with a particular laboratory batch. The data package should include a listing of C-O-C field sample IDs cross-referenced to the associated laboratory sample IDs. The data package should include an easy and unambiguous means of associating a specific QC sample (for example, the laboratory duplicate, the MS/MSD samples, and the laboratory control sample) with specific field samples.

Test Reports for Samples

Sample test reports provide specific information for each sample regarding analytical results and methods. The data package should include the test reports for all reported data. Analytical results (i.e., detected results and non-detected results) should be adjusted for sample characteristics, laboratory preparations/cleanups, and/or laboratory adjustments. Soil samples should be adjusted for moisture content (dry-weight reporting). All analyte detections above the analyte method detection limit (MDL) should be reported.

Surrogate Recovery Data

The data package should include the surrogate data as applicable to the analytical method performed. The surrogate data can be included on the test report for each sample, or can be included on a summary form, provided that the surrogate results are clearly and unambiguously linked to the sample from which the results were measured. The surrogate data should include the percent recovery (%R) and the laboratory's QC limits.

Laboratory Blank Samples

The data package should include test reports or summary forms for all blank samples (for example, method blanks and preparation blanks) pertinent to sample analyses. Blank sample test reports should contain all of the information (e.g., surrogate data) specified

for environmental sample test reports/summary forms. Sample data should not be blank corrected.

Laboratory Control Samples (LCS)

The data package should include the LCS test reports or LCS result summary forms. A LCS should be included in every preparation batch and taken through the entire preparation, cleanup, and analysis procedures. The LCS samples should contain the target analytes identified for the project applicable to the analytical method performed. Table 5 lists the spiked analytes required for this project. The LCS test report, or LCS results summary form, should include the amount of each analyte added, the %R of the amount measured relative to the amount added, and QC limits for each analyte in the LCS. If required by the laboratory's QAP and/or SOPs, the %R and relative percent difference (RPD) data for each analyte in the laboratory control sample duplicate (LCSD) should be reported.

Matrix Spike/Matrix Spike Duplicate Samples (MS/MSD)

The project MS/MSD samples should be spiked with the project-specified analytes (Table 5). The project MS/MSD summary forms should include identification of the compounds in the spike solution, the amount of each compound added to the MS and the MSD, the parent sample concentration, the concentration measured in both MS and MSD, the calculated %R and RPD, and the QC limits for both %R and RPD. The form should also include the laboratory batch number and the laboratory identification number of the sample spiked.

Laboratory Duplicates

If a laboratory duplicate was analyzed, the data package should include the duplicate sample test report summary form. The duplicate sample test report should include the calculated RPD between the sample and the sample duplicate results and the QC limits for the RPD. The test report should also include the laboratory batch number and the identification number of the sample.

Narrative

The laboratory should document and report all observed problems and/or anomalies observed by the laboratory that might have an impact on the quality or usability of the data.

Supporting Data Requirements

Supporting data for each data package should contain instrument printouts, laboratory notebook records, calibration and instrument performance records, and other supporting data deliverables, as described below. Each data sheet and all entries on the data sheet should be legible. Specific reporting formats are not required, however, each record must be clearly labeled with the type of data provided and with either the applicable laboratory quality control batch numbers or applicable dates. Supporting data for each class of analyses (metals, SVOCs, or VOCs) shall be grouped together in the deliverable package.

Raw Data

The laboratory should provide the following supporting data for each field sample, laboratory blank, LCS/LCSD, MS/MSD and duplicate sample, as appropriate for the analytical method:

- ❑ Chromatograms and quantitation reports (chromatographic methods).
- ❑ Real-time instrument printouts (non-chromatographic methods).
- ❑ Laboratory notebook pages (non-chromatographic methods).

If an analyte and concentration are provided on the supporting data, but will not be reported in the test reports, the concentration should be lined out, dated and initialed and a brief explanation for the deletion from the test report should be provided. Suitable explanations include (but are not limited to): "< MDL" (i.e., analyte concentration is less than laboratory method detection limit) or "FP" (i.e., false positive – analyte did not meet method identification requirements).

Internal Standard Summary

If the laboratory utilizes internal standard quantitation, a comparison of the internal standard areas to acceptance criteria should be provided. The comparison may be provided as an internal standard summary form or a summary with each sample or quality control quantitation report/ instrument printout.

Extraction/Digestion Logs

The laboratory should also provide extraction/digestion logs that document initial volumes/weights and final volumes for all field and quality control samples. Logs should identify the preparation method using an EPA method reference number. Quality control samples should be identified on the logs (the laboratory assigned identification that appears on the quality control reports included with the test reports is sufficient).

Instrument Performance Records

The laboratory should provide instrument performance records as appropriate to the analytical method:

- ❑ Bar graph spectrum, chromatogram, instrument performance check summary (GC-MS).
- ❑ Mass calibration and resolution documentation (ICP-MS).

Calibration Records

The laboratory should provide the following supporting data for initial and continuing calibration verifications as appropriate for the analytical method:

- ❑ Initial calibration summary form listing each target analyte, standard identification, the response factor for each target analyte in each standard, average response factor or slope and intercept, and the relative standard deviation (RSD) or correlation coefficient (r).
- ❑ Calibration verification summary form listing each target analyte, standard identification, the response factor for each target analyte in the verification

standard, the average response factor or slope and intercept from the initial calibration curve, and the percent difference (%D) or percent drift (%D).

- ❑ Alternatively, the calibration verification summary may list the true concentration, the found concentration, and the percent recovery.
- ❑ Chromatograms and quantitation reports (chromatographic methods).
- ❑ Real-time instrument printouts (non-chromatographic methods).
- ❑ Laboratory notebook pages (non-chromatographic methods).

Metals Quality Control Samples

The laboratory should provide the following supporting data for metals analyses, as appropriate to the analytical method:

- ❑ Interference check sample results.
- ❑ Serial dilution results.
- ❑ Post-digestate spike results.
- ❑ Method of standard addition results.

1.6.4 Electronic Data Deliverables

The laboratory will submit electronic data deliverables (EDDs) in a format suitable for input into the DuPont CRG Envista database, as described in Attachment G.1. All results reported in the electronic data submittal must match the hardcopy report. Electronic data deliverables will be submitted via the DuPont Secure Website Drop Box, or on diskette with the hardcopy data packages.

In accordance with EPA Region II Requirements, the analytical and field data generated for the chemical monitoring program will be submitted to the agency in the Multimedia Electronic Data Deliverable (MEDD). It is anticipated that this deliverable will be prepared by DuPont/URS Diamond with support from the laboratory.

1.6.5 Archival Requirements/ Project Files

DuPont/URS and all contract laboratories used for this project will maintain the contents of project files for the analytical data generated for the project, including all relevant records, sample logs, field notebooks, photographs, drawings, subcontractor reports, including laboratory data deliverables and data validation reports, and all sample custody documentation in a secure, limited access area. All documents will be maintained in accordance with DuPont's Corporate Records and Information Management (CRIM) policies. Prior to disposal of the files by the subcontractors in accordance with their individual data retention policies, DuPont will be notified in writing and offered custody of the documents. Otherwise, the contents of the files will be retained in each contractor's facility until directed by DuPont to purge their files and release them to DuPont. DuPont will ensure the retention of all records, reports, and other documents for a period of at least three years.

2.0 DATA GENERATION AND ACQUISITION

The elements in this group address aspects of data generation and acquisition. This section describes the appropriate methods for sampling, measurement and analysis, data collection or generation, data handling, and quality control activities.

2.1 Sampling Process Design

Relevant components of the following elements of the sampling design are included in Section 5.0 of the *DuPont Necco Park Long-term Groundwater Monitoring Plan*, including:

- ❑ Types and numbers of samples required;
- ❑ Sampling locations and frequencies;
- ❑ Sample matrices
- ❑ Analytical parameters of interest.

Sampling frequencies are also summarized in Table 1. The analytical parameters and frequencies of QA/QC samples associated with each sampling event are identified in Tables 2 and 4.

2.1.1 Sample Identification

Sample labels will clearly identify the particular sample, and should include the following:

- ❑ Facility name and sample ID
- ❑ Time and date sample was taken
- ❑ Sample preservation
- ❑ Analyses required

The format to be used for assigning field sample identifications is presented in Attachment G.4 *(DuPont CRG Procedure for Completing Chain of Custody Forms, May 2001).*

Example sample IDs for use in this project are as follows:

- ❑ NEC-G-MW-53 (Sample ID for well location MW-53)
- ❑ NEC-G-MW-53-DIS (Field filtered aliquot for dissolved metals analysis)
- ❑ NEC-G-MW-53-DUP (Field duplicate sample collected at well location MW-53)
- ❑ NEC-G-MW-53-MS (Matrix spike aliquot collected at well location MW-53)
- ❑ NEC-G-MW-53-MSD (Matrix spike duplicate aliquot collected at well location MW-53)
- ❑ NEC-K-EQBLK1 (Equipment blank sample)

- NEC-K-TBLK1 (Trip blank blank)

2.2 Sampling Methods

The sampling equipment and procedures to be used for the collection of investigative samples will be consistent with the project objectives. The project SAMP describes the specific sampling procedures for each sample type, and the specific sampling SOPs to be incorporated into the field operations are included as an attachment to the document. All groundwater samples for the chemical monitoring program will be collected using the EPA Region II Low-flow Sampling Procedure (Attachment G.5) and dedicated HDPE tubing.

2.2.1 Containers, Preservatives and Holding Times

Table 6 lists containers, preservatives, and holding times applicable to the project. New re-cleaned and pre-preserved sample containers (in accordance with EPA 540/R-93/051 *Specifications and Guidance for Contaminant-Free Sample Containers*) will be provided by the laboratory in sampling kits. Sample containers should be filled to the preferred volume listed in Table 6. If yield is insufficient to collect the preferred volume, at least the minimum volume listed in Table 6 must be collected for the requested analysis to be performed. If only the minimum sample is collected, the lab may have insufficient sample volume in cases where a dilution or reanalysis is required, which may require a resampling event or data qualification.

2.2.2 Decontamination

Sample collection equipment will be fully decontaminated before sampling and between sampling events. Disposable equipment will not require decontamination if the equipment is sealed in the original manufacturer's packaging. Decontamination deionized water (ASTM Type II reagent-grade) will be obtained from the laboratory or an equivalent from a commercially available source. Sampling and measurement equipment will be decontaminated using the following sequence:

- Wash with non-phosphate detergent and tap water
- Rinse with tap water twice
- Rinse with distilled/deionized water

Decontamination water will be collected and disposed of at the decontamination sump located in the groundwater treatment building.

2.3 Sampling Handling and Custody

During sample collection, fill sample containers to the preferred volume listed in Table 6. Following sample collection, immediately place the lid on the sample container, wipe the container clean, and affix the completed sample label. VOA vials should be inspected for headspace or air bubbles. Immediately after labeling, place the containers in bubble-wrap to protect them from breakage, transfer to an ice-filled cooler, and close the cooler lid.

The custody (C-O-C) form should be completed with the date and time of sampling as the samples are collected. Examples of sample labels and C-O-C forms are included in Attachment G.4 *(DuPont CRG Procedure for Completing Chain-of–Custody Forms, May, 2001)*. At the conclusion of the sampling event, all coolers should be checked, sealed, and a minimum of two custody seals affixed to the lid and sides of each cooler. All VOA vials collected during the day (or sampling event, if all samples are shipped together) should be shipped in a single cooler if possible with the trip blank samples. All samples will be shipped to STL- North Canton via overnight commercial carrier. Discharge monitoring samples will be transported to Chopra-Lee laboratories via laboratory courier.

2.3.1 Chain-of-Custody

Sample custody procedures are summarized below and are described in detail in Attachment G.4. C-O-C procedures are intended to maintain and permanently document sample possession from the time of collection to disposal, in accordance with EPA guidelines. A sample is considered to be under a person's custody if:

- ❑ it is in that person's possession;
- ❑ it is in that person's view, after being in that person's possession;
- ❑ it was in that person's possession and was locked up by them to prevent tampering; or
- ❑ it has been placed in a designated secure area by that person.

2.3.2 Field Chain-of-Custody

The C-O-C record will be initiated in the field for all samples collected. At a minimum, the following information shall be recorded on the form:

- ❑ Signature of custodian
- ❑ Date of receipt and relinquishment
- ❑ Sample IDs
- ❑ Sampling dates and time
- ❑ Sample type and quantity
- ❑ Analyses to be performed
- ❑ C-O-C seal number, if applicable
- ❑ Method of shipment and courier name(s) in the remarks box, if applicable

The initial custodian will sign the C-O-C record; enter the date and time; tear off and file the back copy with the appropriate sampling log; and place the remainder in the shipping container with the samples. The sample documentation will be placed in a sealed plastic bag and taped to the inside lid of the cooler.

2.3.3 Laboratory Chain-of-Custody

The laboratory Quality Assurance Manual and associated laboratory SOPs shall specify the laboratory sample handling and custody requirements. These requirements should be generally consistent with National Environmental Laboratory Accreditation Conference (NELAC). The laboratory sample custodian will receive and sign the C-O-C form for the laboratory, and record the date, time of receipt. The laboratory log-in record will explicitly state the condition of the sample containers, any evidence of damage, preservation, and the completeness of accompanying records. After inspection, each sample will be logged in and assigned a unique laboratory sample ID. In addition, the following information will be entered in the LIMS for each sample:

- ❑ Field sample ID
- ❑ Laboratory sample ID
- ❑ Date received
- ❑ Project name and number
- ❑ Collection date
- ❑ Sample type
- ❑ Analyses to be performed

The condition, temperature, and appropriate preservation of samples shall be checked and documented on the C-O-C form. Preservation of VOC sample containers shall be checked after sample analysis.

After sample log-in is complete, a copy of the C-O-C record, and laboratory confirmation summary with laboratory sample numbers and notations of any discrepancies will be sent to the Project Chemist by fax or email to be entered into the project file. The original C-O-C form will be filed in the laboratory with the shipper's waybill or airbill attached (if applicable). The Laboratory Project Manager will report any problems or discrepancies with the in-coming samples immediately to the Project Chemist. The original copy of the C-O-C form (or photocopy) will be included with the final data package submitted to the Project Chemist.

While in the laboratory, sample shall be stored in limited-access, temperature-controlled areas. Refrigerators, coolers, and freezers shall be monitored for temperature daily. The acceptance criteria for refrigerator and cooler temperatures shall be 0.5 to 6°C and the acceptance criteria for freezer temperatures shall be less than 0°C

2.4 Analytical Methods

The analytical methods proposed for this program are listed in Table 2. Methods and quality control procedures are described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (USEPA SW-846), denoted as SW and Methods for the Chemical Analysis of Water and Waste (EPA 600/4-79-020 and 40 CRF 136), denoted as MCAWW.

The contracted laboratory will perform all analytical testing, documentation, and reporting. Specific laboratory operations are governed by the laboratory's Quality Assurance Plan, which controls all laboratory activities from the arrival of samples to the reporting of validated analytical data. Supplemental QC criteria are provided in the individual methods and the laboratory's SOPs used during the analyses of the samples. The laboratory's SOPs will be made available for review upon request.

Laboratory QC acceptance criteria may be stricter than that specified in this QAPP. If the laboratory QC acceptance criteria are less strict, then the acceptance criteria specified in this QAPP shall be the default criteria for the project. Usability of the laboratory data will be evaluated against the criteria specified in this QAPP.

2.5 Quality Control

For each batch of 20 or fewer samples, sufficient QC samples will be collected and analyzed to ensure that the appropriate QC measures described in the following sections will be attained. QC samples will be handled, preserved, and documented in exactly the same manner as those of the sample batch.

Field QC samples include trip blanks, equipment blanks and field duplicates. Laboratory QC samples include laboratory control samples, laboratory blanks, and matrix spike/matrix spike duplicate samples. Surrogate recoveries and internal standard areas are used to evaluate the method performance for individual samples.

Tables 3, 4, and 5 summarize project quality control acceptance criteria. Tables 4 and 5 list the quality control performance criteria for field and laboratory quality control measurements. Table 4 summarizes the SW-846 calibration procedures for laboratory instruments used for sample analyses. Table 3 lists the quality control requirements for field measurement equipment. Tables 4 and 5 list the acceptance criteria for laboratory quality control measures.

2.5.1 Trip Blanks

Trip blanks are prepared prior to the sampling event by the analytical laboratory using ASTM Type II reagent-grade water. Trip blanks are kept with the investigative samples throughout the sampling event. They are then packaged for shipment with the investigative samples and sent for analysis. At no time after their preparation are the sample containers to be opened before they reach the laboratory. As indicated in Section 2.3, all VOA vials for the investigative samples should be packaged and shipped together with a trip blank sample in a single cooler. If multiple shipments of samples are required for a particular sampling event, trip blanks are to be provided per shipment. Trip blanks will be analyzed for the same target volatiles as the investigative samples.

2.5.2 Equipment Blanks

Equipment blanks are defined as samples that are obtained by running ASTM Type II reagent-grade deionized water over/through non-disposable, reusable sample collection equipment after it has been cleaned (i.e., rinse water pumped through the sample pump and tubing). Type II reagent-grade deionized water will be supplied by the laboratory or

an equivalent obtained from a commercially available source. These samples will be used to determine if decontamination procedures were adequate. A minimum of one equipment blank will be collected each day sampling activities occur. When sampling is conducted using all disposable or dedicated sampling equipment, the collection of at least one equipment blank per sampling event is recommended. Equipment blanks will be analyzed for target inorganics, semivolatile, and volatile analytes associated with the sampling event.

When field-filtering for metals using disposable filtering equipment, a minimum of one filter blank will be collected per sampling round or event. Filter blanks will be collected by running deionized water through the tubing and filter and collecting it in the appropriate sample container.

2.5.3 Field Duplicates

Field duplicate samples are two or more samples collected simultaneously in separate containers from the same source under identical conditions. One duplicate sample will be collected for each batch of 20 or fewer field samples. The field duplicate sample provides a measure of precision, or reproducibility of the sample result. During data evaluation, precision as relative percent difference (RPD) will be calculated according to the following equation:

$$RPD = \frac{|R_1 - R_2| * 200}{(R_1 + R_2)}$$

Where:

R_1 = result from sample 1
R_2 = result from sample 2

Field duplicate samples will be collected and analyzed for target inorganics, semivolatile, and volatile analytes associated with the sampling event.

2.5.4 Laboratory Blank Samples

Analytical results for laboratory blanks provide a means to evaluate laboratory precision and bias, and other potential contamination and carry-over problems. Laboratory blanks are carried through applicable sample preparation and analysis procedures. Laboratory blanks are analyzed for all parameters associated with the sampling event. In addition, if laboratory contamination in the volatiles storage, preparation, or analysis areas is suspected, the Project Chemist may request laboratory storage blanks to be stored, analyzed, and reported with the investigative samples

In addition, the laboratory analyzes a metals calibration blank for every 10 samples. These calibration blanks are not carried through the sample preparation procedure, but are prepared using the same final concentrations of acid as the samples.

2.5.5 Laboratory Control Samples

Laboratory Control Samples (LCS) are analyte-free water or a standard solid matrix (such as sand) that is spiked with the target analytes specified in Table 5. The LCS is spiked at the approximate midpoint of the calibration curve and is carried through the

entire sample preparation and analysis procedures. LCS results are used to assess method/laboratory accuracy. The LCS is not the continuing calibration verification analysis.

2.5.6 Laboratory Duplicate

Laboratory duplicates are generated in the laboratory and analyzed to assess method/laboratory precision in the matrix of concern. Laboratory duplicates may be analyzed for pH and other inorganics, metals, or conventional parameters.

2.5.7 Matrix Spikes/Matrix Spike Duplicates

Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. MS/MSD samples are spiked and analyzed by the laboratory to facilitate identification of effects of the particular matrix of interest on analytical results, particularly biasing of results. Sufficient sample volume will be collected (triple the normal sample volume for groundwater samples) for at least one sample in each batch of 20 or fewer field samples so that MS/MSD samples can be prepared for analysis. MS/MSD samples are spiked at the approximate mid-point of the calibration curve. MS/MSD samples will be analyzed for metals, SVOC, and VOC analytes.

2.5.8 Surrogates

Surrogate recovery data are used to evaluate the precision of the analytical method on a sample specific. Surrogates are compounds similar to the target analytes in chemical composition and behavior but are not normally found in environmental samples. Appropriate surrogates for each method are listed in Table 5. Surrogates are spiked into all field samples and laboratory quality control samples to be analyzed for SVOCs and VOCs.

2.5.9 Internal Standards

Internal standard areas are used to correct sample results affected by losses in the analytical system. Internal standards are measured amounts of compounds not normally found in environmental samples and are added to all field samples and laboratory quality control samples for the analyses of SVOCs and VOCs. Internal standards are also used for metals analyses in the ICP-MS procedure (SW-846 6020A).

2.6 Instrument/Equipment Testing, Inspection, and Maintenance

The purpose of this element is to specify procedures used to verify that instruments and equipment are maintained in sound operating condition and are capable of acceptable performance.

2.6.1 Instrument/Equipment Testing and Inspection

Acceptable performance for analytical instruments/equipment is defined as meeting the instrument performance and calibration requirements listed in Table 3 (Field Equipment) and Table 4 (Analytical Equipment) of this QAPP. Calibration procedures utilize standards that are traceable to National Institute of Standards and Technology (NIST) materials. Specific requirements for calibration of analytical instruments is described further in the field and laboratory SOPs.

2.6.2 Instrument/Equipment Maintenance

Both the field and laboratory contractors shall have a preventative maintenance program in place to minimize the downtime of crucial sampling and/or analytical equipment due to unexpected component failure. Maintenance responsibilities are assigned to the Project Geologist and the Laboratory Manager. These managers establish maintenance procedures and schedules for each major equipment item. The responsibility may be delegated to field or laboratory personnel, although the managers retain responsibility for ensuring adherence to the protocols and procedures.

Manufacturers' recommendations provide the primary basis for establishing maintenance schedules. In addition to a schedule for maintenance activities, the laboratory shall maintain an adequate inventory of spare parts that are subject to frequent failures, have a limited useful lifetime or cannot be obtained in a timely manner should failure occur. Spare parts include, but are not limited to, filaments, chromatographic fittings, and columns for GC/MS systems, and nebulizers, fittings and tubing for ICP systems.

Maintenance and repair of field and laboratory equipment shall be recorded in field or laboratory notebooks. These records shall document the serial numbers of the equipment, the person performing the maintenance or repairs, the date of the repair, and the procedures used during the repair.

2.7 Instrument Calibration and Frequency

The purpose of this element is to define calibration procedures that will be used to generate environmental measurements. Calibration requirements listed in Table 3 (Field Equipment) and Table 4 (Analytical Equipment) of this QAPP. Calibration procedures utilize standards that are traceable to NIST materials. Specific requirements for calibration of analytical instruments are described in the field and laboratory SOPs.

2.8 Inspection/Acceptance Requirements for Supplies and Consumables

The purpose of this element is to establish and document a system for inspecting and accepting supplies and consumables that may affect the quality of the project data. Laboratory or field consumables or supplies that come into contact with samples must be documented to be free of contamination. Examples of consumables and supplies include gloves, glassware, soap or detergent, sample containers, reagents, and reagent water. Field consumables and supplies are demonstrated to be free of contamination through the

collection of equipment blanks. Laboratory consumables and supplies are demonstrated to be free of contamination through the preparation and analysis of laboratory blanks. The laboratory Quality Assurance Plan identifies critical supplies, such as calibration gases or standards, solvents or reagents, and the acceptance criteria for these supplies.

2.9 Data Acquisition Requirements

This element describes the types of non-measurement data needed for project implementation or decision-making.

2.10 Data Management

Throughout the chemical monitoring to be conducted for this project, the Project Management team will determine if project quality objective are being met and assess whether the data being collected are sufficient and appropriate to accomplish the project objectives as stated in the project work plan.

Individuals making field measurements will determine whether field quality control criteria were met and assess the need for corrective action to be implemented in further sampling. This corrective action may include re-calibration of field instruments or substitution of a different type of instrument.

The laboratory analysts and supervisors will determine if analytical QC criteria are achieved, and if not, whether corrective action is warranted. As discussed in previous sections, the laboratory and field data will also be reviewed by the Project Chemist to determine usability with regard to the specific criteria established in the QAPP. Data may not always meet precision and accuracy requirements but may still be considered usable for the purposes of the investigation. The project technical resources, in conjunction with the Project Manager and Project Director, will assess all data collected during the investigation, and advise EPA of any changes to the work scope that may be recommended as a result of data obtained during the sampling efforts to date.

The primary data management goal is to facilitate the analysis, interpretation, and reporting of all data collected as part of the project. The data must be organized to allow assessment of data completeness, data representativeness, and data quality. This objective will be accomplished by keeping complete and correct records of samples collected, sample analytical results, QA/QC results, data evaluation results, data corrections, data analyses, and data manipulations. Maintenance of complete records, both paper and electronic, is of principal importance to accomplish the data management objective and to provide project data for statistical, spatial, and other interpretive analyses and for reporting.

3.0 ASSESSMENT AND OVERSIGHT

Internal audits and assessments will be performed by the organization primarily responsible for conducting the task being audited. For example, DuPont/ URS Diamond will conduct routine assessments of field sample collection activities and the contract laboratory will perform internal audits.

3.1 Assessment and Response Actions

3.1.1 Performance and Systems Audits

Performance and system audits of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with the procedures established in the project SAMP and QAPP. The audits of field and laboratory activities include two independent parts: internal and external audits.

3.1.2 Field Performance and Systems Audits

Internal Field Audits

The Project Manager will conduct internal audits of field activities, including sampling and field measurements. An internal field audit will be conducted at least once during the course of the chemical monitoring, and will include the examination of field sampling records, field instrument operating records, sample collection, handling and packaging in compliance with the established procedures, maintenance of QA procedures, proper completion of chain-of-custody forms, etc. The audit will also involve a review of field measurement records, instrument calibration records, and sample documentation. Follow-up audits will be conducted if necessary to correct any deficiencies and to verify that QA procedures are maintained throughout sampling programs. An example field audit checklist is included in Attachment G.6 of this QAPP.

External Field Audits

External Field Audits may be conducted by the USEPA Region II Quality Assurance Manger or designate at his discretion. External field audits may or may not be scheduled with the field team, and will be conducted according to the field activity information defined in the SAMP and QAPP documents.

3.1.3 Laboratory Performance and Systems Audits

Internal Laboratory Audits

The laboratory QA Officer or his/her designate, normally on a twice-per-year schedule will usually conduct internal audits. Both laboratories participate in a number of performance evaluation (PE) audit programs, including, but not limited to internal programs, the USEPA Water Pollution (WP) and Water Supply (WS) Performance Evaluation program, and other agency PE and round-robin programs.

The internal laboratory systems audits will include an examination of laboratory documentation on sample receiving, sample log-in, sample storage and disposal, chain-of-custody procedures, sample preparation and analysis, instrument operating records

The DuPont CRG maintains a routine on-site audit program for its contract laboratories. Most laboratories are audited on a 2-3 year cycle. STL North Canton was last audited by DuPont in 2002 and is scheduled to be audited again in 2005. An example audit checklist used for on-site laboratory audits is included in Attachment G.7.

External Laboratory Audits

At the discretion of the USEPA, the RCRA Enforcement and Compliance Branch may conduct an external laboratory audit.

External laboratory audits may include (but may not be limited to): review of laboratory preparation and analytical procedures; laboratory on-site visits; and the submittal of performance evaluation samples for analysis. Failure of any or all audit procedures and associated corrective actions can lead to laboratory disqualification and replacement

3.1.4 Assessment of Data

The field and laboratory data collected during the course of the hydraulic and chemical monitoring will be used to assess the effectiveness of source area controls and to monitor the groundwater chemistry. The QC results associated with each analytical parameter for each matrix will be compared to the quality objectives presented in Section 1.4 of this QAPP. Only data not rejected during the data evaluation process will be considered usable for decision-making purposes.

In addition, the data obtained will be both qualitatively and quantitatively assessed on a project-wide, matrix specific, parameter specific, and unit specific basis. The project team will perform the assessment. Factors to be considered in this assessment of field and laboratory data will include, but not necessary limited to the following:

- ❑ Were all samples obtained using the methodologies and SOPs proposed in the QAPP?
- ❑ Were samples obtained from all proposed sampling locations?
- ❑ Do any analytical results exhibit elevated detection limits due to matrix interferences or contaminants present at high concentrations?
- ❑ Were any reported analytes not expected to be present?
- ❑ Were all field and laboratory data evaluated/validated according to the frequency and protocols proposed in the QAPP?
- ❑ Which data points were found to be unusable (qualified “R”) based on data evaluation/validation?
- ❑ Which data points were found to be usable for limited purposes (qualified “J”) based on data evaluation/validation?
- ❑ What effect do qualifiers applied as a result of data evaluation have on the ability to implement the project decision rules?

- ❑ Have sufficient data of appropriate quality been generated to meet the key objectives of the project as identified in Section 1 of this QAPP and the O&M Plan?

3.1.5 Corrective Action

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or poor QC performance which can affect data quality. Corrective action can occur during field activities, laboratory analyses, data evaluation/validation, and data assessment. All corrective action proposed and implemented should be documented in quality assurance reports/ memorandums to management. Proposed corrective action should implemented only after approval by the Project Manager. If immediate corrective action is required, approvals secured by telephone from the Project Manager should be documented in a follow-up memorandum.

For non-compliance problems, a formal, written corrective action plan will be determined and and implemented at the time the problem is identified. The person who identified the problem is responsible for notifying the Project Manager, who will in turn notify the USEPA Region II Site Manager. The Project Chemist will transmit issues concerning the laboratory analysis of project samples or data quality, to the Project Manager. The project Health and Safety Officer will be immediately advised of any issues, concerns, or incidents involving personnel safety and welfare.

Any nonconformance with the established QC approval procedures in the QAPP or SAMP will be identified and corrected in accordance with QAPP protocols. All modifications to the sampling procedures, analytical procedures, data assessment, and/or reporting will be submitted for approval using QAPP addenda. These addenda will include an approval/signoff page similar to the original QAPP document that will encompass key project personnel.

Implementation of corrective actions resulting from field audit findings will be documented in quality assurance reports tot he entire project management team. In addition, all corrective actions implemented will be documented in the field logbook. No staff member will initiate corrective action without prior communication of finding through the proper communication channels.

All key management, as outlined in Section 1.3, will have the authority to initiate and request QAPP modifications. All preliminary modifications will be orchestrated through the Project Chemist who will compile and format the addendum and submit it to the project team and USEPA Region II for approval.

3.1.6 Field Corrective Action

Corrective action in the field may be necessary when the sample network is changed, sampling procedures and/or field analytical procedures require modification, etc., due to unexpected conditions. In this circumstance, the field team will usually identify the need for and recommend a field corrective action. The Project Manager will approve the corrective measure that will be implemented by the field team. It will be the

responsibility of the Field Team Leader to ensure that the corrective action has been implemented.

Corrective action resulting from field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods.

3.1.7 Laboratory Corrective Action

Corrective action in the laboratory may occur prior to, during, and after initial analyses. Corrective action procedures incorporated in the laboratory SOPs included in Attachment G.4 of this QAPP specify the major of the conditions during or after analysis that automatically trigger corrective action or optional procedures. These conditions may include sample dilution, additional sample clean-up, or automatic reanalysis when certain QC criteria are not met. In addition, a number of conditions such as broken sample containers, insufficient sample volume, multiple phases or unexpected sample matrices, high/low pH readings, and potentially high concentration samples, may be identified during sample log-in or just prior to analysis. Following consultation with the laboratory analysts, it may be necessary for the laboratory QA officer to approve the implementation of corrective action.

A member of the laboratory technical staff will identify the need for corrective action. The laboratory QA Officer, in consultation with members of the technical staff, will approve the required corrective action. The laboratory QA Officer will also ensure implementation and documentation of the corrective action. If the nonconformance causes project objectives not to be achieved, it will be necessary to inform all levels of project management for their concurrence.

These corrective actions are performed prior to release of the data from the laboratory. The corrective action will be documented in a laboratory corrective action report or log and included in the final data documentation package.

3.1.8 Corrective Action During Data Evaluation and Data Assessment

The need for corrective action may be identified during the DuPont data evaluation process; data validation performed by Environmental Standards; or data assessment by the project team. Potential types of corrective action may include resampling by the field team, the re-submittal of missing, incomplete, or incorrect information by the laboratory, or reanalysis of samples by the laboratory.

As discussed in Section 4.4, the percent completeness will be calculated and used to determine whether the data quality meets the objectives for the project. If the completeness objectives are not met for individual parameters, the reasons for the invalid data will be reviewed by the project team. Depending on the ability to re-mobilize sampling teams, the reasons for the incomplete data, and the effect of the incomplete data set on the accomplishment of the project objectives, additional samples may be collected and analyzed. An evaluation will also be conducted if the analysis set is incomplete for a given sample location (sample container breakage, chain of custody errors). If the project team determines that the missing results are critical to accomplishing the program objectives, additional sampling will be conducted to obtain the missing data. The project

Manager will be responsible for approving the implementation of corrective action, including resampling, during data assessment.

3.2 Reports to Management

The deliverables associated with the tasks identified in the O & M Plan will contain separate QA sections in which data quality information collected during the task is summarized. These deliverables will include the report on the accuracy, precision, and completeness of the data (as determined during data evaluation and validation), as well as the results of any performance and system audits, and any corrective action needed or taken during the project. The frequency and content of any QA reports to be required during the course of the program will be developed with EPA Region II. These reports, if required, will be the responsibility of the Project Manager.

4.0 DATA VALIDATION AND USABILITY

The elements of this group address the QA activities that occur after the data collection phase of the project is completed. Implementation of these elements determines if the data conform to the specified criteria and satisfy the project objectives.

4.1 Data Review, Verification and Validation

The review performed on the data at each level shall be documented, beginning with the laboratory's review of the analytical results through the independent data review performed by the data user, and finally review by EPA Region II. The intent is to capture the review effort of each party to minimize duplicative efforts, to ensure that critical elements of the review process are not overlooked, and to set in place a system that can be audited or inspected.

4.1.1 Field Data Reduction

Field data reduction is initiated with the recording of field measurement and data into field logbooks immediately after the measurements are taken or the samples are collected. If errors are made, results will be legibly crossed out, initialed, and dated by the field member, and corrected in a space adjacent to the original (erroneous) result. All field measurements recorded in hard-copy logbooks are then transferred into excel forms (see Attachment G) for entry into the DuPont CRG database. Prior to transmittal of the electronic logbook forms to the Project Chemist, the field team leader or Project Geologist will review the forms for completeness, clarity, and transcription errors.

4.1.2 Laboratory Review

All data generated through field activities or by laboratory operations will be reduced and validated prior to final reporting. No data shall be released by the laboratory until it has been subjected to the reduction and validation procedures discussed in this section

4.2 Data Reduction

Data reduction involves the process of generating qualitative and quantitative sample information through observations, field procedures, analytical measurements, and calculations. Data reduction occurs with:

- ❑ The work plan through sample locations and naming conventions
- ❑ The field sampling process through the use of field logs and measurements
- ❑ Project team communication with the laboratory via sample analysis requests
- ❑ Field operations with collection, preservation and Chain-of -Custody documentation
- ❑ Laboratory operations with sample receipt and handling, sample preparation and analysis, collection of raw data, and generation of laboratory results

- ❑ Post-laboratory operations with the evaluation of data and organization of analytical results into a format suitable for use and inclusion in documents.

Data reduction steps include field operations, laboratory operations, and report preparation options.

4.2.1 Field Data Reduction

Field data reduction is initiated with the recording of field measurement and data into field logbooks immediately after the measurements are taken or the samples are collected. If errors are made, results will be legibly crossed out, initialed, and dated by the field member, and corrected in a space adjacent to the original (erroneous) result. The field team leader, or Project Geologist will review the logbook forms for completeness, clarity, and transcription errors prior to transmitting them to the Project Chemist for entry into the DuPont CRG database.

4.1.2 Laboratory Data Reduction

The laboratory analyst is responsible for the reduction of raw data and shall clearly identify any problems or anomalies that might affect the quality of the data. The analyst shall review 100 percent of the data and shall verify that data reduction protocols are correct. At least 10% of the data shall be reviewed independently by a senior analyst or by the supervisor of the laboratory analyst. Both the analyst and independent review shall include:

- ❑ Calibrations and calibration verifications
- ❑ Instrument and system performance checks
- ❑ Blanks
- ❑ LCS recoveries and precision
- ❑ MS/MSD recoveries and precision
- ❑ Duplicate sample precision
- ❑ Compound identification and quantification
- ❑ Serial dilutions, if applicable
- ❑ Interference check sample results, if applicable
- ❑ Post-digestion spike recoveries, if applicable.

The laboratory QA section and/or laboratory project manager shall review the completed data packages and perform a reasonableness check review on the completed data packages. The QA section and/or laboratory project manager shall ensure that all deliverables are present, that qualifiers have been applied to the data and that nonconformance and other issues have been addressed.

4.3 Data Validation

Data validation is the process of verifying that qualitative and quantitative information generated relative to a given sample is complete and accurate. Data validation procedures will be performed for both field and laboratory operations as described below:

4.3.1 Procedures used to Evaluate Field Data

Procedures to evaluate field data for this project primarily include the review of field logbooks to check for completeness, clarity and transcription errors made by the field team members. These procedures are performed to ensure that field measurements and various quality control analyses were properly performed and documents. This task will be the responsibility of the Project Geologist who will otherwise not participate in making any of the field measurements or in adding notes, data, or other information to the logbook.

4.3.2 Procedures Used to Evaluate Long-Term Monitoring

DuPont In-House Review Process

As discussed in Section 1.6.6, the laboratory data deliverables will be submitted to the DuPont CRG ADQM Group in both hardcopy and electronic data formats. Upon receipt of the deliverables package, the ADQM Group will perform the following data review functions:

- ❑ Load the electronic data into the DuPont CRG Envista database to facilitate the semi-automated review process and accessibility of the project data.
- ❑ Perform a completeness check of project data to ensure all request samples were analyzed and the test results were reported.
- ❑ Conduct a quality control (QC) review of laboratory data to evaluate batch integrity per SW-846 guidance, and to ensure that QC acceptance criteria exceptions (versus laboratory and/or project limits) are properly documented via data qualifiers and/or narrative comments.
- ❑ Submit 100% of project laboratory data for evaluation via DuPont's semi-automated in-house Data Review Process (DDR), which applies data usability qualifiers based on the specific project and/or laboratory QC limits; holding time criteria; equipment, trip, and laboratory method blank detections, and quantitation between the MDL and PQL.

The Project Chemist will oversee the in-house data review process, coordinate any questions and/or data re-submittals that may be required, and prepare the data usability narratives for the project team. The Project Chemist will also coordinate the independent data validation to be performed on selected sample locations/matrices.

Data Validation

Environmental Standards, Inc is proposed as the validation contractor for the project. Since the DuPont DDR review process will be performed on 100% of the data generated for the chemical monitoring program, independent data validation is proposed for 10% of

the data. The specific locations to be submitted for validation will be selected by the Project Chemist in cooperation with the Project Manager.

Once the data validation is complete, a Quality Assurance Review summary will be produced by the validator for each data set examined, and data usability qualifiers applied to individual results as appropriate. All qualifiers applied during the validation process will be added to the DuPont CRG Envista database.

The data qualifier codes and definitions will be as follows:

- U- This compound/analyte should be considered "not detected" since it was detected in a blank at a similar level.
- J- Quantitation is approximate due to limitations identified during the quality assurance review.
- N-The analysis indicates that there is presumptive evidence to make a "tentative identification" of this compound/analyte.
- R-Unusable result- compound/analyte may or may not be present in the sample.
- UJ- The compound/analyte was not detected, but the quantitation/detection limit is probably higher than reported due to a low bias identified during the quality assurance review.

Data validation will be performed in accordance with the US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (October, 2004), and Organic Data Review (October, 1999) and method–specific data validation SOPs developed by Environmental Standards (presented in Attachment G.5 of this QAPP).

4.4 Reconciliation with Data Quality Objectives

The purpose of data quality assessment is to determine whether or not data generated for the program are accurate and are consistent with the project objectives. The PARCC data quality indicators will be used to aid in the assessment process (See discussion in Section 1.4). The specific procedures used to evaluate data accuracy, precision, and completeness are given below:

Accuracy Assessment

Accuracy is defined as the nearness of a result or the mean of a set of results to the true value, In order to assure proper accuracy of the analytical procedures, environmental samples will be designated for the laboratory to spike with known amounts of the target analytes to be evaluated. In general, a sample spike should be included in every set of 20 field samples of the same matrix analyzed by an particular method. The increase in concentration of the analyte observed in the spiked sample, due to the addition of an known quantity of the analyte and compared to the reported value of the same analyte in the unspiked sample, determines the percent recovery.

In addition to spiking environmental samples, accuracy for the majority of the target analytes will also be assessed through determination of percent recoveries for laboratory control samples (LCSs). The laboratory will compare the percent recoveries to the controls limits for the particular analysis (see Table 5 of this QAPP). The analysis is

responsible for this comparison and will apply appropriate corrective action as needed. The percent recovery for a spiked samples (MS or MSD is calculated according to the following formula:

% Recovered = (Amount in Spiked sample- Amount in Sample) X 100%

Known Amount Added

Percent recovery for LCS results is determined according to the following formula:

% Recovered = (Experimental Concentration) X 100%

Known Amount Added

Precision Assessment

Precision is defined as the measurement of agreement of a set a replicate results without assumption of any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analyses. For some analyses, duplicate spiked samples are prepared at the laboratory by dividing a designated sample from the sample set into equal aliquots and spiking each of the aliquots with a known amount of analyte. For other analyses, duplicate samples are prepared at the laboratory by just dividing the designated sample into equal aliquots. This process allows the analyst to determine the precision of the preparation and analytical associated with the duplicate sample. The relative percent difference (RPD) between the duplicate spiked sample results and/or the duplicate sample results are calculated and compared to the control limits (see Table 2-3 of this QAPP). The analyst is responsible for this comparison and applies appropriate corrective action as needed. The RPD is calculated according to the following formula:

$$RPD = \frac{|x_1 - x_2|}{\frac{x_1 + x_2}{2}} x100\%$$

Precision may also be assessed by calculating the relative standard deviation (RSD) for three or more measurements. RSD is calculated according to the following formula:

$$\%RSD = \frac{S}{mean} x100\%$$

Where,

$$S = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$$

x_i = each individual value used for calculating the mean

$\bar{x}$ = the mean of n values

n = the total number of values

In addition to evaluation of the method precision, duplicate samples will be collected in the field and analyzed independently. The results will be used to evaluate the total system's variability, including sampling variations. The analytical precision produced by laboratory replicate analyses will be evaluated by both the laboratory and during data evaluation, however field duplicate precision will be evaluated only during data validation.

Completeness Assessment

Completeness is the ration of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing and independent data review for each sampling event associated with this project, the percent completeness will be calculated according to the following formula:

$$\% \text{ Completeness} = \frac{\text{Usable Data Obtained}}{\text{Total Data Planned to be obtained}} \times 100\%$$

The percent completeness will be used to determine whether the data quality meets the objectives for the project.

5.0 REFERENCES

DuPont Corporate Remediation Group (CRG), 2005. *Sampling, Analysis, and Monitoring Plan,* DuPont Necco Park Remedial Program, Niagara Falls, New York. January 2005.

_____. 2005b. *Operations and Maintenance Plan,* DuPont Necco Park Remedial Program, Niagara Falls, New York. January 2005.

_____. 2004. *Long Term Groundwater Monitoring Plan,* DuPont Necco Park, Niagara Falls, New York. March, 2004.

TABLES

Table 1a: Hydraulic Monitoring List
Long-Term Monitoring
DuPont - Necco Park
Niagara Falls, NY

Well ID	Zone	Monitoring Frequency	Well ID	Zone	Monitoring Frequency	Well ID	Zone	Monitoring Frequency
53	A	Monthly	102B	B	Quarterly	139C	C	Quarterly
111A	A	Monthly	112B	B	Quarterly	145C	C	Quarterly
117A	A	Monthly	115B*	B	Quarterly	146C	C	Quarterly
119A	A	Monthly	116B	B	Quarterly	149C	C	Quarterly
123A	A	Monthly	118B	B	Quarterly	150C	C	Quarterly
129A	A	Monthly	119B	B	Quarterly	151C	C	Quarterly
130A*	A	Monthly	120B	B	Quarterly	159C	C	Quarterly
131A	A	Monthly	129B	B	Quarterly	160C	C	Quarterly
137A	A	Monthly	130B	B	Quarterly	161C	C	Quarterly
139A	A	Monthly	136B	B	Quarterly	162C	C	Quarterly
146AR	A	Monthly	137B	B	Quarterly	168C	C	Quarterly
150A	A	Monthly	138B	B	Quarterly	105D	D	Quarterly
159A	A	Monthly	139B	B	Quarterly	111D**	D	Quarterly
163A	A	Monthly	145B	B	Quarterly	115D	D	Quarterly
173A	A	Monthly	146B	B	Quarterly	129D	D	Quarterly
174A	A	Monthly	149B	B	Quarterly	130D	D	Quarterly
175A	A	Monthly	150B	B	Quarterly	136D	D	Quarterly
176A	A	Monthly	151B	B	Quarterly	137D	D	Quarterly
178A	A	Monthly	159B	B	Quarterly	139D	D	Quarterly
179A	A	Monthly	160B	B	Quarterly	145D	D	Quarterly
184A+	A	Monthly	161B	B	Quarterly	148D	D	Quarterly
185A+	A	Monthly	163B	B	Quarterly	149D	D	Quarterly
186A	A	Monthly	167B	B	Quarterly	158D	D	Quarterly
187A+	A	Monthly	168B	B	Quarterly	159D	D	Quarterly
188A+	A	Monthly	169B	B	Quarterly	163D	D	Quarterly
189A+	A	Monthly	170B	B	Quarterly	164D	D	Quarterly
190A+	A	Monthly	171B	B	Quarterly	165D	D	Quarterly
191A+	A	Monthly	172B	B	Quarterly	RW-8	D/E/F	Quarterly
192A+	A	Monthly	BZTW-1	B	Quarterly	RW-9	D/E/F	Quarterly
193A+	A	Monthly	BZTW-2	B	Quarterly	129E	E	Quarterly
194A+	A	Monthly	BZTW-4	B	Quarterly	136E	E	Quarterly
D-11	A	Monthly	D-23	B	Quarterly	145E	E	Quarterly
D-9	A	Monthly	D-10	B/C	Quarterly	146E	E	Quarterly
RDB-3	A	Monthly	D-14	B/C	Quarterly	150E	E	Quarterly
RDB-5	A	Monthly	RW-1	B/C	Quarterly	163E	E	Quarterly
D-13	A	Monthly	RW-10	B/C	Quarterly	164E	E	Quarterly
119AT	AT	Monthly	RW-2	B/C	Quarterly	165E	E	Quarterly
129AT	AT	Monthly	RW-4	B/C	Quarterly	112F**	F	Quarterly
180AT	AT	Monthly	RW-5	B/C	Quarterly	130F	F	Quarterly
184AT	AT	Monthly	TRW-6	B/C	Quarterly	136F	F	Quarterly
185AT	AT	Monthly	TRW-7	B/C	Quarterly	145F	F	Quarterly
186AT	AT	Monthly	105C	C	Quarterly	146F	F	Quarterly
187AT	AT	Monthly	112C	C	Quarterly	148F	F	Quarterly
188AT	AT	Monthly	115C	C	Quarterly	150F	F	Quarterly
189AT	AT	Monthly	123C	C	Quarterly	163F	F	Quarterly
190AT	AT	Monthly	129C	C	Quarterly	164F	F	Quarterly
191AT	AT	Monthly	130C	C	Quarterly	165F	F	Quarterly
192AT	AT	Monthly	136C	C	Quarterly	130G	G	Quarterly
193AT	AT	Monthly	137C	C	Quarterly	141G**	G	Quarterly
194AT	AT	Monthly	138C	C	Quarterly	143G	G	Quarterly

* Well Abandoned ** Well added after approval of LTGMP +Well Renamed AT = Top-of-clay

Note: All B, B/C, D, E, F, and G zone wells will be monitored monthly during the first year of new system operation. Water levels will be recorded quarterly thereafter.

Table 1b
Long-Term Chemical Monitoring Wells
DuPont - Necco Park
Niagara Falls, NY

MONITORING WELL	ZONE	SAMPLING FREQUENCY*	MONITORING WELL	ZONE	SAMPLING FREQUENCY*
D-11	A	Semi-annual	123D	D	Semi-annual
D-13	A	Semi-annual	136D	D	Semi-annual
D-9	A	Semi-annual	145D	D	Semi-annual
137A	A	Semi-annual	148D	D	Semi-annual
145A	A	Semi-annual	147D	D	Semi-annual
146AR	A	Semi-annual	149D	D	Semi-annual
150A	A	Semi-annual	156D	D	Semi-annual
136B	B	Semi-annual	165D	D	Semi-annual
137B	B	Semi-annual	136E	E	Semi-annual
145B	B	Semi-annual	145E	E	Semi-annual
146B	B	Semi-annual	146E	E	Semi-annual
149B	B	Semi-annual	150E	E	Semi-annual
150B	B	Semi-annual	156E	E	Semi-annual
151B	B	Semi-annual	165E	E	Semi-annual
168B	B	Semi-annual	136F	F	Semi-annual
171B	B	Semi-annual	146F	F	Semi-annual
172B	B	Semi-annual	147F	F	Semi-annual
136C	C	Semi-annual	150F	F	Semi-annual
145C	C	Semi-annual	156F	F	Semi-annual
146C	C	Semi-annual	147G1	G1	Semi-annual
149C	C	Semi-annual	147G2	G2	Semi-annual
150C	C	Semi-annual	147G3	G3	Semi-annual
151C	C	Semi-annual			
168C	C	Semi-annual			

*** Semi-annual for first three years of system operation, annual thereafter.**

Table 1c
Natural Attenuation Monitoring Wells
DuPont - Necco Park
Niagara Falls, NY

MONITORING WELL	ZONE
111B	B
137B	B
139B	B
141B	B
145B	B
151B	B
153B	B
105C	C
137C	C
141C	C
145C	C
149C	C
151C	C
105D	D
136D	D
137D	D
139D	D
147D	D
148D	D
149D	D
156D	D
165D	D
136E	E
145E	E
146E	E
156E	E
146F	F
150F	F

Table 1d
DNAPL Observation Locations
DuPont - Necco Park
Niagara Falls, NY

105C	136G	147D	160B
105CD	137A	147F	160C
105D	137B	147G1	161B
111B	137C	147G2	161C
111D	137D	147G3	168B
112A	138B	148D	168C
112B	138C	149A	171B
112C	139A	149D	172B
112D*	139B	150E	145D
112F	139D	150F	145G3
112J*	140A	153D	145J
117A	140B	153FG	146AR
117C	140C	153G3	147B
117E*	140E	155ER	148B
123D	141B	156A	149B
128A+	141C	156E	149C
129B	141D	53	150A
129C	141E*	C-72	150B
129D	141G	D-11	150C
129E	141J*	D-13	151C
129F	142A*	D-14	152A
129G	142B*	D-23	152BC
130B	142C*	D-3	153E
130C	143G	D-7	153G2
130D	145A	RW-1	155A
130G	145B	RW-2	155D
131A	145C	RW-3	156F
136B	145E	RW-4	C-83
136C	145G2	RW-5	D-9
136D	146C	TRW-6	130G
136E	146E	TRW-7	116CD2*
136F	146F	RW-8	136F
136J	147C	RW-10	189A
			193A

* Well abandoned April, 2005. No DNAPL present in well prior to abandonment.
+ Well destroyed

Table 1e
Sampling Summary for MS #1
DuPont Necco Park
Niagara Falls, NY

Outfall Number	Test Parameter	Discharge Limits	Daily Maximum	Units	Monitoring Frequency
		Annual Average			
MS #1	Flow	0.087	0.125	MGD	Continuous
MS #1	Total Suspended Solids	300	400	LBS/DAY	Quarterly**
MS #1	Soluble (diss.)Organic Carbon	90	320	LBS/DAY	Quarterly**
MS #1	Phenols, total	0.5	1	LBS/DAY	Quarterly**
MS #1	Chromium, total	0.01	0.02	LBS/DAY	Quarterly**
MS #1	Nickel, total	0.05	0.4	LBS/DAY	Quarterly**
MS #1	Zinc, total	0.01	0.04	LBS/DAY	Quarterly**
MS #1	Cyanide, total	0.6	3	LBS/DAY	Quarterly**
MS #1	Fluoride	0.3	1	LBS/DAY	Quarterly**
MS #1	Barium, total	0.2	0.5	LBS/DAY	Quarterly**
	Volatile Organics				
MS #1	1,1,2,2-Tetrachloroethane	1.6	2.5	LBS/DAY	Quarterly**
MS #1	1,1,2-Trichloroethane	0.3	0.75	LBS/DAY	Quarterly**
MS #1	1,1-Dichloroethene	0.02	0.05	LBS/DAY	Quarterly**
MS #1	1,2--Dichloroethene (cis and trans)	0.5	1	LBS/DAY	Quarterly**
MS #1	Carbon Tetrachloride	0.25	0.6	LBS/DAY	Quarterly**
MS #1	Chloroform	0.6	1.5	LBS/DAY	Quarterly**
MS #1	Tetrachloroethene	0.4	1	LBS/DAY	Quarterly**
MS #1	Trichloroethene	0.7	1.7	LBS/DAY	Quarterly**
MS #1	Methylene Chloride	0.15	0.35	LBS/DAY	Quarterly**
MS #1	Vinyl Chloride	0.1	0.2	LBS/DAY	Quarterly**
	Semivolatile Organics				
MS #1	Hexachloroethane	0.015	0.15	LBS/DAY	Quarterly**
MS #1	Hexachlorobutadiene	0.2	0.41	LBS/DAY	Quarterly**
MS #1	2,4,6-trichlorophenol (2,4,5- and 2,4,6- isomers)	0.15	0.25	LBS/DAY	Quarterly**
MS #1	Pentachlorophenol	2	3	LBS/DAY	Quarterly**
MS #1	4-methylphenol*	0.054	0.08	LBS/DAY	Quarterly**

*reported as the sum of 3 and 4-methylphenol
** refer to Wastewater discharge Permit SIU #64

Table 2a: Target Analytes and Reporting Limits
STL-North Canton
Semi-Annual Long Term GW Monitoring

Volatile Organics

Compound	CAS #	PQL	MDL	Units	Analytical Method
1,1,2,2-Tetrachloroethane	79-34-5	1	0.22	ug/l	SW-846 5030B/ 8260B
1,1,2-Trichloroethane	79-00-5	1	0.22	ug/l	SW-846 5030B/ 8260B
1,1-Dichloroethene	75-35-4	1	0.18	ug/l	SW-846 5030B/ 8260B
1,2-Dichloroethane	107-06-2	1	0.16	ug/l	SW-846 5030B/ 8260B
Carbon Tetrachloride	56-23-5	1	0.19	ug/l	SW-846 5030B/ 8260B
Chloroform	67-66-3	1	0.16	ug/l	SW-846 5030B/ 8260B
cis-1,2-Dichloroethene	156-59-4	1	0.21	ug/l	SW-846 5030B/ 8260B
Tetrachloroethene	127-18-4	1	0.19	ug/l	SW-846 5030B/ 8260B
trans-1,2-Dichloroethene	156-60-5	1	0.16	ug/l	SW-846 5030B/ 8260B
Trichloroethene	79-01-6	1	0.28	ug/l	SW-846 5030B/ 8260B
Vinyl Chloride	75-01-4	1	0.21	ug/l	SW-846 5030B/ 8260B

Compound	CAS #	PQL	MDL	Units	Analytical Method
Hexachloroethane	67-72-1	50	1.5	ug/l	SW-846 3420C/8270C
Hexachlorobutadiene	87-68-3	10	0.075	ug/l	SW-846 3420C/8270C
Phenol	108-95-2	10	0.044	ug/l	SW-846 3420C/8270C
2,4,5-Trichlorophenol	95-95-4	10	0.12	ug/l	SW-846 3420C/8270C
2,4,6-Trichlorophenol	88-06-2	10	0.13	ug/l	SW-846 3420C/8270C
Pentachlorophenol	87-86-5	50	0.68	ug/l	SW-846 3420C/8270C
Hexachlorobenzene	118-74-1	10	0.035	ug/l	SW-846 3420C/8270C
4-Methylphenol*	106-44-5	10	0.74	ug/l	SW-846 3420C/8270C
Semivolatile TIC 1	N/A	N/A	N/A	ug/l	SW-846 3420C/8270C

*reported as the sum of 3- and 4-Methylphenol

Inorganics/ Water Quality

Compound	CAS #	PQL	MDL	Units	Analytical Method
pH	N/A	0.2	N/A	std units	Field Measurement
Specific Conductivity	N/A	0.1	N/A	umho/cm	Field Measurement
Temperature	N/A	0.1	N/A	Degrees C	Field Measurement
Turbidity	N/A	0.2	N/A	NTU	Field Measurement
Dissolved Oxygen	N/A	0.2	N/A	mg/l	Field Measurement
Redox Potential	N/A	N/A	N/A	n/a	Field Measurement
Chloride	16887-00-6	1	0.2	mg/l	MCCAWW 300.0A
Barium, Dissolved	7440-39-3	0.2	0.00075	mg/l	SW-846 3010A/6010B

Method detection limits are evaluated annually by the laboratory and are subject to change. Specific quantitation limits are highly matrix dependent.

Table 2b: Natural Attenuation Analytes and Reporting Limits
STL- North Canton
Semi-Annual Long Term GW Monitoring

Volatile Organics

Compound	CAS #	PQL	MDL	Units	Analytical Method
1,1,2,2-Tetrachloroethane	79-34-5	1	0.22	ug/l	SW-846 5030B/ 8260B
1,1,2-Trichloroethane	79-00-5	1	0.22	ug/l	SW-846 5030B/ 8260B
1,1-Dichloroethene	75-35-4	1	0.18	ug/l	SW-846 5030B/ 8260B
1,2-Dichloroethane	107-06-2	1	0.16	ug/l	SW-846 5030B/ 8260B
Carbon Tetrachloride	56-23-5	1	0.19	ug/l	SW-846 5030B/ 8260B
Chloroform	67-66-3	1	0.16	ug/l	SW-846 5030B/ 8260B
cis-1,2-Dichloroethene	156-59-4	1	0.21	ug/l	SW-846 5030B/ 8260B
Tetrachloroethene	127-18-4	1	0.19	ug/l	SW-846 5030B/ 8260B
trans-1,2-Dichloroethene	156-60-5	1	0.16	ug/l	SW-846 5030B/ 8260B
Trichloroethene	79-01-6	1	0.28	ug/l	SW-846 5030B/ 8260B
Vinyl Chloride	75-01-4	1	0.21	ug/l	SW-846 5030B/ 8260B

Gas Phase Hydrocarbons (STL -Austin)

Compound	CAS #	PQL	MDL	Units	Analytical Method
Ethene	74-85-1	0.5	0.083	ug/l	8015B MOD (RSK-175)
Ethane	74-84-0	0.5	0.1	ug/l	8015B MOD (RSK-175)
Methane	74-82-8	0.5	0.072	ug/l	8015B MOD (RSK-175)
Propane	74-98-6	0.5	0.015	ug/l	8015B MOD (RSK-175)

Inorganics/ Water Quality

Compound	CAS #	PQL	MDL	Units	Analytical Method
Dissolved Oxygen	N/A	0.2	N/A	mg/l	field measurement
Temperature	N/A	0.1	N/A	degrees C	field measurement
Redox Potential	N/A	N/A	N/A	n/a	field measurement
pH	N/A	0.2	N/A	std units	field measurement
Alkalinity	N/A	5	1.5	mg/l	EPA 310.1
Chloride	16887-00-6	1	0.2	mg/l	EPA 300.0A
Iron, Dissolved	7439-89-6	0.1	0.049	mg/l	SW-846 3010A/6010B
Manganese, Dissolved	7439-96-5	0.015	0.0021	mg/l	SW-846 3010A/6010B
Nitrate/nitrite (total)	N/A	0.1	0.031	mg/l	EPA 353.2
Sulfate	14808-79-8	1	0.11	mg/l	EPA 300.0A
Sulfide	18496-25-8	1	0.4	mg/l	EPA 376.1
Total Organic Carbon	N/A	1	0.081	mg/l	EPA 415.1

Method detection limits are evaluated annually by the laboratory and are subject to change. Specific quantitation limits are highly matrix dependent.

Table 2c: MS #1 Discharge Monitoring Analytes and Reporting Limits
Chopra-Lee, Inc.

Volatile Organics

Compound	CAS #	PQL	MDL	Units	Analytical Method
1,1,2,2-Tetrachloroethane	79-34-5	1000	200	ug/l	EPA 624
1,1,2-Trichloroethane	79-00-5	1000	200	ug/l	EPA 624
1,1-Dichloroethene	75-35-4	1000	200	ug/l	EPA 624
1,2-Dichloroethane	107-06-2	1000	200	ug/l	EPA 624
Carbon Tetrachloride	56-23-5	1000	200	ug/l	EPA 624
Chloroform	67-66-3	1000	200	ug/l	EPA 624
cis-1,2-Dichloroethene	156-59-4	1000	200	ug/l	EPA 624
Tetrachloroethene	127-18-4	1000	200	ug/l	EPA 624
trans-1,2-Dichloroethene	156-60-5	1000	200	ug/l	EPA 624
Trichloroethene	79-01-6	1000	200	ug/l	EPA 624
Vinyl Chloride	75-01-4	1000	200	ug/l	EPA 624

Semivolatile Organics

Compound	CAS #	PQL	MDL	Units	Analytical Method
Hexachloroethane	67-72-1	100	20	ug/l	EPA 625
Hexachlorobutadiene	87-68-3	100	20	ug/l	EPA 625
Phenol	108-95-2	100	20	ug/l	EPA 625
2,4,5-Trichlorophenol	95-95-4	100	20	ug/l	EPA 625
2,4,6-Trichlorophenol	88-06-2	100	20	ug/l	EPA 625
Pentachlorophenol	87-86-5	100	20	ug/l	EPA 625
Hexachlorobenzene	118-74-1	100	20	ug/l	EPA 625
4-Methylphenol	106-44-5	100	20	ug/l	EPA 625

Inorganics/ Water Quality

Compound	CAS #	PQL	MDL	Units	Analytical Method
Barium, total	7440-39-3	0.01	0.002	mg/l	EPA 4.1.3/200.7
Barium, Dissolved	7440-39-3	0.01	0.002	mg/l	EPA 4.1.3/200.7
Chromium, total	7440-47-3	0.01	0.002	mg/l	EPA 4.1.3/200.7
Nickel, total	7440-02-0	0.01	0.002	mg/l	EPA 4.1.3/200.7
Zinc, total	7440-66-6	0.01	0.002	mg/l	EPA 4.1.3/200.7
Cyanide, total	57-12-5	0.01	0.01	mg/l	EPA 335.2
Fluoride	16984-48-8	0.1	0.1	mg/l	EPA 340.2
Phenols, total	N/A	0.005	0.005	mg/l	EPA 420.1
PH	N/A	n/a	n/a	std units	EPA 150.1
Soluble Organic Carbon (SOC)	N/A	1	0.2	mg/l	EPA 415.1
Total Organic Carbon (TOC)	N/A	1	0.2	mg/l	EPA 415.1

Method detection limits are evaluated annually and are subject to change. Specific quantitation limits are highly matrix dependent.

Table 3
Field Measurement Equipment QC and Calibration

Parameter Analysis Method	Achievable Sensitivity /Lower Quantiation Limit	Precision QC Check	Precision Acceptance Criteria	Accuracy/Bias QC Check	Accuracy/Bias Acceptance Criteria	Corrective Action(CA)	Person Responsible for (CA)
pH SW-846 9040B	0.2 pH units	Replicate Measurements	RPD < 20%	Calibration with pH buffer solutions (4 or 10, plus 7)	Slope between 90-102	1. Check with new buffer 2. Repair/replace meter 3. Recalibrate	Project Geologist or Field Team Member
Conductivity SW-846 9050A	0.1umho/cm	Replicate Measurements	RPD < 20%	Calibration with KCL standard	± 5% of standard	1. Evaluate 2. Recalibrate	Project Geologist or Field Team Member
Temperature EPA 170.1	0.1°c	Replicate Measurements	RPD < 20%	Calibration against pH meter temp probe	± 0.1°c	1. Recalibrate 2. Replace thermometer	Project Geologist or Field Team Member
Dissolved Oxygen SM4500-OC	200 ug/l	Replicate Measurements	RPD < 20%	Calibration with standard solution	Per manufacturer operation manual	1. Evaluate 2. Recalibrate	Project Geologist or Field Team Member
Oxidation-Reduction Potential (ORP)	Not Applicable	Replicate Measurements	RPD < 20%	Calibration with Iodine standard	Per manufacturer operation manual	1. Evaluate 2. Recalibrate	Project Geologist or Field Team Member
Turbidity EPA 180.1	0.2 NTU	Replicate Measurements	RPD < 20%	Calibration with standard solution	Per manufacturer operation manual	1. Evaluate 2. Recalibrate	Project Geologist or Field Team Member
PID Organics(Air Vapor Monitoring)	Variable, depending on compound, and field conditions	Replicate Measurements	RPD < 20%	Initial calibration with zero and span gas(isobutylene)	± 5% of span gas	Recalibrate	Project Geologist or Field Team Member

Table 4: Analytical Quality Control Check Samples

Type	QC Check	Frequency	Data Quality Indicator (DQI)	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA
Field	Field Duplicate	1 per 10 samples per matrix	Precision	RPD< 30% (water matrix)	N/A	N/A (Evaluation by Project Chemist)
Field	Equipment Blank	1 per sampling event or 20 samples	Accuracy/ Bias	Target Analytes <PQL	Evaluate results for field samples	Project Chemist
Field	Temperature Blank	1 per cooler	Accuracy/ Bias	4°c ± 2°c	1. Contact PM 2. Evaluate need for resampling	Project Chemist
Laboratory	Matrix Spike (MS) Matrix Spike Duplicate (MSD) or Replicate (REP)	1 per 20 sample batch/matrix 1 per 20 sample batch/matrix	Accuracy/ Bias Precision	Within current Laboratory control limits not to exceed 75-125% for metals, inorganics ±20% RPD for metals See attached for organics limits	Evaluate based on LCS, other QC results, narrate	Analyst
Laboratory	Method Blank	1 per 20 sample batch/matrix	Accuracy/ Bias	<PQL	1. Re-prep and re-analyze blank samples if necessary 2. Narrate	Analyst
Laboratory	Surrogate spikes	All samples analyzed for organics	Accuracy/bias	within current laboratory control limits for method	1. Re-prep and re-analyze non-compliant sample(s) 2. Narrate	Analyst
Laboratory	Laboratory Control Sample(LCS)	1 per 20 sample batch/matrix	Sensitivity	within current laboratory control limits not to exceed 75-125% for metals, inorganics See attached for organics limits	Reanalyze sample; evaluate; narrate	Analyst
Laboratory	Serial Dilutions(ICP)	Each batch of 20 samples similar matrix	Precision	± 10% of original determination	Qualify data	Analyst
Laboratory	Interference Check sample (ICP)	Each wavelength after ICV at beginning of run	Precision	± 20% of the true value for the analytes (metals)	Recalibrate Instrument	Analyst
Laboratory	Post Digestion Spike(ICP)	When Matrix Spikes are outside acceptance windows	Accuracy/Bias	ICP 75% - 125% (metals)	Quality data	Analyst

Table 4: Analytical Quality Control Check Samples (continued)

Type	QC Check	Frequency	Data Quality Indicator (DQI)	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA
Laboratory	Blank - ICB	After every calibration/ verification	Accuracy/Bias	<PQL	Correct problem, recalibrate, and re-analyze	Analyst
Laboratory	Blank - CCB	After every calibration/verification	Accuracy/Bias	<PQL	Correct problem, recalibrate, and re-analyze	Analyst
Laboratory	Blank - Prep	1 per 20 sample batch/matrix	Accuracy/Bias	<PQL	1. Re-prep and reanalyze blank and sample if necessary 2. Narrate	Analyst
Laboratory	Initial Calibration	Per SOP for Method	Precision	Per SOP for Method	1. Evaluate 2. Recalibrate when QC criteria is not met	Analyst
Laboratory	Continuing Calibration Verification	Per SOP for Method	Precision	Per SOP for Method	1. Evaluate 2. Clean system 3. Reanalyze calibration verification and associated samples and/or recalibrate	Analyst

Table 5a: 8270C Spike Recovery Acceptance Limits
Matrix: Water
Laboratory: STL North Canton

	Control Spike					Matrix Spike				
Spike Compound	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**
Hexachlorobenzene	50	ug/l	54	114	34	50	ug/L	48	123	51
Hexachlorobutadiene	50	ug/L	36	113	47	50	ug/L	35	48	56
Hexachloroethane	50	ug/L	29	115	49	50	ug/L	31	118	92
4-Methylphenol	50	ug/L	49	110	35	50	ug/L	29	122	55
Pentachlorophenol	50	ug/L	10	140	56	50	ug/L	10	140	56
Phenol	50	ug/L	10	131	43	50	ug/L	10	131	43
2,4,5-Trichlorophenol	50	ug/L	46	122	48	50	ug/L	45	125	74
2,4,6-Trichlorophenol	50	ug/L	46	118	48	50	ug/L	46	122	98
Surrogate Compound										
2-Fluorobiphenyl	50	ug/L	30	110	N/A	50	ug/L	30	110	N/A
2-Fluorophenol	75	ug/L	13	110	N/A	75	ug/L	13	110	N/A
2,4,6-Tribromophenol	75	ug/L	21	122	N/A	75	ug/L	21	122	N/A
Nitrobenzene-d5	50	ug/L	32	112	N/A	50	ug/L	32	112	N/A
Phenol-d5	75	ug/L	10	113	N/A	75	ug/L	10	113	N/A
Terphenyl-d14	50	ug/L	10	144	N/A	50	ug/L	10	144	N/A

Table 5b: 8260B Spike Recovery Acceptance Limits
Matrix: Water
Laboratory: STL North Canton

	Control Spike					Matrix Spike				
Spike Compound	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**
Carbon tetrachloride	20	ug/L	75	149	30	10	ug/L	63	176	30
Chloroform	20	ug/L	84	128	30	10	ug/L	83	141	30
1,2-Dichloroethane	20	ug/L	79	136	30	10	ug/L	71	160	30
cis-1,2-Dichloroethene	20	ug/L	85	113	30	10	ug/L	87	114	30
trans-1,2-Dichloroethene	20	ug/L	79	120	30	10	ug/L	85	116	30
1,1-Dichloroethene	20	ug/L	63	130	20	10	ug/L	62	130	20
1,1,2,2-Tetrachloroethane	20	ug/L	85	118	30	10	ug/L	88	116	30
Tetrachloroethene	20	ug/L	88	113	30	10	ug/L	85	121	30
1,1,2-Trichloroethane	20	ug/L	83	122	30	10	ug/L	86	129	30
Trichloroethene	20	ug/L	75	122	20	10	ug/L	62	130	20
Vinyl chloride	20	ug/L	61	120	30	10	ug/L	88	126	30
Surrogate Compound										
4-Bromofluorobenzene	10	ug/L	74	116	N/A	10	ug/L	74	116	N/A
1,2-Dichloroethane-d4	10	ug/L	61	128	N/A	10	ug/L	61	128	N/A
Toluene-d8	10	ug/L	76	110	N/A	10	ug/L	76	110	N/A
Dibromofluoromethane	10	ug/L	73	122	N/A	10	ug/L	73	122	N/A

Table 5c: Modified 8015B Spike Recovery Acceptance Limits
Matrix: Water
Laboratory: STL Austin

	Control Spike					Matrix Spike				
Spike Compound	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**	**Spike Amount**	**Units**	**LCL**	**UCL**	**RPD Limit**
Ethane	100	ug/L	51	128	20	100	ug/L	51	128	20
Ethene	100	ug/L	48	125	20	100	ug/L	48	125	20
Methane	50	ug/L	50	126	20	50	ug/L	50	126	20
Propane	5	ug/L	70	130	20	5	ug/L	70	130	20

Table 5d: Metals and Inorganics Spike Recovery Acceptance Limits
Matrix: Water
Laboratory: STL North Canton

		Control Spike					Matrix Spike				
Analysis	Method	Spike Amount	Units	LCL	UCL	RPD Limit	Spike Amount	Units	LCL	UCL	RPD Limit
Barium, dissolved	3010A/ 6010B	2000	ug/L	80	120	20	2000	ug/L	75	125	20
Iron, dissolved	3010A/ 6010B	1000	ug/L	77	127	20	1000	ug/L	75	125	20
Manganese, dissolved	3010A/ 6010B	500	ug/L	80	120	20	500	ug/L	75	125	20
Alkalinity	EPA 310.1	500	mg/L	90	127	20	500	mg/L	10	160	24
Chloride	EPA 300.0A	50	mg/L	90	110	20	50	mg/L	80	120	20
Nitrate/nitrite	EPA 353.2	1	mg/L	85	115	20	0.25	mg/L	54	140	20
Sulfate	EPA 300.0A	50	mg/L	90	110	20	50	mg/L	80	120	20
Sulfide	EPA 376.1	20	mg/L	79	104	20	20	mg/L	75	107	20
Total Organic Carbon	EPA 415.1	25	mg/L	88	115	20	25	mg/L	72	136	20

Table 6: Sample Container, Preservative, and Holding Time Requirements

Parameter	Media	Container/ Preferred Volume	Minimum Volume	Preservative	Maximum Holding Time
Volatile Organic Compounds	Water	Three 40 ml glass vials with septum	Two 40 ml glass vials	Cool 4°C ± 2°C, pH<2 with HCl (no headspace)	114 days from collection to analysis
Semivolatile Organic Compounds	Water	Two 1 L amber glass	1 Liter	Cool to 4°C ± 2°C	7 days from collection for extraction, 40 days for analysis
Metals, Total (excluding Hg)	Water	1 L polyethylene	500 ml	Cool to 4°C ± 2°C, pH<2 with HNO3	6 months from collection to analysis
Metals, Dissolved (excluding Hg)	Water	1 L polyethylene	500 ml	Cool to 4°C ± 2°C, pH<2 with HNO3 following field filtering	6 months from collection
Alkalinity	Water	250 ml polyethylene	50 ml	Cool to 4°C ± 2°C	14 days from collection to analysis
Chloride	Water	250 ml polyethylene	50ml	Cool to 4°C ± 2°C	28 days from collection to analysis
Fluoride	Water	250ml polyethylene	50 ml	Cool to 4°C ± 2°C	28 days from collection to analysis
Total Suspended Solids	Water	250 ml polyethylene	100 ml	Cool to 4°C ± 2°C	7 days from collection to analysis
Total Phenols	Water	1 L glass	100 ml	Cool 4°C ± 2°C, pH<2 with H2SO4	28 days from collection to analysis

Table 6: Sample Container, Preservative, and Holding Time Requirements

Parameter	Media	Container/ Preferred Volume	Minimum Volume	Preservative	Maximum Holding Time
Dissolved (Soluble) Organic Carbon	Water	125 ml amber glass	25 ml	Cool to 4°C ± 2°C, pH <2 with H3PO4	28 days from collection to analysis
Total Organic Carbon	Water	125 ml amber glass	25 ml	Cool to 4°C ± 2°C, pH <2 with H3PO4	28 days from collection to analysis
Sulfate	Water	250 ml polyethylene	50ml	Cool to 4°C ± 2°C	28 days from collection to analysis
Sulfide	Water	500 ml glass	100 ml	Cool to 4°C ± 2°C, pH < 2 with NaOH, Zn Acetate	7 days from collection to analysis
Gas Phase Hydrocarbons (Ethene, Ethane, Methane, Propane)	Water	Two 40 ml glass vials with septum	Two 40 ml glass vials	Cool 4°C ± 2°C, pH<2 with HCl (no headspace)	14 days from collection to analysis
Total Cyanide	Water	500 ml polyethylene	100 ml	Cool to 4°C ± 2°C, pH>12 with NaOH	14 days from collection to analysis
DNA Analysis (16S Rrna Probes)	Water	Two 1 L amber glass	1 L	Cool to 4°C ± 2°C	Not Applicable (to be analyzed by DuPont Experimental Station or subcontractor

Note: Samples collected for multiple parameters may be collected into a larger size sample container provided container type and preservation requirements are the same.

FIGURES

DUPONT

Corporate Remediation Group

An Alliance between DuPont and URS Diamond

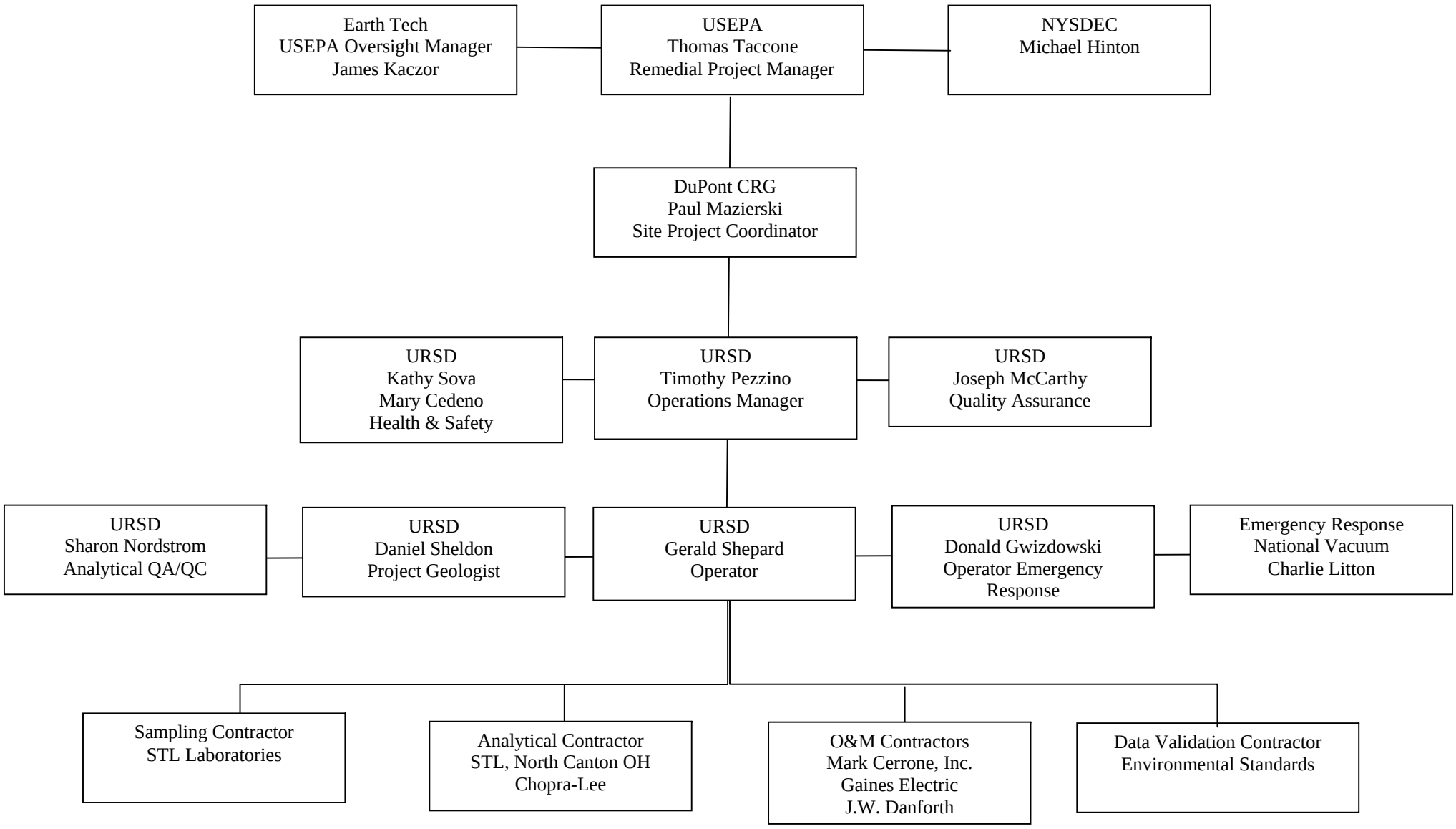
Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1

Figure 2
Remedial Action Organizational Chart
DuPont Necco Park Monitoring and O & M
Groundwater Pumping and Treatment System



ATTACHMENTS

ATTACHMENT A
Contact Information

Attachment A: Contact Information

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Attachment B

DuPont Lab Network
Envista EDD Specification

Version 1.0

April 25, 2003

Introduction

The DuPont Corporate Remediation Group (CRG) maintains a corporate environmental database (Envista) that stores field data, analytical results, QA/QC results, water levels, and other information resulting from the activities of the DuPont environmental projects. Much of this data is provided by analytical labs or sampling contractors performing analytical and sampling services for DuPont. To optimize loading data generated by these contractors, a format of an ASCII text file has been developed for conveying data to DuPont for loading into the database. These text files will be referred to as Envista EDD files. Following is a description of the Envista EDD specification.

General Information

Envista EDD files are electronically submitted to CRG in an agreed upon manner. The EDD must match the hardcopy report in terms of samples, tests, analytes, and results. Also, DuPont requires the lab composite results such that only one result is reported for each analyte (i.e., the lab submits only the result judged best when a sample is re-analyzed for particular analytes due to exceeding calibration range, etc.)

Normally, all data for a particular sample delivery group will be contained in one file. This group is normally referred to as a lot (or group), which makes up a normal reporting/invoicing group and usually consists of samples for a given project and site that the lab has received in one day, including all associated QC samples and results. Note that QC results may be contained in more than one EDD if field samples from different lots were analyzed in the same QC batch.

All data must be written in text format (ASCII). Each data field within a record must be delimited by the caret (^) symbol. Therefore, each record must begin with a ^. If another format is required, arrangements must be made with the DuPont Envista database administrator and another format will be provided. This format must be agreed upon between the lab and DuPont prior to the delivery of the data to DuPont.

Some data fields are required to be populated, while others are populated depending on the project circumstances or the particular data being reported. These requirements are described in the "When Required" column of the EDD specification in Table 1. The length of each field must not exceed the width specified in the "Width" column of the EDD specification in Table 1, or the data will be truncated. Fields designated as a number (N) in the "Width" column of Table 1 must contain a text string that will convert to a number. The record format of the deliverable is positional and therefore, each field must be listed in the order specified in Table 1. Also, null or blank fields must be delimited. For example, if MDL was not applicable to a sample, the field would be designated with a ^^ indicating the MDL was null. Each field begins with a ^ and ends with a ^, but the trailing ^ also becomes the beginning ^ for the next field. Missing data, truncated data, or improperly ordered fields within a record may result in the deliverable being judged to be incomplete.

There is only one type of record, and all records must be the same format (i.e., flat file format). Note that this is changed from the previous DuPont CED EDD specification.

Note that different laboratory samples (samples with different Lab_IDs) may come from the same field sample. This is preferable for results that are from different lab samples that may have the same parent field sample, such as composited results from different dilutions.

Samples taken for matrix spike/matrix spike duplicates (MS/MSD) and laboratory replicates (REP) are QC samples that have field samples. If the field sample is from DuPont and is in the current lot for the current project, the parent or unspiked sample and result information should be included in the EDD and the Field_Sample_ID for the MS, MSD, and REP should be included for those records. If the parent field sample is not from a DuPont site or is from a DuPont site but not the current site and project, the field sample and result should not be included, and the field sample name will be null for the MS, MSD, and REP. Lab originated (QA/QC) samples such as lab control spikes or method blanks will not have a field sample information (field sample ID, date and time sampled, etc.).

The Batch Number is a unique number that identifies the laboratory QC batch. Note that this is changed from the previous DuPont CED EDD specification.

QA/QC results involving relative percent recoveries and relative percent differences, e.g. MS/MSDs, REPs, lab control spikes and lab control spike duplicates (LCS/LCSD), and surrogates must also include these recoveries and differences plus the maximum and minimum recoveries and differences that are acceptable, as applicable. For example, an MS sample requires a result, the relative percent recovery, and the maximum and minimum permissible relative percent recovery. An MSD sample requires a result, the relative percent recovery, the relative percent difference, the maximum and minimum permissible relative percent recovery, and the maximum permissible relative percent difference (see Table 2).

DuPont will no longer require the laboratories to comment on items already flagged in the hardcopy report. For example, laboratories will not be required to comment on poor matrix spike/matrix spike duplicate recoveries, poor laboratory control sample/control sample duplicate recoveries, poor surrogate recoveries, and method blank contamination (if flagged in the hardcopy report).

Laboratories will be required to comment on issues not flagged in the hardcopy report. For example, if samples had to be reextracted/redigested/reanalyzed for any reason, hold times missed, sample was reextracted due to poor surrogate recovery and outcome of reanalysis, sample received without correct preservation, not enough volume to perform matrix spike/matrix spike duplicate samples, etc., laboratories will provide a comment on the analysis report or in the case narrative. Note that comments and/or case narratives should also be included electronically in the comment field, or may be submitted as a separate electronic file in an agreed upon format.

Table 1. DuPont Envista EDD flat file field format			
Field Name	**When Required**	**Maximum Length (C=Character, N=number)**	**Description**
Lot_ID	All Records	C30	Identifier for the lot (group of samples that came lab receives in same shipment, and is the typical EDD/hardcopy report/invoice unit)
Lab_ID	All Records	C30	ID used to identify the sample at the lab
Field_Sample_ID	All Field samples (FS, TB, FB, EB) and MS/MSD/REP when parent is DuPont sample for project	C60	Field sample ID or Client ID (normally from chain of custody)
Sample_Type	All Records	C30	Designates the type of sample as a Field Sample (FS), Equipment Blank (EB), Field Blank (FB), or Trip Blank (TB), Matrix Spike (MS), Matrix Spike Duplicate (MSD), Lab Control Spike (LCS), Lab Control Spike Duplicate (LCSD), Lab Duplicate (REP), Method Blank (MB)
Collection_date	Field samples (FS, TB, FB, EB) only	C9	Date sample was collected (Format is DD-MMM-YY, e.g. 15-JAN-97)
Collection_time	Field samples (FS, TB, FB, EB) only	C4	Time sample was collected (Format is HHMM military time, e.g., 1:30 p.m. is 1330, 9:30 a.m. is 0930)
Receipt_date	Field samples (FS, TB, FB, EB) only	C9	Date received at the lab (Format is DD-MMM-YY, e.g. 15-JAN-97)
Sample_Matrix	All Records	C30	Matrix of the sample (Water, soil, sediment, air, oil…) as collected
Lab_Name	All Records	C30	The name or code for the lab (these will be assigned by DuPont for each lab)
Project_Name	All Records	C30	Name assigned to the project
Sample_comments	As applicable	C600	Lab comments regarding handling of samples (e.g. Sample came in above temperature.) Note that comments may be provided as a separate electronic file in an agreed upon format.
Batch_ID	All Records	C30	Unique ID that identifies the group of samples prepared & analyzed together (QC batch)
Analyte_name	All Records	C60	Compound or sample property tested for.
CAS_No	All Records	C30	Chemical Abstract number of the analyte or lab assigned number (without dashes preferred).
Result_Mod	See Table 2	C30	"<" if result is non-detect, otherwise null
Result	See Table 2	C20	Result of an analysis. If non-detect, use reporting limit; either PQL or MDL as specified by the project. For high-resolution isotope dilution methods, use EDL for non-detects.
PQL	See Table 2	C20	Practical Quantitation Limit for an analysis in same units as result, adjusted for sample amount and

			dilution. For high-resolution isotope dilution methods, use EDL.
MDL	See Table 2	C20	Method Detection Limit for an analysis in same units as result, adjusted for sample amount and dilution. For high-resolution isotope dilution methods, this would be null.
Reporting_Units	See Table 2	C30	Units that the analysis is reported in (mg/l, ug/kg, etc.)
Upper_Error	As applicable	C20	Upper error range (e.g., for rad data, + error measurement)
Lower_Error	As applicable	C20	Lower error range (e.g., for rad data, - error measurement)
Qualifiers	As applicable	C30	Flags applied to the analysis to qualify the data.
Dilution_Factor	All Records	N20	Sample dilution factor. If not diluted, enter one (1).
Analysis_Method	All Records	C30	Method used to run an analysis
Analysis_Date	All Records	C9	Date that the analysis was run (Format is DD-MMM-YY, e.g. 15-JAN-97)
Analysis_Time	All Records	C4	Time that the analysis was run (Format is HHMM military time. e.g. 1:30 p.m. is 1330, 9:30 a.m. is 0930)
Prep_Method	When prep performed	C30	Method used to prep an analysis (if prep method = analysis method, then this should be 'METHOD' without the quotes, or can be null).
Prep_Date	When prep performed	C9	Date that the sample was prepared. (Format is DD-MMM-YY, e.g. 15-JAN-97)
Prep_Time	When prep performed	C4	Time that the sample was prepared (Format is HHMM military time. e.g. 1:30 p.m. is 1330, 9:30 a.m. is 0930)
Preprep_Method	When preprep performed	C30	Method used to preprep/leach an analysis (e.g., 1310, 1311, 1312).
Preprep_Date	When preprep performed	C9	Date that the sample was prepreped (Format is DD-MMM-YY, e.g. 15-JAN-97)
Preprep_Time	When preprep performed	C4	Time that the sample was prepreped (Format is HHMM military time. e.g. 1:30 p.m. is 1330, 9:30 a.m. is 0930)
Analyte _Type	All Records	C30	Target analyte (FS), Surrogate (SU), tentatively identified compound (TIC) or Internal Standard (IS)
Filtered	All Records	C1	Total (T) or Dissolved (D)
Dry_wet_basis	All Records	C2	D for dry weight basis, W for wet weight basis, NS for (air, wipe, etc.)
Instrument	All Records	C30	Lab defined identifier for instrument on which analysis was performed.
TIC_number	For TIC results	N2	Tentatively identified compound number beginning with 1 and consecutively numbered to include all TIC's found in the sample. If no TICS are found, can either submit 1 TIC result with ND as result, or not include TIC result record
Spike_added	See Table 2	N20	Amount of the analyte spiked into a quality control sample, in same units as result
RPR	See Table 2	N20	Relative percent recovery. For MS/MSD, if concentration in unspiked parent sample > 4x spike amount, RPR should be null and enter NC as qualifier. For surrogates, if dilution factor > 4, RPR should be null, and enter NC as qualifier.

Min_RPR	See Table 2	N20	Lowest recovery limit acceptable for the method
Max_RPR	See Table 2	N20	Highest recovery limit acceptable for the method
RPD	See Table 2	N20	Relative percent difference between duplicate sample types (sample & REP, MS & MSD, LCS & LCSD). For MSD, if concentration in unspiked parent sample > 4x spike amount, RPD should be null and enter NC as qualifier.
Max_RPD	See Table 2	N20	Highest relative percent difference allowed for the method/analyte
Initial_weight_volume	Optional	N18	Initial sample weight or volume before any preps or prepreps
Initial_weight_volume_units	If initial weight/volume included	C30	Units for initial sample weight/volume
Final_weight_volume	Optional	N18	Final sample weight/volume after any preps or prepreps
Final_weight_volume_units	If final weight/volume included	C30	Units for final sample weight/volume
DuPont_Cost_Code	Optional	C30	The DuPont cost code (specifies method/matrix/deliverable/turnaround time) from Exhibit B of the current contract. This is currently optional, but will be required in the future.
Result_Comments	As applicable	C600	Any result specific comments. Note that comments may be provided as a separate electronic file in an agreed upon format.
Fraction	All Records	C30	This field is used to differentiate laboratory samples and results as required. For example, some labs use the LabID (2nd field in this list) to identify the client field sample, which does not sufficiently differentiate lab samples and results from different dilutions. This field could also be a more specific internal Lab ID

Table 2. Fields Required for each Sample Type and Surrogates/Internal Standards								
SAMPLE Types---> Fields	**FS, EB, TB, FB**	**MS**	**MSD**	**MB**	**LCS**	**LCSD**	**REP**	**Surrogates**
Result_Mod (if non-detect)	X	X	X	X	X	X	X	
Result	X	X	X	X	X	X	X	
MDL (not TICs)	X	X	X	X	X	X	X	
PQL (not TICs)	X	X	X	X	X	X	X	
Spike_Added		X	X		X	X		
RPR		X	X		X	X		X
Min_RPR		X	X		X	X		X
Max_RPR		X	X		X	X		X
RPD			X			X	X	
Max_RPD			X			X	X	
Reporting_Units	X	X	X	X	X	X	X	

ATTACHMENT C

DuPont CRG Procedure for Completing Chain-Of-Custody Forms

STANDARD OPERATING PROCEDURE FOR COMPLETING CHAIN-OF-CUSTODY FORMS

Date: May 11, 2001

Prepared for: DuPont Remediation Group

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1. PURPOSE

The purpose of this standard operating procedure is to establish a CRG/URSD proper chain-of-custody (COC) standard for tracking samples from the field to the laboratory. A proper COC is necessary if there is any possibility that the analytical data or conclusions based upon the analytical data will be used in litigation (SW846, Chapter 9, Section 9.2.2.7). The persons entering information on the COC are responsible for ensuring the document can withstand scrutiny during litigation.

2. GENERAL INFORMATION

The COC is a legal document/record that must include: facility name, facility address, phone numbers (primary contact and laboratory), sample identification, preservation, dates and times of collection of samples, possession, analyses, and laboratory performing the analyses.

3. PROCEDURES

3.1 Chain-of-Custody (COC)

The policy is to use either Option A or Option B as stated below.

3.1.1 Option A (Pre-printed COC originated by Laboratory Personnel)

If the regulatory agency requires initiation of the COC at the laboratory, use Option A. See Figures 1 and 1A for examples of COC Option A.

Laboratory Personnel do the following:

- ❏ Originate the pre-printed COC by relinquishing the bottles with a signature. The pre-printed COC contains the following information: header information (e.g., facility name, facility address, facility supervisor, project name), location code, matrix code, sample source (e.g., KIN-G-MW1), sample depths, sample type, volume, preservative (if applicable), quantity, bottle type, method and/or analyte.
- ❏ If the sample IDs are known at the time of bottle preparation, pre-print the location code, matrix code, and sample location (e.g., KIN-G-MW1) on the COC.
- ❏ If the sample IDs are **not** known at the time of bottle preparation, either pre-print the location code and matrix code only on the COC (e.g., KIN-G) or leave the sample ID blank.

Field Personnel do the following:

- ❏ If a sample is pre-printed on the COC but will never be collected:
  1. Cross out the sample on the COC.
  2. Date and initial next to the cross-out and give reason on the COC (e.g., well is dry).

- ❑ If an extra sample is collected that was not pre-printed on the laboratory relinquished COC, add this sample to a blank COC not the COC that was relinquished by Laboratory Personnel.
- ❑ If all of the samples listed on the laboratory relinquished COC cannot be collected in one day, use derived COC (see Section 5). (A way to avoid using derived COC is to have one well or boring location per COC.)
- ❑ If a sample is moved from one cooler to another:
    1. Add the comment "Moved to COC Y" (where Y is the unique COC number located on the top right-hand of the COC) in the date and time field on COC X next to the sample being moved.
    2. Add the sample to COC Y.
    3. Add the comment "moved sample from COC X" (where X is the unique COC number located on the top right-hand of the COC) in the margin of the COC Y next to the sample that was moved.

3.1.2 Option B (Pre-printed/Blank COC Originated in the Field)

- ❑ Laboratory Personnel issue forms along with the bottles to be used as chains-of-custody. These forms can be pre-printed or left blank.
- ❑ Field Personnel do the following:
    1. Collect the samples, write the sample ID according to the naming convention as described in Appendix A, if not already present, on the COC.
    2. Write the date and time of sample collection on the COC.
    3. Enter the remaining information on the COC [i.e., sample type, volume, preservative (if applicable), quantity, bottle type, method and/or analyte (if not already pre-printed on the COC)].
    4. Once the samples are ready to be shipped to the laboratory and all of the aforementioned information has been entered for the samples collected, relinquish the samples to the laboratory with his/her signature, date, and time (see Figure 2 and 2A for examples of Option B).

4. SIGNATURES

4.1 Option A

If Laboratory Personnel initiate the COC:

1. Laboratory Personnel relinquish the bottles with a signature.
2. Project Manager designates Field Personnel.
3. Field Personnel receive the cooler(s) from the courier (i.e., Laboratory/Federal Express/Airborne).
   At this time, Field Personnel sign the shipping paperwork. OR, if someone other than

Field Personnel is designated by Project Manager to receive the bottles from Courier, that person signs the shipping paperwork upon receipt of the coolers.

4. Field Personnel:
   - ❑ Check contents of cooler against COC
   - ❑ Sign the COC in the "Received By" box.
   - ❑ Relinquish the samples to the laboratory once they have finished sampling. (Note: If more than one person is in the field sampling, the person receiving the bottles/samples must also relinquish the bottles/samples.
5. Laboratory personnel:
   - ❑ Cross-out the unused "Received By/Relinquished By" boxes prior to signing.
   - ❑ Sign the COC upon receipt of the samples.
6. Field Personnel file and keep the Federal Express/Airborne bill of lading **to** and **from** the site (if possible).

4.2 Option B

If Laboratory Personnel did not initiate the COC:

1. Field Personnel sign the COC upon completion of sampling in the Relinquished By box.
2. Laboratory Personnel sign the COC upon receipt of the samples and cross-out the unused "Received By/Relinquished By" boxes.
3. Field Personnel file and keep the Federal Express/Airborne bill of lading **from** the site (if possible).

5. DERIVED COCS

(Necessary to complete the record of custody when using COC Option A and all of the samples on the pre-printed COC cannot be collected on a single day.)

- ❑ If the COC was originated by Laboratory Personnel with a relinquished signature and all of the samples listed on the COC cannot be collected and sent in one shipment, Field Personnel must use the Derived COCs. (One way to avoid the Derived COC is to list one well or boring location per COC.)
- ❑ Field Personnel must write the sample IDs of the samples that were collected that day and are to be shipped to the laboratory on the Derived COC. It is important that Field Personnel:
  1. Transcribe all of the information pertaining to the sample (e.g., correct sample ID, parameters, preservative, etc.) on the Derived COC.
  2. Reference the Derived COC# on the Original COC in the "Date and Time" boxes of the sample that was transcribed onto the Derived COC.
  3. If the Derived COC doesn't have a number, Field Personnel must assign a number. The assigned number may be the original COC number followed by a –1.

- The original COC remains in the field until all the samples listed on the COC have been collected.
- Field Personnel send the original COC with the last shipment of samples listed on the original COC (see Figure 3 and 3A for examples of "Derived COC").

6. "CROSS OUTS" ON COC

- If corrections are made to the COC while in the field, Field Personnel must date and initial next to the item that was crossed out.
- If corrections are to be made to the COC **after** it has left the field, ADQM Personnel:
  1. Document the error (i.e., email or send out the COC Exception Report form).
  2. Send the email/COC Exception Report form to the person requesting the correction (if other than ADQM Personnel) for signature.
- Once the requestor has reviewed the documentation, he/she sends an email acknowledging the correction or mails the COC Exception Report form back to ADQM personnel with a signature.
- ADQM keeps the original with the file and sends a copy to Laboratory Personnel and to the project manager.

7. LOCATION OF COC WITH RESPECT TO COOLER

Laboratory Personnel:

1. Print the COC on carbon paper so that all parties handling the samples can maintain a copy in their files.
2. Place the original COC or form (which will become a COC once a signature has been added) inside the cooler when shipped to the field.

Field Personnel:

1. Place the original COC and laboratory copy in the cooler containing the samples listed on that COC.
2. Keep one carbon copy of the COC for their files.

8. BOTTLE LABELS

Field Personnel must make sure that the bottle label contains the full sample ID (see Appendix A), the preservative added, the number of bottles, the analyses, and whether or not the sample is filtered. The information on the bottle label must match the information on the COC.

9. DATE/TIME OF SAMPLE COLLECTION

Field Personnel must:

1. Write the date on COC as MM/DD/YY (e.g., 8/31/99)
2. Write the time on COC in 24 hour or military time (e.g. 1330). The time of collection is recorded as the time the sample was initially taken. A separate time of collection is not required for each parameter (e.g., time for volatiles, time for semivolatiles, etc.) The date and time of collection of the matrix spike and matrix spike duplicate samples are the same date and time as the original sample.

10. CUSTODY SEALS

- Laboratory Personnel include custody seals with each cooler shipment.
- Field Personnel:
  1. Pack the samples on ice in the cooler.
  2. Once the cooler is ready for shipment, tape the custody seals to the broad side of the cooler lid opposite the hinges in such a way that the seals will be broken if the cooler is opened.
  3. Sign and date the custody seals prior to shipment to Laboratory Personnel. If Field Personnel break the seals of the cooler prior to shipment (e.g., to re-ice the samples), Field Personnel must attach another set of seals to the cooler with the Field Personnel's signature and the date.
  4. If specified in the QAPP, attach custody seals to the bottles. Place the seal over the cap of the bottle and down both sides in such a way that, if the cap is unscrewed, the seal will be broken (see Appendix B for example custody seal).

11. COOLER NUMBERS

ADQM Personnel instruct the laboratories to write cooler numbers on coolers and associated COC containing samples to be analyzed for volatiles (e.g., label attached with cooler number or cooler number written directly on cooler).

12. SPECIAL REQUESTS/CONCERNS

Field Personnel use comment section of COC for special requests/concerns such as analyze within 7 days, high PID reading, etc.

13. STEP-BY-STEP INSTRUCTIONS

All personnel can follow the step-by-step instructions on how to complete a COC (see Appendix C).

FIGURES

Figure 1 ← **Example of laboratory originated COC sent to the field**

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425 **No. 123**

Job Number: 7035-504116-772000

Facility Name: DuPont Cape Fear	**Telephone Number:** 910-371-4409	**Method of Shipping:** Fed Ex	**Shipping Instructions:** Priority Overnight		
Facility Address: State Road 1426, Leland, NC 28451	**Comments:**				
Facility Supervisor: Bill Jones					
Process Producing Sample: Indicator GW					
Employee(s) Sampling:					
Other Employee(s) Handling:					

Sample Description	Date	Time	Sample Type	Bottle Volume (ml)	Preservative	Quantity	Bottle Type	8260B									
CAP-G-MW-30			WW	40	HCL	2	V	X									
		Laboratory relinquishes the bottles by signing and dating here															

Bottles Relinquished by Bob Adams	**Date/ Time** 03/22/01	10:00	**Bottles Received by**		**Date/ Time**		**Condition of samples upon arrival:**	
Bottles Relinquished by	**Date/ Time**		**Bottles Received by**		**Date/ Time**		**Signature:**	
Bottles Relinquished by	**Date/ Time**		**Bottles Received by**		**Date/ Time**		**Date:**	
Bottles Relinquished by	**Date/ Time**		**Bottles Received by**		**Date/ Time**		**Temp of Samples on Arrival: _____C**	

Figure 1A ← **Example of laboratory originated COC after completed in the field**

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425 **No. 123**

Job Number: 7035-504116-772000

Facility Name: DuPont Cape Fear	**Telephone Number:** 910-371-4409	**Method of Shipping:** Fed Ex	**Shipping Instructions:** Priority Overnight
Facility Address: State Road 1426, Leland, NC 28451	**Comments:**		
Facility Supervisor: Bill Jones			
Process Producing Sample: Indicator GW			
Employee(s) Sampling: Joe Sample			
Other Employee(s) Handling: Dave White			

Sample Description	Date	Time	Sample Type	Bottle Volume (ml)	Preservative	Quantity	Bottle Type	8260B									
CAP-G-MW-30	03/22/01	1200	WW	40	HCL	2	V	X									

Laboratory personnel will accept receipt of the samples by signing and dating here.

Person who received the bottles must also relinquish the bottles by signing here

Laboratory relinquishes the bottles by signing and dating here. The point of contact receives the bottles by signing and dating here.

Bottles Relinquished by	Bob Adams	**Date/ Time** 03/21/01	10:00	**Bottles Received by**	Joe Smith	**Date/ Time** 03/22/01	900	**Condition of samples upon arrival:**	Good
Bottles Relinquished by	Joe Smith	**Date/ Time** 03/22/01	1600	**Bottles Received by**	- ---------	**Date/ Time** -------	------	**Signature:**	Bob Adams
Bottles Relinquished by	----------	**Date/ Time** ---------	---------	**Bottles Received by**	----------	**Date/ Time** ---------	-------	**Date:** 03/23/01	
Bottles Relinquished by	---------- -	**Date/ Time** ---------	---------	**Bottles Received by**	Bob Adams	**Date/ Time** 03/23/01	930	**Temp of Samples on Arrival: __2_C**	

Figure 2 ← Example of COC to be originated in the field

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425 **No. 124**

Job Number:																		
Facility Name: DuPont Cape Fear		**Telephone Number:** 910-371-4409					**Method of Shipping:**					**Shipping Instructions:**						
Facility Address: State Road 1426, Leland, NC 28451					**Comments:**													
Facility Supervisor: Bill Jones																		
Process Producing Sample: Indicator GW																		
Employee(s) Sampling:																		
Other Employee(s) Handling:																		
Sample Description	**Date**	**Time**	**Sample Type**	**Bottle Volume (ml)**	**Preservative**	**Quantity**	**Bottle Type**	8260B										
CAP-G-MW-30			WW	40	HCL	2	V	X										
Bottles Relinquished by		**Date/ Time**			**Bottles Received by**				**Date/ Time**		**Condition of samples upon arrival:**							
Bottles Relinquished by		**Date/ Time**			**Bottles Received by**				**Date/ Time**		**Signature:**							
Bottles Relinquished by		**Date/ Time**			**Bottles Received by**				**Date/ Time**		**Date:**							
Bottles Relinquished by		**Date/ Time**			**Bottles Received by**				**Date/ Time**		**Temp of Samples on Arrival: _____C**							

Figure 2A ← **Example of COC to be originated in the field once completed in the field**

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425

No. 124

Job Number: 7035-504116-772000

Facility Name:	DuPont Cape Fear	**Telephone Number:**	910-371-4409	**Method of Shipping:**	Federal Express
Facility Address:	State Road 1426, Leland, NC 28451	**Comments:**		**Shipping Instructions:**	Priority Overnight
Facility Supervisor:	Bill Jones				
Process Producing Sample:	Indicator GW				
Employee(s) Sampling:	Bob Adams				
Other Employee(s) Handling:	Dave White				

Sample Description	Date	Time	Sample Type	Bottle Volume (ml)	Preservative	Quantity	Bottle Type	8260B
CAP-G-MW-30	03/22/01	1030	WW	40	HCL	2	V	X

Field Personnel initiates the COC upon relinquishment of the samples by signing and dating here.

Laboratory personnel will accept receipt of the samples by signing and dating here.

Bottles Relinquished by	Bob Adams	**Date/ Time**	03/22/01	15:00	**Bottles Received by**	- ---------	**Date/ Time**	- ---------	- ------	**Condition of samples upon arrival:** Good
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**	- ---------	**Date/ Time**	- ---------	- ------	**Signature:** Joe Smith
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**	- ---------	**Date/ Time**	- ---------	- ------	**Date:** 03/23/01
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**	Joe Smith	**Date/ Time**	03/23/01	900	**Temp of Samples on Arrival: 3C**

Figure 3

ORIGINAL COC ← Original COC

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425 **No. 123**

Job Number: 7035-504116-772000

Facility Name: DuPont Cape Fea	**Telephone Number:** 910-371-4409	**Method of Shipping:** Fed Ex	**Shipping Instructions:** Priority Overnight
Facility Address: State Road 1426, Leland, NC 28451	**Comments:**		
Facility Supervisor: Bill Jones			
Process Producing Sample: Indicator GW			
Employee(s) Sampling: Bob Adams			
Other Employee(s) Handling:			

Sample Description	Date	Time	Sample Type	Bottle Volume (ml)	Preservative	Quantity	Bottle Type	8260B									
CAP-G-MW-30	See COC 123-1		WW	40	HCL	2	V	X		Copy all of the information wrt CAP-G-MW-30 onto derived COC							
CAP-G-MW-28			WW	40	HCL	2	V	X									
CAP-G-MW-28D			WW	40	HCL	2	V	X									
CAP-G-MW-29			WW	40	HCL	2	V	X									

Bottles Relinquished by	Joe Smith	**Date/ Time** 03/22/01	9:00	**Bottles Received by**	**Date/ Time**	**Condition of samples upon arrival:**
Bottles Relinquished by		**Date/ Time**		**Bottles Received by**	**Date/ Time**	**Signature:**
Bottles Relinquished by		**Date/ Time**		**Bottles Received by**	**Date/ Time**	**Date:**
Bottles Relinquished by		**Date/ Time**		**Bottles Received by**	**Date/ Time**	**Temp of Samples on Arrival: _____C**

Figure 3

DERIVED COC FROM ORIGINAL COC ← Derived COC

Lancaster Laboratories

2425 New Holland Pike PO Box 12425 Lancaster, PA 17605-2425

No. 123-1

Job Number: 7035-504116-772000

Facility Name: DuPont Cape Fea	**Telephone Number:** 910-371-4409			**Method of Shipping:** Fed Ex				**Shipping Instructions:** Priority Overnight											
Facility Address: State Road 1426, Leland, NC 28451	**Comments:**																		
Facility Supervisor: Bill Jones																			
Process Producing Sample: Indicator GW																			
Employee(s) Sampling: Bob Adams																			
Other Employee(s) Handling: Dave White								8260B											
Sample Description	**Date**	**Time**	**Sample Type**	**Bottle Volume (ml)**	**Preservative**	**Quantity**	**Bottle Type**												
CAP-G-MW-30	03/23/01	1000	WW	40	HCL	2	V	X											
Field Personnel must relinquish																			
the samples by signing and dating here.																			
Bottles Relinquished by	Bob Adams	**Date/ Time**	03/23/01	15:00	**Bottles Received by**			- ---------	**Date/ Time**	- ---------	- ---------	**Condition of samples upon arrival:**						Good	
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**			- ---------	**Date/ Time**	- ---------	- ---------	**Signature:**		Joe Smith					
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**			- ---------	**Date/ Time**	- ---------	- ---------	**Date:**		03/24/01					
Bottles Relinquished by	- ---------	**Date/ Time**	- ---------	- ---------	**Bottles Received by**			Joe Smith	**Date/ Time**	03/24/01	930	**Temp of Samples on Arrival: 3 C**							

Laboratory personnel will accept the samples by signing and dating here.

Number of derived COC to tie it back to the original COC.

Add all information wrt CAP-G-MW-30 from original COC.

Figure 4
COC Exception Report Form

Job Name: _____ Site: _____
Form Initiated By/Date: _____ Date Samples Collected: _____
Responsible Party: _____

Nonconformance (check appropriate box):

Category I: Sample Collection

- ☨ 1. Sample Containers Broken in Field
- ☨ 2. Requested Measurements Not Performed
- ☨ 3. Sample Not Collected
- ☨ 4. Sample ID Incorrect

*Explanation*_____
_____

Category II: Sample Receiving

- ☨ 5. Holding Time Exceeded By_____
- ☨ 6. Test added by Client After Login (*specify*)
- ☨ 7. Sample Received Broken/Leaking
- ☨ 8. Sample Received in Improper Container
- ☨ 9. No Sample ID on Container
- ☨ 10. Sample ID Does Not Match Paperwork
- ☨ 11. Volatile Sample Received With Headspace
- ☨ 12. COC Not Completed
- ☨ 13. Sample Temperature Exceeds 4°C

Category III: Other

- ☨ 14. _____
- ☨ 15. _____

CORRECTIVE ACTION _____

Root Cause:
_____
_____
_____*Initials/Date*: _____

Corrective Action:
_____
_____
_____*Initials/Date*: _____

Action to Prevent Recurrence:
_____
_____
_____*Initials/Date:* _____

Manager Review:

Date Manager Aware of Problem: _____Manager's Initials: _____
Manager's Comments: _____
_____
_____
_____

APPENDICES

SAMPLE IDENTIFIER CODING

APPENDIX A

PURPOSE

Sample identifiers are used in the sampling plan, on the Chain-of-Custody, and on sample bottles to identify samples as they are created in the field. When the samples are delivered to the laboratory for analysis, the sample identifier on each sample bottle is verified on the Chain-of-Custody, and then it is entered into the laboratory's information system. When the laboratory analyses are completed, a laboratory report and an electronic deliverable are provided by the lab. The sampleid ties these results to the appropriate sample.

By encoding the sample identifier with certain pieces of information about the sample, several things are accomplished. 1)It provides a mechanism for identifying the samples uniquely. 2)It conveys information about the type and location of the sample to those who are setting up the sampling program, those that are working in the field, and those that are reviewing the data. 3)It enables the data management system to automatically decode the information and store the individual data items in separate database fields for later use in data analysis and reporting.

FORMAT

Figure 1 illustrates the sample identifier coding format. The fields making up the sample identifier are described in detail on the following page. Examples of different sample identifiers are also provided.

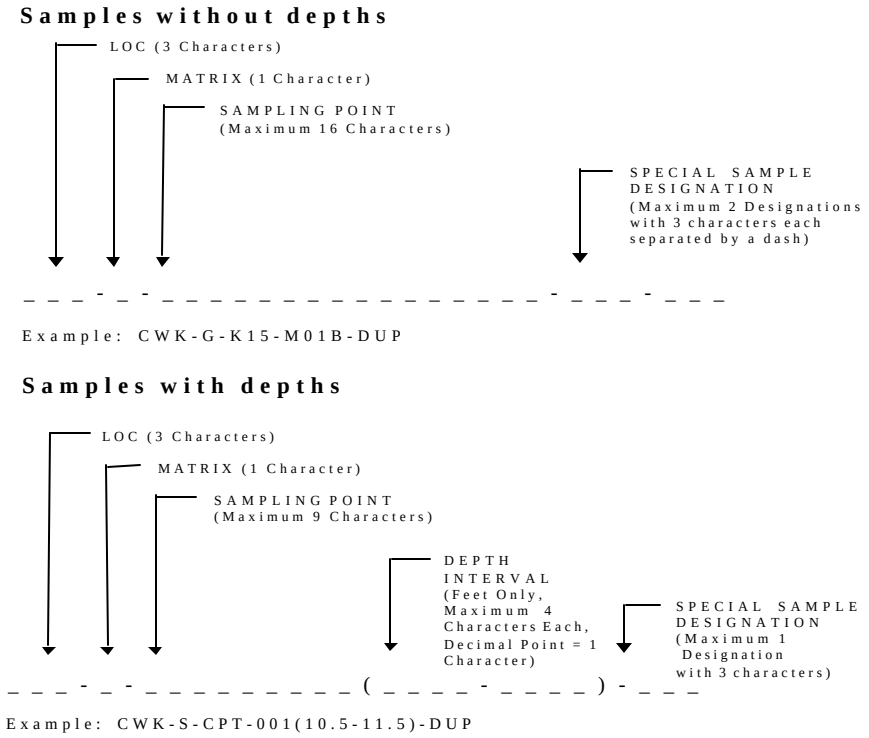


Figure 1

SAMPLE IDENTIFIER CODING

FIELDS

Sample identifiers should consist of the fields listed below concatenated in the order they are listed. The LOC, MATRIX, and SAMPLING POINT are required for all samples. The other fields are optional depending on the type of sample.

LOC -- A three character code designating the plant location or site where the sampling is being done. For example, CWK designates Chambers Works; REP designates Repauno. See Table 1 for a listing of codes. Contact the Lab Service Coordinator for locations not listed. It is required on all sample identifiers and must be the first item in the sample identifier.

SAMPLE TYPE -- A one character code designating the sample type. It is required on all sample identifiers and must immediately follow the LOC code with a dash separating it from the LOC code. If an unusual sample type is being sampled that needs to be specifically classified, contact the Lab Service Coordinator to obtain a new code.

G = Ground Water	S = Soil	A = Air
W = Surface Water	E = Sediment	N = Animal Tissue
D = Drinking Water	U = Sludge	R = Plant Tissue
K = Blank Water	P = Wipe	M = Microbiological
L = Leachate	T = Waste	X = Toxicological
		Z = Other

SAMPLING POINT NAME -- The sampling point name. This may be a well identifier, soil sample code, outfall point, etc. These identifiers should conform to the plant naming convention. Thus, if the official name of a well as defined by the plant is MW-2, then MW2, MW_2, M-2, 2, etc. should not be used. Only MW-2 should be used. Dashes are permitted within the sampling point name.

A sampling point is required in all Sample Identifiers and must immediately follow the matrix code with a dash separating it from the Matrix. For sampling points without depths, the maximum length of the sampling point is 16 characters. For sampling points with depths, the maximum length of the sampling point is 9 characters. Blanks are not permitted but may be denoted by an underscore, i.e. OUTFALL_023.

Blank samples used for QC should be identified as follows: Equipment blanks should be identified as EQBLK-#. Field blanks should be identified as FBLK-#. Trip blanks should be identified as TBLK-#. The # should be replaced with 1 to the number of the particular type of blank included in the sampling event, which may extend over several days. For example, if three trip blanks are included in a sampling event extending over two days, they would be designated TBLK-1, TBLK-2, and TBLK-3

DEPTH INTERVAL-- The depth to the top of the sampling interval followed by the depth to the bottom of the sampling interval. The depth interval must be in feet, and it must be surrounded by parentheses with the top and bottom depths separated by a dash. Each depth may have a maximum of 4 characters with a decimal point counting as one character. Thus, with two decimal places, the maximum depth is 9.99 feet; with one decimal place, the maximum depth is 99.9 feet; with no decimals, the maximum depth is 9999 feet. The depth interval is required for all soil samples.

SAMPLE IDENTIFIER CODING

SPECIAL SAMPLE DESIGNATIONS -- Designates samples used for QC purposes or requiring special handling in the field. The code must be preceded by a dash. Do not specify these if they do not apply.

DUP -- 2nd sample in a duplicate sample set
DIS -- Sample filtered in the field for dissolved metals analysis.
ACR -- This sample is for Acrolein/Acrylonitrile analysis. It requires different preservation than standard VOA samples.
MS -- Matrix Spike sample.
MSD -- Matrix Spike Duplicate sample.

EXAMPLES

1. Groundwater Monitoring Well K16-M05B primary sample at Chambers Works

   CWK-G-K16-M05B

2. Groundwater Monitoring Well K16-M05B duplicate sample at Chambers Works

   CWK-G-K16-M05B-DUP

3. Groundwater Monitoring Well K16-M05B primary sample for dissolved metals at Chambers Works

   CWK-G-K16-M05B-DIS

4. Groundwater Monitoring Well MW-44 Matrix Spike samples at Repauno

   REP-G-MW-44-MS
   REP-G-MW-44-MSD

5. Monitoring Well K16-M05B duplicate sample for dissolved metals at Chambers Works

   CWK-G-K16-M05B-DIS-DUP

6. Surface Water at Outfall 023 primary sample for Acrolein/Acrylonitrile at Niagara

   NIA-W-OUTFALL_023-ACR

7. Surface Water at Outfall 23 duplicate sample for Acrolein/Acrylonitrile at Niagara

   NIA-W-OUTFALL _023-ACR-DUP

8. Soil boring D5534 primary sample at Chambers Works taken at a depth of 6.5 feet to 7 feet

   CWK-S-D5534(6.5-7)

9. Soil Sample P123 duplicate sample at Chambers Works taken at a depth from 6 to 12 inches

   CWK-S-P123(.5-1)-DUP

10. Two Trip Blanks and an Equipment Blank for sampling at Cookson

    CKS-K-TBLK-1
    CKS-K-TBLK-2
    CKS-K-EQBLK-1

TABLE 1

LOC CODES

LOC CODES

LOC	SITE_NAME	LOC	SITE NAME
ABD	ABERDEEN,MS	FLO	FLORENCE
ABN	ABERDEEN,NC	FMN	FORT MADISON
ALB	ALBANY	GEA	GEASLIN
ACT	ALLIS CHALMERS TRUST SITE	GCC	GEON - CALVERT CITY
ANT	ANTIOCH	GLV	GEON - LOUISVILLE
ASH	ASHEPOO	GCK	GILL CREEK
AST	ASTON	GLA	GLASGOW
ATH	ATHENA	GLN	GLENOLDEN
ASC	ATHENS	GLE	GLENPOOL
BAL	BALTIMORE	GSI	GRASSELLI
BAR	BARKSDALE WORKS	GRE	GREENFIELD
BMP	BARLEY MILL PLAZA	GRB	GREENSBORO
BAY	BAYPORT	GRN	GREENWOOD
BEA	BEAUMONT	HAS	HASKELL
BEL	BELLE	HAT	HATFIELD
BET	BETHANY	HER	HERMITAGE ISLAND (NOCED)
BRK	BOERKE SITE	HOE	HOECHST-CELANESE
BRE	BREVARD	JEN	JENKS
BRI	BRIDGEPORT	JNV	JOHNSONVILLE
BUR	BURNSIDE	JON	JONESBORO
CAP	CAPE FEAR	KAN	KANSAS CITY
CAR	CARLYSS	KIN	KINSTON
CRT	CARTERET	WTL	LAKE CHARLES - CONOCO
CWK	CHAMBERS WORKS	LAK	LAKE CHARLES - VISTA
CHA	CHATTANOOGA-DUPONT	LAP	LAPORTE
CHE	CHESAPEAKE	LAV	LAVERNE
CHR	CHESTNUT RUN	LON	LONOKE
CHB	CHOCOLATE BAYOU	LOS	LOS ANGELES
CHI	CHRISTINA LABS	LOU	LOUISVILLE - DUPONT
CIN	CINCINNATI	LOV	LOUVIERS
CIR	CIRCLE RIDGE	LYN	LYNDONVILLE
CVL	CIRCLEVILLE	CDV	MACON-DOCKERY
MAM	CLEVELAND	MAN	MANATI, PUERTO RICO
CFT	CLIFTON	MAR	MARTINSVILLE
CLI	CLINTON	CAM	MAY PLANT
CKS	COOKSON	MEM	MEMPHIS - DUPONT
COO	COOPER RIVER	MIL	MILBERGER
COR	CORPUS CHRISTI	SPA	MILLIKEN
MCC	DACULA	BLA	MILLIKEN CYPRUS PLANT
DCT	DEL CITY	INM	MILLIKEN DEWEY PLANT
DEL	DELISLE	MBR	MOBERLY
DOV	DOVER	MOB	MOBILE - DUPONT
FRO	DUPONT AUTOMOTIVES PLANT	MTG	MONTAGUE
REI	DUPONT-ELSTON AVENUE	MNT	MONTGOMERY - DUPONT
EAG	EAGLE RUN	MTC	MOUNT CLEMENS
ECH	EAST CHICAGO	NAS	NASHVILLE - CONOCO
EDG	EDGEMOOR	NEC	NECCO PARK-NIAGARA FALLS
ELK	ELK GROVE	NWH	NEW HAVEN
ELR	ELK RIVER LEARNING CENTER	NEW	NEWARK
EXP	EXP STATION	NPT	NEWPORT
FAY	FAYETTEVILLE	NTN	NEWTOWN
FER	FERDULA	NIA	NIAGARA FALLS
LEW	FISHING CREEK SITE	NC	NORTH CAROLINA
FLI	FLINT	NTH	NORTHEAST

LOC CODES

OLD	OLD HICKORY	SPR	SPRUANCE SITE
PAM	PAMONA	STH	STINE HASKELL
PAR	PARLIN	TAT	TATNALL STREET
PEN	PENSACOLA	TEC	TECUMSEH
PTC	PITT CONSOL	TOL	TOLEDO
PNA	POMONA	TOW	TOWANDA
POM	POMPTON LAKES	VAL	VALLEY CENTER
PON	PONTCHARTRAIN	VIC	VICTORIA
POT	POTOMAC	WWK	WASHINGTON WORKS
REP	REPAUNO	WAY	WAYNESBORO
RTP	RESEARCH TRIANGLE PARK	WAL	WEST ALTON
ROC	ROCHESTER	WLM	WILMINGTON, PA
SAB	SABINE RIVER	WUR	WURTLAND
SAR	SARTOMER	WYS	WYSHOCK
SEA	SEAFORD		
SEN	SENECA		

LOC CODES

Modifications:

August 26, 1998: Original issued.

Jan 6, 1999 Changed MATRIX to SAMPLE TYPE. Changed G Sample Type from Groundwater to Ground Water. Changed A Sample Type from Air Sample to Air. Changed P Sample Type from Wipe Sample to Wipe.

APPENDIX B

Lancaster Laboratories
Where quality is a science.

029529
CUSTODY SEAL

DATE:_____

SIGNATURE:_____

2425 New Holland Pike, Lancasater, PA 17601-5994 (717) 656-2300

Custody Seal

DATE

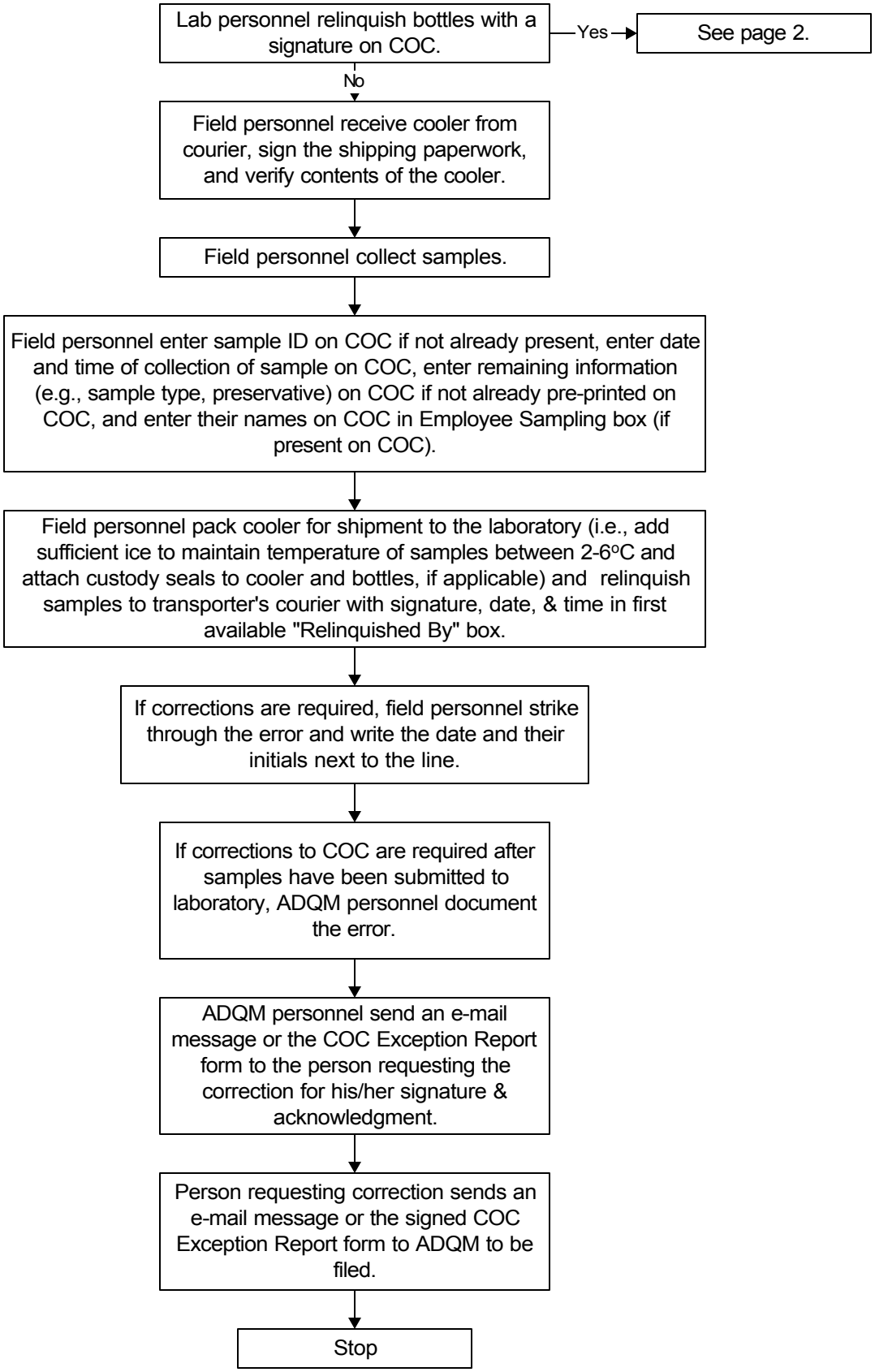
SIGNATURE

Quanterra

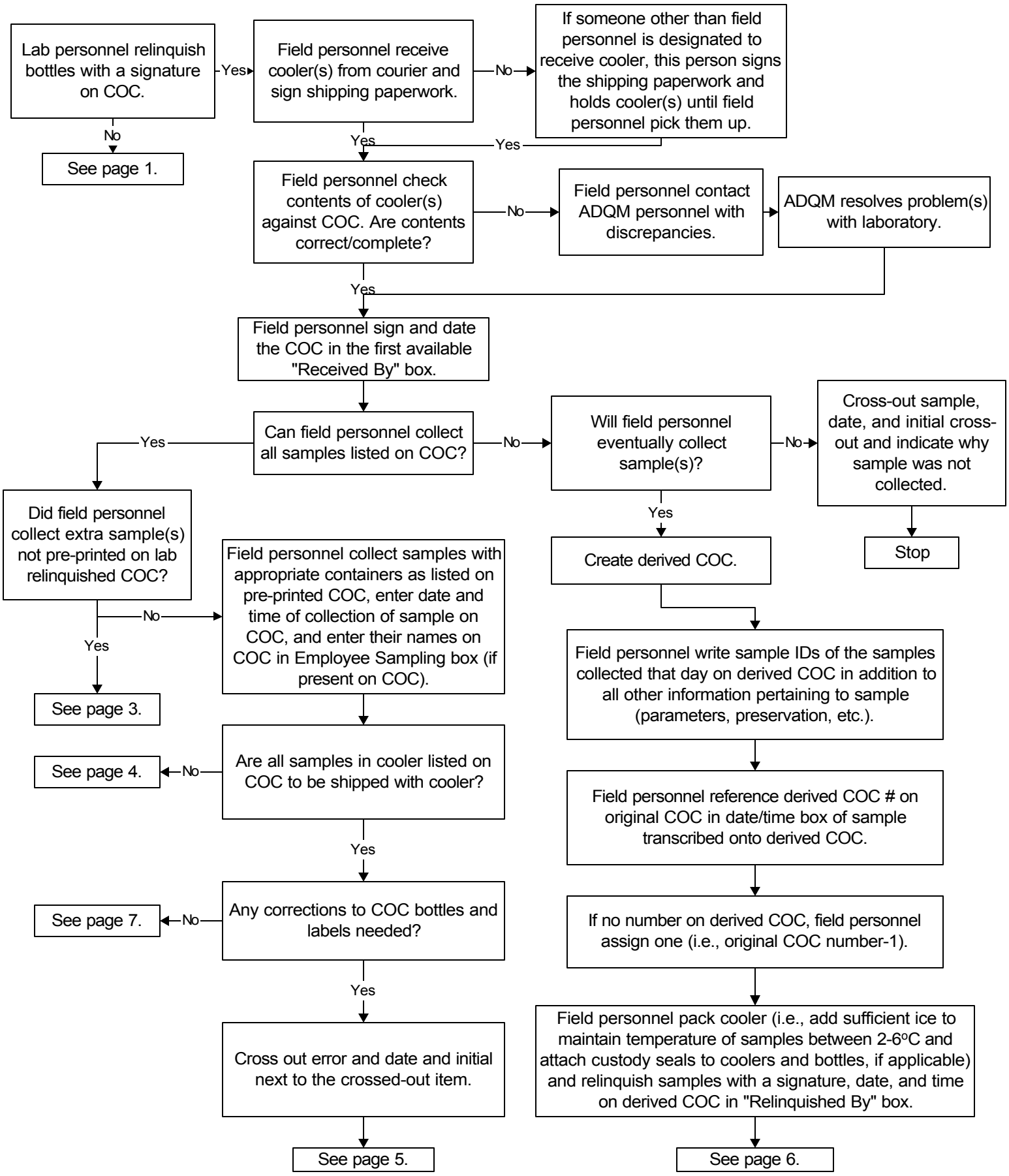
Quanterra

№

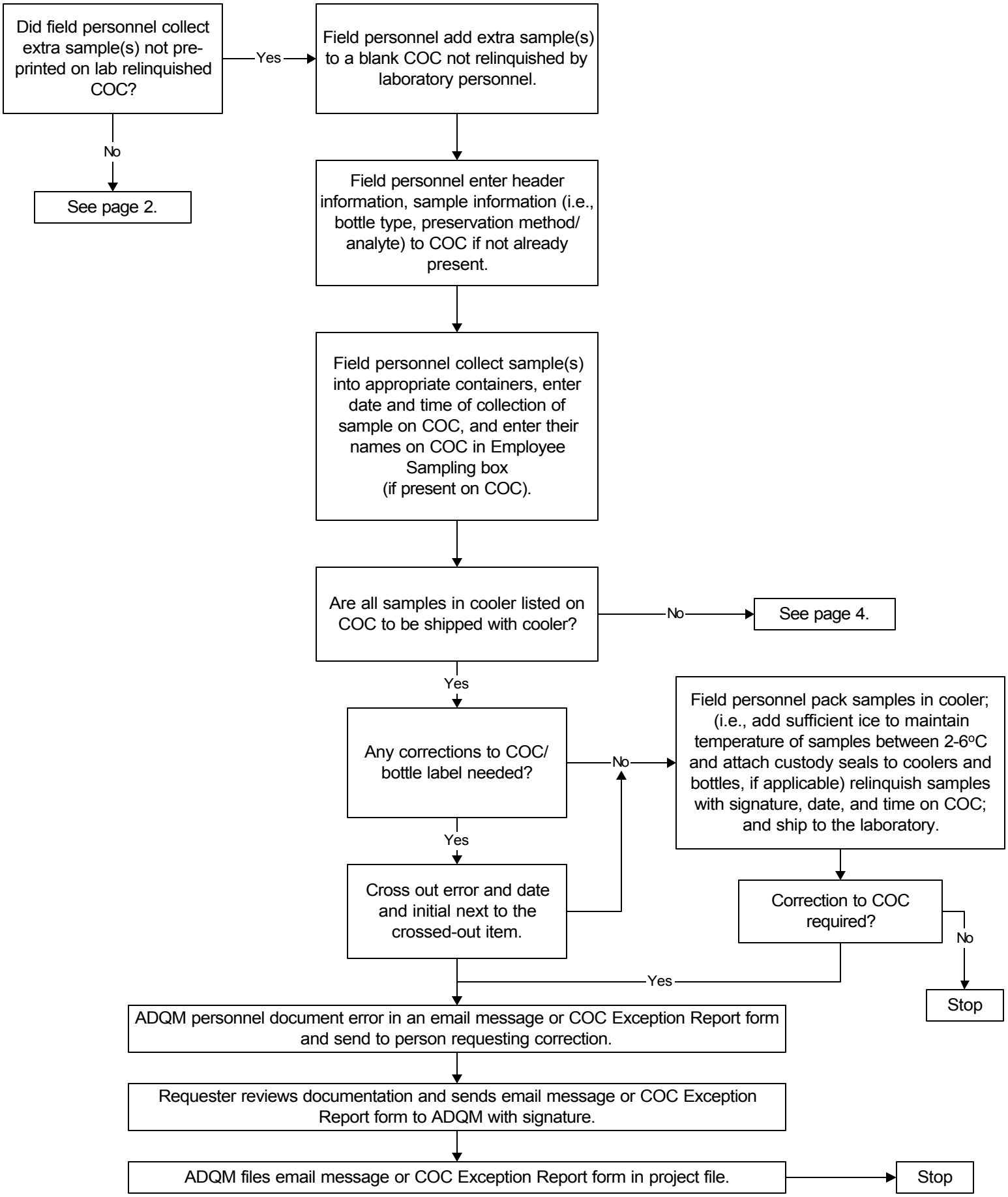
Appendix C
Chain of Custody Flow Diagram



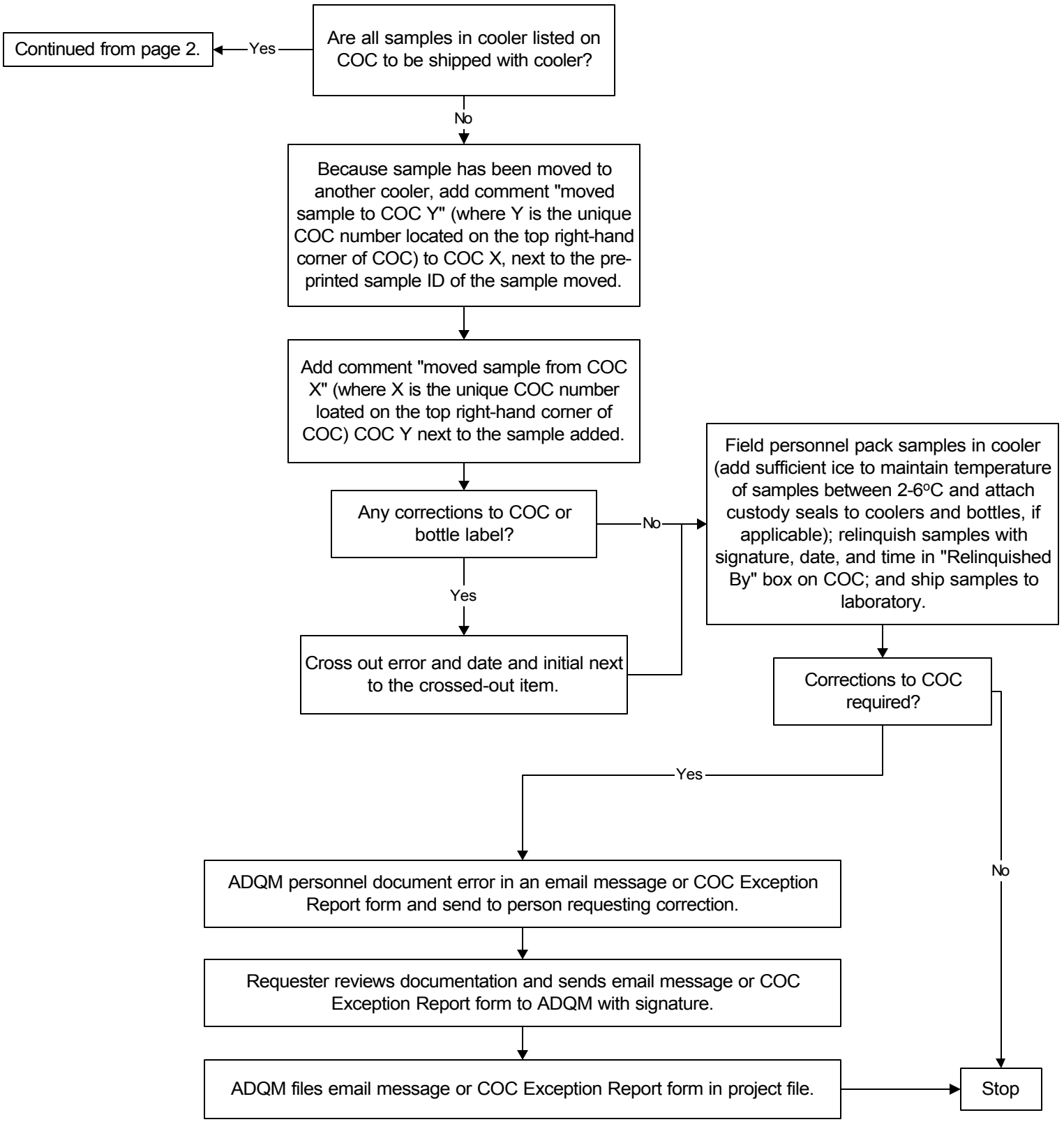
Chain of Custody Flow Diagram



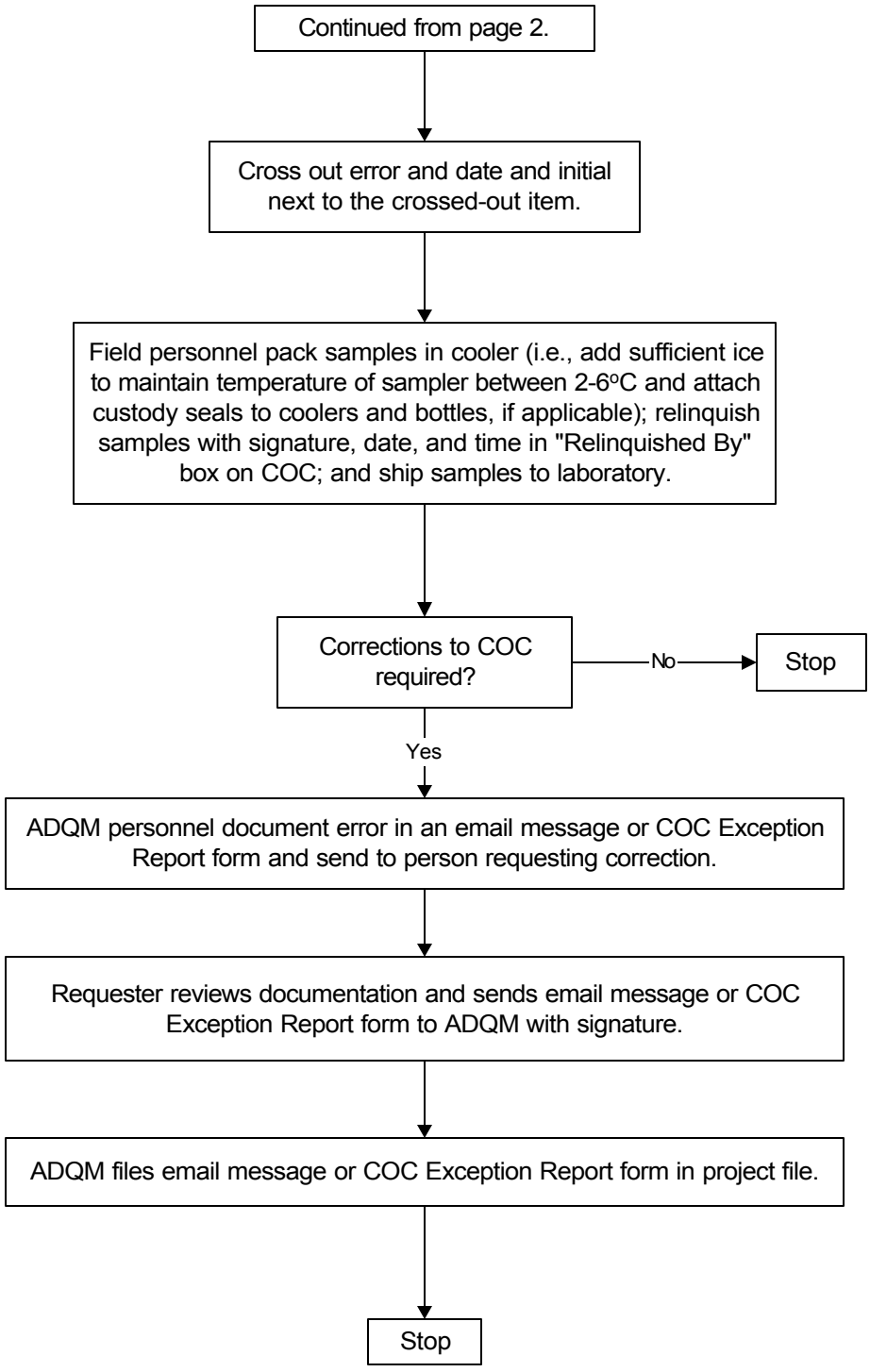
Chain of Custody Flow Diagram



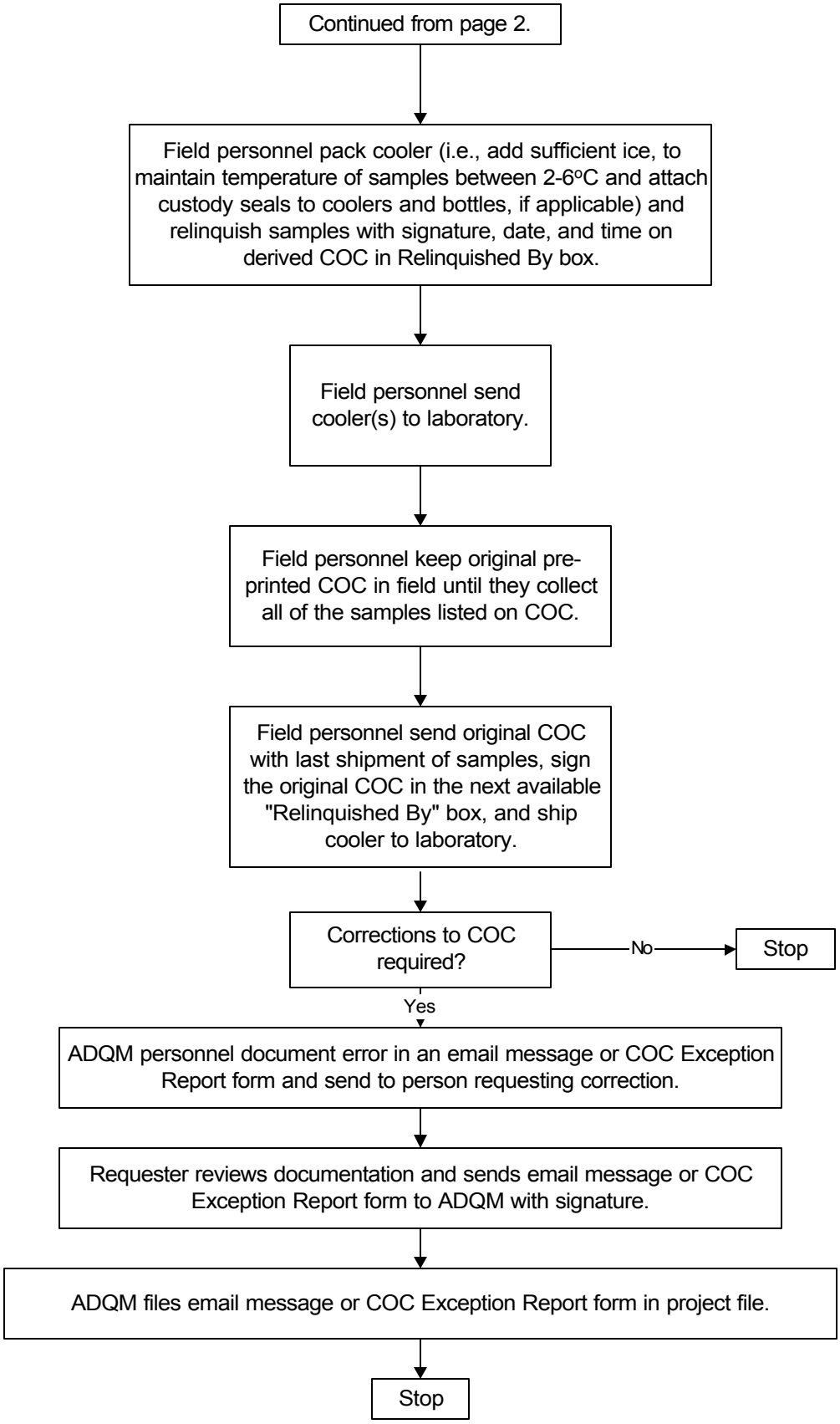
Chain of Custody Flow Diagram



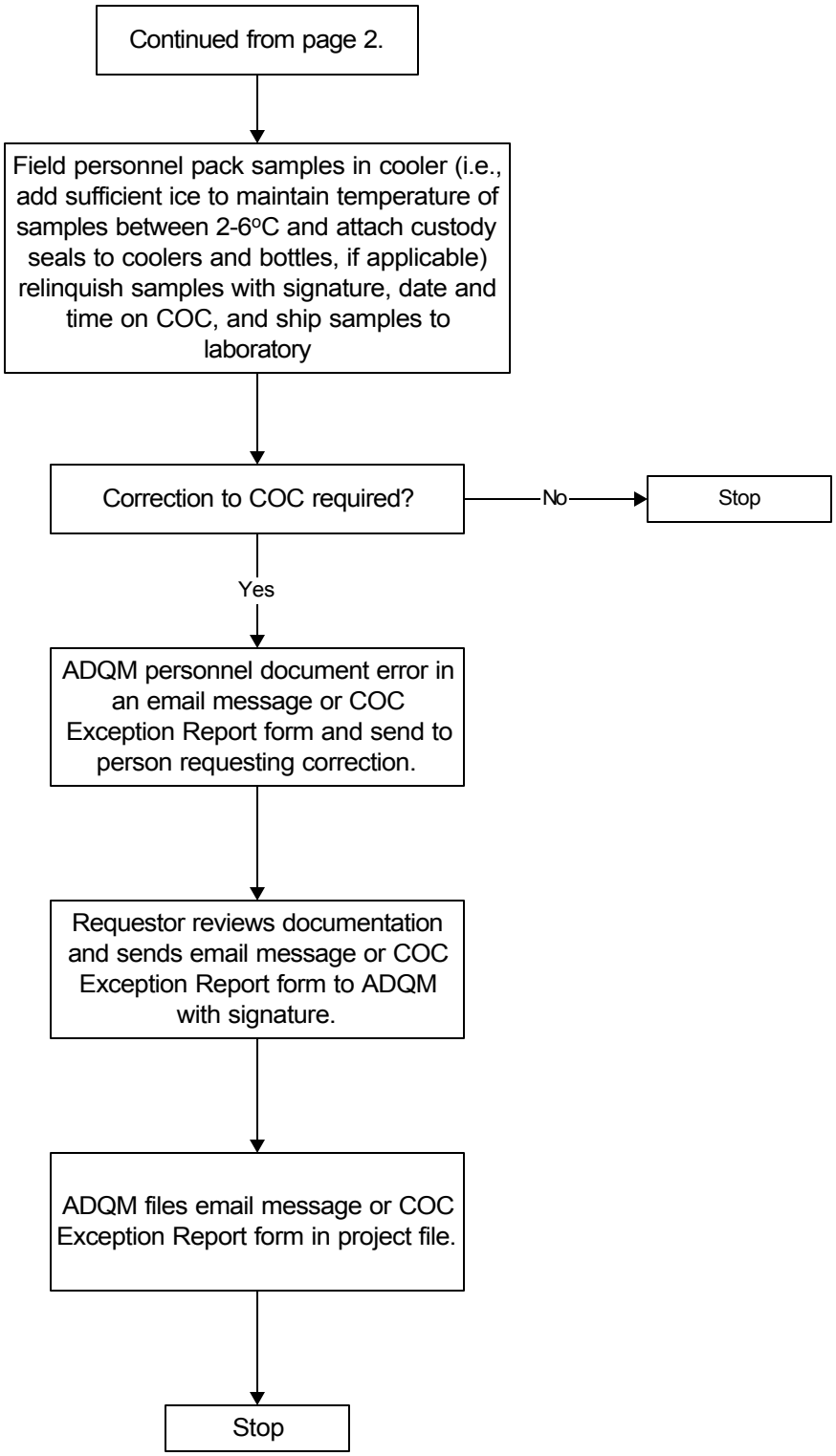
Chain of Custody Flow Diagram



Chain of Custody Flow Diagram



Chain of Custody Flow Diagram



ATTACHMENT D

Environmental Standards, SOPs for Data Validation

ATTACHMENT D

DUPONT
STANDARD OPERATING PROCEDURE
FOR VALIDATION OF
VOLATILE ORGANIC COMPOUND
RESULTS GENERATED BY
SW-846 METHOD 8260B

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that DuPont Quality Assurance/Data Validation Contractor will use to validate volatile organic data. Validation will be performed to assess the compliance of the sample data to the associated preparation SOP(s) and to the SOP(s) for sample analysis according to SW-846 Method 8260B. In addition, the usability of the volatile organic data provided by the project laboratory(ies) for the project will be determined based on the general guidance provided in the National Functional Guidelines for Organic Data Review. It should be mentioned that this guidance applies strictly to data generated by Contract Laboratory Program (CLP) protocol. As such, it is not directly applicable to validation of data generated by SW-846 Method 8260B. Therefore, this SOP presents the specific data qualification actions that will be used for the project.

The validation findings will be presented in a quality assurance review (QAR), which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG as per SOP DV-GEN-02. Copies of annotated analysis summary reports (Form I's), including any changes to the analytical results and all data qualifier codes, or a data summary spreadsheet of the qualified analytical results will be included in the QAR. This SOP applies to the Quality Assurance/Data Validation Contractor for the project.

2.0 EQUIPMENT

Not Applicable.

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994)

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

SOP DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Project Analytical SOP for the Analysis of Volatiles by SW-846 Method 8260B and related preparation SOPs

4.0 PROCEDURE

4.1 DETERMINATION OF METHOD COMPLIANCE

The Quality Assurance/Data Validation Contractor will assess the method compliance of the volatile organic data based on an evaluation of information presented in the data package deliverables. Compliance to the preparation and analytical SOPs for analysis according to SW-846 Method 8260B will be evaluated as part of the assessment. In addition, the deliverables will be evaluated for reporting errors and inconsistencies. The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Organic Data Evaluation" section of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any certain aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal

2. Actions

(a) If soil/solid samples are not analyzed or preserved within 48 hours of collection exactly as required in the QAPP (or Method 5035, if no QAPP is provided), the Quality Assurance/Data Validation Contractor will use professional judgement to determine the need and extent of qualification.

(b) If any criterion is exceeded, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = method detection limit [MDL]/limit of quantitation [LOQ] is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Exceeded Holding Times			
Holding Time for:	Days Beyond Collection	Positive Result(s)	"Not-Detected" Result(s)
Preserved Soil/Solid Sample OR Preserved Aqueous Sample OR Unpreserved Aqueous Sample for Non-Aromatic* Compounds	15-28 days > 28 days	"J" "J"	"UJ" "R"
Unpreserved Aqueous Sample for Aromatic* Compounds	8-14 days > 14 days	"J" "J"	"UJ" "R"

* Aromatic compounds include (but may not be limited to depending on compound list): benzene, chlorobenzene, ethylbenzene, toluene, styrene, and total xylenes

B. Condition of Samples Upon Receipt at the Laboratory

1. Evaluation Criteria

(a) The laboratory was required to record any observations concerning the condition of the samples upon receipt at the laboratory (i.e., sample vials/containers cracked, headspace, unsealed EnCore™ samples, etc.) on the Chain-of-Custody records.

of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

4.2 DETERMINATION OF DATA USABILITY

The Quality Assurance/Data Validation Contractor will determine the usability of the volatile organic data based on an evaluation of the information presented in data package deliverables. The findings of the volatile organic data usability assessment will be described in terms of certain qualifications of the data that the project team should consider in order to best utilize the data. These qualifications will be presented in the "Organic Data Qualifier" subsection of the "Organic Data Evaluation" section of the QAR, as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) has been flagged with representative qualifier code(s) on the data summary spreadsheets or qualified Form I's to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The qualifier codes and the hierarchy of these qualifier codes are presented in SOP DV-GEN-01.

The Quality Assurance/Data Validation Contractor's criteria for evaluating the usability of the volatile organic data and the resultant qualifications will be as follows:

A. Holding Times

1. Evaluation Criteria

   (a) All aqueous samples, including trip and equipment blanks, were required to be field-preserved with hydrochloric acid to a pH $\leq$ 2. All soil/solid samples must be analyzed or preserved with sodium bisulfate or methanol (refer to QAPP for requirement) within 48 hours of collection.

   (b) The analyses of preserved soil/solid samples and preserved aqueous samples were required to be performed within 14 days of the dates of collection.

   (c) The analyses of unpreserved aqueous samples were required to be performed within 7 days of the dates of collection.

(b) The laboratory was required to record the temperature of the sample coolers (based upon the temperature of the temperature bottle blank) upon receipt at the laboratory on the Chain-of-Custody records. The temperature of the sample coolers was required to be maintained at 4°C ± 2°C. However, the Quality Assurance/Data Validation Contractor will not consider there to be a direct impact on the usability of the data unless the temperature is greater than 10°C.

2. Actions

(a) If observations such as headspace and cracked vials were noted on the Chain-of-Custody records, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that these issue(s) may lead to a loss of analyte. Professional judgment will be used to determine if the severity of the problem warrants qualification.

(b) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 6°C, a noncorrectable deficiency will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that elevated temperatures may lead to a loss of analyte. However, if the temperature is less than or equal to 10°C, the noncorrectable deficiency will also note that in the opinion of the Quality Assurance/Data Validation Contractor, data should not be impacted due to the stability and chemical properties (i.e., vapor pressure, boiling point, etc.) of the volatile organic compounds at temperatures less than or equal to 10°C.

(c) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 10°C, positive results for all volatile target compounds will be flagged "J" and "not-detected" results will be flagged "UJ" by the Quality Assurance/Data Validation Contractor in samples associated with that temperature bottle.

C. GC/MS Instrument Performance

1. Evaluation Criteria

(a) The GC/MS system(s) was required to be monitored at the beginning of each 12-hour period during which standards, blanks or samples were analyzed by the analysis of the tuning solution, bromofluorobenzene (BFB). The GC/MS tune must have met the following ion abundance criteria for BFB:

m/z	Ion Abundance Criteria
50	15-40% of m/z 95
75	30-60% of m/z 95
95	Base peak, 100% relative abundance
96	5-9% of m/z 95
173	<2% of m/z 174
174	>50% of m/z 95
175	5-9% of m/z 174
176	>95% but <101% of m/z 174
177	5-9% of m/z 176

However, the most important factors to consider are the empirical results that are relatively insensitive to location on the chromatographic profile and the type of instrumentation. Therefore, the critical ion abundance ratios for BFB are the m/z 95/96, 174/175, 174/176, and 176/177 ratios. The relative abundances of m/z 50 and 75 for the BFB tunes are of lower importance.

The Quality Assurance/Data Validation Contractor will consider there to be no direct impact on the usability of the data if the ion abundance criteria fall within an expanded window of -25% of the low limit and +25% of the high limit for selected ions. The complete expanded criteria for BFB are as follows:

m/z	Expanded Ion Abundance Criteria
50	11-50% of m/z 95
75	22-75% of m/z 95
95	Base peak, 100% relative abundance
96	5-9% of m/z 95
173	<2% of m/z 174
174	>50% of m/z 95
175	5-9% of m/z 174
176	>95% but <101% of m/z 174
177	5-9% of m/z 176

(b) All standards, blanks, samples, matrix spike (MS)/matrix spike duplicate (MSD), and laboratory control samples (LCSs) were required to be injected within a 12-hour period after the injection of an acceptable BFB performance check.

2. Actions

(a) If a mass calibration was in error (i.e., not performed), all associated data will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(b) Results falling outside the expanded criteria will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(c) If the time elapsed between the injection of the BFB tune and the injection of the sample was greater than 12 hours but less than 18 hours, no qualification of data will be warranted.

(d) If the time elapsed between the injection of the BFB tune and the injection of the sample was greater than or equal to 18 hours, all associated data will be qualified as unusable ("R") by the Quality

Assurance/Data Validation Contractor. However, professional judgment will be used to qualify data if an acceptable BFB tune was verified to be analyzed after the analysis of the sample.

D. Initial Calibrations

1. Evaluation Criteria

(a) For all target and surrogate compounds, a five- or six-point internal standard calibration was required before the analyses of blanks, samples and/or quality control (QC) were initiated or as necessary if the continuing calibration acceptance criteria (discussed in Section 4.2.E of this SOP) are not met. The initial calibration standards were required to be at concentrations specific in the analytical SOP.

(b) Separate initial calibrations should have been performed for aqueous and medium-level soil samples and for low-level soil samples. The initial calibrations for aqueous samples and for medium-level soil samples should have been performed with the use of an ambient purge and the initial calibration for low-level soil samples and associated blanks (including trip and field blanks) should have been performed with the use of a heated purge.

(c) Individual standard relative response factors (RRFs), average RRFs, and percent relative standard deviations (%RSDs) for every target compound were required to be calculated and reported by the laboratory. The individual RRFs should be greater than or equal to 0.05 and the %RSDs should be less than or equal to 15% in order to rule out any potential impact on data usability. If the %RSD is >15%, the laboratory must use a calibration curve (first- or second-degree). The correlation coefficient of the calibration curve must be 0.99 or greater in order to rule out any potential impact on data usability.

2. Actions

(a) If any individual RRF of any target compound in the five-point initial calibrations was less than 0.05, the Quality Assurance/Data Validation Contractor will use professional judgment will be to determine whether positive results for that compound in associated samples should be

qualified as estimated ("J") and whether "not-detected" results should be qualified as unusable ("R"). The following guidance should be used along with professional judgement.

For positive results, professional judgment will be based on an assessment of the accuracy in using the calibration curve or average RRF generated from the initial calibration for quantitation (see subsequent Actions [b] and [c]).

For "not-detected" results, professional judgment will be based on the acceptability of the response for the individual compound, not relative to the internal standard, at standard concentrations near that compounds MDL (or LOQ if results are not reported below the LOQ).

Often, compounds which have poor response at low concentrations have higher than typical MDLs and LOQs and are spiked at higher concentrations in the initial calibration to account for this. If the area response for that individual compound in initial calibration standards near (within 2×) or below that MDL (or LOQ if the MDL is not applicable) is comparable to other individual compounds spiked at lower concentrations with acceptable RRFs, no qualification of "not-detected" results will be necessary. In addition, if initial calibration standards near (within 2×) or below that MDL (or LOQ if the MDL is not applicable) do not require manual integration of the spectrum by the analyst, no qualification of "not-detected" results will typically be necessary (for this to apply, it is important that a generally stable, predictable response is observed for the compound). If the response for the individual compound in initial calibration standards near (within 2×) the MDL (or LOQ) is deemed not acceptable (i.e. a very low response is observed at the MDL or LOQ or the peak was not automatically detected by laboratory software and required manual integration by analyst), or if there are no initial calibration standards near the MDL (or LOQ), the Quality Assurance/Data Validation Contractor may raise the MDL and LOQ for that compound in associated samples to a concentration level which does demonstrate acceptable response based on the initial calibration standards (and/or other quality control standards) or qualify associated "not-detected" results as unusable ("R"), based on professional judgment.

(b) If the %RSD between the RRFs for any compound in the five-point initial calibrations was greater than 15% or the correlation coefficient is less than 0.99, all positive results for that compound in associated samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the %RSD between the RRFs for any compound in the five-point initial calibrations was greater than 90% or the correlation coefficient was less than 0.85, all positive results for that compound in associated samples will be qualified as estimated ("J") and "not-detected" results will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(d) If the laboratory did not analyze low-level solid samples with the use of a heated purge, all positive results will be qualified as estimated ("J") and the MDLs for all "not-detected" results will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor.

E. Continuing Calibrations

1. Evaluation Criteria

(a) As a check of instrument stability and performance on a daily basis, the analysis of a calibration standard was required following the analysis of an acceptable BFB tune and before the analysis of blanks, samples, matrix spikes, and laboratory control samples of each 12-hour period from the injection of BFB.

(b) RRFs and percent drifts (%D's) for every target compound were required to be calculated and reported by the laboratory. The RRFs should be greater than or equal to 0.05 and the %D's should be less than or equal to 20% in order to rule out any potential impact on data usability.

2. Actions

(a) If the daily RRF of any target compound in the continuing calibrations was less than 0.05, the Quality Assurance/Data Validation Contractor will use professional judgment to determine if positive results for that

compound in associated samples should be flagged "J" and all "not-detected" results should be qualified as unusable ("R"). The following guidance should be used along with professional judgement.

For positive results, professional judgment will be based on the stability of the instrument at the time of analysis relative to the time that the initial calibration was performed (see subsequent Actions [b], [c], and [d]).

For "not-detected" results, professional judgment will be based on the acceptability of the response for the individual compound, not relative to the internal standard, at standard concentrations near the MDL (or LOQ, if the MDL is not applicable) in the initial calibration (see Action [a] under Section D, Initial Calibrations) if the %D is ≤20% (demonstrating that the instrument sensitivity is stable relative to the initial calibration) or if the %D is greater than 20% but in the direction of an increase in instrument sensitivity (demonstrating that the instrument sensitivity has increased relative to the initial calibration).

If the %D is greater than 20% and in the direction of a decrease in instrument sensitivity (demonstrating that the instrument sensitivity has changed relative to the initial calibration) and a standard at a concentration near (within 2×) or below the MDL (or LOQ, if the MDL is not applicable) was analyzed as part of the continuing calibration and the response for the compound in this standard is deemed acceptable by the criteria used for the initial calibration (see Action [a] under Section D, Initial Calibrations), no qualification of "not-detected" results will be necessary. If the response for the compound in the continuing calibration standard is deemed not acceptable and the %D is greater than 20%, the Quality Assurance/Data Validation Contractor will qualify associated "not-detected" results as unusable ("R") unless professional judgment dictates otherwise.

If the %D is greater than 20%, in the direction of a decrease in instrument sensitivity, and the continuing calibration standard is at a concentration greater than 2× the MDL (or LOQ, if the MDL is not applicable), the Quality Assurance/Data Validation Contractor will consider the extent to which the response representative of the MDL (or LOQ, if the MDL is not applicable) in the initial calibration would be

expected to decrease based on the %D. Based on this determination, the Quality Assurance/Data Validation Contractor will not qualify the result if this adjusted response is acceptable or may raise the MDL for that compound in the associated samples to a concetration level that is based on professional judgement.

(b) If the %D of any target compound in the continuing calibration was greater than 20%, all positive results for that compound in associated samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the %D of any compound in the continuing calibrations was greater than 20%, (regardless of instrument response direction), MDL/LOQs for all associated "not-detected" results will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor. If MDL/LOQs are qualified as biased for high %D(s), the Quality Assurance/Data Validation Contractor will note within the qualifier whether the %D was in a direction of a decrease or increase in instrument sensitivity. If the %D is in a direction of an increase in instrument sensitivity, the Quality Assurance/Data Validation Contractor will also indicate that for a sensitivity increase, the MDL/LOQs may be acceptable as reported by the laboratory.

(d) If the %D of any compound in the continuing calibrations was greater than 90% (regardless of instrument response direction), all positive results for that compound in associated samples will be qualified as estimated ("J") and the MDL/LOQs for all associated "not-detected" results will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

F. Blanks

1. Evaluation Criteria

(a) The analysis of a laboratory method blank was required for every 20 samples of a similar matrix. In addition, the method blank must be analyzed immediately following the continuing calibration standard of any 12-hour period of analysis.

(b) The collection of equipment blanks and trip blanks may be required for most sampling events. The applicable workplan or sampling plan will be consulted for the required collection frequency and applicability.

(c) Positive results for the target compounds or Tentatively Identified Compounds (if required) should not be observed for any blank in order to rule out any possible impact on data usability.

(d) The recovery of all surrogates must have met the criteria specified in Section 4.2.G of this SOP in order to indicate that the associated analyses were properly performed and to accurately reflect possible laboratory contamination.

2. Actions

(a) If a target compound was found in a blank but not in the sample, no action will be taken by the Quality Assurance/Data Validation Contractor. However, if a class of contaminants (e.g., trichloromethanes) was detected in equipment or trip blanks but not in the samples, a comment addressing this issue will be written in the QAR by the Quality Assurance/Data Validation Contractor.

(b) If a target compound was detected in a sample and in any associated blank, the positive sample result will be qualified by the Quality Assurance/Data Validation Contractor as outlined below.

In instances where more than one blank was associated with a given sample, qualification by the Quality Assurance/Data Validation Contractor will be based upon a comparison of the sample result to the associated blank having the highest concentration of a contaminant.

That laboratory method blanks will be used by the Quality Assurance/Data Validation Contractor to flag all samples of a matrix similar to the method blank matrix in the SDG. The Quality Assurance/Data Validation Contractor will use the results of an equipment blank to flag all samples collected on the same day (unless only one was collected for a several-day sampling event; results of the equipment blank will then be applied to all applicable samples in the SDG).

The Quality Assurance/Data Validation Contractor will use the results of a trip blank to flag all samples shipped in the same cooler/shuttle (unless only one trip blank was collected for a several-day sampling event; results of the trip blank will then be applied to all samples in the SDG).

(c) If a common laboratory or field contaminant was detected in sample(s) and in an associated blank, this contaminant in the sample(s) will be flagged by the Quality Assurance/Data Validation Contractor using the 10 times rule as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users. The common laboratory and/or field contaminants include methylene chloride, acetone, and 2-butanone.

Qualification by the 10 Times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 10 times Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 10 times Blank Concentration	No Qualification of Data is Needed

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors will be taken into consideration when applying the "10 times" criterion for laboratory method and storage blanks. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(d) If a target compound other than a common laboratory or field contaminant was detected in sample(s) and in an associated blank, the positive results for the contaminant will be qualified according to the 5 times rule by the Quality Assurance/ Data Validation Contractor as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

Qualification by the 5 Times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 5 times the Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 5 times Blank Concentration	No Qualification of Data is Needed

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors will be taken into consideration when applying the "5 times" criterion for laboratory method and storage blanks. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(e) If common contaminants were reported in samples but were <u>not</u> present in <u>any</u> of the blanks (even at unreported trace-levels), or the blank level is not high enough to flag results "U," the Quality Assurance/Data Validation Contractor will discount, <u>in narrative only</u>, the presence of these compounds in samples if the pattern of contamination in the sample does not substantiate the presence of the compound.

(f) Any Tentatively Identified Compound (TIC) result (when requested as per the Chain-of-Custody Records) found in both a sample and an associated blank(s) will also be qualified. (See Section 4.2.L of this SOP to determine data qualification.)

G. Surrogates

1. <u>Evaluation Criteria</u>

(a) All standards, blanks, samples, MS/MSD, and LCSs were required to be spiked with surrogate compounds specified in the agency-approved laboratory analytical SOP (or analytical method if an agency-approved SOP is not available).

(b) Percent recoveries for all three surrogates were to be calculated and reported for each sample, blank, MS/MSD, and LCS and these must have been within the specified limits (unless the sample or MS/MSD was diluted). If the recovery of at least one surrogate was outside of the specified limit for a sample, the sample was required to have been reanalyzed. If the recoveries for the surrogates were inside QC limits upon reanalysis (and the reanalysis met all other contractual criteria), only the reanalysis was required to be reported. If any recovery for the surrogates was outside QC limits upon reanalysis (or if the reanalysis failed any other contractual criteria), both analyses were required to be reported by the laboratory.

2. Actions

(a) The surrogate recovery limits do not apply to medium-level samples analyzed at a dilution. However, the surrogates should at least be detected if the sample was analyzed at a five-fold dilution or less. No qualification of the data will be necessary if the surrogate is diluted beyond detection. Generally, a greater than five-fold dilution will affect the ability to even detect the surrogate. If a sample was analyzed at a five-fold dilution or less and one or more surrogate(s) was not detected in the medium-level sample, the Quality Assurance/Data Validation Contractor will qualify positive results as estimated ("J") and "not-detected" results as biased ("UJ"). Data qualification by the Quality Assurance/Data Validation Contractor due to an unacceptable surrogate recovery will not be necessary if a greater than five-fold dilution was performed on a medium-level solid sample. However, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the issue that sample-specific method performance based on surrogate recoveries could not be evaluated due to the necessary dilution performed on the sample.

(b) Data will be qualified by the Quality Assurance/Data Validation Contractor based on surrogate results if the recovery of any one volatile surrogate is outside of criteria in an undiluted analysis. The Quality Assurance/Data Validation Contractor will note whether the poor recoveries were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends. Data qualification by the Quality

Assurance/Data Validation Contractor will apply to all volatile target compounds in a sample as summarized below.

- If the percent recovery of any one surrogate compound was greater than the upper control limit, the positive results for all volatile compounds in the sample will be flagged "J." "Not-detected" results will not be qualified.

- If the percent recovery of any one surrogate compound was less than the lower control limit but greater than or equal to 10%, the positive results for all volatile compounds in the sample will be flagged "J" and the "not-detected" results for all volatile target compounds will be flagged "UJ."

- If the percent recovery of any one surrogate compound was less than 10%, the positive results for all volatile compounds in the sample will be flagged "J" and the "not-detected" results for all volatile target compounds will be flagged "R."

H. Matrix Spike/Matrix Spike Duplicates and Laboratory Control Samples

1. Evaluation Criteria

(a) The preparation of a MS and a MSD of a project sample was required for every 20 samples of a similar matrix. All volatile organic target compounds were required in each spike.

(b) The MS/MSD results were required to be quantitated in the same manner as samples. All MS/MSD spike compound recoveries should be within the data usability limits of 70-130% recovery in order to have no effect on data usability. The relative percent differences (RPDs) between the results for each compound in the MS and MSD should be less than or equal to 15% for aqueous samples and less than or equal to 25% for soil samples in order to have no impact on data usability.

(c) The preparation of a LCS was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever was more frequent. The laboratory may also prepare a laboratory control sample duplicate (LCSD).

(d) The LCS/LCSD results were required to be quantitated in the same manner as samples. The LCS/LCSD analyses were required to meet the laboratory-specified limits. If the LCS/LCSD did not meet the recovery criteria, all associated samples were required to be reextracted and reanalyzed. However, all LCS/LCSD spike compound recoveries should be within the data usability limits of 70-130% in order to have no effect on data usability.

2. Actions

(a) If the recovery for any compound did not meet the limits of 70-130% in the MS and/or MSD analyses, the result for that compound in the **unspiked sample only** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor MS/MSD Recoveries		
If Percent Recovery:	Flag Positive Result:	Flag "Not-Detected" Result:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 70%	"J"	"UJ"
Percent Recovery > 130%	"J"	No Qualification

(b) If the RPD between the results for any compound in the MS and MSD exceeded 15% for aqueous samples or 25% for solid samples, positive results for that compound **in the unspiked sample only** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the recovery for any compound does not meet the limits of 70-130% in the LCS and/or LCSD analyses, the results for that compound in **all associated samples** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor LCS/LCSD Recoveries		
If Percent Recovery:	Flag Positive Results:	Flag "Not-Detected" Results:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 70%	"J"	"UJ"
Percent Recovery > 130%	"J"	No Qualification

(d) If the RPD between the results for any compound in the LCS and LCSD exceeded 15% for aqueous samples or 25% for solid samples, positive results for that compound **all associated samples** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

I. Internal Standards

1. Evaluation Criteria

(a) All standards, blanks, samples, MS/MSD, and LCSs were required to be spiked with the internal standard compounds bromochloromethane, 1,4-difluorobenzene, and chlorobenzene-d_5.

(b) Extracted ion current profiles (EICPs) of all three internal standards were required to be reported for each sample, blank, MS/MSD, and LCS. Area abundances of the internal standards must not vary by more than a factor of 2 (-50% to +100%) from the internal standard area abundances in the associated continuing calibration standard for all blanks, samples, and laboratory control samples, or reanalysis was required. If the internal standard areas were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any internal standard area was outside QC limits upon reanalysis (or if the reanalysis failed any other

contractual criteria), both analyses were required to be reported by the laboratory.

(c) The retention times for all three internal standards were required to be reported for each sample, blank, MS/MSD, and LCS. Retention times of the internal standards must not vary more than ± 30 seconds from the retention times of the internal standard in the associated continuing calibration standard. If the retention times for the internal standards were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any retention time for the internal standards was outside QC limits upon reanalysis (or if the reanalysis failed any other method criteria), both analyses were required to be reported by the laboratory.

2. Actions

(a) If the area abundance for any internal standard in a sample was outside - 50% or +100% of the area abundance for the same internal standard in the associated continuing calibration standard, positive results for those volatile target compounds quantitated using this internal standard will be qualified "J" and "not-detected" results for those volatile target compounds quantitated using this internal standard (refer to the analytical SOP) will be qualified "UJ" by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will note whether the poor internal standard areas were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

(b) If the area abundance for any internal standard in a sample was <25% of the area abundance for the same internal standard in the associated continuing calibration standard, positive results for those volatile target compounds quantitated using this internal standard will be qualified "J" and "not-detected" results for those volatile target compounds quantitated using this internal standard (refer to the analytical SOP) will be qualified "R" by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will note whether the poor internal standard areas were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

(c) If the internal standard retention time varied by more than 30 seconds from the retention time of the same internal standard in the associated continuing calibration standard, professional judgment will be used by the Quality Assurance/Data Validation Contractor to assess data quality. For example, if peaks were not observed in the sample chromatogram, data will not be qualified. However, if peaks are observed in the sample chromatogram and shifts of a large magnitude are observed, rejection of data may be warranted as determined by professional judgment. The Quality Assurance/Data Validation Contractor will note whether the poor retention time matches were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

J. Target Compound Identification

1. Evaluation Criteria

(a) Based on a comparison of the sample mass spectrum to a current laboratory-generated standard mass spectrum, the laboratory was required to report the presence of volatile target compounds according to the following qualitative criteria:

- All ions present in the standard mass spectrum at a relative intensity greater than 10% of the base ion must be present in the sample spectrum.

- The relative intensities of these ions must agree within ± 20% between the standard and sample spectra.

- Ions present at greater than 10% relative intensity in the sample mass spectrum but not present in the standard spectrum must be considered and accounted for.

Alternately, a selective ion monitoring (SIM) mode may have been used to determine the presence of particular compounds.

(b) The relative retention time (RRT) of the target compound in the sample must be within ± 0.06 RRT units of the RRT of the target compound in the associated continuing calibration standard.

2. Actions

(a) If the RRT criterion for the reported positive result for a compound was greatly exceeded and there was no match for the primary and secondary ions in the mass spectrum provided, then the reported result will be qualified as "not-detected" ("U") by the Quality Assurance/Data Validation Contractor.

(b) If the RRT criterion for the reported "not-detected" result for a compound was met and an acceptable mass spectrum was provided, then the positive result for that compound will be added by the Quality Assurance/Data Validation Contractor.

(c) If the RRT criterion for the reported positive result for a compound was not met but a good mass spectral match was observed, the data will not be qualified; however, it will be noted in the QAR that the RRT criterion was not met.

(d) If the RRT criterion for the reported compound was met but a poor mass spectral match (i.e., primary and/or secondary ions missing) was observed, then the reported positive result will be qualified as "R" by the Quality Assurance/Data Validation Contractor.

(e) If the RRT criterion was not met and if a questionable mass spectral match (i.e., interference from coeluting compound or poor ion relative intensity) is provided, then the reported result will be qualified as presumptively present ("N") by the Quality Assurance/Data Validation Contractor.

K. Compound Quantitation and Reporting Limits

1. Evaluation Criteria

(a) Compound quantitation was required to be calculated according to the internal standard method.

(b) The quantitation of positive results was to be based upon the average RRF from the associated initial calibration or the equation generated for the associated initial calibration curve.

(c) The associated internal standard as defined in the analytical SOP was required to be used for the quantitation of positive results.

(d) The area of the primary characteristic mass ion as defined in the analytical SOP was required to be used in quantitation unless an interference was observed with this ion. If an interference was observed with the primary ion, the area of a secondary characteristic ion was to be used.

(e) All solid sample results were required to be reported on a dry-weight basis.

(f) The equations to be used for the calculation of concentrations of target analytes if a calibration curve is not being utilized are as follows. Otherwise, the calibration curve must be used for quantitation.

Water, Wastewater, and Water-Soluble Samples:

$$\text{Concentration } (\mu g/L) = \frac{(Ax)(Is)}{(Ais)(RRF)(Vo)}$$

Where:

Ax = Area of the quantitation ion peak for the compound to be measured

Ais = Area of the quantitation ion peak for the appropriate internal standard

Is = Amount of internal standard added in ngs

Vo = Volume of sample purged in mL

RRF = Average RRF from the associated initial calibration

Low-Level Soil, Solid, and Water-Insoluble Samples:

$$\text{Concentration } (\mu g/kg) = \frac{(Ax)\,(Is)}{(Ais)\;(RRF)\;\;(Ws)\;\;[(100 - M)/100]}$$

Where:

Ax	=	Area of the quantitation ion peak for the compound to be measured
Ais	=	Area of the quantitation ion peak for the appropriate internal standard
Is	=	Amount of internal standard added in ngs
Ws	=	Weight of the sample purged in grams
RRF	=	Average RRF from the associated initial calibration
M	=	Percent moisture

Medium-Level Soil, Solid, and Water-Insoluble Samples:

$$\text{Concentration } (\mu g / kg) = \frac{(Ax)\,(Is)(Vt)}{(Ais)\,(RRF)\,(Ws)\,(Vi)\,[(100 - M) / 100]}$$

Where:

Ax	=	Area of the quantitation ion peak for the compound to be measured
Ais	=	Area of the quantitation ion peak for the appropriate internal standard
Is	=	Amount of internal standard added in ngs

Vt	=	Volume of the total extract in µLs
Vi	=	Volume of the extract used for purging in µLs
Ws	=	Weight of the sample purged in grams
RRF	=	Average RRF from the associated initial calibration
M	=	Percent moisture

(g) Concentrations quantitated at levels less than the LOQ but ≥ MDL were required to be reported as estimated values ("J").

(h) All positive results were required to be quantitated from instrument levels which are below the concentrations of the highest calibration standard.

2. Actions

(a) If a positive result was not quantitated according to the correct equation, the Quality Assurance/Data Validation Contractor will report the result as requantitated from the correct equation (unless a significant number of miscalculation errors are observed).

(b) Positive results reported at concentrations less than the sample-specific LOQs will be qualified as estimated ("J") by the Quality Assurance/ Data Validation Contractor.

(c) Positive results associated with on-column concentrations greater than the concentration of the highest calibration standard will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will also indicate within the qualifier whether the sample was properly diluted and reanalyzed as required.

L. Tentatively Identified Compounds (TICs) (ONLY when requested on the Chain-of-Custody Records)

1. Evaluation Criteria

(a) If TIC analyses were requested on the Chain-of-Custody records, the laboratory was required to conduct, for each sample, a mass spectral search of the NIST library and to report the possible identity of the 10 largest peaks which are not surrogates, internal standards or target compounds of the GC/MS volatile or semivolatile fractions, but which have an area greater than 10% of the area of the nearest internal standard. Results for these TIC results were required to be calculated and reported for each sample.

(b) Based on a comparison of the sample mass spectrum to the library-generated reference mass spectrum, the laboratory was required to report the tentative identity of TICs according to the following qualitative criteria:

- Major ions (greater than 10% relative intensity) in the reference spectrum should be present in the sample spectrum.
- The relative intensities of the major ions should agree within 20% between the sample and the reference spectra.
- Molecular ions present in the reference spectrum should be present in the sample spectrum.
- If a valid identification could not be made, the compound should have been reported as an "unknown," or if there is a lack of specificity, the result should have been reported as a class of compound (e.g., "unknown aromatic"), if possible.

(c) The quantitation of positive results was required based upon a RRF of 1.0.

(d) The closest eluting internal standard was required to be used for the quantitation of TICs.

(e) The total peak areas of the TIC and of the internal standard were required to be used in the quantitation of TIC results.

2. Actions

(a) Upon examining the mass spectral library searches provided, the Quality Assurance/Data Validation Contractor will report the identification of the TIC based on professional judgment if the identification reported by the laboratory is found to be unacceptable.

(b) If the same TIC was detected in a sample and in an associated blank, the Quality Assurance/Data Validation Contractor will report the TIC as a "Blank Contaminant" and flag the result "R". The Quality Assurance/Data Validation Contractor will not report TICs in field and trip blanks and in the method blank as "Blank Contaminants" in the trip and field blanks.

(c) When a TIC is detected in a sample but is not detected in any blanks and is a suspected artifact of the analysis, the TIC will be reported as a "Laboratory Artifact" and flagged "R" by the Quality Assurance/Data Validation Contractor. "Laboratory Artifacts" reported as TICs in field and trip blanks will also be reported as "Laboratory Artifacts" and flagged "R" by the Quality Assurance/Data Validation Contractor. Some examples of common laboratory contaminants/artifacts are as follows:

- Common laboratory contaminants: CO_2 (m/z 44), siloxanes (m/z 73), hexane, certain freons (1,1,2-trichloro-1,2,2-trifluoroethane [m/z 101/103] or fluorotrichloromethane), phthalates [m/z 149], cyclohexane, cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, chlorocyclohexanol, 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one and 5,5-dimethyl-2(5H)-furanone.

(d) TICs other than "Blank Contaminants" and "Laboratory Artifacts" will be qualified "NJ" by the Quality Assurance/Data Validation Contractor.

(e) The Quality Assurance/Data Validation Contractor will report results for all similar compounds in a sample as a total. A total concentration will be reported on the qualified TIC Form I's or data summary spreadsheets,

followed by the number of peaks which contribute to the total concentration (in parentheses), and the proper qualifier code ("R" or "NJ"). For example, "Total Unknowns 150 (5) NJ."

M. Overall Assessment of the Data

If any problems or situations are uncovered in the data review that are not method compliance in nature but are deemed noteworthy by the Quality Assurance/Data Validation Contractor, a comment will be included in the QAR. In addition, the overall assessment of the data will be included in the conclusions of the QAR.

N. Field Duplicates

1. Evaluation Criteria

   (a) The RPD between the results of aqueous field duplicates should be less than or equal to 20% for results greater than 5 times the LOQ. The difference between results in aqueous field duplicates should be less than the LOQ when at least one result is less than or equal to 5 times the LOQ.

   (b) The RPD between the results in soil field duplicates should be less than or equal to 40% for results greater than 5 times the LOQ. The difference between results in soil field duplicates should be less than 2 times the LOQ when at least one result is less than or equal to 5 times the LOQ.

2. Action

   If the result for any compound did not meet the above criteria, the positive result(s) for this compound in the field duplicate pair will be flagged "J" by the Quality Assurance/Data Validation Contractor.

4.3 DISTRIBUTION

The Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

5. TRAINING

All data validation chemists must be trained in the proper methods of volatile organic analysis data qualification as determined by the Quality Assurance/Data Validation Contractor's Data Validation Task Manager.

6. DOCUMENTATION

The results of the data validation review will be documented in a QAR as described in SOP DV-GEN-02 -- "Preparation of Written Quality Assurance Reviews to Report Data Validation Results."

DUPONT
STANDARD OPERATING PROCEDURE
FOR
VALIDATION OF HERBICIDE
COMPOUND RESULTS GENERATED
BY SW-846 METHOD 8151A

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that the DuPont Quality Assurance/Data Validation Contractor will use to validate herbicide data. Validation will be performed to assess the compliance of the sample data to the laboratory preparation SOPs and analytical SOP for the analysis of herbicides by SW-846 Method 8151A. In addition, the usability of the herbicide data provided by the project laboratories will be determined based on the general guidance provided in the National Functional Guidelines for Organic Data Review. It should be mentioned that this guidance applies strictly to data generated by Contract Laboratory Program (CLP) protocol. As such, it is not directly applicable to validation of data generated by SW-846 Method 8151A. Therefore, this SOP presents the specific data qualification actions that will be used for the project.

The validation findings will be presented in a quality assurance review (QAR), which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG as per SOP DV-GEN-02. Copies of annotated analytical results summaries (Form I's), including any changes to the analytical results and all data qualifier codes, or a data summary spreadsheet of the qualified analysis results will be included in the QAR. This SOP applies to the Quality Assurance/Data Validation Contractor for the project.

2.0 EQUIPMENT

Not Applicable.

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994)

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

SOP DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Project Analytical SOP for the Analysis of Herbicides by SW-846 Method 8151A and related preparation SOPs

4.0 PROCEDURE

4.1 EVALUATION OF METHOD COMPLIANCE

The Quality Assurance/Data Validation Contractor will assess the method compliance of the herbicide data based on an evaluation of information presented in the data package deliverables. Compliance to the laboratory SOP for analysis according to SW-846 Method 8151A will be evaluated as part of the assessment. In addition, the deliverables will be evaluated for reporting errors and inconsistencies. The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Organic Data Evaluation" section of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any certain aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

4.2 DETERMINATION OF DATA USABILITY

The Quality Assurance/Data Validation Contractor will determine the usability of the herbicide data based on an evaluation of the information presented in data package deliverables. The findings of the herbicide data usability assessment will be described in terms of certain qualifications of the data that the project team should consider in order to best utilize the data.

These qualifications will be presented in the "Organic Data Qualifier" subsection of the "Organic Data Evaluation" section of the QAR, as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) has been flagged with representative qualifier code(s) on the data summary spreadsheet or Form I's to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The qualifier codes and the hierarchy of these qualifier codes are presented in SOP DV-GEN-01.

The Quality Assurance/Data Validation Contractor's criteria for evaluating the usability of the herbicide data and the resultant qualifications will be as follows:

A. Holding Times

1. Evaluation Criteria

   (a) The extractions of aqueous samples were required to be performed within 7 days of the date of sample collection.

   (b) The extractions of solid samples were required to be performed within 14 days of the date of sample collection.

   (c) The analyses of sample extracts were required to be performed within 40 days of the dates of extraction on both analytical columns.

2. Actions

   If any criterion is exceeded, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = method detection limit [MDL]/limit of quantitation [LOQ] is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Exceeded Holding Times			
Holding Time for:	Days Beyond Collection/ Extraction	Positive Result(s)	"Not-Detected" Result(s)
Aqueous Sample Extraction	8-14 days > 14 days	"J" "J"	"UJ" "R"

Qualification Due to Exceeded Holding Times			
Holding Time for:	Days Beyond Collection/ Extraction	Positive Result(s)	"Not-Detected" Result(s)
Solid Sample Extraction	15-28 days	"J"	"UJ"
	> 28 days	"J"	"R"
Extract Injection	41-80 days	"J"	"UJ"
	> 80 days	"J"	"R"

B. Condition of Samples Upon Receipt at the Laboratory

1. Evaluation Criteria

(a) The laboratory was required to record any observations concerning the condition of the samples upon receipt at the laboratory (i.e., sample containers cracked, etc.) on the Chain-of-Custody records.

(b) The laboratory was required to record the temperature of the sample coolers (based upon the temperature of the temperature bottle blank) upon receipt at the laboratory on the Chain-of-Custody records or on a separate logbook. The temperature of the sample coolers was required to be maintained at 4°C ± 2°C. However, the Quality Assurance/ Data Validation Contractor will not consider there to be a direct impact on the usability of the data due to temperature issues.

2. Actions

(a) If observations such as cracked containers were noted on the Chain-of-Custody records, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that these issue(s) may lead to a loss of analyte. Professional judgement will be used to determine if the severity of the problem warrants qualification.

(b) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 6°C, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that elevated temperatures may lead to a loss of analyte; however, the Quality

Assurance/Data Validation Contractor should not consider the data to have been impacted due to the stability and chemical properties (i.e., vapor pressure, boiling point, etc.) of the herbicide compounds.

C. Instrument Performance

1. Evaluation Criteria

   (a) The retention times (RTs) of all compounds in the continuing calibration standards were required to be within the RT windows established at the beginning of the day. See the subsequent Section 4.2.E of this SOP for frequency and other additional requirements for continuing calibration standards.

   (b) The RTs of the surrogate in all blanks, field samples, and quality control (QC) samples should have been within the RT windows established at the beginning of the day for data not to be impacted.

2. Actions

   (a) If the RT of any compound in a continuing calibration standard is outside the corresponding RT window established at the beginning of the day, the sample data since the last compliant continuing calibration standard will be evaluated by the Quality Assurance/Data Validation Contractor as follows:

      i. If the analysis has RT window problems on only one column of the two column analysis, only the compounds with tentative positive results on the acceptable column are potentially affected. Therefore, if there are no tentative positives in the acceptable column analysis for the analyte(s) out of control in the noncompliant column analysis, no further action or qualification will be necessary.

      ii. If there are tentative positives in the acceptable column analysis for the analyte(s) which are out of control on the noncompliant column analysis, the sample chromatograms from the noncompliant column will be checked for any peaks or cluster interferences that are close to the expected RT window of the analyte which is out of

control. If no peaks are present either within or close to the RT window of the analyte which is out of control, then no further action or qualification will be necessary.

iii. If the affected sample chromatograms contain peaks which may be of concern (i.e., above the MDL/LOQ and either close to or within the expected RT window of the analyte of interest), one of the following two options will be followed:

Option 1

The data package will be examined for three or more standards containing the analyte in question that were run closest to the sample of concern. If three or more standards are available, the mean and standard deviation of the RT window can be re-evaluated.

If all standards (and QC samples, if analyzed during the affected run) fall within the revised RT window, the validity of the presence or absence of the analyte(s) in the samples bracketed by the noncompliant continuing calibration standard can be determined using this window. Note that second column confirmation is still required.

Option 2

If Option 1 fails, professional judgement will be used to determine if anything else can be done to resolve the problem. If nothing else can be done, all positive results and MDL/LOQs for the analyte in question will be flagged as unusable ("R") in the affected samples.

(b) If the RT of the surrogate in a sample chromatogram is outside the corresponding RT window established at the beginning of the day, a careful evaluation of the sample chromatogram will be performed by the Quality Assurance/Data Validation Contractor to determine if the shift is truly a chromatographic shift or a coelution of an interfering peak such as a phthalate ester. Any associated standard and spike chromatograms will also be evaluated to determine if a true chromatographic shift is apparent in only the sample chromatogram.

If a chromatographic shift is apparent, an evaluation will be performed as to the validity of the presence or absence of the target analyte(s) in the affected sample taking into account the chromatographic shift.

D. Initial Calibrations

1. Evaluation Criteria

(a) For all single peak herbicides, a five-point calibration was required at the beginning of the analytical sequence on each of two columns.

(b) The percent relative standard deviation (%RSD) of response factors (RFs) (calculated using peak height) from the five-point initial calibrations was required to be less than or equal to 20% if the average RF was used for quantitation. If the %RSD is greater than 20%, a linear or quadratic curve that passes through the origin was required to be generated from the five-point calibration and used for quantitation. If the correlation coefficient is less than 0.99 for a linear curve, a quadratic curve will be utilized.

(c) The RT windows were required to be based on a laboratory study over 72 hours and to be equal to the absolute RTs plus or minus three times the standard deviation (or the minimum RT window as stated in the analytical SOP, whichever is larger). In addition, if the RT windows for two single peak herbicides overlapped on one column used for analysis, they were required to not overlap on the second column used for analysis.

2. Actions

(a) For the single peak herbicides, if a five-point calibration was not performed in association with a sample analysis on either column for a required analyte, professional judgement will be used by the Quality Assurance/Data Validation Contractor to determine if qualification of the associated data is necessary. In particular, it will be determined if the MDL/LOQ should be considered biased and "not-detected" results in the affected samples will be flagged "UJ." In addition, it will be determined whether linearity was demonstrated or positive results in the affected samples will be qualified as estimated ("J"). It should be noted that if proper calibration was performed on at least one column used for analysis,

only analytes with tentative positive results on the acceptable column need to be evaluated.

(b) If the %RSD of the RFs in the initial calibration is greater than 20% for any target analyte and the average RF was used for quantitation, positive results for that analyte reported from the column that was out of control in the affected samples will be flagged as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If a calibration curve was used for quantitation, professional judgement will be used by the Quality Assurance/Data Validation Contractor to determine the appropriateness of the curve generated. For instance, the Quality Assurance/Data Validation Contractor may determine if the average percent error for the calibration standards is acceptable with special attention given to quantitation at the MDL or LOQ, depending on reporting conventions.

(d) If the RT windows were not determined properly, the Quality Assurance/Data Validation Contractor will contact the Contracted Laboratories to fix the problem.

(e) If the RT windows for any two analytes overlap on either column, a careful examination of the data will be performed by the Quality Assurance/Data Validation Contractor whenever a tentative identification is observed for either of the two analytes on that column. If a peak fell into the RT window of both analytes, the sample chromatogram from the other column will be examined for peaks for both analytes. If peaks for both analytes are observed on the other column, positive results reported for either analyte will be flagged as tentative ("N"). In addition, if the quantitation of a positive result was performed from the column analysis in which the RT windows overlapped, the positive results will be flagged as estimated ("J"). Furthermore, if a "not-detected" result was reported for either analyte, a quantitation of the possible positive result will be performed by the Quality Assurance/Data Validation Contractor. If the quantitation for the analyte is greater than the MDL/LOQ but less than 10 times the MDL/LOQ on both columns, the MDL/LOQ for the "not-detected" result will be flagged as biased ("UJ"). If the quantitation for the analyte is greater than 10 times the MDL/LOQ (depending on

reporting conventions) on both columns, the "not-detected" result will be flagged as unusable ("R").

E. Continuing Calibrations

1. Evaluation Criteria

(a) The analysis of a mid-level continuing calibration standard was required after each group of 10 samples analyzed and at the end of the analysis sequence. The concentrations of all analytes in the continuing calibration standards were required to be calculated using the same method as used for the samples. The relative percent difference (RPD) between the calculated concentrations and the true concentrations was required to be less than or equal to 15% on both columns used for analysis.

(b) The RT windows were required to be determined at the beginning of each day by centering the windows (the width determined as noted under Initial Calibrations) around the RTs of the analytes in the first (daily) continuing calibration standard of the day. The RTs of all analytes in the continuing calibration standards were required to be within the RT windows established at the beginning of the day.

2. Actions

(a) If the RPD for any analyte in a continuing calibration standard exceeded ±15% on either column, positive results for that analyte in the affected samples (samples since the last in control standard) will be flagged as estimated ("J") by the Quality Assurance/Data Validation Contractor if reported from the column which was out of control.

(b) If the RPD for any analyte in a continuing calibration standard is greater than 15% (sensitivity decrease) on either column, the MDL/LOQ for any "not-detected" result in the affected samples will be flagged as biased low ("UJ") by the Quality Assurance/Data Validation Contractor if a tentative positive result was observed for that analyte on the compliant column analysis. In addition, if the RPD for any analyte in a continuing calibration standard is greater than 15% (sensitivity decrease) on both columns, the MDL/LOQ for any "not-detected" result in the affected

samples will be flagged as biased low ("UJ") whether or not tentative positive results were observed.

(c) If the RT windows were not set based on the RTs of the analytes in the first calibration standard of the day, the data will be reevaluated using proper RT windows by the Quality Assurance/Data Validation Contractor.

(d) If the RT of any analyte in the continuing calibration standards was outside the RT window established at the beginning of the day, the data will be evaluated by the Quality Assurance/Data Validation Contractor as discussed previously under Section 4.2.C.

F. Blanks

1. Evaluation Criteria

(a) The preparation and analysis of a laboratory method blank was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever is more frequent.

(b) The collection of equipment blanks may be required for most sampling events. The applicable workplan or sampling plan will be consulted for the required collection frequency and applicability.

(c) Ideally, for there to be no possible impact on data usability, peaks in the RT windows of the target compounds would not be observed in any blank. Any peak on the chromatogram from the analysis of a blank on either column must be considered external contamination by the Quality Assurance/Data Validation Contractor.

2. Actions

(a) If a herbicide is detected in a sample analysis and is also detected in the analysis of any associated blank (see [b], below, for what blanks are associated with the samples), the positive results will be qualified according to the 5 times rule by the Quality Assurance/Data Validation Contractor as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

Qualification by the 5 times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 5 times the Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 5 times the Blank Concentration	No Qualification of Data is Needed

Note:

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors must be taken into consideration when applying the "5 times" criterion. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(b) The results of all laboratory method blanks of similar matrix will be used to apply to all samples in an SDG. The results of a field/equipment/rinse blank should be applied to all samples collected on the same day (unless only one was collected for a several day sampling event; results would be applied to all samples in the SDG).

(c) If a herbicide is found in a blank but not in the sample, no action will be taken by the Quality Assurance/Data Validation Contractor.

(d) If it is determined that contamination has been introduced from a source other than the sample, qualification of data may be made by the Quality Assurance/Data Validation Contractor. Contamination introduced through dilution water is one example. Instances of this occurring can be identified when compounds have been detected in the diluted sample but were not detected in the undiluted sample.

(e) Professional judgement by the Quality Assurance/Data Validation Contractor will be utilized when a peak within the RT window of a target compound is observed in the blank on only one column chromatogram. Sample chromatograms should be examined closely in comparing such peaks. If similar peaks are observed in the blank and associated samples within the RT window of target compounds, it will be noted that certain

positive results should be used with caution. In addition, when warranted as determined by professional judgement, such positive results will be qualified as tentative ("N") or "not detected" ("U").

G. Surrogates

1. Evaluation Criteria

(a) All standards, blanks, field samples, and QC samples were required to be spiked with 2,4-dichlorophenylacetic acid (DCAA).

(b) The RTs of the surrogate in all blanks, field samples, and QC samples should be within the RT windows established at the beginning of the day for data not to be impacted.

(c) Surrogate results were required to be quantitated in the same manner as the samples (i.e., the lower results between the two analytical columns must be used to calculate the percent recoveries). The DCAA recovery in sample(s) analyzed undiluted was required to be within the specified recovery limits or sample(s) were required to be reextracted and reanalyzed to demonstrate that the poor recoveries are due to a sample matrix effect. If the recovery for the surrogate was inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If the recovery for the surrogate was outside QC limits upon reanalysis (or if the reanalysis failed any other method criteria), both analyses were required to be reported by the laboratory. For sample(s) analyzed at a dilution of five-fold or less (but not undiluted), surrogates were required to at least be detected or sample(s) were required to be reextracted and reanalyzed to demonstrate that the poor recoveries are due to a sample matrix effect.

2. Actions

(a) If the RT of any surrogate in a sample chromatogram was outside the corresponding RT window established at the beginning of the day, see the Section 4.2.C of this SOP for the required action(s).

(b) Sample chromatograms will be carefully scrutinized by the Quality Assurance/Data Validation Contractor for possible interferences when

surrogate recoveries are outside criteria. When interferences are observed that appear to have resulted in the laboratory reporting recoveries outside criteria, caution will be exercised in qualifying data. If it is determined that the poor recoveries were due to an interference and not a bias, data will not be qualified due to the poor recoveries. Instead, refer to the "Target Compound Identification" section of this SOP.

(c) The surrogate recovery limits do not apply to samples analyzed at a dilution. However, the surrogate should at least be detected if the sample was analyzed at a five-fold dilution or less. No qualification of the data will be necessary if the surrogate is diluted beyond detection. Generally, greater than a five-fold dilution will affect the ability to even detect the surrogate. If a sample was analyzed at a five-fold dilution or less and the surrogate was not detected in the sample, the Quality Assurance/Data Validation Contractor will qualify positive results as estimated ("J") and the MDL/LOQs for "not-detected" results as biased ("UJ"). Data qualification by the Quality Assurance/Data Validation Contractor due to an unacceptable surrogate recovery will not be necessary if a greater than five-fold dilution was performed on a sample. However, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the issue that sample specific method performance based on surrogate recoveries could not be evaluated due to the necessary dilution performed on the sample.

(d) Unacceptable surrogate recoveries will be cause for qualification of sample data (analyzed undiluted) by the Quality Assurance/Data Validation Contractor when interferences are not evident as summarized in the following table.

Qualification Due to Surrogate Recoveries Outside of Limits		
If DCAA recovery:	Flag positive results:	Flag "not-detected" results:
< 10%	"J"	"R"
< 10% ≥ recovery < LCL	"J"	"UJ"

Qualification Due to Surrogate Recoveries Outside of Limits		
> UCL	"J"	No Qualification

LCL = Lower control limit
UPL = Upper control limit

H. Matrix Spike/Matrix Spike Duplicates and Laboratory Control Samples

1. Evaluation Criteria

(a) The preparation of a matrix spike (MS) and a matrix spike duplicate (MSD) of a project sample were required for every 20 samples of a similar matrix. All single peak herbicides were required in each spike.

(b) The MS/MSD results were required to be quantitated in the same manner as samples (i.e., the lower results between the two analytical columns must be used to calculate the percent recoveries). All MS/MSD spike compound recoveries should be within the data usability limits of 50-135% recovery for data not to be potentially impacted. The RPDs between the results for each compound in the MS and MSD should be less than or equal to 20% for aqueous samples and less than or equal to 40% for soil samples for data not to be potentially impacted.

(c) The preparation of a laboratory control sample (LCS) was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever was more frequent.

(d) The LCS results were required to be quantitated in the same manner as samples (i.e., the lower results between the two analytical columns must be used to calculate the percent recoveries). The LCS analysis was required to meet the specified QC limits. If the LCS did not meet the recovery criteria, all associated samples were required to be reextracted and reanalyzed. However, all LCS spike compound recoveries should be within the data usability limits of 50-135% for data not to be potentially impacted.

2. Actions

(a) If the recovery for any compound did not meet the limits of 50-135% in the MS and/or MSD analyses, the result for that compound in the **unspiked sample only** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor MS/MSD Recoveries		
If Percent Recovery:	Flag Positive Result:	Flag "Not-detected" Result:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

(b) If the RPD between the results for any compound in the MS and MSD exceeded the 20% for aqueous samples or 40% for soil samples, positive results for that compound **in the unspiked sample only** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the recovery for any compound does not meet the limits of 50-135% in the LCS analysis, the results for that compound in **all associated samples** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor LCS Recoveries		
If Percent Recovery:	Flag Positive Results:	Flag "Not-detected" Results:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

I. Target Compound Identification

1. Evaluation Criteria

   (a) A herbicide was required to be considered identified if peaks were detected within its appropriate RT windows on each of two dissimilar columns at concentrations at or above the MDL or LOQ (depending on reporting conventions).

   (b) GC/MS confirmation may have been performed if the concentration of a herbicide was considered to be sufficiently high (generally, > 10 ng/μL in the extract).

2. Actions

   (a) If the qualitative RT criteria for a compound in a sample were not met on both columns and there was not any evidence of shifts of the RTs of the surrogates in the samples or of the compound in the associated standards, the reported positive result will not be reported on the Form I's or data summary spreadsheets by the Quality Assurance/Data Validation Contractor. See the Section 4.2.C of this SOP if RT shifts are observed.

   (b) If the qualitative RT criteria for a compound reported as "not-detected" in a sample were met for both columns and there was not any evidence of shifts for the RTs of the surrogate in the samples or of the compound in the associated standards, the positive result will be reported on the Form I's or data summary spreadsheets by the Quality Assurance/Data Validation Contractor. See Section 4.2.C of this SOP if RT shifts are observed.

   (c) If a chromatographic interference is observed by the Quality Assurance/ Data Validation Contractor during the expected RT of a target compound, the sample chromatogram and data system printout will be evaluated to determine if the compound could be detected at the LOQ by comparing the height of the interference in the sample chromatogram to the height of the compound in the associated low-level standard chromatogram. If the height of the peak for the compound in the sample chromatogram is less than or equal to 10 times the height of the peak for the compound in the standard (looking at the best column), the

MDL/LOQ (depending on reporting conventions) for the "not-detected" result for the compound will be flagged biased ("UJ") and if it is greater than 10 times, an analysis with a "not-detected" result for the compound will be flagged unusable ("R").

(d) If GC/MS was used to confirm if a compound is present or not in a sample, the Quality Assurance/Data Validation Contractor will evaluate the GC/MS data. Otherwise, the Quality Assurance/Data Validation Contractor will use professional judgement to assess whether the presence or absence could be determined by the analysis performed and qualify data accordingly if the presence was not confirmed.

J. Compound Quantitation and Reporting Limits

1. Evaluation Criteria

(a) All quantitations must be based on the initial multi-point calibrations. The higher result from the two analytical columns was required to be reported as the sample result. Individual compound concentrations must be greater than the MDL or LOQ (depending on reporting conventions) on both columns to be reported as a positive result.

(b) The relative percent difference (RPD) between the results for a compound on the two analytical columns should be less than or equal to 40% for there to be no impact on data usability.

2. Actions

(a) If both analytical results are greater than five times the LOQ and the RPD between the results for a compound quantitated from the two analytical columns is $> 40\%$ and $\leq 80\%$, the positive result will be flagged "J" by the Quality Assurance/Data Validation Contractor. If at least one analytical result is less than 5 times the LOQ and the difference between the results for a compound quantitated from two analytical columns is >2 times the LOQ and ≤ 4 times the LOQ, the positive result will be flagged "J" by the Quality Assurance/Data Validation contractor. An exception may be made if the reported result meets all criteria and there is reason to believe that the alternate column concentration may be biased.

(b) If both results are greater than 5 times the LOQ and the RPD between the results for a compound quantitated from the two analytical columns is $> 80\%$ and $\leq 120\%$, the positive result will be flagged "JN" by the Quality Assurance/Data Validation Contractor. If at least one of the result is less than 5 times the LOQ and the difference between the results for a compound quantitated from the two analytical columns is > 4 times the LOQ and ≤ 8 times the LOQ, the positive result will be flagged "JN" by the Quality Assurance/Data Validation Contractor. An exception may be made is the reported result meets all criteria and there is reason to believe that the alternate column concentration may be biased.

(c) If both results are greater than 5 times the LOQ and the RPD between the results for a compound quantitated from the two analytical columns is $> 120\%$, the positive result will be flagged "R" by the Quality Assurance/Data Validation Contractor. If at least one result is less than 5 times the LOQ and the difference between the results for a compound quantitated from the two analytical columns is > 8 times the LOQ, the positive result will be flagged "R" by the Quality Assurance/Data Validation Contractor. An exception may be made if the reported result meets all criteria and there is reason to believe that the alternate column concentration may be biased.

(d) Positive results reported at concentrations based on instrument levels greater than the calibration range of the instrument will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will also indicate within the qualifier whether the sample was properly diluted and reanalyzed.

K. Field Duplicates

1. Evaluation Criteria

(a) The RPD between the results in aqueous field duplicates should be less than or equal to 20% for results greater than 5 times the LOQ. The difference between results in aqueous field duplicates should be less than the LOQ when at least one results is less than the 5 times LOQ.

(b) The RPD between the results in soil field duplicates should be less than or equal to 40% for results greater than 5 times the LOQ. The difference between results in soil field duplicates should be less than two times the LOQ when at least one results is less than the 5 times the LOQ.

(c) A value of the MDL or LOQ (depending on the reporting conventions being used) will be used for a "not-detected" result for comparison only.

2. Action

If the results for any compounds do not meet the above criteria, the positive results will be flagged "J" by the Quality Assurance/Data Validation Contractor.

L. Overall Assessment of the Data

If any problems or situations are uncovered in the data review that are not method compliance in nature but are deemed noteworthy by the Quality Assurance/Data Validation Contractor, a comment will be included in the QAR. In addition, the overall assessment for the data will be included in the conclusions of the QAR.

4.3 DISTRIBUTION

The Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

5.0 TRAINING

All data validation chemists must be trained in the proper methods of herbicide analysis qualification as determined by the Quality Assurance/Data Validation Contractor project manager.

6.0 DOCUMENTATION

The results of the data validation review will be documented in a QAR as described in SOP DV-GEN-02 -- "Preparation of Written Quality Assurance Reviews to Report Data Validation Results."

DUPONT
STANDARD OPERATING PROCEDURE
FOR
VALIDATION OF ORGANOCHLORINE PESTICIDE/PCB COMPOUND RESULTS GENERATED BY SW-846 METHODS 8081A AND 8082

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that the DuPont Quality Assurance/Data Validation Contractor will use to validate organochlorine pesticide/PCB data. Validation will be performed to assess the compliance of the sample data to the preparation SOPs and to the analytical SOP for analysis of Organochlorine Pesticide/PCBs by SW-846 Methods 8081A and 8082. In addition, the usability of the organochlorine pesticide/PCB data provided by the project laboratories will be determined based on the general guidance provided in the National Functional Guidelines for Organic Data Review. It should be mentioned that this guidance applies strictly to data generated by Contract Laboratory Program (CLP) protocol. As such, it is not directly applicable to validation of data generated by SW-846 Methods 8081A and 8082. Therefore, this SOP presents the specific data qualification actions that will be used for the project.

The validation findings will be presented in a quality assurance review (QAR), which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG as per SOP DV-GEN-02. Copies of annotated analytical results summaries (Form I's), including any changes to the analytical results and all data qualifier codes, or a data summary spread sheet of the qualified analytical results will be included in the QAR. This SOP applies to the Quality Assurance/Data Validation Contractor for the project.

2.0 EQUIPMENT

Not Applicable.

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994)

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

SOP DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Project Analytical SOPs for the Analysis of Organochlorine Pesticides/PCB by SW-846 Methods 8081A and 8082 and related preparation and clean-up SOPs

4.0 PROCEDURE

4.1 EVALUATION OF METHOD COMPLIANCE

The Quality Assurance/Data Validation Contractor will assess the method compliance of the organochlorine pesticide/PCB data based on an evaluation of information presented in the data package deliverables. Compliance to the laboratory SOPs for analysis according to SW-846 Methods 8081A and 8082 will be evaluated as part of the assessment. In addition, the deliverables will be evaluated for reporting errors and inconsistencies. The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Organic Data Evaluation" section of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any certain aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

4.2 DETERMINATION OF DATA USABILITY

The Quality Assurance/Data Validation Contractor will determine the usability of the organochlorine pesticide/PCB data based on an evaluation of the information presented in data package deliverables. The findings of the organochlorine pesticide/ PCB data usability assessment will be described in terms of certain qualifications of the data that the project team should consider in order to best utilize the data. These qualifications will be presented in the "Organic Data Qualifier" subsection of the "Organic Data Evaluation" section of the QAR, as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) has been flagged with representative qualifier code(s) on the data summary spreadsheets or Form I's to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The qualifier codes and the hierarchy of these qualifier codes are presented in SOP DV-GEN-01.

The Quality Assurance/Data Validation Contractor's criteria for evaluating the usability of the organochlorine pesticide/PCB data and the resultant qualifications will be as follows:

A. Holding Times

1. Evaluation Criteria

   (a) The extractions of aqueous samples were required to be performed within 7 days of the date of sample collection.

   (b) The extractions of solid samples were required to be performed within 14 days of the date of sample collection.

   (c) The analyses of sample extracts were required to be performed within 40 days of the dates of extraction on both analytical columns.

2. Actions

   If any criterion is exceeded, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = method detection limit [MDL]/limit of quantitation [LOQ] is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Exceeded Holding Times			
Holding Time for:	Days Beyond Collection/ Extraction	Positive Result(s)	"Not-Detected" Result(s)
Aqueous Sample Extraction	8-14 days > 14 days	"J" "J"	"UJ" "R"
Solid Sample Extraction	15-28 days > 28 days	"J" "J"	"UJ" "R"
Extract Injection	41-80 days > 80 days	"J" "J"	"UJ" "R"

B. Condition of Samples Upon Receipt at the Laboratory

1. Evaluation Criteria

(a) The laboratory was required to record any observations concerning the condition of the samples upon receipt at the laboratory (i.e., sample containers cracked, etc.) on the Chain-of-Custody records.

(b) The laboratory was required to record the temperature of the sample coolers (based upon the temperature of the temperature bottle blank) upon receipt at the laboratory on the Chain-of-Custody records or on a separate logbook. The temperature of the sample coolers was required to be maintained at 4°C ± 2°C. However, the Quality Assurance/ Data Validation Contractor will not consider there to be a direct impact on the usability of the data due to temperature issues.

2. Actions

(a) If observations such as cracked containers were noted on the Chain-of-Custody records, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that these issue(s) may lead to a loss of analyte. Professional judgment will be used to determine if the severity of the problem warrants qualification.

(b) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 6°C, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that elevated temperatures may lead to a loss of analyte; however, the Quality Assurance/Data Validation Contractor should not consider the data to have been impacted due to the stability and chemical properties (i.e., vapor pressure, boiling point, etc.) of the organochlorine pesticide/PCB compounds.

C. Instrument Performance

1. Evaluation Criteria

(a) The laboratory was required to analyze the Evaluation Standard containing 4,4′-DDT and endrin at a frequency of once per day of analysis prior to the analysis of the initial calibration or continuing calibration standard. The 4,4′-DDT and endrin percent breakdowns in the Evaluation Standards associated with sample analyses were required to not exceed 20%.

(b) The retention times (RTs) of all compounds in the continuing calibration standards were required to be within the RT windows established at the beginning of the day. See the subsequent Section 4.2.E of this SOP for frequency and other additional requirements for continuing calibration standards.

(c) The RTs of the surrogates in all blanks, field samples, and quality control (QC) samples should have been within the retention time windows established at the beginning of the day for data not to be impacted.

2. Actions

(a) If 4,4′-DDT (*or endrin*) breakdown is greater than 20% on at least one column, for all samples associated with the noncompliant standard, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = MDL/LOQ is biased, "N" = tentative identification, OK = no qualification) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to High 4,4'-DDT (*or Endrin*) Breakdown				
Column/Met criteria?	If 4,4'-DDT (*or endrin*):	And if 4,4'-DDD and/or 4,4'-DDE (*or endrin ketone and/or endrin aldehyde*):	Then flag 4,4'-DDT (*or endrin*):	And flag **positives** for 4,4'-DDD and/or 4,4'-DDE (*or endrin ketone and/or endrin aldehyde*):
(1)/no (2)/yes	+ +	any +'s +'s or ND's	"J" column (1) OK column (2)	"JN" column (1) "N" column (2)
(1)/no (2)/yes	ND + > RL†	any +'s +'s or ND's	ND "R"	"JN" column (1) "N" column (2)
(1)/no (2)/yes	ND + < RL†	any +'s +'s or ND's	ND OK	"JN" column (1) "N" column (2)
(1)/no (2)/yes	+ +	all ND's +'s or ND's	*	NA
(1)/no (2)/yes	ND + or ND	all ND's +'s or ND's	ND OK	NA
(1)/no (2)/yes	+ or ND ND	+'s or ND's +'s or ND's	ND OK	OK
(1)/no (2)/no	ND + or ND	any +'s any +'s	ND "R"	"JN"
(1)/no (2)/no	+ +	any +'s any +'s	"J"	"JN"
(1)/no (2)/no	+ ND	all ND's any +'s	ND "R"**	NA
(1)/no (2)/no	+ +	all ND's all ND's	*	NA
(1)/no (2)/no	+ or ND ND	+'s or ND's all ND's	ND OK	NA

Notes:

\+ A peak was observed in the RT window for this pesticide on the corresponding column indicating a tentative identification for this pesticide. The positive result may quantitate to be below, at, or above the reporting limit.

ND Not Detected regardless of the reporting limit (flat baseline was observed in the area of the chromatogram where this compound would elute if it were truly present in the sample).

RL† Reporting limit - may be MDL or LOQ. Positives from a non-quantitative (confirmational) column analysis should be considered above the reporting limit for evaluation purposes, whether or not the result was quantitated above the reporting limit on this non-quantitative column.

NA Not Applicable. Pesticide was not detected and only positive results are impacted.

* Although high breakdown was indicated by the associated standard on at least one column used for analysis, this positive result for 4,4'-DDT (*or endrin*) has <u>not</u> been qualified because the breakdown components were not detected in the sample analysis on the noncompliant column(s). However, since high breakdown was indicated by the associated standard, it is questionable whether the peak(s) used for

identification on the noncompliant column(s) truly represents 4,4′-DDT (*or endrin*). It is highly unusual not to detect the breakdown components in the presence of 4,4′-DDT (*or endrin*).

** This "not-detected" result for 4,4′-DDT (*or endrin*) has been qualified as unusable ("R") because the breakdown components were observed in the sample analysis on this column for which high breakdown was indicated by the associated standard. However, it should be noted that the breakdown components were not detected in the sample analysis on the other column for which high breakdown was also indicated by the associated standard. Since high breakdown was indicated by the associated standard on this other column it is questionable whether the peak used for identification on this other column truly represents 4,4′-DDT (*or endrin*). It is highly unusual not to detect the breakdown components in the presence of 4,4′-DDT (*or endrin*).

(b) If the RT of any compound in a continuing calibration standard is outside the corresponding RT window established at the beginning of the day, the sample data since the last compliant continuing calibration standard will be evaluated by the Quality Assurance/Data Validation Contractor as follows:

i. If the analysis has RT window problems on only one column of the two column analysis, only the compounds with tentative positive results on the acceptable column are potentially affected. Therefore, if there are no tentative positives in the acceptable column analysis for the analyte(s) out of control in the noncompliant column analysis, no further action or qualification will be necessary.

ii. If there are tentative positives in the acceptable column analysis for the analyte(s) which are out of control on the noncompliant column analysis, the sample chromatograms from the noncompliant column will be checked for any peaks or cluster interferences that are close to the expected RT window of the analyte which is out of control. If no peaks are present either within or close to the RT window of the analyte which is out of control, then no further action or qualification will be necessary.

iii. If the affected sample chromatograms contain peaks which may be of concern (i.e., above the MDL/LOQ and either close to or within the expected RT window of the analyte of interest), one of the following two options will be followed:

Option 1

The data package will be examined for three or more standards containing the analyte in question that were run closest to the sample of concern. If three or more standards are available, the mean and standard deviation of the RT window can be re-evaluated.

If all standards (and QC samples, if analyzed during the affected run) fall within the revised RT window, the validity of the presence or absence of the analyte(s) in the samples bracketed by the noncompliant continuing calibration standard can be determined using this window. Note that second column confirmation is still required.

Option 2

If Option 1 fails, professional judgment will be used to determine if anything else can be done to resolve the problem. If nothing else can be done, all positive results and MDL/LOQs for the analyte in question will be flagged as unusable ("R" and "UR," respectively) in the affected samples.

(c) If the RT of any surrogate in a sample chromatogram is outside the corresponding RT window established at the beginning of the day, a careful evaluation of the sample chromatogram will be performed by the Quality Assurance/Data Validation Contractor to determine if the shift is truly a chromatographic shift or a coelution of an interfering peak such as a phthalate ester. Any associated standard and spike chromatograms will also be evaluated to determine if a true chromatographic shift is apparent in only the sample chromatogram.

If a chromatographic shift is apparent, an evaluation will be performed as to the validity of the presence or absence of the target analyte(s) in the affected sample taking into account the chromatographic shift.

D. Initial Calibrations

1. Evaluation Criteria

(a) For all single peak pesticides, a five-point calibration was required at the beginning of the analytical sequence on each of two columns. For the multicomponent analytes Aroclor-1016 and Aroclor-1260, a five-point calibration was required at the beginning of the analytical sequence on each of the two columns.

(b) For the multicomponent analytes toxaphene, technical chlordane, Aroclor-1221, Aroclor-1232, Aroclor-1242, Aroclor-1248, and Aroclor-1254, a single-point standard was required at the beginning of the analytical sequence on each of two columns. If the presence of a multicomponent analyte in a project sample was indicated on either column analysis, the sample extract was required to be reanalyzed after a five-point calibration was performed on both columns used for analysis.

(c) The percent relative standard deviation (%RSD) of response factors (RFs) (calculated using peak height) from the five-point initial calibration was required to be less than or equal to 20% if the average RF was used for quantitation. If the %RSD is greater than 20%, a quadratic curve that passes through the origin was required to be generated from the five-point calibration and used for quantitation. The correlation coefficient of the linear curve must be greater than 0.99.

(d) The RT windows were required to be based on a laboratory study over 72 hours and to be equal to the absolute RTs plus or minus three times the standard deviation (or the minimum RT window as stated in laboratory SOP, whichever is larger). In addition, if the RT windows for two single peak pesticides overlapped on one column used for analysis, they were required to not overlap on the second column used for analysis.

2. Actions

(a) For the single peak pesticides and positive results for the multicomponent analytes, if a five-point calibration was not performed in association with a sample analysis on either column for a required

analyte, professional judgment will be used by the Quality Assurance/Data Validation Contractor to determine if qualification of the associated data is necessary. In particular, it will be determined if the MDL/LOQ (depending on reporting conventions) should be considered biased and "not-detected" results in the affected samples will be flagged "UJ." In addition, it will be determined whether linearity was demonstrated or positive results in the affected samples will be qualified as estimated ("J"). It should be noted that if proper calibration was performed on at least one column used for analysis, only analytes with tentative positive results on the acceptable column need to be evaluated.

(b) For not-detected results for the multicomponent analytes, if a MDL or LOQ standard analysis was not performed in association with any sample analysis on either column, professional judgment will be used by the Quality Assurance/Data Validation Contractor to determine if there is any impact on the "not-detected" results (if MDL/LOQs for the affected sample[s] must be considered biased and flagged "UJ"). It should be noted that if proper calibration was performed on at least one column used for analysis, only analytes with tentative positive results on the acceptable column need to be evaluated.

(c) If the %RSD of the RFs in the initial calibration is greater than 20% for any target analyte and the average RF was used for quantitation, positive results for that analyte reported from the GC column that was out of control in the affected samples will be flagged as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(d) If a calibration curve was used for quantitation, professional judgment will be used by the Quality Assurance/Data Validation Contractor to determine the appropriateness of the curve generated. For instance, the Quality Assurance/Data Validation Contractor may determine if the average percent error for the calibration standards is acceptable with special attention given to quantitation at the MDL or LOQ, depending on the reporting conventions.

(e) If the RT windows were not determined properly, the Quality Assurance/Data Validation Contractor will contact the Contracted Laboratories to fix the problem.

(f) If the RT windows for any two analytes overlap on either column, a careful examination of the data will be performed by the Quality Assurance/Data Validation Contractor whenever a tentative identification is observed for either of the two analytes on that column. If a peak fell into the RT window of both analytes, the sample chromatogram from the other column will be examined for peaks for both analytes. If peaks for both analytes are observed on the other column, positive results reported for either analyte will be flagged as tentative ("N"). In addition, if the quantitation of a positive result was performed from the column analysis in which the RT windows overlapped, the positive results will be flagged as estimated ("J"). Furthermore, if a "not-detected" result was reported for either analyte, a quantitation of the possible positive result will be performed by the Quality Assurance/Data Validation Contractor. If the quantitation for the analyte is greater than the MDL/LOQ but less than 10 times the MDL/LOQ on both columns, the MDL/LOQ for the "not-detected" result will be flagged as biased ("UJ"). If the quantitation for the analyte is greater than 10 times the MDL/LOQ (depending on reporting conventions) on both columns, the "not-detected" result will be flagged as unusable ("R").

E. Continuing Calibrations

1. Evaluation Criteria

(a) The analysis of a mid-level continuing calibration standard was required after each group of 10 samples analyzed and at the end of the analysis sequence. The concentrations of all analytes in the continuing calibration standards were required to be calculated using the same method as used for the samples. The absolute value of the percent differences (%Ds) between the calculated concentrations and the true concentrations was required to be less than or equal to 15% on both columns used for analysis.

(b) The RT windows were required to be determined at the beginning of each day by centering the windows (the width determined as noted under Initial Calibrations) around the RTs of the analytes in the first (daily) continuing calibration standard of the day. The RTs of all analytes in the continuing calibration standards were required to be within the RT windows established at the beginning of the day.

2. Actions

(a) If the %D for any analyte in a continuing calibration standard exceeded ±15% on either column, positive results for that analyte in the affected samples (samples since the last in control standard) will be flagged as estimated ("J") by the Quality Assurance/Data Validation Contractor if reported from the column which was out of control.

(b) If the %D for any analyte in a continuing calibration standard is greater than 15% (sensitivity decrease) on either column, the MDL/LOQ for any "not-detected" result in the affected samples will be flagged as biased low ("UJ") by the Quality Assurance/Data Validation Contractor if a tentative positive result was observed for that analyte on the compliant column analysis. In addition, if the %D for any analyte in a continuing calibration standard is greater than 15% (sensitivity decrease) on both RT columns, the MDL/LOQ for any "not-detected" result in the affected samples will be flagged as biased low ("UJ") whether or not tentative positive results were observed.

(c) If the RT windows were not set based on the RTs of the analytes in the first calibration standard of the day, the data will be reevaluated using proper RT windows by the Quality Assurance/Data Validation Contractor.

(d) If the RT of any analyte in the continuing calibration standards was outside the RT window established at the beginning of the day, the data will be evaluated by the Quality Assurance/Data Validation Contractor as discussed previously under Section 4.2.C.

F. Blanks

1. Evaluation Criteria

(a) The preparation and analysis of a laboratory method blank was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever is more frequent.

(b) The collection of equipment blanks may be required for most sampling events. The applicable workplan or sampling plan will be consulted for the required collection frequency and applicability.

(c) Ideally, for there to be no possible impact on data usability, peaks in the RT windows of the target compounds would not be observed in any blank. Any peak on the chromatogram from the analysis of a blank on either column must be considered external contamination by the Quality Assurance/Data Validation Contractor.

2. Actions

(a) If a pesticide/PCB is detected in a sample analysis and is also detected in the analysis of any associated blank (see [b], below, for what blanks are associated with the samples), the positive results will be qualified according to the 5 times rule by the Quality Assurance/Data Validation Contractor as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

Qualification by the 5 times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 5 times the Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 5 times the Blank Concentration	No Qualification of Data is Needed

Note:

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors must be taken into consideration when applying the "5 times" criterion. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(b) The results of all laboratory method blanks of similar matrix will be used to apply to all samples in an SDG. The results of a field/equipment/rinse blank should be applied to all samples collected on the same day (unless only one was collected for a several day sampling event; results would be applied to all applicable samples in the SDG).

(c) If a pesticide/PCB is found in a blank but not in the sample, no action will be taken by the Quality Assurance/Data Validation Contractor.

(d) If it is determined that contamination has been introduced from a source other than the sample, qualification of data may be made by the Quality Assurance/Data Validation Contractor. Contamination introduced through dilution water is one example. Instances of this occurring can be identified when compounds have been detected in the diluted sample but were not detected in the undiluted sample.

(e) Professional judgment by the Quality Assurance/Data Validation Contractor will be utilized when a peak within the RT window of a target compound is observed in the blank on only one column chromatogram. Sample chromatograms should be examined closely in comparing such peaks. If similar peaks are observed in the blank and associated samples within the RT window of target compounds, it will be noted that certain positive results should be used with caution. In addition, when warranted as determined by professional judgment, such positive results will be qualified as tentative ("N") or "not-detected" ("U").

G. Surrogates

1. Evaluation Criteria

(a) All standards, blanks, field samples, and QC samples were required to be spiked with tetrachloro-*m*-xylene (TCMX) and decachlorobiphenyl (DCB).

(b) The retention times of the surrogates in all blanks, field samples, and QC samples should be within the RT windows established at the beginning of the day for data not to be impacted.

(c) Surrogate results were required to be quantitated in the same manner as the samples (i.e., the higher results between the two analytical columns must be used to calculate the percent recoveries). At least one of the two surrogate recoveries (TCMX or DCB) in sample(s) analyzed undiluted were required to be within the specified limits or sample(s) were required to be reextracted and reanalyzed to demonstrate that the poor

recoveries are due to a sample matrix effect. If the recoveries for the surrogates were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any recovery for the surrogates was outside QC limits upon reanalysis (or if the reanalysis failed any other contractual criteria), both analyses were required to be reported by the laboratory. For sample(s) analyzed at a dilution of five-fold or less (but not undiluted), surrogates were required to at least be detected or sample(s) were required to be reextracted and reanalyzed to demonstrate that the poor recoveries are due to a sample matrix effect.

2. Actions

(a) If the RT of any surrogate in a sample chromatogram was outside the corresponding RT window established at the beginning of the day, see the "Instrument Performance" section of this SOP for the required action(s).

(b) Sample chromatograms will be carefully scrutinized by the Quality Assurance/Data Validation Contractor for possible interferences when surrogate recoveries are outside criteria. When interferences are observed that appear to have resulted in the laboratory reporting recoveries outside criteria, caution will be exercised in qualifying data. If it is determined that the poor recoveries were due to an interference and not a bias, data will not be qualified due to the poor recoveries. Instead, refer to the "Target Compound Identification" section of this SOP.

(c) The surrogate recovery limits do not apply to samples analyzed at a dilution. However, the surrogates should at least be detected if the sample was analyzed at a five-fold dilution or less. No qualification of the data will be necessary if the surrogate is diluted beyond detection. Generally, greater than a five-fold dilution will affect the ability to even detect the surrogate. If a sample was analyzed at a five-fold dilution or less and either surrogate was not detected in the sample, the Quality Assurance/Data Validation Contractor will qualify positive results as estimated ("J") and the "not-detected" results as biased ("UJ"). Data qualification by the Quality Assurance/Data Validation Contractor due to an unacceptable surrogate recovery will not be necessary if a greater than

five-fold dilution was performed on a sample. However, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the issue that sample specific method performance based on surrogate recoveries could not be evaluated due to the necessary dilution performed on the sample.

(d) Unacceptable surrogate recoveries will be cause for qualification of sample data (analyzed undiluted) by the Quality Assurance/Data Validation Contractor when interferences are not evident as summarized in the following table(s).

Qualification Due to Surrogate Recoveries Outside of Limits		
If TCMX and/or DCB recovery:	Flag positive results:	Flag "not-detected" results:
< 10%	"J"	"R"
10% ≤ % recovery < LCL	"J"	"UJ"
> UCL	"J"	No Qualification

Note:

LCL = lower control limit
UCL = upper control limit

H. Matrix Spike/Matrix Spike Duplicates and Laboratory Control Samples

1. Evaluation Criteria

(a) The preparation of a matrix spike (MS) and a matrix spike duplicate (MSD) of a project sample were required for every 20 samples of a similar matrix. All single peak pesticides were required in each spike. The preparation of a MS/MSD was also required for the multipeak pesticides and Aroclors if samples require reanalysis for the quantitation of these compounds (see Section 4.2.D of this SOP). The spike was required on a sample suspected of containing these multicomponent compounds and was to be spiked with the suspected contaminants. Since the extraction of MS/MSDs for multipeak pesticides and Aroclors were only required after it was determined that multipeak pesticides and/or Aroclors were in the samples, the extractions were not required to be within holding time. Due to the stability of these compounds, the data

quality for these MS/MSDs should not be impacted by missed holding times.

(b) The MS/MSD results were required to be quantitated in the same manner as samples (i.e., the higher results between the two analytical columns must be used to calculate the percent recoveries). All MS/MSD spike compound recoveries should be within the data usability limits of 50-135% recovery for data not to be potentially impacted. The relative percent differences (RPDs) between the results for each compound in the MS and MSD should be less than or equal to 20% for aqueous samples and less than or equal to 40% for soil samples for data not to be potentially impacted.

(c) The preparation of a laboratory control sample (LCS) was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever was more frequent.

(d) The LCS results were required to be quantitated in the same manner as samples (i.e., the lower results between the two analytical columns must be used to calculate the percent recoveries). The LCS analysis was required to meet the specified QC limits. If the LCS did not meet the recovery criteria, all associated samples were required to be reextracted and reanalyzed. However, all LCS spike compound recoveries should be within the data usability limits of 50-135% for data not to be potentially impacted.

2. Actions

(a) If the recovery for any compound did not meet the limits of 50-135% in the MS and/or MSD analyses, the result for that compound in the **unspiked sample only** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor MS/MSD Recoveries		
If Percent Recovery:	Flag Positive Result:	Flag "Not-detected" Result:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

(b) If the RPD between the results for any compound in the MS and MSD exceeded the 20% for aqueous samples or 40% for soil samples, positive results for that compound **in the unspiked sample only** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the recovery for any compound does not meet the limits of 50-135% in the LCS analysis, the results for that compound in **all associated samples** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor LCS Recoveries		
If Percent Recovery:	Flag Positive Results:	Flag "Not-detected" Results:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

I. Target Compound Identification

1. Evaluation Criteria

(a) A single component pesticide was required to be considered identified if peaks were detected within its appropriate RT windows on each of two dissimilar columns at concentrations at or above the MDL or LOQ (depending on reporting conventions).

(b) A multicomponent analyte was required to be considered identified primarily by pattern recognition, but the RTs of the major peaks of the multicomponent analyte must also have been taken into consideration.

(c) Kepone cannot be analyzed using the DB1701 column; therefore, if this column was used and kepone was detected at or above the LOQ on the other analytical column, a confirmational analysis was required for the affected sample on another column suitable for kepone.

(d) GC/MS confirmation may have been performed if the concentration of an organochlorine pesticide or PCB was considered to be sufficiently high (generally, > 10 ng/mL in the extract).

2. Actions

(a) If the qualitative RT criteria for a compound in a sample were not met on both columns and there was not any evidence of shifts of the RT of the surrogates in the samples or of the compound in the associated standards, the reported positive result will not be reported on the data summary spreadsheets or Form I's by the Quality Assurance/Data Validation Contractor. See the "Instrument Performance" section of this SOP if RT shifts are observed.

(b) If the qualitative RT criteria for a compound reported as "not-detected" in a sample were met for both columns and there was not any evidence of shifts for the RTs of the surrogates in the samples or of the compound in the associated standards, the positive result will be reported on the data summary spreadsheets or Form I's by the Quality Assurance/Data Validation Contractor. See Section 4.2.C of this SOP if RT shifts are observed.

(c) If the DB1701 column was used for analysis and kepone was detected at or above the LOQ on the other analytical column and a confirmational analysis was not performed as required for the affected sample on another column usable for kepone, the positive result will be reported by the Quality Assurance/Data Validation Contractor and flagged as a tentative identification ("N") with a estimated concentration ("J"). If a "not-detected" result was reported by the laboratory the result calculated

by the Quality Assurance/ Data Validation Contractor will be reported on the data summary spreadsheets or Form I's.

(d) If multicomponent analytes exhibit marginal pattern-matching quality, professional judgment will be used by the Quality Assurance/Data Validation Contractor to establish whether the differences are attributable to environmental "weathering." If the presence of a multicomponent analyte is strongly suggested, the result will be reported on the data summary spreadsheets or Form I's by the Quality Assurance/Data Validation Contractor and qualified as presumptively present ("N") and estimated ("J") if a positive result was not reported by the laboratory. If a positive result was reported by the laboratory, it will be qualified as presumptively present ("N") and estimated ("J").

If an observed pattern closely matches more than one Aroclor, professional judgment will be used by the Quality Assurance/Data Validation Contractor to decide whether a neighboring Aroclor is a better match, or if multiple Aroclors are present. A comparison of the RTs and height ratios of the greatest peaks in the Aroclor in the sample with that of the standard should provide assistance in determining which multi-peak pattern is a better match. In the case where two Aroclors provide an equal match due to "weathering", then the laboratory-reported result will be flagged as a tentative identification ("N") with an estimated concentration ("J") and it will be noted that the other Aroclor may be present. If an additional Aroclor appears to be present, the result will be calculated by the Quality Assurance/Data Validation Contractor and will be added to the data summary spreadsheets or Form I's.

(e) If any multicomponent analytes are detected in a sample, the Quality Assurance/Data Validation Contractor will evaluate the sample data for "positive" results for single peak pesticides which are attributable to the multipeak pattern of the multicomponent analyte(s). If any positive results for single peak pesticides were reported that are attributable to the multicomponent analyte, they will be qualified as unusable ("R"). If the Quality Assurance/Data Validation Contractor observes any positive results for single peak pesticides that are attributable to the presence of a multicomponent analyte which were not reported, the MDL/LOQs for the "not-detected" results will be qualified as biased ("UJ") if the positive result quantitates to a value greater than the MDL/LOQ but less

than 10 times the MDL/LOQ or qualified as unusable ("R") if the positive result quantitates to a value greater than 10 times the MDL/LOQ.

(f) If a chromatographic interference is observed by the Quality Assurance/ Data Validation Contractor during the expected RT of a target compound, the sample chromatogram and data system printout will be evaluated to determine if the compound could be detected at the MDL/LOQ by comparing the height of the interference in the sample chromatogram to the height of the compound in the associated low-level standard chromatogram. If the height of the peak for the compound in the sample chromatogram is less than or equal to 10 times the height of the peak for the compound in the standard (looking at the best column), the MDL/LOQ for the "not-detected" result for the compound will be flagged biased ("UJ") and if it is greater than 10 times, an analysis with a "not-detected" result for the compound will be flagged unusable ("R").

(g) If GC/MS was used to confirm if a compound is present or not in a sample, the Quality Assurance/Data Validation Contractor will evaluate the GC/MS data. Otherwise, the Quality Assurance/Data Validation Contractor will use professional judgment to assess whether the presence or absence could be determined by the analysis performed and qualify data accordingly if the presence was not confirmed.

J. Compound Quantitation and Reporting Limits

1. Evaluation Criteria

(a) All quantitations must be based on the initial multi-point calibrations. The higher result from the two analytical columns was required to be reported as the sample result. Individual compound concentrations must be greater than the MDL or LOQ (depending on reporting conventions) on both columns to be reported as a positive result.

(b) The %RPD between the results for a compound on the two analytical columns should be less than or equal to 40% or < 2 times the LOQ for there to be no impact on data usability.

(c) All positive results were required to be quantitated from instrument

levels which are within the calibration range of the instrument.

2. Actions

(a) If both results are greater than five times the LOQ and the %RPD between the results for a compound quantitated from the two analytical columns is $> 40\%$ and $\leq 80\%$, the positive result will be flagged "J" by the Quality Assurance/Data Validation Contractor. If at least one result is less than 5 times the LOQ and the difference between the results for a compound quantitated from the two analytical columns is $>$ 2 times the LOQ and $\leq$ 4 times the LOQ, the positive result will be flagged "J" by the Quality Assurance/Data Validation Contractor. An exception may be made if the reported result meets all criteria and there is reason to believe that the alternate column concentration may be biased.

(b) If both results are greater than 5 times the LOQ and the RPD between the results for a compound quantitated from the two analytical columns is $> 80\%$ and $\leq 120\%$, the positive results will be flagged "JN" by the Quality Assurance/Data Validation Contractor. If at least one of the results is less than 5 times the LOQ and the difference between the results for a compound quantitated from the two analytical columns is $>$ 4 times the LOQ and $\leq$ 8 times the LOQ, the positive results will be flagged "JN" by the Quality Assurance/Data Validation Contractor. An exception may be made if the reported result meets all criteria and there is reason to believe that the alternate column concentration may be biased.

(c) If both results are greater than 5 times the LOQ and the RPD between the results for a compound quantitated for the two analytical columns is $> 120\%$, the positive result will be flagged "R" by the Quality Assurance/Data Validation Contractor. If at least one result is less than 5 times the LOQ and the difference between the results for a compound quantitated from the two analytical columns is $>$ 8 times the LOQ, the positive result will be flagged "R" by the Quality Assurance/Data Validation Contractor. An exception may be made if the reported result meets all criteria and there is no reason to believe that the alternate column concentration may be biased.

(d) Positive results reported at concentrations based on instrument levels

greater than the calibration range of the instrument will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will also indicate within the qualifier whether the sample was properly diluted and reanalyzed.

K. Field Duplicates

1. Evaluation Criteria

   (a) The RPD between the results in aqueous field duplicates should be less than or equal to 20% for results greater than 5 times the LOQ. The difference between results in aqueous field duplicates should be less than the LOQ when at least one results is less than the 5 times the LOQ.

   (b) The RPD between the results in soil field duplicates should be less than or equal to 40% for results greater than 5 times the LOQ. The difference between results in soil field duplicates should be less than 2 times the LOQ when at least one results is less than the 5 times the LOQ.

   (c) A value of the MDL or LOQ (depending on reporting conventions being used) will be used for a "not-detected" result for comparison only.

2. Action

   If the results for any compounds do not meet the above criteria, the positive results will be flagged "J" by the Quality Assurance/Data Validation Contractor.

L. Overall Assessment of the Data

If any problems or situations are uncovered in the data review that are not method compliance in nature but are deemed noteworthy by the Quality Assurance/Data Validation Contractor, a comment will be included in the QAR. In addition, the overall assessment for the data will be included in the conclusions of the QAR.

4.3 DISTRIBUTION

The Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

5.0 TRAINING

All data validation chemists must be trained in the proper methods of organochlorine pesticide/PCB analysis qualification as determined by the Quality Assurance/Data Validation Contractor's Data Validation Task Manager.

6.0 DOCUMENTATION

The results of the data validation review will be documented in a QAR as described in SOP DV-GEN-02 - "Preparation of Written Quality Assurance Reviews to Report Data Validation Results."

DUPONT
STANDARD OPERATING PROCEDURE
FOR VALIDATION OF
SEMIVOLATILE ORGANIC COMPOUND
RESULTS GENERATED BY
SW-846 METHOD 8270C

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that the DuPont Quality Assurance/Data Validation Contractor will use to validate semivolatile organic data. Validation will be performed to assess the compliance of the sample data to the preparation SOPs and to the analytical SOP for analysis according to SW-846 Method 8270C. In addition, the usability of the semivolatile organic data provided by the project laboratories for the project will be determined based on the general guidance provided in the National Functional Guidelines for Organic Data Review. It should be mentioned that this guidance applies strictly to data generated by Contract Laboratory Program (CLP) protocol. As such, it is not directly applicable to validation of data generated by SW-846 Method 8270C. Therefore, this SOP presents the specific data qualification actions that will be used for the DuPont project.

The validation findings will be presented in a quality assurance review (QAR), which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG as per SOP DV-GEN-02. Copies of annotated analytical results summaries (Form I's), including any changes to the analytical results and all data qualifier codes, or a data summary spreadsheet of the qualified analytical results will be included in the QAR. This SOP applies to the Quality Assurance/Data Validation Contractor for the DuPont project.

2.0 EQUIPMENT

Not Applicable.

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994)

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

SOP DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Project Analytical SOP for Analysis of Semivolatiles by SW-846 Method 8270C and relevant preparation and cleanup SOPs

4.0 PROCEDURE

4.1 DETERMINATION OF METHOD COMPLIANCE

The Quality Assurance/Data Validation Contractor will assess the method compliance of the semivolatile organic data based on an evaluation of information presented in the data package deliverables. Compliance to the preparation and analytical SOPs for analysis according to SW-846 Method 8270C will be evaluated as part of the assessment. In addition, the deliverables will be evaluated for reporting errors and inconsistencies. The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Organic Data Evaluation" section of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal

of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

4.2 DETERMINATION OF DATA USABILITY

The Quality Assurance/Data Validation Contractor will determine the usability of the semivolatile organic data based on an evaluation of the information presented in data package deliverables. The findings of the semivolatile organic data usability assessment will be described in terms of certain qualifications of the data that should be considered in order for the project team to best utilize the data. These qualifications will be presented in the "Organic Data Qualifier" subsection of the "Organic Data Evaluation" section of the QAR, as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) has been flagged with representative qualifier code(s) on the data summary spreadsheets or Form I's to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The qualifier codes and the hierarchy of these qualifier codes are presented in SOP DV-GEN-01.

The Quality Assurance/Data Validation Contractor criteria used for evaluating the usability of the semivolatile organic data and the resultant qualifications will be as follows:

A. Holding Times

1. Evaluation Criteria

   (a) The extraction of aqueous samples was required to be performed within seven days of the date of sample collection.

   (b) The extraction of solid samples was required to be performed within 14 days of the date of sample collection.

   (c) The analysis of sample extracts was required to be performed within 40 days of the date of extraction.

2. Actions

   If any criterion is exceeded, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = method detection limit [MDL]/limit of quantitation [LOQ] is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Exceeded Holding Times			
Holding Time for:	Days Beyond Collection/ Extraction	Positive Result(s)	"Not-Detected" Result(s)
Aqueous Sample Extraction	8-14 days > 14 days	"J" "J"	"UJ" "R"
Solid Sample Extraction	15-28 days > 28 days	"J" "J"	"UJ" "R"
Extract Injection	41-80 days > 80 days	"J" "J"	"UJ" "R"

B. Condition of Samples Upon Receipt at the Laboratory

1. Evaluation Criteria

(a) The laboratory was required to record any observations concerning the condition of the samples upon receipt at the laboratory (i.e., sample vials/containers cracked, etc.) on the Chain-of-Custody records.

(b) The laboratory was required to record the temperature of the sample coolers (based upon the temperature of the temperature bottle blank) upon receipt at the laboratory on the Chain-of-Custody records or in a separate logbook. The temperature of the sample coolers was required to be maintained at 4°C ± 2°C. However, the Quality Assurance/Data Validation Contractor will not consider there to be a direct impact on the usability of the data unless the temperature is greater than 20°C.

2. Actions

(a) If observations such as cracked containers were noted on the Chain-of-Custody records, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that these issue(s) may lead to a loss of analyte. Professional judgment will be used to determine if the severity of the problem warrants qualification.

(b) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 6°C, a noncorrectable deficiency will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that elevated temperatures may lead to a loss of analyte. However, if the temperature is less than or equal to 20°C, the noncorrectable deficiency will also note that in the opinion of the Quality Assurance/Data Validation Contractor, data should not be impacted due to the stability and chemical properties (i.e., vapor pressure, boiling point, etc.) of the semivolatile organic compounds at temperatures less than or equal to 20°C.

(c) If the temperature of the temperature bottle upon receipt at the laboratory was greater than 20°C, positive results for all semivolatile target compounds will be flagged "J" and "not-detected" results will be flagged "UJ" by the Quality Assurance/Data Validation Contractor in samples associated with that temperature bottle.

C. GC/MS Instrument Performance

1. Evaluation Criteria

(a) The GC/MS system(s) was required to be monitored at the beginning of each 12-hour period during which standards, blanks or samples were analyzed by the analysis of the tuning solution, decafluorotriphenyl-phosphine (DFTPP). The GC/MS tune must have met the following ion abundance criteria for DFTPP:

m/z	Ion Abundance Criteria
51	30-60% of m/z 198
68	<2% of m/z 69
70	<2% of m/z 69
127	40 - 60% of m/z 198
197	<1% of m/z 198
198	Base peak, 100% relative abundance
199	5 - 9% of m/z 198

m/z	Ion Abundance Criteria
275	10 - 30% of m/z 198
365	>1% of m/z 198
441	Present, but < m/z 443
442	>40% of m/z 198
443	17 - 23% of m/z 442

However, the most important factors to consider are the empirical results that are relatively insensitive to location on the chromatographic profile and the type of instrumentation. Therefore, the critical ion abundance criteria for DFTPP are the m/z 198/199 and 442/443 ratios, which are based on the natural abundances of carbon 12 and carbon 13 and should always be met. Similarly, the relative abundances for m/z 68, 70, 197, and 441 indicate the condition of the instrument and the suitability of the resolution adjustment and are very important. For the ions at m/z 51, 127 and 275, the relative abundances are not as critical. The relative abundance of m/z 365 is an indicator of suitable instrument zero adjustment. If the relative abundance of m/z 365 is zero, minimum detection limits may be affected. On the other hand, if m/z 365 is present, but less than the minimum abundance criteria, the deficiency is not as serious.

The Quality Assurance/Data Validation Contractor will consider there to be no direct impact on the usability of the data if the ion abundance criteria fall within an expanded window of -25% of the low limit and +25% of the high limit for selected ions. The complete expanded criteria for DFTPP are as follows:

m/z	Expanded Ion Abundance Criteria
51	22-75 of m/z 198
68	< 2% of m/z 69
70	<2% of m/z 69
127	30-75% of m/z 198

m/z	Expanded Ion Abundance Criteria
197	<1% of m/z 198
198	base peak, 100% relative abundance
199	5-9% of m/z 198
275	7-37% of m/z 198
365	>0.75% of m/z 198
441	present, but less than m/z 443
442	>30% of m/z 198
443	17-23% of m/z 442

(b) All standards, blanks, samples, matrix spikes/matrix spike duplicates (MS/MSDs) and laboratory control samples (LCSs) were required to be injected within a 12-hour period after the injection of an acceptable DFTPP tune.

2. Actions

(a) If a mass calibration is in error (i.e., not performed), all associated data will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(b) Results falling outside of the expanded criteria will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(c) If the time elapsed between the injection of the DFTPP tune and the injection of the sample was greater than 12 hours but less than 18 hours, no qualification of data will be warranted.

(d) If the time elapsed between the injection of the DFTPP tune and the injection of the sample was greater than or equal to 18 hours, all associated data will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor. However, professional judgment will be used to qualify data if an acceptable DFTPP tune was verified to be analyzed after the analysis of the sample.

D. Initial Calibrations

1. Evaluation Criteria

(a) For all target and surrogate compounds, a five-point internal standard calibration was required before the analyses of blanks, samples, and/or quality control (QC) were initiated or as necessary if the continuing calibration acceptance criteria (discussed in Section 4.2.E of this SOP) are not met.

(b) Individual standard relative response factors (RRFs), average RRFs, and percent relative standard deviations (%RSDs) for every target compound were required to be calculated and reported by the laboratory. The individual RRFs should be greater than or equal to 0.05 and the %RSDs should be less than or equal to 15% in order to rule out any potential impact on data usability. If the %RSD is >15%, the laboratory must use a calibration curve (first- or second-degree). The correlation coefficient of the calibration curve must be 0.99 or greater in order to rule out any potential impact on data usability.

2. Actions

(a) If any individual RRF of any target compound in the five-point initial calibrations was less than 0.05, the Quality Assurance/Data Validation Contractor will use professional judgment will be to determine whether positive results for that compound in associated samples should be qualified as estimated ("J") and whether "not-detected" results should be qualified as unusable ("R"). The following guidance should be used along with professional judgement.

For positive results, professional judgment will be based on an assessment of the accuracy in using the calibration curve or average RRF generated from the initial calibration for quantitation (see subsequent Actions [b] and [c]).

For "not-detected" results, professional judgment will be based on the acceptability of the response for the individual compound, not relative to the internal standard, at standard concentrations near that compounds MDL (or LOQ if results are not reported below the LOQ).

Often, compounds which have poor response at low concentrations have higher than typical MDLs and LOQs and are spiked at higher concentrations in the initial calibration to account for this. If the area response for that individual compound in initial calibration standards near (within 2×) or below that MDL (or LOQ if the MDL is not applicable) is comparable to other individual compounds spiked at lower concentrations with acceptable RRFs, no qualification of "not-detected" results will be necessary. In addition, if initial calibration standards near (within 2×) or below that MDL (or LOQ if the MDL is not applicable) do not require manual integration of the spectrum by the analyst, no qualification of "not-detected" results will typically be necessary (for this to apply, it is important that a generally stable, predictable response is observed for the compound). If the response for the individual compound in initial calibration standards near (within 2×) the MDL (or LOQ) is deemed not acceptable (i.e. a very low response is observed at the MDL or LOQ or the peak was not automatically detected by laboratory software and required manual integration by analyst), or if there are no initial calibration standards near the MDL (or LOQ), the Quality Assurance/Data Validation Contractor may raise the MDL and LOQ for that compound in associated samples to a concentration level which does demonstrate acceptable response based on the initial calibration standards (and/or other quality control standards) or qualify associated "not-detected" results as unusable ("R"), based on professional judgment.

(b) If the %RSD between the RRFs for any compound in the five-point initial calibrations was greater than 15% or the correlation coefficient is less than 0.99, all positive results for that compound in associated samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the %RSD between the RRFs for any compound in the five-point initial calibrations was greater than 90% or the correlation coefficient was less than 0.85, all positive results for that compound in associated

samples will be qualified as estimated ("J") and "not-detected" results will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(d) If the laboratory did not analyze low-level solid samples with the use of a heated purge, all positive results will be qualified as estimated ("J") and the MDL/LOQs for all "not-detected" results will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor.

E. Continuing Calibrations

1. Evaluation Criteria

(a) As a check of instrument stability and performance on a daily basis, the analysis of a calibration standard was required following the analysis of an acceptable DFTPP tune and before the analysis of blanks, samples, matrix spikes, and laboratory control samples of each 12-hour period from the injection of DFTPP.

(b) RRFs and percent drifts (%Ds) for every target compound were required to be calculated and reported by the laboratory. The RRFs should be greater than or equal to 0.05 and the %Ds should be less than or equal to 20% for there to be no potential impact on data usability.

2. Actions

(a) If the daily RRF of any target compound in the continuing calibrations was less than 0.05, the Quality Assurance/Data Validation Contractor will use professional judgment to determine if positive results for that compound in associated samples should be flagged "J" and all "not-detected" results should be qualified as unusable ("R"). The following guidance should be used along with professional judgement.

For positive results, professional judgment will be based on the stability of the instrument at the time of analysis relative to the time that the initial calibration was performed (see subsequent Actions [b], [c], and [d]).

For "not-detected" results, professional judgment will be based on the acceptability of the response for the individual compound, not relative to the internal standard, at standard concentrations near the MDL (or LOQ, if the MDL is not applicable) in the initial calibration (see Action [a] under Section D, Initial Calibrations) if the %D is ≤20% (demonstrating that the instrument sensitivity is stable relative to the initial calibration) or if the %D is greater than 20% but in the direction of an increase in instrument sensitivity (demonstrating that the instrument sensitivity has increased relative to the initial calibration).

If the %D is greater than 20% and in the direction of a decrease in instrument sensitivity (demonstrating that the instrument sensitivity has changed relative to the initial calibration) and a standard at a concentration near (within 2×) or below the MDL (or LOQ, if the MDL is not applicable) was analyzed as part of the continuing calibration and the response for the compound in this standard is deemed acceptable by the criteria used for the initial calibration (see Action [a] under Section D, Initial Calibrations), no qualification of "not-detected" results will be necessary. If the response for the compound in the continuing calibration standard is deemed not acceptable and the %D is greater than 20%, the Quality Assurance/Data Validation Contractor will qualify associated "not-detected" results as unusable ("R") unless professional judgment dictates otherwise.

If the %D is greater than 20%, in the direction of a decrease in instrument sensitivity, and the continuing calibration standard is at a concentration greater than 2× the MDL (or LOQ, if the MDL is not applicable), the Quality Assurance/Data Validation Contractor will consider the extent to which the response representative of the MDL (or LOQ, if the MDL is not applicable) in the initial calibration would be expected to decrease based on the %D. Based on this determination, the Quality Assurance/Data Validation Contractor will not qualify the result if this adjusted response is acceptable or may raise the MDL for that compound in the associated samples to a concetration level that is based on professional judgement.

(b) If the %D of any target compound in the continuing calibration was greater than 20%, all positive results for that compound in associated

samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the %D of any compound in the continuing calibrations was greater than 20%, (regardless of instrument response direction), MDL/LOQs for all associated "not-detected" results will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor. If MDL/LOQs are qualified as biased for high %D(s), the Quality Assurance/Data Validation Contractor will note within the qualifier whether the %D was in a direction of a decrease or increase in instrument sensitivity. If the %D is in a direction of an increase in instrument sensitivity, the Quality Assurance/Data Validation Contractor will also indicate that for a sensitivity increase, the MDL/LOQs may be acceptable as reported by the laboratory.

(d) If the %D of any compound in the continuing calibrations was greater than 90% (regardless of instrument response direction), all positive results for that compound in associated samples will be qualified as estimated ("J") and the MDL/LOQs for all associated "not-detected" results will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

F. Blanks

1. Evaluation Criteria

(a) The preparation and analysis of a laboratory method blank was required for every 20 samples of a similar matrix and/or every time samples were extracted, whichever is more frequent.

(b) The collection of equipment blanks may be required for most sampling events. The applicable workplan or sampling plan will be consulted for the required collection frequency and applicability.

(c) Positive results for the target compounds or Tentatively Identified Compounds (TICs) (if required) should not be observed for any blank in order to rule out a possible impact on data usability.

(d) The recovery of all surrogates must have met the criteria specified in Section 4.2.G of this SOP in order to indicate that the associated analyses were properly performed and to accurately reflect possible laboratory contamination.

2. Actions

(a) If a target compound was found in a blank but not in the sample, no action will be taken by the Quality Assurance/Data Validation Contractor. However, if a class of contaminants (e.g., polyaromatic hydrocarbons) was detected in equipment blanks but not in the samples, a comment addressing this issue will be written in the QAR by the Quality Assurance/Data Validation Contractor.

(b) If a target compound was detected in a sample and in any associated blank, the positive sample result will be qualified by the Quality Assurance/Data Validation Contractor as outlined below.

In instances where more than one blank was associated with a given sample, qualification by the Quality Assurance/Data Validation Contractor will be based upon a comparison of the sample results to the associated blank having the highest concentration of a contaminant.

The laboratory method blanks will be used by the Quality Assurance/Data Validation Contractor to flag all samples similar to the method blank matrix in the SDG. The Quality Assurance/Data Validation Contractor will use the results of an equipment blank to flag all samples collected on the same day (unless only one was collected for a several-day sampling event; results of the equipment blank will then be applied to all applicable samples in the SDG).

(c) If a phthalate ester was detected in sample(s) and in an associated blank, this contaminant in the sample(s) will be flagged by the Quality Assurance/Data Validation Contractor using the 10 times rule as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

Qualification by the 10 Times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 10 times the Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 10 times the Blank Concentration	No Qualification of Data is Needed

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors will be taken into consideration when applying the "10 times" criterion for laboratory method and storage blanks. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(d) If a target compound other than a phthalate ester was detected in sample(s) and in an associated blank, the positive results for the contaminant will be qualified according to the 5 times rule by the Quality Assurance/Data Validation Contractor as shown in the following table. The values of positive results flagged "U" according to the following table should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

Qualification by the 5 Times Rule* for Blank Contamination	
If:	Then:
Sample Concentration ≤ 5 times the Blank Concentration	Flag Sample Result with a "U"
Sample Concentration > 5 times the Blank Concentration	No Qualification of Data is Needed

* It should be noted that blanks may not involve the same weights, volumes, dilution factors and/or dry-weight correction factors as the associated samples. These factors will be taken into consideration when applying the "5 times" criterion for laboratory method and storage blanks. This is generally best accomplished by directly comparing the concentrations at the instrument levels.

(e) If phthalate esters were reported in samples but were not present in any of the blanks (even at unreported trace-levels), or the blank level is not high enough to flag results "U," the Quality Assurance/Data Validation Contractor will discount, in narrative only, the presence of these compounds in samples if the pattern of contamination in the sample does not substantiate the presence of the compound.

(f) TIC result (when requested as per the Chain-of-Custody records) found in both a sample and associated blank(s) will also be qualified. (See Section 4.2.L of this SOP to determine data qualification.)

G. Surrogates

1. Evaluation Criteria

(a) All standards, blanks, samples, MS/MSDs, and LCSs were required to be spiked with the surrogate compounds specified in the agency-approved laboratory analytical SOP (or analytical method if an agency-approved SOP is not available).

(b) Percent recoveries for all six surrogates were to be calculated and reported for each sample, blank, MS/MSD, and LCS, and these must have been within the laboratory specified limits (unless the sample or MS was diluted beyond a five-fold dilution). If the recoveries of at least two surrogates per fraction (acid and/or base/neutral) were outside of the specified limit for a sample or if any surrogate recovery was $<10\%$, the sample was required to have been reextracted and reanalyzed. If the recoveries for the surrogates were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any recovery for the surrogates was outside QC limits upon reanalysis (or if the reanalysis failed any other method criteria), both analyses were required to be reported by the laboratory.

2. Actions

(a) The surrogate recovery limits do not apply to samples analyzed at a dilution. However, the surrogates should at least be detected if the sample was analyzed at a five-fold dilution or less. No qualification of

the data will be necessary if the surrogate is diluted beyond detection. Generally, a greater than five-fold dilution will affect the ability to even detect the surrogate. If a sample was analyzed at a five-fold dilution or less and two or more surrogates of the acid and/or base/neutral fractions were not detected in the sample, the Quality Assurance/Data Validation Contractor will qualify positive results as estimated ("J") and "not-detected" results as biased ("UJ") for the particular fraction. Data qualification by the Quality Assurance/Data Validation Contractor due to an unacceptable surrogate recovery will not be necessary if a greater than five-fold dilution was performed on a sample. However, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the issue that sample-specific method performance based on surrogate recoveries could not be evaluated due to the necessary dilution performed on the sample.

(b) Data will be qualified by the Quality Assurance/Data Validation Contractor based on surrogate results if the recoveries of at least two semivolatile surrogates per fraction were outside of criteria specification or if any one surrogate recovery was less than 10%. The Quality Assurance/Data Validation Contractor will note whether the poor recoveries were probably due to sample matrix effects or laboratory inefficiencies based on whether the original extractions/analyses and reextractions/reanalyses demonstrated similar trends. Data qualification by the Quality Assurance/Data Validation Contractor will apply to all semivolatile target compounds of a fraction in a sample as summarized below.

- If the percent recovery of at least two acid surrogate compounds were greater than the upper control limit, the positive results for all semivolatile acid compounds will be flagged "J." "Not-detected" results will not be qualified.

- If the percent recovery of at least two base/neutral surrogate compounds were greater than the upper control limit, the positive results for all semivolatile base/neutral compounds will be flagged "J." "Not-detected" results will not be qualified.

- If the percent recovery of at least two acid surrogate compounds were less than the lower control limit but greater than or equal to

10%, the positive results for all semivolatile acid compounds will be flagged "J" and the "not-detected" results for all semivolatile acid target compounds will be flagged "UJ."

- If the percent recovery of at least two base/neutral surrogate compounds were less than the lower control limit but greater than or equal to 10%, the positive results for all semivolatile base/neutral compounds will be flagged "J" and the "not-detected" results for all semivolatile base/neutral target compounds will be flagged "UJ."

- If the percent recovery of any one surrogate compound in a fraction was less than 10%, the positive results for all semivolatile compounds in that fraction will be flagged "J" and the "not-detected" results for all semivolatile target compounds in that fraction will be flagged "R."

H. Matrix Spike/Matrix Spike Duplicates and Laboratory Control Samples

1. Evaluation Criteria

(a) The preparation and analysis of a MS and an MSD of a project sample was required for every 20 samples of a similar matrix. All semivolatile organic target compounds were required in each spike.

(b) The MS/MSD results were required to be quantitated in the same manner as samples. All MS/MSD compound recoveries should be within the data usability limits of 50-135% recovery in order to have no effect on data usability. The relative percent differences (RPDs) between the results for each compound in the MS and MSD should be less than or equal to 20% for aqueous samples and less than or equal to 40% for soil samples in order to have no effect on data usability.

(c) The preparation of an LCS was required for every 20 samples of a similar matrix and/or every time samples are extracted, whichever was more frequent. The laboratory may also prepare a laboratory control sample duplicate (LCSD).

(d) The LCS/LCSD results were required to be quantitated in the same manner as samples. The LCS/LCSD analyses were required to meet the specified QC limits. If the LCS/LCSD did not meet the recovery criteria, all associated samples were required to be reextracted and reanalyzed. However, all LCS/LCSD spike compound recoveries should be within the data usability limits of 50-135% in order to have no effect on data usability.

2. Actions

(a) If the recovery for any compound did not meet the limits of 50-135% in the MS and/or MSD analyses, the result for that compound in the unspiked sample only will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor MS/MSD Recoveries		
If Percent Recovery:	Flag Positive Result:	Flag "Not-Detected Result:"
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

(b) If the RPD between the results for any compound in the MS and MSD exceeded 20% for aqueous samples or 40% for solid samples, positive results for that compound **in the unspiked sample only** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the recovery for any compound does not meet the limits of 50-135% in the LCS and/or LCSD analyses, the results for that compound in **all associated samples** will be qualified by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification Due to Poor LCS Recoveries		
If Percent Recovery (%R):	Flag Positive Results:	Flag "Not-detected" Results:
Percent Recovery < 10%	"J"	"R"
10% ≤ Percent Recovery < 50%	"J"	"UJ"
Percent Recovery > 135%	"J"	No Qualification

(d) If the RPD between the results for any compound in the MS and MSD exceeded 20% for aqueous samples or 40% for solid samples, positive results for that compound in **all associated samples** will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

I. Internal Standards

1. Evaluation Criteria

(a) All standards, blanks, samples, MS/MSDs and LCSs were required to be spiked with internal standard compounds 1,4-dichlorobenzene-d_4, naphthalene-d_8, acenaphthene-d_{10}, phenanthrene-d_{10}, chrysene-d_{12} and perylene-d_{12}.

(b) Extracted ion current profiles (EICPs) of all six internal standards were required to be reported for each sample, blank, MS/MSD, and LCS. Area abundances of the internal standards must not vary by more than a factor of 2 (-50% to +100%) from the internal standard area abundance of the associated continuing calibration standard for all blanks, samples, and LCSs. If this criterion was not met, the sample extract should have been reanalyzed or diluted and reanalyzed. If the internal standard areas were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any internal standard area was outside QC limits upon reanalysis (or if the reanalysis failed any other method criteria), both analyses were required to be reported by the laboratory.

(c) The retention times all three internal standards were required to be reported for each sample, blank, MS/MSD, and LCS. Retention times of the internal standards must not vary more than ± 30 seconds from the retention times of the internal standards in the associated continuing calibration standard. If the retention times for the internal standards were inside QC limits upon reanalysis (and the reanalysis met all other method criteria), only the reanalysis was required to be reported. If any retention time for the internal standards was outside QC limits upon reanalysis (or if the reanalysis failed any other method criteria), both analyses were required to be reported by the laboratory.

2. Actions

(a) If the area abundance for any internal standard in a sample was outside -50% or +100% of the area abundance for the same internal standard in the associated continuing calibration standard, positive results for those semivolatile target compounds quantitated using this internal standard will be qualified "J" and "not-detected" results for those semivolatile target compounds quantitated using this internal standard (refer to the analytical SOP) will be qualified "UJ" by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will note whether the poor internal standard areas were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

(b) If the area abundance for any internal standard in a sample was <25% of the area abundance for the same internal standard in the associated continuing calibration standard, positive results for those semivolatile target compounds quantitated using this internal standard will be qualified "J" and "not-detected" results for those semivolatile target compounds quantitated using this internal standard (refer to the analytical SOP) will be qualified "R" by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will note whether the poor internal standard areas were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

(c) If the internal standard retention time varied by more than 30 seconds from the retention time of the same internal standard in the associated continuing calibration standard, professional judgment will be used by the Quality Assurance/Data Validation Contractor to assess data quality. For example, if peaks were not observed in the sample chromatogram, data will not be qualified. However, if peaks are observed in the sample chromatogram and shifts of a large magnitude are observed, rejection of data may be warranted as determined by professional judgment. The Quality Assurance/Data Validation Contractor will note whether the poor retention time matches were probably due to sample matrix effects or laboratory inefficiencies based on whether the original analyses and reanalyses demonstrated similar trends.

J. Target Compound Identification

1. Evaluation Criteria

(a) Based on a comparison of the sample mass spectrum to a current laboratory-generated standard mass spectrum, the laboratory was required to report the presence of semivolatile target compounds according to the following qualitative criteria:

- All ions present in the standard mass spectrum at a relative intensity greater than 10% of the base ion must be present in the sample spectrum.

- The relative intensities of these ions must agree within ± 20% between the standard and sample spectra.

- Ions present at greater than 10% relative intensity in the sample mass spectrum but not present in the standard spectrum must be considered and accounted for.

(b) The relative retention time (RRT) of the target compound in the sample must be within ± 0.06 RRT units of the RRT of the target compound in the associated continuing calibration standard.

2. Actions

(a) If the RRT criterion for the reported positive result for a compound was greatly exceeded and there was no match for the primary and secondary ions in the mass spectrum provided, then the reported result will be qualified as "not-detected" ("U") by the Quality Assurance/Data Validation Contractor.

(b) If the RRT criterion for the reported "not-detected" result for a compound was met and an acceptable mass spectrum was provided, then the positive result for that compound will be added by the Quality Assurance/Data Validation Contractor.

(c) If the RRT criterion for the reported positive result for a compound was not met but a good mass spectral match was observed, the data will not be qualified; however, it will be noted in the QAR that the RRT criterion was not met.

(d) If the RRT criterion for the reported compound was met but a poor mass spectral match (i.e., primary and/or secondary ions missing) was observed, then the reported positive result will be qualified as "R" by the Quality Assurance/Data Validation Contractor.

(e) If the RRT criterion was not met and if a questionable mass spectral match (i.e., interference from coeluting compound or poor ion relative intensity) is provided, then the reported result will be qualified as presumptively present ("N") by the Quality Assurance/Data Validation Contractor.

K. Compound Quantitation and Reporting Limits

1. Evaluation Criteria

(a) Compound quantitation was required to be calculated according to the internal standard method.

(b) The quantitation of positive results was to be based upon the RRF from the associated continuing calibration standard.

(c) The associated internal standard as defined in the analytical SOP was required to be used for the quantitation of positive results.

(d) The area of the primary characteristic mass ion as defined in the analytical SOP was required to be used in quantitation unless an interference was observed with this ion. If an interference was observed with the primary ion, the area of a secondary characteristic ion was to be used.

(e) All solid sample results were required to be reported on a dry-weight basis.

(f) The equations to be used for the calculation of concentrations of target analytes if a calibration curve is not being utilized are as follows. Otherwise, the calibration curve must be used for quantitation.
Water, Wastewater, and Water-Soluble Samples:

$$\text{Concentration } (\mu g/L) = \frac{(Ax)\ (Is)\ (Vt)\ (Df)}{(Ais)\ (RRF)\ (Vo)\ (Vi)}$$

Where:

Ax	=	Area of the quantitation ion peak for the compound to be measured
Ais	=	Area of the quantitation ion peak for the appropriate internal standard
Is	=	Amount of internal standard added in ngs
RRF	=	Average RRF from the associated initial calibration.
Vt	=	Volume of concentrated extract in µls
Vo	=	Initial Volume of sample extracted in mls
Vi	=	Volume of extract injected in µls
Df	=	Dilution factor

Low-Level Soil, Solid, and Water-Insoluble Samples:

$$\text{Concentration } (\mu g/Kg) = \frac{(Ax)\ (Is)\ (Vt)\ (G)\ (Df)}{(Ais)\ (RRF)\ (Ws)\ (Vi)\ [(100-M) / 100]}$$

Where:

Ax	=	Area of the quantitation ion peak for the compound to be measured
Ais	=	Area of the quantitation ion peak for the appropriate internal standard
Is	=	Amount of internal standard added in ngs
RRF	=	Average RRF from the associated initial calibration
Vt	=	Volume of concentrated extract in µls
Ws	=	Weight of the sample purged in grams
G	=	1 if the extract did not require gel permeation chromatography (GPC) cleanup
	=	2 if the extract required GPC cleanup
Vi	=	Volume of extract injected in µls
Df	=	Dilution factor
M	=	Percent moisture

(g) Concentrations quantitated at levels less than the LOQ but ≥ the MDL were required to be reported as estimated values ("J").

(h) All positive results were required to be quantitated from instrument levels which are below the concentrations of the highest calibration standard.

2. Actions

(a) If a positive result was not quantitated according to the correct equation, the Quality Assurance/Data Validation Contractor will report the result as requantitated from the correct equation (unless a significant number of miscalculation errors are observed).

(b) Positive results reported at concentrations less than the sample-specific LOQ will be qualified as estimated ("J") by the Quality Assurance/ Data Validation Contractor.

(c) Positive results associated with on-column concentrations greater than the concentration of the highest calibration standard will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. The Quality Assurance/Data Validation Contractor will also indicate within the qualifier whether the sample was properly diluted and reanalyzed as required.

L. Tentatively Identified Compounds (TICs) (ONLY when requested on the Chain-of-Custody Records)

1. Evaluation Criteria

(a) If TIC analyses were requested on the Chain-of-Custody records, the laboratory was required to conduct, for each sample, a mass spectral search of the National Institute for Standards and Technology (NIST) library and to report the possible identity of the 20 largest peaks which are not surrogates, internal standards or target compounds of the GC/MS volatile or semivolatile fractions, but which have an area greater than 10% of the area of the nearest internal standard. Results for these TIC results were required to be calculated and reported for each sample.

(b) Based on a comparison of the sample mass spectrum to the library-generated reference mass spectrum, the laboratory was required to report the tentative identity of TICs according to the following qualitative criteria:

- Major ions (greater than 10% relative intensity) in the reference spectrum should be present in the sample spectrum.

- The relative intensities of the major ions should agree within 20% between the sample and the reference spectra.

- Molecular ions present in the reference spectrum should be present in the sample spectrum.

- If a valid identification could not be made, the compound should have been reported as an "unknown," or if there is a lack of specificity, the result should have been reported as a class of compound (e.g., "unknown aromatic"), if possible.

(c) The quantitation of positive results was required to be based upon a RRF of 1.0.

(d) The closest internal standard was required to be used for the quantitation of TICs.

(e) The total peak areas of the TIC and of the internal standard were required to be used in the quantitation of TIC results.

2. Actions

(a) Upon examining the mass spectral library searches provided, the Quality Assurance/Data Validation Contractor will report the identification of the TIC based on professional judgment if the identification reported by the laboratory is found to be unacceptable.

(b) If the same TIC was detected in a sample and in an associated blank, the Quality Assurance/Data Validation Contractor will report the TIC as a "Blank Contaminant" and flag the result "R". The Quality Assurance/Data Validation Contractor will not report TICs found in both the field blanks and in the method blank as "Blank Contaminants" in the field blanks.

(c) When a TIC is detected in a sample but is not detected in any blanks and is a suspected artifact of the analysis, the TIC will be reported as a "Laboratory Artifact" and flagged "R" by the Quality Assurance/Data Validation Contractor. "Laboratory Artifacts" reported as TICs in field blanks will also be reported as "Laboratory Artifacts" and flagged "R"

by the Quality Assurance/Data Validation Contractor. Some examples of common laboratory contaminants/artifacts are as follows:

- Common laboratory contaminants: CO_2 (m/z 44), siloxanes (m/z 73), hexane, certain freons (1,1,2-trichloro-1,2,2-trifluoroethane [m/z 101/103] or fluorotrichloromethane), phthalates (m/z 149), cyclohexane, cyclohexanone, cyclohexenone, cyclohexanol, cyclohexenol, chlorocyclohexene, chlorocyclohexanol, 4-hydroxy-4-methyl-2-pentanone, 4-methyl-2-penten-2-one and 5,5-dimethyl-2(5H)-furanone.

(d) TICs other than "Blank Contaminants" and "Laboratory Artifacts" will be qualified "NJ" by the Quality Assurance/Data Validation Contractor.

(e) The Quality Assurance/Data Validation Contractor will report results for all similar compounds in a sample as a total. A total concentration will be reported on the qualified TIC Form I's or data summary spreadsheet, followed by the number of peaks which contribute to the total concentration (in parentheses), and the proper qualifier code ("R" or "NJ"). For example, "Total Unknowns 150 (5) NJ."

M. Overall Assessment of the Data

If any problems or situations are uncovered in the data review that are not method compliance in nature but are deemed noteworthy by the Quality Assurance/Data Validation Contractor, a comment will be included in the QAR. In addition, the overall assessment of the data will be included in the conclusions of the QAR.

N. Field Duplicates

1. Evaluation Criteria

(a) The RPD between the results of aqueous field duplicates should be less than or equal to 20% for results greater than 5 times the LOQ. The difference between results in aqueous field duplicates should be less than the LOQ when at least one result is less than or equal to 5 times the LOQ

(b) The RPD between the results in soil field duplicates should be less than or equal to 40% for results greater than 5 times the LOQ. The

difference between results in soil field duplicates should be less than 2 times the LOQ when at least one result is less than or equal to 5 times the LOQ.

2. Action

If the result for any compound does not meet the above criteria, the positive result(s) for this compound in the field duplicate pair will be flagged "J" by the Quality Assurance/Data Validation Contractor.

4.3 DISTRIBUTION

The Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

5.0 TRAINING

All data validation chemists must be trained in the proper methods of semivolatile organic analysis data qualification as determined by the Quality Assurance/Data Validation Contractor's Data Validation Task Manager.

6.0 DOCUMENTATION

The results of the data validation review will be documented in a QAR as described in SOP DV-GEN-02 -- "Preparation of Written Quality Assurance Reviews to Report Data Validation Results."

DUPONT
STANDARD OPERATING PROCEDURE
FOR
VALIDATION OF METALS DATA
GENERATED BY SW-846 METHOD 6010B

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that the DuPont Quality Assurance/Data Validation Contractor will use to validate inductively coupled plasma (ICP) metals data. Validation will be performed to assess the compliance of the sample data to the laboratory preparation SOPs and analytical SOP for the analysis for metals by SW-846 Method 6010B. In addition, the usability of the metals data provided by the project laboratories will be determined based on the general guidance provided in the National Functional Guidelines for Inorganic Data Review. It should be mentioned that this guidance applies strictly to data generated by Contract Laboratory Program (CLP) protocol. As such, it is not directly applicable to validation of data generated by SW-846 Method 6010B. Therefore, this SOP presents the specific data qualification actions that will be used for the project.

The validation findings will be presented in a quality assurance review (QAR), which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG as per SOP DV-GEN-02. Copies of annotated analytical results summaries (Form I's), including any changes to the analytical results and all data qualifier codes, or a data summary spreadsheet of the qualified analysis reports will be included in the QAR. This SOP applies to the Quality Assurance/Data Validation Contractor for the project.

2.0 EQUIPMENT

Not Applicable.

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines of Inorganic Data Review (February 1994)

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

SOP DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Project Analytical SOP for Metals Analysis by SW-846 Method 6010B and related preparation SOPs

4.0 PROCEDURE

4.1 EVALUATION OF METHOD COMPLIANCE

The Quality Assurance/Data Validation Contractor will assess the method compliance of the ICP metals data based on an evaluation of information presented in the data package deliverables. Compliance to the laboratory SOP for analysis according to SW-846 Method 6010B will be evaluated as part of the assessment. In addition, the deliverables will be evaluated for reporting errors and inconsistencies. The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Inorganic Data Evaluation" section of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any certain aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

4.2 DETERMINATION OF DATA USABILITY

The Quality Assurance/Data Validation Contractor will determine the usability of the ICP metals data based on an evaluation of the information presented in data package deliverables. The findings of the metals data usability assessment will be described in terms of certain qualifications of the data that the project team should consider in order to best utilize the data. These qualifications will be presented in the "Inorganic Data Qualifier" subsection of the "Inorganic Data Evaluation" section of the QAR, as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) has been flagged with representative qualifier code(s) on the data summary spreadsheet or Form I's to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The qualifier codes and the hierarchy of these qualifier codes are presented in SOP DV-GEN-02.

The Quality Assurance/Data Validation Contractor's criteria for evaluating the usability of the ICP metals data and the resultant qualifications will be as follows:

A. Holding Times

1. Evaluation Criterion

   The analyses of samples of all matrices were required to be performed within 180 days of the dates of sample collection.

2. Action

   If any holding time criterion is exceeded, sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = method detection limit [MDL]/limit of quantitation [LOQ] is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification due to Exceeded Holding Times		
Days Beyond Sample Collection	Positive Results	"Not-Detected" Results
181-360 days	"J"	"UJ"
> 360 days	"J"	"R"

B. Condition of Samples Upon Receipt at the Laboratory

1. Evaluation Criteria

   (a) The laboratory was required to record any observations concerning the condition of the samples upon receipt at the laboratory (i.e., sample containers cracked, etc.) on the Chain-of-Custody records.

   (b) Aqueous samples were required to be preserved to pH < 2 with HNO_3.

2. Actions

   (a) If observations such as cracked containers were noted on the Chain-of-Custody records, a comment will be written in the QAR by the Quality Assurance/Data Validation Contractor addressing the fact that these issue(s) may lead to loss of analyte. Professional judgment will be used to determine if the severity of the problem warrants qualification.

   (b) If any preservation criterion is exceeded, aqueous sample results will be qualified ("R" = unusable, "J" = estimated, "UJ" = MDL/LOQ is biased) by the Quality Assurance/Data Validation Contractor according to the following table:

Qualification due to Improper Preservation		
pH	Positive Results	"Not-Detected" Results
> 2 but < 6	"J"	"UJ"
> 6	"J"	"R"

C. Calibration and Contract Required Detection Limit Standards (CRI)

1. Evaluation Criteria

   (a) ICP Instruments were required to have been calibrated each 24 hours and each time the instruments were set up.

(b) A blank and at least one standard was required to be used in establishing the analytical curve. Once the calibration was complete, the Contract Laboratories were required to reanalyze the high standard for each target element. The concentrations of each element must have not varied from their true values by more than 5% for sample analysis to begin.

(c) Initial and Continuing Calibration Verification (ICV and CCV, respectively):

i. ICV and CCV analysis results were required to fall within the control limits of 90-110% of their true value.

ii. An EPA certified standard or a second source reference material, other than the reference material used for calibration and at a different concentration (than the calibration points), must have been used for the ICV and must have been analyzed immediately following instrument calibration for each wavelength used for analysis.

iii. A concentration at or near the mid-point of the linear range was required to be used for the CCV and a CCV must be analyzed at the beginning and at the end of every sequence and every 10 analytical samples or every 2 hours, whichever was more frequent.

(d) To verify linearity near the CLP contract-required detection limits (CRDLs), the laboratory typically analyzes a CRI standard at the frequency stated in the analytical SOP. The recoveries of the CRI standards should be within the quality control limits of 85-115% to have no impact on data usability. True concentrations of the ICP analytes in the CRI standard are 2-times the CRDL as follows:

Analyte	CRI Concentration, mg/L
Antimony	120.0
Arsenic	20.0
Beryllium	10.0
Cadmium	10.0
Chromium	20.0
Cobalt	100.0

Analyte	CRI Concentration, mg/L
Copper	50.0
Lead	6.0
Manganese	30.0
Nickel	80.0
Selenium	10.0
Silver	20.0
Thallium	20.0
Vanadium	100.0
Zinc	40.0

2. Actions

(a) If the appropriate number of standards were not used for initial calibration or if the instrument was not calibrated daily and each time the instrument was set up, the data will be qualified as unusable ("R" and/or "UR") by the Quality Assurance/Data Validation Contractor.

(b) If any ICV/CCV recovery falls outside the acceptance windows, sample results will be qualified by the Quality Assurance/Data Validation Contractor according to the following guidance. The following qualification will be applicable to the samples preceding and the samples following the CCV out of criterion. If the ICV is out of criterion, the entire sequence will be qualified.

i. If the ICV/CCV recovery falls outside the acceptance windows but within the ranges of 75-89%, positive results will be qualified as estimated ("J") and the "not-detected" results will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor.

ii. If the ICV/CCV recovery is within the range of 111-125%, positive results will be qualified as estimated ("J") and "not-detected" results will be considered acceptable by the Quality Assurance/Data Validation Contractor.

iii. If the ICV/CCV recovery is $<75\%$, all positive and "not-detected" results for the associated analyses will be qualified as unusable ("R" and "UR," respectively) by the Quality

Assurance/Data Validation Contractor.

v. If the ICV/CCV recovery is >125%, positive results will be qualified as unusable ("R") and "not-detected" results will be considered acceptable by the Quality Assurance/Data Validation Contractor.

(c) If the recovery of the CRI standard for any analyte is outside of 85-115%, professional judgement must be used to determine whether the concentration of the CRI is applicable to the reported results (CRI concentration must be compared to the MDL or LOQ, depending on reporting conventions – the data validation task manager should be contacted for this determination). If the CRI standard is applicable, all results for the analyte outside criteria in the associated sample analyses will be qualified by the Quality Assurance/Data Validation Contractor according to the following guidance. The following qualification will be applicable to the sample analyses preceding and the sample analyses following the CRI standard out of the quality control limits up to the next CRI standard within the quality control limits.

i. If the recovery of the CRI standard is ≥ 50% but < 85%, positive results ≤ 3 times the CRDL and "not-detected" results with MDLs or LOQs (depending on reporting convention) ≤ 3 times the CRDL will be qualified as estimated ("J" and "UJ," respectively).

ii. If the recovery of the CRI standard is > 115% and ≤150%, positive results ≤ 3 times the CRDL will be qualified as estimated ("J").

iii. If the recovery of the CRI standard is <50%, positive results < 3 times the CRDL will be qualified as estimated ("J") and "not-detected" results with MDLs or LOQs (depending on reporting convention) ≤ 3 times the CRDL will be qualified as unusable ("R").

iv. If the recovery of the CRI standard is >150%, positive results less than or equal to 3 times the CRDL will be qualified as

unusable ("R") and positive results greater than 3 times the CRDL and less than or equal to 5 times the CRDL will be qualified as estimated ("J").

D. Blanks

1. Evaluation Criteria

(a) A preparation blank, consisting of deionized water processed through each sample preparation and analysis procedure, was required to have been prepared and analyzed for each matrix, for each quality control (QC) batch of ≤ 20 samples digested, or for each time samples in a QC batch are digested, whichever was more frequent.

(b) Initial and continuing calibration blanks (ICB and CCB, respectively) were required to have been analyzed after every ICV and CCV at a frequency of every 10 samples or every 2 hours, whichever was greater, and before and after samples were analyzed.

(c) The collection of an equipment blank was at the frequency specified in the project-specific workplan or QAPP.

(d) Any method, calibration, or equipment blank analysis with a magnitude (absolute value) greater than the instrument detection limit (IDL) for any analyte could impact data.

2. Actions for Blanks with Positive Concentrations of Target Compounds

(a) The results of all laboratory preparation blanks of similar matrix will be used to apply to all samples of the same matrix in an SDG.

(b) The results of all initial calibration blanks and continuing calibration will be applied to all samples in the SDG. Note that the laboratory frequently separates aqueous and solid samples into different SDGs. In that case, calibration blanks are not cross-applied to both aqueous and solid sample analyses.

(c) Results of the equipment blanks will be applied to all samples collected on the same day (unless only one collected for a several-day sampling

event; results would be applied to all applicable samples in the SDG). However, consideration should be given to the samples with which the equipment blank was digested.

(d) In instances where more than one blank is associated with a given sample, qualification will be based upon a comparison with the associated blank having the highest concentration of a contaminant. The result will not be corrected by subtracting any blank value. Action levels should be calculated that are 5 times the maximum concentration of each contaminant detected in any blank. No positive results should be reported unqualified unless the concentration of the analyte in the sample exceeds 5 times the amount detected in any blank.

NOTE: The Quality Assurance/Data Validation Contractor should note that the blank analyses may not involve the same weights, volumes, or dilution factors as the associated samples. In particular, solid sample results reported on the Form I's will not be on the same basis (units, dilutions) as the calibration blank data reported on the blank summary forms. Sample weights, volumes, and dilution factors must be taken into consideration on a sample-specific basis when applying the 5 times the criteria.

(e) Sample results will be qualified by the Quality Assurance/Data Validation Contractor as follows:

i. If an analyte is detected in the blank but not in the sample, no action will be taken by the Quality Assurance/Data Validation Contractor.

ii. Positive results less than the action level will be qualified as "not-detected" ("U") by the Quality Assurance/Data Validation Contractor. The values of positive results flagged "U" should be used as the revised MDL (or LOQ if the MDL is not applicable) by data users.

iii. Positive results greater than the action level will not be qualified with respect to blank contamination by the Quality Assurance/ Data Validation Contractor.

(f) If it is determined that some contamination is introduced from a source other than the sample, qualification of data may be made by the Quality Assurance/Data Validation Contractor. Contamination introduced through dilution water is one example. Instances of this occurring can be identified when analytes have been detected in the diluted sample but were not detected in the undiluted sample.

3. Actions for Blanks with Negative Concentrations of Target Compounds

(a) The results of all laboratory preparation blanks, initial calibration blanks, and continuing calibration blanks will be applied to all samples in the analysis sequence.

(b) In instances where more than one blank is associated with a given sample, qualification will be based upon a comparison with the associated blank having the highest absolute value of concentration of an analyte. Action levels should be calculated that are 5 times the absolute value of the negative value with the greatest magnitude for each analyte observed in any blank in the anlytical sequence. No positive results should be reported unqualified unless the concentration of the analyte in the sample exceeds 5 times the absolute value of the negative value observed in any blank. MDLs or LOQs less than 5 times the absolute value of the negative value observed in any blank will also be qualified.

NOTE: The Quality Assurance/Data Validation Contractor should note that the blank analyses may not involve the same weights, volumes, or dilution factors as the associated samples. In particular, solid sample results reported on the Form I's will not be on the same basis (units, dilutions) as the calibration blank data reported on the blank summary forms. Sample weights, volumes, and dilution factors must be taken into consideration on a sample-specific basis when applying the 5 times the criteria.

(c) Sample results will be qualified by the Quality Assurance/Data Validation Contractor as follows:

i. For blanks with negative values for target analytes with absolute values greater than 2 times the IDL, positive results less than the

action level in the associated samples will be qualified as "estimated" ("J") by the Quality Assurance/Data Validation Contractor.

ii. For blanks with negative values for target analytes with absolute values greater than 2 times the IDL, MDL/LOQs less than the action level will be qualified as "estimated" ("UJ") by the Quality Assurance/Data Validation Contractor.

ii. Positive results and MDLs or LOQs (depending on reporting conventions) greater than the action level will not be qualified with respect to negative interference by the Quality Assurance/ Data Validation Contractor.

E. ICP Interference Check Sample Analysis

1. Evaluation Criteria

(a) The ICP interference check sample (ICS) analysis consists of two solutions: Solution A (consisting of the interferents) and Solution AB (consisting of interferents and other analytes). An ICS was required to have been run at the frequency stated the analytical SOP.

The ICS Solution A contains aluminum, calcium, iron, and magnesium.

The ICS Solution AB contains the analytes in ICS Solution A plus silver, barium, beryllium, cadmium, cobalt, chromium, copper, manganese, nickel, lead, vanadium, and zinc.

(b) Results for the ICS solution AB analysis were required to have fallen within the control limits of $\pm$ 20% of the true value.

(c) Any ICSA analysis with results > IDL for elements which are not reported as truly present in the ICS solution indicates that the possibility of false positive exists. Any ICSA analysis with results < negative IDL for elements which are not present in the ICS solutions indicates that the possibility of false negatives in the samples may exist.

2. Actions

(a) For samples with concentrations of Al, Ca, Fe, or Mg which are greater than 50% of the true concentration (in aqueous units) of their respective levels in the ICSA, the following actions will apply:

i. If the ICSAB recovery for an element is >120%, "not-detected" results will be considered acceptable for use by the Quality Assurance/Data Validation Contractor.

ii. If the ICSAB recovery for an element is >120% and the reported sample results are positive, the affected data will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

iii. If the ICSAB recovery for an element falls is 50- 79% and reportable quantities of the analyte were detected in the sample, the positive results will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

iv. If an analyte is not detected in the sample and the ICSAB recovery for that analyte falls within the range of 50-79%, the possibility of false negatives exists. The data for these samples will be qualified as estimated ("UJ") by the Quality Assurance/ Data Validation Contractor.

v. If ICSAB recovery results for an element are <50%, all data will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor. In the narrative, the Quality Assurance/Data Validation Contractor will point out that the positive results may be qualitatively valid but are quantitatively biased quite low.

(b) In general, the sample data will be accepted if the concentrations of Al, Ca, Fe, and Mg in the sample are found to be less than 50% of the respective concentrations in the ICSA. If other elements are present in the sample at >10 mg/L, professional judgement will be used to determine if the data warrants qualification.

(c) For positive analytes (non-ICSA constituents) in the ICSA (not reported as being truly in the ICSA) that are greater than 2 times the IDL, positive results up to 5 times the concentration level observed in the ICSA will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor in associated samples displaying high interferent levels (>50% of any of the ICSA interferents). "Not-detected" results will not be qualified due to this issue.

If non-ICSA analytes are reported as being "true" values in the ICSA, a comment will be included in the QAR stating that it is ambiguous whether the presence of such analytes reported as "true" values represents a contractual noncompliance.

For negative interferences with absolute values that are greater than 2 times the IDL, positive sample results (up to 5 times the absolute value of the level of the analyte observed in the ICSA) will be flagged "J" and "not-detected" results with MDL/LOQs less than 5 times the absolute value of the level of that analyte observed in the ICSA will be flagged "UJ". Note: This will only apply when an interferent is >50% of the ICSA in samples.

F. Matrix Spike Analysis

1. Evaluation Criteria

(a) A pre-digestion matrix spike analysis was required to be performed from each group of ≤20 samples of a similar matrix.

(b) Samples identified as equipment blanks should not have been used for spike sample analysis.

(c) Spike recoveries were required to be within the limits of 75-125% (spike recovery limits were not to apply when the sample concentration exceeded the spike concentration by more than a factor of 4).

(d) If the matrix spike recovery did not meet criteria, a post-digestion spike was required for analytes run by ICP (except for silver).

2. Actions

Note: These actions apply to samples associated with the matrix spike sample. In most cases, a laboratory will analyze one pre-digestion spike sample for each matrix in an SDG. However, there may be times when more than one spike analysis is performed for a given matrix in an SDG. In these cases, use the digestion logs provided to associate samples with the matrix spike sample analyses.

(a) If the spike recovery is >125% and the reported sample results are <MDL or LOQ (depending on reporting conventions), the data will be considered acceptable for use by the Quality Assurance/Data Validation Contractor.

(b) If the spike recovery is >125% or <75%, positive results in associated samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(c) If the spike recovery falls within the range of 30-74% and the sample results are "not detected," the "not-detected" results for these samples will be qualified as estimated ("UJ") by the Quality Assurance/Data Validation Contractor.

(d) If the spike recovery results are <30% and the sample results are "not-detected," the data for these samples will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(e) The Quality Assurance/Data Validation Contractor will take no actions based solely on the post-digestion matrix spike recoveries. However, these may be used in conjunction with the laboratory duplicate analyses and the pre-digestion matrix spike recoveries to indicate the possible reason for the poor pre-digestion matrix spike recoveries (poor sample homogeneity, digestion loss, analytical bias or sample-specific matrix effects).

G. Laboratory Duplicate Analysis

1. Evaluation Criteria

(a) A duplicate sample was required to be prepared and analyzed for every QC batch of ≤ 20 samples, for every time samples were digested, or for every matrix, whichever is more frequent.

(b) Samples identified as equipment blanks should not have been used for duplicate sample analysis.

(c) A control limit of 20% for relative percent difference (RPD) was required to be used for sample and duplicate results greater than or equal to 5 times the LOQ (corrected for mg/Kg and dry-weight for soils).

A control limit of ± LOQ is used for sample and/or duplicate results less than 5 times the LOQ (corrected for % solids and mg/Kg for soils).

2. Actions

Note: These actions apply to samples associated with the laboratory duplicate sample. In most cases, a laboratory will analyze one duplicate sample for each matrix in an SDG. However, there may be times when more than one duplicate analysis is performed for a given matrix in an SDG. In these cases, use the digestion logs provided to associate samples with the laboratory duplicate sample analyses.

(a) If duplicate analysis results for a particular analyte fall outside the appropriate control windows, the positive results for that analyte in all samples of the same matrix will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. If one result is less than the MDL or LOQ (depending on reporting conventions), a value of the MDL or LOQ, respectively, will be used for that result for comparison only.

(b) When evaluating laboratory duplicate results, the Quality Assurance/ Data Validation Contractor will keep in mind the analyte concentrations in the preparation blanks. It may be possible in some instances to attribute high imprecision to blank contamination.

H. Laboratory Control Samples (LCS)

1. Evaluation Criteria

(a) An LCS was required to be analyzed for each analyte using the same sample preparation and method employed for the samples received. One LCS must be prepared and analyzed for each matrix every time samples in a QC batch are digested.

(b) All aqueous LCS results were required to fall within the control limits of 80-120%.

(c) All solid LCS results were required to fall within the control limits established by the vendor.

2. Actions

(a) Aqueous LCS:

i. If the LCS recovery for any analyte falls within the range of 50-79% or 120-150%, positive results for that analyte in associated samples will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor. However, positive results for analytes displaying recoveries >150% will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

ii. If the LCS recovery for any analyte is greater than 120%, "not-detected" results for that analyte will be considered acceptable by the Quality Assurance/Data Validation Contractor.

iii. If the LCS recovery for any analyte falls within the range of 50-79%, the "not-detected" results in the associated samples will be qualified as biased ("UJ") by the Quality Assurance/Data Validation Contractor.

iv. If the LCS recovery for any analyte is <50%, the analyses for

that analyte in associated samples will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(b) Solid LCS:

For solid LCSs, recoveries outside the 70-130% range shall require qualification by the Quality Assurance/Data Validation Contractor. Positive results for an analyte outside the 70-130% range in the associated LCS will be flagged estimated ("J") by the Quality Assurance/Data Validation Contractor. The "not-detected" results associated with solid LCS recoveries $<70\%$ will be flagged as biased ("UJ") by the Quality Assurance/Data Validation Contractor. The only exception will be when the true value is below <3 times the MDL or the LOQ (whichever applies), in which case no qualification is warranted from a recovery perspective by the Quality Assurance/Data Validation Contractor.

I. Serial Dilution Analysis

1. Evaluation Criteria

(a) A five-fold serial dilution analysis was required for each group of ≤ 20 samples of a similar matrix. An equipment blank should not have been used for the serial dilution analysis.

(b) If the analyte concentration was sufficiently high (concentration in the original sample is, minimally, a factor of 50 above the MDL), results for the serial dilution analysis were required to agree within 10% of the original results.

2. Action

If the percent difference (%D) $>10\%$ for any analyte with original sample results >50 times MDL, then positive results for that analyte in associated samples will be flagged estimated ("J") by the Quality Assurance/Data Validation Contractor.

J. Sample Result Verification

1. Evaluation Criteria

(a) The reported results were required to fall within the linear range of the ICP.

(b) The ICP results > LOQ must have <30% relative standard deviation (RSD) for three or more exposures and < 25% RPD for two exposures for impact there to be no impact on data quality.

(c) Analyte quantitation for solid samples are calculated in accordance with the following:

$$\text{Soil Concentration (mg/Kg)} = \frac{(C)\,(V)\,(DF)}{(W)\,(S)}$$

where:
- C = concentration (mg/L)
- V = final volume in mL after sample prep
- W = weight of wet sample in grams
- S = % solids/100
- DF = dilution factor

2. Actions

(a) If there are any discrepancies found regarding sample result verification, the laboratory may be contacted to obtain additional information that could resolve differences. If a discrepancy remains unresolved, the Quality Assurance/Data Validation Contractor may determine that qualification of the data is warranted.

(b) If examination of the raw data reveals negative concentrations (>2 times the MDL or LOQ, whichever is applicable), the "not-detected" results will be qualified as biased ("UJ"). If the negative concentration is > 5 times the MDL or LOQ (whichever is applicable), the "not-detected" results for the analyses will be qualified as unusable ("R").

(c) If the multiple exposures for ICP exceed 30% RSD (>2 exposures) or 25% RPD (2 exposures) and the sample result is >LOQ, the result will

be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

(d) If an error is detected for the analysis of a toxic metal (i.e., the laboratory failed to report a high-level positive result), a second chemist will be asked to verify the error.

K. Overall Assessment of the Data

If any problems or situations are uncovered in the data review that are not method compliance in nature but are deemed noteworthy by the Quality Assurance/Data Validation Contractor, a comment will be included in the QAR. In addition, the overall assessment of the data will be included in the conclusions of the QAR.

L. Field Duplicates

1. Evaluation Criteria

(a) The RPD between the results of aqueous field duplicates should be less than or equal to 20% for results greater than 5 times the LOQ. The difference between results in aqueous field duplicates should be less than the LOQ when at least one result is less than or equal to 5 times the LOQ.

(b) The RPD between the results in soil field duplicates should be less than or equal to 40% for results greater than 5 times the LOQ. The difference between results in soil field duplicates should be less than 2 times the LOQ when at least one result is less than or equal to 5 times the LOQ.

(c) If one result is less than the MDL or LOQ (depending on reporting conventions), a value of the MDL or LOQ, respectively, will be used for that result for comparison only.

2. Action

If the result for any analyte did not meet the above criteria, the positive result(s)

for this analyte in the field duplicate pair will be flagged estimated ("J") by the Quality Assurance/Data Validation Contractor.

M. Dissolved/Total Metals Comparison

1. Evaluation Criteria

The following criteria are only applied when the total analyte result of a sample is less than the dissolved analyte result for the same sample.

(a) If one or both of the results (total and dissolved concentrations) are less than 10 times the MDL or LOQ (depending on reporting conventions), the difference between the results must be less than the MDL or LOQ, respectively, for there to be no impact on data quality.

(b) If both results are greater than 10 times the MDL or LOQ (depending on reporting conventions), then the %D calculated using the following equation must be less than 10% for there to be no impact on data quality.

$$\%D = \frac{|\text{Total concentration} - \text{Dissolved concentration}|}{\text{Total concentration}} \times 100\%$$

(c) If one result is less than the MDL or LOQ (depending on reporting conventions), a value of the MDL or LOQ, respectively, will be used for that result for comparison only.

2. Actions

(a) The data will be considered acceptable by the Quality Assurance/Data Validation Contractor if the total analyte results are greater than the dissolved analyte results.

(b) No action will be taken by the Quality Assurance/Data Validation Contractor on equipment blank results based on a total versus dissolved analyte comparison.

(c) If one or both of the results (total and dissolved concentrations) are less than 10 times the MDL or LOQ (depending on reporting conventions) and the dissolved concentration is greater than the total concentration, the following actions will be taken by the Quality Assurance/Data Validation Contractor.

i. If the difference between the results is greater than the MDL or LOQ (depending on reporting conventions), positive results for both the total and dissolved metal will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

ii. If the difference between the results is greater than 5 times the MDL or LOQ (depending on reporting conventions), positive results for both the total and dissolved metal will be qualified as unusable ("R") by the Quality Assurance/Data Validation Contractor.

(d) If both results are greater than 10 times the or LOQ (depending on reporting conventions) and the dissolved concentration is greater than the total concentration, the following actions will be taken by the Quality Assurance/Data Validation Contractor:

i. If the %D is greater than 10%, positive results for both the total and dissolved metal will be qualified as estimated ("J") by the Quality Assurance/Data Validation Contractor.

ii. If the %D is greater than 50%, positive results for both the total and dissolved metal will be qualified as unusable ("R") by the Quality Assurance/ Data Validation Contractor.

4.3 DISTRIBUTION

The Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

5.0 TRAINING

All data validation chemists must be trained in the proper methods of ICP metals analysis data qualification as determined by the Quality Assurance/Data Validation Contractor's Data Validation Task Manager.

6.0 DOCUMENTATION

The results of the data validation review will be documented in a QAR as described in SOP DV-GEN-02 -- "Preparation of Written QARs to Report Data Validation Results."

DUPONT
STANDARD OPERATING PROCEDURE
FOR
PREPARATION OF WRITTEN
QUALITY ASSURANCE REVIEWS
TO
REPORT DATA VALIDATION RESULTS

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes procedures that the DuPont Quality Assurance/Data Validation Contractor will use to prepare written Quality Assurance Reviews (QARs) to report data validation results. QARs will be prepared to present the compliance relative to the required analytical method, the validity, and the usability of the chemical, biological, and physical data provided by the project laboratory(ies) to represent their analytical work performed for the project. As part of the QAR, qualified analytical result summaries (Form I's) or data summary spreadsheets will be generated which will provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result. The QARs will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG. This SOP applies to the Quality Assurance/Data Validation Contractor for the project.

2.0 EQUIPMENT

Not Applicable

3.0 SUPPORTING SOPs AND DOCUMENTS

SOP DV-GEN-01 - General Data Validation Procedures and Qualifier Codes

Individual Validation SOPs for Analytical Methods (a current complete listing is available in the Quality Assurance Project Plan [QAPP])

Individual Analyses SOPs for Analytical Methods (a current complete listing is available in the QAPP)

4.0 PROCEDURE

4.1 QAR FORMAT

All DuPont QARs will be written in the format shown in this SOP (DV-GEN-02). A QAR will typically be prepared for each SDG. A QAR may be prepared for several SDGs if it is logical to do so. The SDG(s) addressed by the QAR will be clearly identified in the title of the QAR.

All QARs will be printed on white paper. All headers and titles will be printed in bold type, and the text of the report will be printed in standard type. Text in the body of the QAR will be at full justification. All margins surrounding the text will be one inch in width. Standard text should be 12-point size and "Times" style font. Each QAR will be typed using Word 6.0 or a compatible software. The validated and qualified results may be presented on annotated photocopies of the Form I's. Alternatively, the validated and qualified results may be presented in a data summary spreadsheet.

Each QAR shall be organized into 10 parts (as applicable to the SDG[s]). All QAR elements will be arranged in the following order:

1. Title Page
2. Table of Contents
3. Executive Summary
4. Introduction and Sample Listing
5. Section 1: Data Evaluation
6. Section 2: Qualified Form I's or Data Summary Spreadsheets
7. Section 3: Organic Data Support Documentation
8. Section 4: Inorganic and Wet Chemistry Data Support Documentation
9. Section 5: Laboratory Case Narratives and Project Chain-of-Custody Records
10. Section 6: Project Correspondence

The contents of each of the aforementioned elements, and any subdivisions, are described in greater detail in the subsequent sections of this SOP.

4.2 TITLE PAGE

The first page of each QAR will be the Title Page. The Title Page will provide the QAR title, the date the QAR was issued, the name and address of DuPont for which the QAR was prepared, and the name and address of the Data Validation Contractor who prepared the QAR. All information presented on the Title Page will be left-to-right centered.

Each QAR will be identified by a unique QAR title which will appear at the top of the Title Page. The QAR title will include the DuPont project name and SDG identification of the data presented in the QAR. The title should read as follows:

QUALITY ASSURANCE REVIEW
OF THE SAMPLES COLLECTED FOR
DUPONT PROJECT NAME
SDG #####

4.3 TABLE OF CONTENTS

Each QAR will contain a Table of Contents following the Title Page. The Table of Contents will identify the aforementioned 10 elements and any appropriate subdivisions in order of appearance in the QAR.

4.4 EXECUTIVE SUMMARY

Following the Table of Contents, each QAR will contain an executive summary. This executive summary will summarize the data validation findings relevant to the samples included in the QAR. Brief statements of any reasons for qualification of the data will be provided, including the level of impact (unusable versus estimated, etc.) and approximation of the amount of data impacted (all, the majority, a small portion, etc.).

4.5 INTRODUCTION AND SAMPLE LISTING

Following the Executive Summary, each QAR will contain a brief introduction. This introduction will summarize the number of samples evaluated, the dates of sample collection, any references used in the data evaluation, the required analytical methods and data package deliverable references and any other general information relevant to the QAR.

A list of the samples in the SDG that was evaluated in the QAR will be presented after the introduction. The sample listing will include the DuPont sample identifications along with the

associated laboratory sample identifications, the dates of sample collection, and the parameters examined in each sample.

4.6 SECTION 1: DATA EVALUATION

The majority of the text of the QAR will appear in the Data Evaluation Section of the QAR. For clarity, this section of the QAR will be presented in the following subdivisions:

1. Organic Data Evaluation

    a. Introduction
    b. Laboratory Compliance
    c. Organic Data Qualifiers

2. Inorganic and Wet Chemistry Data Evaluation

    a. Introduction
    b. Laboratory Compliance
    c. Inorganic and Wet Chemistry Data Qualifiers

3. Conclusions

The individual introductions of the organic and inorganic and wet chemistry data evaluation sections will briefly state the number of samples analyzed, the project laboratory that analyzed them, the organic/inorganic and wet chemistry parameters which were analyzed for in the samples, and the analytical methods which were used for analysis. These introductions will also state the types of quality control (QC) measures that were evaluated and give a general description of the data quality ("excellent," "very good," "good," "fair," or "poor").

The laboratory compliance sections will be presented in three subdivisions: "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments." Correctable deficiencies consist of any errors made that could be corrected after the fact. These include deficiencies such as missing data deliverables, transcription errors, and calculation errors. Whenever time allows, these deficiencies will be corrected by the laboratory or the data reviewer prior to issuing the report and addressed under "Comments" instead.

Noncorrectable deficiencies consist of any errors made on which it is too late to take corrective action. These include errors made on the field Chain-of-Custody records, errors made in sampling (i.e, preservation, etc.), and errors made in the preparation and analysis of the

samples (i.e., contrary to the required protocols). Finally, comments will also be made about any information relating to the samples which may prove useful for the data user. Comments may include problems that are not covered under the required protocols (but might be the result of not following good laboratory practices) that may impact data. When appropriate, a page reference from the required analytical method or other associated document will be provided with the deficiency/comment to document the source and validity of the data reviewer's statement.

The data qualifier sections will present qualifiers that should be considered in order to best utilize the data. For every statement made in this section, there is a subsequent finding that justifies the qualifying statement. These qualifiers/findings are presented as bulleted items in order of importance relative to their impact on the data set.

Finally, a conclusion paragraph will be presented which will include a general statement about the overall usability of the data. It will also include any outstanding issues identified during the data evaluation. The names of the author(s) and reviewer(s) of the QAR along with their signatures will also be presented with the conclusions of the QAR.

4.7 SECTION 2: QUALIFIED FORM I's OR DATA SUMMARY TABLES

This section will include qualified Form I's or data summary tables, including a glossary defining the qualifier codes. The qualified Form I's or data summary tables will be presented in order of volatiles, semivolatiles, organochlorine pesticides/PCBs, organophosphorus pesticides, organochlorine herbicides, dioxins/furans, metals, and wet chemistry parameters, as applicable to the QAR. The definitions of all qualifier codes are provided in SOP DV-GEN-01.

4.8 SECTION 3: ORGANIC DATA SUPPORT DOCUMENTATION

The Organic Data Evaluation is fully supported by the documentation presented in this section of the QAR. For every deficiency, comment, and qualifier made in the report, a photocopied page of laboratory data is provided in support of the reviewer's comments. All relevant QC summary forms as well as the data reviewer's worksheets are presented in the support documentation.

4.9 SECTION 4: INORGANIC AND WET CHEMISTRY DATA SUPPORT DOCUMENTATION

The Inorganic and Wet Chemistry Data Evaluation is fully supported by the documentation presented in this section of the QAR. For every deficiency, comment, and qualifier made in the report, a photocopied page of laboratory data is provided in support of the reviewer's comments. All relevant QC summary forms as well as the data reviewer's worksheets are presented in the support documentation.

4.10 SECTION 5: LABORATORY CASE NARRATIVES AND PROJECT CHAIN-OF-CUSTODY RECORDS

This section of the QAR will contain the laboratory case narratives and the field and laboratory Chain-of-Custody records corresponding to the SDG(s).

4.11 DISTRIBUTION

The Quality Assurance/Data Validation Contractor will distribute a copy of each QAR to the DuPont Project Manager. In addition, a copy of each QAR will be maintained by the Quality Assurance/Data Validation Contractor.

4.12 REVISIONS

Revisions to the QARs will be made on an "as needed" basis. The author of the QAR is responsible for the revision and reissue of QARs. Depending on the extent of the revision, a single page or the entire QAR may have to be reissued to the aforementioned recipients. The reviewer will indicate revisions to a QAR by adding the date the revision(s) were made under the existing issue date on the QAR title page. The revision number (i.e., Rev. 0, Rev. 1) will immediately follow the revision date.

5.0 TRAINING

All data validation chemists must be trained in the proper methods of preparing the QAR as determined by the Quality Assurance/Data Validation Contractor's Data Validation Task Manager.

6.0 DOCUMENTATION

Not applicable.

DUPONT
STANDARD OPERATING PROCEDURE
FOR
GENERAL DATA VALIDATION PROCEDURES
AND QUALIFIER CODES

1.0 OBJECTIVES

This Standard Operating Procedure (SOP) describes general procedures that the DuPont Quality Assurance/Data Validation Contractor will use to perform full and limited validation of analytical data and the codes which the Quality Assurance/Data Validation Contractor will use to qualify the data based on the validation. The sample analyses to be validated and the level of validation to be performed will be dictated by project-specific work plans or other applicable sampling plans. Validation will be performed to assess compliance of the sample data to DuPont project SOPs and/or the individual analytical SOPs. In addition, the usability of the analytical data provided by the project laboratory(ies) will be determined based on the general guidance provided in the National Functional Guidelines for Organic Data Review and Inorganic Data Review. It should be mentioned that these guidance documents apply strictly to data generated by Contract Laboratory Program (CLP) protocols. As such, it is not directly applicable to validation of data generated by SW-846 methods. Therefore, method-specific data validation SOPs have been prepared for this project.

Copies of annotated analysis results summaries (Form I's) including any changes to the analytical results and all data qualifier codes, or a data summary spreadsheet of the qualified analytical results will be included in the quality assurance review (QAR). The validation findings will be presented in a QAR which will be prepared by one or more Sample Delivery Groups (SDGs) and include all analysis types within each SDG. This SOP applies to the Quality Assurance/Data Validation Contractor.

2.0 EQUIPMENT

Not applicable

3.0 SUPPORTING SOPs AND DOCUMENTS

US EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (February 1994)

US EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (February 1994)

DV-GEN-02 - Preparation of Written Quality Assurance Reviews to Report Data Validation Results

Individual Analysis SOPs for Analytical Methods (a current and complete listing is available in the Quality Assurance Project Plan [QAPP])

Individual Validation SOPs for Analytical Methods (a current and complete listing is available in the QAPP)

Project-Specific Work Plans, QAPP, and Other Applicable Sampling Plans

4.0 PROCEDURE

4.1 DATA PACKAGE RECEIPT AND LOG-IN

The Quality Assurance/Data Validation Contractor will receive from the contracted laboratory(ies) one unbound copy of each complete sample data package within any specified turnaround times. On the date on which the data package is received by the Quality Assurance/Data Validation Contractor, the Data Validation Task Manager for the Quality Assurance/Data Validation Contractor will record key management/schedule information, including the date of receipt, the SDG number, the analyses performed, and the number of samples analyzed on an in-house data validation tracking form. (An example of the in-house data validation tracking form is presented as Figure 1.) The Quality Assurance/Data Validation contractor will verify that all samples numbers for the SDG are included in the data

package and that they are consistent with those listed on the Chain-of-Custody documentation submitted with the SDG.

The Data Validation Task Manager will record the date on which the final QAR is due on the in-house data validation tracking form. This date is based on the required turnaround time from the date of receipt of the data package (the standard is 30 days from receipt). The Quality Assurance/Data Validation Contractor will utilize the individual Form I's or data summary spreadsheets for the validation. The Form I's are to be included in the data packages provided by the contracted laboratory(ies).

4.2 TRACKING OF DATA VALIDATION

The Quality Assurance/Data Validation Contractor Data Validation Task Manager will record the date on which each data package is assigned to a staff quality assurance chemist for validation on the in-house data validation tracking form. In addition, the Data Validation Task Manager will record a date on which a draft QAR is due from that staff quality assurance chemist for senior technical review and the date on which the final QAR for the SDG data package is due to DuPont. The Data Validation Task Manager, along with the staff quality assurance chemist, will determine the sample analyses to be validated and the level of validation to be performed to meet the specifications dictated by the project-specific work plan or other applicable sampling plan. Furthermore, the Data Validation Task Manager will track the progress of the staff quality assurance chemist in order to discover as early as possible, any problems that may interfere with meeting the deadlines. If any problems arise during the preliminary data validation, the Data Validation Task Manager will inform DuPont's Project Manager of the nature of the problem and whether the problem will affect the deadline for the QAR. Any issues impacting the schedule will be communicated to the project team via verbal communication or facsimile.

4.3 DATA VALIDATION

A. Initial Data Validation

The Quality Assurance/Data Validation Contractor's staff quality assurance chemists will perform the initial data validation according to the individual validation SOPs and will prepare draft QARs according to SOP DV-GEN-02 to report the validation findings. The criteria evaluated, problems identified and validation support documentation included in each report will be summarized on validation checklists included in the QAR support documentation. Examples of the organic and inorganic analysis checklist cover pages are presented in Figure 2 and Figure 3, respectively.

For the initial data validation, a staff quality assurance chemist will systematically examine the data package and every analytical result reported for an SDG in order to assess the method compliance and the usability of the data in that SDG.

1. Evaluation of Method Compliance

For full data validation, the Quality Assurance/Data Validation Contractor will review the Chain-of-Custody records. All deliverables (inclusive of all raw instrument data) will be evaluated for reporting errors and inconsistencies. Assessment of compliances will also include data calculation checks to determine if errors potentially exist. Positive sample results will be recalculated at a rate of 100%. Other instrumental raw data (calibrations, surrogates, internal standards, response factors, etc.) will be recalculated at a minimum rate of 10%. If errors are detected during the 10% minimum recalculation check, additional instrumental raw data will be recalculated.

For limited data validation, the Quality Assurance/Data Validation Contractor will assess the method compliance of the specific aspects of the sample analyses to the individual analysis SOPs. The specific aspects of sample analysis evaluated under limited data validation include sample holding times and organic surrogate compound performance as well as the frequency and performance of method, trip and field blanks, laboratory control samples (LCSs), matrix spikes (MSs), matrix spike duplicates (MSDs) or laboratory duplicates, inductively coupled plasma (ICP) serial dilutions, and field duplicates. In addition, the Quality Assurance/Data Validation Contractor will assess the method compliance of sample result and quality control (QC) summary forms (and no raw instrument data). These summary forms will also be evaluated for reporting errors and inconsistencies relative to one another.

The findings of the method compliance assessment will be described in terms of deficiencies and comments about the data/deliverables. The deficiencies/comments will be presented in three subdivisions -- "Correctable Deficiencies," "Noncorrectable Deficiencies," and "Comments" -- of the "Organic Data Evaluation" and "Inorganic Data Evaluation" sections of the QAR as described in SOP DV-GEN-02. Each deficiency and comment discussed in the QAR will indicate any subsequent impact on the usability of the data or any aspect(s) of the data that could not be evaluated due to the deficiency.

The Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of certain deficiencies prior to the submittal of the QAR, if such corrections are necessary for a full evaluation of the usability of the data. Such correctable deficiencies may include sample result errors, missing data deliverables, or calculation errors that would take a significant amount of the Quality Assurance/Data Validation Contractor's time to correct. In addition, the Quality Assurance/Data Validation Contractor will contact the project laboratory(ies) to request the correction of all correctable deficiencies that impact sample results or that the data reviewer was unable to correct themselves prior to the submittal of the QAR, if time allows. Any laboratory resubmittals as a result of such requests will be discussed in the "Comments" section of the QAR.

2. Determination of Data Usability

For full data validation, the Quality Assurance/Data Validation Contractor will determine the usability of the reported results based on an evaluation of all information (inclusive of all raw instrument data) presented in data package deliverables. For limited data validation, the Quality Assurance/Data Validation Contractor will determine the usability of the analytical results based on an evaluation of summary forms (and no raw instrument data) which provide sample results, dates relative to holding times, method, trip, and field blank results, LCS recoveries, MS and/or MSD recoveries, MSD or laboratory duplicate precision, organic surrogate compound performance, and field duplicate results.

The findings of the data usability assessment will be described in terms of certain qualifications of the data that should be considered in order for the project team to best utilize the data. These qualifications will be presented in the "Organic Data Qualifiers" and "Inorganic Data Qualifiers" subdivisions of the "Organic Data Evaluation" "Inorganic Data Evaluation" sections, respectively, of the QAR as described in SOP DV-GEN-02. Each qualification discussed in the QAR will indicate that the affected sample result(s) have been flagged with representative qualifier code(s) on the Form I's or data summary spreadsheets to provide, at a glance, an indication of the quantitative and qualitative reliability of each analytical result.

The organic data qualifier codes and definitions will be as follows:

U - This compound should be considered "not detected" since it was detected in a blank at a similar level.

J - Quantitation is approximate due to limitations identified during the quality assurance review (data validation).

N - The analysis indicates that there is presumptive evidence to make a "tentative identification" of this compound.

R - Unusable result -- compound may or may not be present in this sample.

UJ - This compound was not detected, but the quantitation limit is probably higher due to a low bias identified during the quality assurance review.

C - The presence of this compound as determined by gas chromatography (GC) analysis was confirmed by GC/mass spectroscopy (MS) analysis.

The inorganic data qualifier codes and definitions will be as follows:

U - This analyte should be considered "not-detected" since it was detected in a blank at a similar level.

J - Quantitation is approximate due to limitations identified during the quality assurance review (data validation).

R - Unusable result -- analyte may or may not be present in this sample.

UJ - This analyte was not detected, but the detection limit is probably higher due to a low bias identified during the quality assurance review.

If the Quality Assurance/Data Validation Contractor(s) identify multiple reasons to qualify any analytical result, the analytical result will only be flagged with the one qualifier code that has the greatest impact on data usability (with the

exception of the combination of "J" and "N"). The order of the qualifier codes from greatest impact to least impact is as follows:

Order	Positive Results	Not-Detected Results
1	"U"	"R"
2	"R"	"UJ"
3	"J" and/or "N"	

Please note that qualifying a positive result "R" (unusable) has a greater impact on the end use of the data than qualifying the same positive result "U" (blank contamination). However, during data validation, once a positive result is qualified as a false positive due to blank contamination ("U"), it is not further evaluated based on other QC measures. For this reason, "U" qualified results are presented first in the data validation reports since they are not further qualified.

B. Peer Review of Initial Data Validation

The Quality Assurance/Data Validation Contractor's senior quality assurance chemists and/or Data Validation Task Manager will review all draft QARs prepared by staff quality assurance chemists for completeness and for consistency to this SOP, to the individual validation SOPs, and to SOP DV-GEN-02 for the preparation of QARs. The senior quality assurance chemist or the Data Validation Task Manager will systematically examine the draft QAR narrative, data support documentation, laboratory case narratives, and project Chain-of-Custody records prepared by the staff quality assurance chemists to ensure that the QAR is technically accurate. The senior quality assurance chemist or Data Validation Task Manager will ensure that any necessary technical changes are incorporated into the final QAR for delivery to the DuPont project team.

C. Review for Project Consistency

The Quality Assurance/Data Validation Contractor's Data Validation Task Manager will review each QAR for consistency with all other QARs issued for the project.

D. Review for Consistency Between the QAR Text and Qualified Form I's or Data Summary Spreadsheet

As the final step of each QAR, the Quality Assurance Data Validation Contractor will verify that all changes in analytical results and all qualifications to the analytical results stated in the text of the QAR are reflected on the associated qualified Form I's or data summary spreadsheet.

5.0 TRAINING

Not applicable.

6.0 DOCUMENTATION

Not applicable

FIGURE 1
Data Validation Tracking Form

Report #	Laboratory	SDG Number	Analysis Performed	# of Samples	Date of Collection	Date of Lab Receipt	Date of ESI Receipt	Date to Chemist	Draft QAR Done	Final QAR Due	Date Report Sent

FIGURE 2

Organic Analyses Support Documentation

Environmental Standards Project Name: _____
Sample Collection Dates: _____
Job Number: _____
Project Manager: _____
Laboratory: _____

Reviewed By: _____
Approved By: _____
Completion Date: _____

Applicable Sample No's.: ☐ Refer to Table 1 in the Quality Assurance Review

Sample No.	Lab. Control No.

Deliverables:
- CLP ☐
- Tier I ☐
- Ties II ☐
- Limited ☐
- Other _____

The following table indicates criteria which were examined, the identified problems, and support documentation attachments.

	Criteria Examined in Detail — Check (✓) If Yes or Footnote Letter for Comments Below				Problems Identified — Check (✓) If Yes or Footnote Number for Comments Below				Support Documentation Attachments — Check (✓) If Yes — or Identify Attachment No.			
	VOA Method	BNA Method	PEST / PCB Method	Other Method(s)	VOA Method	BNA Method	PEST / PCB Method	Other Method(s)	VOA Method	BNA Method	PEST / PCB Method	Other Method(s)
Holding Times												
Blank Analysis Results: Target Compounds												
Blank Analysis Results: TICs												
System Mntr. Cmpds. &/or Surrogate Spike Rslts.												
Matrix Spike / Matrix Spike Duplicate Results												
Blank Spike Results												
Duplicate Analysis Results ☐ Field ☐ Lab												
Qualitative Identification: Target Compounds												
Qualitative Identification: TICs												
DFTPP & BFB Mass Tuning												
GC Instrument Performance												
Initial Calibrations												
Continuing Calibrations												
Quantitation of Results												
DDT / Endrin Breakdown												
Surrogate Retention Time Shifts												
Internal Standards Performance												
Resolution Check Standards												
Analytical Sequence												
Florisil Cartridge Check & GPC Calibration												
GC Column Agreement												
Others:												

Comments: _____

FIGURE 3
Inorganic Analyses Support Documentation

Environmental Standards Project Name: _____
Sample Collection Dates: _____
Job Number: _____
Project Manager: _____
Laboratory: _____

Reviewed By: _____
Approved By: _____
Completion Date: _____

Applicable Sample No's.: ☐ Refer to Table 1 in the Quality Assurance Review

Sample No.	Lab. Control No.

Deliverables:
- CLP ☐
- Tier I ☐
- Tier II ☐
- Limited ☐
- Other _____

The following table indicates criteria which were examined, the identified problems, and support documentation attachments.

	Criteria Examined in Detail — Check (✓) If Yes or Footnote Letter for Comments Below					Problems Identified — Check (✓) If Yes or Footnote Number for Comments Below					Support Documentation Attachments — Check (✓) If Yes — or Identify Attachment No.				
	ICP or A.A Metals	Furnace Metals	Cold Vapor Mercury	Cyanide	Other Method(s) _____	ICP or A.A Metals	Furnace Metals	Cold Vapor Mercury	Cyanide	Other Method(s) _____	ICP or A.A Metals	Furnace Metals	Cold Vapor Mercury	Cyanide	Other Method(s) _____
Holding Times															
Blank Analysis Results															
Matrix Spike (Predigestion) Results															
Duplicate Analysis Results ☐ Field ☐ Lab															
Quantitation of Results															
Detection Limits / Sensitivity															
Initial Calibrations															
Continuing Calibrations															
Laboratory Control Standards (LCS)															
ICP Linear Range Analysis															
ICP Interference Checks															
ICP Serial Dilutions															
ICP Post-Digestion Spike															
GFAA Post-Digestion Spikes															
GFAA Duplicate Injections															
ICP Multiple Exposures															
GFAA Standard Additions															
CRDL Standards															
Others:															

Comments: _____

ATTACHMENT E
Example Field Audit Checklist

1.0 INTRODUCTION

1.1 Purpose

The purpose of this procedure is to establish the minimum requirements for field safety audits.

1.2 Background

N/A

1.3 Key Terms

The following definitions apply to terms used in this procedure:

- **Individual Audits**: An audit performed by an individual of the field project team who observes peoples' actions and makes a safety contact with the people being observed. This activity is to be integrated into normal, daily activities and require no more than 15 to 20 minutes.

- **Team Audits**: A team audit comprised of two to three people (various disciplines) and led by a member of the field project team. A contractor representative should be included as a team member.

- **Safety Audit Focus**: Some suggested audit focuses are:

  - Peoples' actions.
  - Housekeeping.
  - Equipment operation.
  - Personal protective equipment use.
  - Permits.
  - Tools.
  - Exclusion zones.
  - Decontamination.
  - Hand safety/Body positioning
  - Traffic handling/patterns

1.4 Responsibilities

Roles and responsibilities for the implementation of this guideline are defined as follows:

- Project Director —responsible for ensuring that audits are scheduled, conducted, and findings distributed as outlined by this SOP.

- ❑ CRG health and safety department—Responsible for:
  - Filing and maintaining (for 1 year or less) audit reports.
  - Communicating audit learnings and trends on a monthly basis to the organization.
  - Review learnings and trends on a quarterly basis with the SHE CORE TEAM.
- ❑ Site Safety Officer—Responsible for maintaining all the audit reports in the project field file for duration of field activity.

2.0 APPLICATION

This procedure applies to all CRG/URSD employees/projects.

3.0 PROCEDURE

3.1 Methodology

This procedure should be carried out in the following manner:

- ❑ For projects two weeks or less in duration, all field project teams will, at a minimum complete one audit which can be performed as an Individual Audit.
- ❑ For projects two weeks or greater in duration periodic audits shall be conducted. The PD shall ensure that the audit frequency and audit teams are identified prior to the start of field activities.
- ❑ Conduct the audit using the following steps:

1. Decide on a focus (Use Attachment 1 as a resource for focus items)
2. Observe the work scene, first looking for your selected focus.
3. Look for positive safety actions and indications of safety attitudes.
4. Discuss your observations with the people observed:
5. Mention the positives observed.
6. Involve the people observed in a discussion about safety, weaving in the observations.
7. Ensure that previous findings (if applicable) have been corrected.
8. Exit by thanking the people for their time and ideas for improvement.
9. Report the audit findings to the field project team at the next daily safety briefing.
10. Submit an audit report (see Figure 1) to the CRG health and safety department, URSD Regional Health and Safety Manager, and the project team via e-mail.

4.0 REFERENCES

The following sources were used in developing this guideline:

- CRG Safety Skills Training, *Observation and Communication Resource Manual.*
- DuPont SHE Procedure A-11.1, *DuPont Engineering Safety, Health and Environmental Audits.*

Figure 1

AUDIT REPORT FORMAT

Date:
Site:
Audit Team:
Audit Focus: (Based on past audits, areas if concern, interest):
Activities Audited:
Number of Personnel Audited:
(CRG, WCD, Contractors)
Site Contact:

Positive Observations within Focus:

Improvement Observations within Focus:
(Corrective action/responsible person/timing)

Positive Observations outside of Focus:

Improvement Observations outside of Focus:
(Corrective action/responsible person/timing)

Hand Safety Observations:

Environmental Observations:

Unsafe Acts:

Unsafe Conditions:

Next audit suggestions: (include discrepancies or findings of this audit)

CC: BTL, audit team, project team, H&S group

Attachment 1

Focus Items

	YES	NO
Was activity performed in a safe manner?		

Comments: _____

HAZARD COMMUNICATION

	N/A	YES	NO
1. Chemical inventory list complete and available.			
2. MSDS on-site and available.			
3. Containers properly labeled (federal and state requirements).			

Comments: _____

MEDICAL AND FIRST AID

	N/A	YES	NO
1. First-aid kits are accessible and identified.			
2. Emergency eye/safety washes are available.			
3. First-aid kits are inspected weekly.			
4. First-aid assistance is available.			

Comments: _____

SITE SAFETY/EMERGENCY PLANS

	N/A	YES	NO
1. Daily site briefing was held and documented.			
2. Personnel are properly trained to perform assigned work?			
3. All personnel are aware of emergency procedures.			
4. All permits are in place.			

Comments: _____

PERSONAL PROTECTION

	N/A	YES	NO
1. Is protective equipment being properly worn			
2. All equipment meets ANSI/OSHA/EPA criteria.			
3. Areas requiring special protection clearly identified.			
4. If respirators are in use			
Respirator maintenance program is in place.			
Personnel are fit-tested for respirators.			
On-site?_____ Fit test current?			
5. Defective equipment is tagged and reported.			
6. Sufficient quantities of equipment are available.			

Comments: _____

FIRE PREVENTION/PROTECTION

	N/A	YES	NO
1. Required flame permits are obtained.			
2. Smoking is restricted to designated area.			
3. Fire lanes are established and maintained.			
4. Flammable/combustible liquid dispensing transfer systems are grounded and bonded.			
5. Flammable materials are properly labeled and stored.			
6. Workers are aware of fire alarms.			
7. Location and use of fire extinguishers are known by all personnel.			
8. Fire extinguishers are checked before each shift, and inspected monthly.			
9. Fire extinguishers are appropriate for fire hazard potential.			
10. Combustible materials are segregated from ignition sources.			

Comments: _____

WALKING AND WORKING SURFACES

	N/A	YES	NO
1. Accessways, stairs, ramps, and ladders are free of ice, mud, snow, or debris.			
2. Ladders are properly used and maintained.			
3. Stairways, floor, and wall openings are guarded.			
4. Elevated work areas are guardrailed or safety chained.			
5. Flotation devices are worn when working on or over water.			
6. Toe boards are on overhead work surfaces.			
7. Mobile office/labs have OSHA-approved stairs and handrails.			
8. Work areas are kept free of debris and equipment.			

Comments: _____

EXCAVATIONS, CONFINED SPACES

	N/A	YES	NO
1. Competent person (as defined by OSHA) is on-site			
2. Excavations are sloped or shored to prevent cave-ins.			
3. Shoring is approved by engineer.			
4. Excavations are properly barricaded.			
5. Excavation locations are visible at night.			
6. Utility check is performed and documented before excavation or drilling.			
7. Trench access/egress is established per OSHA standards.			
8. Excavated materials are placed at least 24 inches from the edge of all trenches.			
9. Confined-space entry (CSE) permit procedure is in place and communicated to all personnel.			
10. Employees are trained in CSE.			
11. CSE procedure checklist:			
a. Safety watch			
b. Safety watch protected same as workers			
c. Safety line and tripod (if required)			
d. Appropriate harness			
e. Lines of communication			
f. Electrical and other equipment tagged out			
g. Air monitoring performed			

Comments: _____

HAND AND POWER TOOLS

	N/A	YES	NO
1. Guards and safety devices are in place and used.			
2. Tools are inspected before each use.			
3. Defective tools are tagged and removed from service.			
4. Eye, ear, and hand protection areas are identified and enforced.			
5. Nonsparking tools are used as required.			

Comments: _____

WELDING AND CUTTING

	N/A	YES	NO
1. Required flame permit system is in use.			
2. Fire watch is established.			
3. Fire extinguishers are present at all welding and cutting operations.			
4. Confined spaces, tanks, and pipelines are tested before welding or cutting. API or NFPA procedures are used.			
5. Proper helmets and shields (including proper tint for UV protection) are used.			
6. Welding equipment is properly grounded.			
7. Fuel gas and oxygen gas cylinders are stored at least 20 feet apart or separated by fire wall.			
8. All welders are trained.			

Comments: _____

COMPRESSED GAS CYLINDERS/PRESSURIZED LINES

	N/A	YES	NO
1. Breathing-air cylinders are charged to prescribed pressure.			
2. Breathing air (grade D) is certified.			
3. No other gas system can be mistaken for breathing air.			
a. Fittings prohibit cross connection.			
4. Cylinders are segregated appropriately in controlled, protected, and well-ventilated areas.			
5. Smoking is prohibited in storage areas.			
6. Cylinders are stored upright and secured.			
7. Cylinder caps are in place when stored (not in use) or when moved.			
8. Fuel gas and oxygen are a minimum of 20 feet apart or separated by a fire wall.			
9. Pressurized air and/or waterlines are securely connected.			
10. Gas and/or other hazardous lines are labeled appropriately.			
11. Empty cylinders are labeled and stored separately from full cylinders.			

Comments: _____

MOTOR VEHICLES/HEAVY EQUIPMENT

	N/A	YES	NO

1. Are inspected daily.
2. Operators are licensed/trained for equipment used.
3. Unsafe equipment is tagged out and reported.
4. All safety appliances/guards are in place.
5. Are shut down when fueling.
6. Are equipped with back-up alarms or spotters are employed.
7. Loads are secure before transport.
8. Riders are prohibited on heavy equipment and beds of pickup trucks.
9. Operators of equipment with lifting capacity are aware of overhead hazards.
10. Speed limit followed.
11. Traffic patterns designated.

Comments: _____

SLINGS AND CHAINS

	N/A	YES	NO
1. Slings, chains, and rigging are inspected per OSHA and documented.			
2. Damaged slings, chains, or rigging are tagged out and reported.			
3. Employees are keep clear of suspended loads.			

Comments: _____

ELECTRICAL

	N/A	YES	NO
1. A positive electrical lock-/tag-out system is used whenever work is done on or in electric equipment or electrically activated equipment.			
2. Warning signs indicate presence and location of high-voltage lines (250 volts or greater).			
3. Electrical equipment and wiring are properly guarded.			
4. Electrical lines, extension cords, and cables are guarded and properly maintained.			
5. Extension cords are kept out of wet areas.			
6. Damaged equipment is tagged out and reported.			
7. Underground electrical lines are located and indicated.			
8. Overhead electrical lines are deenergized.			
9. Elevated work platforms, work areas, booms, or ladders are erected to prevent contact with electrical lines.			

Comments _____

MISCELLANEOUS

	N/A	YES	NO

1. Tools and other equipment (portable) are stored away from walkways, roads, or driveways where they cannot fall on or be fallen over by site personnel.
2. Overhead hazards are noted, communicated to all, and labeled as needed.
3. Hard hat, eye, and hearing protection areas are defined and signs are in place.
4. Site managers know procedure in the event of an OSHA inspection.

Comments: _____

STATE, LOCAL, AND/OR PLANT REQUIREMENTS

	N/A	YES	NO
1.			
2.			
3.			
4.			
5.			

Comments: _____

PROJECT-SPECIFIC REQUIREMENTS

	N/A	YES	NO
1.			
2.			
3.			
4.			
5.			

Comments: _____

ATTACHMENT F
Example Laboratory Audit Checklist

URS CORPORATION

LABORATORY AUDIT PROGRAM

LABORATORY PRE-AUDIT QUESTIONNAIRE

Table of Contents

1.0 ORGANIZATION AND PERSONNEL

Record years of experience

ITEM	
Laboratory or Project Manager (individual responsible for overall technical effort)	
Name:_____	
Degree(s) - Year(s):	Major(s):
GC/MS Laboratory Supervisor	
Name:_____ Experience: 3 years minimum requirement	
Degree(s) - Year(s):	Major(s):
Organic Sample Preparation Supervisor	
Name:_____ Experience: 3 years minimum requirement	
Degree(s) - Year(s):	Major(s):
GC/MS Operator	
Name:_____ Experience: 1 year minimum requirement (3 years if no degree in physical science)	
Degree(s) - Year(s):	Major(s):
GC/MS Spectral Interpretation Expert	
Name:_____ Experience: 2 years minimum experience	
Degree(s) - Year(s):	Major(s):
Extraction/Concentration Expert	
Name:_____ Experience: 1 year minimum requirement	
Degree(s) - Year(s):	Major(s):
Pesticide Residue Analysis Expert	
Name:_____ Experience: 2 years minimum	
Degree(s) - Year(s):	Major(s):

1.0 ORGANIZATION AND PERSONNEL (Continued)
Record years of experience

ITEM	
Inductively Coupled Plasma Emission Spectroscopist	
Name:_____ Experience: 1 year minimum requirement	
Degree(s) - Year(s):	Major(s):
Inductively Coupled Plasma Mass Spectroscopist	
Name:_____ Experience: 1 year minimum requirement	
Degree(s) - Year(s):	Major(s):
Flameless Atomic Absorption Spectroscopist	
Name:_____ Experience: 1 year minimum requirement	
Degree(s) - Year(s):	Major(s):
Inorganic Sample Preparation Expert	
Name:_____ Experience: 3 months minimum requirement	
Degree(s) - Year(s):	Major(s):
Flame and Cold Vapor AA Spectroscopist	
Name:_____ Experience: 9 months minimum experience	
Degree(s) - Year(s):	Major(s):
Classical Inorganic Techniques Analyst	
Name:_____ Experience: 6 months minimum requirement	
Degree(s) - Year(s):	Major(s):

1.0 ORGANIZATION AND PERSONNEL (Continued)

Record years of experience

	Yes	No
Do personnel assigned to this project have the appropriate **educational** background to successfully accomplish the objectives of the program?		
Does the staff have a copy of the facility's Quality Assurance Plan (QAP)?		
Do the analytical supervisors have their groups follow the QAP?		
Is the organization adequately staffed to meet project commitments in a timely manner?		

Will the Quality Assurance Officer be available during the onsite audit? _____

Name:_____

Degree(s) - Year(s):	Major(s):

Will the person responsible for disposal of hazardous waste be available during the onsite audit? _____

Name:_____

Does the Laboratory Quality Assurance Officer report to senior management levels? ____

Name:_____

Will the Project Manager be available during the evaluation? ____

Name:_____

If not, will his/her substitute be available during the audit? ____

Name:_____

Please attach the most recent laboratory organization chart. If there have been changes, please mark them on the chart

Additional Comments:

_____

_____

_____

2.0 ANALYTICAL INSTRUMENTATION*

2.1 GC/MS/DS Instrumentation

	Manufacturer	Model/ Revision	Installation Date (Updates)	GC Column(s)	Analyses Performed
GC MS ID No.					
GC MS ID No.					
GC MS ID No.					
Data System ID No.					N/A
EPA NIH Mass Spectral Library (No. of compounds)					N/A
Data System ID No.					N/A
EPA NIH Mass Spectral Library (No. Of compounds)					N/A
Purge and Trap ID No.					N/A
Purge and Trap ID No.					N/A

* A complete list of all analytical instrumentation can substitute for completion of this section.

2.0 ANALYTICAL INSTRUMENTATION (Continued)

2.2 GC Instrumentation

	Manufacturer	Model/ Revision	Installation Date (Updates)	GC Column(s)	Analyses Performed
GC ID No.					
GC ID No.					
GC ID No.					
GC ID No.					
Data System ID No.					N/A
Data System ID No.					N/A
Data System ID No.					N/A
Data System ID No.					N/A

ITEM
Are manufacturer's operating manuals readily available to the operator? ____
Is service maintenance by contract? ____
How often is it performed? ____

2.0 ANALYTICAL INSTRUMENTATION (Continued)

2.3 ICP, ICP-MS and AA Instrumentation

Instrument	Manufacturer	Model/ Revision	Installation Date (Updates)	Analyses Performed
ICP ID No.				
ICP ID No.				
ICP Data System ID No.				N/A
ICP Data System ID No.				N/A
ICP MS ID No.				
ICP MS ID No.				
ICP MS Data System ID No.				N/A
ICP MS Data System ID No.				N/A
AA ID No.				
AA ID No.				
AA Data System ID No.				N/A
AA Data System ID No.				N/A

2.4 TOC and TOX Instrumentation

Instrument	Manufacturer	Model/ Revision	Installation Date	Analyses

2.0 ANALYTICAL INSTRUMENTATION (Continued)

2.5 HPLC Instrumentation

Instrument	Manufacturer	Model/ Revision	Installation Date	Analyses

2.6 Inorganic Instrumentation - pH Meters, Auto-analyzers, Flashpoint, etc.

Instrument	Manufacturer	Model	Installation Date	Analyses

3.0 CALIBRATION MATERIALS

Test	Source of Standard(s)*	Source of Reference Samples**
VOA		
BNA		
Pesticides/PCB's		
Metals		
Cyanide		
Others (list):		

*Standard materials used to prepare calibration standards.
**Reference samples supplied to verify external accuracy.

4.0 DATA REDUCTION

What software packages are used in data reduction?

Instrument	Analysis	Software	Has the Software Been Verified?
GC-MS	VOAs		
GC	VOAs		
GC-MS	BNAs		
GC	Pesticides		
	Herbicides		
	PNAs		
	Phenols		
	Other		
ICP	Metals		
ICP-MS	Metals		
AA	Metals		
Miscellaneous	General Chemistry		

Additional Comments on Data Reduction Software:

5.0 LABORATORY DOCUMENTATION

5.1 Quality Assurance Manual

Please provide a copy of the laboratory QA manual.

5.2 Standard Operating Procedures

Please provide a copy of the Table of Contents for laboratory standard operating procedures.

5.3 Laboratory Certifications

Please provide copies of original laboratory certifications.

5.4 Performance Evaluation Studies

Please provide copies of results of laboratory's participation in EPA WP and WS Performance Evaluation Studies and any other performance evaluation studies.

URS CORPORATION

LABORATORY AUDIT PROGRAM

GENERAL AUDIT CHECKLIST

Table of Contents

LABORATORY AUDIT CHECKLIST

1.0 GENERAL INFORMATION

Laboratory: _____

Address: _____

_____

_____

Phone No. _____

Date Audited: _____

Auditor(s): _____

Title: _____

Names of Personnel Contacted:	Title

1.0 GENERAL INFORMATION (Continued)

1.1 Sample Receipt and Storage Area

Item	Yes	No	Comment(s)
Is the sample custodian designated? If yes, name of sample custodian. Name:_____ Years in this position: ____			
Is there a backup custodian? Who?_____			
Are written Standard Operating Procedures (SOPs) available for receipt and storage of samples?			
Are chain of custody forms checked with samples?			
Does the laboratory handle the chain of custody forms properly?			
Does the custodian sign the COC form?			
Does the sample custodian note the condition of the samples upon receipt in a logbook?			
Does the custodian note the presence of custody seals in a logbook?			
How are discrepancies noted and the client alerted?			
Does the sample custodian generate a laboratory ID for each sample?			
Is the log-in process linked by computer to the LIMS?			
Are the samples and/or aliquots adequately tracked through the laboratory?			
Does the lab maintain internal COC on all samples and extracts?			
Is the appropriate portion of the SOP available to the analyst at the sample receipt/storage area?			
Are the sample shipping containers opened in a manner which prevents possible laboratory contamination?			
Are samples documented with preservative?			
Are samples stored in such a way as to maintain their preservation?			

1.0 GENERAL INFORMATION (Continued)

1.1 Sample Receipt and Storage Area (Continued)

Item	Yes	No	Comment(s)
Are volatile samples stored separately from semi-volatile samples?			
Are low level samples/standards stored separately from high level samples/standards?			
Are adequate facilities provided for storage of samples, including cold storage?			
Are samples maintained in a refrigerated, designated, locked and secure area?			
Are previously analyzed samples kept until the date report is finalized and accepted by the client?			
Is the temperature of the cold storage recorded daily in a logbook?			
Are temperature excursions noted and are appropriate actions taken when required?			
Are the sample receipt/storage and temperature logbooks maintained in a manner consistent with CLP?			
Are the thermometers used for storage areas referenced to a NBS or ASTM certified or traceable thermometer? How often? _____			
Has the QA Officer or Supervisor of the individual maintaining the notebook/bench sheet personally examined and reviewed the notebook/bench sheet periodically, and signed his/her name therein, together with the date and appropriate comments as to whether or not the notebook/bench sheet is being maintained in an appropriate manner?			
Does the laboratory provide bottles of traceable quality (e.g. ICHEM 300 bottle or equivalent)?			

1.0 GENERAL INFORMATION (Continued)

1.1 Sample Receipt and Storage Area (Continued)

Item	Yes	No	Comment(s)
Are the bottles prepared/preserved in accordance with specific methods and parameters?			
How many shifts for this area?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.2 Hazardous Waste Disposal Procedures

Item	Yes	No	Comment(s)
Name of person responsible for disposal of hazardous waste(s) (HW): _____ Years in this position: _____			
Are written SOPs available for disposal of HW?			
Are the HW disposal/policies well defined and followed by the laboratory?			
Are liquid wastes disposed of properly? How? How often?			
Are solid waste disposed of properly? How? How often?			
Are waste disposal records available?			
Are HW manifests filled out correctly?			

Name of HW transporter:	
Name of HW disposal facility:	
Name(s) of HW recycler(s):	

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.3 General Laboratory Facilities

When touring the facilities, give special attention to:

(a) the overall appearance of organization and neatness,

(b) the proper maintenance of facilities and instrumentation, and

(c) the general adequacy of the facilities to accomplish the required work.

Item	Yes	No	Comment(s)
Is the laboratory maintained in a clean and organized manner?			
Does the laboratory appear to have adequate workspace (120 sq. Feet, 6 linear feet of unencumbered bench space per analyst)?			
Does the laboratory appear to have the capacity to handle large volumes of samples? (How many samples/day do they process?)			
Are voltage control devices used on major instrumentation?			
Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			
Are contamination-free areas provided for trace level analytical work?			
Are contamination-free work areas provided for the handling of toxic material (e.g., glove box)?			
Are exhaust hoods provided to allow contamination-free work with volatile materials?			
Does the laboratory have adequate hood space?			
Is an external security system used to protect the premises from intruders?			
Is access to the laboratory limited to lab personnel only? Are all visitors escorted?			
Does the laboratory have separate designated areas for sample submission, sample storage, extractions, volatile analysis, pest/PCB and semivolatile analysis, inorganic analysis, wet chem analysis, and sample disposal?			

1.0 GENERAL INFORMATION (Continued)

1.3 General Laboratory Facilities (Continued)

Item	Yes	No	Comment(s)
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Can the laboratory supervisor document that trace-free water is available for preparation of standards and blanks?			
Is the supply checked daily? What corrective actions are taken? How is the water pumped to/through the lab? How is the VOA reagent water prepared?			
Is the analytical balance located away from drafts and areas subject to rapid temperature changes?			
Is the balance routinely checked with the appropriate range of Class S weights before each use and are the results recorded in a logbook? For standards preparation? For sample weights?			
Has the balance been calibrated within one year by a certified technician?			
Are pH and ion selective meters operational and properly maintained?			
Is a UV-Visible spectrophotometer operational and properly maintained?			
Do adequate procedures exist for disposal of waste liquids from the ICP and AA spectrometers?			
Is the laboratory secure?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			

1.0 GENERAL INFORMATION (Continued)

1.3 General Laboratory Facilities (Continued)

Item	Yes	No	Comment(s)
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC?			
VOAs?			
Pesticides/PCBs?			
Cyanide?			
TOX?			
BNAs?			
Metals?			
TOC?			
Are reference materials properly labeled with concentrations, date of preparation, and the identify of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Is a spiking/calibration standards preparation and tracking logbook(s) maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Are volatile and semi-volatile solutions properly segregated?			

1.0 GENERAL INFORMATION (Continued)

1.3 General Laboratory Facilities (Continued)

Item	Yes	No	Comment(s)
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Do you have a back-up laboratory?			
If so, who?			
How do you monitor their performance?			
Do you audit your backup laboratory?			
Does the prime laboratory maintain a chain of custody on all samples sent to any subcontract laboratory?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
How does analyst keep track of samples so holding times are not missed?			
How does analyst handle "RUSH REQUESTS"?			
How are samples delivered to this area?			
Are the proper sample handling methods utilized?			
Does lab use procedures for screening VOAs? If so, what procedure?			
Does lab use low medium level extraction and analysis procedures? If not, how does laboratory handle saturation? How long are samples held at room temperature before the actual analysis (injection into the purge and trap chamber)?			
Are voltage control devices used on major instrumentation?			
Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			
Are work areas provided for preparation of standards?			
Are exhaust hoods provided to allow contamination-free work with volatile materials?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Is the analytical balance located away from drafts and areas subject to rapid temperature changes?			

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS (Continued)

Item	Yes	No	Comment(s)
Is the balance routinely checked with the appropriate range of Class S weights before each use and are the results recorded in a logbook?			
For standards preparation? For sample weights?			
Has the balance been calibrated within one year by a certified technician?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? How often?			
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Are spiking/calibration standards preparation and tracking logbooks maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS (Continued)

Item	Yes	No	Comment(s)
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Are volatile and semi-volatile solutions properly segregated?			
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Is equipment consistent with that reported by the lab?			
Are manufacturer's operating manuals readily available to the operator?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventative maintenance scheduled and applied?			
Is a permanent service record maintained in a logbook?			
Has the instrument been modified in any way? If so, how?			
Is the instrument properly vented or are appropriate traps in place?			

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS (Continued)

Item	Yes	No	Comment(s)
Is a glass jet separator in place and operational?			
Is raw data being archived and documented properly (i.e., magnetic tape)? Is the archived data maintained for 1 year?			
Are in-house quality control charts maintained and available for onsite inspection?			
Is a split/splitless capillary injector in place?			
Are method blanks run? How often?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			
How does the analyst handle interference?			
Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
Does the purge and trap have reasonable efficiencies?			
Is BFB tuning conducted daily?			
What does analyst do if BFB tuning is not acceptable?			
Are surrogate spikes put through the whole procedure?			
Are the recoveries acceptable?			
What are the procedures in use for analysis of soil (especially clayey) samples?			

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS (Continued)

Item	Yes	No	Comment(s)
How does the laboratory document the use of various calibration curves for volatile analysis of soil and water samples?			
How is calibration standard raw data being archived?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			
Are data calculations documented?			
Are limits of detection determined and reported properly?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			
How does this area handle overload?			
How many samples per day do they process for Volatile Organic Compounds?			
How many shifts are there for this area?			
How is VOA water prepared?			

1.0 GENERAL INFORMATION (Continued)

1.4 Volatile Organics by GC/MS (Continued)

Item	Yes	No	Comment(s)
What are the common laboratory contaminants detected?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
How does analyst keep track of samples so holding times are not missed?			
How does analyst handle "RUSH REQUESTS"?			
How are samples delivered to this area?			
Are the proper sample handling methods utilized?			
Does lab use procedures for screening VOAs? If so, what procedure?			
Does lab use low medium level extraction and analysis procedures? If not, how does laboratory handle saturation? How long are samples held at room temperature before the actual analysis (injection into the purge and trap chamber)?			
Are voltage control devices used on major instrumentation?			
Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			
Are work areas provided for preparation of standards?			
Are exhaust hoods provided to allow contamination-free work with volatile materials?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Is the analytical balance located away from drafts and areas subject to rapid temperature changes?			

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC (Continued)

Item	Yes	No	Comment(s)
Is the balance routinely checked with the appropriate range of Class S weights before each use and are the results recorded in a logbook?			
For standards preparation?			
For sample weights?			
Has the balance been calibrated within one year by a certified technician?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? How often?			
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Are spiking/calibration standards preparation and tracking logbooks maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC (Continued)

Item	Yes	No	Comment(s)
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Are volatile and semi-volatile solutions properly segregated?			
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Is equipment consistent with that reported by the lab?			
Are manufacturer's operating manuals readily available to the operator?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventative maintenance scheduled and applied?			
Is a permanent service record maintained in a logbook?			
Has the instrument been modified in any way? If so, how?			
Is the instrument properly vented or are appropriate traps in place?			

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC (Continued)

Item	Yes	No	Comment(s)
Is raw data being archived and documented properly? Is the archived data maintained for 1 year?			
Are in-house quality control charts maintained and available for onsite inspection?			
Is a split/splitless capillary injector in place?			
Are method blanks run? How often?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			
How does the analyst handle interference? Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
Does the purge and trap have reasonable efficiencies?			
Are surrogate spikes put through the whole procedure?			
Are the recoveries acceptable?			
What are the procedures in use for volatile GC analysis of soil (especially clayey) samples?			
How does the laboratory document the use of various calibration curves for volatile analysis of soil and water samples?			
How is calibration standard raw data being archived?			

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC (Continued)

Item	Yes	No	Comment(s)
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			
Are data calculations documented?			
Are limits of detection determined and reported properly?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			
How does the laboratory handle overload?			
How many samples per day do they process for Volatile Organic Compounds?			
How many samples per day do they process for Volatile Halogenated Hydrocarbons?			
How many shifts are there for this area?			
How is VOA water prepared?			

1.0 GENERAL INFORMATION (Continued)

1.5 Volatile Organics by GC (Continued)

Item	Yes	No	Comment(s)
What are the common laboratory contaminants detected?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.6 Semi-Volatile Organics Preparation

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
How does analyst keep track of samples so holding times are not missed?			
How does analyst handle "RUSH REQUESTS"?			
How are samples delivered to this area?			
Are the proper extraction methods utilized?			
Water extraction equipment?			
Sonicator or Soxhelt?			
Concentration equipment?			
For solid samples?			
Are the recoveries acceptable?			
Were the proper holding times followed? within 7 days for extraction of water? within 10 days for extraction of solids?			
Was a Kuderna-Danish used to concentrate and exchange solvents?			
Was the cleanup procedure utilized? Which one?			
Are voltage control devices used on major instrumentation?			
Are contamination-free areas provided for preparation of standards and surrogates?			
Are all extractors located in exhaust hoods to provide contamination-free work with volatile organic analyses?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			

1.0 GENERAL INFORMATION (Continued)

1.6 Semi-Volatile Organics Preparation (Continued)

Item	Yes	No	Comment(s)
What does the laboratory use for the method blank?			
Is the analytical balance located away from drafts and areas subject to rapid temperature changes?			
Is the balance routinely checked with the appropriate range of Class S weights before each use and are the results recorded in a logbook? For standards preparation? For sample weights?			
Has the balance been calibrated within one year by a certified technician?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? Pesticides/PCBs? BNAs?			
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Is a spiking/calibration standards preparation and tracking logbooks maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			

1.0 GENERAL INFORMATION (Continued)

1.6 Semi-Volatile Organics Preparation (Continued)

Item	Yes	No	Comment(s)
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Are extracts screened before submitting extracts to analysts?			
How are extracts delivered to analysts?			
Are there internal chain-of-custody forms?			
How are soil samples disposed of after extraction?			
How does this area handle overload?			
Additional Comments:			

1.0 GENERAL INFORMATION (Continued)

1.7 Semi-Volatile Organics Analysis by GC/MS

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
Do analyst check with extractions group to prevent missed holding times of samples?			
How does analyst handle "RUSH REQUESTS"?			
How are extracts delivered to this work area?			
How many shifts for this area?			
Are voltage control devices used on major instrumentation?			
Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			
Are work areas provided for preparation of standards?			
Are exhaust hoods provided to allow contamination-free work with volatile materials?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? BNAs?			

1.0 GENERAL INFORMATION (Continued)

1.7 Semi-Volatile Organics Analysis by GC/MS (Continued)

Item	Yes	No	Comment(s)
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Is a spiking/calibration standards preparation and tracking logbook(s) maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Are volatile and semi-volatile properly segregated?			
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Is equipment consistent with that reported by the lab?			

1.0 GENERAL INFORMATION (Continued)

1.7 Semi-Volatile Organics Analysis by GC/MS (Continued)

Item	Yes	No	Comment(s)
Are manufacturer's operating manuals readily available to the operator?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventative maintenance scheduled and applied?			
Is a permanent service record maintained in a logbook?			
Has the instrument been modified in any way? If so, how?			
Is the instrument properly vented or are appropriate traps in place?			
Is a glass jet separator in place and operational?			
Is raw data being archived and documented properly (i.e., magnetic tape)? Is the archived data maintained for 1 year?			
Are in-house quality control charts maintained and available for onsite inspection?			
Is a split/splitless capillary injector in place?			
Are method blanks run? How often?			
Are the results within QC limits?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			

1.0 GENERAL INFORMATION (Continued)

1.7 Semi-Volatile Organics Analysis by GC/MS (Continued)

Item	Yes	No	Comment(s)
How does the analyst handle interference? Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
What does analyst do if DFTPP tuning is not acceptable?			
Is the tuning conducted daily?			
Are surrogate spikes put through the whole procedure?			
Are the recoveries acceptable?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
How many samples per day can be analyzed?			
How does this area handle overload?			
How does the laboratory document the use of various calibration curves for analysis of soil and water samples?			
How is the calibration standard raw data being archived?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			
Are data calculations documented?			
Are limits of detection determined and reported properly?			
Are all data and records retained for the required amount of time?			

1.0 GENERAL INFORMATION (Continued)

1.7 Semi-Volatile Organics Analysis by GC/MS (Continued)

Item	Yes	No	Comment(s)
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.8 Semi-Volatile Organics Analysis by GC

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
Do analyst check with extractions group to prevent missed holding times of samples?			
How does analyst handle "RUSH REQUESTS"?			
How are extracts delivered to this work area?			
How many shifts for this area?			
Are voltage control devices used on major instrumentation?			
Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			
Are work areas provided for preparation of standards?			
Are exhaust hoods provided to allow contamination-free work with volatile materials?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
Are reagent grade or higher purity chemicals (Ultrex-metals, pesticide grade-organics) used to prepare standards?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? Pesticides/PCBs?			

1.0 GENERAL INFORMATION (Continued)

1.8 Semi-Volatile Organics Analysis by GC (Continued)

Item	Yes	No	Comment(s)
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Is a spiking/calibration standards preparation and tracking logbook(s) maintained?			
Are the primary standards traceable to EPA standards? (If not, where?)			
Are standards stored separately from sample extracts?			
Do the analysts record bench data in a neat and accurate manner?			
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Are volatile and semi-volatile solutions properly segregated?			
Is the appropriate portion of the SOP available to the analyst at the sample preparation area?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily?			
Are temperature excursions noted and appropriate actions taken when required?			
Is equipment consistent with that reported by the lab?			

1.0 GENERAL INFORMATION (Continued)

1.8 Semi-Volatile Organics Analysis by GC (Continued)

Item	Yes	No	Comment(s)
Are manufacturer's operating manuals readily available to the operator?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventative maintenance scheduled and applied?			
Is a permanent service record maintained in a logbook?			
Has the instrument been modified in any way? If so, how?			
Is the instrument properly vented or are appropriate traps in place?			
Is a glass jet separator in place and operational?			
Is raw data being archived and documented properly (i.e., magnetic tape)? Is the archived data maintained for 1 year?			
Are in-house quality control charts maintained and available for onsite inspection?			
Is a split/splitless capillary injector in place?			
Are method blanks run? How often?			
Are the results within QC limits?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			

1.0 GENERAL INFORMATION (Continued)

1.8 Semi-Volatile Organics Analysis by GC (Continued)

Item	Yes	No	Comment(s)
How does the analyst handle interference? Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
Are Aroclor 1221 and 1232 standards run at least monthly and the data maintained?			
How does analyst quantitate PCBs? (Have analyst show you chromatogram.)			
How does analyst quantitate PCBs if some of the Aroclor peaks have been degraded?			
How does analyst quantitate PCBs when some of the peaks of one Aroclor overlaps with a second Aroclor?			
How does analyst quantitate PCBs if pesticides are present?			
For pesticide analysis, are DDT/Endrin degradation products evaluated?			
How many samples per day can be analyzed?			
How does this area handle overload?			
How does the laboratory document the use of various calibration curves for analysis of soil and water samples?			
How is the calibration standard raw data being archived?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			

1.0 GENERAL INFORMATION (Continued)

1.8 Semi-Volatile Organics Analysis by GC (Continued)

Item	Yes	No	Comment(s)
Are data calculations documented?			
Are limits of detection determined and reported properly?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.9 Metals Digestion

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
How are samples delivered to this work area?			
How does this person schedule work to meet reporting times?			
How does this person handle "RUSH REQUESTS"?			
Are SOPs available in this area?			
How many shifts for this area?			
Is the laboratory maintained in a clean and organized manner?			
Does the laboratory appear to have adequate workspace (120 sq. Feet, 6 linear feet of unencumbered bench space per analyst)?			
How many samples/day do they process?			
Are exhaust hoods provided for digestion of metals?			
Is the air flow of the hoods periodically checked and recorded (i.e., once per quarter)? What is flowrate maintained in the hoods?			
Can the laboratory supervisor document that trace-free water is available for preparation of standards and blanks? How is the water pumped to/through the lab?			
Is the analytical balance located away from drafts and areas subject to rapid temperature changes?			
Is the balance routinely checked with the appropriate range of Class S weights before each use and are the results recorded in a logbook?			
For standard preparation? For sample weights?			
Has the balance been calibrated within one year by a certified technician?			

1.0 GENERAL INFORMATION (Continued)

1.9 Metals Digestion (Continued)

Item	Yes	No	Comment(s)
Are the solvent storage cabinets properly vented as appropriate for the prevention of possible laboratory contamination?			
Are analytical reagents dated upon receipt?			
Are reagent inventories maintained on a first-in, first-out basis?			
Are analytical reagents checked out before use?			
How are samples digested for mercury?			
Are fresh analytical standards prepared at a frequency consistent with good QA/QC? How often?			
Are reference materials properly labeled with concentrations, date of preparation, and the identity of the person preparing the samples?			
Are standards kept in proper containers, with necessary preservatives and storage temperatures?			
Are spiking/calibration standards preparation and tracking logbooks maintained?			
Are the primary standards traceable to EPA standards? If not, where?			
Are standards stored separately from sample extracts?			
Does the laboratory staff record bench data in a neat, complete, and accurate manner?			
Has the supervisor of the analyst maintaining the notebook/bench sheet personally examined and reviewed the documentation periodically, and signed his/her name therein, together with the data and appropriate comments as to whether or not the documentation is being maintained in an appropriate manner?			
Is the appropriate portion of the SOP available to the laboratory staff at the sample preparation area?			

1.0 GENERAL INFORMATION (Continued)

1.9 Metals Digestion (Continued)

Item	Yes	No	Comment(s)
Do you perform separate digestions for Ag Sb, and Mo?			
Do you perform HCI and HNO_3 digestions?			
Do you have more than one prep method for water?			
Do you have more than one prep method for soil?			
Are QC samples spiked at a concentration in the middle of the calibration curve?			
Is the SOP for glassware washing posted at the cleaning station?			
Are the SOPs for the glassware washing and cleaning adequate for the particular analyses?			
Is the temperature of the refrigerator/freezers recorded daily? Are temperature excursions noted and appropriate actions taken when required?			
How are digested samples delivered to analysts?			
Are there internal chain-of-custody forms?			
How are soil samples disposed of after digestion?			
How does this area handle overload?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.10A Metals Analysis – Inductively Coupled Argon Plasma Emission Spectroscopy

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
Do analysts check with metals digestion group to prevent missed reporting times for samples?			
How do analysts handle "RUSH REQUESTS"?			
How are digested samples delivered to this work area?			
Is instrumentation consistent with that reported by the lab?			
Are manufacturer's operating manuals readily available to the operator?			
Are SOPs available?			
Is there a calibration protocol available to the operator?			
Are the calibration results kept in a permanent bound record?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventive maintenance scheduled and applied?			
Is a permanent service record maintained in a bound logbook for each instrument?			
Is each entry signed and dated?			
Has the instrument been modified in any way?			
Is the instrument properly vented?			
Is the argon supply reliable, and pressure regulated?			
Are interference check samples run regularly? At what frequency?			
Are interference corrections made automatically by the data system?			
Do adequate procedures exist for disposal of waste			

1.0 GENERAL INFORMATION (Continued)

1.10A Metals Analysis – Inductively Coupled Argon Plasma Emission Spectroscopy

Item	Yes	No	Comment(s)
liquids from the ICP spectrometers?			
How are the following interferences compensated? Spectral overlap? Spectral background?			
How do they perform metal analyses in salt water samples?			
Are out of range samples diluted and re-analyzed?			
Are in-house quality control charts maintained and available for on-site inspection?			
Are method blanks run? How often?			
Are the results within QC limits?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			
How does the analyst handle interferences?			
Is a duplicate sample analyzed with the batch?			
What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
Are bound sample analysis logs kept for each instrument? Is each entry signed and dated?			

1.0 GENERAL INFORMATION (Continued)

1.10A Metals Analysis – Inductively Coupled Argon Plasma Emission Spectroscopy

Item	Yes	No	Comment(s)
How many samples per day can be analyzed?			
How does this area handle overload?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			
Are data calculations documents?			
Are limits of detection determined and reported properly?			
Are MDL studies updated annually?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken in a timely fashion when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			
Has the supervisor of the individuals maintaining logbooks personally reviewed the logbooks periodically, and signed his/her name there in, together with the data and appropriate comments as to whether or not the logbook is being maintained in an appropriate manner?			
Concentration CCV?			
Concentration ICV?			
Frequency CCB analysis?			
Frequency of ICS analysis?			

1.0 GENERAL INFORMATION (Continued)

1.10A Metals Analysis – Inductively Coupled Argon Plasma Emission Spectroscopy

Item	Yes	No	Comment(s)
Frequency of CCV analysis?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.10B Metals Analysis – Inductively Coupled Plasma Mass Spectrometry

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
Do analysts check with metals digestion group to prevent missed reporting times for samples?			
How do analysts handle "RUSH REQUESTS"?			
How are digested samples delivered to this work area?			
Is instrumentation consistent with that reported by the lab?			
Are manufacturer's operating manuals readily available to the operator?			
Are SOPs available?			
Is there a calibration protocol available to the operator?			
Are the calibration results kept in a permanent bound record?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventive maintenance scheduled and applied?			
Is a permanent service record maintained in a bound logbook for each instrument?			
Is each entry signed and dated?			
Has the instrument been modified in any way?			
Is the instrument properly vented?			
Is the argon supply reliable, and pressure regulated?			
Is the tuning solution analyzed daily? What metals are included in the tuning solution?			
Is mass calibration and resolution checks performed daily?			

1.0 GENERAL INFORMATION (Continued)

1.10B Metals Analysis – Inductively Coupled Plasma Mass Spectrometry

Item	Yes	No	Comment(s)
What are the evaluation criteria?			
What Internal Standards does the analyst use? What are the criteria for selecting Internal Standards?			
What are the acceptance ranges for internal standard recovery?			
What does the analyst do if the recoveries are outside of the pertinent acceptance range?			
Are the Internal Standards added to the Standards and samples on-line or by pipet? How often is the tubing changed? How often is the pipet calibrated?			
What does the analyst do if the Internal Standard for the CCB or CCV don't agree within ±20% of the intensity level of the original calibration solution?			
Are interference check samples run regularly? At what frequency?			
Are interference corrections made automatically by the data system?			
Do adequate procedures exist for disposal of waste liquids from the ICP-MS?			
How are metal analyses in salt water samples performed?			
Are in-house quality control charts maintained and available for on-site inspection?			
Are method blanks run? How often?			
Are the results within QC limits?			
Are the sample results blank corrected?			
Are daily standard(s) run? Does the analyst acid match standards? What does the analyst do if the results are not within QC limits?			

1.0 GENERAL INFORMATION (Continued)

1.10B Metals Analysis – Inductively Coupled Plasma Mass Spectrometry

Item	Yes	No	Comment(s)
Is a matrix spike analyzed with the batch?			
What does the analyst do if the spike recovery is not acceptable?			
Is a LCS analyzed with each batch? What does the analyst do if the spike recovery is not acceptable?			
Is a post-digestion spike analyzed with the batch? What does the analyst do if the recovery is not acceptable?			
Is a serial dilution analyzed with the batch? What does the analyst do if the % Ds are not acceptable?			
What does the analyst do when sample concentrations exceed the linear range?			
How does the analyst handle interferences?			
Is a duplicate sample analyzed with the batch?			
What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
Are bound sample analysis logs kept for each instrument?			
Is each entry signed and dated?			
Are out of range samples diluted and reanalyzed?			
How many samples per day can be analyzed?			
How does this area handle overload?			
After review of data by analyst, where does data package go?			

1.0 GENERAL INFORMATION (Continued)

1.10B Metals Analysis – Inductively Coupled Plasma Mass Spectrometry

Item	Yes	No	Comment(s)
Are data calculations spot-checked by a second person?			
Are data calculations documents?			
Are limits of detection determined and reported properly?			
Are MDL studies updated annually?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken in a timely fashion when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			
Has the supervisor of the individuals maintaining logbooks personally reviewed logbooks periodically, and signed his or her name therein, together with the data and appropriate comments as to whether or not the logbook is being maintained in an appropriate manner?			
Concentration CCV?			
Concentration ICV?			
Frequency of CCB analysis?			
Frequency of ICS analysis?			
Frequency of CCV analysis?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.11 Metals Analyses - Atomic Absorption (AA) Spectroscopy

Item	Yes	No	Comment(s)
Who is person responsible for this area? Name:_____ Years in this position: _____			
Do analysts check with metals digestion group to prevent missed reporting times for samples?			
How do analysts handle "RUSH REQUESTS"?			
How are digested samples delivered to this work area?			
Is instrumentation consistent with that reported by the lab?			
Are the calibration results kept in a permanent record?			
Is service maintenance by contract? How often is it performed?			
Are extensive in-house replacement parts available?			
Is preventive maintenance scheduled and applied?			
Is a permanent service record maintained in a logbook?			
Has the instrument been modified in any way?			
Is the instrument properly vented?			
Is the unit equipped with flameless accessory?			
Is background correction automatically performed?			
Are manufacturer's operating manuals readily available to the operator?			
Are SOPs available?			
Do adequate procedures exist for disposal of waste liquids from the ICP and AA spectrometers?			
How many shift for this area?			
Are in-house quality control charts maintained and available for on-site inspection?			
Are method blanks run? How often?			

1.0 GENERAL INFORMATION (Continued)

1.11 Metals Analyses - Atomic Absorption (AA) Spectroscopy (Continued)

Item	Yes	No	Comment(s)
Are the results within QC limits?			
Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the spike recovery is not acceptable?			
Is a dilution test analyzed with the batch? What does the analyst do if all samples are ND? What does the analyst do if the % Ds are not acceptable?			
How does the analyst handle interferences?			
Is a duplicate sample analyzed with the batch?			
What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they less than those in the method?			
How do they perform mercury analyses?			
How are their selenium analyses? (Selenium analyses are difficult.)			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
How many samples per day can be analyzed?			
How does this area handle overload?			
After review of data by analyst, where does data package go?			
Are data calculations spot-checked by a second person?			
Are data calculations documents?			

*Under what conditions would the analyst use the MSA for quantitation.

1.0 GENERAL INFORMATION (Continued)

1.11 Metals Analyses - Atomic Absorption (AA) Spectroscopy (Continued)

Item	Yes	No	Comment(s)
Are limits of detection determined and reported properly?			
Are all data and records retained for the required amount of time?			
Are quality control data (e.g., standard curve results of duplication and spikes) accessible for all analytical results?			
Do records indicate that appropriate corrective action has been taken when analytical results fail to meet QC criteria?			
Are computer programs validated before use?			
Do supervisory personnel review the data and QC results?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.12 Other Metal Analyses

Item	Yes	No	Comment(s)
Are the proper analytical methods utilized for chromium (VI)?			
Are SOPs available?			
How does the person scheduled work to meet holding times? For chromium VI (24 hours)?			
Are method blanks run? What does the analyst do if the results are not within QC limits? Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the recovery is not acceptable? How does the analyst handle interferences?			
Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they lower than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately form sample prep to the final value (including dilution factors)?			
How many samples per day can be analyzed?			
How does this area handle overload?			
Are in-house quality control charts maintained and available for onsite inspection?			

1.0 GENERAL INFORMATION (Continued)

1.12 Other Metal Analyses (Continued)

Item	Yes	No	Comment(s)
After review of data, where does data package go?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.13 Cyanide Analyses

Item	Yes	No	Comment(s)
Are the proper analytical methods being used?			
How does the analyst keep track of samples to prevent missed holding items (cyanide - 14 days)?			
Are the samples for total analysis properly digested/distilled?			
What are the recoveries of the internal standard from the digestion/distillation procedure (±10%)?			
Are daily blanks run? What does the analyst do if the results are not within QC limits? Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the recovery is not acceptable? How does the analyst handle interferences?			
Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Have the detection limits been calculated? Are they lower than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately form sample prep to the final value (including dilution factors)?			
How many samples per day can be analyzed?			
Are in-house quality control charts maintained and available for onsite inspection?			

1.0 GENERAL INFORMATION (Continued)

1.13 Cyanide Analyses (Continued)

Item	Yes	No	Comment(s)
After review of data, where does data package go?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.14 Total Organic Carbon

Item	Yes	No	Comment(s)
Are the proper analytical methods utilized?			
Are SOPs available?			
Are samples collected in glass bottles? With no head space?			
Are the samples acidified by pH <2 with HCL or H_2SO_4 if not analyzed within 2 hours?			
Are the samples cooled (4°C) and protected from sunlight?			
Are samples analyzed within 28 days of sampling?			
Are the samples homogenized in a blender?			
Are inorganic forms of carbon removed by acidifying to a pH <2?			
Are the acidified samples purged with nitrogen?			
If the inorganic carbon is not removed, is it accounted for in the sample results?			
Is potassium hydrogen phthalate used as the standard?			
Is a series of standards used to encompass the sample range?			
Is an independently prepared check standard analyzed every 15 samples?			
Are quadruplicate analyses performed? Are the average and range of each sample reported?			
Are instrument operation manuals available?			
Are daily blanks run? What does the analyst do if the results are not within QC limits? Are the sample results blank corrected?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			

1.0 GENERAL INFORMATION (Continued)

1.14 Total Organic Carbon (Continued)

Item	Yes	No	Comment(s)
Is a matrix spike analyzed with the batch? What does the analyst do if the recovery is not acceptable?			
Is a spike duplicate run every 10 samples? Is it put through the whole preparation and analyses?			
Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Are reagent blanks interspersed every 15 samples? Do they show any memory effects or contamination?			
Have the detection limits been calculated? Are they lower than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
Are in-house quality control charts maintained and available for onsite inspection?			
After review of data, where does data package go?			

Additional Comments:

1.0 GENERAL INFORMATION (Continued)

1.15 Total Organic Halides

Item	Yes	No	Comment(s)
Are the proper analytical methods utilized?			
Are SOPs available?			
Are the inorganic halides less than 20,000 times the organic halides?			
Is one of the recommended instruments used for the analysis (Cosa TOX-10, Xertex/Dohrmann DX-20, or DX20A)?			
Are instrument operating manuals available?			
If not, is the instrument in use a suitable replacement?			
Are samples collected and stored in clean glass bottles?			
With no headspace?			
Are samples acidified to pH <2 with sulfuric acid?			
Are samples cooled (4°C) and protected form sunlight?			
Is sulfite added to reduce residual chlorine?			
Are samples analyzed within 14 days?			
Are particulates eliminated from the sample?			
If the particulates are removed, was the purgeable organic halides (POX) measured separately from the non-purgeable organic halides (NPOX)?			
Is the methanol used to prepare the calibration standard used as the blank standard? Is the absorption efficiency of each batch of carbon measured and within a 95 to 100% recovery?			
Is trichlorophenol used as the standard?			
Is a series of standards used to encompass the sample range?			
Is an independently prepared check standard analyzed every 15 samples?			

1.0 GENERAL INFORMATION (Continued)

1.15 Total Organic Halides (Continued)

Item	Yes	No	Comment(s)
Are nitrate wash blanks (method blanks) run every morning and every eight pyrolysis determinations?			
Are daily blanks run? What does the analyst do if the results are not within QC limits?			
Are daily standard(s) run? What does the analyst do if the results are not within QC limits?			
Is a matrix spike analyzed with the batch? What does the analyst do if the recovery is not acceptable? How does the analyst handle interferences?			
Is a spike duplicate run every 10 samples? Is it put through the whole preparation and analyses?			
Is a duplicate sample analyzed with the batch? What does the analyst do if the precision is not acceptable?			
Are reagent blanks interspersed every 15 samples? Do they show any memory effects or contamination?			
Have the detection limits been calculated? Are they lower than those in the method?			
Are the bench sheets accurate and well organized?			
Are the sample results calculated accurately from sample prep to the final value (including dilution factors)?			
How many samples per day can be analyzed?			
Are in-house quality control charts maintained and available for onsite inspection?			
After review of data, where does data package go?			

1.0 GENERAL INFORMATION (Continued)

1.15 Total Organic Halides (Continued)

Item	Yes	No	Comment(s)
Additional Comments:			

2.0 DATA MANAGEMENT CHECKLIST

2.1 Sample Tracking

Item	Yes	No	Comment(s)
Is computer hardware consistent with questionnaire?			
Is there a computerized sample tracking system in place? If not, describe tracking methodology used? If so, is sample status readily available?			
Is there a warning system for holding time expirations?			
How are special requests handled?			
How are standard requests handled?			

Additional Comments:

2.0 DATA MANAGEMENT CHECKLIST (Continued)

2.2 Reporting

Item	Yes	No	Comment(s)
Is report generating software included in data reduction software? If so, for what instruments/methods?			

What software other than those cited above are used in report generation?

Method	Software

For analyses which do not include computerized data reduction/reporting, how are data verified?			
Have report generating software packages been independently verified?			
How are final reports proofed against input data?			
What is the calculated average turnaround time from sample receipt to report delivery?			
Can holding times be verified from reports?			
Are reports signed by either the analyst or a QC reviewer?			
Is a case narrative provided with report?			
What types of QC reports are available?			
Is there an extra charge?			
If appropriate, has laboratory provided examples of reporting format?			
Can analysts verify proper instrument performance (calibration, continuing calibration, surrogate recovery, interference check standard, spike recovery, blanks, as appropriate) during analysis at the time of the audit?			
Are QC criteria met before samples are analyzed?			

2.0 DATA MANAGEMENT CHECKLIST (Continued)

2.2 Reporting (Continued)

Item	Yes	No	Comment(s)
Additional Comments:			

2.0 DATA MANAGEMENT CHECKLIST (Continued)

2.3 Responsiveness

Item	Yes	No	Comment(s)
Are senior technical personnel available for same-day consultation?			
Are specific individuals assigned for client contact?			
How long before a client request is typically answered?			

Additional Comments:

3.0 EFFECTIVENESS OF QA PROGRAM

Item	Yes	No	Comment(s)
Is there a consistent understanding of the labs QA protocols, including corrective actions at all levels?			
Management			
QA Officers			
Supervisory			
Staff			
Technicians			
Is there an internal QA audit program? If so, what is the frequency? When was the last internal audit? Have the corrective actions mentioned in the audit report been implemented by the bench chemists?			
How are audits documented? Request documentation from most recent audit.			
Does the internal program include corrective actions? How are they implemented?			
Does the laboratory participate in external audit programs? If so, list them. Request most recent results.			
Has the laboratory participated in EPA's WS and WP Performance Evaluation studies during the last year?			
Do they have the records on file for easy review?			
Have they analyzed the compounds that they report for the facility?			

3.0 EFFECTIVENESS OF QA PROGRAM (Continued)

Item	Yes	No	Comment(s)
What percentage of the possible analytes did they analyzed?			
Did the lab have acceptable performance on the QA samples for the reported analytes? (Note problem analytes.)			
For the analyses outside of acceptable limits, did the lab conduct any corrective action?			
Was the corrective action documented?			
Has the laboratory participated in performance evaluations other than the EPA WP or WS series?			
Have they been a part of an external QA program?			
Is their performance acceptable?			
Is there a mechanism established for corrective action on analyses with poor performance?			
Does the lab have a regularly scheduled internal QA program?			
Does the QA Officer submit blind samples for analyses? How often?			
Is there a mechanism established for corrective action on analyses with poor performance?			
Is there a formal staff training program?			
Do SOPs exist for the training program?			
How are new analysts certified?			
Does the QA officer maintain employee training records?			
Are these records available?			
Are SOPs and QAP consistent with current regulatory guidance?			

When was the last revision?

Document	Last Revision Date
SOP	
QAP	

3.0 EFFECTIVENESS OF QA PROGRAM (Continued)

Item	Yes	No	Comment(s)
Has the QA Officer verified any computer programs used for data reduction and reporting? _____			
If so, how? Attach documentation.			

Software	Verified by	Date	Comments

Additional Comments:

SUMMARY CHECKLIST

Item	Yes	No	Comment(s)
Do responses to the evaluation indicate that project and supervisory personnel are aware of QA/QC and its application to the project?			
Do project and supervisory personnel place positive emphasis on QA/QC?			
Have responses, with respect to QA/QC aspects, been open and direct?			
Has a cooperative attitude been displayed by all project and supervisory personnel?			
Does the organization place the proper emphasis on quality assurance?			
Is the overall quality assurance adequate to accomplish URS and/or client objectives?			
Has corrective action(s), recommended during previous evaluations, been implemented? If not, provide details under additional comments.			

Additional Comments:

EXIT INTERVIEW WORKSHEET
Part I

Laboratory Facility: _____

Date: _____ Prepared by: _____

	1	2	3	Comment
1.0 BASIC CAPABILITIES				
a - Facilities				
b - Organization and personnel				
c - Analytical instrumentation				
d - Calibration materials				
e - Laboratory documentation				
2.0 LABORATORY OPERATIONS				
a - Sample receipt and handling				
b - Sample tracking				
c - Sample preparation				
d - Analytical methods				
e - Data reduction and reporting				
f - Data review and documentation				
3.0 CRITICAL OBSERVATIONS				
a - Capacity				
b - Responsiveness				
c - Reporting				
d - Effectiveness of QA Program				

1 - Satisfactory

2 - Not Satisfactory - any item rated "Not Satisfactory" must be listed on the attached form with a full explanation of the deficiency. All such items should be discussed with laboratory management and corrective actions agreed upon and noted. The attached form must be signed and dated by the audit team, and by laboratory management. A copy should be left with the laboratory for implementation of corrective action.

3 - Not Reviewed - Items listed as "not reviewed" must also be accompanied by an explanation, although corrective actions may not be required.

EXIT INTERVIEW WORKSHEET
PART II

AREAS OF DEFICIENCY

Item No.	Explanation of Deficiency	Corrective Action

Signatures:

Auditor	Date	Lab Representative	Date
Auditor	Date	Lab Representative	Date

YEAR 2000 COMPLIANCE CHECKLIST

How have you evaluated the following items for Y2K compliance?

Item	Comments	OK	
LIMS		Y	N
Automated/Computer Controlled Instrumentation		Y	N
Operating System for PCs		Y	N
Phone System		Y	N
Fax machine		Y	N
Software		Y	N

YEAR 2000 COMPLIANCE CHECKLIST FOR SHRINK WRAP OR INTERNALLY DEVELOPED APPLICATIONS (Source: Sybase)

Product: _____

Tester: _____

Date: _____

		Pass	Fail	N/A
General Integrity				
If the product provides a function to obtain the system date:				
Does the product return the correct value for system date for high risk dates (see Note 2 below)	9/9/99			
	12/31/99			
	1/1/00			
	2/29/00			
Does the product return the correct value for system date after the system date rolls over on high-risk dates	1998-12-31 > 1999-01-01			
	1999-12-31 > 2000-01-01			
	2000-02-28 > 20000-02-29			
	2000-02-29 > 2000-03-01			
Date Integrity				
Does the product support date values in the range 1900-01-01 to 2050-12-31?				
Do the product routines treat 2000 as a leap year and 1900 as a non-leap year?				
Does the date arithmetic correctly calculate differences between dates, add dates and durations, and compute date of week across centuries?				
Does the product correctly compare dates across centuries?				
Does the product retrieve dates accurately for values in the range 1900-01-01 to 2050-12-31?				
Does the product convert date values from one representation to another (for example, YMD to Julian to base-and-offset internal)?				
Is the date function free of special values? (E.g.: a year value of 99 or 00 meaning end of file)				
If the product uses sort/merge utilities to order file contents on date fields or uses indexed file structures keyed on date fields, is the order correct for all values of date in the range 1900-01-01 to 2050-12-31?				
Explicit Century				
Does the date field permit setting explicit values for century, stored in an 8-digit field with a 4-digit year?				
Do retrieval functions permit formatting dates with explicit century?				
Implicit Century				
Does the date field provide for data types without explicit century?				
If the value for century is not explicitly provided, is the century value derived consistently from the value of the date provided?				

Notes:

Evaluation of the product for Year 2000 compliance should be based upon how well it passed the test. The "Failed" items should be carefully evaluated for setting priority on product upgrade or migration to another compliant product. If the product's use is not adversely impacted by the failed items, upgrade may not be necessary.

This test procedure requires resetting your computer clock. We recommend that the test be conducted on a stand-alone computer to avoid corrupting date related information on your "production" computer.

ATTACHMENT G

DuPont CRG and URS DIAMOND FIELD SERVICES

GROUNDWATER FIELD SAMPLE LOG SHEET

SITE: LOC: PERSONNEL:
PROJECT NAME:
PROJECT MANAGER:
PROJECT CHARGE NO:

SAMPLE (WELL ID)	DATE SAMPLED	TIME SAMPLED	WELL DEPTH (ft)	WATER LEVEL (ft)	OVM (PPM)		pH	TEMP (C)	SPECIFIC CONDUCTANCE (umhos/cm)	DISSOLVED OXYGEN (mg/l)	REDOX (mv)	TURBIDITY (ntu)	COLOR	ODOR
					BZ	CA								

Additional Comments: O23 had duplicate sample,ms/msd voa samples on gwrs inf/eff. Olin inf/eff.

APPENDIX H
HEALTH AND SAFETY PLAN
OPERATIONS AND MAINTENANCE
DUPONT NECCO PARK
NIAGARA FALLS, NEW YORK

Date: April 2005

DuPont Project No: 7407
URSD Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

Kathryn A. Sova
URS Diamond
Regional Health and Safety Manager

Joseph M. McCarthy
URS Diamond
Project Manager

REVISION CHECKLIST

HASP Section	PM Initials	RHSM Initials	SSO Initials	Date	Comments

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1.0 PURPOSE

The purpose of this health and safety plan (HASP) is to assign responsibilities, establish personnel protection standards, specify safe operating procedures, and provide for contingencies that may arise during the operation and maintenance of the landfill cap upgrade and groundwater hydraulic controls remedial actions at the DuPont, Necco Park Landfill site in Niagara Falls, New York. This HASP also addresses other elements of the remedial program described in the Necco Park Statement of Work including long-term hydraulic and chemistry monitoring and landfill cap upgrade.

This HASP has been developed in accordance with the DuPont Corporate Remediation Group (CRG), and URS Diamond (URSD) safety and health standard operating procedures and is in compliance with requirements set forth in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.

The site supervisor and site safety officer (SSO) have shared responsibility for implementing and enforcing this HASP. The SSO will evaluate this HASP for continuing adequacy throughout the course of field activities to incorporate changes necessitated as a result of changes in site activities. All proposed revisions to this HASP will be reviewed by the Regional Health and Safety Manager prior to implementation by the project team and annotated on the revision checklist provided at the beginning of this document.

All participants involved in the project will be briefed on and afforded the opportunity to question this HASP. In addition, all personnel will sign the HASP Compliance Form provided in Attachment A (see Attachment A for field-related forms).

ATTENTION CONTRACTORS: You are responsible for compliance with this HASP and any other regulatory requirements set forth by the Occupational Safety and Health Act (OSHA) and other federal/state regulations.

2.0 PROJECT DESCRIPTION

2.1 General

Plant/Facility Name:	Necco Park
Plant/Facility Address:	5600 Niagara Falls Blvd. Niagara Falls, New York 14302
Plant/Facility Description:	The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York. Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Allied Waste. Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a CSX right-of-way bound the site to the west. Land in the vicinity of the site is predominately zoned for commercial or industrial use. Several major manufacturing facilities are located within one mile of the site, and two manufacturers – Durez Chemical and the Carbide/Graphite Group (formerly Airco Carbon) - are 2,000 feet and 300 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.
Project/Site History:	Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company. The site was sold to DuPont in 1930. As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on DuPont records and an interpretation of historic aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill. Documentation of activities at Necco Park prior to 1964 is

limited. The following wastes were disposed of in the largest quantities:

- Flyash
- Building demolition and miscellaneous plant debris
- Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- Sodium cell rubble (i.e., thermal brick, corroded steel)
- Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- Liming residues (i.e., sludge saturated with tri- and tetyrachloroethene [TCE and PCE])
- Scrap organic mixtures, off-grade product
- Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)
- Refined adiponitrile waste (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

Several interim response actions were implemented to mitigate the impact and spread of contamination. During 1978 and 1979, a clay cap was constructed over the 24-acre site.

In 1982, two existing monitoring wells (D-12 and 52) were converted to recovery wells (RW-1 and RW-2) to control off-site migration of contaminated groundwater to the upper bedrock fracture zones. Wells RW-1 and RW-2 have been used as recovery wells from 1982 to the present. In 1992, a third recovery well, RW-3, began operation at Necco Park. Extracted groundwater was pumped to the adjacent CECOS facility where it was treated and discharged to the Niagara Falls publicly owned treatment works (POTW). DuPont installed an interim treatment system (ITS) in August 2004. The permanent groundwater treatment facility is scheduled to begin operation in April, 2005.

A site location map is included in Figure 1.

2.2 Nature of Activity

[ ] PRFI [ ] RFI [ ] Remedial Action [X] Other O&M

Project Name:	Necco Park Operations and Maintenance Plan		
Project Number:	7407 (DuPont); 18983995 (URSD)		
Project Manager:	Timothy J. Pezzino		
Customer Contact:	Paul F. Mazierski	Phone No.	(716) 278-5496
Contract Administrator:	Timothy Pezzino	Phone No.	(716) 278-5239

3.0 SCOPE OF WORK

The Statement of Work for the Operations and Maintenance (O&M) Plan addresses both existing systems as well as the systems constructed under the selected remedy for this site and includes:

- ❑ Landfill Cap upgrades and surface water controls
- ❑ Groundwater extraction and treatment systems
- ❑ DNAPL monitoring and recovery program
- ❑ Long-term groundwater monitoring program

Each of these elements will be specifically addressed in an addendum to this HASP. Therefore, task-specific hazard analysis, Personal Protective Equipment (PPE) requirements, air monitoring, and other safety procedures will be addressed separately for each of the above listed activities at the site.

4.0 PROJECT ORGANIZATION

CRG/URS Diamond personnel on site:	2	Maximum number:	5
Contractor personnel on site:	2	Maximum number:	5
Others on site:	NA	Maximum number:	NA

4.1 Responsibilities

4.1.1 Project Manager

Timothy J. Pezzino

Responsibilities include overall coordination of site activities. The project manager has overall responsibility for the safety of operations and the health and safety of all personnel. The project manager is responsible for ensuring that the project is audited to verify compliance with the project health and safety program.

4.1.2 URS Diamond Regional Health and Safety Manager

Kathryn A. Sova

The health and safety manager is a resource for development of the site-specific HASP and will be consulted on all related health and safety issues that arise in the field, including any changes in the scope of work. The health and safety manager will make all final decisions regarding questions on the HASP.

4.1.3 Site Supervisor

Gerald M. Shepard

The site supervisor is responsible for field-related activities under the direction of the project manager and for maintaining field operations in accordance with project requirements. He is responsible for enforcing daily implementation of the HASP and resolving health and safety issues with the SSO. He also will assist in conducting daily site briefings and document having done so (see Section 8.4) on the Daily Safety Briefing Log (refer to Attachment A) or in the field logbook. He will substitute for the SSO as required by project activities.

4.1.4 Site Safety Officer

Gerald M. Shepard

Responsibilities of the SSO include daily implementation of this HASP. The SSO is responsible for implementing and enforcing the HASP, overseeing the safety of daily operations, serving as the Respiratory Protection Program administrator, and coordinating safety with subcontractors. In particular, the SSO will:

- ❑ Ensure that personnel and DuPont subcontractors are aware of the provisions of this HASP and are instructed in work practices, safety, waste management, and emergency procedures.
- ❑ Establish and ensure maintenance of site work zones.
- ❑ Monitor the work area and personal breathing zone and ensure compliance of workers relative to pre-established personal protection levels.
- ❑ Evaluate site conditions (i.e., weather, chemical, physical) and recommend any modifications to existing levels of protection.
- ❑ Ensure that daily safety briefings are conducted with assistance from the site supervisor.
- ❑ Initiate emergency response procedures with immediate communication to the project manager.
- ❑ Exercise stop-work authority in the event of imminent danger to project personnel.
- ❑ Resolve any noncompliance issues with the site supervisor.
- ❑ Conduct regular inspections to determine effectiveness of the HASP.
- ❑ Maintain the SSO logbook.
- ❑ Ensure the adequacy of the Respiratory Protection Program including proper respirator use, cleaning, inspection, and storage.
- ❑ Maintain copies of documents (e.g., training, medical, fit test).

4.1.5 Project Personnel

Project personnel involved in field activities are responsible for:

- ❑ Taking all reasonable precautions to prevent injury to themselves and to fellow employees.
- ❑ Conducting only those tasks that they believe they can do safely.
- ❑ Reporting all occurrences and/or unsafe conditions to the SSO or project manager.

5.0 HAZARD EVALUATION

5.1 Project Safety Analysis

A project safety analysis (PSA) is required for all projects and will be completed prior to project start-up.

5.2 Chemical Hazards

Groundwater data indicate contamination is present at existing recovery wells RW-1, RW-2, and RW-3. Groundwater sampling conducted during the pre-design investigation pump tests have also shown contaminated groundwater at the new recovery well locations. In addition, recovery well RW-2 consistently accumulates Dense Nonaqueous Phase Liquid (DNAPL). The presence of DNAPL has also been observed in existing recovery well RW-1 at a lesser frequency.

The most prevalent chemicals detected in groundwater samples from Necco Park monitoring wells are volatile organic compounds (VOCs). The VOCs 1,1,2,2-tetrachloroethane and vinyl chloride are present in low parts per million (ppm) concentrations, and pose an inhalation and dermal hazard. Both are suspect human carcinogens with ACGIH Threshold Limit Values (TLVs) less than 1 ppm. In addition, hydrogen sulfide may form as a by-product from the addition of hydrochloric acid to the leachate. Hydrogen sulfide is also found to occur naturally in deeper (D/E/F) bedrock zones.

Compared to VOCs, semivolatiles are present at lower concentrations. The main semivolatile is hexachlorobutadiene (HCBD), which has the potential for exposure when DNAPL or leachate is encountered. HCBD is found to be at high concentrations in DNAPL and is a suspect human carcinogen that causes toxicity through inhalation, ingestion, or direct skin contact. The TLV for HCBD is 0.02 ppm, which is well below the detection limits of field instrumentation. Pentaclorophenol has been detected in groundwater. Therefore, increased respiratory protection (Level B) will be used when exposure to DNAPL is likely.

Based on the information above, personal protective equipment (PPE) criteria for tasks performed on site can be found in Section 6.0. Table 1 lists occupational health information relevant for the chemical constituents identified above. Several of the Constituents of Concern have a "skin" notation which refers to the potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or of probable greater significance, by direct skin contact.

Any hazardous materials that will be brought on site to facilitate this project (i.e., decontamination solutions, fuel for equipment operations, etc.), will require an MSDS, labeling and approval for use by the CRG Health and Safety Department. MSDS must be available on-site and maintained by the SSO.

5.3 Physical Hazards

The main physical hazards for this project are excavation, overhead and underground obstructions, drilling, operation of heavy equipment, slip/trip/fall, pinch points, heat or cold stress, noise, and electrical concerns. Electrical concerns will be managed through visual inspection of tools, Ground Fault Circuit Interrupter (GFCI) usage, and lock/tag/try procedures.

Procedures to be used to monitor/reduce these hazards will include the following:

- **Slip/trip/fall:** Good housekeeping practices should be employed to prevent slip/trip/fall hazards. Caution must be employed when walking to prevent slip/trip/fall hazards caused by terrain.
- **Excavations:** Consult and follow the procedures presented in CRG Standard HS-102 (see Appendix B). This standard applies whenever excavations of six inches or greater are present. The procedure does not apply for excavations that employees physically could not enter (i.e., well borehole).
- **Overhead lines:** Heavy equipment (e.g., drilling rig, excavator) will remain a safe distance (minimum 20 feet) from overhead power lines. See Section 5.3.1 and Attachment C for additional information regarding overhead hazards.
- **Buried utilities:** Underground utilities must be located before intrusive activities begin. In addition, the Site Supervisor must obtain the appropriate permit from the site prior to initiating intrusive activities. See CRG Standard HS-163 in Attachment D for information regarding underground hazards
- **Drill rig:** The drill rig will be inspected prior to on-site use and daily throughout the project. Attachment E provides additional safety requirements including drilling safety checklists.
- **Heavy equipment:** Attachment F provides information regarding heavy equipment safety. All construction equipment will be inspected prior to arrival on site and daily throughout the project. Backup alarms must be operable on all equipment.
- **Heat/cold:** Ample breaks will be taken during hot or cold ambient conditions (see Attachment G.)
- **Pinch points:** Personnel must always be aware of limb or body position in close proximity to moving equipment to reduce pinch point hazards. Wear appropriate hand protection to protect hands.
- **Electrical:** Power tools must be in good working order and used with ground fault circuit interrupt (GFCI) protection. All electrical cords and extension cords must be inspected prior to use. Do not overload plugs; See Attachment H.
- **Vehicle traffic:** Use barricades, traffic cones or other appropriate measures to control vehicle traffic through the work area.
- **Lock/Tag/Try:** Lock, Tag and try procedures will be used to prevent injury by the inadvertent operation of powered equipment. Attachment I contains the CRG procedure for lock, tag and try.

- ❑ **Line Breaks:** Any opening cleared or uncleared lines by actions or equipment will necessitate following the CRG Standard for line breaks; see Attachment J.
- ❑ **Drum handling:** Do not manhandle full drums. Partially fill drums to reduce weight when possible. Get help when moving drums. Use a drum cart or fork lift with a drum grappler or other mechanical lifting device if possible. Wear gloves and pay close attention to the positions of hands and feet.
- ❑ **Noise:** Workers **must** wear approved hearing protection when working around equipment that produces sound levels in excess of 85 decibels, whenever signs indicate that hearing protection is required, and whenever voices must be raised to be heard at a distance of three feet or less.
- ❑ **Terrain:** Adequate site clearing and leveling should be conducted to accommodate equipment and supplies and provide a safe working area.
- ❑ **Fire/explosion:** Fueling of any gas- or diesel-powered equipment shall be performed only after the equipment is cooled. Grounding techniques will be used during transfer of fuel and/or other flammable liquids.
- ❑ **High Pressure Water Cleaning:** Safety requirements for high-pressure water cleaning can be found in DuPont Corporate Engineering Standard PP18 in Attachment K.

5.3.1 Overhead Obstructions

Overhead obstructions (OHOs) include electrical and communications lines, piping, bridges, and crosswalks. Extremely hazardous OHOs are defined in Section 1.3 of CRG Standard HS-162.

	Yes	No	
a.	X		Are OHOs located within the confines of the project site?
b.	X		Are OHOs located on accessible adjoining properties?
c.			Will trucks with raisable beds (e.g., dumps, rolloff containers) be used on the project? **To be determined on an activity-specific basis**
d.			Will equipment with "high clearance" be brought on the site? **To be determined on an activity-specific basis**

If the response to (a) or (b) is yes, and response to (c) or (d) is yes, an OHO Work Plan must be developed.

	Yes	No	
e.			Are there any extremely hazardous OHOs present in the work area? **To be determined on an activity-specific basis**
f.			What type(s) is(are) the expected extremely hazardous OHO(s)? **To be determined on an activity-specific basis**

	Yes	No	
g.	☐	☐	At what frequency will the expected extremely hazardous OHO be encountered? **To be determined on an activity-specific basis**

If the response to (e) is yes and the response to (f) is more than one, then an OHO Work Plan must be developed. Refer to CRG Standard HS-162.

	Yes	No	
h.	☐	☐	Will cranes, excavators, or similar equipment be required to operate within 15 feet of OHOs on the project? **To be determined on an activity-specific basis.**
i.	☐	☐	Will drilling rigs be required to operate within 20 feet of OHOs on the project? **To be determined on an activity-specific basis.**

If the response to (h) or (i) is yes, refer to CRG Standard HS-162. A "proximity permit" must be completed before work begins.

5.4 Biological Hazards

Bees are the main biological hazard on-site. Deer ticks may be found at certain times of the year as well as snakes. Fox and deer have also been seen on site, but are a minimal concern to on-site personnel.

Procedures to be used to monitor/reduce these hazards will include the following:

- **Ticks:** Ticks are prevalent. Specific information regarding precautions and symptoms of tick bites is provided in Attachment L. Use an insect repellent containing DEET and personnel should check themselves frequently for the presence of ticks.
- **Feral animals:** Air horns will be carried by field personnel as a deterrent for wild dogs, fox, and deer.
- **Mosquitoes:** Mosquitoes may be present and may be carriers of malaria, yellow fever, encephalitis, West Nile Fever and other diseases. Wear mosquito repellant as necessary, especially to areas not protected by clothing. Be aware of the mosquito-borne illnesses in your area. Drain pooled or standing water if possible.
- **Stinging insects:** If stung by a bee, carefully removed the stinger by gently scraping with a fingernail (do not squeeze). Wash the area with soapy water and apply a cold (ice) compress to decrease absorption and spreading of the venom. If excessive swelling or redness appears, seek immediate medical attention.
- **Snakes:** Be familiar with local venomous species of snakes; caution must be exercised when walking. Always walk in areas that are visible, not over logs or rocks, and never place hands in or on objects that are not completely visible. Use a long stick or rod to move grass and/or bushes, if necessary. Personnel should wear leg guards or rubber boots to protect the lower leg. If bitten, try to identify the snake. Ice the area and seek medical attention immediately.

(Note: Allergic reactions to bee stings can be life threatening; therefore, identify susceptible persons prior to project start-up. See form in Attachment A.)

6.0 WORKER PROTECTION

The levels of personal protection are selected by evaluating the performance characteristics of the clothing against the requirements and limitations of the site- and task-specific conditions.

6.1 Level of Protection

The specific PPE listed for each level of protection was selected based on potential respiratory and dermal hazards. The levels of protection to be used during project-related activities are as follows:

- ❑ Level B
    - Pressure demand full face piece supplied air respirator with escape SCBA
    - Saranex® coveralls taped at hood, gloves and boots
    - Nitrile outer gloves
    - Surgical inner gloves
    - Latex booties
    - Steel-toe work boots
    - Hard hat
    - Splash shield (line breaks)
- ❑ Level C
    - Full-face air purifying respirator with organic vapor/acid gas/particulate cartridges*
    - Poly-coated Tyvek® coveralls taped at hood, gloves and boots (if potential for contact with groundwater)
    - Nitrile outer gloves
    - Surgical inner gloves
    - Latex booties
    - Steel-toe work boots
    - Hard hat
    - Splash shield (line breaks)
- ❑ Modified Level D
    - Poly-coated Tyvek® coveralls taped at gloves and boots
    - Nitrile outer gloves
    - Surgical inner gloves
    - Latex booties
    - Steel-toe work boots
    - Hard hat
    - Side shield safety glasses
    - Splash shield (line breaks and decontamination)

- ❑ Level D
    - Steel-toe work boots
    - Work gloves
    - Hard hat
    - Side shield safety glasses
    - Standard work clothes, i.e. long pants and shirt that covers the shoulders

*Respirator cartridge change out schedule: At a minimum daily or sooner if odor, taste, irritation, or resistance to breathing is noted.

6.2 Task-specific Protection Level

Each addendum to this HASP addresses task-specific PPE requirements.

7.0 AIR/WORKPLACE MONITORING

7.1 Real-time Monitoring

[ ] No [X] Yes

An Organic Vapor Analyzer will be used to determine PPE upgrades or downgrades respiratory protection requirements and to monitor along the downwind site perimeter. Monitoring results will be recorded every half-hour and recorded in the field logbook. During remedial activities, task-specific addendum's will identify the level of respiratory protection required to initiate each task. In general, any volatiles detected above 1 ppm will warrant the use of air-purifying respiratory protection (Level C). An action level of 5 ppm has been set for an upgrade from Level C to Level B. If such concentrations are detected, personnel will leave the area immediately and re-evaluate the respiratory protection requirements before resuming work.

Real-time monitoring for total dust will be conducted using a M.I.E. PDM-3 aerosol monitor (Miniram). The Miniram is a personal size airborne particulate monitor, which operates by light scattering principles. The detection range for this instrument is 0.00 mg/m^3 to 99 mg/m^3. Real-time monitoring will be conducted at upwind and downwind perimeters of the site. Monitoring results will be recorded in a field logbook every half-hour.

Site perimeter monitoring will be conducted in accordance with NYSDEC's Community Air Monitoring Plan. Refer to Attachment M for specific information regarding perimeter monitoring.

Monitoring for combustible gases and percent oxygen will be conducted using a combustible gas indicator (CGI)/oxygen meter. Monitoring for combustible gases will be conducted during intrusive activities (e.g. excavation, drilling) within the landfill area. Operations will cease and the project will be re-evaluated if any combustible gas readings are detected, i.e., exceed zero of the lower explosive limit (LEL).

Monitoring for hydrogen sulfide will be conducted during any intrusive work within recovery well sheds using a personal hydrogen sulfide monitor. The monitor will operate continuously during the work period and will have an audible alarm as well as a visible alarm that will activate at 5 ppm. An action level of 5 ppm will be set for hydrogen sulfide (based on the American Conference of Governmental Industrial Hygienists Threshold Limit Value of 10 ppm). An exceedance of 5 ppm will necessitate evacuation from the area and the use of supplied air respiratory protection to re-enter.

Calibration Procedure:

All monitoring equipment will be calibrated in accordance with the manufacturer's instructions prior to the first use of the day and documented in the field logbook and/or air monitoring data sheets (e.g., specify calibration gas/flow rates). In addition, background levels will be established before field activities begin.

7.2 Air Sampling

[X] No [ ] Yes

Air sampling may be conducted periodically to quantify known contaminants on site. Samples will be collected and analyzed in accordance with the appropriate OSHA or NIOSH method.

These periodic air samples will be collected and analyzed for VOCs, HCBD, and vinyl chloride. Samples will be collected on personnel with the greatest exposure potential during activities with the highest potential for exposure. The sampling results will be used to re-evaluate levels of respiratory protection.

Affected individuals will be notified of air sampling results, and a copy of these results will be sent to the regional health and safety office. Air sampling will be conducted as necessary during the project at frequencies yet to be determined.

Calibration Procedures

All air sampling equipment will be pre- and post-calibrated in accordance with manufacturer's instructions and noted in the field logbook and or industrial hygiene data sheet.

7.3 Noise Monitoring

[X] No [ ] Yes

Noise monitoring will be conducted in any area where individuals must raise their voices to communicate at a distance of three feet or less, unless already posted as a mandatory hearing protection area or unless hearing protection is required of the task.

7.4 Heat/Cold Stress Monitoring

[X] No [ ] Yes

Heat or cold stress monitoring will be conducted as per the protocols provided by the American Conference of Governmental Industrial Hygienists (ACGIH) (see Attachment G).

7.5 Monitoring Equipment

[ ] No [X] Yes

- ❑ Organic Vapor Analyzer, OVA
- ❑ Combustible gas indicator/oxygen meter
- ❑ Personnel sampling pumps
- ❑ Aerosol/particulate/dust monitor, M.I.E PDM-3 (MiniRam)
- ❑ Hydrogen Sulfide monitor

8.0 PERSONNEL TRAINING

All personnel involved in field activities will be required to participate in a health and safety training program that complies with criteria set forth by OSHA in accordance with 29 CFR 1910.120(e).

8.1 Pre-assignment and Annual Refresher Training

Prior to arrival on site, each employer (contractor) will be responsible for certifying that his or her employees meet the requirements of 40/24-hour pre-assignment training. In addition, each employee must be able to document dates of attendance at annual eight-hour refresher training and three/one day(s) of fieldwork under a qualified supervisor. Failure to provide these documents will prohibit entry to the site.

8.2 Site Supervisor Training

Consistent with OSHA 29 CFR 1910.120(e)(4), prior to arrival on site, individuals designated as site supervisors require an additional eight hours of specialized training.

8.3 Site Safety Officer Training

All Site Safety Officers must meet the requirements of CRG Standard HS-1001.

8.4 Initial Site Briefing

In addition to 29 CFR 1910.120(e) training, all site employees will attend an initial HASP review prior to initiating field activities. This review must include the following:

- **Project Personnel Roles and Responsibilities**
  Personnel will understand the lines of authority regarding health and safety and site personnel roles and responsibilities.
- **Site-specific Health and Safety Hazards**
  Personnel will be informed of specific hazards related to the site and site operations, such as health hazards of site chemicals and specific safety hazards of process equipment.
- **Personal Protective Equipment**
  Personnel will be trained in the proper use of PPE.
- **Safe Work Practices/Engineering Controls**
  Personnel will be informed of appropriate work practices and engineering controls that will reduce risk of exposure to site hazards.
- **Communication Methods**
  Personnel will be informed of means for normal site and emergency communication.

- ❑ **Air Monitoring**
  Personnel will be informed of the frequency and types of air monitoring, personnel monitoring, and sampling techniques to be used on site.
- ❑ **Medical Surveillance Program**
  Personnel will be informed of the medical surveillance requirements, including recognition of symptoms and signs of exposure. In addition, specific biological monitoring program requirements will be explained.
- ❑ **Site Control Methods**
  Personnel will understand site methods used to reduce exposure to on- and off-site personnel.
- ❑ **Decontamination Procedures**
  Personnel will be trained in proper decontamination procedures, including decontamination of PPE, equipment, and vehicles.
- ❑ **Emergency Response**
  Personnel will be trained to respond properly in the event of an emergency.
- ❑ **Confined-space Entry/Special Hazards**
  Personnel involved in specific hazardous activities, such as confined-space entry and/or drum handling, will receive training in the appropriate techniques to employ prior to commencing these operations.

8.5 Daily Briefings

Daily briefings will be conducted before each work shift at a location designated by the SSO or site supervisor. All personnel will attend this briefing to participate in the in-field activities for that day. Attendance at the briefing will be documented in the daily site briefing log (see Attachment A) or SSO's field logbook.

8.6 Special Facility Training

Site Orientation	[ ]	No	[X]	Yes	If yes, specify:	Necco Park Site Orientation
Area Orientation	[X]	No	[ ]	Yes	If yes, specify	
Other	[ ]	No	[X]	Yes	If yes, specify	HASP and PSA Review

8.7 Visitor Procedures

All on-site visitors will be escorted by CRG/URS Diamond site personnel and will be required to review and agree to comply with provisions of this HASP. In addition, visitors will sign in and out of the site logbook. Only visitors who meet the training and medical monitoring requirements of 29 CFR 1910.120 will be allowed to enter the Exclusion Zone or Contamination Reduction Zone.

9.0 MEDICAL MONITORING

All personnel involved in field activities must participate in a medical monitoring program as outlined in 29 CFR 1910.120(f).

Contractors will assume responsibility for obtaining the necessary medical monitoring for their employees and will provide a medical clearance letter to CRG as requested. In addition, personnel will complete the Medical Data Sheet included in Attachment A.

10.0 SITE CONTROL/ILLUMINATION

Site control measures are as follows:

- ❑ The job site is partitioned into three distinct work zones: Support Zone, Contamination Reduction Zone, and Exclusion Zone. The zones will be clearly delineated using caution tape, barriers, signs, or whatever means is appropriate for the job site.
- ❑ Workers will enter and exit the Exclusion Zone only through the Contamination Reduction Zone. Gross decontamination will occur in the established corridor.
- ❑ Only authorized personnel are allowed to enter Exclusion Zone/Contamination Reduction Zone.
- ❑ SSO will depict the actual site layout in SSO logbook daily, and as needed thereafter.
- ❑ Appropriate containers will be used for temporary collection of contaminated clothing and articles of PPE. Site supervisor will ensure waste containers are clearly dated with contents identified and are managed in accordance with the project waste management plan.
- ❑ Communications on site will be conducted using two-way radios or cell phones. Telephones are also available in the groundwater treatment building, and the field office. In event of an emergency, the SSO or project personnel will alert all personnel to leave Exclusion Zone and await further instructions.
- ❑ The buddy system will be employed to the extent feasible to assist in event of an emergency.

10.1 Illumination

Hours of field operation: 7:00 am to 5:00 pm

Describe lighting source: Natural daylight

As part of the construction of the hydraulic controls, additional site lighting has been installed. If required, adequate artificial lighting will be provided for all activities.

11.0 DECONTAMINATION

11.1 Personnel Decontamination Procedures

Personnel decontamination procedures are as follows:

1. Equipment drop
2. Boot wash
3. Boot rinse
4. Outer glove wash
5. Outer glove rinse
6. Boot removal
7. Outer glove removal
8. Suit removal
9. Respirator removal
10. Inner glove removal

When project requirements necessitate deviations from the listed steps, deviations will be noted in the field logbook.

11.2 Sample Equipment Decontamination Procedures

Decontamination of equipment will be conducted in the decontamination area in the new treatment building. Equipment decontamination procedures are as follows:

- ❑ Alconox scrub wash
- ❑ Tap water rinse

All solid wastes, such as PPE and disposable equipment will be disposed of in accordance with the project-specific CRG Waste Management Plan.

All spent decontamination solutions shall be disposed of in the decontamination sump located in the new groundwater treatment building.

11.3 Heavy Equipment Decontamination Procedures

Heavy equipment decontamination procedures are as follows:

- ❑ Heavy soil will be brushed off with a broom or shovel, followed by pressure wash or steam cleaning.

ALL EQUIPMENT WILL BE INSPECTED PRIOR TO DEPARTURE OFF-SITE. MEANS OF APPROVAL WILL BE DETERMINED BY:

- ❑ Visual inspection

11.4 Procedure to Clean and Store Respirators

Each employee will use his or her respirator exclusively and is responsible for inspecting it prior to use and for cleaning it after use. The SSO will conduct periodic inspections to verify that respirators are being properly cleaned and stored.

Respirators will be stored on site in a way to prevent contamination (i.e., plastic bag in accordance with 29 CFR 1910.134). Respirators will be field-cleaned in the Contamination Reduction Zone after each use. Respirators will be washed and sanitized at the end of each week.

12.0 SANITATION

Sanitation facilities will be provided in accordance with 29 CFR 1910.120(n). Highest number of personnel (URS Diamond and contractors) anticipated on site: 5.

12.1 Potable Water

[ ] Provided by CRG [X] Provided by site [ ] Provided by contractor

All potable water will be clearly marked, tightly closed, and equipped with a tap. Provisions will be made for sanitary storage and proper disposal of cups.

12.2 Non-potable Water

[ ] Provided by CRG [X] Provided by site [ ] Provided by contractor

Sources of non-potable water will be segregated and clearly marked as unsafe for drinking, cooking, and washing.

12.3 Toilet Facilities

[ ] Provided by CRG [X] Provided by site [ ] Provided by contractor

12.4 Washing/Showering

Is project duration greater than six months? [ ] No [X] Yes

Are showering facilities necessary? [X] No [ ] Yes

[ ] Provided by CRG [X] Provided by site [ ] Provided by contractor

12.5 Personal Hygiene

Prior to eating, drinking, or smoking, hands and face must be thoroughly washed.

Are hand-washing facilities necessary? [ ] No [X] Yes

[ ] Provided by CRG [X] Provided by site [ ] Provided by contractor

13.0 EMERGENCY CONTINGENCY

13.1 Emergency Phone Numbers

Contact	Name	Number
Police	Niagara Falls Police Dept. Niagara County Sheriff Erie County Sheriff North Tonawanda NY State Police	911 716-438-3393 716-662-6150 716-692-4111 716-297-0757
Fire	Niagara Falls Fire Dept.	911
Ambulance	Rural Metro Ambulance	716-284-4228
Hospital Name: Address:	Niagara Falls Memorial Medical Center 621 Tenth Street Niagara Falls, NY	716-278-4000
CRG Project Director	Paul F. Mazierski	716-278-5496
URS Diamond Project Manager	Timothy J. Pezzino	716-278-5239
CRG Safety Manager	Mary Glowacki	302- 992-5993
URS Diamond Safety Manager	Kathryn A. Sova	973-492-7708
Regulatory Agency	USEPA - Region II	212-264-2525

The evacuation route, assembly area, and alarm system will be identified by the site supervisor/SSO prior to onset of field activities and reviewed with all field personnel.

Directions to the hospital: Follow directions on the hospital route map located in Figure 2.

13.2 Notification Procedure

In the event of an incident, follow the Unexpected Occurrence Reporting procedure found in Attachment N.

13.3 Injury Response

In the event a person becomes ill or injured while in the Exclusion Zone, the SSO will:

- ❑ Ensure that all equipment has been shut off.
- ❑ Assess the nature of the injury.
- ❑ **Phone 911 or (716) 284-4228** for emergency assistance.
- ❑ Decontaminate the person to the maximum extent possible.
- ❑ Administer first aid (if certified to do so).
- ❑ Meet the emergency crew.
- ❑ Follow the Unexpected Occurrence Reporting procedure found in Attachment N.
- ❑ Begin injury investigation.

13.4 Fire/Explosion Response

In the event of a fire or explosion:

- ❑ Ensure that all equipment is shut off.
- ❑ **Phone 911** for emergency assistance.
- ❑ Rally at **designated** location and take head count.
- ❑ Secure the area until emergency assistance arrives.
- ❑ Meet emergency crew and advise fire chief of location and nature of the situation.
- ❑ Follow the Unexpected Occurrence Reporting procedure found in Attachment N.

13.5 Spill/Release Response

In the event of a spill or leak:

- ❑ Ensure that all equipment is shut off.
- ❑ Phone (716) 278-5149 (Gerald Shepard) for assistance with site spill response.
- ❑ Secure the area.
- ❑ Locate and stop or contain the spill if it can be done safely (proper PPE must be worn).
- ❑ Follow the Unexpected Occurrence Reporting procedure found in Attachment N.
- ❑ Begin investigation.

13.6 Tornado/Earthquake Response

In the event of a tornado or earthquake:

- ❑ Sound alarm.
- ❑ Phone for assistance.
- ❑ Take head count.
- ❑ Secure immediate first aid.
- ❑ Meet emergency crews and advise of situation.
- ❑ Secure area and assess replacement needs and phone URS Diamond office to ensure client has been notified.
- ❑ Begin investigation, if applicable.

13.7 Flood/Hurricane Response

In the event of a flood or hurricane:

- ❑ Maintain contact with local news.
- ❑ Take precautions to protect personnel.
- ❑ Remove, shelter, or otherwise protect equipment.
- ❑ Secure all items that could be blown away.
- ❑ Fill all tanks/vessels/drums that cannot be secured to prevent floating.
- ❑ Phone office and others who must be notified.
- ❑ Secure area and leave, if at all possible.
- ❑ After public safety has been established, return and assess the situation.
- ❑ Begin investigation.

13.8 Volatile Organic Release

Operations will cease and site conditions re-evaluated if volatile organic constituents are detected at the work area perimeter at levels exceeding the action level specified in this HASP; (see Attachment M).

13.9 Emergency Equipment

- ❑ First-aid kit
- ❑ Emergency shower/eyewash
- ❑ Fire extinguisher
- ❑ Respiratory protection
- ❑ Spill kit

First-aid Locations: Necco Park site field office and Groundwater Treatment Building

TABLES

Table 1
Chemical Constituents

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
VOLATILE ORGANIC COMPOUNDS				
Carbon tetrachloride (Tetrachloromethane) (56-23-5)	PEL: 10 ppm 25 ppm (C) TLV: 5 ppm AEL: 5 ppm STEL: 10 ppm (CA) IDLH 200 ppm Skin: Yes	Colorless liquid with a characteristic ether-like odor. Air odor threshold: 70 ppm LEL: N/A UEL: N/A IP: 11.47 eV VP: 91 mm FI.P.: UN	INH ABS ING CON	Irritation to the eyes and skin. May cause central nervous system depression, drowsiness, dizziness, and incoordination. Nausea, vomiting, liver and kidney damage may occur. Potential occupational carcinogen.
Chloroform (Methane trichloride) (67-66-3)	PEL: 50 ppm (C) TLV: 10 ppm AEL: 2 ppm STEL: N/E IDLH: 500 ppm (CA) Skin: No	Colorless liquid with a pleasant odor. Air odor threshold: UN LEL: N/A UEL: N/A IP: 11.42 eV VP: 160 mm FI.P.: UN	INH ABS ING CON	Irritation to eyes and skin. Causes dizziness, mental dullness, nausea, confusion, headache, fatigue, and enlarged liver. Potential occupational carcinogen.
Methylene chloride (Dichloromethane) (75-09-02)	PEL: 25 ppm TLV: 50 ppm AEL 50 ppm STEL: N/E IDLH: 2,300 ppm (CA) Skin: No	Colorless liquid with a chloroform-like odor. Air odor threshold: 200 ppm LEL: 13% UEL: 23% IP: 11.32 eV VP: 350 mm FI.P.: UN	INH ABS ING CON	Central nervous system depressant; an eye, skin, and respiratory tract irritant. Symptoms also include numb tingling limbs, nausea, weakness, fatigue, and drowsiness. Potential occupational carcinogen.

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
1,2-Dichloroethylene (Acetylene dichloride) (540-59-0)	PEL: 200 ppm TLV: 200 ppm AEL: N/E STEL: N/E IDLH: 1,000 ppm Skin: No	Colorless liquid with a slightly acrid chloroform-like odor. Air odor threshold: N/D LEL: 5.6% UEL: 12.8% IP: 9.65 eV VP: 180 - 265 mm FI.P: 36 - 39°F	INH ING CON	Symptoms include eye, respiratory system irritation,and central nervous system depression.
Ethylene dichloride (1,2-Dichloroethane) (EDC) (107-06-2)	PEL: 50 ppm LV: 10 ppm AEL: 1 ppm STEL: N/E IDLH: 50 ppm (CA) Skin: No	Clear liquid with a sweet odor like chloroform. Air odor threshold: 100 ppm LEL: 6.2% UEL: 16% IP: 11.05 eV VP: 64 mm FI.P.: 56°F	INH ING CON ABS	Symptoms include eye irritation, corneal opacity, central nervous system depression, nausea, and vomiting. Dermatitis; liver, kidney, CVS damage. Potential occupational carcinogen.
1,1-Dichloroethane (Ethylidene chloride) (75-34-3)	PEL: 100 ppm TLV: 100 ppm AEL: N/E STEL: N/E IDLH: 3,000 ppm Skin: No	Colorless oily liquid with a chloroform-like odor. Air odor threshold: 5.0 ppm LEL: 5.4% UEL: 11.4% IP: 11.06 eV VP: 182 mm FI.P.: 2°F	INH ING CON	Symptoms include skin irritation, central nervous system depression, liver, kidney, and lung damage.
1,1,2,2-Tetrachloroethane (Acetylene tetrachloride) (79-34-5)	PEL: 5 ppm TLV: 1 ppm AEL: N/E STEL: N/E IDLH: 100 ppm (CA) Skin: Yes	Colorless to pale-yellow liquid with a pungent chloroform-like odor. Air odor threshold: UN LEL: N/A UEL: N/A IP: 11.10 eV VP: 5 mm FI.P.: UN	INH ABS ING CON	An irritant to the eyes, upper respiratory tract, and mucous membranes. Can cause dermatitis, abdominal pain, jaundice, hepatitis, liver and kidney damage. Potential occupational carcinogen.

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
Tetrachloroethylene (Perchloroethylene) (PCE) (127-18-4)	PEL: 100 ppm 200 ppm (C) TLV: 25 ppm AEL: 25 ppm STEL: 100 ppm IDLH: 150 ppm (CA) Skin: No	Colorless liquid with a mild chloroform-like odor. Air odor threshold: 500 ppm LEL: N/A UEL: N/A IP: 9.32 eV VP: 14 mm FI.P.: UN	INH ABS ING CON	Eye, nose, and throat irritant. May cause nausea and flushness to face and neck, dizziness, and uncoordination. Potential occupational carcinogen.
Trichloroethene (Trichloroethylene) (TCE) (79-01-6)	PEL: 100 ppm 200 ppm (C) TLV: 50 ppm AEL: 50 ppm STEL: 100 ppm IDLH: 1,000 ppm (CA) Skin: No	Colorless liquid, unless dyed, with a sweet chloroform like odor. Air odor threshold: 20 ppm LEL: 8.0% UEL: 10.5% IP: 9.45 eV VP: 58 mm FI.P.: UN	INH ABS ING CON	Irritant to eyes and skin. May also cause headache, nausea, vomiting, fatigue, weakness, cardiac arrhythmia, and liver damage. Potential occupational carcinogen.
Vinylidene chloride (1,1-Dichloroethene) (75-35-4)	PEL: N/E TLV: 5 ppm AEL: 5 ppm STEL: N/A IDLH: (CA) Skin: No	Colorless gas or liquid with a mild, sweet, chloroform-like odor. Air odor threshold: UN LEL: 6.5% UEL: 15.5% IP: 10.00 eV VP: 500 mm FI.P.: -2°F	INH ABS ING CON	Irritating to the eyes, skin, throat. May cause dizziness, headache, nausea, breathing difficulty, liver and kidney disfunction. Potential occupational carcinogen.
1,1,2-Trichloroethane (Ethane trichloride) (79-00-5)	PEL: 10 ppm TLV: 10 ppm AEL: N/E STEL: N/E IDLH: 100 ppm (CA) Skin: Yes	Colorless liquid with a sweet, chloroform-like odor. Air odor threshold: UN LEL: 6% UEL: 15.5% IP: 11.00 eV VP: 19 mm FI.P.: UN	INH ING CON ABS	Irritation to the eyes and nose. Central nervous system depression. Can damage the liver and kidney and has caused liver cancer in animals.

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
Vinyl chloride (Chloroethene) (75-01-4)	PEL: 1 ppm 5 ppm (C) TLV: 1 ppm AEL: N/E STEL: N/E IDLH: N/E Skin: No	Colorless gas or liquid with a pleasant odor at high concentrations. Air odor threshold: UN LEL: 3.6% UEL: 33.0% IP: 9.99 eV VP: 3.3 atm FI.P.: UN (Gas)	INH CON	Confirmed human carcinogen. May be a severe irritant to skin, eyes, and mucous membranes. Symptoms include weakness, gastrointestinal bleeding, cyanosis of extremities, and enlarged liver.
SEMI-VOLATILE ORGANIC COMPOUNDS				
Hexachlorobenzene (118-74-1)	PEL: 15 mg/m^3 TLV: 0.002 mg/m^3 AEL: N/E STEL: N/E IDLH: N/E Skin: Yes	White, needle-like solid. Combustible. LEL: N/A UEL: N/A VP: 0.0000123 mm IP: UN FI.P.: 468°F	INH ING CON	Irritating to the nasal passages and decreased sense of smell. Skin irritation. Restlessness, loss of appetite, increased liver and kidney weights, twitching of skin, chemical porphria. Light sensitivity, excessive color and hair growth, red or dark brown urine. Arthritis in fingers and toes.
Hexachlorobutadiene (87-68-3)	PEL: None TLV: 0.02 ppm AEL: N/E STEL: N/E IDLH: CA Skin: Yes	Clear, colorless liquid with a mild turpentine like odor LEL: Unknown UEL: Unknown VP: 0.2 mm IP: Unknown FI.P.: Unknown	INH ING CON	Eye, skin, nose and throat irritant. Chronic effects can occur to liver and kidneys; carcinogen.
Hexachloroethane (67-72-1)	PEL: 1 ppm TLV: 1 ppm AEL: N/E STEL: N/E IDLH: 300 ppm (CA) Skin: Yes	Colorless crystals with a comphor-like odor. LEL: N/A UEL: N/A VP: 0.2 mm IP: 11.22 eV FI.P.: N/A	INH ABS ING CON	Irritant to eyes, skin and mucous membranes. In animals, kidney damage; carcinogen.

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
Pentachlorophenol (PCP) (87-86-5)	PEL: 0.5 mg/m^3 TLV: 0.5 mg/m^3 AEL: N/E STEL: N/E IDLH: 2.5 mg/m^3 Skin: Yes	Colorless to white, crystalline solid with a benzene-like odor. Air odor threshold: 0.3 ppm LEL: N/A UEL: N/A IP: UN VP: 1.0 X 10^{-4} mm FI.P.: UN	INH ING CON ABS	Irritating to the eyes, nose, and throat. May cause sneezing, coughing, weakness, anorexia, weight loss, sweating, headache, dizziness, nausea, vomiting, chest pain, difficulty breathing, high fever, and dermatitis.
Phenol (Carbotic acid) (108-95-2)	PEL: 5 ppm TLV: 5 ppm AEL: N/E STEL: N/E IDLH: 250 ppm Skin: Yes	Colorless to light-pink crystalline solid with a sweet, acrid odor. Air odor threshold: 0.3 ppm LEL: 1.8% UEL: 8.6% IP: 8.50 eV VP: 0.4 mm FI.P.: 175°F	INH ING CON ABS	Severe skin, eye, nose, and throat irritant. Symptoms include weakness, muscle ache, dark urine, narcosis, defatting dermatitis, cyanosis, tremors, liver and kidney damage.
METALS				
Barium (7440-39-3)	PEL: 0.5 mg/m^3 TLV: 0.5 mg/m^3 AEL: N/E STEL: N/E IDLH: 50 mg/m^3 Skin: No	Varies depending on specific compound.	INH ING CON	Upper respiratory tract irritant by inhalation; gastrointestinal disorders may also occur. Skin burns may result from dermal contact.
OTHER				
Hydrochloric Acid (7647-01-0))	PEL: 5 ppm (C) TLV: N/E AEL: 5 ppm STEL: 2 ppm (C) IDLH: 50 ppm Skin: Yes	Colorless to slightly yellow liquid with a pungent, irritating odor. LEL: N/A UEL: N/A VP: 40.5 atm IP: 12.74 eV FI.P.: N/A	INH ING CON	Irritant to nose, throat and larynx; cough, choking, dermatitis; Solution: eye, skin burns; Liquid: Frostbite

Chemical Name Synonyms (trade name) (CAS No.)	OSHA PEL ACGIH TLV DuPont AEL ACGIH STEL NIOSH IDLH Skin Designation	Characteristics	Route of Exposure	Symptoms of Exposure
Hydrogen Sulfide (7783-06-4)	PEL: 20 ppm (C) TLV: 10 ppm AEL: 10 ppm STEL: 15 ppm IDLH: 100 ppm Skin: No	Colorless gas with a strong odor of rotten eggs. LEL: 4.0% UEL: 44.0% VP: 17.6 atm IP: 10.46 eV FI.P.: N/A (gas)	INH CON	Irritates eyes, respiratory system, apnea (dificulty breathing), coma, convulsions, conjunctivitis, eye pain, lacrimation, photophobia, corneal visiculation, dizziness, headache, fatigue, irritability, insomnia, GI disturbances.

OSHA PEL	Occupational Safety and Health Administration Final Rule Limits, Permissible Exposure Limit for an eight-hour, time-weighted average.
ACGIH TLV	American Conference of Governmental Industrial Hygienists, Threshold Limit Value for an eight-hour, time-weighted average.
DuPont AEL	DuPont, Acceptable Exposure Limit.
ACGIH STEL	American Conference of Governmental Industrial Hygienists, Short-term Exposure Limit for a 15-minute, time-weighted average.
NIOSH IDLH	National Institute for Occupational Safety and Health, Immediately Dangerous to Life or Health concentration.
ppm	Part of vapor or gas per million parts of air by volume at 25° Celsius and 760 mm Hg.
mg/m^3	Milligram of substance per cubic meter of air.
$\mu g/m^3$	Microgram of substance per cubic meter of air.
CAS	The Chemical Abstracts Service registry number is a numeric designation assigned by the American Chemical Society's Chemical Abstracts Service and uniquely identifies a specific chemical compound. This entry allows one to conclusively identify a substance regardless of the name or naming system used.
CA	NIOSH has identified numerous chemicals that it recommends be treated as potential or confirmed human carcinogens.
(C)	The (ceiling) concentration that should not be exceeded during any part of the working exposure.
Skin	The potential contribution to the overall exposure by the cutaneous route, including mucous membranes and eye, either by airborne or, more particularly, by direct contact with the substance.
UEL	Upper Explosive Limit—the highest concentration of a material in air that produces an explosion in fire or ignites when it contacts an ignition source. A higher concentration of the material in a smaller percentage or concentration of air may be too rich to be ignited.
LEL	Lower Explosive Limit—the lowest concentration of the material in air that can be detonated by spark, shock, fire, etc.
INH	Inhalation
ABS	Skin absorption
ING	Ingestion
CON	Skin and/or eye contact
N/E	Not Established
N/A	Not Applicable
UN	Unavailable

FIGURES

DUPONT

Corporate Remediation Group

An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1

Niagara Falls Memorial Medical Center
621 Tenth Street
Niagara Falls, New York
Ph: (716) 278–4000

Corporate Remediation Group
An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

HOSPITAL ROUTE MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	HOSPITAL
DATE	CHECKED	APPROVED	FIGURE
2/25/99	KAS		2

ATTACHMENT A
PROJECT FORMS

HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

Project Name: _____ **Project Number:** _____

I have read, understood, and agree with the health and safety protocols presented in the Health and Safety Plan (HASP) and the information discussed in the health and safety briefing. I also understand that noncompliance with the HASP may result in dismissal from the site.

Printed Name	Organization	Signature	Date

Personnel Health and Safety briefing conducted by:

_____ _____ _____

Name Signature Date

TAILGATE MEETING FORM

Date and Time of Meeting _____

Prepared By: _____

CHECK TOPIC(S) DISCUSSED

First Aid
- Facilities
- Reporting and Records
- Treatment of _____

Personal Protective Equipment
- Glasses, Goggles, and Shields
- Hard Hats
- Respirators
- Gloves
- Other _____

Emergency Procedures
- Glasses, Goggles, and Shields
- Hard Hats
- Respirators
- Gloves
- Rally/Headcount Area
- Other _____

Special Tools / Equipment
- Chain saws / Chop saws
- Other _____
- Other _____

Industrial Sanitation and Hygiene
- Drinking water
- Restrooms/Porta toilets
- Personal Cleanliness

Housekeeping
- Waste Containers
- Waste Materials

Fire Prevention
- Extinguishers
- Smoking
- Hot Work
- Explosives and Flammable Liquids
- Other _____

Vehicles/Heavy Equipment
- Transportation of Employees
- Operation and Inspection
- Preventative Maintenance
- Other _____

Discussion_____
_____
_____
_____

ATTENDEES

Name (Printed)	**Signature**

MEDICAL DATA SHEET

Name:

Home Phone:

Home Address:

Whom to Notify in Case of Emergency

Name:

Daytime Phone Number:

Personal Physician's Name:

Medical Conditions:

Allergies:

Special Considerations:

CRG/URS DIAMOND UNEXPECTED OCCURRENCE REPORT
REPORT NO.: UO- YY- No.

Title:

Location:

Date and Time:

Description:

(The description should be a concise statement of what happened in one to three sentences)

Key Learnings

Summary of Investigation:

(Include bullet items of the incident findings)

❑

Conclusions:

(List the cause(s) of the unexpected occurrences or the key learnings)

Recommendations/Responsibility:

(What should be done to prevent a recurrence or other relevant path forward items, with assignment to an individual or the team and the completion date). Be specific and concise.

ATTACHMENT B
EXCAVATION

1.0 INTRODUCTION

1.1 Purpose

The purpose of this guideline is to establish general safety requirements prior to and during excavation activities; and to provide definitions, establish responsibilities, and provide technical guidance for project team members involved in these operations.

1.2 Key Terms

The following definitions apply to terms used in this guideline:

- **Benching or Bench System**—Excavating sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- **Competent Person**—A designated person who is capable of identifying both existing hazards and predictable hazards that would pose a danger to employees. This person must have authorization to take corrective measures to eliminate these dangers.
- **Excavation**—An excavation shall mean any intrusive activity below the depth of six inches. This activity may involve, but is not limited, to grading, trenching, driving sheet piles, and well drilling.
- **Registered Professional Engineer**—A person who is registered as a professional engineer in any state when approving designs for protective systems or tabulated data.
- **Excavation Permit**—Permit designed to identify hazards and provide control measures prior to and during field activities.
- **Excavation Checklist**—Checklist used by the competent person to determine soil type and conditions in and around the excavation. This information will be used to determine protective measures.
- **Shield or Shield System**—A structure, usually steel, that is able to withstand the forces imposed on it by cave-ins, thereby protecting workers.
- **Shoring or Shoring System**—A structure, such as a metal hydraulic, mechanical or timber shoring system, that supports the sides of an excavation to prevent cave-ins.
- **Sloping or Sloping System**—Method of excavating the side of an excavation away from the excavation to prevent cave-ins.
- **Soil Classifications**
  - ***Type A Soils***—Cohesive soils with an unconfined, compressive strength of 1.5 tons per square foot (tsf) or greater. Examples: clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam.

- ***Type B Soils***—1) Cohesive soil with a unconfined compressive strength greater than 0.5 tsf, but less than 1.5 tsf; or 2) granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and in some cases, silty clay loam and sandy clay loam; 3) previously disturbed soils except those which would otherwise be classed as Type C soil; 4) soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or 5) dry rock that is not stable; or 6) material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V) but only if the material would otherwise be classified as Type B.

- ***Type C Soils***—1) Cohesive soil with an unconfined compressive strength of 0.5 tsf or less; or 2) granular soils including gravel, sand and loamy sand; or 3) submerged soil or soil from which water is freely seeping; or 4) submerged rock that is not stable; or 5) material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

1.3 Responsibilities

- ***Project Director (PD)***—Responsible for ensuring preparation and completion of the excavation permit (Attachment 1). The PD may appoint a member of the project team to review the necessary drawings to identify underground obstructions and utilities. The PD has full responsibility for the health and safety of all employees working in and around excavations. It is also the PD's responsibility to ensure a competent person is identified for excavation activities.

- ***Site Safety Officer (SSO)***—Responsible for providing technical support to the project manager during preparation of the excavation permit. He or she is also responsible for any air monitoring and continual evaluation of hazards during the excavation process.

- ***Site Supervisor/Engineer***—Shall assist PM in preparation of the excavation permit and ensure that all safeguards are in place during excavation activities. He or she shall post the permit in an area where the operation will be conducted. He or she is responsible for locating underground electrical and process lines in the area of the excavation and communicating the exact location of any such lines to the PM.

- ***Competent Person***—Is responsible for evaluating soil conditions using the Excavation Checklist (Attachment 2). This information will be used to determine proper safeguarding measures. Additionally, the competent person shall inspect all excavations to which he or she is assigned in the frequency stated in this procedure. The competent person shall stop work in the event an unsafe condition exists.

- ***All Employees***—All employees are responsible for complying with this procedure and immediately reporting any unsafe condition or behavior to their supervisor.

2.0 APPLICATION

This guideline applies to all excavations as defined, conducted by DuPont Corporate Remediation Group.

3.0 PROCEDURE

- ❑ This procedure does not require use of a protective system (i.e., shoring, sloping) when an excavation is less than four feet deep, and a competent person has examined the ground and determined there is no indication of a potential cave-in.
- ❑ Prior to any excavation activity, an excavation permit must be completed and signed by the site supervisor, competent person, and site safety officer. CRG Health and Safety must also review and approve the excavation permit for excavations over 10 feet that personnel must physically enter.
- ❑ The competent person shall complete the excavation checklist immediately following excavation work. This activity would not be required for excavation activities that employees physically could not enter (i.e., well drilling). Based on this review, the excavation may be entered provided the conditions of the excavation permit are satisfied. The excavation checklist shall be posted near the excavation. Additionally, the competent person shall initial and date the excavation checklist each time he or she inspects the excavation.
- ❑ Soil classification shall be determined and listed on the excavation permit. Unclassified soil will be considered to be Type C soil.
- ❑ No soils for the purpose of the procedure shall meet requirements of Type A soils. Type A soils shall be safeguarded under requirements of Type B soils.
- ❑ Safeguarding systems for excavations that extend over 20 feet or below a foundation (footer) of any structure shall be designed and approved by a registered professional engineer.
- ❑ All excavations four feet in depth or greater shall be air-monitored prior to entry. This test will be conducted for percent oxygen and lower explosive limit (LEL) at a minimum and will be specified on the excavation permit. Results will be recorded in the project logbook.
- ❑ All excavations must have a stairway, ladder, or ramp secured in a safe manner every 25 feet in the excavation. When ladders are used for egress, they must extend at least three feet above the excavation.
- ❑ When a shield system (trench box) or metal hydraulic shoring system is used, at no time shall any parts be modified or installed other than to the manufacturer's exact specification. All trench box systems shall extend at least 18 inches above the excavation or the point where sloping begins.
- ❑ Excavations shall be inspected prior to entry and as described below by the competent person specified on the excavation permit. This inspection shall be recorded on a excavation checklist:

    - At the start of each shift,

- As needed throughout the shift,
- After heavy rains, and
- When freezing and/or thawing temperatures occur.

- ❑ Materials, equipment, and spoils that may fall or roll into an excavation shall be located at least three feet from the edge of the excavation. A warning system (i.e., stop logs or barricade fence) alerting mobile equipment and personal to the excavation shall be installed. Never leave an open excavation unprotected.
- ❑ Excavations five feet or greater shall be considered a confined space.

3.2 Special Considerations/Requirements/Equipment

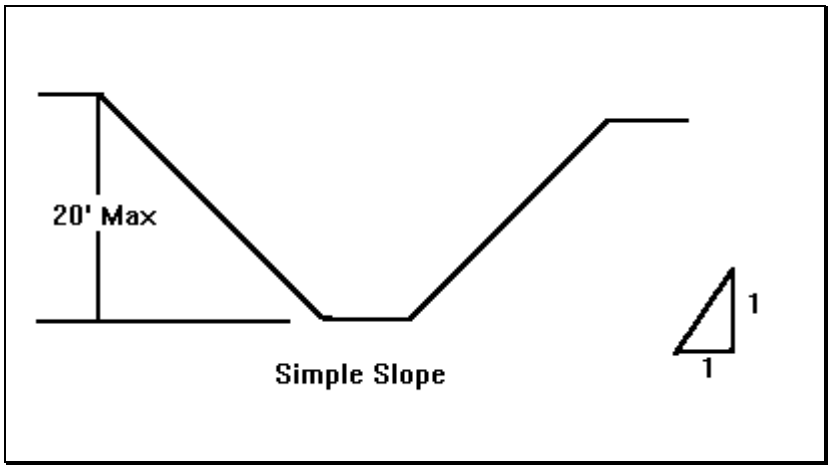
The intent of this section is to provide guidance on selection of protective systems used in excavations. This is not a complete list of all possible protective systems but does provide general information.

Soil Type	Maximum Allowable Slopes (H:V) for Excavations Less Than 20 Feet
Type A[1]	1:1 (45°)[2]
Type B	1:1 (45°)[2]
Type C	1.5:1 (34°)[2]

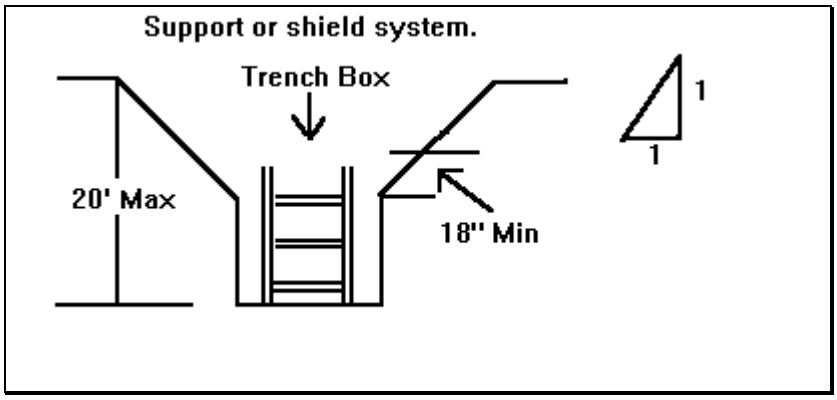
[1] Type A soil shall be safeguarded as Type B soil for the purposes of this procedure.
[2] Numbers shown in parenthesis are angles expressed in degrees from the horizontal.

3.3 Type B Soil Excavations

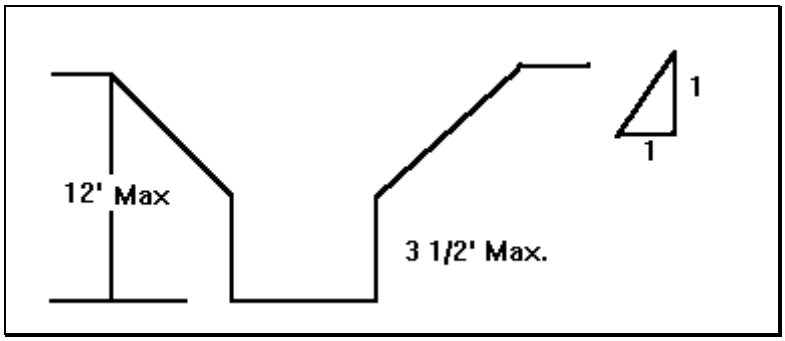
All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



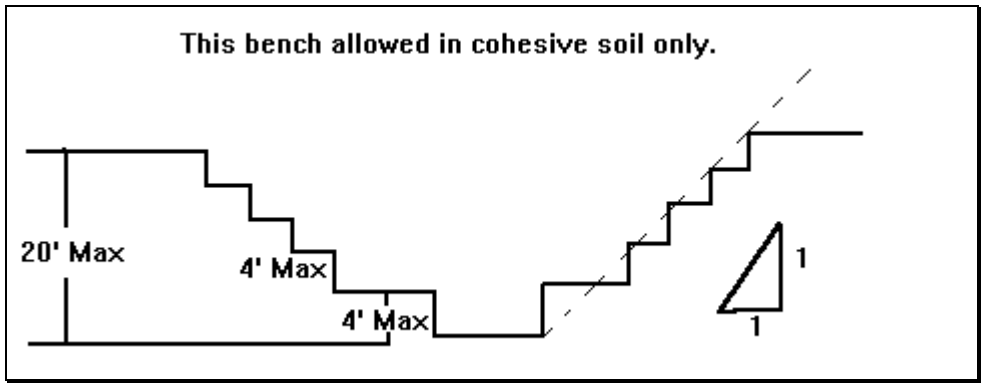
Excavations 20 feet or less in depth which have vertically-sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side.



All excavations more than eight feet but not more than 12 feet in depth with unsupported vertical sided lower portions shall have maximum allowable slope of 1.1 and a maximum vertical side of 3.5 feet.

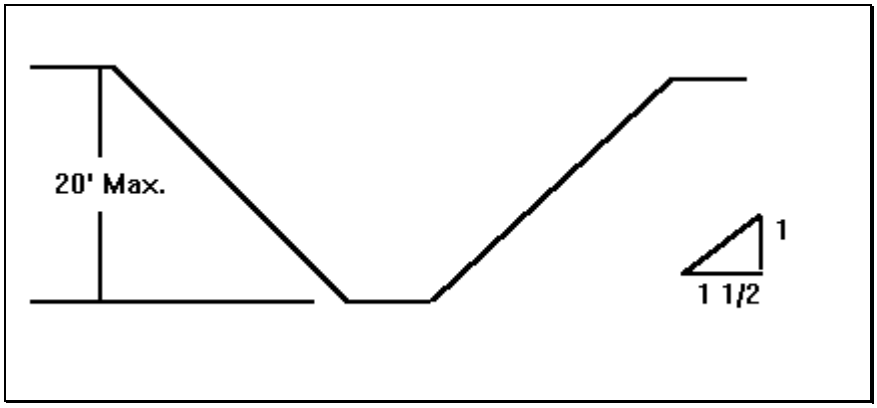


Multiple benching allowed in excavations less than 20 feet in Type B cohesive soils. Benching is not allowed in non-cohesive Type C soils.

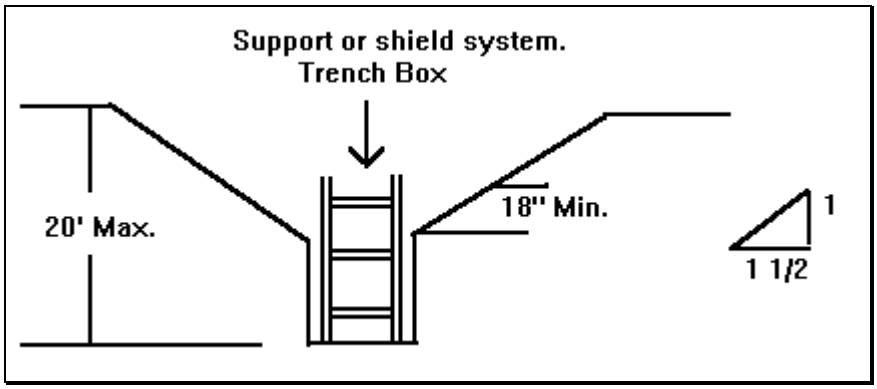


3.4 Type C Soil Excavations

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1.5:1.



Excavations 20 feet or less in depth with a vertically-sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1.5:1.



4.0 REFERENCES

The following OSHA regulation for Excavations was used in developing this guideline:

- 29 CFR Chapter XVII, Part 1926, Subpart P.

Attachment 1
EXCAVATION PERMIT

1.0 Describe work to be conducted. _____

2.0 Specific location of work. _____

3.0 Size of excavation (LWH). _____

4.0 Number of persons to enter excavation. _____

5.0 Underground obstructions identified ☐ Yes ☐ No ☐ N/A

Describe _____

Identify precautions for working around underground obstructions ☐ Hand excavation ☐ Area marked ☐ Smooth bucket ☐ Spotter

Describe additional safeguards _____

6.0 Overhead obstructions identified ☐ Yes ☐ No ☐ N/A

Identify precautions for working around OHO. ☐ OHO ☐ Spotter ☐ Mechanical device

Describe additional safeguards _____

7.0 Vibration hazard present? ☐ Yes ☐ No ☐ N/A

Describe vibration source _____

8.0 Access and egress provided? ☐ Yes ☐ No ☐ N/A

Specify type. _____

9.0 Hazardous atmosphere testing ☐ Yes ☐ No ☐ N/A

Type of testing required ☐ % Oxygen ☐ CO ☐ H_2S ☐ LEL

Additional testing required _____

Frequency of testing _____

10.0 Is the excavation a confined space? ☐ Yes ☐ No ☐ N/A

11.0 Soil type ☐ Type B ☐ Type C ☐ N/A

Describe method (i.e., shoring, sloping) of safeguarding excavation. _____

Modification or additional safeguards (requires approval of competent person or H&S). _____

_____ Competent Person Initial _____

Competent Person _____

Site Supervisor _____

Site Safety Officer _____

Note: Excavations 10 feet or greater, that employees will enter, require approval from the CRG Health and Safety.

CRG Health and Safety _____

Attachment 2
EXCAVATION CHECKLIST

Job Location and Description _____

Date _____ **Competent Person** _____

Visual Tests - *One or more must be performed each time soil conditions change*

	Yes	No
1. Underground obstructions identified		
a. Telephone, electric	☐	☐
b. Sewer	☐	☐
c. Water	☐	☐
d. Process	☐	☐
2. Particle size and consistency		
a. Fine-grained -- cohesive material	☐	☐
b. Clumps -- cohesive material	☐	☐
c. Coarse-grained -- sand and gravel	☐	☐
d. Breaks up easily -- granular material	☐	☐
3. Observe opened excavation		
a. Crack-like openings in sides	☐	☐
b. Spalling in sides	☐	☐
c. Indications of moving ground	☐	☐
d. Layered systems	☐	☐
If yes, visual and manual test shall be conducted on the worst-case area		
4. Water conditions		
a. Surface water (creeks, etc.)	☐	☐
b. Runoff	☐	☐
c. Below water table	☐	☐
d. Water buildup	☐	☐
e. Pumping system working	☐	☐
5. Vibration present		
a. General area (equipment, highway, etc.)	☐	☐
b. In excavation (equipment tools, etc.)	☐	☐
6. Surface Encumbrances		
a. Vehicular traffic	☐	☐
b. Rocks, boulders, etc.	☐	☐
c. Telephone poles	☐	☐
d. Sidewalks	☐	☐
e. Buildings	☐	☐
7. Access and Egress		
a. Ramps	☐	☐
b. Ladders	☐	☐
c. Barricades in place	☐	☐
8. Hazardous Atmospheres		
a. Predictable hazards (gas stations, debris pits, landfills, etc.)	☐	☐
b. Air or contaminant testing	☐	☐
c. Ventilation required	☐	☐
9. OSHA compliance		
a. Properly sloped	☐	☐
b. Shoring	☐	☐
c. Trench boxes	☐	☐
d. Excavated material two feet from edge	☐	☐

Manual Tests - *One or more must be performed each time soil conditions change*

	Yes	No
1. Plasticity (may be wetted to handle)		
a. Mold sample into small ball	☐	☐
b. Roll ball into 1/8-inch diameter	☐	☐
c. Pick up two-inch length by one end. If it doesn't break, soil is cohesive	☐	☐
2. Plasticity (may be wetted to handle)		
a. Mold soil into 2-1/2- to 3-inch ball	☐	☐
b. Roll ball into 5/8-inch rope	☐	☐
c. Mash entire length of rope between thumb and forefinger to 1/2-inch thickness	☐	☐
d. If rope stays together and curls around hand, soil is cohesive	☐	☐
3. Dry soil strength		
a. Type A characteristic - cohesive material		
1. Breaks into clumps	☐	☐
2. Does not break into smaller clumps	☐	☐
3. Clumps broken by hand with difficulty	☐	☐
4. Visual indication of fissures (If YES, classify Type B)	☐	☐
3. Dry soil strength (continued)		
b. Type B characteristics - cohesive material		
1. Falls into clumps	☐	☐
2. Breaks into smaller clumps	☐	☐
3. Smaller clumps broken by hand with difficulty	☐	☐
c. Type C characteristics - granular material		
1. Crumbles on its own	☐	☐
2. Crumbles with moderate hand pressure	☐	☐
3. Breaks into individual grains or powder	☐	☐
4. Thumb penetration test[1]		
a. Type A soil (unconfined compressive strength of 1.5 TSF and higher)	☐	☐
1. Cannot be readily indented by thumb	☐	☐
b. Type B soil (unconfined compressive strength of 0.5 to 1.5 TSF)	☐	☐
1. Can be readily indented by thumb	☐	☐
c. Type C soil (unconfined compressive strength of 1.5 TSF and higher)	☐	☐
1. Easily penetrated by several inches by thumb	☐	☐
2. Molded by light finger pressure	☐	☐

Note: Based on at least one visual and manual test, I have determined the soil to be: Type A ☐ Type B ☐ Type C ☐

Competent person _____

[1] Estimates the unconfined compressive strength of cohesive material. NOTE: These tests should be performed on a freshly excavated clump of soil without exposure to wetting influence.

ATTACHMENT C
OVERHEAD LINES

1.0 INTRODUCTION

1.1 Purpose

To prevent heavy equipment or its load from contacting overhead obstructions.

1.2 Background

N/A

1.3 Key Terms

- Qualified electrical person: one who is thoroughly knowledgeable in the construction and operation of specific electrical equipment or a specific electrical task and the hazards associated with that equipment or task.
- High clearance load: material or equipment carried by truck, trailer or otherwise whose vertical dimension relative to the clearance elevations of onsite overhead obstructions is such that there is potential for hitting an overhead obstruction.
- Overhead obstruction: electric lines, communications lines, pipe lines and supports, bridges, guy wires, etc.
- Heavy equipment: dump trucks, roll-off trucks, cranes, drill rigs, excavators and other types of construction equipment able to reach overhead obstructions.
- Proximity permit: written authorization to perform work with heavy equipment in proximity to overhead obstructions. Proximity permits are used for equipment which operate by use of a boom, derrick or bucket. See figures 1 and 2.
- Overhead Obstruction Plan (OHOP): a written plan by which heavy equipment is managed to prevent contact with overhead obstructions. Trucks whose beds can be raised and trucks or trailers carrying high clearance loads are managed with an OHOP. See the appendix.

1.4 Responsibilities

1. The project director is responsible for:
    a. Assuring that appropriate controls are put in place to prevent heavy equipment from striking overhead obstructions.
    b. Assuring that this procedure and control methods required by this procedure are implemented.

2. The site supervisor and site safety officer are responsible for:

   c. Implementing or requiring the contractor to implement the controls required by this procedure.

   d. Auditing to assure the requirements of this procedure are implemented.

   e. Taking corrective action immediately to address inadequacies in the implementation of controls.

2.0 APPLICATION

This procedure is to be followed at work locations that CRG manages/coordinates whenever there is potential for contacting overhead obstructions with heavy equipment. It does not apply to vendor or contractor haulage of oversized loads on public roadways.

3.0 PROCEDURE

3.1 Methodology

An overhead obstructions plan (OHOP) is used as a tool to identify and manage specified heavy equipment in transit or operation on sites with overhead obstructions. The OHOP requires controls for:

1. operation of equipment with raised bed capability (dump trucks & roll-off trucks)
2. movement of trucks/trailers/equipment with high clearance

The site supervisor will prepare the OHOP (see appendix). The site safety officer and, whenever feasible, a contractor representative should participate. Consult with the project director for involvement of a client representative.

A proximity permit will be used as a special control for equipment that uses a boom, bucket or derrick when operating near overhead obstructions. See Table 3.1.1 below for requirements. For work of this type, the basic question must be asked: Is it possible through operator error or equipment malfunction for the equipment to contact OHOs? The proximity permit should put in place controls to prevent such contact.

3.1.1 Table of Requirements

Equipment Type	Obstruction	
	Electrical (1)	Non-Electrical
Boom/Bucket in Operation (2)	Permit within 15 ft. (3)	Permit within 15 ft. (4)
Drilling	Permit within 20 ft.	Permit within 20 ft.
High Clearance in Transit	• OHOP • Maintain 4 ft. clearance	OHOP
Raisable Bed (operating on an transit)	• OHOP • Maintain 4 ft. clearance	OHOP

Notes to table:

1. Operating heavy equipment around uninsulated or unprotected energized electrical lines at a distance closer than 10 feet is an unsafe practice that exposes workers to potentially serious electrical shock. Work of this nature will not normally be performed. Qualified electrical personnel must be involved. Consult with the regional health and safety manager.
2. Includes cranes, excavators, dozers, manlifts, and similar type equipment.
3. Avoid lifting over cable tray. Protect the contents when work is necessary.
4. Lifting over pipelines containing hazardous materials should be avoided. Shut down the line if possible.

3.1.2 Audits

Overhead obstructions will be an initial audit focus for each project. Overhead obstructions will also be the focus for long-term projects on a monthly basis.

During the OHO focused audit, compliance with the specific provisions of the proximity permit or the OHOP should be reviewed.

3.1.3 HASP Review

The project site HASP and associated OHOPs will be reviewed on a monthly basis by the site supervisor and site safety officer to determine that overhead obstructions are being managed per them. At the same time, site conditions will be assessed to determine if the HASP/OHOP should be amended to address new or changing conditions that could result in contact with an overhead obstruction.

3.2 Special Considerations/Requirements/Equipment

The following language will appear in CRG contracts.

"Contractor shall comply with the requirements described below for preventing construction equipment from coming in contact with overhead obstructions."

"All dump trucks and other equipment having raisable beds, including that of tier subcontractors and vendors making deliveries to the project site, shall not be operated without use of a spotter. The spotter must confirm to the driver that the body or bed is fully down before the driver will be permitted to leave the work area."

"In lieu of using a spotter, the Contractor may propose, in writing, alternate control methods to the PD for consideration in order to meet this condition."

"For all other equipment (cranes, and other heavy equipment) capable of contacting an overhead obstruction while in operation, and working within 15 feet, a proximity permit (figure 1) is required before initiation of work. For drill rigs capable of contacting an overhead obstruction and working within 20 feet, a proximity permit is required. Contact the site supervisor for issuance of this permit."

4.0 References

- DuPont Engineering Standard E1Z, General Electrical Safe Practices
- DuPont Engineering SHE Procedure B-1.18, Use of Mobile Equipment Near Exposed Electric Lines
- OSHA 29 CFR 1926.550(a)15, Cranes and Derricks

Figure 1

PROXIMITY PERMIT FOR WORK AROUND OVERHEAD ELECTRICAL OBSTRUCTIONS

Date:_____ **Identify Equipment:**_____

This is your approval to work closer than 15 feet (20' for drill rigs) from an overhead line and cable with voltages of 50 kV and below, or closer than 20 feet (25' for drill rigs) from an overhead line and cable with voltages of 51 kV and above.

Job Description: _____

_____

Observe all of the following conditions. (Check the items that apply.)

- ☐ 1. Identify electrical service * _____
- ☐ 2. Electrical power to be de-energized (including lockout, test & safety ground)*
- ☐ 3. Position equipment to make encroachment within 10 feet impossible.*
- ☐ 4. Use "hot stick" to check line voltage if within 15 feet of uninsulated electrical line.*
- ☐ 5. Boot lines.*
- ☐ 6. Have a spotter present whose sole function is to watch the operation of the equipment and the persons performing the work.
- ☐ 7. Ensure that an Electrical Standby person is present.*
- ☐ 8. Number. _____ rope tag line(s) to be used.
- ☐ 9. Protect cable tray with wooden covers.
- ☐ 10. Additional personal protective equipment required:_____

  _____
- ☐ 11. Additional special safety precautions:_____

  _____

***** Indicates that a qualified electrical person is to perform the task.

This permit expires on (Date) _____ at (Time) _____

Site Supervisor	Date	Contractor Supervisor	Date
Site Safety Officer	Date	Electrical Representative	Date
CRG Project Director	Date	Customer Representative	Date

Figure 2

PROXIMITY PERMIT FOR WORK AROUND NON-ELECTRICAL OVERHEAD OBSTRUCTIONS

Date:_____ **Date Expires:**_____

This is your approval to work closer than 15 feet to a non-electrical overhead obstruction.

Work Description:_____

Work Location:_____

Type of Equipment:_____

Distance of Equipment/Load from Hazard:_____

If pipeline, what is service:_____

Specific Precautions Required to Perform the Work Safely: _____

Signatures:

Contractor Supervisor	Date	Site Supervisor	Date
Site Safety Officer	Date	Project Director	Date
Customer Representative	Date		

APPENDIX

OVERHEAD OBSTRUCTION PLAN

1.0 Introduction/Purpose

The OHOP will be prepared by the project team prior to the implementation of field activities. The OHOP will detail the multiple control measures to be implemented by the project team, contractors, and material suppliers, to prevent contact with overhead obstructions.

(Standard Operating Procedure, Number 162, and project-specific HASP contain the decision tree on whether an OHOP is required for a project. The SOP also includes related requirements such as: proximity permits, contract conditions, and auditing requirements.)

The complexity of the OHOP will be determined by the type of project, the type and frequency of overhead hazards, and the expected equipment usage on the site.

Project Name and Location:_____

2.0 Hazard Identification

The project team should tour the work site for the purpose of identifying all of the overhead obstructions. The field tour should not be limited to the immediate work area, and should include all potential routes of vehicular access to the site. Consider all overhead obstructions and their respective clearances, established delivery routes, alternate routes in case of emergencies, unloading zones, waste management activities (transporting of drums, roll-offs, storage areas, etc.).

Three major types of overhead obstructions are:

1. Electrical wires and other overhead utilities
2. Pipe racks and associated piping
3. Low clearance structures (roof overhangs, bridges, etc.)

List the obstructions in prioritized order (by degree of hazard and frequency)

_____

_____

_____

_____

_____

_____

3.0 Equipment Identification

The project team should review the scope of work to identify all of the types of equipment that have the potential for causing an overhead "hit." All equipment should be evaluated for its maximum operating "reach." The following list should be used as a starting point:

1. Dump trucks, and other raisable-bed equipment
2. Drill rigs (control by proximity permit for work within 20 ft. of OHO's)
3. Cranes and other rigging equipment (control by proximity permit for work within 15 ft. of OHOs)
4. Excavators and other bucket type heavy equipment (control by proximity permit within 15 ft. of OHO's)
5. High clearance loads including tanks, columns, storage silo's, treatment systems, that require movement under or unloading/set-up near overhead obstructions.

List the equipment in prioritized order by frequency of usage and potential hazard:

_____

_____

_____

_____

_____

_____

_____

4.0 Eliminate/Isolate the Obstruction

The first and most effective means for dealing with an overhead obstruction is to remove it from the work area. Although this is not always possible, it should be the first option considered. Consider utility relocation, utility shut-off, locking out of pipelines, temporary shut-down of adjacent processes, etc.

List the steps being taken below:

_____

_____

_____

_____

_____

_____

5.0 Use Procedures as Tools

Detail the requirements for all drivers of dump trucks and other raisable-bed equipment. A separate orientation program may be warranted, and at a minimum, overhead hazards should be

covered explicitly during the site and HASP orientation. Clearly establish the expectations of all parties involved, including drivers, spotters, dispatchers, equipment operators, etc.. Detail the specific steps required of the spotter during a delivery. A spotter must safely locate the truck for its dump cycle, and not allow the driver to leave the dump site until they have verified the bed is down and signaled the driver to leave. In the absence of a dedicated spotter, drivers must exit the cab to verify that their bed is down. If this is not possible because of site rules or other project conditions, list the procedures used to meet this intent.

List the procedures to be used/followed:

_____

_____

_____

_____

_____

_____

_____

6.0 Isolate the Equipment

The project team should take all steps necessary to isolate the equipment on the project from all overhead obstructions. Curbing, barricades, cones, etc., can be used to mark routes and prevent traffic from entering into unsafe areas. Traffic routes for project traffic and all vendor deliveries can be designated and marked. Consider the use of stop signs, warning signs, warning sensors, electric eyes, warning chains or false work (similar to what is typically found in parking garages to prevent damage), additional visual and audible alarms (those provided by the mfr. have not prevented past incidents), and other controls to prevent contact with an overhead obstruction. The project team should concentrate on controls that are simple to apply, cost-effective, and easy to audit for compliance.

List the control systems to be used:

_____

_____

_____

_____

_____

_____

7.0 Summary of Controls

Summarize the multiple controls/systems/procedures to be used:

_____

_____

_____

_____

The OHOP must be reviewed and approved by the Project Director.

Approved:

_____	_____
Contractor Supervisor	Date
_____	_____
Site Safety Officer	Date
_____	_____
Site Supervisor	Date
_____	_____
Project Director	Date

ATTACHMENT D
BURIED UTILITIES

1.0 INTRODUCTION

1.1 Purpose

To assist project teams in identifying, locating, and ensuring that underground utilities are not damaged during intrusive activities.

1.2 Background

Recent encounters with unmarked/unidentified underground utilities have prompted the CRG to develop this procedure to reduce the potential for encountering underground utilities.

1.3 Key Terms

- **Process Safety Analysis (PSA)**: A review of the project with project participants (to include contractors when appropriate) to identify key concerns and problem areas before beginning field work.
- **Line Finder**: Any of a number of various tools which use radio transmitters/receivers, magnetic fields etc., to locate underground utilities. There are specific limitations and detection capabilities of each type of device.
- **Underground Utilities**: Electric lines, communications lines, pipelines sewer lines etc., which are buried below the surface.
- **Soft Dig**: A soil removal technique that use high pressure air to loosen and remove soil without damaging underground utilities.
- **Heavy Equipment**: Drill rigs, excavators, cone penetrometers (CPT) and other types of construction equipment able to conduct subsurface work.
- **Excavation Permit**: Written authorization to perform subsurface work. The CRG will defer to the plants permit procedure. In the absence of plant specific procedure CRG procedure HS-102 will be followed.

1.4 Responsibilities

1. The **Project Director** is responsible for:
   a. Assuring that the project team has considered this hazard in the development of the work plan/HASP.
   b. Assuring that this procedure and required control methods are implemented.
2. The **Project Manager** is responsible for:
   a. Assuring that appropriate controls are put in place to prevent heavy equipment from damaging an underground utility.
   b. Assuring that this procedure and required control methods are implemented.

3. The **Site Supervisor** and/or **Site Safety Officer** are responsible for:

   a. Implementing or requiring the contractor to implement the controls required by this procedure.

   b. Auditing to assure the requirements of this procedure are implemented

2.0 APPLICATION

This procedure should be consulted for all work locations that CRG (to include URSD, URS) manages/coordinates in which subsurface intrusive activities are being performed, and the potential for encountering underground obstructions exist.

3.0 PROCEDURE

3.1 Methodology

The flow chart provided as attachment 1 is a tool to identify and manage intrusive activities and heavy equipment operations on site. This flowchart can be used at several points in the project life cycle. It should be used during the PSA, and when acquiring excavation permits.

The site supervisor will review the flow chart with the plant resource when procuring the excavation permit. When on an active site the CRG will use the sites excavation permit procedure, in the absence of a plant specific procedure follow the CRG Excavation permit procedures located in HS-102.

4.0 REFERENCES

- DuPont CRG Procedure HS-102 Excavations
- OSHA 29 CFR 1926.651, Specific Excavation Requirements

EXCAVATION PERMIT

1.0	Describe work to be conducted.	_____
2.0	Specific location of work.	_____
3.0	Size of excavation (Area & Depth).	_____
4.0	Number of persons to enter excavation.	_____
5.0	Underground utilities identified	☐ Yes ☐ No ☐ N/A
	Describe	_____
	Identify precautions for working around underground utilities	☐ Hand excavation ☐ Area marked ☐ Smooth bucket ☐ Spotter
	Describe additional safeguards	_____
6.0	Overhead utilities identified	☐ Yes ☐ No ☐ N/A
	Identify precautions for working around OHO.	☐ OHOP ☐ Spotter ☐ Mechanical device
	Describe additional safeguards	_____
7.0	Vibration hazard present?	☐ Yes ☐ No ☐ N/A
	Describe vibration source	_____
8.0	Access and egress provided?	☐ Yes ☐ No ☐ N/A
	Specify type.	_____
9.0	Hazardous atmosphere testing	☐ Yes ☐ No ☐ N/A
	Type of testing required	☐ % Oxygen ☐ CO ☐ H_2S ☐ LEL
	Additional testing required	_____
	Frequency of testing	_____
10.0	Is the excavation a confined space?	☐ Yes ☐ No ☐ N/A
11.0	Soil type	☐ Type B ☐ Type C ☐ N/A
	Describe method (i.e., shoring, sloping) of safeguarding excavation.	_____
	Modification or additional safeguards (requires approval of competent person or PM).	_____

PM Initial _____ Competent Person Initial _____

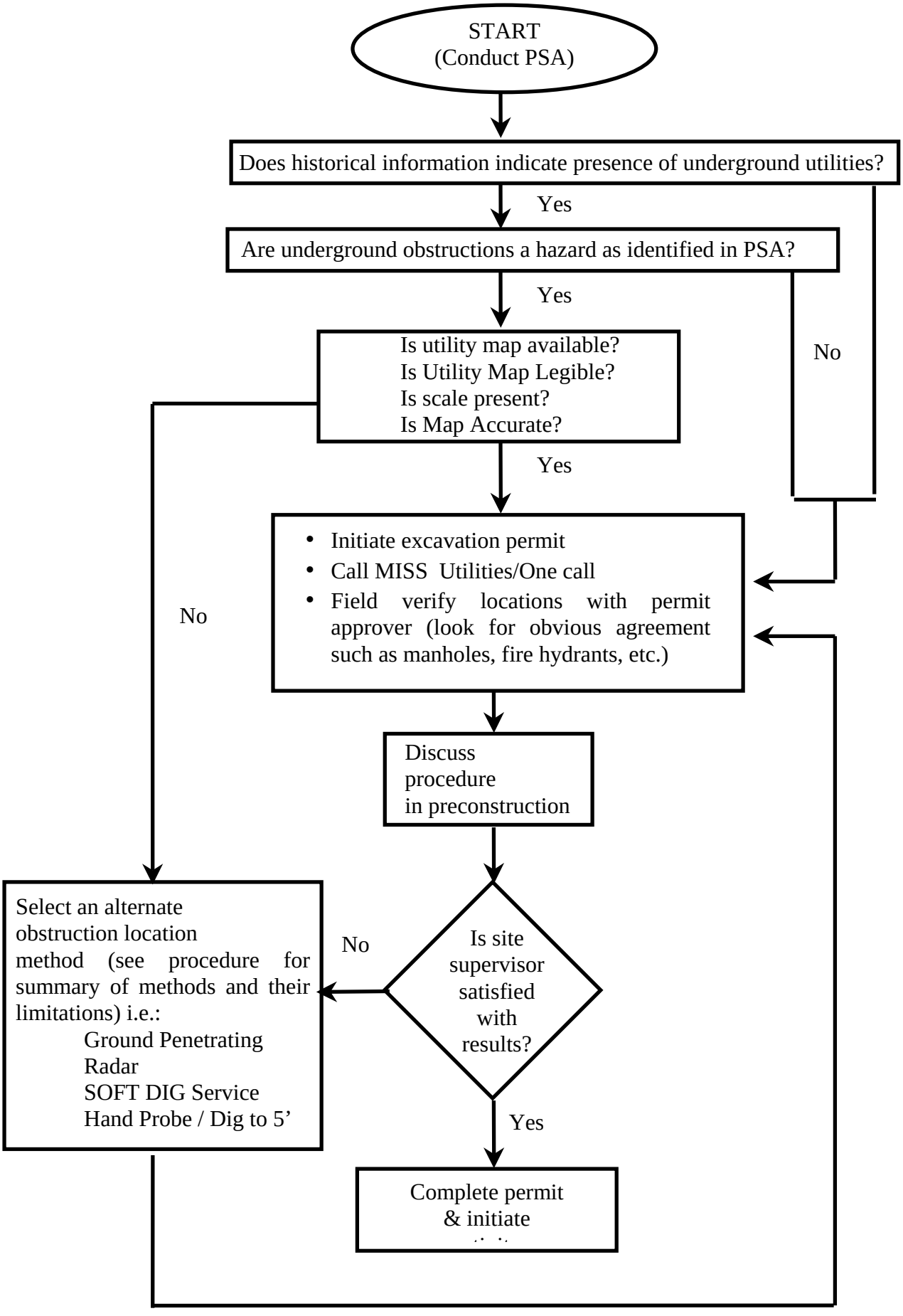
Project Manager _____ Site Supervisor _____

Competent Person _____ Site Safety Officer _____

Note: Excavations 10 feet or greater, that employees will enter, require approval from CRG Health and Safety.

CRG Health and Safety _____

Attachment 1 - Underground Obstructions Decision Tree



ATTACHMENT E
DRILLING

DRILLING
SAFETY HANDBOOK

CONTENTS

1.0 PRE-FIELDWORK

It is very difficult to predict all problems that may occur during drilling fieldwork activities. However, if pre-fieldwork preparations are completed thoroughly, the job will likely proceed more safely and smoothly (i.e., with less down time). This section lists some important safety items that should be performed/considered prior to initiation of actual fieldwork. The DuPont Corporate Remediation Group (CRG) personnel (or CRG representative) should review this list and determine if other pre-fieldwork activities are necessary.

- ❑ Ensure that all items are completed on the Pre-fieldwork Checklist.
- ❑ A copy of all maps showing underground equipment, lines, or hazards must be attached or accompany the excavation permit.
- ❑ Check with utility one-call service before excavating or drilling.
- ❑ Visually inspect each location in the field for underground utilities.
- ❑ Drafting maps should be checked for utilities.
- ❑ Review a site map with a plant representative (on DuPont plants this should be second layer maintenance) familiar with layout of underground hazards.
- ❑ Determine if surveying is needed to locate underground hazards.
- ❑ Obtain work permits from the plant area work supervisor.
- ❑ Obtain an excavation permit from the appropriate supervisor. Any changes in job scope will require detailed review and reissuance of the excavation permit. The excavation permit clears the excavation only.
- ❑ Markers, flags, or painted lines, etc., should be used to identify excavation boundaries and locations, or hazards beyond which excavation must not exceed.
- ❑ All dimensions, elevations, and coordinates should be viewed as approximate locations of buried equipment, lines, etc. Elevations may change due to erosion or the addition of fill. Buried cables have been found three to five feet on either side of buried protective boards and markers.
- ❑ If buried equipment, lines, etc., exist within 10 feet on either side of the excavation, these should be considered in the excavation area.
- ❑ A conscious decision should be made on whether or not to de-energize underground cables within 10 feet (overhead cables within 20 feet) of the excavation prior to excavation.
- ❑ A signal generator and portable receiver can be used to roughly locate buried underground utility lines that are made of metal. Plants usually have this equipment; otherwise, check with CRG Field Services.
- ❑ If the location of a utility line is unclear, the local utility company should be contacted for clarification of line location.

- Prior to beginning excavation, probing or hand augering to a depth of five feet is recommended. Probing and hand augering should be performed such that the area to be excavated is within the radius of the investigation.
- Excavating around process lines requires extreme caution. If any unusual odors or other signs indicating leakage are observed, the job should be shut down immediately and area supervision notified. Air quality checks must be performed to ensure adequate personnel protection is provided. Whenever possible, process lines should be depressurized before excavating.

2.0 MOBILIZATION

The following are safe guidelines related to on- and off-road movement of drilling equipment. Prior to mobilizing or demobilizing drilling equipment, responsible individuals should consider the following:

- ❑ Inspect the rig, using the Drilling Equipment Checklist.
- ❑ Before moving any equipment, first walk the route of travel with driller, inspecting for depressions, slumps, gullies, ruts, and similar obstacles. The drill site also should be inspected for debris, plant, and animal hazards. It also should be determined if the ground is suitable for heavy equipment travel.
- ❑ Make sure bystanders and passengers are clear of equipment.
- ❑ After equipment has been moved to a new drilling site, set all brakes and/or locks. When grades are steep, block the wheels.
- ❑ Use caution when traveling on steep grades. Conservatively evaluate side-hill capability of equipment movement. Arbitrary addition of drilling tools may raise the center of mass. When possible, travel directly uphill or downhill.
- ❑ When moving up a steep grade or slope, anchor a winch line from the vehicle to a suitable object at the top of the slope.
- ❑ Attempt to cross obstacles such as small logs and small erosion channel or ditches squarely, not at an angle.
- ❑ Use the assistance of someone on the ground as a guide when lateral or overhead clearance is restricted, or when setting the drill rig on location.
- ❑ Never travel with the mast (derrick) of the drill rig in the raised or partially raised position.
- ❑ Do not raise the mast or operate the drill rig if this distance to overhead powerlines is less than 20 feet. In general, distance between the overhead power line and boom should be no less than the height of the boom. Remember to “Look Up and Live.”
- ❑ Keep in mind that both hoist lines and overhead powerlines can be moved toward each other by the wind. If strong winds are present, consider having the utility company (or plant) cover the overhead power lines.
- ❑ Prior to drilling, adequate site cleaning and leveling should be performed to accommodate the drilling rig and equipment. This provides a safe, obstacle-free working area. Drilling should not commence when tree limbs, protruding objects, unstable ground, site obstructions, or debris may cause unsafe work conditions and/or limited, awkward work spaces. An area clear of obstructions or debris should be maintained around the drilling or support activities at all times.
- ❑ Never leave equipment idling and unattended, especially on any incline or on loose material; the vibration may put the machine in motion.

3.0 EQUIPMENT DECONTAMINATION

Due to the presence of water, heat, pressure, and heavy equipment, decontamination activities can be very dangerous. The following are safety items to be considered during equipment decontamination:

- ❑ Obtain flame permit where required for the steam cleaner.
- ❑ Follow equipment decontamination procedures outlined in the Health and Safety Plan (HASP) or Project Work Plan.
- ❑ Chock wheels of equipment/supply trailer prior to beginning work.
- ❑ Use face shield, *Tyvek*®, and gloves, boots, etc., to prevent physical contact with potential contaminants and debris.
- ❑ Check hose for possible weakness or potential break points prior to use.
- ❑ Do not point wand toward body when in use.
- ❑ Use anti-freeze (windshield washer type) in cold weather to prevent water from freezing inside equipment.
- ❑ Regarding access/egress, safe footing, lifting hazards, slipping on plastic should be considered as potential hazards, especially inside the decontamination area.
- ❑ Beware of burrs and sharp edges when moving augers and drilling equipment.
- ❑ Practice good housekeeping at all times.
- ❑ Be aware of heat and hot water from steam cleaner.

4.0 SET-UP AND START-UP

4.1 Set-up

This information should be reviewed prior to set-up activities at each drilling location:

- ❑ If required, a barricade should be set up after defining the exclusion zone.
- ❑ When drilling near suspected underground electrical hazards, the rig should be grounded with a ground wire attached to a ground rod.
- ❑ All brakes must be set before drilling begins. If the rig is positioned on a steep grade and leveling of ground is impossible or impractical, the wheel of the transport vehicle should be blocked and other means employed to prevent the rig from moving or tipping over (e.g., level jacks on rig).
- ❑ Use sufficient blocking under rig jacks to prevent sinking.
- ❑ Inspect pulley sheaves for wear and cable/rope positioning.
- ❑ Work to be done above three feet on the mast requires the use of a safety harness, or the mast must be lowered.
- ❑ Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform lifting with muscles in your legs, not muscles in your lower back. If the object is in excess of 50 pounds, request assistance.

4.2 Start-up

After drill set-up, the following safety items should be observed:

- ❑ All personnel should know location and use of kill switch.
- ❑ Identify potential pinch points and hazards which could injure fingers and toes.
- ❑ All drilling rig personnel and visitors should be instructed to “stand clear” of the drilling rig immediately prior to and during starting of an engine.
- ❑ Make sure all gear boxes are in neutral, all hoist levers are disengaged, all hydraulic levers are in the correct non-actuating positions, and the cathead rope is not on the cathead before starting a drilling rig engine.
- ❑ Raise the derrick a few inches in order to check the brakes and always check for overhead power lines.
- ❑ Secure and/or lock the mast in upright position if required, according to the drilling manufacturer's recommendations.
- ❑ Place the fire extinguisher in an easily accessible location away from the drilling rig.

5.0 DRILLING

This section concerns rotating equipment, catheads, wire ropes, and hoists (the part of the drilling rig which may cause serious injuries), and drilling techniques most commonly used during auger and rotary drilling:

- Only personnel necessary to achieve drilling objectives should remain within the exclusion zone. All others should remain outside the exclusion zone.
- Drilling personnel should not wear clothing that may be awkward or loose and get caught in rotating equipment.
- Wear protective gloves when handling augers, cable, rods, or any sharp or splintery materials.
- Proper gloves (see HASP) should always be worn when handling materials which can irritate or contaminate skin.
- When appropriate, noise protection must be worn by employees who are working when drilling equipment is operating.
- Effective communication (hand signals, etc.), especially under high noise conditions, is essential to safety. Clarify use of hand signals.
- Use tools only for the job for which they were intended.
- Do not perform maintenance or refueling while equipment is running.
- Stay clear of cables while lifting equipment or while drilling rig is under heavy strain.
- Do not operate the drilling rig in an electrical (lightening) storm. If drilling when a storm approaches, stop drilling and lower the mast, if possible. Do not stay near drilling rig if the mast cannot be lowered.
- When removing drilling string from borehole, the rod string should not exceed 1.5 times the height of the mast.
- Do not ride on hook, ropes, or other traveling lines of the rig.
- Do not climb the rig mast while equipment is running. Shut down equipment and use safety harness if climbing mast, is necessary.
- When moving or hoisting stabilizers or drill collars, tag lines should always be used. A helper should not use his hands to hold or control heavy equipment. Instead, he should loop a rope around it and hold onto both ends of the rope.
- The operator of a drilling rig should only operate the rig from the position of the controls. The operator should shut down the drilling engine before leaving the vicinity of the drilling rig.
- All hydraulic lines should be inspected periodically for integrity, and replaced as needed.

- Drilling should always proceed cautiously, especially at depths less than ten feet.
- Operation of drilling equipment should be limited to qualified personnel.

5.1 Auger Drilling

Auger drilling uses direct power to rotate (screw) flighted augers into the ground. Be aware of the following hazards which may be unique to this type of drilling:

- Only use the manufacturer's recommended method of securing the auger to the drill drive coupling. Do not touch the coupling or the auger with your hands, a wrench, or any other tools during rotation.
- Whenever possible, use tool hoists to handle auger sections.
- Never place hands or fingers under the bottom of an auger section when hoisting the auger over the top of the auger section in the ground, or over other hard surfaces such as the drilling rig platform.
- Never allow feet to get under the auger section that is being hoisted.
- When rotating augers, stay clear of the rotating augers and other rotating components of the drilling rig. Never reach behind or around a rotating auger for any reason whatsoever.
- Never place your hands between the drill rig and an auger, even when attempting to free damaged or bound sampling equipment from the auger.
- Never use your hands or feet to move cuttings away from the auger.
- Augers should be cleaned only when the drill rig is in neutral and the augers have stopped rotating.
- Care should be taken to ensure augers are properly stored and secured when not in use and during transport.

5.2 Rotary Drilling

Mud rotary is direct rotary drilling using mud slurry circulation to remove cuttings and keep the borehole wall stabilized. Be aware of the following hazards which may be unique to this type of drilling:

- Lifting heavy equipment (i.e., drill rods, etc.);
- Rotating equipment/parts; and
- Slippery or dangerous work areas caused by messy mud pits or troughs (could fall in); keep area clear.

Air rotary is direct rotary drilling using high pressure air circulation to remove cuttings and keep the bit cool. Be aware of the following hazards which may be unique to this type of drilling:

- ❑ Rotating/lifting equipment;
- ❑ High pressure air lines;
- ❑ Air discharge of cuttings at high velocity; use a cover to control discharge of cuttings;
- ❑ Heavy drill rods being lifted;
- ❑ Very loud; wear hearing protection;
- ❑ Large drill rig and support vehicle (space limitations); and
- ❑ Dust generation in dry formations; move upwind and use a cover for dust control.

Listed below are general rotary (air and mud) drilling hazards:

- ❑ Drill rods should not be braked during lowering into the hole with drill rod chuck jaws.
- ❑ Drill rods should not be held or lowered into the hole with pipe wrenches.
- ❑ If a string of drill rods is accidentally or inadvertently released into the hole, do not attempt to grab the falling rods with your hands or a wrench.
- ❑ In the event of a plugged bit or other circulation blockage, high pressure in the piping and hose between the pump and the obstruction should be relieved or bled down before breaking the first tool joint.
- ❑ When drill rods are hoisted from the hole, they should be cleaned for safe handling with a rubber or other suitable rod wiper. Do not use your unprotected hands to clean drilling fluids from drill rods.
- ❑ If work must progress over a portable drilling fluids (mud) pit, do not attempt to stand on narrow sides or cross members. The mud pit should be equipped with a rough surface and/or cover panels of adequate strength to hold drilling rig personnel.
- ❑ Drill rods should not be lifted and leaned unsecured against the mast. Either provide some method of securing the upper ends of the drill rod sections for safe vertical storage or lay down the rods.

5.3 Cathead

Listed below are guidelines regarding cathead operation:

- ❑ Only drilling personnel familiar with cathead operation should be allowed to operate equipment. Keep the cathead clean and free of rust and oil and/or grease. The cathead should be cleaned with a wire brush if it becomes rusty.

- ❑ The cathead operator must operate the cathead while standing on a level surface with good, firm footing conditions, without distraction or disturbance.
- ❑ Always use a clean, dry, sound rope. A wet or oily rope may "grab" the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast. Do not operate the cathead in rain.
- ❑ Never wrap the rope from the cathead (or any other rope, wire rope, or cable on the drilling rig) around a hand, wrist, arm, foot, ankle, leg, or any other part of your body.
- ❑ Always maintain a minimum of 18 inches (driving spoon length) clearance between the operating hand and the cathead drum when driving samplers, casing, or other tools with the cathead.
- ❑ Do not use a rope that is longer than necessary. A rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- ❑ Do not use more rope wraps than are required to hoist a load.
- ❑ Do not leave a cathead unattended with the rope wrapped on the drum.
- ❑ Position all other hoist lines to prevent contact with the operating cathead rope.
- ❑ When using the cathead and rope for driving or back-driving, make sure that all threaded pipe connections are tight and stay as far as possible from the hammer impact point.
- ❑ When stuck tools or similar loads cannot be raised with a hoist, disconnect the hoist line and connect the stuck tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull to the hoist line or the feed mechanism of the drill.
- ❑ Should the rope "grab" the cathead or otherwise become tangled in the drum, do not attempt to release the rope. Instead, sound an appropriate alarm for all personnel to rapidly back away and stay clear. The operator should also back away and stay clear. If the rope "grabs" the cathead, and tools are hoisted to the sheaves at the top of the most, the rope often will break, releasing the tools. If the rope does not break, stay clear of the drilling rig until the operator cautiously returns to turn off the drilling rig engine and appropriate action is taken to release the tools. The operator should keep careful watch on the suspended tools and should quickly back away after turning off the engine.

5.4 Wire Ropes and Hoists

Listed below are guidelines regarding wire ropes and hoists:

- ❑ Replace damaged safety latches on safety hooks before using.
- ❑ Always wear the appropriate gloves when handling wire ropes.
- ❑ Minimize shock loading on wire rope; apply loads smoothly and steadily.
- ❑ Protect wire rope from sharp corners or edges.
- ❑ Do not guide wire ropes onto cable drum with your hands.
- ❑ Never leave a load suspended in the air when the hoist is unattended.
- ❑ Keep your hands away from hoist, wire rope, hoisting hooks, sheaves, and pinch points as slack is being taken up and when the load is being hoisted.
- ❑ Never hoist the load over the head, body, or feet of any person.

6.0 WELL CONSTRUCTION AND GENERAL HOUSEKEEPING

This section presents safety items around well construction, and general housekeeping. The following safety items should be observed:

- Before lifting a relatively heavy object, approach the object by bending at the knees, keeping your back vertical and unarched while obtaining a firm footing. Grasp the object firmly with both hands and stand slowly and squarely while keeping your back vertical and unarched. In other words, perform lifting with muscles in your legs, not muscles in your lower back. If the object is in excess of 50 pounds, request assistance.
- Wastewater and drilling fluids must be properly contained and labeled. Refer to the project Waste Management Plan.
- Suitable storage locations should be provided for all tools, materials, and supplies so that they can be conveniently and safely handled without falling on a member of the drill crew or a visitor, without creating tripping hazards, and without protruding at eye or head level.
- Avoid storing or transporting tools, materials, or supplies within or on the mast (derrick) of the drill rig.
- Pipe, drill rods, bit casings, augers, and similar drilling tools should be stacked in an orderly manner on racks or sills to prevent spreading, rolling, or sliding and should be secured prior to moving equipment.
- Work areas, platforms, walkways, scaffolding, and other accesses should be kept free of materials, obstructions, and substances such as ice, water, mud, excess grease, or oil that could cause a surface to become slick or otherwise hazardous. The use of additional footing safeguards (mats) should be evaluated on a case-by-case basis.
- Keep all controls, control linkages, warning, and operation lights and lenses free of oil, grease, or other substances which would decrease safe handling.
- Do not store gasoline in any portable container other than that specifically designed for the intended purpose.
- Welding gas cylinders should be stored in an upright and secured position. Protective caps should be in place when the cylinders are not in use.
- All unattended boreholes must be adequately covered or otherwise protected to prevent personnel, site visitors, or animals from falling into the hole. All open boreholes should be covered, protected, or back filled adequately and according to local and state regulations upon completion of the drilling project.
- Do not tolerate unprofessional conduct ("horse play") on the job site.

7.0 RIGGING DOWN AND DEMOBILIZATION

This section presents safe guidelines when rigging down at a drilling location, or demobilizing for the end of a project. The drill crew may be tired after a long field day, or in a rush to pack up and leave the site. Individuals are often less aware of their surroundings when either fatigued or in haste; which can often lead to an accident. Guidelines are listed below:

- ❑ Safety issues are similar to those in Mobilization (Section 2.0) and Set-up (Section 4.0).
- ❑ Remind crew to slow down and work safely when rigging down and demobilizing. Many injuries occur at the end of the day. Develop a safety attitude. Allow time to break down equipment.
- ❑ Review the day's activities and ensure everything is in order (e.g., field notes).
- ❑ Secure site.

ATTACHMENT F
HEAVY EQUIPMENT

C-5.2
Earth-Moving Equipment

1.0 Scope

This procedure provides minimum requirements for inspecting and operating earth-moving equipment. This procedure covers equipment such as dump trucks, front-end loaders, bulldozers, graders, backhoes, and tracked and rubber-tired hydraulic excavators, such as Gradalls.

2.0 Definitions

Earth-Moving Equipment - All rubber-tired, self-propelled scrapers, rubber-tired front-end loaders, rubber-tired dozers, wheel-type agricultural and industrial tractors, crawler tractors, crawler-type loaders, and motor graders, with or without attachments, that are used in construction work.

Engineer - The person who requests the work and is responsible for the safety, quality, and timing of the work requested.

Qualified Inspector - An experienced craftsperson or engineer (Du Pont or contractor) who has demonstrated his or her ability or competency to inspect equipment to the site manager and/or the Du Pont Fleet Operations designee.

Qualified Operator - An experienced craftsperson who has received training and demonstrated competency to operate a specific piece of equipment.

Site Manager - The highest level Engineering employee responsible for work conducted on the site.

3.0 General

3.1 Inspection of Earth-Moving Equipment

A qualified inspector must inspect all contractor-owned or company-owned earth-moving equipment before its use on site and at least quarterly thereafter. (Rental equipment is considered contractor-owned.) The inspector should use an Earth-Moving Equipment Inspection form (Attachment C-5.2-1) or its equivalent.

3.2 Qualification of Operators

Only qualified operators may operate earth-moving equipment.

Before an operator uses earth-moving equipment on site, the operator's employer must furnish to the site manager a description of how the operator has been qualified. In addition, the operator's employer must submit an Equipment Operator Qualification form (Attachment C-5.2-2) or its equivalent to the site manager and/or designee.

3.3 Permits

Permits should be site-specific and handled according to site procedures.

3.4 Operation

Operate earth-moving equipment according to the posted safe speed limit.

Equipment operated on public roadways must meet the requirements of the local governing body.

Earth-moving equipment may carry only as many people as there are factory-installed seat belts. If equipment is not equipped with factory-installed seat belts, and local, state, or government regulations allow this equipment to be operated without seat belts, then only the operator should be allowed to ride the equipment.

During refueling of this equipment the engine must be shut off, and a fire extinguisher must be present.

Any earth-moving equipment operated after dark and/or under limited lighting must be equipped with factory-installed lighting or equivalent lighting subject to the qualified inspector's or site manager's approval.

Flammable and explosive environmental classifications must be considered before using earth-moving

equipment in any operating area. For more information on classifications, see SHE A-21.1.

Personnel must not occupy excavators or loader buckets during the operation of the equipment.

When using continuous-tracked equipment, place protection on paved road surfaces to prevent damage.

3.5 Hydraulic Lines

Hydraulic lines must be maintained to prevent leakage. If catastrophic failure of a hydraulic system occurs, the spill must be cleaned up according to site, local, state, and governmental regulations. Sites should have a written procedure to respond to this type of spill.

3.6 Backhoes

"Walking" and/or straddling a backhoe across an open trench should be avoided. If walking or straddling is necessary, the engineer must plan the job.

Backhoes must not be used for any operations exceeding the manufacturer's recommendations or the capability of the equipment (e.g., unloading a truck with a backhoe boom instead of a crane). If the manufacturer permits the use of a backhoe as a "crane," rigging must be according to the site standards and must be attached to the bucket according to the manufacturer's recommendations, and load charts showing load and radius capacities must be in the backhoe.

3.7 Trucks with Dumping Beds

If the cab of a dump truck is equipped with vertical and horizontal protection (designed to withstand the impact of the material being loaded), all personnel may remain in the cab of the dump truck during the loading of the dump bed with materials less than 3 inches (7.5 centimeters) in diameter. If the cab has insufficient protection and/or the materials are larger than 3 inches (7.5 centimeters) in diameter, then all personnel must leave the truck during loading and must wear all required site-specific safety equipment (i.e., hard hats and safety glasses) when they are outside the vehicle.

Personnel must not be transported in the bed of any dump truck that has the capability to dump.

When dumping a load, follow the manufacturer's recommendation on ground conditions. These recommendations give the "acceptable" slope of the terrain when operating the dump bed.

Dumping operations must be performed on stable, compacted areas. When dumping loads on the elevated edges of "new fill" areas, the engineer should develop a plan to prevent the dump truck from entering the area of unstable material.

Refer to SHE E-14.1 and SHE E-15.1 for removal of material from a Du Pont site.

Before and during the operation of a dump truck with the bed in the "up" position, the operator must verify and check the overhead clearances during forward and backward movements. The engineer must be sure that the dumping operation does not conflict with the requirements of SHE B-1.18 and SHE C-10.1.

Use a positive bed lock when any work is required under the dumping bed when the bed is in an "up" position.

3.8 Rollover Protection Systems

All earth-moving equipment except dump trucks and hydraulic excavators requires rollover protection. All backhoes require rollover protection except a backhoe attachment mounted on a tractor of less than 20 horsepower.

4.0 References

4.1 SHE A-21.1, *Planning Work in Plant Areas*

SHE B-1.18, *Use of Mobile Equipment Near Exposed Electric Lines*

SHE C-10.1, *Mobile Equipment Work Near Hazardous/Critical Pipe Lines*

SHE E-14.1, *Federal Environmental Regulations (CERCLA, RCRA, and SARA)*

SHE E-15.1, *Storage, Handling, and Disposal of Hazardous Materials*

ATTACHMENT C-5.2-1

Earth-Moving Equipment Inspection

Check equipment to be inspected: Dump Truck _____ Front – end Loader _____
Backhoe _____ Bulldozer _____ Motor Grader _____
Other _____

Equipment identification number _____

ITEMS	CONDITION			REMARKS
	good	rejected	n/a	
1. Access & Egress*				
2. Backup Alarms*				
3. Body				
4. Boom Excess Movement*				
5. Boom Pins*				
6. Brakes*				
7. Bulk Head Partition*				
8. Clutch*				
9. Cotter Pins/Hardened Pins*				
10. Cover				
11. Fire Extinguisher				
12. Frame				
13. Fuel Systems*				
14. Glass*				
15. Guards*				
16. Horn*				
17. Hydraulic System* (no leaks)				
18. Levers All Labeled*				
19. Lights				
20. Lugs				
21. Muffler & Exhaust Pipe*				
22. Muffler Guards*				
23. Outriggers*				
24. Parking Brakes*				
25. Platform Decking				
26. Positive Dump Bed Latch*				
27. Rear View Mirror				
28. Rollover Protection*				
29. Seat Belts*				
30. Side Mirrors (Both)*				
31. Steering Mechanism*				
32. Tracks, Tires, Wheels*				
33. Turn Signals				
34. Windshield Wipers				

* If any of these are rejected, the equipment shall not be used.

_____ _____
Inspected by Date

Equipment Operator Qualification

(Please check appropriate equipment.)

Backhoe _____

Bulldozer _____

Dump Truck _____

Front-end Loader _____

Grader _____

Hydraulic Excavator _____

Other _____

_____ employed by
(Operator's Name)

_____ is authorized to
(Employee's Name)

operate this equipment_____
(Equipment Make/Model)

and for the specific crane to be operated:

- has the required physical and mental abilities required to operate the crane.
- has read the specific crane manufacturer's operating manual.
- has received and successfully completed specific written and/or oral training and instructions on the crane to be operated.
- has demonstrated proficiency in the safe operation of the crane to be operated.

Verified by _____ _____
(Employer Representative) Date

_____ _____
Employee's Signature Date

ATTACHMENT G
HEAT & COLD EXPOSURE

HEAT EXPOSURE

Heat stress may pose a threat to the health and safety of site personnel based on the season of the year. Depending on the relative humidity, temperatures may create heat stress conditions, particularly when working in chemical-protective equipment. This section discusses heat-related health hazards and details CRG's heat stress program, which has been used successfully.

Heat Stress

Heat stress is a major hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly—within as little as 15 minutes. The key to preventing excessive heat stress is to educate personnel on the hazards associated with working in heat and the benefits of implementing proper controls and work practices.

Heat Rash

Heat rash (prickly heat) may result from continuous exposure to heat or humid air where the skin remains wet due to lack of evaporation, sweat ducts become clogged, and a skin rash appears. This uncomfortable rash can be prevented by resting in a cool place during breaks and by practicing good daily personal hygiene.

Heat Cramps

Heat cramps are muscular spasms that usually occur in the abdomen or limbs due to a loss of salt from profuse sweating. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt.

- ❑ First Aid
  - Apply warm, moist heat and pressure to reduce pain.
  - Give electrolyte drinks by mouth (e.g., *Gatorade*®).

Heat Exhaustion

Caution: Persons with heart problems or on a low-sodium diet who work in hot environments should consult a physician about what to do under these conditions.

Heat exhaustion is a result of overexertion in hot or warm weather. It is highly possible for an on-site worker to experience heat exhaustion due to the use of protective coveralls, boots, gloves, and respiratory protection, even if ambient temperatures are mild.

- ❏ *Symptoms*
  - Pale, clammy skin
  - Profuse perspiration
  - Weakness
  - Headache
  - Nausea
- ❏ *First Aid*
  - Get victim into the shade or to a cooler place.
  - Immediately remove any protective clothing.
  - Encourage victim to drink plenty of fluids.
  - Make victim lie down with feet raised.
  - Fan and cool victim with wet compress.
  - Transport victim to the hospital if vomiting occurs.
  - Instruct victim to rest for a few days.
- ❏ *Prevention*
  - If possible, schedule work for early morning or evening during warm weather.
  - Have cool liquids at the Exclusion Zone border for down-range personnel to continuously replace body fluids.
  - The SSO or alternate should continually monitor personnel for signs of heat stress.

Heat Stroke

The body's temperature control system, which causes sweating, stops functioning correctly in the case of heat stroke. Brain damage and death may occur if the body core temperature is extremely elevated and is not reduced.

- *Symptoms*
  - Flushed, hot, dry skin
  - High body core temperature (greater than 105°F)
  - Dizziness
  - Nausea
  - Headache
  - Rapid pulse
  - Unconsciousness
- *First Aid*
  Immediately take precautions to cool the body core temperature by removing clothing and sponging the body with alcohol or cool water, or by placing the victim in a tub of cold water until his or her body temperature is reduced sufficiently (102°F). Stop cooling and observe the victim for 10 minutes. Once the temperature is controlled at a low enough level, dry the person off. Use fans or air conditioning, if available. Do not give the victim stimulants. Transfer to a medical facility.

Heat Stress Program

The heat stress program includes work and rest regimens employed as necessary so that personnel do not suffer adverse effects from heat stress. The SSO is responsible for monitoring heat stress throughout the day. Based on heat stress severity, the SSO will determine to what extent the elements of the heat stress program will be implemented.

Special clothing and an appropriate diet and fluid intake will be recommended to all site personnel to reduce the chance of heat-related hazards. The work and rest regimens followed by CRG were developed based on the current American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) guidelines and on National Institute of Occupational Safety and Health (NIOSH) recommendations.

Work Load

The following table will be used as a guide for establishing initial work and rest regimens. It takes into account TLV wet-bulb globe temperature (WBGT) correction factors for clothing.

Work/Rest Regimen	Work Load		
	Light	Medium	Heavy
Continuous work	76°F WBGT	70°F WBGT	67°F WBGT
75% work and 25% rest per hour	77°F WBGT	72°F WBGT	68°F WBGT
50% work and 50% rest per hour	79°F WBGT	75°F WBGT	72°F WBGT
25% work and 75% rest per hour	80°F WBGT	78°F WGBT	76°F WBGT

The work-load category will be established by ranking each job in light, medium, or heavy load categories based on the type of operation, as follows:

- *Light Work*
  Sitting or standing to operate machinery, performing light hand or arm work.
- *Moderate*
  Walking about with moderate amounts of lifting or pushing.
- *Heavy*
  Heavy physical labor (e.g., pick and shovel work).

COLD EXPOSURE

Cold Stress

Cold injury such as frostbite and hypothermia may occur during field operations. The extent of injury caused by exposure to the cold will depend on such factors as wind velocity, temperature, and humidity. To guard against such injuries, personnel must wear appropriate clothing, have immediate access to warm shelter, carefully schedule work and rest periods, monitor workers' physical conditions, and learn to recognize warning symptoms, such as reduced coordination, drowsiness, impaired judgment, fatigue, and numbing of toes and fingers.

Frostbite

Frostbite is a localized injury that results from the freezing of tissue. It is most common to the fingers and toes (due to reduced circulation in the extremities), and on the face and ear (most commonly exposed to the weather).

For frostbite to occur, there must be subfreezing temperatures. It is most prevalent in very cold temperatures (20°F or less) or when cold temperatures are exacerbated by the wind (wind chill).

- *Symptoms*
  - Prefrostbite
    The affected area feels painfully cold, but is usually flushed (rosy-red in color)
  - First-Degree Frostbite (Frost Nip)
    Crystallization occurs in superficial tissues. The affected area no longer feels cold, is completely numb, and shows as a small white or grayish-yellow waxy patch. Immediate treatment will completely reverse the condition with no ill effects.
  - Second-Degree Frostbite (Deep)
    A deep freezing of the fluids in the underlying soft tissues. Symptoms and treatment are the same as for first-degree frostbite. It usually results in the death of tissue (e.g., blistering black skin or a loss of toes) with possible complications from gangrene.

- *First Aid*
  - Cover and protect the affected area.
  - Provide extra clothes.
  - Bring the victim indoors as soon as possible.
  - Give the victim warm drink
  - Rewarm frozen tissue quickly by immersing it in warm water (if thawed and refrozen, warm at room temperature).
  - Do not rub; rubbing causes death of tissue.
  - Do not apply heat.
  - Do not break blisters.
  - Do not allow victim to walk after feet thaw.
  - Discontinue warming as soon as the frostbitten body part becomes flushed.
  - Exercise the thawed body part.
  - Separate fingers and toes with sterile gauze.
  - Elevate frostbitten parts.
  - Seek medical attention because of chance of infection or gangrene.

Hypothermia

Hypothermia is a systemic lowering of the body temperature. Extreme cases (core temperature below 90°F) result in death. Hypothermia is the most common cause of death for persons involved in outdoor/wilderness activities. It does not require freezing temperatures and can occur in ambient air temperatures as high as 70°F. Wind and wetness greatly accentuate hypothermia by causing increased cooling. An example of a hypothermic condition is a rainy, windy day with 50°F air temperatures.

- *Symptoms*
  - First Stage—"goose bumps," shivering, feeling chilly
  - Second Stage—violent shivering, blue lips, pale complexion, feeling extremely cold
  - Third Stage—no longer feeling cold, lack of coordination, mild unresponsiveness, drowsiness, stumbling
  - Fourth Stage—failing eyesight, almost total lack of responsiveness, inability to speak, inability to walk
  - Fifth Stage—coma or rapid death

- *Treatment*

  For all levels, remove wet, frozen, or restrictive clothing. Dry and rewarm the victim using an external heat source that completely envelops the victim (e.g., placing the victim in a warm vehicle, a warm room, a tub of warm water, or a sleeping bag with another person). Do not use a source of radiant heat that will warm only one side of the victim. Be prepared to administer cardiopulmonary resuscitation (CPR). Do not give the victim alcohol.

  - First Stage
    Put additional clothing on the victim such as a hat, shirt, or windbreaker; give food and drink; exercise tense muscles.
  - Second Stage
    Follow the same steps listed for the first stage, only more so; give warm drinks and provide means of rewarming if possible.
  - Third Stage
    Rewarm the victim; give warm food and drink. **Note: In hypothermia beyond the second stage, the victim can no longer warm himself and must have an external heat source.**
  - Fourth Stage
    Remove wet or cold clothing and gradually rewarm the victim so that blood trapped in extremities is rewarmed before it is circulated back into the inner body, in order to prevent *afterdrop*. Afterdrop is a further lowering of the body core temperature that results from recirculation of cold blood. Avoid hot, radiant heat sources that will warm surface blood before the inner blood has been warmed. Do not give warm drinks that can fool the body internally into feeling it is warm. Fourth stage hypothermia victims are best treated by supervised, experienced medical help because complications can cause death. Place the victim in a warm vehicle and evacuate immediately to a medical facility.
  - Fifth Stage
    Gradually rewarm the victim. Requires sophisticated medical help to prevent death from *aftershock* (a recirculation of chilled blood causing heart fibrillation).

ATTACHMENT H
GROUND FAULT CIRCUIT INTERRUPTERS

B-1.15
Ground Fault Circuit Interrupters

1.0 Scope

This procedure provides guidelines and manufacturers' recommendations for using ground fault circuit interrupters (GFCIs).

2.0 Procedure

2.1 How GFCIs Work

Under normal conditions the current in an electrical branch circuit flows equally between the hot (supply) and neutral (return) conductors. The GFCI has a sensing element that monitors the current of both these conductors. If the GFCI senses a current difference between the hot and neutral conductors of as much as five (5) milliamps, it will trip, thus opening the circuit in a fraction of a second. This protects the user of a defective tool, device, or extension cord from lethal shock.

However, the GFCI will not protect an employee from line-to-line contact such as holding two "hot" wires or a hot and neutral wire in each hand.

2.2 Required Use

– GFCIs shall be used on all extension cords and portable electric tools.

– All 120vac, single phase, 15, 20, and 30 ampere receptacle outlets on construction sites which are not a part of the permanent wiring of the building or structure and are in use by employees.

– Only site management may authorize deviations, including substitution of an "assured grounding program," in lieu of GFCI protection for only those cases where a greater hazard is created by using a GFCI.

– Portable electric lighting used in confined spaces shall operate at 12 volts maximum or 120 volts if protected by a GFCI.

Note: Low-voltage (12 V) lighting is preferred due to the possibility that the GFCI will trip and leave the entrants unable to see.

– Electric tools should not be permitted on the same circuit as lighting where 120-volt GFCI protected lighting is used, for the same reason.

– GFCIs shall not be used on temporary lighting circuits.

2.3 Type and Proper use of GFCIs

2.3.1 – GFCIs should only be used on AC circuits. GFCI devices ~~do~~ will not function on DC circuits.

2.3.2 – Class A GFCIs:

– Are accepted as personal protection by OSHA in temporary wiring circuits.

– Should be plugged in as close to the circuit source as possible.

– Should be tested using the built-in test button before each use.

– Do not afford protection in the event of an open circuit neutral condition.

CAUTION: Some Class A GFCIs have an automatic reset feature and are **not** approved for use on DuPont sites.

CAUTION: A GFCI breaker in a panel board does **not** afford protection in the event of a reverse polarity circuit condition.

Note: Class A GFCI receptacles and breakers in permanently wired systems, which have been tested

for open circuit neutral and reverse polarity are acceptable as personal protection and afford excellent shock protection.

Sites shall not field-fabricate portable GFCI units. Portable GFCIs shall be purchased as an assembly.

2.3.3 – Class B GFCIs are not to be used for personal protection. They are intended for use as equipment protection.

2.3.4 – See FCSM B-1.14 for GFCIs installed in generators and welding machines.

3.0 Testing

All GFCIs have a test button that proves the internal contacts will mechanically trip. The test button shall be used each time the GFCI is used.

GFCIs shall be tested on at least an annual basis or more often per the manufacturer's recommendations with a GFCI tester that can detect when the power has been removed.

4.0 References

4.1 DuPont Standard S16G, *Confined Space Entry*

4.2 FCSM B-1.14, *Electric Welding and Portable Generators*

4.3 FCSM B-1.16, *Temporary Wiring*

4.4 FCSM B1.0, *Electrical Safety Program* - (Definitions)

ATTACHMENT I
LOCK, TAG AND TRY

Mandatory and advisory language conforms with Corporate SHE Policy S1Z, the DuPont SHE Protocol.

S14G
Lockout/Tagout

Table of Contents

List of Appendices

In July 2003, the entire standard was revised.

Entire document reaffirmed July 2003

Contact Valerie.S.Lamison@usa.dupont.com on e-mail for more information.

1. Scope and field of application

1.1 Scope [Last revised 7/03]

This standard specifies the minimum mandatory requirements and advisory guidance for controlling hazardous energy. It also describes how to achieve and maintain the security of any isolations made.

Local and national regulations shall be used in conjunction with this standard.[*] Additional mandatory requirements specific to the U.S. are included in **Appendix A**.

Mandatory requirements in this standard are noted in italics.

1.2 Field of application [Last revised 7/03]

See Sections 1 and 4 of the DuPont SHE Protocol, Corporate Policy S1Z.

2. References [Last revised 7/03]

DuPont Corporate Policy

S1Z DuPont SHE Protocol

S2Z DuPont SHE Commitment

S3Z Responsible Care®

DuPont Corporate Standard

S16G Confined Space Entry

S27G Line Breaks

S31G Electrical Safety Management

DuPont Engineering Standard

E5Z Safe Practices Using Mobile Equipment in the Vicinity of Electric Lines and Cables

3. Management responsibilities [Last revised 7/03]

Line management in businesses, regions, and functions has the responsibility to implement this standard.

4. Definitions [Last revised 7/03]

Affected person—any person who operates machinery or equipment that is periodically controlled by lockout.

Authorized employee—an employee trained and authorized by his or her employer to make and try isolations.

[*] *Mandatory requirements are italicized.*

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Complex lockout—lockouts that may involve multiple

- Crafts
- Employers
- Hazardous energy sources
- Lockout points
- People
- Shifts

Control device—a device used to execute a system change by manual, remote, automatic, or partially automatic means (e.g., push buttons, emergency buttons or stops, selector switches, and other control-circuit type devices).

Energy-isolating device—a mechanical device that physically prevents the transmission or release of energy, including but not limited to, the following:

- A manually operated electrical circuit breaker
- A disconnect switch
- A manually operated switch that disconnects a circuit from all ungrounded supply conductors and prevents all poles from being operated independently
- A line valve
- Slip plates, blanks, and physical disconnections
- A mechanical block or any similar device used to block or isolate energy

Hazardous energy—any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or any other energy that, if not controlled, could cause injury to personnel or damage to property.

- **Electrical hazards** are present when conductors or components that may be electrically energized could cause injury to personnel or damage to property.
- **Mechanical hazards** are present when the unexpected start-up of the system, equipment, or machine, or the release of stored energy while adjusting, maintaining, or servicing systems, equipment, or machines could cause injury to personnel or damage to property.
- **Process hazards** are present when the unexpected release of gases, liquids, or solids could cause injury to personnel or damage to property. These hazards can exist during such tasks as installation, fabrication, servicing, or maintenance of pipelines, vessels, or associated equipment.

Isolation—separation of the area where work is to occur from sources of hazardous energy or materials in such a way that only a conscious and deliberate act can restore the connection.

Lock—one of three types of locking mechanisms:

- **Discrete**—locks that are different from one another; each can only be opened by one key.
- **Personal**—a discrete lock, individually keyed, issued to an individual for his or her use in securing isolations.

- **Series** or **system**—a group of locks that are opened by a single key and are used in area/complex lockouts. Various sets of locks may be in use; however, only one key can open any given lock in a particular set.

Locking—placing a lockout device on a hazardous-energy-isolating device at a point of isolation.

Lockout—isolation of a source of hazardous energy, including releasing any residual hazardous energy that might be present, and securing an isolation point by locking it.

Lockout device—a piece of equipment that prevents the unauthorized or accidental operation of a hazardous-energy-isolating device.

Person in charge—a qualified employee who is specifically appointed with overall responsibility for a lockout/tagout to place and keep all hazardous energy sources under lockout/tagout and to account for all persons working on the job or task.

Proprietor/owner/operator—the person or group responsible for the operation of a machine, system, or equipment.

Qualified person—a person familiar with the construction and operation of the equipment and the hazards involved.

Stored energy—hazardous energy that can continue to exist after equipment is isolated (e.g., the hazardous energy contained in springs, flywheels, pressurized fluids or gases, capacitors, or gravity).

Tagging—placing a tag on a lock or point of isolation to identify who placed the lock and when it was placed.

Tagout—placement of a “Danger—Do Not Operate” tag (without a lock).

Testing—when a qualified person verifies the absence of voltage using a site-approved testing device.

Troubleshooting—a process for identifying malfunctioning components within a system that is done in both energized and de-energized systems.

Try/trying—proving the effectiveness of an isolation by attempting to make a machine, system, or equipment operate without being inhibited by interlocks or other means that would impede the “try” step.

5. Standards/guidelines

5.1 General [Last revised 7/03]

Lockout/tagout is performed to prevent injury to personnel or damage to property by the unexpected release of hazardous energy. When planning a lockout, it is important to consider the nature of all hazardous energy that may be present.

5.2 Principles [Last revised 7/03]

The following principles govern all lockouts/tagouts:

- *All sources of hazardous energy shall be identified prior to initiating any lockout/tagout.*
- *All sources of hazardous energy shall be removed or controlled prior to potential exposure to the hazards.* Examples of removing or controlling hazardous energy are as follows:
  - Disconnecting power and discharging any capacitance

- Isolating pressure sources and releasing the pressure
- Stopping rotating devices and securing them from further movement
- Releasing stored hazardous energy
- Lowering or securing equipment to prevent movement caused by gravity
- Protecting equipment from external forces (e.g., wind) that may cause movement

- *Before starting work, each individual working on a task must determine, to his or her satisfaction, that appropriate isolations are in place and the isolations are secure for the task in which he or she is involved.*
- *Where a lock can be applied, tagout alone shall not be used to control exposure to sources of hazardous energy. Where a lock cannot be applied, site procedures shall address the use of tagout and the additional steps essential to help ensure a level of safety equivalent to that obtained by using lockout. Other means shall be used to secure access to the device, where possible.*
- *Each person potentially exposed to the hazardous energy must place a lock and tag, when a lock can be applied. Individuals who enter the hazard zone of a lockout shall be considered potentially exposed to the hazard.*

  Note: *An exception to this principle shall only be made when the site has a written procedure describing the method of controlling, accounting for, and recording an individual's involvement in the lockout.*
- *Each person potentially exposed to the hazardous energy must participate in the lockout/tagout.*
- *Clear communication of the lockout's/tagout's status shall be ongoing.*
- *An energy source shall be considered energized until the source is removed and the energy isolation is verified.*

  Note: *Exposure to hazardous material shall be controlled in accordance with the mandatory provisions of DuPont SHE Standard S27G.*
- *An effective try step must be performed. All interlocks that may prevent an effective try step must be accounted for.*
- *A test for the absence of voltage must be performed for all electrical hazards.*

5.3 Lockout procedure [Last revised 7/03]

5.3.1 Overview

Each site shall establish written procedures for controlling and methodologies for isolating hazardous energy. The procedures shall include the following information:

- *How the hazardous energy sources are to be controlled for the duration of the work*
- *Who is responsible for determining that the hazardous energy sources are controlled for the duration of the work*
- *The responsibilities of **all** personnel involved in the work*
- *Mandatory training requirements*

5.3.2 Procedure

At a minimum, each site's lockout procedure must include details on the following elements:

- *Removing the source of hazardous energy and hazardous materials*
- *Addressing exposure to hazards while performing the lockout/tagout*
- *Installing lockout devices*
- *Verifying that the hazardous energy source has been removed*
- *Trying the equipment to determine that the hazardous energy is under control*
- *Developing a method for helping ensure the continuity of lockouts across shifts*
- *Releasing the equipment from lockout*
- *Describing the specific measures to be used to enforce the procedure's mandatory requirements*
- *Identifying and listing lockout points for tasks with multiple lockout points*

5.3.2.1 Removing the source of hazardous energy and hazardous materials

All personnel who use site lockout procedures must know the following information:

- *The specific hazardous-energy-isolating devices for the task to be performed*
- *The type of hazardous energy supply or hazardous material*
- *The type and location of the disconnecting/isolating device acceptable for the hazardous energy source or hazardous material*
- *The mechanics and hazards of operating the disconnecting/isolating device*
- *The mechanics of installing a lockout device*

Note: Push buttons, selector switches, and other control-circuit type devices are not hazardous-energy-isolating devices. Control and solenoid valves are not adequate means of providing isolation for fluids. Control valves that are designed for use as hazardous-energy-isolating devices and that provide an effective isolation from the hazardous energy may be used in alignment with the mandatory requirements of DuPont SHE Standard S27G.

A method must be used to verify that the hazardous energy source or hazardous material has been removed and that the hazardous energy isolation is complete. In some instances, the "try" step is sufficient; in other instances, only testing can verify the isolation is complete.

Where hazardous energy can reaccumulate due to system design, configuration, or installation, a means of preventing this reaccumulation must be used. An example of possible hazardous energy reaccumulation is in a long electrical cable that has a high capacitance. *When the system or equipment contains a source of stored hazardous energy (e.g., springs, flywheels, gravitational effects, or capacitors), the stored hazardous energy must be relieved or otherwise blocked with components that control the potential hazard.* The advisability of installing protective grounds in complex or high-energy electrical systems should be considered (see DuPont SHE Standard S31G).

Fuel-powered, engine-driven equipment (sometimes called portable equipment) must be rendered inoperable by secure means (e.g., by removing the battery cables or removing the spark-plug wire or equivalent).

5.3.2.2 Installing lockout devices

The lockout device must be installed in a way that helps ensure that inadvertent operation of the hazardous-energy-isolating device is impossible.

Each site must define in written procedures the method of controlling or securing the keys for the lockout devices for all lockouts.

Each person potentially exposed to the hazardous energy must place a lock and tag, when a lock can be applied.

Note: *An exception to this principle shall only be made when the site has a written procedure describing the method of controlling, accounting for, and recording an individual's involvement in the lockout.*

5.3.2.3 Verifying that the hazardous energy source has been removed

All isolations shall be verified to determine that the hazardous energy has been removed.

The following are examples of how to verify the removal of hazardous energy sources: opening drains; viewing pressure gauges, site glasses, or level indicators; visually verifying that rotating equipment has stopped; visually verifying that components have been disconnected (e.g., couplings, belts, and chains have been removed); and verifying that stored hazardous energy has been removed or is appropriately blocked.

Caution: Gauges should be viewed before the hazardous energy source is removed to confirm they are in working order. Drains can become blocked and not function as designed. When verifying isolations, personnel should take precautions to avoid putting themselves at risk or creating additional hazards.

For tasks where there is exposure to electrical hazards, a break in the power conductors should be visually inspected, where possible. *All lockouts must include verification of a complete physical break in the power conductors by testing for absence of voltage with a site-approved voltage-detecting device.*

Note: For information on "Test Before Touch" and testing for the absence of voltage, refer to DuPont SHE Standard S31G.

5.3.2.4 Trying the equipment to determine that the hazardous energy is under control

When the equipment is "tried" (i.e., the control device operated) to verify its isolation from sources of hazardous energy or hazardous materials, the area surrounding the equipment shall be cleared of people and equipment that could be injured or damaged prior to attempting to start the equipment. "Try" procedures must help ensure the isolation of all sources of hazardous energy and the positive control of hazardous materials by trying to start or move the equipment. The "try" procedure must also account for all items (e.g., interlocks) that may prohibit the equipment from starting or moving.

5.3.2.5 Releasing the equipment from lockout

Before the equipment or pipeline is released back to the proprietor, the people working on it shall determine that it is safe to reintroduce the hazardous energy or material to the equipment or pipeline. The equipment's status shall be conveyed to the proprietor when the equipment is released from lockout. The proprietor shall inspect or otherwise verify the integrity of the pipeline or equipment before hazardous energy or hazardous material is reintroduced. This verification may include leak testing, pressure testing, or simple visual inspection.

Where work extends over multiple days or shifts, a lockout device may be permitted to remain in place for the duration of the work period. *However, the individual shall verify the lockout is in place after any absence from the work site.* Each person who installed a lock should remove it when his or her work is complete.

Sites shall establish a procedure, including the mandatory level of authorization, for removing an absentee's lock. Once the installer's unavailability (i.e., not on site) is confirmed, formal authorization for removing the lock should be given. *If someone other than the installer removes a lock, the installer shall be informed immediately on his or her return to work that the lock was removed.*

Where lockouts extend beyond one shift, the lockout/job plan shall address the continuity of the lockout across the shifts.

5.4 Procedure audit [Last revised 7/03]

Each site shall establish an audit process to determine

- *How often to audit.*
- *If the established procedure is being followed.*
- *If there are deficiencies in the established procedure.*
- *If there are deficiencies in understanding the established procedure.*

The person responsible for the procedure and other knowledgeable personnel shall audit the procedure.

5.5 Lockout types [Last revised 7/03]

5.5.1 Prevention of exposure to electrical hazards

Where an electrical hazard is a possibility, caution should be exercised to verify that all possible sources of hazardous electrical energy are controlled. *Persons making the lockout shall be suitably qualified to assess and address the electrical hazards associated with the lockout.* Additional steps are taken for lockouts for work on or near potentially energized electrical equipment. For more information, refer to DuPont SHE Standard S31G.

5.5.2 Simple lockout

A simple lockout is accomplished by individuals placing personal locks and tags directly on the points of isolation. This is the preferred method of lockout and should be used when appropriate.

5.5.3 Complex lockout

For complex lockouts, each site shall define the following in writing:

- *The person in charge shall be responsible for keeping all hazardous energy sources, hazardous materials, and electrical, process, and mechanical hazards under control as the work progresses.*
- *When multiple employers are working on the same process, everyone involved in the work must understand and observe the mandatory requirements of all the lockout procedures of all the employers involved.*
- *The lockout process must cover all issues identified in all employer procedures.*

5.6 Lockout locks [Last revised 7/03]

Lockout locks shall only be used to control hazardous energy. In certain situations, an individual employee may apply multiple locks keyed to a single key. Locks are an essential element of a lockout device. However, the lockout device may include other components if the assembly effectively contains the source of hazardous energy.

All lockout locks shall be identified as follows:

- *Series or system locks shall indicate the lockbox number, system, or equipment being locked out.*
- *Personal and discrete locks shall indicate the individual who applied the lock.*

The information may be on a danger tag attached to the lock or may be on the lock. The preferred method is to use a danger tag with the locks.

5.7 Danger tags [Last revised 7/03]

Danger tags shall be designed to be different from all other tags available at the site. Each site shall establish a mandatory requirement for danger tag design for all lockout applications. The danger tag shall be readily identifiable as a danger tag. The tags should include standardized verbiage (e.g., “Danger—Do Not Operate” or “Danger—Do Not Remove Without Authority”). *The danger tag must provide space for the name of the employee and the date the tag is installed.* It may also provide space for other information (e.g., the craft or the reason for the tag). *Danger tags must be able to withstand the environment in which they are used for the duration of the lockout.*

Danger tags shall not be used for any other purpose than to indicate an isolation point for controlling hazardous energy.

5.8 Employee training and documentation [Last revised 7/03]

All employees shall be trained to the degree warranted by their job assignments. They shall be retrained whenever their job assignments change or whenever the hazardous energy control procedure changes.

Note: A job may change by reassignment or by equipment modification.

Documentation shall exist for each employee who has been trained. This documentation shall include the following information:

- *Employee’s name and job assignment*
- *Employer*
- *Date of training*
- *Content of the training received*
- *Name of the person conducting the training*
- *Method of verifying the employee’s understanding of the training*

Documentation may be maintained in a computer-based system but should be made available in hard copy form on request.

5.9 Line breaks [Last revised 7/03]

See DuPont SHE Standard S27G for mandatory requirements and advisory guidance on lockout associated with line breaks. *The mandatory requirements of both DuPont SHE Standard S27G and this standard must be followed when making line breaks.*

5.10 Confined spaces [Last revised 7/03]

See DuPont SHE Standard S16G for mandatory requirements and advisory guidance on working in confined spaces. *The mandatory requirements of both DuPont SHE Standard S16G and this standard must be followed when working in confined spaces.*

6. Management systems

6.1 Support resources [Last revised 7/03]

Site and business SHE resources are available to assist with implementation of this standard.

6.2 Management records [Last revised 7/03]

Records shall be retained in compliance with the Corporate Records and Information Management Program.

6.3 Audit requirements [Last revised 7/03]

Each SBU or region should audit compliance with this standard as part of its SHE audit program.

6.4 Standard renewal process [Last revised 7/03]

This standard shall be reviewed and revised as necessary and, at a minimum, not later than five years from the date of the last revision.

6.5 Deviation process [Last revised 7/03]

Deviations from this standard must be authorized by the Director of Operations for the relevant business/region after consultation with the SHE Excellence Center and Legal and nonobjection from the Responsible Care® Core Team. Deviations must be documented, and documentation must include the relevant facts supporting the deviation decision. Deviation authorization must be renewed periodically and no less frequently than every three years.

6.6 Training and communications requirements [Last revised 7/03]

Each business and site should provide training as appropriate. See Section 5.8 for specific mandatory requirements.

6.7 Contact [Last revised 7/03]

The contact for this document is the Employee Safety Competency of the SHE Excellence Center.

Appendix A—OSHA requirements specific to U.S. sites [Last revised 7/03]

The following are OSHA requirements contained within 29 CFR 1910.147 and are specific to U.S. sites only.

- *All equipment installed after January 2, 1990, that is used for controlling hazardous energy shall be capable of accepting a lockout device.*
- *Affected employees shall be trained to*
  - *Recognize a lockout device.*
  - *Understand that equipment with lockout devices installed must not be operated.*
  - *Understand the procedure enforcement measures.*
  - *Understand that a lockout procedure exists, where and how they have access to the procedure, and their role in executing the procedure.*
- *Authorized employees shall be trained to*
  - *Recognize the hazards associated with the equipment they are authorized to lock out.*
  - *Install lockout devices.*
  - *Understand the details of the site procedure including the purpose.*
  - *Understand the types of hazardous energy available on the site.*
  - *Understand the types of equipment used for controlling hazardous energy.*
  - *Understand complex lockout procedures, including "lockbox" lockouts.*
  - *Understand contractor procedures for contractors' work progressing in the area.*
  - *Be able to use drawings and/or tags and labels to identify hazardous energy isolation points.*
  - *Understand line-break procedures if their job assignments involve them.*
  - *Understand their roles and responsibilities in executing the lockout procedure.*
- *At least annually, each site shall audit one lockout while it is in progress.*
- *Records of the audit and findings shall be documented and maintained for inspection. The records shall identify the person conducting the audit, the employees involved in the work process, and any deficiencies identified.*

ATTACHMENT J
LINE BREAKS

Mandatory and advisory language conforms with Corporate SHE Policy S1Z, the DuPont SHE Protocol.

S27G
Line Breaks

Table of Contents

In June 2002, the entire standard was revised.

Entire document reaffirmed June 2002

Contact Valerie.S.Lamison@usa.dupont.com on e-mail for more information.

1. Scope and field of application

1.1 Scope [Last revised 6/02]

This standard provides the minimum provisions for planning and executing all line breaks. It also specifies that line break considerations be addressed at an early stage in the design process of new and modified equipment. This standard is a principle-level document, and additional voluntary guidance can be found in the DuPont Line Break Manual (DuPont Accession Report 18386), which is in accordance with this standard.

Mandatory requirements in this standard are noted in italics.

1.2 Field of application [Last revised 6/02]

See Sections 1 and 4 of the DuPont SHE Protocol, Corporate Policy S1Z.

2. References [Last revised 6/02]

DuPont Corporate Policy

S1Z DuPont SHE Protocol

S2Z DuPont SHE Commitment

S3Z Responsible Care®

DuPont Corporate Standard

S21A Process Safety Management (PSM)

S14G Lockout/Tagout Basic Requirements

S16G Confined Space Entry

S11H Specialty Thermal Protective Apparel

S3Y Incident Investigation

Other References

The following references can be found at
http://www1.lvs.dupont.com/SHE/sheman/references/s27g.htm

DuPont FC&S Safety Manual, Procedure B-20.1, Hot Taps and Welding on Energized Systems

DuPont Line Break Manual (DuPont Accession Report 18386)

3. Management responsibilities [Last revised 6/02]

Line management in businesses, regions, and functions has the responsibility to implement this standard.

4. Definitions [Last revised 6/02]

Cleared—all lines and equipment associated with a system are verified by standard practices to have been isolated and, where appropriate, drained, flushed, and/or purged of hazardous material, and the following criteria are met:

- The system's temperature is lower than 140°F (60°C) and higher than 14°F (-10°C).
- Atmospheric pressure has been attained.

- Hazards associated with toxicity, corrosiveness, flammability of gases, vapors, or mists, and/or airborne combustible dust are reduced to acceptable levels.

Controlled bleed—a valved opening (bleed) located between two block valves. The bleed consists of an open block valve and terminates with an open end or pressure gauge. The bleed serves as an indicator of the integrity of the upstream block valve. Selection and positioning of the bleed termination point are dependent on the hazards associated with the process material and local conditions at the time of the line break.

Double isolation—double block valve and controlled bleed (i.e., block valve/controlled bleed/block valve) or block valve and blank/blind flange.

Engineered process plug—a means of isolating process flow by solidifying a portion of the process in a pipeline in a controlled, predesigned, and approved manner.

Hazardous process or system—a process or system that contains any material at any pressure that could cause a risk of injury to an individual(s), a risk of fire or explosion, an environmental risk, or an off-site risk. Examples of hazardous processes or systems include, but are not limited to, compressed fluids, especially gases in pipes and vessels; corrosive and/or flammable substances; and other lines that could contain material that is hazardous on contact or inhalation, including fluid whose temperature is higher than 140°F (60°C) or lower than 14°F (-10°C).

Hot tap—a mechanical method of adding a tie-in or drain to existing piping service or equipment without interrupting the service.

Isolated—manually valved and/or blanked or blind flanged to completely isolate the line or equipment from the process material. (See Section 5.5 for additional information.)

Line break—opening cleared or uncleared lines or equipment by actions that may include, but are not limited to, the following:

- Breaking flanges
- Removing one or more bolts from flanges
- Opening valves to the atmosphere
- Removing valve bonnets and nonreturn (i.e., check) valves
- Turning spectacle plates (i.e., blanks)
- Breaking pipe joints
- Removing slip plates (i.e., blanks), blind flanges, plugs, and caps
- Disconnecting tubing
- Disconnecting loading and unloading process hoses
- Penetrating a line by mechanical or other means
- Opening inspection ports
- Making subtle adjustments (e.g., replacing packing on a valve)

Permitted line break—a line break where the written job plan is a line break permit.

PPE—personal protective equipment.

Qualified personnel—those who by extensive knowledge, training, and experience have successfully demonstrated their ability to solve or resolve problems related to line breaks in accordance with this standard.

5. Standards/guidelines

5.1 New projects and modifications to existing systems [Last revised 6/02]

Systems shall be designed and built to enable isolation and clearing of the hazard.[*] *The line organization shall work with the appropriate engineering design groups so that line break issues are considered in both new projects and modifications to existing systems.* It is the responsibility of the line organization to engage the design function so that these specifications are addressed.

Key elements for designing a system include the following:

- *Isolation and clearing shall be primary considerations during project front-end loading activity.*
  - *The design shall consider the balance between added potential leak points (catastrophic and fugitive) vs. the benefit of providing additional connections for flushing and clearing access to systems and equipment.*
  - *The design shall include the ability to isolate secondary energy sources for polymer and melt systems where the material is "frozen" (i.e., solidified) to eliminate the hazard.*
  - *All systems shall be designed with the ability to isolate secondary energy sources.*

    Examples of secondary energy sources include steam and electric tracing and jacketed vessels and pipe.
- *Experienced field operators and mechanics shall be involved in the front-end loading efforts.*
- *The hierarchy for isolating hazardous processes from workers shall be as follows:*

  1. *Double block valve and controlled bleed*
  2. *Block valve and blank/blind flange*
  3. *Double block valves*
  4. *Single block valve*
  5. *Engineered process plug (i.e., solidifying the process)*

  The design team shall consider this hierarchy, starting with the most protective level. The decision should be based on the level of protection to people and environment vs. additional potential hazards introduced as the result of adding additional valves. *If neither double block valve and controlled bleed or block valve and blank/blind flange isolation is feasible, then appropriate safeguards must be provided, documented, and included as part of the design process hazards review.*

[*] *Mandatory requirements are italicized.*

5.2 Training [Last revised 6/02]

All work on hazardous processes or systems, including planning and execution, shall be performed by qualified personnel.

Sites shall provide training on line break procedures, which shall include the provisions of this standard. Training should include the guidelines of the DuPont Line Break Manual.

Key elements for determining personnel qualifications are listed below:

- *Initial training shall be provided for*
  - *Operating personnel, including supervision.*
  - *Maintenance and construction personnel, including supervision.*
  - *Contractors and contract administrators.*
  - *Planners/schedulers.*
  - *Personnel who write and approve line break permits.*
- *Periodic refresher training shall follow initial training by no more than three years.*
- *Training shall be documented in accordance with the record-keeping specifications in DuPont SHE Standard S21A.*
- *Documented first-party field audits shall be conducted periodically to verify continued comprehension of training.*

5.3 Job planning [Last revised 6/02]

A written job plan that specifically addresses safety, health, and environmental issues shall be prepared and implemented for all line breaks on hazardous processes and systems until all hazards have been cleared or controlled. The job plan shall be prepared by someone who understands the hazards in the system and reviewed by everyone involved in the work prior to the start of the line break.

The job plan shall include the following:

- *Specific identification of the hazards*
- *Isolation, clearing, and flushing plans, which may include isometric drawing(s) describing which valve to close, where to drain, and the lockout points*
- *A description of the PPE to be used, when to wear it, and when to remove it*
- *The specifications for and duties of a standby person, where appropriate*
- *Contingency plans if a single isolation device is used or if unprotected personnel and/or the environment are potentially exposed*
- *Control of entry to the area affected by the line break*

Personnel performing the work shall know the safety, health, and environmental provisions. The plan's details shall be communicated to all of the personnel involved. These details include lockout points, flushing and clearing, and standby person responsibilities.

Note: When any part of the body crosses the natural plane of an opening created by a line break, DuPont SHE Standard S16G may govern the entry.

The preferred written job plan is a properly completed line break permit written in accordance with this section. The DuPont Line Break Manual provides a good example of an acceptable line break permit. Another alternative is an approved job procedure, which can be used for routine jobs, including preparing the system for the initial line break. *If a procedure is used, a process shall be in place to do the following:*

- *Periodically review the procedure for inclusion of all mandatory elements of this standard*
- *Document the line break training and periodic retraining of the people performing the routine line break jobs*

5.4 System preparation [Last revised 6/02]

The system shall be properly prepared before any line breaks are made on any system. The first break does not always verify that the system or equipment is free of hazards. Company experience has shown that incidents still occur after the first break is completed. These incidents have a variety of causes, including trapped pockets of pressure or hazardous process material, not isolating all sources of pressure or hazardous process material, or not draining the low point and venting the high point.

Key elements for proper system preparation include the following:

- *Levels of cleanliness shall be established and verified.*

  Caution: Hot liquids that cool to solid can create special problems if gases and hot liquids are trapped between solidified plugs, which can then "blow out."

- Chemical hazards should be cleared until the hazards are eliminated. *Where it cannot be demonstrated that a system is cleared, specific written procedures shall be in place to eliminate or control the hazards. If clearing cannot be accomplished as expected, the job shall be stopped and the following steps shall be performed: replan, document, authorize, and communicate.*

Note: Locations that have hazards associated with toxicity, corrosiveness, or flammability of gases, vapors, mists, and/or airborne combustible dust should set site- and process-specific limits that reduce these hazards to an acceptable level.

5.5 Lockout/isolation [Last revised 6/02]

All systems prepared for line breaks shall be properly isolated according to DuPont SHE Standard S14G.

In addition, key elements for proper system isolation include the following:

- *A mechanism (e.g., tagging lists, common system isometrics, or process and instrument diagrams) to identify appropriate valves, blanks, and blind flanges in the field shall be used.*
- *Blanks and blind flanges shall be tagged.*
- *All valves within the isolated system must be maintained in the open position and the line cleared to prevent trapping process material in the line/equipment.*
- *The specific steps for isolating all primary and secondary (e.g., steam tracing and electric tracing) energy sources shall be identified.* This is especially important in polymer and melt systems that are “frozen” (i.e., solidified) to isolate them and for acids that can vaporize if cooled and then reheated.

Various means of isolating systems or equipment that contain hazards can be used. A listing, from the most protective to the least protective, is as follows:

1. Double block and controlled bleed
2. Block valve and blank/blind flange
3. Double block valves
4. Single block valve
5. Engineered process plug (i.e., solidifying the process)

The degree of isolation depends on the hazards of the material being isolated, the configuration of the piping system, the frequency of the line break, the added risk of leaks from additional isolation valves, and the experience gained from past line breaks.

Where work on hazardous systems is to be performed behind a single blocking valve, the line break permit or procedure shall indicate how the hazard is to be mitigated, including worst-case scenarios and contingency plans.

When breaking into systems and/or equipment containing hazardous processes, all work after initial line break has been completed should be performed behind double isolation if PPE is to be removed.

Examples of manual valves used for isolation are gate valves, plug valves, and ball valves. The use of control valves is discouraged. *If control valves are used for isolation, site-specific procedures for maintaining isolation with these valves shall be in place.*

5.6 Job turnover [Last revised 6/02]

A specific review of the job scope and plan shall be held for preparing, opening, and returning to service processes or equipment that contain hazards. This review shall be done before the work begins and again after it is completed and shall be between the personnel who prepared the system or equipment for work and those who are to work on it. This review shall include information on safety, health, and environmental issues.

Key elements of job turnover reviews shall include the following:

- *Providing information on isolation locations, the clearing and verification method(s) used, and equipment status*
- *Communicating system or equipment status to maintenance or contractors immediately prior to work being performed*
- *Communicating and understanding the hazards of residual material in the equipment*
- *Providing written turnover to address shift-to-shift communications when jobs span more than one shift to complete*
- *Verifying the system or equipment is ready for return to Operations through specific turnover*
- *Documenting turnover and incorporating specific "sign-off" of all parties involved*

5.7 Personal protective equipment [Last revised 6/02]

For each job task where there is potential exposure to a hazard, PPE shall be specified, available, and used, based on normal system operating conditions, no matter how thoroughly the system was prepared for the line break.

Each site shall have a system for making the proper, decontaminated PPE available and ready for use.

Personnel shall be trained on how to use the specific PPE and what its limitations are.

5.7.1 Selection

PPE that is both protective and practical to work in shall be selected for each potential exposure on the site.

Key elements when selecting PPE include the following:

- A cross section of knowledgeable people, including those who are to use the PPE, should be involved.
- Before any PPE is adopted, it should be field tested for practicality by the personnel who are to use it.
- *A list of site-approved PPE, categorized by hazard, shall be readily available to all personnel.*

5.7.2 Use

Key elements for specifying and using PPE shall include the following:

- *What PPE shall be worn*
- *When PPE shall be worn*
- *When PPE shall be removed*

Where hot suits (see DuPont SHE Standard S11H) or totally encapsulating suits for situations that are immediately dangerous to life and health (IDLH) are specified by the site for line breaks on hazardous processes or systems:

- *A member of the work group shall be equally suited in the role of a standby person*

Note: An exception can be made in situations where an assessment of risk would support the decision for the standby person not to wear the hot suit hood if he or she is positioned outside the barricade or cordoned-off area and in full view of the work. *If the hood is not worn, it must be readily available to the standby person.*

- An owner/area representative should also be present outside the barricade or cordoned-off area, in full view of the work, until the PPE has been relaxed. This individual should be knowledgeable of the process hazards and capable of summoning emergency assistance.

These elements shall be specified in writing as part of the job plan.

5.8 Job execution [Last revised 6/02]

Line break(s) shall be executed in accordance with the mandatory requirements outlined in this standard.

Key elements of job execution should include the following:

- Clear identification where the line break(s) is to be made
- A barricade or properly cordoned-off area that adequately protects people not involved in the line break from a sudden and unexpected release of the hazardous material

When job conditions affecting safety, health, or the environment differ from the expected (e.g., the drain valve is plugged or the line cannot be cleared), the job shall be stopped and reevaluated, and a new job plan developed.

Key elements for addressing the unexpected shall include the following:

- *Tasks shall be reevaluated with the same level of thought as the original job plan.*
- *Approval for the new job plan shall be at least at the same level as approval for the original job plan.*
- *Personnel performing the task shall understand the job plan and what to expect to enable them to recognize when the unexpected occurs.*

5.9 Incident investigation [Last revised 6/02]

All line break incidents shall be investigated according to DuPont SHE Standard S3Y.

6. Management systems

6.1 Support resources [Last revised 6/02]

Site and business SHE resources are available to assist with implementation of this standard.

6.2 Management records [Last revised 6/02]

Records shall be retained in compliance with the Corporate Records and Information Management Program.

6.3 Audit requirements [Last revised 6/02]

Each site and SBU or region shall audit compliance with this standard as part of its SHE audit program.

6.4 Standard renewal process [Last revised 6/02]

This standard shall be reviewed and revised as necessary and, at a minimum, not later than five years from the date of the last revision.

6.5 Deviation process [Last revised 6/02]

Deviations from this standard must be authorized by the Director of Operations for the relevant business/region after consultation with the SHE Excellence Center and Legal and nonobjection from the Responsible Care® Core Team. Deviations must be documented, and documentation must include the relevant facts supporting the deviation decision. Deviation authorization must be renewed periodically and no less frequently than every three years.

6.6 Training and communications requirements [Last revised 6/02]

Each business and site shall provide training as appropriate. See Section 5.2 for specific requirements.

6.7 Contact [Last revised 6/02]

The guardian for this document is the SHE Excellence Center. Contact the Employee Safety Competency of the SHE Excellence Center.

B-21.1
First-Line Breaks

1.0 Scope

This procedure outlines minimum requirements that must be satisfied before Construction personnel may enter a piping system or equipment that has not been opened by Operations personnel. This procedure also applies to subsequent breaks in an undrained line. Cleared lines as defined in Section 2.0 are exempt from this procedure.

2.0 Definitions

Hazardous process or system- a process or system that contains any material at any pressure that could cause a risk of injury to an individual(s), a risk of fire or explosion, an environmental risk, or an off-site risk. Examples of hazardous processes or systems include, but are not limited to, compressed fluids, especially gases in pipes and vessels; corrosive and/or flammable substances; and other lines that could contain material that is hazardous on contact or inhalation, including fluid whose temperature is higher than 140 F (60 C) or lower than 14 F (-10 C).

Cleared – all lines and equipment associated with a system are verified by standard practices to have been isolated and, where appropriate, drained, flushed, and/or purged of hazardous material, and the following criteria are met:

- The system's temperature is lower than 140 F (60 C) and higher than 14 F (-10 C).
- Atmospheric pressure has been attained.
- Hazards associated with toxicity, corrosiveness, flammability of gases, vapors, or mists, and/or airborne combustible dust reduced to acceptable levels.

Engineer – The person who requests the work and is responsible for the safety, quality, and timing of the work requested.

First Line Break – The initial opening of lines or equipment after appropriate preparation.

Hot Tap – A mechanical method of adding a new tie-in point to existing piping service or equipment without interrupting the existing service.

Line Break – Opening cleared or uncleared lines or equipment by actions that may include, but are not limited to, the following:

- Breaking flanges
- Removing one or more bolts from flanges
- Opening valves to the atmosphere
- Removing valve bonnets and nonreturn (i.e., check) valves caps
- Turning spectacle plates (i.e., blanks)
- Breaking pipe joints
- Removing slip plates (i.e., blanks),blind flanges, plugs, and caps
- Disconnecting tubing
- Disconnecting loading and unloading hoses
- Penetrating a line by mechanical or other means
- Opening inspection ports
- Making subtle adjustments (e.g., replacing packing on a valve)

Maintenance Supervisor – The first-line supervisor with maintenance responsibility for the plant area where line breaks are made.

Operations Supervisor – The first-line supervisor with operating responsibility for the area where line breaks are made.

Pipe Superintendent – The person in charge of the pipe craft. An alternate may be designated by name by the FC&S site leader.

Undrained Line – Any line or equipment system that does not meet the definition of a cleared line.

3.0 General

Any site considering first line breaks must develop a site-specific procedure that addresses all provisions outlined in this procedure and Corporate SHE Standard S27G. The procedure must specify what services are excluded or covered by agreement with the Operations personnel. The site procedure must be approved by the appropriate Engineering Manager.

The Operations personnel involved in planning and executing first line breaks must be from the line organization rather than members of a Plant/ Engineering function liaison team.

3.1 Preparing and Authorizing First Line Breaks

The Operations supervisor must furnish a lockout plan identifying break points and must physically mark each break point with the engineer and the pipe superintendent. The Operations supervisor, engineer, and pipe superintendent must agree on the location of first breaks.

Operations personnel must close isolating valves and stop pumps. The system must be locked, tagged, and tried according to lockout procedures.

Where possible, the Operations personnel must depressurize, drain, flush, and vent to prepare the system for safe opening.

If the engineer, pipe superintendent, and Operations supervisor agree that the FC&S function will do the work, a Line-Break Permit (Attachment B-21.1-1) must be completed. The appropriate people should work together in completing the Line-Break Permit prior to any work taking place. Operations supervisor and work group members must sign the permit verifying their agreement.

All work on hazardous processes or systems, including planning and execution, shall be performed by qualified personnel. Sites shall provide training on line break procedures, which shall include the provisions of SHE S27G, par.5.2. Training should include the guidelines of the DuPont Line Break Manual. Crew foremen and an Operations supervisor must be present when the first break is made on hazardous process systems.

Off-shift or weekend supervisors may not perform first breaks without approval as required in this procedure.

3.2 Executing First-Line Breaks

Barricade the area and plug the floor drains to prevent exposing anyone in adjacent work areas or on floors above or below. Consider the volume and pressure of the system when placing barricades.

Service crafts should remain outside barricades. If they are required to be in the barricaded area, they should be protected by the same clothing and equipment as the person making the line break.

Required protective equipment and clothing should be indicated on the Line-Break Permit. Minimum protective equipment is generally dictated by Operations personnel. Employees must be trained in the use of special protective equipment such as air-supplied masks, self-contained breathing apparatus, and respirators.

Once the first break is completed and the line is verified by both Operations and Construction to be cleared (i.e., drained, vented, flushed, and demonstrated to be clear of any hazardous residue, pluggage, or pressure), work may be done on the system or in the area without the required PPE. If the line cannot be verified to be cleared, personnel must continue to use required PPE for any work on or in the vicinity of the open pipeline.

Standard practice for breaking a flange is to loosen the bolts on the lower and opposite side from the mechanic, keeping the bolts nearest the mechanic under control and allowing the line to separate in a manner that causes any spillage to be away from the mechanic. The flange should then be spread apart. The mechanic should always be positioned on the upwind side of the flange being broken.

When a valve bonnet is removed, the line must be drained and the valve placed in the open position before the bonnet bolts are loosened. Ball and plug valves may have pressure in the cavity under the stem packing and bonnet, regardless of the position of the valve and the pressure in adjacent lines. Ball and plug valves that are to be removed from the system must be opened, closed, and reopened to relieve pressure after the line is drained.

Each employee must be shown the location of the nearest exit, safety shower, and eyewash station prior to starting work.

Employees must be instructed in emergency first-aid procedures (such as washing or applying cold packs). Employees must report to the plant medical office if any hazardous process or other toxic substance comes in contact with eyes, skin, clothing, or shoes, or if they inhale a hazardous process or other toxic substances. The plant medical office must coordinate all treatment of chemically related injuries or exposures.

No Construction employee may begin making a line break until he or she has received and acknowledged understanding of specific safety instructions from the foreman.

Make all reasonable efforts to ensure that no unknown substances, chemicals, or processes are in the system. Plan a method for collecting or containing and disposing of spilled materials.

Where hot suits or totally encapsulating suits for situations that are immediately dangerous to life and health (IDLH) are specified by the site for line breaks on hazardous processes or systems a stand-by member of the work team and a person responsible for the operation must be present. The stand-by member of the work team must have the same PPE installed as the person performing the line break. The stand-by person may remove required headgear (hood) while outside the line break barricade. The stand-by member of the work team and the person responsible for the operation must both remain in full view of the job and be prepared to render emergency assistance.

Respirators must be worn where concentrations of a toxic substance might exceed allowable limits. Contact the Plant Safety Office for assistance.

When in the course of a job, conditions affecting safety, health, or environment differ from the expected (e.g., drain valve plugged or line cannot be cleared), the job shall be stopped, reevaluated, and a new plan developed.

3.3 Hot Taps

Hot taps should be treated the same as a first line break with the additional requirements:- of FCSM B-20.1.

First line break protective equipment must be worn for welding on energized systems and for making hot taps. A Line-Break Permit is also required.

4.0 References

4.1 *Corporate Standard SHE S27G.*

4.2 *Corporate Standard SHE S21A.*

4.3 FCSM B-41.1, Isolation from Plant Processes.

4.4 FCSM B-20.1, Hot Taps and Welding on Energized Systems.

4.5 DuPont Line Break Manual (Accession Report #18386 Third Edition).

Job Planning

Date:_____ **Time:**_____ **Area:**_____ **Equipment**_____

Job Description:_____

Special Instructions:_____

Location of:

- Safety shower and eye wash station_____
- Fire extinguisher_____
- Self-contained breathing apparatus (e.g., Scott or MSA)_____
- Fire alarm box_
- Emergency medical telephone number_____
- Stretcher_____
- Escape routes (primary and secondary)_____
- Barricades_____
- Other (specify)_

System Preparation

Service:_____ **Operating Pressure:**_____ **Operating Temp:**_____

Indicated Pressure:_____ **Indicated Temp:**_____

Check the appropriate boxes:

Yes	No	N/A*		Yes	No	N/A*	
			Purge required?				**Volume of material considered?**
			Air analysis required?				**Standby personnel required?**
			Blanks installed?				**Valves open/closed and locked?**
			Floor openings safe?				**Ventilation required?**
			Spill containment needed?				**System vented?**
			System drained?				**Steam blanketing?**
			Level of cleanliness established?				**Additional piping supports required?**
			Describe:				**Chemical hazards eliminated?**
			Verification needed?				**Verification needed?**
			Verification completed?				**Verification completed?**
Detailed plans:							
***Not applicable**							

Lockout/Isolation Check the appropriate boxes:

Yes	No	N/A*		Yes	No	N/A*	
			Secondary energy sources?				**Valves locked closed?**
			Drained valves locked open?				**Equipment locked**
			Vents locked open?				**Is stored energy a factor?**
			Explosibility check required?				**Radioactive sources involved?**
			How will the system be isolated?				**Blanks and blind flanges tagged?**
			Double block and bleed				
			Block valve and blank/blind flange				
			Double block valve				
			Single block valve				
			Engineered process plug				
If work is to be performed behind a single blocking valve or engineered process plug, answer the following questions:							
What is the worst-case scenario?							
How will the hazard be mitigated?							
Contingency plans?							
***Not applicable**							

Personal Protective Equipment (PPE)

PPE required (see PPE service list):_____

Yes	No	
		Has the PPE has been inspected and decontaminated, and is it ready for use?
		Where hot suits or totally encapsulating suits for IDLH situations are specified:
		Is a member of the work group equally suited as a standby person?
		Is an owner (proprietor), area representative, or his or her nominee/designee needed outside?
		Is the owner (proprietor), area representative, or his or her nominee/designee capable of summoning emergency assistance?

PPE—relaxed conditions* **(At least one of the following must be checked prior to the line break being made)**

- ❑ **After the job has been completed.**
- ❑ **Pipe, piping component, or vessel can be seen through end-to-end. Open ends have been positively sealed by devices such as flange flank/blinds, and/or screw caps/plugs. (Note: Reopening is a new line break)**
- ❑ **Pipe, piping component, or vessel has been thoroughly flushed with water. Opening in pipe, piping component, or vessel verifies that the material left has changed temperature and/or consistency such that no hazards exist.**
- ❑ **Other. (When none of the above items are possible, verification can be by any positive means that ensures any material that might be left in the system has changed temperature and/or consistency such that the line break specified safety requirements are no longer needed.)**

  Explain:_____

Job Turnover **(Turnover by proprietor/operating area to person[s] performing the line break[s])**

Check the appropriate boxes:

Yes	No	
		Has the following information been communicated to the person(s) doing the line break:
		The isolation locations?
		The clearing and verification method(s) used?
		The equipment status?
		Has the equipment status been communicated to the person(s) doing the line break immediately prior to starting the job?
		Have the hazards of residual material left in the equipment been communicated to person (s) doing the line break?
		Have written turnover instructions been addressed if the job spans more than one shift?
		Is there a clear understanding as to where the line break is to be made?
		Will a barricade or cordoned-off area be provided that will protect people not involved in the line break from a sudden, unexpected release of the hazardous material?

Approvals

Agreement to the above plans:

Operating area:_____
Work group:_____
(All involved)_____

The Unexpected

When conditions exists that are different from the above plan, STOP, re-evaluate and complete a new line break permit.
Unusual conditions found when work stopped:_____

Specific Job Turnover **(Work group turnover to proprietor/operating area—conditions after job completed)**

Job completed and turnover conditions documented above:

Work group:_____ **Date:**_____ **Time:**_____
(representative)
Proprietor:_____ **Date:**_____ **Time:**_____
(representative)

ATTACHMENT K
SAFETY REQUIREMENTS FOR HIGH-PRESSURE WATER CLEANING

Materials Network

PP18
Safety Requirements for High-Pressure Water Cleaning

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Document revised December 2002 / Entire document reaffirmed June 2002
Contact Valerie.S.Lamison@usa.dupont.com by e-mail for more information.

1. Scope

1.1 This document describes safety requirements for manual high-pressure water cleaning and establishes qualification requirements for contractors and DuPont personnel when performing high-pressure water cleaning.

1.2 High-pressure water cleaning normally is performed using jet streams that can have a velocity greater than that of a 45-caliber bullet and do as much damage. Extreme caution must be used to prevent the jet stream from striking the operator, other employees, or delicate equipment. The key to safe operation of this equipment is to focus on engineering controls, work practices, personnel selection and training, and administrative controls.

1.3 High-pressure is defined as working pressures greater than 3,000 psig. However, the principles of this document should be considered when using pressures less than 3,000 psig, since they can also cause injury.

1.4 The focus of this document is on manual cleaning operations. Where they can be applied, remote or robotic cleaning operations that put people out of harm's way are considered the safest methods.

1.5 All contractors performing this work for DuPont shall satisfy Corporate Standard S29A, On-Site Safety Administration of Contractor Personnel.

2. Definitions

2.1 Shotgunning - an operation involving a hand-held unit used to clean surfaces.

2.2 Tube lancing - a repetitive operation using a rigid or flexible lance to clean the inside of tube bundle tubes.

2.3 Line moling - an operation using a self–propelled jet nozzle (mole) and a high-pressure hose to clean the inside of piping systems.

2.4 Automated/robotic cleaning and cutting - a method of cleaning designed specifically to maximize the cleaning impact of the water while distancing personnel from the jets. The driving mechanisms may be hydraulic, mechanical or pneumatic. They are usually operated by remote control.

2.5 Operator - the qualified person handling the cleaning tool.

2.6 Apprentice - a person with less than 6 months experience who does not handle the cleaning tool but works under an operator's monitoring and control.

2.7 Maximum allowable working pressure - maximum pressure at which the hose can be operated without exceeding the allowable stress of the hose material.

2.8 Working pressure (or actual working pressure) - pressure at which hose is operating.

2.9 Burst pressure - pressure where the tensile strength of the hose is exceeded and failure of the hose occurs.

3. Personnel qualification

3.1 Contractor

3.1.1 All personnel involved in high-pressure water cleaning on DuPont sites shall be at least 18 years old and full-time employees of the Company providing the service. They shall satisfactorily complete a training course provided by the employer, which includes safety considerations and equipment operation before cleaning on DuPont sites. The training course shall include the items listed in **Table 4**. Personnel shall be retrained annually.

3.1.2 The contractor shall be able to verify to DuPont the qualifications of each member of the cleaning crew.

3.1.3 A cleaning crew shall be composed of at least two persons. The operator shall be in view of another crew member at all times.

3.1.4 Operators shall have at least 1000 hours of documented experience in high-pressure water cleaning, on or off DuPont locations. Alternatively, high-pressure water cleaning operators shall complete a minimum 180 hours apprenticeship (observing and assisting) on high-pressure water cleaning operations on a DuPont site after completing the above training course.

3.1.5 Operators of automated/robotic equipment, as defined in **Section 2.4**, do not have to meet the requirements of 3.1.4 if they are not subject to direct exposure to the hazards of high-pressure water cleaning. However, operators of automated/robotic equipment must be trained and qualified to operate equipment in a safe manner.

3.2 DuPont

3.2.1 DuPont personnel, or their representatives, who monitor or oversee high-pressure water cleaning must be completely familiar with the requirements of this standard. Completion of formal training on the subject is required.

4. Training requirements

4.1 Each contractor employee shall complete a training course before their first high-pressure water-cleaning job at a DuPont location. A description of the training program (outline, etc.), should be provided to DuPont. The training course shall include, but not be limited to, items listed in **Table 4**. DuPont may audit the training program at any time.

4.2 Formal training on the requirements of PP18 is required of DuPont employees, or representatives, who monitor work guided by this procedure. An applicable course is available at the DuPont College of Maintenance at:
http://engrs3.bec.dupont.com/tlm32/Login.asp?db=TLM32Corp1

Click for the Course Catalogue and Registration, choose the Safety Requirements for the High-Pressure Water Cleaning course from the menu of offering, self-register, and then complete the course.

5. Personnel Safety during Operation

5.1 DuPont and the contractor are responsible for jointly completing a checklist similar to Table 1 before starting each job. This checklist should be attached to the work permit. **See Table 2 for methods of addressing concerns specific to the type of work being done.**

5.2 No portion of the body shall ever be placed in front of the water jet. These jets of water can easily puncture and tear the skin or penetrate deeper causing infection or serious internal damage. This is a significant concern because most water is not clean. Contractors must assure that their local medical provider is advised of the potential for contamination introduced via the injected water.

5.3. Operators or personnel exposed to water spray or scattered material shall wear a raincoat, rain pants, safety glasses, hard hat with face shield, and gloves. Hearing protection shall be worn when needed. Safety boots meeting ANSI Z41 must be worn and equipped with metatarsal protection.

5.4. If a standby person is exposed to the same hazards as the operator, identical protection must be worn.

5.5 When cleaning equipment that might be contaminated with hazardous chemicals, appropriate additional protection specified by DuPont shall be worn by the operator.

5.6 Reactive back thrust forces from the high-pressure water jets physically stress the operator and affects operator control. Back thrust forces result from water volume leaving the nozzle at high velocity. Sound footing conditions must be established and maintained during cleaning.

5.7 General rotating equipment such as lances and nozzle tips must be guarded to prevent contact and injury to operating personnel.

5.8 Loose clothing or long hair that can be caught in rotating equipment must not be permitted.

5.9 Operators shall not work for more than 16 hours in any 24-hour period. The team members should rotate their duties to minimize fatigue.

5.10 At least one control valve or switch shall control each high-pressure tool. An employee shall operate only one high-pressure tool, mole or shotgun at one time.

5.11 The pressure must be removed from the system before tightening or loosening fittings.

5.12 Pressurized hoses should not be handled within 1 ft of hose connections

5.13 High-pressure water flow is controlled through fail-safe, contact type switches or valves, and when released by the operator, reduces pressure at the cleaning tool (lance, mole, shotgun). The high-pressure water is diverted by a valve assembly and dumped at a diffused safe pressure. Such valve assembly shall be arranged so that discharge of this diffused water is away from personnel or mechanically guarded to protect personnel.

5.14 The guidance in this standard is based on currently known best practices. Site specific deviations or variances may be required at times due to equipment configuration, etc. Contractors performing HPWC work shall have a variance process for deviations for any of the standard work practices, or design safety features of their equipment as specified in PP18. The variance process shall minimally include:

- Description of the variance needed to perform the work.
- Contingency plan/alternative safety measures put in place to address the hazards.
- Contractor management approval – authorization should come from contractor management.
- DuPont approval – authorization by a person knowledgeable of HPWC and SBU leadership of the area where the work is being performed.
- For routine jobs requiring variance, the variance can be written for a period of time with periodic reviews to ensure they are current. Variance should be reviewed at least annually.

6. Equipment set-up - inspection and testing

See **Table 3** for addressing equipment issues.

7. Resources

Primary Contact:

A. Dennis Cobb
(713) 981-2088 – DUCOM 240-2088

Back-Up Contacts:

Bruce Cole
(302) 774-2464 – DUCOM 774-2464
Bryan Shelton
(302) 774-2653 – DUCOM 774-2653

Figure 1. Tube Lancing Equipment - Examples

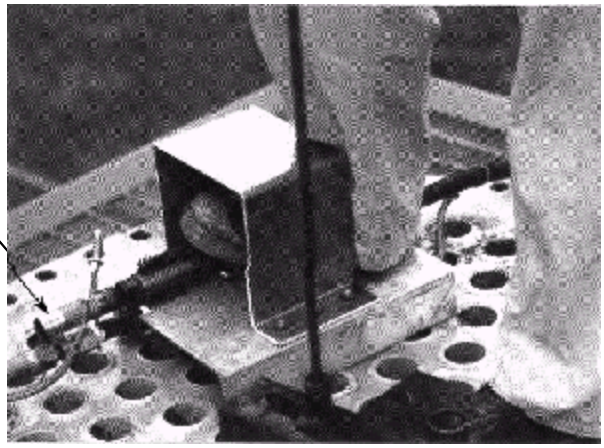


FIGURE 1-A

Typical Foot Operated Valve

FIGURE 1-B

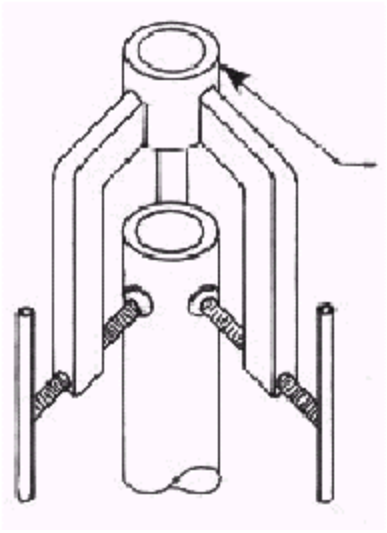
FIGURE 1-C

Typical Anti Withdrawal Device for Flex Lancing

Figure 2. Shotgunning Equipment

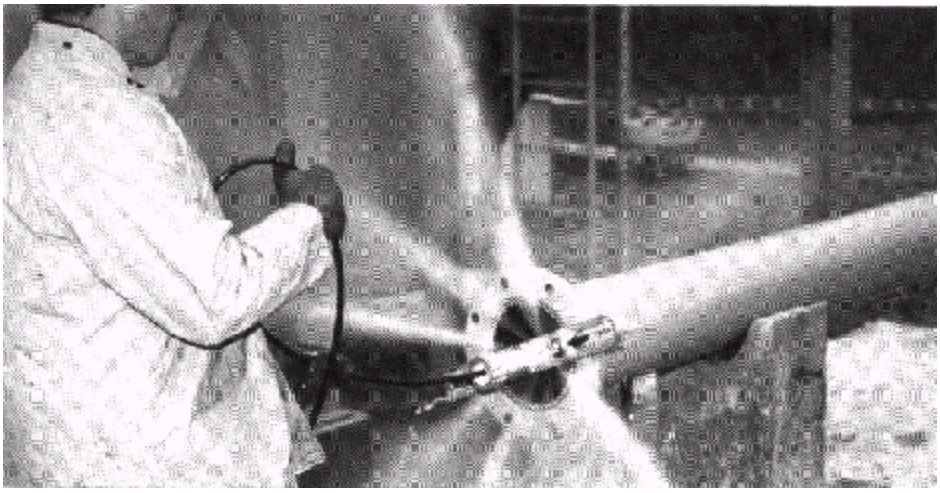
Shotgun with "double deadman" controls. Length from butt to nozzle not less than 66 in.

Figure 3. Line moling equipment



Pipe sleeve sized to permit the mole pipe and hose to pass while preventing the mole nozzle from ejecting

Alternate Clamping Method
Cut from standard “C" clamps (3 typical, spaced 120 degrees apart)



Examples of two types of anti-withdrawal devices

Table 1. High-pressure water cleaning checklist

DuPont Location / Unit	Ref. No.	Date
Equipment to be serviced	Service application	
Pre-service / Pre-engineering data prepared by:		

		Responsibility		
		Vendor	Site	Both
No.	**SAFETY ITEMS**			
1.	Are site/area orientations current?			
2.	Has an authorized work permit been issued for the job?			
3.	All operators have applicable experience.			
4.	Lockout/Tagout: □ Is Locking/Tagging of system complete? □ Has crew attached lock(s)/tag(s)			
5.	Are the following safety items or services available? □ Eyewash Station □ Safety Showers □ Fire Extinguisher □ Emergency Notification System □ First Aid Station			
6.	Indicate the proper safety gear for all jobs? □ Safety glasses □ Monogoggles □ Face shield □ Slicker suit □ Full metatarsal boots □ Chemical resistant gloves □ Hard hat □ Hearing protection □ Respirators □ Full body suit □ Acid suit and/or hood □ Fall protection □ Other_____			
7.	Have unit specific emergency procedures been reviewed with the crew? Plant Emergency# Evacuation check point(s) _____			
8.	Are the following warning signs posted as required? □ Equipment & area properly barricaded □ Hearing protection □ Watch your step			
9.	Have all High Pressure Hoses been inspected for: □ Condition □ Secured □ Properly arranged □ Rated for 2-1/2 times MAWP □ Connections secure □ Safety Chains/Whipchecks located at all hose joints □ Quarterly inspection up to date			
10.	Ensure "Failsafe" valves are in proper location and functioning properly. □ Discharge stream from dump valve(s) is diffused. □ Discharge stream from dump valve(s) is directed away from personnel and guarded.			
11.	Relief device/Rupture disc rating checked against the lowest rated components.			
12.	Have the following safety devices been installed and inspected: □ Equipment guards are in place (trigger guards, rotational guards) □ Safety shrouds □ Lance guard deflector			
13.	Proper lance and jet nozzle			
14.	Has the high-pressure system been tested at operating pressures for leaks?			
15.	Shotgunning: □ Overall shotgun length 66" minimum □ Double failsafe valves in place			
16.	Line Moling: □ Rigid pipe on line mole to prevent mole reversal □ Warning marker 2 ft from nozzle □ Anti-withdrawal device in place to prevent mole from ejecting			
17.	Tube Lancing □ Failsafe valve *reversal?* □ Hand-held deflector/guard with ID < jet nozzle □ Visible marker 2 ft from nozzle □ Shroud on back end of tube □ Dump valve discharge away from operator			
18.	Have the following conditions been checked □ Workspace is adequate. □ Footing conditions are firm □ Lighting is adequate □ GFCI placed on electrical equipment			

Continued on next page

Table 1. High-pressure water cleaning checklist (cont'd)

No.	SAFETY ITEMS TO BE REVIEWED	YES	NO	N/A
19.	Have the following items been reviewed with the crew? □ Job procedures □ Individual assignments □ Review of hazards of hydroblasting such as: cutting action, unbalanced thrusts and footing			
20.	Have the following facilities been identified for the crew? □ Personnel equipment decontamination area/facility □ Handwashing area □ Break / eating area □ Smoking area			
21.	Have you met HAZCOM policy by discussing the known chemical(s) that the crew may come in contact with? □ If so, what chemical(s) did you determine that there might be potential exposure to? Chemicals:_____ □ Was a MSDS used in the discussion of the chemical hazards?			
22.	Will respiratory protection be necessary for the job? If so, has the necessary respiratory protection been covered with the crew? What type of respirator / cartridge will be used? Respirator:_____ Cartridge:_____			
23.	□ Will scaffolding be required? □ Does it meet OSHA and DuPont safety standards?			
24.	Has the hydroblast system been flushed out with water prior to putting the nozzles on?			
25.	Is waste containment required and if so, is the waste containment in place for the job?			
26.	Was the customer informed on any hazards that may be created by the hydroblast service?			
27.	Has nearby equipment / personnel been protected from high–pressure water spray as needed?			
28.	Pre-job checklist items 1 through 24 have been addressed by those performing the work			
29.	Equipment to be cleaned is properly dismantled, isolated, and tagged.			
30.	Vessel Entry permits, if required.			

I have reviewed the above pre-job checks and requirements before beginning the high-pressure cleaning work:
Signatures of:

_____ _____ _____

_____ _____ _____

Apprentices (trained with less than 6 months experience)

_____ _____ _____

Approved for HPWC to begin: DuPont Job Representative

_____

Note: Are any Deviations properly approved?

Table 2. Specific Safety Issues Related to High Pressure Water Cleaning

Cleaning Method / Safety Issue	Concern	Resolution
Shotgunning		
Pressure reduction in case of emergency	Operator must have means of rapidly releasing flow of water at cleaning tip	Two integral fail safe switches on each shotgun (See **Figure 2**)
Minimum shotgun length	Avoid jet striking operator's body	66 in from butt to nozzle
Maximum allowable time on job	Operator fatigue	Eight hour in any 16 hour period
Tube Lancing		
Pressure reduction in event of emergency (rigid lancing)	Operator must have means of rapidly releasing flow of water at cleaning tip	Foot operated valve (See **Figure 1-A**) Controlled by person nearest the nozzle
Deflection of spray-back (rigid lancing)	Operator struck by spray	Hand held deflector with ID < OD of spray nozzle (See **Figure 1-B**)
Accidental ejection of lance (flexible lancing)	Operator struck by jet	Anti-withdrawal device with ID < OD of spray nozzle (See **Figure 1-C**)
Detection of remaining length of lance inside pipe (flexible and rigid lancing)	Accidental removal of lance, exposing operator to jet	Visible marker 2 ft from nozzle end of lance
Protection from water spray at open end of pipe (flexible and rigid lancing)	Personnel and equipment exposed to spray	Build temporary guard
Line Moling		
Pressure reduction in event of emergency	Operator must have means of rapidly releasing flow of water at cleaning tip	Foot operated valve (See **Figure 1-A**) Controlled by person nearest the nozzle
Mole reversal in line	Operator placed in line of jet	Length of hose coupling, mole tip, and any rigid pipe extension must exceed ID of pipe being cleaned
Detecting remaining length of mole inside pipe	Accidental removal of mole, exposing operator to jet	Visible marker 2 ft from nozzle end of lance. First 2 ft can be cleaned with tube lancing
Accidental ejection of line mole	Operator struck by jet	Anti-withdrawal device with ID < OD of spray nozzle (See **Figure 1-C**)

Table 3. Equipment Setup, Inspection and Testing

Item	Concern	Requirement
High Pressure Hose		
Basic data	Documentation available on request	• Safety factor of 2.5:1 burst pressure: minimum working pressure • Manufacturer's data documented
Testing	Per manufacturer's recommendations	Quarterly inspection tag visible
Kinking close to high usage fittings	Failure close to high usage fittings	Shroud to resist bending tighter than manufacturer's recommendations
Hose-hose connections	Whipping in event of separation	Safety chains or equivalent for each joint, except for line moling hose connections that are within the pipe
Braid	Damage such as fraying	Remove and repair
Kinking of unsupported sections	Hose damage, leading to bursting	Securely tie off if hose drop exceeds 10 ft and limit bends to manufacturer's recommendations
Relief and Dump Devices		
Relief type	Inadequate relief, leading to pressure buildup	Rupture disc preferred, valves to be set no higher than maximum allowable pressure of lowest rated component
Location	Inadequate relief, leading to pressure buildup	Install on high pressure side of pump
Inspection	Inadequate relief, leading to pressure buildup	Check pressure rating before each operation
Dump valve	Spray is directed away from operator	Conduct functional check that water stream is diffused to safe pressure and away from personnel
Barricades and Protection		
Signs	Clear outline of working area	Barricade and place warning signs at high pressure hose outside of barricade
Working area below cleaning (when applicable)	Exposure of personnel working there	Barricade area below wirk if necessary
Pipe openings	Exposure of personnel to secondary spray	Barricade all openings when line moling
Electrical and electronic equipment close to operation	Damage to equipment and electrocution hazard	Protect from overspray
Lighting brought into area	Electrocution hazard	Low voltage light source or GFI

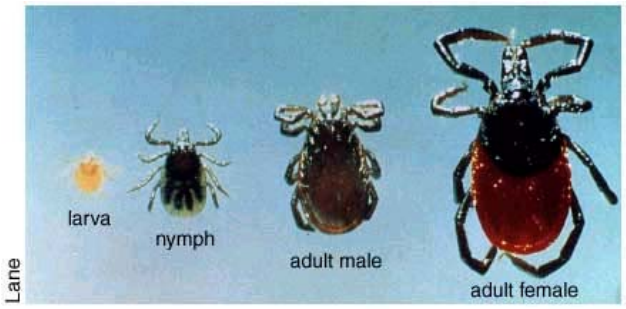
Table 4. Contractor Training Requirements

Item	Type of Instruction	Skill Demonstration
Hazards of High Pressure Water	Audiovisual or live demonstration of cutting action	No
Personal Protective Equipment	Explanation and hands-on	Yes
Operation, Startup, and Shutdown of System and Auxiliaries	Theory and hands-on	Yes
Operation and Purpose of Safety Devices	Theory	Yes
Proper Method of Connecting, Handling and Inspecting Hoses	Hands-on	Yes
Understanding of Standard PP18	Explanation	Use of Table 1 in standard

ATTACHMENT L
LYME DISEASE

CRG FACT SHEET

Lyme Disease



Facts

- Lyme disease is the leading cause of vector-borne infectious illness in the U.S. with about 15,000 cases reported annually, though the disease is greatly under reported. Based on reported cases, during the past ten years 90% of cases of Lyme disease occurred in ten states (NY, CT, PA, NJ, WI, RI, MD, MA, MN, & DE).
- Lyme disease is an infection caused by the corkscrew-shaped bacteria *Borrelia burgdorferi* and is transmitted to humans by the "bites" of certain kinds of ticks
- Transmitters of the bacteria include the Western black-legged tick in the West and the Black-legged tick and potentially the Lone star tick in the rest of the country.
- For Lyme disease to exist in an area, at least three closely interrelated elements must be present in nature: (1) the Lyme disease bacteria, (2) ticks that can transmit the bacteria, and (3) mammals (such as mice and deer) to provide food for the ticks in their various life stages
- It was previously thought that all target-shaped rashes (i.e., circular-shaped with red border and clearing center) were erythema migrans, and that the appearance of this rash was pathognomonic for Lyme disease. There is increasing clinical suspicion that many of these rashes that patients report are probably not Lyme disease.
- About ¼ of patients with Lyme disease never get a rash.
- Oral antibiotic therapy is often just as effective in fighting Lyme disease as IV antibiotic therapy.
- Lyme disease is a curable and preventable infection.
- Lyme disease is not a communicable disease.

Avoidance of tick habitat

Whenever possible, persons should avoid entering areas that are likely to be infested with ticks, particularly in spring and summer when nymphal ticks feed. Ticks favor a moist, shaded environment, especially that provided by leaf litter and low-lying vegetation in wooded, brushy or overgrown grassy habitat. Both deer and rodent hosts must be abundant to maintain the Lyme disease bacteria.

Prevention and Control

Individuals who are exposed to tick infested areas should wear light-colored clothing so that ticks can be spotted more easily and removed before becoming attached. Wearing long-sleeved shirts and tucking pants into socks or boot tops may help keep ticks from reaching the skin. Ticks are usually located close to the ground, so wearing high rubber boots may provide additional protection. Application of insect repellents containing DEET (n,n-diethyl-m toluamide) to clothes and exposed skin, and permethrin (which kills ticks on contact) to clothes, should also help reduce the risk of tick attachment. DEET can be used safely on children and adults but should be applied according to Environmental Protection Agency guidelines to reduce the possibility of toxicity.

Transmission

Ticks seek blood meals from a variety of mammal, reptile, and bird species. The animal that provides the blood meal is termed the **host**. An animal in which *B. burgdorferi* can live and from which a feeding tick can acquire the bacteria for subsequent transmission to the next host is termed a **reservoir** of the infection. There are data to suggest that ticks must feed for 24-48 hours before the bacteria is transmitted to the host. On animals, which cannot remove the ticks once attached, these ticks can feed for 4 to 7 days, and during that time they increase dramatically in size and weight. Humans probably detect attached ticks after several days, after they become engorged with blood.
The black legged tick has a two year life cycle in three stages. The first stage, larvae, appear in the late summer and fall of any given calendar year. The larva feeds once, then molts to the next stage, nymph, which appears in the spring of year two of the two-year life cycle. The nymph feeds once, then molts to the adult form, which appears in the fall of year two. Male and female adults then mate, and the female over-winters, then lays eggs which will produce larvae within a few months. Sub-adult forms (larvae, nymphs) feed on a wide variety of small mammals, birds, and reptiles, but prefer to feed on white-footed mice, which are the important reservoir of infection in nature. Adults prefer to feed and mate on white-tailed deer.

Symptoms

The classic presentation of early Lyme disease is the appearance of a characteristic rash, termed erythema migrans (previously named erythema chronicum migrans). This rash begins as a small red papule at the site of a tick bite, generally 3-30 days after a tick bite of sufficient duration to transmit the bacteria, but most patients (68-86%) do not recall a tick bite at the site. Over several days to weeks, it can grow in size, with red expanding borders and often a clearing center. Several concentric rings of redness may appear, resembling a target. The rash can grow to over 20 cm in diameter, and the specificity of this sign for the diagnosis of Lyme disease is probably improved with increasing diameter of the rash (a minimum diameter of 5 cm is suggested by the Centers for Disease Control for diagnosis). *B. burgdorferi* can be detected (by culture or polymerase chain reaction) at the leading edge of the rash.

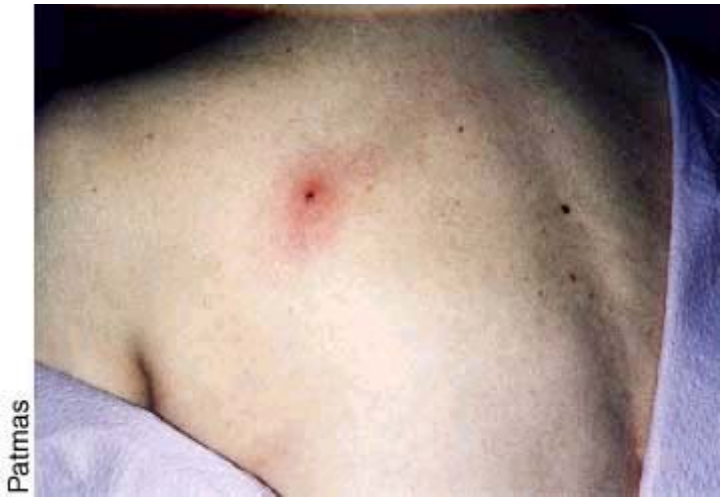
While the vast majority of patients develop a rash (60 to 80%), the classic, target-shaped rash occurs in less than 40% of cases, and solid red rashes are probably most common. Up to 80% of patients have associated symptoms (summarized in the following table). Specific respiratory or gastrointestinal complaints (other than anorexia) are rare and the presence of these symptoms argues against a diagnosis of Lyme disease.

Borrelia burgdorferi is a corkscrew - shaped bacterium.

Table of Symptoms

Early manifestations (days to weeks after tick bite)	• Erythema migrans – probably over 80% • Fever – 30-40% • Chills – 30-40% • Flu-like symptoms - %gt;50% • Headache – 40-50% • Stiff neck – 30-40% • Myalgias – 40-50% • Polyarthralgias – 40-50% • Fatigue – 40-50%
Mid-term manifestations (weeks to months later)	• Meningitis – overall central nervous system (CNS) or peripheral nervous system (PNS) involvement in 10-20% • Cranial neuropathy – overall CNS or PNS involvement in 10-20% • Radiculoneuropathy – overall CNS or PNS involvement in 10-20% • Atroventricular nodal block – overall cardiac involvement in 4-10% • Pericarditis – overall cardiac involvement in 4-10% • Myopericarditis – overall cardiac involvement in 4-10% • Eye involvement – probably uncommon
Late manifestations (months to years later)	• Arthritis – up to 60% of untreated patients, most often monoarticular and large joint • Encephalopathy – subtle cognitive dysfunction – probably uncommon • Polyneuropathy – distal paresthesias or radicular pain – probably uncommon

Tick embedded with EM rash developing



Blood Tests

Blood tests, also known as Lyme titers, cannot diagnose Lyme disease alone, but they are used to confirm a diagnosis. The most common blood test ordered for Lyme disease is the ELISA, with the western blot used as a follow-up test. The ELISA tests for antibodies, the body's defense system against infections; it does not test for the bacteria itself. These anti-*Borrelia burgdorferi* antibodies may take up to 2 to 6 weeks after infection to appear in the blood. Therefore, a blood test immediately following a tick bite will not be able to determine whether or not a person has been infected since not enough time has passed for antibodies to develop.

Other bacterial infections and diseases may cause an ELISA to be positive when, in fact, the patient does not have Lyme disease. Therefore, the Western Blot, a more accurate test that can be used 6 to 12 weeks after infection, is recommended to confirm all positive or equivocal ELISA results. However, if symptoms and history strongly suggest Lyme disease, a doctor may begin treatment without blood test confirmation. Note that frequent testing without symptoms that suggest infection, even in endemic areas, increases the chance of a test result being positive when a person is not actually infected with Lyme disease.

First Aid Measures

- Embedded ticks should be removed using fine-tipped tweezers.
- DO NOT use petroleum jelly, a hot match, nail polish, or other products.
- Grasp the tick firmly and as closely to the skin as possible. With a steady motion, pull the tick's body away from the skin.
- The tick's mouthparts may remain in the skin, but do not be alarmed.
- The bacteria that cause Lyme disease are contained in the tick's midgut.
- Cleanse the area with an antiseptic.

CRG Control Measures

CRG field teams should employ the following measures where applicable:

- Clear cut areas of work if possible
- Pull socks overtop of pant leg
- Wear Dupont Tyvek ® protective suits
- Perform periodic checks for ticks with prompt removal (Note: transmission of *B. burgdorferi* from an infected tick is not likely to occur before 36 hours of tick attachment).
- Spray shoes and ankles with DEET.
- Keep available in the field the Tick ID Carrier card to be used as a reference guide.

ATTACHMENT M
COMMUNITY AIR MONITORING PLAN

Community Air Monitoring Plan

Real-time air monitoring for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 parts per million (ppm) above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for state (NYS DEC and NYS DOH) personnel to review.

- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is 150 micrograms per cubic meter (ug/m ^{3}) greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for state
(NYS DEC and NYS DOH) personnel to review.

Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emissions do not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if organic vapor levels are approaching 5 ppm above background for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

Major Vapor Emission Response Plan:

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.

2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.

3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM #4031

FUGITIVE DUST SUPPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

TO: Regional Hazardous Waste Remediation Engrs., Bur. Directors & Section Chiefs

FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Waste Remediation

SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM -- FUGITIVE DUST SUPRESSION AND PARTICULATE MONITORING PROGRAM AT INACTIVE HAZARDOUS WASTE SITES

DATE: Oct 27, 1989

Michael J. O'Toole, Jr. (signed)

1. Introduction

Fugitive dust suppression, particulate monitoring, and subsequent action levels for such must be used and applied consistently during remedial activities at hazardous waste sites. This guidance provides a basis for developing and implementing a fugitive dust suppression and particulate monitoring program as an element of a hazardous waste site's health and safety program.

2. Background

Fugitive dust is particulate matter--a generic term for a broad class of chemically and physically diverse substances that exist as discrete particles, liquid droplets or solids, over a wide range of sizes--which becomes airborne and contributes to air quality as a nuisance and threat to human health and the environment.

On July 1, 1987, the United States Environmental Protection Agency (USEPA) revised the ambient air quality standard for particulates so as to reflect direct impact on human health by setting the standard for particulate matter less than ten microns in diameter (PM_{10}); this involves fugitive dust whether contaminated or not. Based upon an examination of air quality composition, respiratory tract deposition, and health effects, PM_{10} is considered conservative for the primary standard--that requisite to protect public health with an adequate margin of safety. The primary standards are 150 ug/m^3 over a 24-hour averaging time and 50 ug/m^3 over an annual averaging time. Both of these standards are to be averaged arithmetically.

There exists real-time monitoring equipment available to measure PM_{10} and capable of integrating over a period of six seconds to ten hours. Combined with an adequate fugitive

dust suppression program, such equipment will aid in preventing the off-site migration of contaminated soil. It will also protect both on-site personnel from exposure to high levels of dust and the public around the site from any exposure to any dust. While specifically intended for the protection of on-site personnel as well as the public, this program is not meant to replace long-term monitoring which may be required given the contaminants inherent to the site and its air quality.

3. Guidance

A program for suppressing fugitive dust and monitoring particulate matter at hazardous waste sites can be developed without placing an undue burden on remedial activities while still being protective of health and environment. Since the responsibility for implementing this program ultimately will fall on the party performing the work, these procedures must be incorporated into appropriate work plans. The following fugitive dust suppression and particulate monitoring program will be employed at hazardous waste sites during construction and other activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Such activities shall also include the excavation, grading, or placement of clean fill, and control measures therefore should be considered.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM_{10}) with the following minimum performance standards:

   Object to be measured: Dust, Mists, Aerosols
   Size range: <0.1 to 10 microns
   Sensitivity: 0.001 mg/m^3
   Range: 0.001 to 10 mg/m^3
   Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust

   Operating Conditions:
   Temperature: 0 to 40°C
   Humidity: 10 to 99% Relative Humidity

   Power: Battery operated with a minimum capacity of eight hours continuous operation

   Automatic alarms are suggested.

   Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. Consequently, instrumentation shall require necessary averaging hardware to accomplish this task; the P-5 Digital Dust Indicator as manufactured by MDA Scientific, Inc. or similar is appropriate.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the

responsibility of the entity operating the equipment to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m^3 over the integrated period not to exceed 15 minutes. While conservative, this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m^3, the upwind background level must be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 ug/m^3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see Paragraph 7). Should the action level of 150 ug/m^3 be exceeded, the Division of Air Resources must be notified in writing within five working days; the notification shall include a description of the control measures implemented to prevent further exceedences.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM_{10} at or above the action level. Since this situation has the potential to migrate contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

    1. Applying water on haul roads.
    2. Wetting equipment and excavation faces.
    3. Spraying water on buckets during excavation and dumping.
    4. Hauling materials in properly tarped or watertight containers.
    5. Restricting vehicle speeds to 10 mph.
    6. Covering excavated areas and material after excavation activity ceases.
    7. Reducing the excavation size and/or number of excavations.

    Experience has shown that utilizing the above-mentioned dust suppression techniques, within reason as not to create excess water which would result in unacceptable wet conditions, the chance of exceeding the 150 ug/m^3 action level at hazardous waste site remediations is remote. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. If the dust suppression techniques being utilized at the site do not lower particulates to an acceptable level (that is, below 150 ug/m^3 and no visible dust), work must be suspended until appropriate corrective measures are approved to remedy the situation.

Also, the evaluation of weather conditions will be necessary for proper fugitive dust control--when extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended.

There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require appropriate toxics monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

ATTACHMENT N
UNEXPECTED OCCURRENCE REPORTING

Unexpected Occurrence Reporting

Note: You must follow this procedure when reporting unexpected occurrences!

Unexpected Occurrence Defined

A UO is any unplanned event or action that could cause: injury or illness, property damage, an environmental release*, work interruption, or occurrences indicative of a pattern. We report and investigate UOs so that we can prevent similar incidents, promote safety awareness, communicate learnings, and to collect data for trend analysis. There are several key elements of the Reporting Unexpected Occurrences CRG SOP HS-500 that you must be aware of. These are as follows:

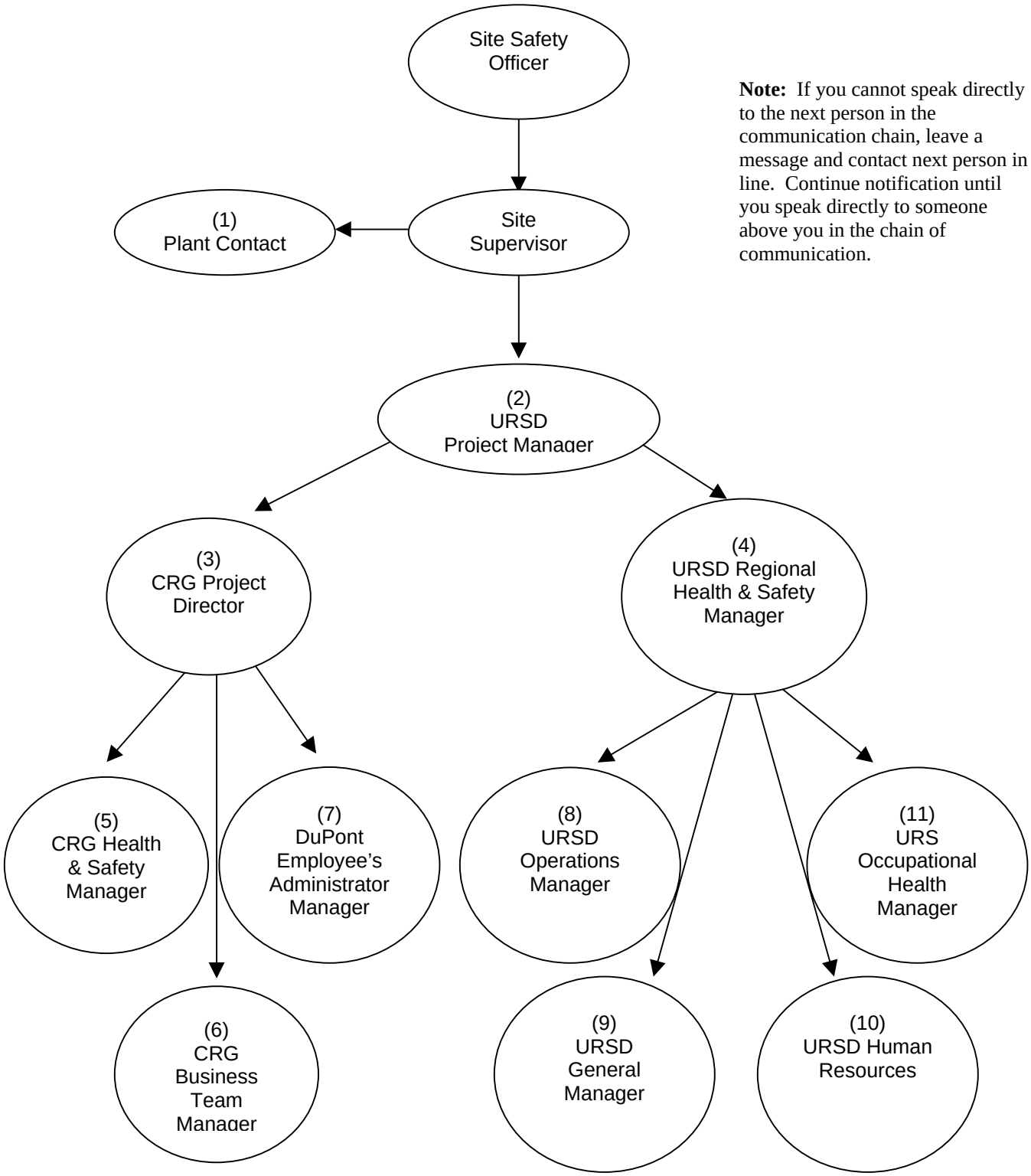
- ❑ For all project related occurrences, each employee, including contractors and subcontractors, are responsible for reporting any unexpected occurrence in which they are involved to the Site Supervisor (SS) as soon as practical. As per the SOP, the SS must contact the Project Director (PD) and the Project Manager (PM).
- ❑ The PD is responsible for contacting the CRG Health and Safety Manager (HSM) (i.e., Mary Glowacki or Brian Ambrose if Mary is not readily available), the Business Team Manager (BTM) and the affected employee's Administrative Manager (AM) as soon as feasible subsequent to the occurrence.
- ❑ The CRG HSM (along with the project team) will decide if company-wide reporting is needed and assign a tracking number.
- ❑ A preliminary communication (concise statement of what happened) must be communicated by the PD to the organization within 8 hours. The CRG HSM can assist on the proper wording of the communication.
- ❑ The PD will ensure that a final draft of the report is forwarded to the CRG HSM with sufficient lead time for review and issuance of the report within one week.
- ❑ A project-specific list of emergency contact names and telephone numbers is included on page 3 of this procedure.

Call-Up Procedure

- ❑ Reporting within URSD shall be as follows: The Site Supervisor notifies the PM. The PM, after contacting the PD, should also contact the URSD Regional Health and Safety Manager (Kathy Sova or Lisa Schatzman, as appropriate). The URSD RHSM will then notify Ted Horton, Edward Andrechak, and Elsie Papanastasiou. If the incident involves injury to a URS/URSD employee, contact Jeanette Schrimsher, RN, the URS Occupational Health Manager.
- ❑ In the event that it is not possible to readily contact the next person in the chain (CRG and/or URSD), leave a message in the best manner possible, and contact the next person up the chain. Continue in this manner until you have had verbal communication and/or other confirmation that the message has been delivered upwards. See reporting chain on the following page.

* Please note that there may be additional reporting requirements for environmental incidents.

Unexpected Occurrence Reporting Chain



Note: If you cannot speak directly to the next person in the communication chain, leave a message and contact next person in line. Continue notification until you speak directly to someone above you in the chain of communication.

	Title	Name	Phone Number	Alternate Numbers
(1)	Site Office Trailer		(716) 278-5406	
(2)	URS Diamond Project Manager	Timothy J. Pezzino	(716) 278-5239	(cell) 570-6846
(3)	CRG Project Director	Paul F. Mazierski	(716) 278-5496	
(4)	URS Diamond Regional Health & Safety Manager	Kathy Sova or Lisa Schatzman	(973) 492-7708 (281) 586-5636	(713) 557-2923 (cell) or (281) 852-9638 (home)
(5)	CRG Health & Safety	Mary Glowacki or Brian Ambrose	(302) 992-5993 (302) 992-5869	
(6)	CRG Business Team Leader	Michael J. Lukas	(302) 992-6892	
(7)	DuPont Employee's Administrative Manager	Michael J. Lukas	(302) 992-6892	
(8)	URS Diamond Operations Manager	Ted Horton, Jr.	(302) 892-7174	
(9)	URS Diamond General Manager	Edward Andrechak	(302) 892-7613	(484) 467-5962 (cell) or Cheryl Greiser (302) 892-0615
(10)	URS Diamond Human Resources	Elsie Papanastasiou	(302) 992-6924	Sylvia Todd (302) 992-6828
(11)	URS Occupational Health Manager	Jeanette Schrimsher, RN	(866) 326-7321	(519) 419-6440

Note: If you cannot speak directly to the next person in the communication chain leave a message and contact the next person in line. Continue notification until you speak directly to someone above you in the chain of communication.

APPENDIX I
WASTE MANAGEMENT PLAN FOR DUPONT NECCO PARK REMEDIAL PROGRAM NIAGARA FALLS, NEW YORK

April 2005

DuPont Project No.: 7407
URSD Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

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1.0 INTRODUCTION

1.1 Purpose

This Waste Management Plan (WMP) establishes a system for managing, documenting, and monitoring the handling, storage, and disposal of wastes generated during the operation and maintenance activities associated with the DuPont Necco Park site. These activities are associated with, but not limited to, the landfill cap upgrade, the hydraulic and chemical monitoring of the groundwater, on-site groundwater treatment facility, and any DNAPL monitoring and recovery activities as specified in the Necco Park Statement of Work (SOW). The site location is shown on Figure 1. Process flow diagrams for the groundwater treatment system are included in the Groundwater Treatment O&M Manual (see Appendix C).

This document has been designed to meet the following generator requirements outlined in Resource Conservation and Recovery Act (RCRA) regulations as applicable to conducting any of the above activities:

- ❑ Hazardous waste identification (waste classification)
- ❑ Waste minimization requirements
- ❑ Preparedness and prevention requirements
- ❑ Contingency planning (including spill prevention, response, and reporting)

1.2 Scope

This WMP describes all procedures for managing wastes generated during the applicable site activities conducted by DuPont CRG/URS Diamond (URSD) or designated subcontractors.

This WMP is organized in the following manner:

- ❑ The body of this plan describes the overall requirements for waste handling and disposal activities associated with operation and maintenance of the on-site groundwater remediation system, landfill cap upgrade, and any other long-term monitoring or maintenance activities required at the Necco Park site.
- ❑ The attachments outline the following:
  - Attachment I-1: Specific Requirements for Analytical and Treatability Samples
  - Attachment I-2: Documentation of Listing Code Applicability
  - Attachment I-3: Waste Characterization Forms
  - Attachment I-4: Waste Container Generation Form
  - Attachment I-5: Waste Accumulation Inspection Form

1.3 Limitations

URS Diamond will perform services for The DuPont CRG in accordance with the URS Diamond/DuPont contract (2005-2009) and any additional individual Scope of Work agreements generated during the contractual agreement period. No guarantee is either expressed or implied.

URS Diamond has assumed that the information provided to them is accurate and complete. URS Diamond does not assume any liability for information that has been misrepresented to it or for items not visible, accessible, or present on the facility at the time this document was developed.

Opinions and judgments expressed herein, which are based on URS Diamond's understanding and interpretation of current regulatory standards, should not be construed as legal opinions. This document and the information contained herein have been prepared solely for the use by the DuPont Necco Park facility. No third party shall have the right to rely on URS Diamond's opinions rendered in connection with the services in this document without URS Diamond's written consent and the third party's agreement to be bound to the same conditions and limitations as our client.

2.0 RESPONSIBILITIES

The DuPont Necco Park team consists of both DuPont CRG and URSD personnel. Roles and responsibilities of the team are discussed below.

2.1 General Responsibilities

The DuPont CRG retains the generator responsibilities, such as reporting, final approval of waste classification, document retention, manifest review and approvals, and emergency response.

The Necco Park team shall ensure that remedial operation, maintenance, and long-term monitoring activities are conducted in a manner that does the following:

- ❑ Safeguards human health and the environment
- ❑ Complies with all applicable laws and regulations
- ❑ Meets all relevant site standards and policies
- ❑ Safely and effectively manages subcontractors

The DuPont CRG shall ensure that all relevant information is communicated to applicable team members to facilitate compliance with the facility's waste management and safety and environmental reporting procedures.

2.2 Specific Responsibilities

The Necco Park Team responsibilities include the following:

- ❑ Administer contracts and oversee contractors
- ❑ Perform determination of RCRA listing codes (per 40 CFR 261)
- ❑ Determine or review waste classifications for each generated waste (RCRA listing and characteristic codes) stream and document them in this WMP. URSD may provide assistance upon request by CRG
- ❑ Perform operation and maintenance activities as identified in the Necco Park Groundwater Treatment System Operations Manual
- ❑ Coordinate and oversee applicable field activities
- ❑ Coordinate drum or waste container supply
- ❑ Complete Waste Container Generation forms (Attachment I-4)
- ❑ Conduct sampling and testing as needed to properly characterize any generated wastes
- ❑ Coordinate and interpretation of applicable analytical data
- ❑ If necessary, inspect waste accumulation areas associated with field activities periodically, document status (Attachment I-5)

- ❑ Report any releases to the environment resulting from field activities, according to site contingency plan
- ❑ Retain tracking records of waste accumulation and disposal and container activities
- ❑ Prepare waste shipping, transportation, and disposal documentation
- ❑ Prepare and submit required state and/or Federal waste management

3.0 WASTE OVERVIEW

The remedial and long-term monitoring at the Necco Park landfill will include the following activities:

- ❑ Hydraulic and chemical monitoring of the groundwater
- ❑ Operation and maintenance of the on-site groundwater treatment facility
- ❑ Landfill cap upgrade and maintenance
- ❑ DNAPL monitoring and recovery

The following waste streams will be generated from the remedial measures and monitoring at the site:

- ❑ Groundwater from extraction wells to be treated on site.
- ❑ Decontamination water
- ❑ General Site Trash (Personal Protective Equipment)
- ❑ Well development and purge water
- ❑ Disposable sampling and analytical equipment (including plastic sheeting and tubing)
- ❑ Dense Non-Aqueous Phase Liquid (DNAPL)
- ❑ Construction refuse
- ❑ Discarded remedial equipment (pumps, piping, gauges, etc)

Each waste stream generated during operation of the groundwater treatment system or other remedial and construction activities will be characterized upon generation to determine applicable disposal options. Some waste streams, such as groundwater generated for well sampling and development, will not require characterization, as indicated in Attachment I-3. Predetermined waste classifications may be based upon historical laboratory analytical results, RCRA listed waste determinations, or material safety data sheets (MSDS) that describe contaminants suspected to be contained in environmental media (soil, groundwater, remedial equipment, etc). If no information is available to pre-characterize waste in compliance with RCRA requirements, then additional waste characterization samples may be required.

Waste generated from analytical samples will be properly handled and disposed of by the laboratory (the laboratory becomes generator of these wastes). If a laboratory will not dispose of analytical sample wastes, arrangements must be made for proper disposal upon return of the unused portions of the analytical samples.

4.0 WASTE CHARACTERIZATION PROCEDURES

Characterization of generated waste to determine applicability of RCRA listed and characteristic codes will be accomplished by using generator knowledge, field screening techniques, and laboratory chemical analyses.

4.1 Generator Knowledge

4.1.1 RCRA Listing Codes

The DuPont CRG is responsible for evaluating the applicability of RCRA listing codes for waste environmental media (e.g., soil, decontamination fluids, and groundwater) generated during field activities at the Necco Park site. DuPont CRG, URS Diamond, DuPont Engineering Technology, and/or DuPont Legal may provide input into the RCRA listing code evaluation on behalf of the Necco Park site. If necessary, prior to conducting activities in an unevaluated area, a RCRA listing code evaluation will be performed. This evaluation will consist of a review of historical records that document material handling and disposal practices, chemicals handled or produced, environmental release reports, and personnel interviews where possible. This information will be used to classify waste materials properly prior to generation and ultimate disposal of the wastes.

4.1.2 RCRA Characteristic Codes

RCRA characteristic waste codes will be based upon the following:

- ❑ Historical analyses of applicable waste streams
- ❑ Evaluation of MSDS for suspected contaminants in a generated waste stream
- ❑ Direct knowledge of how a waste stream was generated

4.2 Qualitative Field Characterization

When necessary, the Necco Park team will perform a qualitative characterization of waste materials by observing and recording the presence or absence of staining, odors, organic vapors, free product, or any other relevant visual and instrument observations that may aid in characterizing generated waste materials.

Field screening equipment specified in an applicable work plan to detect hazardous constituents (e.g., photoionization detector for volatiles) could be used to aid in the qualitative field characterization. Qualitative characterization can be used in conjunction with generator knowledge to segregate suspected hazardous waste from unknown waste at the time of generation. This segregation could minimize the generation of hazardous waste as well as aid in the design of composite sampling schemes for the purpose of waste characterization.

4.3 Laboratory Chemical Analysis

If necessary, waste material will be staged until characterization and classifications are complete. Analytical results from waste characterization samples will be used to assist in waste stream characterizations. Specific work plan requirements will dictate specific sample locations and disposal requirements for the waste being analyzed.

4.4 Documentation of Waste Classification

The Necco Park Team will document how a waste classification was determined for each generated waste stream. This will include generator knowledge, qualitative field characterization information, and laboratory analytical results. If necessary, the RCRA listing code documentation will be filed in Attachment I-2 of this plan. In addition, individual waste characterization profiles will be filed in Attachment I-3 of this WMP.

5.0 WASTE MINIMIZATION PROCEDURES

The DuPont CRG achieves waste minimization by following the efforts outlined in this WMP. The Necco Park project team:

- ❑ Properly identifies hazardous waste and segregates it from non-hazardous wastes
- ❑ Ensures minimal contact between hazardous waste and protective gear and sampling devices
- ❑ Proactively outlines spill contingency and release prevention requirements
- ❑ Minimizes waste generated during field and operational activities by using innovative sampling techniques

5.1 Hazardous Waste Segregation

Historical data, raw material MSDS and finished products MSDS will be reviewed in an effort to determine the potential for generated wastes to be characterized as hazardous. Based on these reviews waste generated from the identified field activities will be segregated based on their anticipated waste classification. This segregation process reduces the volume of hazardous waste generated by avoiding mixing of hazardous and non-hazardous waste streams.

5.1 Hazardous Waste Contact Minimization

Whenever possible the waste generation procedures are modified to reduce the contact between generated non-hazardous wastes and suspected hazardous wastes. When scopes of works are written, procedures are identified to reduce activities in potentially hazardous areas. In addition, when necessary, representative waste characterization samples are collected prior to generation to eliminate further contact with waste streams strictly for the purposes of disposal characterization.

5.2 Outlining Spill Contingency Requirements

Section 7.0 of this WMP outlines procedures to be used at the Necco Park site to minimize spills or releases of containerized material.

5.3 Innovative Techniques

New technologies to reduce the impact or invasive nature of site procedures are constantly being developed. Whenever appropriate and approved by the overseeing agency, these new techniques will be used to reduce the amount of waste generated by sample collection, excavation, or routine operation or maintenance. Examples of technologies currently being used to minimize waste generation are as follows:

- ❑ Low flow purge for groundwater sample collection
- ❑ Direct recycling of generated waste material

- Pre-Characterization of waste material

Each of these technologies dramatically reduces the amount of waste generated in comparison to traditional sampling, operational, or drilling methods.

6.0 WASTE MANAGEMENT PROCEDURES

The following procedures outline the global DuPont CRG waste management procedures.

6.1 Containment

All wastes that are generated as a result of site activities will be containerized in accordance with all applicable regulations. Containers used for transportation to off-site treatment and disposal (TSD) facilities will meet all applicable United Nations (UN) packaging specifications in accordance with Department of Transportation (DOT) requirements. The minimum requirements for containers in an accumulation area are as follows:

- ❑ Containers must be labeled according to Federal and State requirements.
- ❑ Containers used to store the waste, and their closure devices, must be leakproof and strong enough to withstand dropping, overturning, and other collisions while filled, without impairing the ability of the container to contain the waste.
- ❑ Containers (including gaskets and liners) will be compatible with the waste.
- ❑ Containers will be closed at all times except during filling or emptying to minimize the chance of leaks, spills, and emissions, as well as personnel exposure to the waste or vapors.
- ❑ The outside of the containers will be kept clean at all times to prevent personnel exposure to the waste.
- ❑ Containers will be handled and stored in a manner that prevents accidental spills and damage to the container.
- ❑ Containers will be arranged in a manner that segregates hazardous and non-hazardous waste, segregates incompatible wastes, makes identification labels visible, and facilitates an inventory.

Waste containers will be moved to a designated waste accumulation when the container has been filled and properly labeled. The designated Necco Park waste coordinator will maintain a record of all waste materials that are transferred to an accumulation area.

6.2 Labeling

After waste is placed in an appropriate container and is designated for movement to the central temporary storage area, the container will be labeled with a description of contents and the accumulation start date. The following information will be written on the container, identifying the following:

- ❑ Content
- ❑ Date material was placed in the container
- ❑ State of the material (e.g., liquid, solid, and slurry)

- ❑ Unique sequential identification number

As waste containers are generated, field personnel will log them into a working copy of a Field Documentation Form (Attachment I-4).

6.3 Handling

All containers will be handled with approved handling equipment such as slings, forklifts, or drum grapplers. Drums will not be handled in such a manner that they may be dropped or the contents spilled.

6.4 Accumulation and Inspection

Containers that have not yet been properly characterized will be marked with "ON HOLD Pending Analysis" labels and may be held at the waste accumulation area pending final characterization and subsequent shipment. Materials classified as hazardous may be held in the waste accumulation area prior to disposal.

A typical drum accumulation area should be one of the following:

- ❑ Concrete pad with curbing
- ❑ Asphalt surface with curbing
- ❑ Polyethylene liner with self-curbing (liner extending over curbing to prevent leakage under curbing)
- ❑ Containers stored on secondary containment skids
- ❑ Other suitable area that is designed to contain a minimum of 10 percent of the volume of the containers or the volume of the largest container, whichever is greater

Accumulation areas will be inspected on a minimum weekly basis by the designated waste coordinator. The Necco Park waste coordinator will maintain a record of all containers and inspections.

The hazardous waste accumulation period for small quantity generators cannot exceed 180 days from the date of generation of the waste. [*Note: Small quantity generators generate more than 100 kg (220 lb.) but less than 1000 kg of hazardous waste per calendar month*.

6.6 Shipment, Treatment, and/or Disposal

After waste characterization and classification are completed, arrangements will be made for shipping the waste to a DuPont CRG approved TSD facility. Disposal of hazardous or nonhazardous waste at a TSD facility is subject to RCRA solid waste regulations and the disposal facility acceptance criteria. If necessary, waste containers will be shipped to a TSD facility by a transporter approved by DOT and DuPont CRG. All wastes that are classified as RCRA hazardous will be shipped with a required hazardous waste manifest.

RCRA regulations provide three options for off-site treatment and/or disposal of waste:

- ❑ Wastewater treatment
- ❑ Landfill
- ❑ Incineration

In order to adopt any of the above methods, additional characterization may be required.

DuPont CRG has been designated as the Necco Park waste generator. DuPont CRG personnel, or designated URSD personnel, will complete a manifest prior to waste shipment. DOT-trained personnel at the site will assist in assigning any additional DOT placarding needed for hazardous waste shipments.

DuPont CRG will retain copies of the waste manifests, LDR forms, and any treatment verification forms. If Federal or State reporting is also required, all reports will be prepared and submitted by the designated Necco Park waste management consultant or team member with applicable DuPont CRG waste management reporting authority.

7.0 SPILL REPORTING AND CLEANUP

Spill reporting instructions should be outlined in the following site documents.

- Necco Park Site Health and Safety Plan (HASP) - contains a list of materials and associated hazards likely to be encountered during fieldwork. The HASP covers safety procedures to be followed while conducting investigation and remediation activities at a site. The HASP also contains a list of key emergency personnel contacts.
- Necco Park Site Contingency Plan - defines procedures to minimize the hazards to human health and/or to the environment in the event that a waste or hazardous-constituent release (e.g., a spill or gaseous release) occurs. The provisions of this plan must be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents. The Site Contingency Plan also contains a list of key emergency personnel contacts.

FIGURES

DUPONT

Corporate Remediation Group

An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1

ATTACHMENTS

Specific Requirements for Analytical and Treatability Samples

Analytical Samples

An analytical sample is a sample of solid waste, water, soil, or air collected for the sole purpose of testing to determine its characteristics and/or composition. These samples are typically less than one gallon and can be analyzed for both chemical and physical parameters. Analytical samples are not subject to the requirements of RCRA Parts 124, 261 - 268, and 270, or to the notification requirements of Section 3010 when the sample is being:

- ❑ Transported to a laboratory for the purpose of testing
    - ❑ Transported back to the sample collector after testing
    - ❑ Stored by the sample collector before transport to a laboratory for testing
    - ❑ Stored in a laboratory before testing
    - ❑ Stored in a laboratory after testing but before being returned to the sample collector
    - ❑ Stored temporarily in the laboratory after testing for a specific reason (e.g., until conclusion of a court case or enforcement action where further testing of the sample may be necessary)

A sample collector shipping samples to a laboratory and a laboratory returning samples to the sample collector must comply with the Department of Transportation (DOT), the United States Postal Service, and/or other applicable shipping requirements. If the sample collector determines that the DOT, the United States Postal Service, and/or other applicable shipping requirements do not apply, the sample collection must ensure that the following information, at a minimum, accompanies the sample:

- ❑ Sample collector's name, mailing address, and telephone number
- ❑ Laboratory's name, mailing address, and telephone number
- ❑ Date of shipment
- ❑ Quantity of sample(s)
- ❑ Description of sample(s)
- ❑ CRG project number

This information will be documented on the shipping label, traffic reports (TRs), and chain-of-custody forms (COCFs). The TRs and COCFs must be packaged with the samples for shipment to the laboratory in a sealed plastic bag to prevent damage. If the samples are to be returned to the site for disposal, copies of the TRs and COCFs will be given to the environmental coordinator for the project waste management files.

Samples must be packaged in a manner to prevent leaks, spills, or vapors from their packaging. Sample containers will be cleaned prior to packaging to prevent contact with

the sample material. Each sample container will then be labeled with the following information:

- ❑ Sample name
- ❑ Date and time of collection
- ❑ Preservatives used
- ❑ TR number
- ❑ CRG project number

This information will enable the applicable party to identify the samples at a later date. Sample containers will be placed inside a dedicated plastic bag filled with ice. The plastic bag containing ice and sample containers will be placed into a shipping container, such as a cooler. The shipping container will then be filled with a nonflammable, shock absorbent material to absorb any liquids that might leak from the sample containers and protect the sample containers from being damaged. (Vermiculite is an excellent packing material.) The shipping container will be packed in a manner that prevents the shifting of the over-packed containers.

The sample packing requirements are necessary when transporting samples via delivery service organizations such as Federal Express. Should the shipping container leak, the individual whose name appears on the shipping form will be notified immediately. The shipping container will be dropped off at the next stop, and the individual will be required to claim the shipping container in person. Copies of the shipping documents must be given to the environmental coordinator for the project waste management file. Samples cannot be transported on commercial mass transit vehicles such as passenger airplanes, trains, or buses.

Treatability Samples

Treatability samples are samples collected for the sole purpose of conducting treatability studies as defined in RCRA 40 CFR 260.10. These samples are not subject to any requirements of RCRA 40 CFR 261 through 263, or the notification requirements of Section 3010 of RCRA when the sample is being:

- ❑ Collected and prepared for transportation by the generator or sample collector
- ❑ Accumulated or stored by the generator or by the sample collector prior to transportation to a laboratory or testing facility
- ❑ Transported to the laboratory or testing facility for the purpose of conducting a treatability study

The following quantities are based on the Final Rule published on February 23, 1994, in 59 FR 8362, which modifies 40 CFR 261.4. Please note that previously authorized state regulatory agencies may not yet have adopted this new rule. State regulations should be reviewed prior to taking samples for treatability studies.

The exclusions apply to samples of hazardous waste provided that:

- ❑ The generator or sample collector uses (in treatability studies) no more than 10,000 kilograms of media contaminated with non-acute hazardous waste, or no more than 2,500 kilograms of media contaminated with acute hazardous waste. [Note: Acute hazardous wastes are all of the P-listed wastes and specific F-listed wastes containing dioxins and furans (F020-23 and F026-28)].
- ❑ The mass of each sample shipment does not exceed the following limits: 1,000 kilograms of "as received" hazardous waste, 1 kilogram of acute hazardous waste, or 250 kilograms of soil, water, or debris contaminated with acute hazardous waste.
- ❑ The same shipping requirements as for analytical samples are met (including the EPA hazardous waste number, if applicable).
- ❑ The sample is shipped to a laboratory or testing facility that is exempt under RCRA 40 CFR 261.4(f) or has an appropriate RCRA permit or interim status.

Additional quantities of treatability sample may be requested by providing specific information to the appropriate lead regulatory agency in writing.

The same packaging requirements described for analytical samples apply to treatability samples. However, treatability samples are typically larger in volume and may consist of several 55-gallon drums. The sample collector will not place sample material directly into a 55-gallon drum. Sample material will be placed into a smaller container and then placed into a larger shipping container with packing material as described for analytical samples. This is necessary because these samples will be shipped via a standard freight company or delivery service organization and not a licensed hazardous waste transporter. Shipping containers that weigh more than 150 pounds need to be shipped via a standard freight company. TRs and COCFs must accompany the shipment to the laboratory or testing facility. In addition to the standard TR information, the mass quantity and technology being evaluated must be clearly stated on the TR. Copies of the TRs, COCFs, and shipping documents will be given to the environmental coordinator for the project waste management file.

Documentation of Listing Code Applicability

Anticipated Waste Streams and Waste Characterization Forms

Waste Stream	Proposed RCRA Classification	Anticipated Waste Characterization Testing	Container Requirements and Estimated Volume		Labeling Requirements	Anticipated Disposal Method
Excess Soil Generated from Site Maintenance, Well Drilling, etc.	RCRA Listed	TCLP VOA, SVOA, Metals, RCRA	TBD	NF – 109B	Green Non Hazardous Label	Necco Park based on Necco Park Acceptance Criteria
Decontamination Water	Non Hazardous	None – Although On-Site WWTP may have specific requirements	TBD – Generally Polyethylene Tank or direct discharge to adjacent area sump	NF – 77A	Green Non Hazardous Label	Recycled back-through groundwater treatment system
Groundwater / Purge Water ABC Zone Water	RCRA listed	None – Although On-Site WWTP may have specific requirements	TBD	NF-77	None	Recycled back-through groundwater treatment system
Groundwater / Purge Water DEF Zone Water	RCRA listed	None – Although On-Site WWTP may have specific requirements	TBD	NF-79	None	Recycled back-through groundwater treatment system
Pumps and Associated Mechanical Equipment	Non Hazardous	None	TBD – Generally Roll-Off	NF – 108	TBD	Off-Site (However, recycling options should be reviewed dependent on material recovered)
Dense Non Aqueous Phase Liquid (DNAPL)	Hazardous	TCLP VOA, SVOA, Metals, RCRA,	TBD	NF - 86	Yellow Hazardous Waste Label	Off-Site Vendor
Dense Non Aqueous Phase Liquid (DNAPL) from PCB indicating DNAPL wells	Hazardous Listed Hazardous PCBs	TCLP VOA, SVOA, Metals, RCRA, TSCA	TBD	NF – 86P	Yellow Hazardous Waste Label PCB label	Off-Site Vendor
PPE and General Trash	Non Hazardous based on Process Knowledge	None	Polyethylene Bags	None	None	On-Site Industrial Dumpsters

Waste Container Generation Form

INSTRUCTIONS:

Every project's Field Team Leader is to submit this form using the Lotus Notes Technology Networks Database, for automatic forwarding to the Waste Management Consultant. This form is located on the Technology Networks Database, Waste Management Network. Completion of this documentation form replaces the former "Waste Container Generation Form" and "Inventory Sheet". A hardcopy of this form will not be accepted.

The Waste Management Field Documentation form consists of two main Sections and is organized as follows:

Section A:

This Section contains general information about the project and serves as documentation that a Waste Management Plan Addendum was prepared, received and reviewed by the field team. Completion of this page will be used to document compliance with 6 Sigma improvements and the CRG waste management plan metric.

Section B:

To be completed for all wastes handled by the field team.

SECTION A

GENERAL INFORMATION:

Field Event Date(s):_____

CRG Project No._____ Project Manager: _____

Site Name: _____ Project Name: _____

Site Address: _____

Site EPA ID No.: _____

Task Name: _____

Field Team Leader: _____ Phone: _____

URSD Waste Consultant: _____

* Site environmental coordinator or contact: _____ Phone: _____

(*Orphan sites will not have an on-site contact)

WASTE MANAGEMENT PLAN DOCUMENTATION:

Was a Waste Management Plan Addendum prepared for the specific task(s) performed during this field event? _____ YES _____ NO

Date the Addendum was prepared? _____ (MM/DD/YY)

Was the Addendum received and reviewed by the Field Team before fieldwork began?

_____ YES _____ NO

SECTION B

INSTRUCTIONS: Please complete the appropriate blanks for all waste streams, as applicable.

B1. Wastes disposed of at the time of generation. Please complete all that apply.

_____ gallons (total) of purgewater to on-site resource (i.e. POTW outfall, WWTP or other approved outfall, on-site groundwater treatment system)

_____ gallons (total) of purgewater to ground

_____ (# of)bags of PPE to on-site or off-site DuPont controlled solid waste dumpster

_____ (# of) 5, 35 or 55-gallon (circle one) containers of soil or solids to on-site

_____ cubic yards of soil or solids to on-site landfill.

Other (complete the blanks as described in the parentheses):

_____ (Quantity) of _____ (volume) containers of _____ (material) managed at/by _____ (location/site authority)

B2. Wastes left for management and disposal by site personnel

_____ (# of gallons) of _____* waste left for management by on-site personnel

_____ cubic yards of stockpiled _____* waste left for management by on-site personnel

Other (complete the blanks as described in the parentheses):

_____ (Quantity) of _____ (volume) containers of _____ (material)

* Insert appropriate waste stream here (i.e. soil, debris, purgewater, PPE etc.)

Other wastes (Please describes material, number of containers, container type, volume, waste matrix, etc.):

_____

_____

_____

DO YOU NEED HELP FROM A URSD WM CONSULTANT TO DISPOSE OF WASTE GENERATED FROM THIS PROJECT: _____ YES _____ NO

INSTRUCTIONS: If the answer to the above question is NO, WHO WILL BE RESPONSIBLE FOR DISPOSAL OF THE WASTE? _____

IF THE ANSWER IS YES, PLEASE COMPLETE SECTION B3.

B3. Wastes Requiring Characterization and/or Disposal Assistance by URSD Waste Consultant

INSTRUCTIONS: This inventory must be completed to notify the URSD Waste Consultant of wastes needing disposal.

This inventory must include all waste not covered under Section B1 or B2. A separate line entry for each container must be entered. This is required to distinguish one container from another for labeling and disposal requirements. Also include the source area (i.e. SWMU or AOC number, well number, boring ID) and matrix (Plastic, PPE, groundwater, decon water, soil).

Project Specific

Waste Inventory Sheet

Container Number	Work Area (SWMU or boring ID)	Matrix (soil, GW, decon water, PPE, plastic)	Container Type (roll-off, 55-gal drum, 35-gal, drum, tanker)	% full (25%, 50%, 75%, 100%)	Label (On-hold, Hazardous, Non-Haz)	Accum. Start Date	Waste characterization Sample name (If applicable)

Accumulation Area Inspection Log

Date: _____ Time: _____

Inspector Name and Title: _____

Equipment	Checklist	OK (√)	Comments
Containers	Corrosion, leakage, structural damage		
Container Sealing	Open lid, rings, bung caps		
Container Labels	Improper identification, date missing		
Segregation of Incompatibles	Storage of incompatibles		
Container Stacking	Aisle space, Height		
Pallets	Damaged, drums not on pallet		
Base or Foundation	Cracks, spelling, erosion, wet spots		
Warning Signs	Damaged, missing		

Problem—Corrective Action Taken

_____

_____

_____

_____

APPENDIX J
EMERGENCY ACTION AND CONTINGENCY PLAN
DUPONT NECCO PARK
NIAGARA FALLS, NEW YORK

Date: April, 2005

DuPont Project No.: 7407
URSD Project No.: 18983995

CORPORATE REMEDIATION GROUP
An Alliance between
DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

TABLE OF CONTENTS

FIGURES

ATTACHMENTS

1.0 FACILITY INFORMATION

The information in this plan has been developed for the following site:

E.I. du Pont de Nemours and Company, Inc. - Necco Park Landfill
5600B Niagara Falls Blvd.
Niagara Falls Blvd & 56th Street
Niagara Falls, NY 14304

EPA IDENTIFICATION: **NYD980536288** (Small Quantity Generator)

The site location is shown on Figure 1.

The DuPont Necco Park site is located approximately 1.5 miles north of the Niagara River in a predominantly industrial area of Niagara Falls, New York.

Necco Park is bounded on three sides by disposal facilities. Immediately north and east of the site lies the Newco solid waste landfill, an active Subtitle D facility owned by Allied Waste. Immediately south of the site are three inactive hazardous waste landfill cells and a wastewater pre-treatment facility owned by CECOS International, Inc. An access road and a CSX right-of-way bound the site to the west. Land in the vicinity of the site is predominately zoned for commercial or industrial use. Several major manufacturing facilities are located within one mile of the site, and two manufacturers – Durez Chemical and the Carbide/Graphite Group (formerly Airco Carbon) - are 2,000 feet and 300 feet from the site, respectively. The nearest residential neighborhoods are located approximately 2,000 feet to the south and 2,500 feet to the west.

2.0 PURPOSE

This plan has been prepared in accordance with 40 CFR §262.34(d)5 (*Contingency Plan and Emergency Procedures*) and 40 CFR §265, Subpart C (*Preparedness and Prevention Procedures and Equipment*).

This plan is designed to minimize hazards to human health or the environment from fires, explosions, tornado's, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to the air, soil, surface or groundwater.

In addition, this plan will outline facility specific emergency procedures needed for medical emergencies and/or civil disturbances.

3.0 HISTORICAL AND CURRENT FACILITY OPERATIONS

3.1 Site History

Necco Park is a 24-acre inactive industrial waste disposal site that was originally used as a recreational park by the Niagara Electrochemical Company. The site was sold to DuPont in 1930.

As part of the initial investigations conducted at the site, an operational history for the site from the mid-1930s to 1977 was developed based on DuPont records and an interpretation of historic aerial photographs. During that period, the site received a number of liquid and solid wastes generated from a variety of processes operated at the nearby DuPont Niagara Plant. These wastes included flyash, sodium salts and cell bath residue (i.e., barium, calcium, and sodium chlorides), cell and building rubble, chlorinolysis wastes, and off-grade products. Liquid wastes were generally disposed of in shallow earthen lagoons on the southeastern portion of the site; the remainder of the site functioned primarily as a solid waste landfill.

Documentation of activities at Necco Park prior to 1964 is limited. The following wastes were disposed of in the largest quantities:

- ❑ Flyash
- ❑ Building demolition and miscellaneous plant debris
- ❑ Sodium sludge waste salts, cell bath, and floor sweepings (i.e., barium, calcium, and sodium chloride)
- ❑ Sodium cell rubble (i.e., thermal brick, corroded steel)
- ❑ Polyvinyl acetate solids and stilling bottoms (i.e., vinyl acetate with high boiling tars)
- ❑ Chlorinolysis wastes (i.e., high boiling residues including hexachlorobenzene, hexachlorobutadiene, and hexachloroethane)
- ❑ Liming residues (i.e., sludge saturated with tri- and tetyrachloroethene [TCE and PCE])
- ❑ Scrap organic mixtures, off-grade product
- ❑ Glycol polymer (Terathane®) scrap (i.e., filter press cloth, filter press sludge)
- ❑ Refined adiponitrile waste (high boiler wastes)

In 1977, Necco Park was identified as a potential source of groundwater contamination, and disposal activities were promptly discontinued.

Several interim response actions were implemented to mitigate the impact and spread of contamination. During 1978 and 1979, a clay cap was constructed over the 24-acre site.

In 1982, two existing monitoring wells (D-12 and 52) were converted to recovery wells (RW-1 and RW-2) to control off-site migration of contaminated groundwater to the upper

bedrock fracture zones. Wells RW-1 and RW-2 have been used as recovery wells from 1982 to the present. In 1992, a third recovery well, RW-3, began operation at Necco Park. Extracted groundwater was pumped to the adjacent CECOS facility where it was treated and discharged to the Niagara Falls publicly owned treatment works (POTW). DuPont installed an interim treatment system (ITS) in August 2004. Operation of the permanent groundwater treatment facility began April, 2005.

3.2 Current Facility Operations

Five well pumps are used to pump groundwater from recovery wells via two separate collection headers to two separate processing systems. Three pumps collect groundwater from A/B/C flow zones while two pumps collect groundwater from D/E/F flow zones.

A/B/C-Zone groundwater is then collected in a 7,500 gallon A/B/C process tank. D/E/F-Zone groundwater is collected in a 7,500 gallon D/E/F process tank.

Once a sufficient amount of each stream is accumulated in their respective tanks, A/B/C-Zone groundwater is batched to a 500 CFM air stripper designated for A/B/C-Zone groundwater only. D/E/F-Zone groundwater is batched to another 500 CFM air stripper designated for D/E/F-Zone groundwater.

The two streams are treated via air stripping. The off-gas is emitted through an 82-ft air emission stack, and the treated groundwater (effluent) is combined in a 15,000-gallon effluent tank and discharged to the POTW.

4.0 DEFINITIONS

The following definitions are applicable to the implementation of this plan:

EMERGENCY: any situation which cannot be immediately controlled by assigned site or contract personnel, and

1. which results in or has the potential to result in a fire or explosion that could harm human health or the environment
2. which results in human injury or has a serious potential for human injury
3. which results in the use of water and/or chemical suppressants resulting in contaminated runoff.
4. which results in the release or the serious potential of a release of toxic substances above permissible exposure limits to the environment.

GENERATOR: person, by site, whose act or process produces hazardous waste identified or listed in 40 CFR §261 whose act first causes a hazardous waste to become subject to regulation.

INCIDENT: An incident includes a fire, spill, fume release, or medical emergency that can be controlled within its area by site or contract personnel.

5.0 SITE APPLICABILITY AND REQUIREMENTS

Current activities at the Necco Park Landfill consist of maintenance and monitoring activities and the operation of a sitewide groundwater recovery and treatment system. Monitoring activities will consist of groundwater sampling to evaluate the effectiveness of the engineered hydraulic controls and cap system. Groundwater sampling activities will generate a small quantity of listed hazardous wastewater.

DuPont Necco Park site will adhere to all federal and state requirements associated with a small quantity hazardous waste generator (SQG).

The following general requirements are applicable to the site:

1. The quantity of hazardous waste accumulated on-site will never exceed 13,220 lbs
2. Use and management of containers
   - All containers will be in good condition, if leaks are found material will be moved to a new container
   - Containers will be used that are compatible with material being contained
   - Containers will be closed at all times except for adding or removing waste
   - Containers will be stored, opened, handled in a manner that will not cause rupture
   - Generated containers will be inspected and documented on a weekly basis (Attachment J-1)
3. The date upon which each period of accumulation begins must be clearly marked and visible for inspection on each waste container
4. While waste containers are being accumulated on-site, each container must be labeled or marked clearly with the words, "Hazardous Waste"
5. Adherence to a Waste Analysis Plan or Procedure which assures that wastes disposed of meet Federal Land Disposal Restrictions.
6. Preparedness and Prevention (40 CFR §265 Subpart C) - Sections 7.0 and 8.0 outline general guidelines for dealing with site emergency situations. In addition, the following equipment is located at the site.
   - An internal communication system which provides immediate notification of emergencies to site personnel.
   - A telephone to summons emergency assistance from local police, fire departments, and local emergency response teams.
   - A portable fire extinguisher
   - Spill control equipment - Located within the vicinity of the <90 Day accumulation area
   - Water at adequate volume to aid in fire suppression

   All facility communication, fire protection, and spill control equipment, where required, will be tested and maintained to assure its proper operation in time of emergency/spill.

7. During the storage of any significant quantities of drummed material, adequate aisle space will be maintained to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment to any area of near and around drum storage area.

6.0 RESPONSIBILITIES AND DUTIES

6.1 Emergency Coordinator(s)

The DuPont Necco Park Landfill is considered a DuPont 'Orphan' site since only active environmental remediation is currently taking place at the site. Thus, various DuPont Corporate Remediation sub-contractors, at various times throughout the year, complete environmental remediation projects in an effort to meet state and federal requirements.

Because of the inconsistent timing of remediation projects, the primary contact may or may not be on-site. Therefore, DuPont has designated a URS Diamond employee as the primary on-site emergency contact.

The primary emergency coordinator for this facility is:

Tim Pezzino (URS Diamond)
Site Phone: 716-278-5239
Cell Phone: 716-570-6846
Home Phone: 716-876-7918

The secondary emergency coordinator(s), to be contacted in case the primary coordinator is unavailable, are:

Gerald Shepard (URS Diamond)
Work Phone: 716-278-5149
Cell Phone: 716-536-1269

Paul Mazierski (DuPont)
Work Phone: 716-278-5496
Cell Phone: 716-940-5122

The primary emergency coordinator, is responsible, and has the authority for committing time sensitive resources and funds, for coordinating all emergency response measures for the site. In addition, he is responsible for being thoroughly familiar with the:

- ❑ This Emergency Action Plan
- ❑ The operations and activities at the facility
- ❑ The location and characteristics of waste handled at the site
- ❑ The location of all records necessary to assist and implement this Emergency Action Plan within the facility
- ❑ The physical layout of the facility

6.2 Duties

The primary emergency coordinator will ensure that the following waste generator requirements are adhered to:

- ❑ The following information will be posted next to each site phone:
  - Names and phone numbers of the emergency coordinator(s) (Attachment J-2)
  - Location of fire extinguisher, spill control equipment, and fire alarm (if present) (Attachment J-3)
  - Name and telephone numbers of local fire/police department(s)
- ❑ Assurance that all employees are thoroughly familiar with proper waste handling and emergency procedures relevant to there job function during normal facility operations.

7.0 EMERGENCY ACTION PLAN IMPLEMENTATION

If the emergency coordinator, designee, or on-site personnel determines there is an emergency or an imminent /actual threat to human health or the environment at this facility, immediate implementation of this emergency plan will be completed. The following are examples outlining when this action plan will be implemented:

7.1 Fire or Explosion

- ❑ Fire or explosion occurring in the hazardous waste storage area (Figure 2)
- ❑ Brush/Grass fires
- ❑ Truck fires

7.2 Spills

- ❑ A spill that cannot be contained on-site, which results in off-site or on-site soil contamination and/or ground/surface water pollution.

7.3 Natural Disasters

- ❑ Earthquakes
- ❑ Tornado

7.4 Medical Emergencies

- ❑ Cuts, bruises, small burns
- ❑ Broken bones
- ❑ Eye contamination

8.0 EMERGENCY RESPONSE PROCEDURES

8.1 Fire or Explosion

If a fire, explosion, or smoke, is detected the following actions will be taken:

- ❑ Assess possible direct and indirect hazards to human health or the environment that may result or have resulted from the fire, explosion, or smoke.
- ❑ Evaluate the fire or explosion – if fire is the result and is small enough to be extinguished, use a portable fire extinguisher to put out fire – If in doubt, do not try – EVACUATE
- ❑ If fire or explosion may compromise the property, notification to the respective personnel as well as to the neighboring Allied Waste personnel will be completed – See list of contacts – Attachment J-2.
- ❑ (if possible and necessary) Call Niagara Falls Fire Department - 911
- ❑ Warn others in the area
- ❑ Evacuate area and proceed to site rally spot (Figure 2)

8.2 Hazardous Waste Releases (Spills)

If a spill occurs or is found, the following actions will be taken.

Appropriate spill response equipment is listed in Attachment J-3 and its location is identified in Figure 2. This equipment should be employed as needed to contain or control any spill or release.

- ❑ Identify the character, exact source, amount, and the real extent of any released material
- ❑ Assess possible direct and indirect hazards to human health or the environment that may result from the release
- ❑ Activate any facility alarms and notify appropriate State or local agencies (as necessary)
- ❑ Determine if evacuation of local areas outside of the facility is required, immediately notify the National Response Center (800-424-8802) (if necessary)
- ❑ Ensure that releases will not recur or spread to other hazardous waste (if in the vicinity) at the facility (e.g. contain the release, via isolating the leak, over-packing a container)
- ❑ Provide treatment, storage and disposal of any material that results from the release immediately.

8.3 Natural Disasters

All personnel and visitors should do the following:

1. Remain calm. Do not attempt to evacuate.
2. Find shelter under a desk or sturdy table. A doorway may provide some shelter if a piece of furniture is not immediately available.
3. Avoid places where objects may fall from overhead storage or near outside walls and windows.
4. Follow instructions from the Emergency Coordinator or designated alternate.
5. If the occurrence is earthquake, once the building/ ground stops shaking follow the designated evacuation route quickly. If outside, stay away from buildings, trees, and electrical lines.

8.4 Medical Emergencies and Basic First Aid

The following site personnel are trained in basic first aid:

Tim Pezzino

- ❑ Local first aid and emergency responders (Attachment J-2) will be requested if medical assistance above basic first aid is needed.
- ❑ An employee should not provide medical attention unless they have been trained and have the necessary supplies available.
- ❑ Avoid contact with blood, body fluids, or other potentially infectious material by using protective equipment and safe practices.
- ❑ First aid kits are available at the following locations:
  - Main Groundwater Treatment Building - Inside front door on adjacent wall

9.0 EVACUATION PROCEDURES

Indication of the site rally spot (Figure 2) is posted at the following locations.

- ❑ Main Groundwater Treatment Building - Inside front door on adjacent wall
- ❑ Construction Trailer – Inside front door
- ❑ Hazardous Waste Storage Area
- ❑ In each of the 5 Recovery Well Buildings

Employees should become familiar with all evacuation routes and assembly areas.

In the event of an evacuation, the Emergency Coordinator will:

- ❑ Conduct a headcount at the appropriate rally spot (Figure 2).
- ❑ Stay in the assembly area until all personnel and site visitors have been accounted for and until personnel are authorized to leave the premises (if necessary).
- ❑ If personnel are required to leave site, personnel will not be able to return until authorized.

10.0 PERSONNEL TRAINING

All on-site personnel will be briefed on the contents of this emergency action plan once a year.

In addition, any subcontractor entering the site should be briefed on the contents of this plan upon entering the site.

An attendance sheet documenting this training is included as Attachment J-4.

10.1 On-Site Availability

This plan is maintained in the office of the emergency coordinator. Any employees or contractors performing work at the site should have access to the plan. All personnel on-site are required to become familiar with this action plan.

10.2 Off-site availability

Copies of the plan have been submitted to the following organizations:

- ❑ Local Fire
- ❑ Local Police
- ❑ Governmental

Copies of the letters are attached in Attachment J-5.

11.0 RECORD KEEPING AND INCIDENT REPORTS

An initial verbal report to the National Response Center (1-800-424-8802) and DuPont Niagara Plant (716-278-5444) will occur if an emergency could threaten human health or the environment outside the facility, if a spill has the potential to reach surface waters, or if the initial assessment indicates that evacuation of local areas may be advisable.

The emergency coordinator will also notify agencies and local authorities (Attachment J-2) when required. An initial verbal report must include the following:

- ❑ Name and phone number of reporter
- ❑ Name and address of facility
- ❑ Time and type of incident
- ❑ Name and quantity of material(s) involved to the extent known (if applicable)
- ❑ The extent of injuries, if any

If applicable, a copy of any incident report(s) will be maintained in Attachment J-6 of this plan for future site records.

12.0 PLAN MAINTENANCE

12.1 Amendments

This Emergency Plan will be reviewed and amended, if necessary, whenever **any** of the following occur:

- ❑ Applicable regulations are revised.
- ❑ The plan fails in an emergency.
- ❑ Changes occur in facilities or materials stored on-site that increase the potential for fire, explosion or releases of hazardous substances or changes the response necessary in and emergency.
- ❑ The list of Emergency Coordinators and their respective information profiles changes.
- ❑ A change occurs in the on-site emergency equipment listed in Attachment J-3 of this document.

Amendments to this plan will be documented on the form included as Attachment J-7.

FIGURES

DUPONT

Corporate Remediation Group

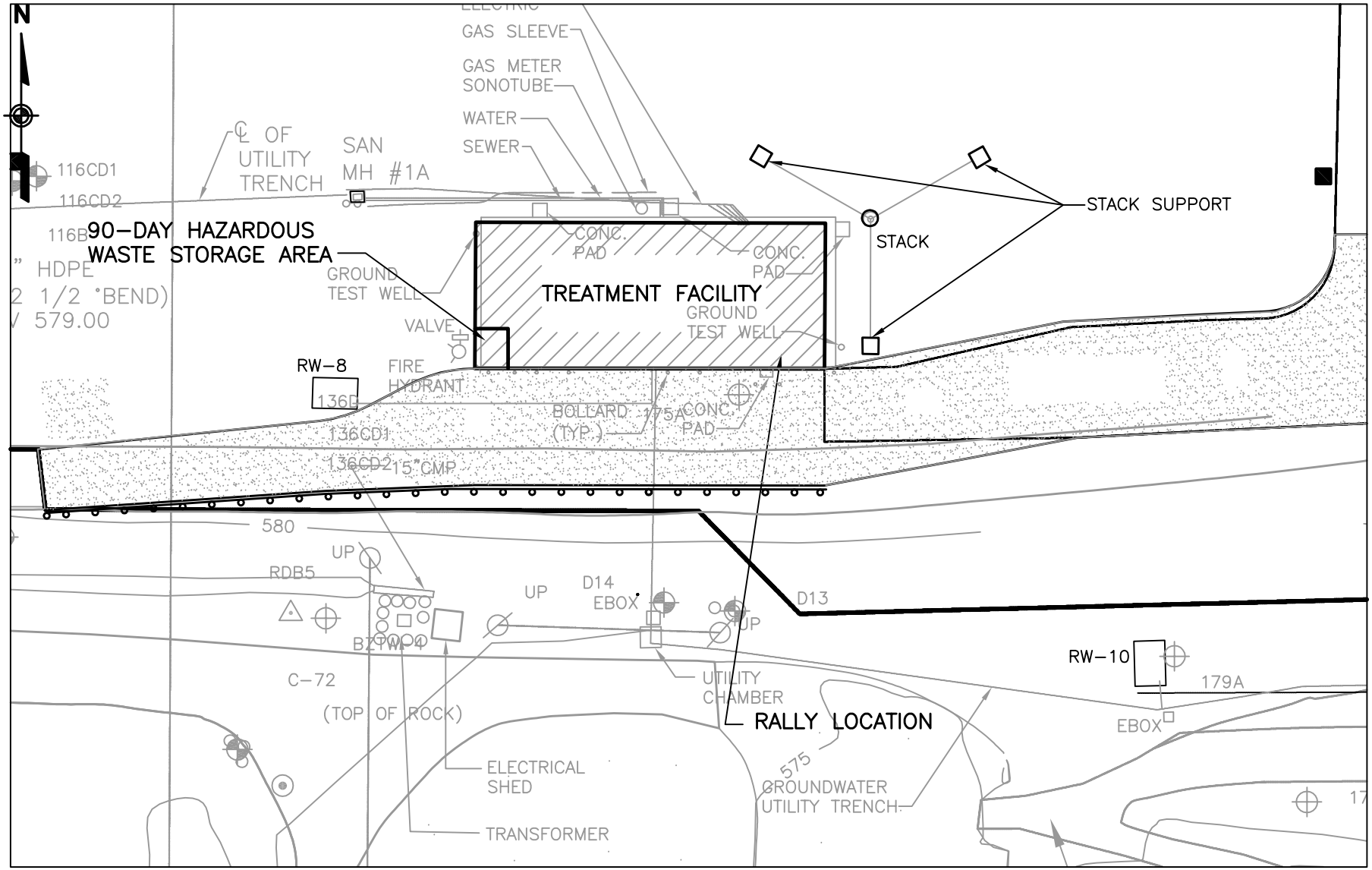
An Alliance between DuPont and URS Diamond

Barley Mill Plaza, Building 27
Wilmington, Delaware 19805

SITE LOCATION MAP

Necco Park Site
Niagara Falls, New York

SCALE	DESIGNED	DRAWN	CAD FILE NO.
No Scale		DEL	Site_Location
DATE	CHECKED	APPROVED	FIGURE
10/16/03	KAS		1



URS	NECCO PARK GROUNDWATER TREATMENT FACILITY SITE MAP	FIGURE 2

ATTACHMENTS

Attachment J-1

Daily Inspection Form

Accumulation Area Inspection Log

Date: _____ Time: _____

Inspector Name and Title: _____

Number of Containers: _____

Equipment	Checklist	OK (√)	Comments
Containers	Corrosion, leakage, structural damage		
Container Sealing	Open lid, rings, bung caps		
Container Labels	Improper identification, date missing		
Segregation of Incompatibles	Storage of incompatibles		
Container Stacking	Aisle space, Height		
Pallets	Damaged, drums not on pallet		
Base or Foundation	Cracks, spelling, erosion, wet spots		
Warning Signs	Damaged, missing		

Problem—Corrective Action Taken

_____

_____

_____

_____

Attachment J-2

DuPont Necco Park Site Emergency Coordinator and Agency Contact List

The following is a list of emergency contacts and are posted at each emergency phone location:

Emergency Coordinator	Phone*
Primary Coordinator **Tim Pezzino**	Office: 278-5239 Home: 876-7918 Cell: 570-6846
Operations Technician **Gerald Shepard**	Control Room: 282-1755 Office: 278-5149 Home: 735-3041 Cell: 536-1269
Project Director (DuPont) **Paul Mazierski**	Office: 278-5496 Cell: 940-5122
Emergency Coordination Team **Don Gwizdowski**	Office: 278-5321 Cell: 570-5726
General Manager **BFI/Allied** **Dave Grenier**	Office: 285-3344 Cell: 632-1221
Fire Department	911
Police Department	911
Ambulance	911
Hospital **Niagara Falls Memorial**	278-4000
24 Hour Emergency Response	911
USEPA National Response Center	800-424-8802
USEPA REGION II OFFICE	212-264-2525

*** 716 area code unless otherwise specified.**

List and Location of Emergency Equipment for Necco Park

Medical, Fire and Spill Response Equipment	
Item	**Location**
First Aid Kit	Office Area
Fire Extinguisher	Office Area and 90 Day RCRA Storage Area
Oil Dry® and/ or Absorbent (or equivalent)	90 Day RCRA Storage Area
Shovel	90 Day RCRA Storage Area
Disposable Gloves	90 Day RCRA Storage Area
Communication Equipment	
Telephone	Office Area / Process Area
2-Way Radios	Office Area and on person (as needed)

Attachment J-4

Training Documentation

The following personnel have reviewed this contingency plan:

Name	Company	Date of Review

Attachment J-5

Plan Distribution Documentation

Once this plan has been approved by the USEPA, it will be distributed to the following local agencies:

Local Fire Department

Niagara Falls Fire Department
3115 Walnut Avenue
P.O. Box 69
Niagara Falls, NY 14302-0069

Local Police Department

Niagara Falls Police Department
520 Hyde Park Blvd.
Niagara Falls, NY 14301

Incident Reports

List of Plan Amendments

This plan was amended on the following dates:

Current Version: **April 2005**

Revision 1: n/a