REVIEW COPY

THE WHITMAN COMPANIES, INC.

Setting the Standard in Environmental Engineering & Management

REMEDIAL ACTION WORKPLAN:
FOR SOIL AND GROUND WATER AT "AREA A" AND "AREA I"

FOR

DEXTER CHEMICAL, LLC
845 EDGEWATER ROAD
BRONX, NEW YORK
SITE #: V00186-2
INDEX #: W2-0864-03-08

SUBMITTED TO

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION, REGION 2
LONG ISLAND CITY, NY

VOLUME 1
TEXT, TABLES, FIGURES AND ATTACHMENTS

PERFORMED BY

THE WHITMAN COMPANIES, INC.

MAY 2005

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May 13, 2005

Hari O. Agrawal, P.E.
New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, NY 11101

RE: Dexter Chemical, LLC
819-845 Edgewater Road
810-842 Whittier Street
Bronx, New York
Site # V00186-2
Index # W2-0864-03-08
Whitman Project #97-09-10

Dear Mr. Agrawal:

Enclosed are one original and three copies (one unbound) of a report entitled, *Remedial Action Work Plan for Soil and Ground Water at Area A and Area I* for the above-referenced site.

This work plan presents the proposed scope of work to conduct the air sparging and soil vapor extraction (AS/SVE) remediation at the site. The remedial action is being conducted under the Voluntary Cleanup Agreement recently executed between Dexter Chemical, LLC and the New York State Department of Environmental Conservation (NYSDEC).

Dexter is eager to move forward with the remediation at the site and requests an expedited review and response to this work plan.

Please contact Richard Britton P.G., or me should you have any questions regarding the contents of this work plan.

Sincerely,

Ira L. Whitman, P.E.
Principal

ILW/gs
Enclosure

cc: Leonard Sitver, Dexter Chemical, LLC
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REMEDIAL ACTION WORKPLAN:
FOR SOILS AND GROUND WATER AT "AREA A", AND "AREA I"

DEXTER CHEMICAL, LLC
BRONX, NEW YORK

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REMEDIAL ACTION WORKPLAN:
FOR SOILS AND GROUND WATER AT "AREA A", AND "AREA I"

DEXTER CHEMICAL, LLC
BRONX, NEW YORK

1.0 INTRODUCTION

Dexter Chemical, LLC (Dexter) is submitting this remedial action work plan (RAW) under the December 4, 2003 Voluntary Cleanup Program Agreement (VCA) between Dexter and the New York State Department of Conservation (NYSDEC).

This work plan presents a scope of work to implement the agreed upon air sparging and soil vapor extraction (AS/SVE) remedy for Area A and Area I at the site (Figure 1). An AS/SVE pilot test was conducted in Area A in June 2004. The results from the Pilot Study were submitted to NYSDEC in Progress Report #4 for the site dated April 7, 2005. The pilot study results indicated that AS/SVE was a viable remedial option for the site. This RAW has been completed consistent with the requirements of section 5.3 of the DRAFT Technical Guidance for Site Investigation and Remediation (DER-10), December 2002.

2.0 SUMMARY OF PREVIOUS INVESTIGATION RESULTS FOR AREA A AND AREA I

2.1 Area A Soils

As shown on Figure 2 and Table 1, soil samples were collected in Area A to delineate the extent of the soil contamination. The soil sample results for Area A indicate several Volatile Organic Compounds (VOCs) exceed the NYSDEC TAGM Recommended Soil Cleanup Objectives. Concentrations of Benzene, Ethylbenzene, Toluene, Xylene, Chlorobenzene, 1,2 Dichlorobenzene, 1,3 Dichlorobenzene, 1,4 Dichlorobenzene, 1,2,4 Trichlorobenzene and Naphthalene were identified above the NYSDEC TAGM Recommended Soil Cleanup Objectives.

Figure 2 shows that the soil contamination in Area A covers an area approximately 40 feet wide by 40 feet long and 15 feet deep. Delineation of Area A is complete. 40 x 40 x 15'

2.2 Area I Soils

As shown on Figure 3 and in Table 2, soil samples were collected in Area I to delineate the extent of the soil contamination. The Area I soil sample results indicate several VOCs exceed the NYSDEC TAGM Recommended Soil Cleanup Objectives. Concentrations of Ethylbenzene, Xylene, 1,3 Dichlorobenzene, 1,4 Dichlorobenzene, 1,2,4 Trichlorobenzene and Naphthalene were identified above the NYSDEC TAGM Recommended Soil Cleanup Objectives.

Figure 3 shows that soil contamination in Area I covers an area approximately 50 feet wide by 75 feet long and extends to a depth of 15 feet. Delineation in Area I is complete except north of boring locations AISB-9 and AISB-10.

Area I contaminant concentrations are an order of magnitude lower than those found at Area A.

2.3 Ground Water Investigation

Historically, several rounds of ground water samples from the on site and off site monitoring wells (MW-1 through MW-10), on-site peizometers (PZ-1 through PZ-4) and three (3) grab ground water samples (GW-1 through GW-3) were collected to evaluate ground water conditions. The most recent samples to date are summarized on Figure 4 and in Table 3. Examination of Figure 4 and Table 3 indicate several VOCs exceed the 1998 NYSDEC Ground Water Criteria. Concentrations of Benzene, Ethylbenzene, Toluene, Xylene, cis-1,2 Dichloroethene, 1,2 Dichloropropane, Vinyl Chloride, Chlorobenzene, 1,2 Dichlorobenzene, 1,4 Dichlorobenzene, 1,2,4 Trichlorobenzene and Naphthalene were identified above the 1998 NYSDEC Ground Water Criteria. All of the historic ground water sampling events have revealed a consistent ground water flow to the Northeast.

2.4 Area A Pilot Test

The AS/SVE pilot test proposed in Whitman's February 2004 Workplan and approved by the NYSDEC, in a letter dated May 7, 2004, was conducted in Area A at the site on June 28, 2004 through June 30, 2004. One SVE well (SVE-1) and one air sparging well (AS-1) were installed within the known zone of contamination at Area A. A total of five (5) monitoring points, MP-1 through MP-5, were installed within Area A (Figure 5).

The SVE test initiated with the extraction of soil gas from SVE-1 using a regenerative blower as a vacuum source. Soil gas extracted during the course of the pilot test was routed through a 55-gallon (200 lb) granular activated carbon treatment for hydrocarbon removal prior to discharge. Approximately 2 hours after the start of the SVE pilot test, air was introduced to AS-1 using an air compressor. The combination of air sparging and soil vapor extraction continued for 2 hours. After this period, the air sparging system was turned off and SVE only was conducted for the final hour of the test to recover vapors liberated during the combination of air sparging and soil vapor extraction portion of the test.

2.4.1 Effluent Soil Gas Sampling Data

Tedlar air bag samples, SVE-1 though SVE-3, were collected from the SVE discharge at three (3) times during the SVE test. The three (3) samples were taken as follows:

SVE-1	At the start of the SVE test.
SVE-2	During a period of soil vapor extraction and air sparging.
SVE-3	Prior to shutting off the SVE Blower, but following the termination of air sparging.

The table below summarizes the analytical results for the Tedlar air bag samples, SVE-1 through SVE-3, at Area A:

Volatile Organics in Soil Vapor, Area A – Results in Parts per Billion (ppbv)			
	Sample		
Compound**	**SVE-1**	**SVE-2**	**SVE-3**
Benzene	ND	25.6	ND
Ethylbenzene	76.4	578	442
Methylene Chloride	144	ND	ND
Toluene	58.0	ND	ND
Xylene (total)	221.6	1216	968

** Not all five (5) of these compounds were found in each sample.
All other Volatile Organic Compounds were Non-Detect (ND) in each sample.

2.4.2 VOC Mass Removal

The average mass removal rate calculated based upon the pilot study data was 0.13 kg/day. This value was calculated using an average flow rate of 20 cfm and an average soil vapor concentration for the BTEX compounds. For a full scale system, an overall flow rate of 300 cfm

would be likely. At the design flow rate of 300 cfm, a mass flow of 1.95 kg/day (4.3 lbs/day) would be achieved. It is anticipated that significantly higher hydrocarbon recovery rates may be initially encountered. Generally these rates of removal decline as remediation progresses. On this basis, it may be most cost effective to operate the off-gas system using a thermal or catalytic system during the initial stages of remediation with a transition to granular activated carbon after several months. These design details will be finalized upon completion of the well and recovery point installation and start-up tests.

2.4.3 Induced Vacuum and Pressure Readings

The soil vapor extraction only (SVE only) phase of the pilot study was initiated at 9:45 a.m. when SVE-1 was connected to a regenerative style blower. The blower utilized was a Gast Regenair™ Model 5125-2. This blower has a maximum vacuum capability of 60 inches of water and a maximum open flow of 160 cubic feet per minute (cfm). Due to the shallow site water table, maximum vacuum could not be applied to SVE-1 without recovering water from the point. Accordingly, the vacuum applied to the point was reduced to 50 inches of water. The reduction in applied vacuum was obtained by "bleeding in" ambient air upstream of the blower thereby reducing vacuum and increasing air flow. At test conditions the blower flow was estimated to be 80 cfm. The flow from the subsurface was 20 cfm with the balance of the flow attributed to ambient air bleed in.

SVE Vacuum Response
Induced Vacuum

Point	Distance From SVE-1 (feet)	Applied Vacuum (inches of water)	Induced Vacuum@ 1Hr (inches of water)	Induced Vacuum@ 2 Hrs (inches of water)
SVE-1	NA	50		
MP-1	10	NA	0.18	0.20
MP-2	20	NA	<0.01	<0.01
MP-3	13	NA	0.06	0.06
MP-4	17	NA	0.01	0.02
MP-5	25	NA	<0.01	<0.01

At approximately 11:45 a.m., air sparging was initiated to point AS-1. Compressed air was introduced to AS-1 at a rate of approximately 2 cfm under a pressure of 7 pounds per square inch (psi). Within five minutes noticeable bubbling was observed from monitoring point MP-3. The air pressure and flow were subsequently reduced to approximately 1 cfm @5 psi (approximately 140 inches of water) to decrease the bubbling from MP-3. The reduction in flow

and pressure did reduce, but not eliminate, the vigorous bubbling observed at MP-3. Table 4 below summarizes air sparging monitoring data.

Air Sparging Response
Induced Pressure
Headspace Readings

Point	Distance From AS-1 (feet)	Applied Pressure (inches of water) Note:1 psi = 28 inches of water	Induced Pressure@ 0.5Hr (inches of water)	Increase in PID Response over Baseline (ppmv)
AS-1	NA	140	NA	NA
MP-1	15	NA	0.25	14
MP-2	20	NA	0	11
MP-3	10	NA	>20	369
MP-4	20	NA	0.5	63
MP-5	30	NA	0.12	28

Based upon the noticeable impact of air sparging in both observed and measured response, and due to a noticeable increased odor within the work area, the sparging operation was suspended after approximately one hour. The SVE system was allowed to run for an additional hour after sparging was halted. Headspace readings within the monitoring points were periodically checked until levels returned to pre-test conditions.

2.4.4 Flow Rates and Estimated Radius of Influence

Based upon the data derived in the pilot study, an estimated radius of influence for SVE was estimated at 15-20 feet. Unfortunately, the shallow water table within Area "A" limits the ability to apply relatively higher vacuum that might increase the effective radius of influence. For air sparging, the field observations and measurements indicate that the subsurface materials are amenable to air sparging. An estimated radius of influence of 15-20 feet is attainable at moderate pressure and flow.

3.0 DESCRIPTION OF REMEDIAL ACTION

Based on the results of the pilot test, AS/SVE was deemed a viable remediation option for the site. Since the pilot test was deemed successful at Area A, a full scale AS/SVE system will be applied to remediate soils in both Area A and Area I as described in the following sections.

IT SHOULD BE TO REMOVE AS MUCH CONTAMINANT MASS AS NECESSARY TO ENSURE THAT THE RESIDUAL CONT IS PROTECTIVE OF THE

3.1 Remedial Action Objectives

The primary remedial action objective (RAO) of the AS/SVE remedial system will be to remove as much contaminant mass as possible in Areas A and I. As described in more detail in Section 3.6, the system will be operated until persistent asymptotic levels are observed in mass removal rates. As demonstrated during the pilot study, it is anticipated that the AS/SVE system will be very effective at removing the Volatile BTEX Compounds and moderately effective at removing the less Volatile Chlorinated Benzene compounds.

In accordance with the Draft DER-10 guidance document, additional RAO's for soil and groundwater include the following:

Ground Water

RAO's for Public Health Protection:

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAO's for Environmental Protection:

- Restore groundwater aquifer to pre-disposal/pre-release conditions to the extent practicable.
- Prevent the discharge of contaminants to surface water.
- Remove the source of ground or surface water contamination.

Soil

RAO's for Public Health Protection:

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAO's for Environmental Protection

- Prevent migration of contaminants that would result in ground water or surface water contamination.

- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

The selected remedy will achieve all of the above RAO's.

3.2 System Design

3.2.1 Area A Design

Several design considerations must be addressed in Area A. First, ground water is present at relatively shallow depths in Area A. This introduces two separate design issues, namely the issue of "pulling water" from the subsurface in an attempt to extract soil gas; and access to contaminated soils within the saturated zone. To address these concerns the vapor extraction wells in this area of the site will be installed horizontally and at relatively shallow depth. In doing so, the effect of drawing water up the conventional vertical well (as through a straw) is minimized. This approach will also effectively permit venting of the more permeable materials beneath the concrete floor. With regard to soils beneath the water table, SVE will not effectively treat this material without effective dewatering. For treatment of the saturated zone, air sparging will be conducted to volatilize contaminants to the unsaturated zone. Air Sparging also has the added effect of increasing dissolved oxygen levels within the subsurface to aid in the effective bioremediation of soil and ground water. Vapors released by air sparging will be captured by the SVE system.

An area plan illustrating the proposed layout of the air sparging and vapor extraction points and piping is provided as Figure 6. The precise location of the removal and injection lines and points will be field determined to minimize impact to ongoing facility operations and to account for any currently unknown subsurface anomalies. Typical construction details for the air sparging, soil venting wells and trenches are illustrated on Figure 7.

Four (4) horizontal slotted 2 inch PVC SVE extraction lines will be installed within four trenches oriented in a north-south direction. Each trench will be approximately 2 feet deep and one foot wide and will be backfilled with No. 2 morie sand and compacted native soils. The concrete floor surface will be restored above each trench. Fifteen (15) vertical air sparging wells will be installed in parallel with the four SVE lines.

The vertical AS wells will be installed using a combination of direct-push and hollow stem auger drilling equipment. Prior to the placement of an AS well at any given location, a preliminary soil boring will be performed to log lithology and to obtain "baseline" soil samples.

Upon verifying site lithology, the appropriate AS well will be installed. The AS wells will be installed to a depth of approximately 18-20 feet (corresponding with the top of the previously identified meadow mat layer). It is anticipated that each AS well will consist of approximately 15-17 feet of solid 2-inch PVC casing and 2.5 feet of perforated 2-inch PVC well screen. The air sparging well annulus will be sealed from 1 foot above the screened/sand interval up to grade level using a Portland cement/bentonite grout and completed at grade level with a traffic rated manhole. The design AS well Radius of Influence (ROI) is 15 feet as determined during the pilot study.

3.2.2 Area I Design

Data gathered from the Area A Pilot test has been utilized to extrapolate a remediation design for Area I based upon the relatively lower contaminant concentrations in Area I compared to Area A.

Based upon the soil borings completed in this AOC, ground water generally occurs at 10 to 12 feet below ground surface. Soil borings also indicate that the soils within this AOC are generally consistent with those observed in Area A, consisting of fine to medium grained sediment as well as historic fill materials including, brick, cinders and similar materials underlain at a depth of 17-19 feet by a natural meadow mat stratum. Accordingly, it is assumed that soil vapor extraction and air sparging would be similarly effective in this AOC as compared to Area A. Therefore, a combination AS/SVE injection and recovery network will be installed to mitigate remaining VOCs within this AOC. Because ground water occurs at greater depth in Area I, conventional vertical vapor extraction wells will be utilized. A projected radius of venting influence of 15-20 has been estimated for design purposes. Likewise, since remaining soil contamination was observed below the top of the ground water surface in several borings, air sparging will be utilized to liberate VOCs at depth and to provide an oxygen source for enhanced natural biological degradation. The proposed AS/SVE system layout is illustrated on Figure 8. As shown on Figure 8, a total of fourteen AS wells and seventeen SVE extraction wells will be installed in Area I. It should be noted that many of the AS/SVE points illustrated are within a manufacturing area and that the exact placement of the points will need to be field determined. Access limitations will impact the total number of points installed as well as their exact location. Furthermore, subsurface structures including building foundations, USTs and other unknown features may limit the placement of points.

The AS wells will be constructed similar to those in Area A and will be installed at the top of the peat layer. The SVE extraction wells will be constructed of slotted 2 inch PVC pipe and

will be installed to a depth of approximately 10 feet below grade or just above the depth of the water table. A design ROI for the SVE and AS wells is 15 feet.

3.2.3 Joint Treatment System

The proposed treatment facility will be centrally located to service both areas A and I. This location will be within area A as illustrated on Figure 6. Area A has adequate electrical power availability and is proximal to the facility's sanitary sewer collection which may be needed for discharge of treated ground water recovered by way of the vapor extraction system(s). Final details regarding placement of the system will be made in concert with facility personnel and in accordance with New York City building regulations.

A piping and instrumentation diagram for the recovery and treatment system is provided as Figure 9. Final details concerning the selection of an off-gas control mechanism, whether it is granular activated carbon, thermal or catalytic oxidation will not be made until the remediation points and piping are installed and can be sampled. The determination of the most appropriate off-gas control methodology will be dependent upon a measurement of maximum potential emissions and upon NYCDEP and NYSDEC permit considerations.

The general layout of the SVE unit will include a blower unit, a moisture separator and an off-gas control device. The SVE unit will be located in Area A. The SVE blower unit will create a vacuum which is applied to designated extraction locations. A zone of influence is created around the extraction locations in which air and volatile organic vapors are drawn away from the soils and into SVE piping network. The extracted soil vapor/air stream (air stream) is channeled through the piping network into the moisture separator unit. The pressure drop created within the moisture separator allows moisture within the air stream to precipitate out and collect in a reservoir within the separator. The precipitation collected within the moisture separator is discharged by pump into a separate holding container. Effluent within this container will be treated with granular carbon and discharged to the sanitary sewer. The resultant dry air stream is passed through the blower unit and through two (2) in-series carbon units. The carbon units filter out the volatile organic vapors and the treated air stream is discharged into the atmosphere. Permit requirements for these discharges are discussed in Section 8 of this document.

As illustrated in Figure 9, the SVE equipment will include the following:

1. 250 gallon knock-out tank with automatic shutdown in the event of condensate pump-out failure

2. Explosion proof 5 hp blower rated at 300 scfm

3. Explosion proof 3 hp centrifugal condensate pump rated at 5gpm

4. Off-gas control device (catalytic oxidation or granular activated carbon)

The SVE system will operate optimally with a vacuum level of 2 to 6 inches Hg at the withdrawal wells. These levels will vary through the treatment duration based on soil moisture levels and permeabilities. The system will be equipped with operational interlocks which shut down the process machinery if blower temperatures exceed specified limits or if excessive vacuum is produced.

The layout of the air sparging system will include an air compressor and associated valves and pressure meters. As illustrated in Figure 9, the AS compressor will be a rotary valve compressor at 50 scfm at a pressure of 20 psib. The manifold and piping will be constructed of Kynor tubing. A pressure relief valve will be installed immediately after the compressor to exhaust excess air from the manifold. A pressure regulating valve will be installed between the manifold and each well to prevent temporary high pressure in the screened internal from forcing air and water back into the manifold system after the system is shut off.

The system will also be connected to the interlock which will shut down the system in the event of excessive temperatures or pressures.

3.3 System Startup

The startup phase will begin with the startup of the SVE system. This phase will include approximately 7-10 days of manifold valving adjustments. These adjustments will be used to optimize contaminant mass removal by increasing vacuum pressure on the wells/horizontal lines producing the highest contaminant concentrations. During this period, flow measurements vacuum readings and vapor concentrations will be recorded daily from each extraction well line from the manifold and from the effluent.

After the SVE system is optimized, the air sparging system will be started. AS startup will continue for an additional 7-10 days of valuing adjustments. During this period, injection and extraction rates, pressures, depth-to-water and vapor concentrations will be monitored hourly at first and then daily. Other startup monitoring will include visual observation for water bubbling and indoor vapor concentrations.

Based on the pilot study results, initial AS air pressure and flow will be introduced at 1 scfm per well at 5 psi. The low flow rate is necessitated by the observation of bubbling water

and odors at higher flow rates during the pilot study. If any bubbling is observed in monitoring points or if any noticeable odors or VOC vapors are detected in the ambient air (see Section 3.4), the air pressure and flow will be reduced until the detection effects are eliminated.

3.4 AS/SVE System Performance Monitoring

Performance monitoring of the SVE system will be conducted to assure it is working properly, evaluate vapor recovery rate and determine when system shutdown post-remedial sampling should be performed. The following performance monitoring will be conducted on a monthly basis and reported on a quarterly basis to NYSDEC.

1. Air sparging and extraction flow rates.
2. Sparging pressure and vacuum readings from venting monitoring points and manifold.
3. Laboratory analysis of the extracted vapor stream for VO+10.
4. Vapor concentrations in venting monitoring points and effluent discharge as determined by field monitoring equipment.
5. Estimated mass removal rates.
6. Estimated cumulative VOC mass removed.
7. Scaled site plans with vacuum pressures and vapor concentrations from the venting monitoring points.
8. Changes in water table elevation.
9. Estimated zone of influence for SVE and AS wells.

QUARTERLY FOR A MIN OF 8 QUARTERS

In addition, groundwater samples will be collected on a ~~semi-annual~~ basis from ~~sample~~ ALL points PZ-4, MW-6 and GW-3 in Area A and MW-7 in Area I and analyzed for VO+10. MWs & PIEZOMETERS

WE MAY REDUCE MONITORING FREQUENCY OF SOME WELLS AS NECESSARY

3.5 Health and Safety

A site-specific Health and Safety Plan has been prepared for the AS/SVE system in accordance with Section 1.9 of the Draft DER-10. The Health and Safety Plan is included as Attachment 1 to this RAW.

3.6 Confirmation Endpoint Sampling and Site Restoration

The system monitoring data will be reviewed to determine the effectiveness of the AS/SVE system and determine when the system operation should cease. Information reviewed will include the system performance monitoring data, VOC removal rates over time and contaminant

distribution in vent gas over time. When asymptotic behavior is observed in the cumulative mass removal and effluent VOC concentrations, the following actions will be undertaken to increase mass removal:

- Adjusting flow and vacuum rates to wells with higher concentrations
- Pulse the system with periodic shutdowns

When asymptotic behavior persists for a period of three months following these actions, the system will be shut down. A proposal to shut the system down will be submitted to NYSDEC with the next regularly scheduled monthly progress report.

Upon determination that the SVE system operations should cease, soil and ground water samples will be collected to verify the effectiveness of the remediation. The soil samples will be collected from the following locations:

Area A

- A-104 (7-8')
- A-101 (7-8')
- A-105A (7-8')
- 1SB-1 (7-9')
- 1SB-3 (7-8')
- A-102A (7-8')

Area I

- A1SB-17A (5.5-6')
- A1SB-10A (7-7.5')
- I-1 (7.5-8')
- A1SB-1B (10.5-11')
- A1SB-14 (7.5-8')
- I-104 (7-8')

Groundwater samples will be collected from the following locations:

- PZ-4
- MW-6
- GW-3
- MW-7

3.7 Removal of Remedial Structures

Upon completion of the remedial action described in this RAW, all remedial structures and equipment will be dismantled, decontaminated and removed from the site. All AS/SVE injection and monitoring points will be properly abandoned.

4.0 COST ESTIMATE

The estimated cost for the remedial action is summarized as follows:

• **AS/SVE Remedial Action**	
- Design, install full scale system for Area A	$200,000
- Design, install full scale system for Area I	200,000
- Operation and maintenance of JOINT treatment system	140,000
- Post remediation soil sampling	50,000
- Post remedial action ground water monitoring–8 quarters for Areas A and I	60,000
Subtotal	**$650,000**
• **Reporting, Regulatory Compliance and Project Management**	
- Reporting, meetings and regulatory compliance	$80,000
- Project Management	25,000
- NYSDEC oversight fees	50,000
- Attorney's fees	25,000
Subtotal – Regulatory	**$180,000**
TOTAL COST	**$830,000**

5.0 SCHEDULE

The anticipated schedule to complete the proposed work in accordance with section 5.7 of the DRAFT DER-10 Guidance document is provided below.

	Task	Months from NYSDEC Approval of RAW for Task Completion
1.	Submit OM&M Manual	1
2.	Contractor Bidding/Review/Acceptance	2
3.	Obtain Permits	2
4.	Receive Approval of OM&M Manual	4
5.	System Construction	6
6.	System Startup Phase	7
7.	System Operation Phase	31
8.	System Shutdown and Confirmation Endpoint Sampling	32
9.	Removal of System	34
10.	Ground Water Monitoring Reports	Semi-annually throughout the remedial action
11.	Progress Reports	Monthly throughout the remedial action

- Schedule will be updated upon NYSDEC approval of the RAW and again after approval of

the OM&M manual. Assumes 3 months NYSDEC review time.

6.0 INSTITUTIONAL CONTROLS

No institutional controls for soils or ground water are planned at this time. The need for institutional controls will be re-evaluated upon completion of the remedial action described herein.

7.0 OPERATIONS AND MAINTENANCE PLAN

An Operations and Maintenance Plan (O&M Plan) will be submitted to NYSDEC upon approval of this RAW. The O&M Plan will be developed in accordance with Section 6 of the DRAFT DER-10 Guidance document.

8.0 PERMITS

8.1 Air Permits

In accordance with Section 7.3 and Appendix 7B of the Draft DER-10 guidance document, the site remedial activities are exempted from the requirements to obtain an Air Discharge Permit for the site activities issued by the NYDEC, which otherwise would require a permit.

The activities conducted at the site will satisfy all substantive technical requirements applicable to the specified permits.

8.2 Water Discharge Permits

It is likely that despite efforts to minimize entrainment of water by the SVE system, that some quantity of ground water and/or condensation will occur during operation of the AS/SVE system. The facility is in possession of a permit authorizing the discharge of process water to the sanitary sewer system. This permit authorizes a maximum contaminant load based upon measured concentrations of certain contaminants and upon a flow rate of 2,000 gallons per day. The discharge is mass limited. Accordingly, it may be necessary to amend the existing permit to

allow for added flow from the AS/SVE system. To insure minimum additional impact from the AS/SVE water discharge, nominal carbon treatment of entrained water treatment is proposed.

8.3 Construction Permits

The installation of the system will require installation of numerous wells, subsurface piping and above grade treatment system components. Local permits including plumbing, electrical and fire will likely be required for these tasks. These permits requirements have not yet been fully evaluated.

TABLES

TABLE 1A

Dexter Chemical, L.L.C.
Historic Summary of Volatile Organic Results for Soil
AEC-A

Sample ID Lab Sample Number Sampling Date Sample Depth (feet) Units	1994 NYSDEC Rec. Soil Cleanup Objective ug/kg	ISB-1 32211 11/18/97 7-9' ug/kg	ISB-2 32213 11/18/97 7-8' ug/kg	ISB-3 33215 11/18/97 7-8' ug/kg	A-1 48923 03/10/98 4-6 ug/kg	A-1 48925 03/10/98 20-21 ug/kg	MW-6 49339 3/12/98 7-8 ug/kg	A-100 218846 07/21/00 4-5 ug/kg	A-101 218847 07/21/00 7-8 ug/kg	A102A 218856 07/21/00 7-8 ug/kg	A-102B 218857 07/21/00 14-15 ug/kg	A-102D 218859 07/21/00 19-20 ug/kg	A-103A 218860 07/21/00 6-7 ug/kg	A-104A 218848 07/21/00 7-8 ug/kg	A-104B 218849 07/21/00 14-15 ug/kg	A-104C 218850 07/21/00 19-29 ug/kg	A-105A 218851 07/21/00 7-8 ug/kg	A-105B 218852 07/21/00 14-15 ug/kg	A-105C 218853 07/21/00 19-20 ug/kg
VOLATILE COMPOUNDS																			
Chloromethane	1900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	36	ND	ND	ND	ND	ND	ND	12
Bromomethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7 J	ND	ND	ND	ND
Methylene Chloride	6000	ND	ND	ND	ND	1.1	ND	1.3 J	ND	ND	ND	6.7 J	ND	ND	ND	ND	ND	ND	4.1
Trichlorofluoromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	400	ND	ND	ND	ND	ND	ND	0.7 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	70 J	ND
1,1,1-Trichloroethane	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NS	ND	ND	ND	ND	ND	ND	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	700	ND	ND	ND	ND	ND	ND	0.8 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	ND	ND	ND	**430**	ND	ND	ND	ND	ND	ND	4.7	ND	ND	0.8 J	ND	ND	ND	ND
trans-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1400	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1500	ND	ND	ND	360	3	ND	1.0 J	**28,000**	ND	ND	89	230 J	ND	1.7 J	1,200 J	**15,000 J**	260 J	100
Chlorobenzene	1700	ND	ND	**260,000**	**7,200 ***	ND	ND	ND	ND	ND	390 J	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5500	3,100	ND	**19,000**	3,200	1	ND	ND	**49,000**	**5,900 J**	100 J	5.9 J	2,600	5,000 J	1.6 J	ND	**58,000**	400 J	8.6
Xylene (Total)	1200	**26,000**	ND	**79,000**	**25,000 ***	2	ND	0.7 J	**450,000**	**29,000**	**2,700**	22	**12,000**	**17,000**	12	ND	**410,000**	**3,000**	32
Total Confident Conc.		29,100	0	358,000	36,190	8	0	8.3	527000	34900	3190	164.3	14830	22000	17.8	1200	483000	3730	156.7
Total Estimated Conc. VOA TICs		1,809,000	1,218,000	3,030,000	1,710,000	42	46,800	6.6	7,920,000	2,240,000	252,000	1,114	382,300	3,670,000	249	0	6,340,000	21,020	1,134

- Exceeds NYSDEC Soil Cleanup Criteria
NS - No Standard for Individual Contaminant
ND - None Detected
TI - Tentatively Identified Compounds
J - The result is less than detection limit, but greater than zero

TABLE 1B

Dexter Chemical, L.L.C.
Historic Summary of Base Neutral Organic Results for Soil
AEC-A

Sample ID	1994 NYSDEC	ISB-1	ISB-2	ISB-3	A-1	MW-6	A-100	A-101	A-102A	A-102B	A-102D	A-103A	A-104A	A-104B	A104-C	A-105A	A-105B	A-105C
Lab Sample Number	Rec. Soil	32211	32212	33214	48923	49339	218846	218847	218856	218857	218859	218860	218848	218849	218850	218851	218852	218853
Sampling Date	Cleanup	11/18/97	11/18/97	11/18/97	03/10/98	3/12/98	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00	07/21/00
Sampling Depth (feet)	Objective	7-9'	1-1.5'	3-4'	20-21	7-8	4-5	7-8	7-8	14-15	19-20	6-7	7-8	14-15	19-20	7-8	14-15	19-20
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
BASE NEUTRALS																		
N-Nitrosodimethylamine	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Chloroethyl) ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	1,600	ND	30J	1300J	ND	ND	ND	ND	ND	**2,300 J**	ND	ND	**2,200 J**	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8,500	1200J	43J	2800J	ND	ND	ND	ND	3,000 J	**11,000 J**	ND	180 J	**7,500 J**	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	7,900	4600	290J	4500	ND	ND	ND	3,500 J	5,700 J	2,100 J	ND	650 J	**14,000 J**	ND	ND	ND	ND	ND
bis(2-chloroisopropyl) ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-Nitroso-di-n-propylamine	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nitrobenzene	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isophorone	4,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Chloroethoxy)methane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	3,400	**18000**	3300	**6100**	ND	ND	ND	ND	3,000 J	960	ND	ND	**110,000**	ND	ND	ND	ND	ND
Naphthalene	13,000	**28000**	320	520	ND	31	ND	**160,000**	**43,000 J**	990 J	ND	1,100	**32,000 J**	290 J	ND	**37,000**	5,100	ND
Hexachlorobutadiene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,200	ND	ND	ND	ND	ND	ND
Hexachlorocyclopentadiene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloronaphthalene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dimethylphthalate	2,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	41,000	ND	ND	ND	ND	14	ND	ND	ND	ND	ND	ND	ND	340 J	ND	ND	ND	ND
2,6-Dinitrotoluene	1,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	50,000	400	ND	ND	ND	8.5	ND	ND	ND	87 J	ND	ND	ND	590 J	ND	ND	ND	ND
2,4-Dinitrotoluene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	7,100	1800J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorophenyl-phenylether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluorene	50,000	400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,500	ND	ND	ND	ND
N-Nitrosodiphenylamine	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Bromophenyl-phenylether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobenzene	410	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Phenanthrene	50,000	1500	28J	ND	18	37	ND	ND	ND	ND	ND	370 J	ND	8,000	ND	ND	ND	ND
Anthracene	50,000	89J	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	2,600	ND	ND	ND	ND
Di-n-butylphthalate	8,100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	50,000	390	51	110J	ND	100	78 J	ND	ND	ND	ND	170 J	ND	10,000	ND	ND	ND	ND
Pyrene	50,000	360	45	130J	13	92	69 J	ND	ND	ND	ND	150 J	ND	10,000	ND	ND	98 J	ND
Benzidine	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Butylbenzylphthalate	50,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3,3'-Dichlorobenzidine	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(a)anthracene	224	210	40	ND	14	48	42	ND	ND	ND	ND	ND	ND	**5,000**	ND	ND	ND	ND
Chrysene	400	110J	31J	ND	ND	70	47 J	ND	ND	ND	ND	ND	ND	**5,800**	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	50,000	1200J	530	ND	ND	82	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Di-n-octylphthalate	50,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	1,100	ND	40J	ND	ND	70	60	ND	ND	ND	ND	ND	ND	**6,100**	ND	ND	ND	ND
Benzo(k)fluoranthene	1,100	ND	18J	ND	ND	25	23 J	ND	ND	ND	ND	ND	ND	**2,500**	ND	ND	ND	ND
Benzo(a)pyrene	61	ND	ND	ND	ND	50	ND	ND	ND	ND	ND	ND	ND	**5,000**	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	3200	ND	ND	ND	ND	33	ND	ND	ND	ND	ND	ND	ND	2,100	ND	ND	ND	ND
Dibenz(a,h)anthracene	14	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**710**	ND	ND	ND	ND
Benzo(g,h,i)perylene	50,000	ND	ND	ND	ND	37	ND	ND	ND	ND	ND	ND	ND	1,800	ND	ND	ND	ND
Total Confident Conc. BN (s)		53860	4286	11120	45	708.5	319	163500	54700	17437	0	6820	165700	62330	0	37000	5198	0
Total Estimated Conc. BN TICs (s)		2130000	354500	10900	29140	18830	1,300	8,380,000	6,180,000	367,000	502,000	205,100	7,620,000	73,300	461,000	2,990,000	175,000	554,000

- Exceeds NYSDEC Soil Cleanup Criteria
ND - None Detected
NS - No Standard for Individual Contaminant
TI - Tentatively Identified Compounds
J - The result is less than detection limit, but greater than zero

THE WHITMAN COMPANIES, INC.

TABLE 2

Dexter Chemical, L.L.C.
Historic Summary of Volatile Organic Results for Soil - AEC-I

Sample ID Lab Sample Number Sampling Depth (feet) Sample Date Units	1994 NYSDEC Recommended Soil Cleanup Objective ug/kg	AISB-14A 06044-001 7.5 - 8 06/28/04 ug/kg	AISB-14B 06044-002 10.5 - 11 06/28/04 ug/kg	AISB-14C 06044-003 12.5 - 13 06/28/04 ug/kg	AISB-15 06044-004 2.5 - 3 06/28/04 ug/kg	AISB-16 06044-005 3.5 - 4 06/28/04 ug/kg	AISB-17A 06044-006 5.5 - 6 06/28/04 ug/kg	AISB-17B 06044-007 8.5 - 9 06/28/04 ug/kg	AISB-17C 06044-008 14.5 - 15 06/28/04 ug/kg	AISB-18A 06044-009 6.5 - 7 06/28/04 ug/kg	AISB-18B 06044-010 11.5 - 12 06/28/04 ug/kg	AISB-18C 06044-011 14.5 - 15 06/28/04 ug/kg	AISB-19 06044-012 3.5 - 4 06/28/04 ug/kg
VOLATILE COMPOUNDS													
Chloromethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	6,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NS	ND	ND	ND	ND	16	ND	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane(EDC)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.89 J	ND	ND
trans-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1,700	ND	21	ND	ND	ND	ND	ND	ND	ND	174	ND	7.72
Ethylbenzene	5,500	1,300	8.53	ND	3.02 J	ND	4,590	ND	ND	ND	71	ND	2.22 J
Total Xylenes	1,200	**12,200**	485	ND	3.97 J	1.57 J	**22,600**	166	ND	ND	543	ND	5.31 J
Bromoform	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	1,600	391 J	11	ND	ND	1.39 J	**2,020**	89	ND	48 J	74	ND	7.77
1,4-Dichlorobenzene	8,500	1,670	64	ND	ND	3.95 J	5,810	439	ND	213	237	ND	31
1,2-Dichlorobenzene	7,900	927	5.18 J	ND	ND	ND	5,310	222	ND	151	13	ND	ND
1,2,4-Trichlorobenzene	3,400	**11,400**	ND	ND	ND	ND	**43,700**	73	ND	451	3.66 J	ND	ND
Naphthalene	13,000	4,000	89	ND	ND	ND	10,400	464	ND	386	75	ND	ND
Total Confident Conc.		31,900 J	683 J	ND	6.99 J	23 J	94,400	1,450	ND	1,250 J	1,190 J	ND	54 J
Total Estimated Conc. VOA TICs (s)		63,600	510	13,000	135	9.57	17,200	3,720	32	169	111	55	ND

- Detected above NYSDEC Soil Cleanup Criteria - TAGM Memo #4046
NS - No Standard for Individual Contaminant
ND - None Detected
~ - Not Analyzed
NA - Standard Not Available

TABLE 2

Dexter Chemical, L.L.C.
Historic Summary of Volatile Organic Results for Soil - AEC-I

Sample ID	1994 NYSDEC	AISB-1A	AISB-1B	AISB-1C	AISB-2A	AISB-2B	AISB-3A	AISB-3B	AISB-3C	AISB-4A	AISB-4B	AISB-4C	AISB-4D	AISB-5A	AISB-5B	AISB-5D	AISB-5E	AISB-6A	AISB-6B	AISB-7A	AISB-7B	AISB-8A	AISB-8B
Lab Sample Number	Recommended Soil	07190-001	07190-002	07190-003	07190-004	07190-005	07190-006	07190-007	07190-008	07190-009	07190-010	07190-011	09114-016	07190-012	07190-013	09114-017	09114-018	07190-014	07190-015	07190-016	07190-017	07190-018	07190-019
Sampling Depth (feet)	Cleanup	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	10/09/03	08/14/03	08/14/03	10/09/03	10/09/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03	08/14/03
Sample Date	Objective	7.5 - 8	10.5 - 11	14.5 - 15	8.5 - 9	14.5 - 15	7.5 - 8	9 - 9.5	13 - 13.5	7.5 - 8	10.5 - 11	13.5 - 14	15.5 - 16	7.5 - 8	11.5 - 12	13 - 13.5	14.5 - 15	7.5 - 8	11.5 - 12	7.5 - 8	11.5 - 12	9.5 - 10	12.5 - 13
Units	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
VOLATILE COMPOUNDS																							
Chloromethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	6,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane(EDC)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1,700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	5,500	ND	1,390	ND	ND	ND	7.12	559 J	514 J	ND	ND	231 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	1,200	ND	**10,500**	ND	ND	ND	36.6	**3,570**	**3,140**	ND	ND	**1,390**	ND	261 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	1,600	ND	323 J	183 J	1,570	ND	2.03	215 J	234 J	ND	ND	329 J	ND	ND	ND	ND	ND	ND	ND	ND	1.93 J	23 J	ND
1,4-Dichlorobenzene	8,500	ND	1,770	430 J	3,590	ND	12.1	1,560	1,330	1,040	ND	1,000	ND	ND	ND	ND	ND	3.72 J	155	344 J	15	153	726
1,2-Dichlorobenzene	7,900	ND	2,110	ND	ND	ND	6.65	329 J	269 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	125 J	ND	ND	94	213 J
1,2,4-Trichlorobenzene	3,400	ND	**23,400**	1,280	2,580	ND	ND	1,720	2,500	1,350	ND	3,110	ND	ND	ND	ND	ND	14	2,250	1,840	ND	1,790	3,360
Naphthalene	13,000	223 J	5,390	1,560	ND	ND	7.85	413 J	536 J	ND	ND	924	ND	ND	ND	ND	ND	4.82 J	2,070	ND	12	171	ND
Total Confident Conc.		223 J	44,900 J	3,450 J	7,740	ND	72.4	8,370 J	8,520 J	2,390	ND	6,980 J	ND	261 J	ND	ND	ND	23 J	4,600 J	2,180 J	29 J	2,230 J	4,300 J
Total Estimated Conc. VOA TICs (s)		4,250	56,400	6,810	26,400	13,100	210	11,300	11,200	9,420	1,780	43,300	18	1,240	ND	ND	ND	ND	9,060	5,620	10	1,500	22,000

- Detected above NYSDEC Soil Cleanup Criteria - TAGM Memo #4046
NS - No Standard for Individual Contaminant
ND - None Detected
~ - Not Analyzed
NA - Standard Not Available

TABLE 2

Dexter Chemical, L.L.C.
Historic Summary of Volatile Organic Results for Soil - AEC-I

Sample ID Lab Sample Number Sampling Depth (feet) Sample Date Units	1994 NYSDEC Recommended Soil Cleanup Objective ug/kg	AISB-9A 09114-001 10/09/03 7 - 7.5 ug/kg	AISB-9B 09114-002 10/09/03 9.5 - 10 ug/kg	AISB-9C 09114-003 10/09/03 14.5 - 15 ug/kg	AISB-10A 09114-004 10/09/03 7 - 7.5 ug/kg	AISB-10B 09114-005 10/09/03 10.5 - 11 ug/kg	AISB-10C 09114-006 10/09/03 14.5 - 15 ug/kg	AISB-11A 09114-007 10/09/03 7.5 - 8 ug/kg	AISB-11B 09114-008 10/09/03 10.5 - 11 ug/kg	AISB-11C 09114-009 10/09/03 14.5 - 15 ug/kg	AISB-12A 09114-010 10/09/03 7.5 - 8 ug/kg	AISB-12B 09114-011 10/09/03 10.5 - 11 ug/kg	AISB-12C 09114-012 10/09/03 14.5 - 15 ug/kg	AISB-13A 09114-013 10/09/03 7.5 - 8 ug/kg	AISB-13B 09114-014 10/09/03 10.5 - 11 ug/kg	AISB-13C 09114-015 10/09/03 14.5 - 15 ug/kg
VOLATILE COMPOUNDS																
Chloromethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	1,900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrolein	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	6,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NS	ND	ND	ND	ND	ND	30	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	800	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane(EDC)	100	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethylvinyl Ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	1,500	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	1,400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	1,700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.9	ND
Ethylbenzene	5,500	173	48	ND	588 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	1,200	**1,370**	460	41	**5,170**	**2,930**	42	ND	ND	ND	ND	ND	ND	ND	ND	2.2 J
Bromoform	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	1,600	75	220	14 J	454 J	ND	9 J	ND	ND	ND	ND	ND	ND	ND	3.2 J	ND
1,4-Dichlorobenzene	8,500	287	366	20 J	1,300	1,220	52	ND	ND	ND	ND	ND	ND	ND	2.6 J	ND
1,2-Dichlorobenzene	7,900	363	277	ND	2,610	2,310	139	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	3,400	2,080	707	22 J	**21,900**	**32,200**	1,140	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	13,000	1,860	880	738	**14,200**	5,710	627	ND	3.6 J	ND	ND	ND	ND	ND	ND	ND
Total Confident Conc.		6,210	2,960	834 J	46,200 J	44,400	2,040 J	ND	3.6 J	ND	ND	ND	ND	ND	16 J	2.2 J
Total Estimated Conc. VOA TICs (s)		12,800	3,970	5,190	181,000	79,900	3,430	ND	36	ND	ND	114	ND	ND	319	135

- Detected above NYSDEC Soil Cleanup Criteria - TAGM Memo #4046

NS - No Standard for Individual Contaminant

ND - None Detected

~ - Not Analyzed

NA - Standard Not Available

G:/projects/970910Dexter/AEC-1/Hist Delin Voa/VOA-Soil2

THE WHITMAN COMPANIES, INC.

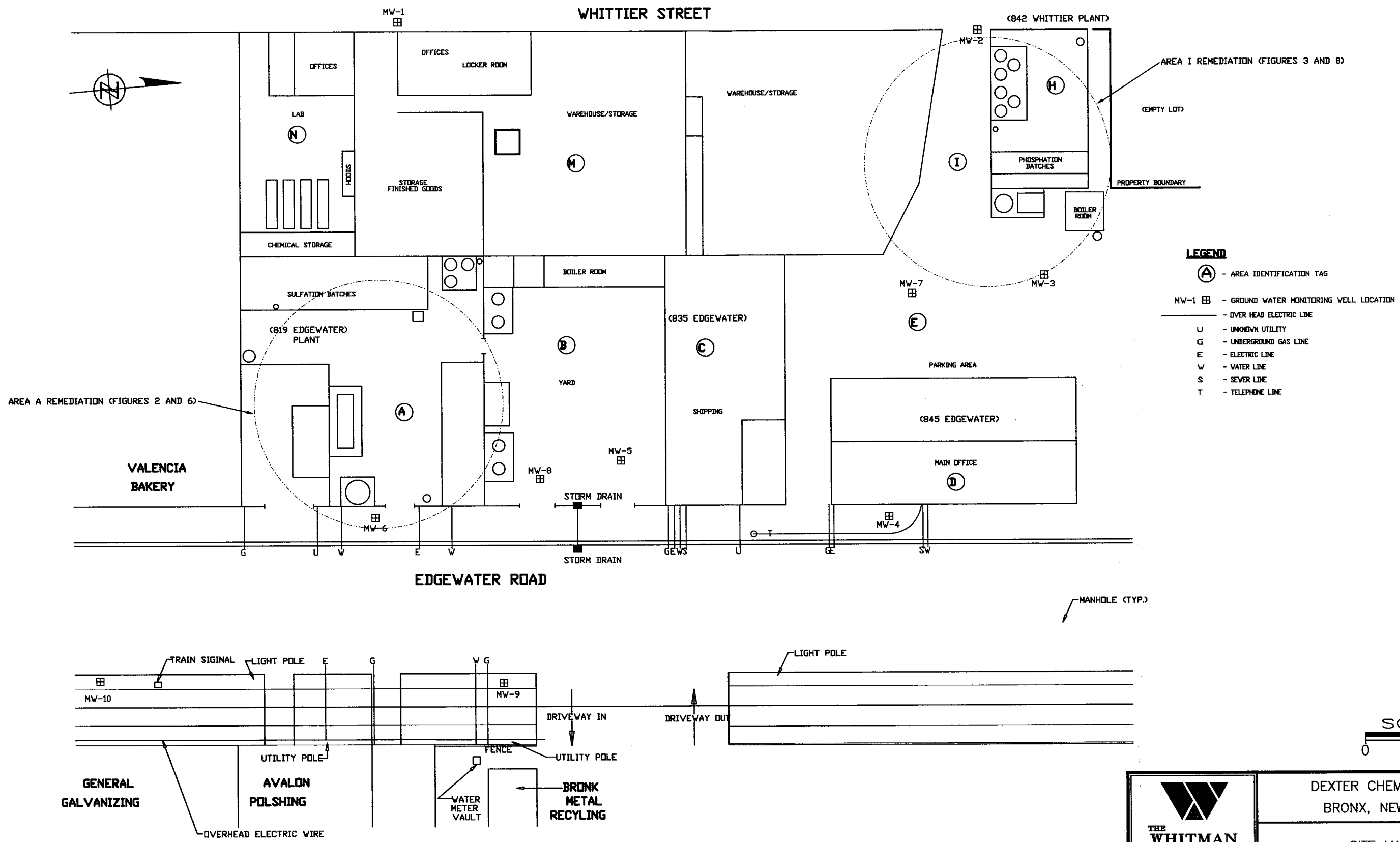
TABLE 3

Dexter Chemical, L.L.C.
Summary of Volatile Organic Compound Results For Ground Water

Sample ID Lab Sample Number Sampling Date Units	1998 NYSDEC Ground Water Standards/Criteria ug/l	MW-1 231797 09/27/00 ug/L	MW-2 281798 09/27/00 ug/L	MW-3 231799 09/27/00 ug/L	MW-4 231800 09/27/00 ug/L	MW-5 231801 09/27/00 ug/L	MW-6 328632 1/22/02 ug/l	MW-7 231803 09/27/00 ug/L	MW-8 231804 09/27/00 ug/L	MW-9 9551-001 12/3/02 ug/l	MW-10 9551-002 12/3/02 ug/l	PZ-1 328628 1/22/02 ug/l	PZ-2 328629 1/22/02 ug/l	PZ-3 328630 1/22/02 ug/l	PZ-4 9551-004 12/3/02 ug/l	GW-1 322116 12/14/01 ug/l	GW-2 322117 12/14/01 ug/l	GW-3 322118 12/14/01 ug/l
VOLATILE COMPOUNDS																		
Chloromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl Chloride	2	ND	ND	ND	ND	ND	1.5	ND	ND	ND	ND	ND	ND	ND	1.05	ND	ND	**2.6**
Chloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5*	ND	2.1	0.6	ND	ND	**26**	3.5	ND	ND	0.252	ND	ND	ND	**38.9**	ND	ND	2.7
Chloroform	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	0.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND	ND	ND	**95**	ND	ND	ND	ND	ND	ND	ND	**290**	ND	ND	**7.6**
cis-1,3-Dichloropropene	0.4 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	5*	ND	ND	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND	3.8	ND	ND	1.1
Dibromochloromethane	50**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	1	ND	0.4	0.3	ND	ND	**27**	**1.7**	0.6	ND	ND	ND	ND	ND	**9.75**	ND	ND	**8.8**
trans-1,3-Dichloropropene	0.4 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chloroethyl Vinyl Ether	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	5*	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	1.98	ND	ND	ND
1,1,2,2-Tetrachloroethene	5*	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	5*	ND	ND	0.4	ND	ND	**73**	0.5	ND	ND	0.313	ND	ND	ND	**58.6**	ND	ND	**9.4**
Chlorobenzene	5*	ND	3.3	0.4	ND	ND	ND	**35**	ND	ND	1.47	ND	ND	ND	ND	ND	ND	2.8
Ethylbenzene	5*	ND	ND	1.6	ND	ND	**88**	0.8	ND	ND	0.329	ND	ND	ND	**195**	ND	ND	**24**
Xylene (Total)	5*	ND	0.8	**16**	ND	ND	**470**	**15**	1.4	ND	3.17	ND	ND	1.3	**1280**	ND	ND	**80**
1,3-Dichlorobenzene	3	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8
1,4-Dichlorobenzene	3	ND	ND	1.4	ND	ND	**4.6**	2.9	ND	ND	ND	ND	ND	ND	0.693	ND	ND	**9.4**
1,2-Dichlorobenzene	3	ND	ND	ND	ND	ND	**9.1**	ND	ND	ND	0.34	ND	ND	ND	**4.13**	ND	ND	**4.6**
1,2,4-Trichlorobenzene	5	ND	ND	3.0	ND	ND	**11**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**8.7**
Naphthalene	10**	ND	ND	ND	ND	ND	**41**	1.1	ND	ND	ND	0.3	ND	0.3	**44.6**	0.3	1.6	3.4
Total Confident Conc. VOAs (s)		0	6.6	19.3	0	0	783.7	56.5	2.0	0	5.874	0	0	1.3	1928.503	0	0	139
Total Estimated Conc. VOA TICs (s)		0	26	90	12	21	1013	128	36	5	506.6	12	16	526	2764	0	172	212

- Results above 1998 NYSDEC Ground Water Standards/Criteria - GA Water Class
ND - None Detected
NS - No Standard

FIGURES



THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

SITE MAP

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G1
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	1

THE DELINEATION WAS NOT DONE TO CLEAN BECAUSE OF SPACE LIMITATIONS — ACTUAL AREA OF CONTAMINATION COULD BE LARGER

ESTIMATED EXTENT OF SOIL CONTAMINATION

ISB-2 (7-8')	
VO-B	B
BN-	B
ARSENIC-	B
BERYLLIUM-	0.52
CADMIUM-	B
CHROMIUM-	19.0
COPPER-	B
MERCURY-	B
NICKEL-	17.2
ZINC-	49.3

A-104 (7-8')	
XYLENE-	17,000
1,3-DICHLOROBENZENE-	2,200
1,2-DICHLOROBENZENE-	14,000
1,4-DICHLOROBENZENE-	7,500
NAPHTHALENE-	32,000
1,2,4-TRICHLOROBENZENE-	110,000
MERCURY-	290
A-104B (14-15')	
BENZO(a)ANTHRACENE-	5,000
CHRYSENE-	5,800
BENZO(b)FLUORANTHENE-	6,100
BENZO(k)FLUORANTHENE-	2,500
BENZO(a)PYRENE-	5,000
DIBENZ(a,h)ANTHRACENE-	710
VO-	B
MERCURY-	160
A-104C (19-20')	
VO-	B
BN-	B
MERCURY-	B

ISB-3 (7-8')	
CHLOROBENZENE	260,000
ETHYLBENZENE-	19,000
XYLENE-	79,000
1,2,4-TRICHLOROBENZENE-	6,100
ARSENIC-	B
BERYLLIUM-	0.47
CADMIUM-	B
CHROMIUM-	16.1
COPPER-	26
MERCURY-	0.19
NICKEL-	14.2
ZINC-	72.9

A-100 (4-5')	
VO-	B
BN-	B
MERCURY-	B

A-101 (7-8')	28,000
TOLUENE-	49,000
ETHYLBENZENE-	
XYLENE-	450,000
MERCURY-	1,100

A-102A (7-8')	
ETHYLBENZENE-	5,900
XYLENE-	29,000
NAPHTHALENE-	43,000
MERCURY-	B
A-102B (14-15')	
XYLENE-	2,700
1,3-DICHLOROBENZENE-	2,300
1,4-DICHLOROBENZENE-	11,000
MERCURY-	160
A-102C-NA	
A-102D (19-20')	
VO-	B
BN-	B
MERCURY-	B

A-105A (7-8')	
TOLUENE-	15,000
ETHYLBENZENE-	58,000
XYLENE-	410,000
NAPHTHELENE-	37,000
MERCURY-	130
A-105B (14-15')	
XYLENE-	3,000
BN-	B
MERCURY-	200
A-105C (19-20')	
VO-	B
BN-	B
MERCURY-	B

A-103A (6-7')	
XYLENE-	12,000
BN-	B
MERCURY-	370

A-1 (4-6')	
CHLOROBENZENE-	7,200
XYLENE-	25,000
BENZENE-	430
A-1 (20-21')	
VO-	B
BN-	B
ARSENIC-	7.9
BERYLLIUM-	0.89
CADMIUM-	B
CHROMIUM-	36.4
COPPER-	B
MERCURY-	B
NICKEL-	26.4
ZINC-	76.4

MW-6 (7-8')	
VO-	B
BN-	B
ARSENIC-	B
BERYLLIUM-	0.46
CADMIUM-	B
CHROMIUM-	24.0
COPPER-	38.1
MERCURY-	B
NICKEL-	17.7
ZINC-	56.4

ISB-1 (7-9')	
XYLENE-	26,000
1,2,4-TRICHLOROBENZENE-	18,000
NAPHTHALENE-	28,000
ARSENIC-	B
BERYLLIUM-	0.23
CADMIUM-	0.44
CHROMIUM-	18.6
COPPER-	194
MERCURY-	0.64
NICKEL-	14.2
ZINC-	111

MIXING KETTLES

LYE TANK

SURFACE ACID

OFFICES

LEGEND

A-102	⊙	- SOIL BORING LOCATION (JULY 2000)
ISB-3	⊗	- SOIL BORING TAKEN ON 11/97
A-1	⊗	- SOIL BORING TAKEN ON 3/98
(7-8')		- DEPTH OF SAMPLE COLLECTION BELOW GRADE
VO		- VOLATILE ORGANIC COMPOUNDS
BN		- BASE NEUTRAL COMPOUNDS
B		- CONCENTRATIONS ARE BELOW TAGM
NA		- NOT ANALYZED

NOTE: 1) ALL RESULTS REPORTED IN MICROGRAMS PER KILOGRAM (ppb.)

2) ONLY COMPOUND CONCENTRATIONS EXCEEDING NYSDEC TAGM

SCALE 0 20'

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

AREA – A SOIL RESULTS AND ESTIMATED EXTENT OF SOIL CONTAMINATION EXCEEDING CLEANUP CRITERIA

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G2
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	2

LEGEND

- I – AREA IDENTIFICATION TAG
- B-3 – SOIL BORING LOCATION (MARCH 1998)
- SOIL BORING LOCATION (JULY 2000)
- AISB-5 – SOIL BORING LOCATION (AUGUST 2003, OCTOBER 2003 & JUNE 2004)
- MW-1 – GROUNDWATER MONITORING WELL LOCATION (JULY 2000)
- LIMITS OF SOIL EXCEEDING NYDEC SOIL CLEANUP OBJECTIVES.
- ESTIMATED LIMITS OF SOIL EXCEEDING NYDEC SOIL CLEANUP OBJECTIVES.
- A — A' – CROSS SECTION LINE

I-2(7.5-8')
VO- B
I-2(9.5-10')
VO- B

I-104 (7-8')
XYLENE- 6,800
1,2,4-TRICHLOROBENZENE- 18,000

AISB-2 (ALL DEPTHS)
VO- B

AISB-9A(7-7.5')
XYLENE- 1,370
AISB-9B(9.5-10')
VO- B
AISB-9C(14.5-15')
VO- B

AISB-1A(7.5-8')
VO- B
AISB-1B(10.5-11')
XYLENE- 10,500
1,2,4 TRICHLOROBENZENE - 23,400
AISB-1C(14.5-15')
VO- B

AISB-17A(5.5-6')
XYLENE- 22,600
1,2,4-TRICHLOROBENZENE- 43,700
1,3-DICHLOROBENZENE- 2,020
AISB-17B(8.5-9')
VO- B
AISB-17C(14.5-15')
VO- B

AISB-10A(7-7.5')
XYLENE- 5,170
1,2,4-TRICHLOROBENZENE- 21,900
NAPHTHALENE- 14,200
AISB-10B(10.5-11')
XYLENE- 2,930
1,2,4-TRICHLOROBENZENE- 32,200
AISB-10C(14.5-15')
VO- B

AISB-6 (ALL DEPTHS)
VO- B

AISB-8 (ALL DEPTHS)
VO- B

AISB-7 (ALL DEPTHS)
VO- B

I-103 (7-8')
1,2,4-TRICHLOROBENZENE-4,300

AISB-18 (ALL DEPTHS)
VO- B

I-1(3.5-4')
VO- B
I-1(7.5-8')
ETHYLBENZENE- 8,400
XYLENE- 45,000
1,3-DICHLOROBENZENE- 1,900
1,4-DICHLOROBENZENE- 14,000
1,2,4-TRICHLOROBENZENE- 110,000
NAPHTHALENE- 18,000

I-100 (7-8')
XYLENE- 5,000

I-102 (7-8')
VO-B

E-2(1.5-2')
VO- B
E-2(2.5-3')
VO- B

E-4 (3-3.5')
VO- B

AISB-14A(7.5-8')
XYLENE- 12,200
1,2,4-TRICHLOROBENZENE- 11,400
AISB-14B(10.5-11')
VO- B
AISB-14C(12.5-13')
VO- B

AISB-3A(7.5-8')
VO- B
AISB-3B(9-9.5')
XYLENE- 3,570
AISB-3C(13-13.5')
XYLENE- 3,140

AISB-13 (ALL DEPTHS)
VO- B

AISB-5 (ALL DEPTHS)
VO- B

AISB-11 (ALL DEPTHS)
VO- B

AISB-4A(7.5-8')
VO - B
AISB-4B(10.5-11')
VO - B
AISB-4C(13.5-14')
XYLENE - 1,390
AISB-4D(15.5-16')
XYLENE - B

AISB-12 (ALL DEPTHS)
VO- B

I-101 (5-6')
VO- B

MW-2, MW-3, A, A', C, C', D, D', I, AISB-1, AISB-2, AISB-3, AISB-4, AISB-4R, AISB-5, AISB-5R, AISB-6, AISB-7, AISB-8, AISB-9, AISB-10, AISB-11, AISB-12, AISB-13, AISB-14, AISB-15, AISB-16, AISB-17, AISB-18, AISB-19, DRUM STORAGE, BURIED CONCRETE DRIVE PATH, AST, AST, BOILER ROOM, UST - APPROXIMATE LOCATION AND SIZE, UST - APPROXIMATE LOCATION AND SIZE

B – CONCENTRATIONS ARE BELOW TAGM

VO – VOLATILE ORGANIC COMPOUNDS

(7-8') – DEPTH OF SAMPLE COLLECTION BELOW GROUND SURFACE

* ALL SOIL RESULTS REPORTED IN MICROGRAMS PER KILOGRAM (ppb.)

** ONLY COMPOUND CONCENTRATIONS EXCEEDING NYSDEC TAGM RECOMMEND SOIL CLEANUP OBJECTIVES ARE SHOWN

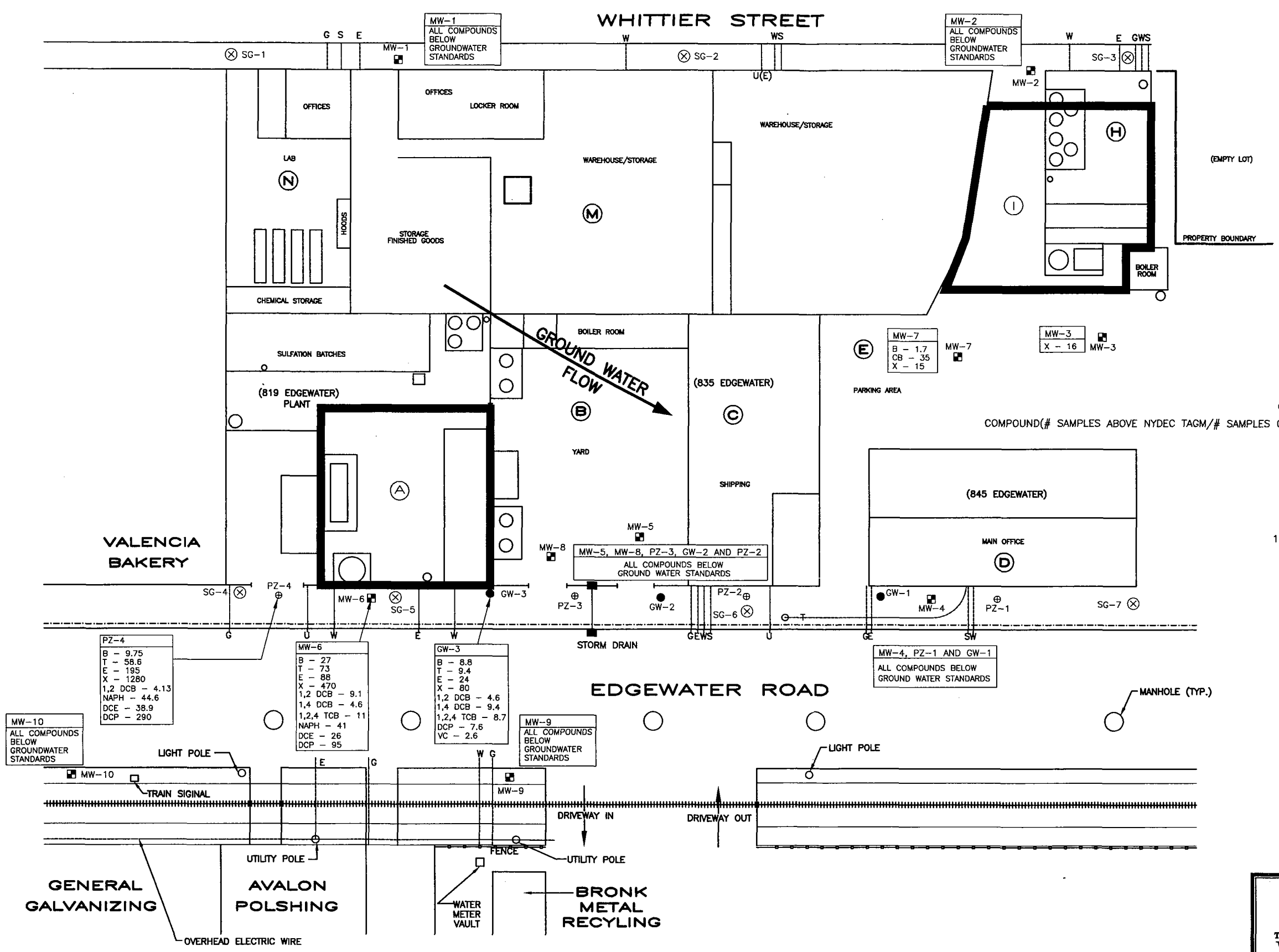
0 15 30
SCALE IN FEET

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

AREA I – SOIL RESULTS ESTIMATED EXTENT OF SOIL CONTAMINATION EXCEEDING CLEANUP CRITERIA

ORIG. BY: M.P.	DWG. BY: A.A.	CHK. BY: E.S.
DWG.#: 970910G4	DATE: MAY 2005	FIGURE: 3



LEGEND

- (A) – AREA IDENTIFICATION TAG
- MW-1 – GROUND WATER MONITORING WELL LOCATION
- PZ-2 – PIEZOMETER LOCATION – JANUARY 22, 2002
- GW-1 – SOIL BORING LOCATION – DECEMBER 14, 2001
- SG-1 – SOIL GAS SAMPLING LOCATION – JANUARY 18, 2005
- ——— – OVER HEAD ELECTRIC LINE
- U – UNKNOWN UTILITY
- G – UNDERGROUND GAS LINE
- E – ELECTRIC LINE
- W – WATER LINE
- S – SEWER LINE
- T – TELEPHONE LINE
- – AREA OF VOLATILE ORGANIC CONCENTRATIONS ABOVE NYDEC TAGM SOIL CLEANUP OBJECTIVES

CB(2/18) – 133,600

COMPOUND(# SAMPLES ABOVE NYDEC TAGM/# SAMPLES COLLECTED) – AVERAGE OF HIGHEST THREE SAMPLE RESULTS (ppb)

- B – BENZENE
- T – TOLUENE
- E – ETHYLBENZENE
- X – XYLENE
- 1,2 DCB – 1,2 DICHLOROBENZENE
- 1,3 DCB – 1,3 DICHLOROBENZENE
- 1,4 DCB – 1,4 DICHLOROBENZENE
- 1,2,4 TCB – 1,2,4 TRICHLOROBENZNENE
- NAPH – NAPHTHALENE
- CB – CHLOROBENZENE
- DCE – CIS 1,2 DICHLOROETHENE
- DCP – 1,2 DICHLOROPROPANE
- VC – VINYL CHLORIDE

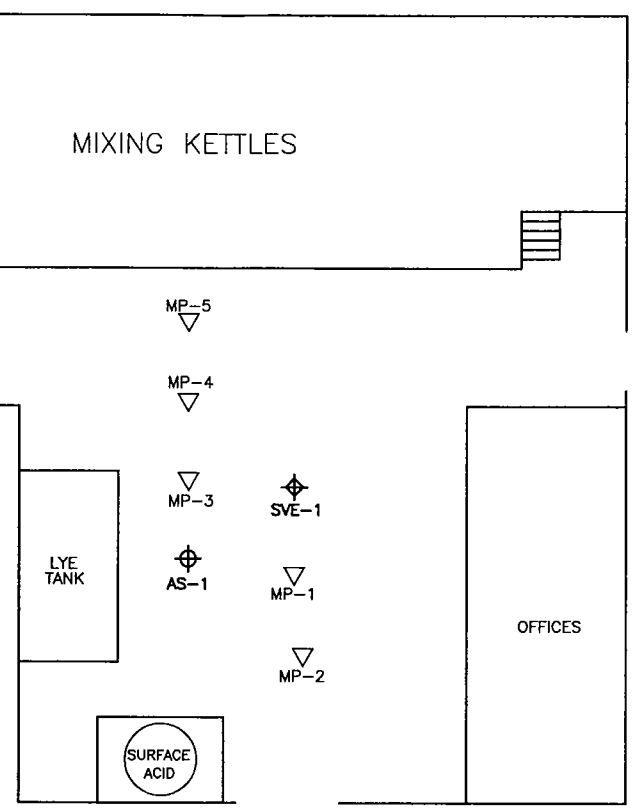
SCALE
0 40'

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

GROUND WATER SAMPLE RESULTS

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	R.R.	970910H1
CHECKED BY:	DATE:	FIGURE NO:
R.B.	MAY 2005	4



LEGEND

AS-1 ⊕ – AIR SPARGING POINT

SVE-1 ⊕ – SOIL VAPOR EXTRACTION POINT

MP-1 ▽ – MONITORING POINT

SCALE

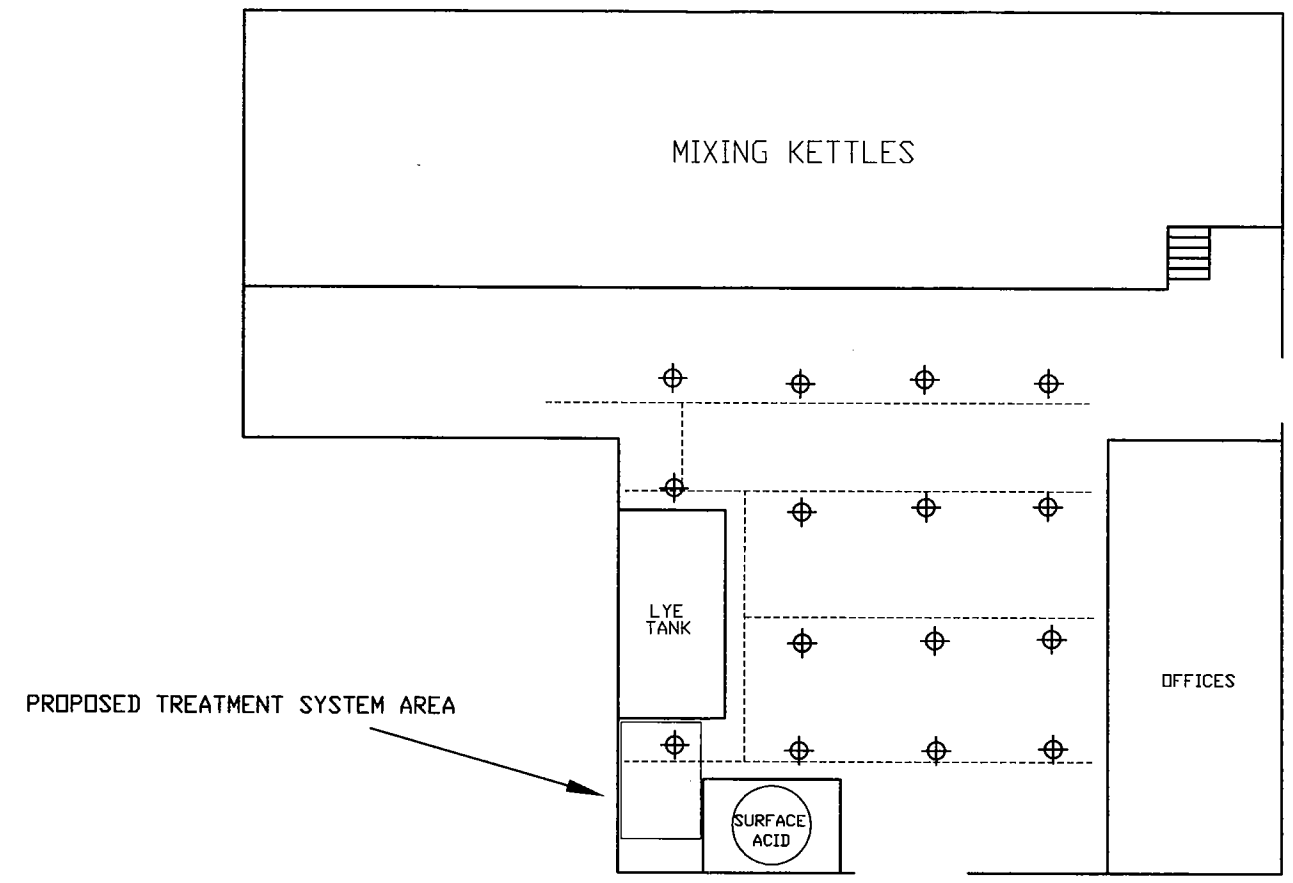
0 20'

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

PILOT STUDY
AS/SVE/MONITORING POINTS

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	R.R.	970910G3
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	5



SCALE
0 20'

LEGEND

⊕ PROPOSED AIR SPARGING WELL LOCATION

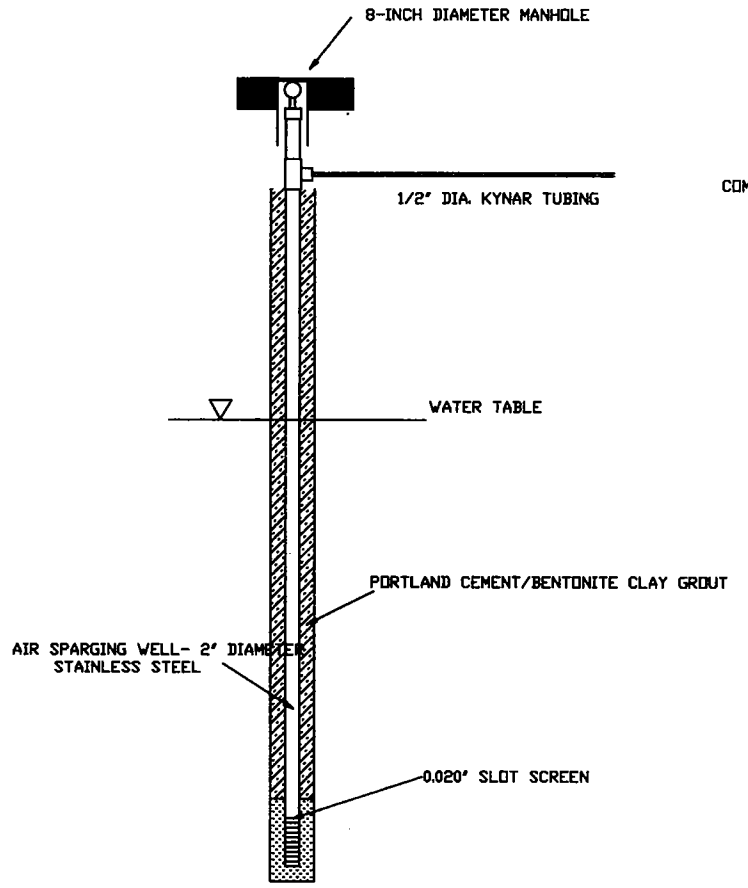
------- PROPOSED HORIZONTAL SOIL VAPOR EXTRATION PIPING

THE WHITMAN COMPANIES, INC.

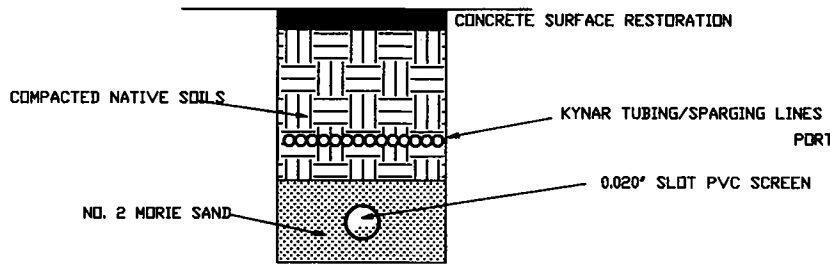
DEXTER CHEMICAL LLC
BRONX, NEW YORK

REMEDIAL DESIGN
AREA A

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G8
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	6

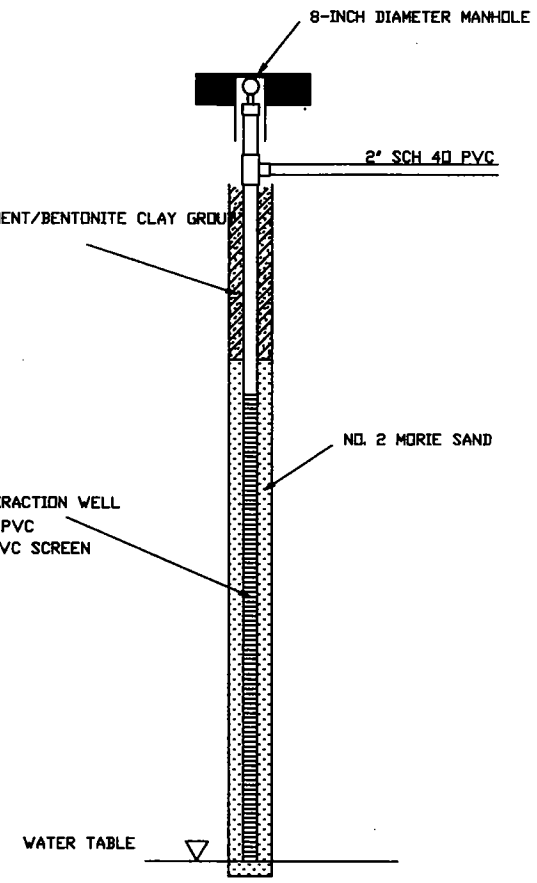


AIR SPARGING WELL (TYP.)
APPROXIMATELY 15 WELLS PROPOSED FOR AREA A
APPROXIMATELY 14 WELLS PROPOSED FOR AREA I
DEPTH ADJUSTED TO TOP OF PEAT LAYER, 2 ' SCREENED INTERVAL
NOT TO SCALE
AREA A & AREA I



HORIZONTAL VAPOR EXTRACTION TRENCH (TYP)
APPROXIMATELY 2' DEEP

AREA A



SOIL VAPOR EXTRACTION WELL (TYP)
APPROXIMATELY 17 PROPOSED AREA I
DEPTH ADJUSTED TO TOP OF WATER TABLE, 5' SCREENED INTERVAL
NOT TO SCALE

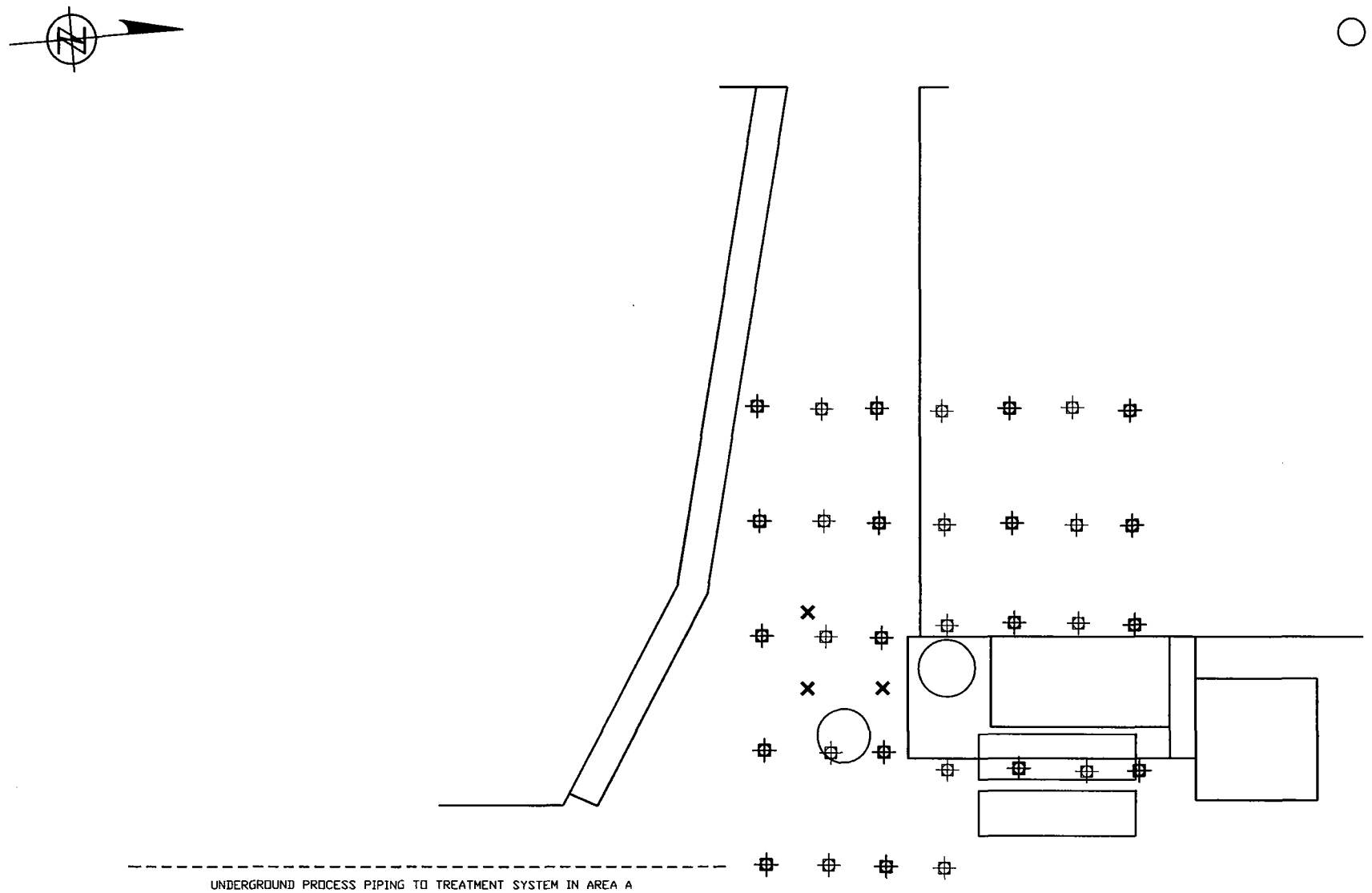
NOT TO SCALE

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

DETAILS FOR AS/SVE POINT AND TRENCHES

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G6
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	7



LEGEND

AS WELL LOCATION

SVE WELL LOCATION

×

ACTUAL WELL LOCATIONS TO BE FIELD LOCATED
WELL LOCATIONS WILL BE ADJUSTED TO ACCOUNT FOR ACCESS LIMITATIONS
AND PRESENCE OF UNDERGROUND OBSTRUCTIONS

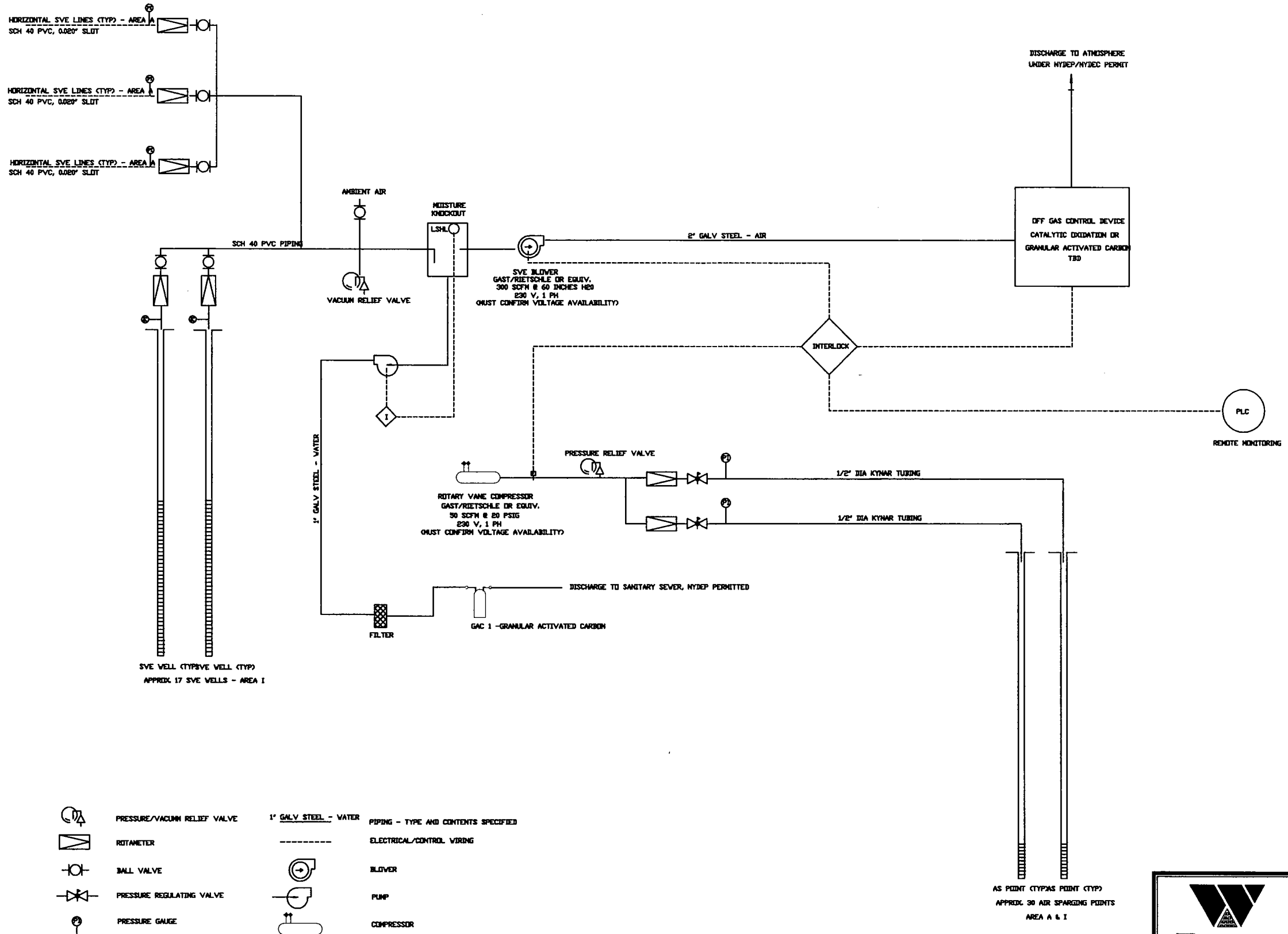
SCALE
0 20'

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

REMEDIAL DESIGN AREA I

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G5
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	8



NOT TO SCALE

THE WHITMAN COMPANIES, INC.

DEXTER CHEMICAL LLC
BRONX, NEW YORK

AS/SVE SYSTEM
PIPING AND INSTRUMENTATION DIAGRAM

ORIGINAL BY:	DRAWN BY:	DRAWING NO:
M.P.	A.A.	970910G7
CHECKED BY:	DATE:	FIGURE NO:
E.S.	MAY 2005	9

ATTACHMENTS

ATTACHMENT 1

HEALTH AND SAFETY PLAN

THE WHITMAN COMPANIES, INC.
HEALTH AND SAFETY PLAN
PROJECT NO. 97-09-10

***Project Name:**	Dexter Chemical		
***Project No.:**	97-09-10		
***Site Location:**	Edgewater Road, Bronx, New York		
***Mark Out Reference #**			
***Client:**	Dexter Chemical		
***Contact:**	Len Sitver	***Telephone:**	718-542-7700
		Pager #:	
***Project Manager:**	Rich Britton	***Telephone:**	732-390-5858
		Fax Number:	732-390-9496
***Date:**	2/16/05		

Describe Objectives of Field Project

Install AS/SVE System

Operate AS/SVE System

Tasks: Check all applicable	**Task No.**
( ) Drilling	
() Soil Sampling	
(X) Well Point Installation	1
(X) Monitor Well Sampling	3
( ) Test Pit Installation	
( ) Drum Sampling and Consolidation	
( ) UST Removal	
( ) Waste Pile Classification	
( ) Remediation O&M of Systems	
( ) Spill Response	
(X)Soil Excavation/Trenching	2
( ) Other (Backfilling & Grading)	

***Surrounding Area**

(X) Residential (X) Industrial ( ) Vacant Land (X) Commercial ( ) Other:

* This plan is provided to subcontractors for informational purposes only. The information contained herein is the best information available to Whitman Companies' personnel at the time of the project. Not withstanding anything to the contrary herein, all subcontractors are solely and independently responsible for insuring that their health and safety plans adequately address federal and state requirements.

JOB-SITE HAZARDS

Physical State of Contaminants:

(X) Liquid (X) Solid (X) Gas/Vapor ( ) Sludge ( ) Unknown ( ) Other, specify:

Characteristics of Contaminants:

( ) Corrosive	( ) Reactive	( ) Explosive	( ) Flammable	(X) Irritant
(X) Toxic	( ) Unknown	( ) Biological	( ) Radiological	(X) Volatile
( ) Other, specify:				

Principal Hazards on Job-Site:

(X) Heat Stress	(X) Cold Stress	(X) Physical Hazards
(X) Noise	( ) Organic Chemicals	( ) Inorganic Chemicals
( ) Explosive/Flammable	( ) Oxygen Deficient	( ) Radiological
( ) Biological	( ) Confined Space*	( ) Electrical
( ) Cutting/Welding	( ) Heavy Equipment	( ) Excavation
( ) Other, specify:		( ) Overhead Hazards

Location of On-site Hazardous Materials:

( ) Underground Storage Tanks	( ) Drums	( ) Pit or Lagoon
( ) Landfill	( ) Lined Sump	( ) Unlined Sump
( ) Above Ground Tanks	( ) Open Dump	( ) Unknown
( ) Other, specify:	( ) Surface Discharge	(X) Subsurface Discharge

**If confined space entry is required, proper permitting and lock-out tag-out procedures must be followed.*

TOXIC LIQUID//GAS CONTAMINANT DATA*

Known Contaminant(s)	Highest Site Conc. (ppm) (Year)	PEL ppm, mg/m^3	IDLH ppm, mg/m3	Ionization Potential (eV)	Instrument Response Factor	Action Concentration (ppm)	Symptoms/ Effects of Acute Exposure
BENZENE	430(1998)	1	500	9.24	1.78	1	See Attachment 4 and 5
ETHYLBENZENE	49,000(1997)	100	800	8.76	1	100	
TOLUENE	48,000(1998)	200	500	8.82	1.91	200	
TOTAL XYLENES	450,000(1997)	100	900	8.44	1	100	
CHLOROBENZENE	260,000(1997)	75	1000	9.07	N/A	75	
NAPHTHALENE	160,000(1997)	10	250	8.12	N/A	10	
1,2,4 TRICHLOROBENZENE	110,000(1998)	NONE	NONE	N/A	N/A	NONE	
1,2 DICHOLORBENZEN	14,000 (1998)	50	200	9.06	N/A	50	
1,3 DICHOLORBENZEN	2,300 (1998)	50	200	9.06	N/A	50	
1,4 DICHOLORBENZEN	11,000(1998)	75	150	8.98	N/A	75	
1,2 DICHLOROPROPANE	19(1997)	75	400	10.87	N/A	75	
VINYL CHLORIDE	2.6(1997)	1	NONE	9.99	N/A	1	
1,2 DICHLOROTHEANE	38.9(1997)	50	50	11.05	N/A	50	
Historic fill (Coal Tar)	Various	Various	Various	Various	N/A	Various	

NA = Not Available NE = None Established U = Unknown

* - NIOSH and/or ACGIH listings for contaminants are included in Attachment HASP-4.
- MSDS are in Attachment HASP-5

Toxic Material Concentration/Exposure Potential:

(X) Low ( ) Medium ( ) High ( ) Unknown

Fire/Explosion Potential:

(X) Low ( ) Medium ( ) High ( ) Unknown

Overall Hazard Evaluation:

(X) Low ( ) Medium ( ) High ( ) Unknown

Justification: Low level in ground water and soil.

Required Training for Site Personnel:

• 40-hr OSHA for field technicians & supervisors with 8 hours annual update.

Task Description (Describe Major Tasks from Page One - Attach additional pages if necessary.)

#1 AS/SVE well point installation

#2 Trenching & horizontal SVE line installation

#3 Monitoring well sampling

#4

#5

Personal Protective Equipment Required for Tasks Described Above.

Task	Level (Circle One)
#1	A B C D
#2	A B C D
#3	A B C D
#4	A B C D
#5	A B C D

Description of PPE included in Attachment 3. Modified PPE is as follows:

Field Monitoring Equipment (Check under appropriate column.)

Task #	Not Needed	LEL Meter	10.6 eV PID	11.7 eV PID	FID	Detector Tubes	Other (Describe)
#1			X				
#2			X				
#3			X				
#4							
#5							

Action Levels for PPE Upgrade (Describe):

PID readings of greater than 1,000 units above background in the breathing zone require upgrade to Level C.

DECONTAMINATION INFORMATION

Attach Site map indicating exclusion, decontamination, and support zones.

Personnel Decontamination (Describe/or attach diagram.) ( ) Not Needed

See Attachment 2 Wash with soap and water

Sampling Equipment Decontamination (Describe/or attach diagram.) ( ) Not Needed

See Attachment 2

Heavy Equipment Decontamination (Describe/or attach diagram) ( ) Not Needed

See Attachment 2

Disposal Method for Liquids and Solids (Describe/or attach diagram) ( ) Not Needed

See Attachment 2

CONTINGENCY INFORMATION

Site Emergency Contact to be Notified:

Location of Nearest Telephone:

Local Emergency Response Contacts:	**Name**	**Phone**
Ambulance/EMS:		911 or
Fire Department:		911 or
Sheriff/Police Dept:		911
Whitman Project Manager:	Rich Britton	(732) 390-5858
NY Department of Environmental Commission Hotline		1-800-847-7332
USEPA Environmental Response Team		(202)-321-6660
USEPA RCRA Hotline		(800) 424-9346
CHEMTREC		(800)-424-9300
National Response Center		(800) 424-8802
Substance Identification (CAS)		(800) 848-6538
Nearest Local Hospital:	Albert Einstein-Weiler Hospital	718-904-2000
Hospital Address:	1825 Eastchester Road, Bronx, NY 10461	
Route to Hospital:	Hospital Route	

Contingency Plans - Summarize Below

PERSONAL HYGIENE

The Whitman Companies or Contractors personnel have the following personal hygiene requirement:

1. No eating, drinking, smoking, gum or tobacco chewing is allowed in the active work zone.
2. Wash hands and face before leaving work area.
3. Contact with contaminated surface or surfaces suspected of being contaminated will be avoided while unprotected.
4. Any person under a physician's care and/or taking medication must inform the site supervisor.
5. Personnel using respirators must be fit tested, clean shaven and trained in respiratory protection.

MEDICAL SURVEILLANCE PROGRAM

See Health and Safety Officer for Standard list of medical surveillance program. Additionally medical surveillance above the Standard will include:

EMERGENCY/PROBLEMS CHAIN-OF-COMMAND

If a release, emergency or other unexpected situation arises onsite, The Whitman Companies should be notified immediately. If The Whitman Companies, Inc. is not on site when the event occurs, please use the following contact list.

Name	Office # and Address	Home #
Richard Britton, Vice President of Geological Services	The Whitman Companies, Inc. 116 Tices Lane, Unit B-1 East Brunswick, NJ 08816 (732) 390-5858	732-940-9225
Todd Gerber, Executive Vice President	The Whitman Companies, Inc. 116 Tices Lane, Unit B-1 East Brunswick, NJ 08816 (732) 390-5858	(908)-281-6551

Active Work Zone Emergencies

Fire/Explosion: A severe emergency such as a fire or explosion could require immediate evacuation of the site. The emergency response notification process should take place as soon as an incident occurs.

In the event of an evacuation of the Active Work Area, affected personnel will leave immediately, go through decontamination if time permits and reassemble at the closest street. The signal for an evacuation is three (3) long bursts of an air or vehicle horn. Contact local emergency services if needed and contact The Whitman Companies.

Emergency Spill Containment/Control Plan

Spill/Release: Upon a detected spill or release of a hazardous substance or waste, there must be notification to the state (NJDEP), Local Authorities, client, and The Whitman Companies. Spills/Releases should be contained where possible by diking or otherwise isolating the spill/release. If necessary, an emergency response contractor will be contacted to provide assistance. If product is encountered during soil investigation activities, there must be notification to The Whitman Companies.

In the event of a spill or leak of a liquid chemical or hazardous waste, personnel in the area of the spill will do the following:

- Inform the Site Supervisor immediately
- Determine if adequate protective equipment is available to enter area of the spill i.e., IDLH conditions
- Get spill kit materials
- Identify source of spill
- Contain, absorb and recover spilled substance in proper containers
- Dispose of spilled materials properly, according to local, state and federal regulations

Spill Prevention

The prevention of spills through good work practice is the most important aspect of the spill containment/control plan. The following standard work practices for material handling will minimize the potential for spills.

- All drums and containers used during the cleanup shall meet the appropriate DOT, OSHA and EPA regulations for the wastes that they will contain.
- Drums and containers shall be inspected and their integrity assured prior to moving them. Drums or containers that cannot be inspected before being moved because of storage conditions shall be positioned in an accessible location and inspected prior to further handling.
- Operations on site will be organized so as to minimize the amount of drum or container movement.
- Where spills, leaks, or ruptures may occur, adequate quantities of spill containment equipment will be stationed in the immediate area. The spill containment program must be sufficient to contain and isolate the entire volume of hazardous substances being transferred.
- Drums or containers that cannot be moved without rupture, leakage, or spills, shall be emptied into a sound container.
- Fire extinguishing equipment meeting 29 CFR 1910 Subpart L shall be on hand ready for use to control fires.

COMMUNITY AIR MONITORING PLAN

Real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Continuous monitoring will be required for all ground intrusive activities. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil or groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwindPM-10 particulate concentration to within 150 mcg/m3 of the upwind level and in preventing visible dust migration. All readings must be recorded and be available for State (DEC and DOH) personnel to review.

PLAN REVISIONS

The site Health and Safety Plan will be revised whenever the following events occur:

1. The Plan fails in an emergency
2. New physical or chemical hazards are discovered
3. Changes occur in telephone numbers, personnel, etc.

All personnel will be briefed when pertinent changes occur.

Project Manager Approval _____ Date: _____

HEALTH & SAFETY SUMMARY SHEET

1. ACTIVITIES

(See attached scope of work.)

2. PRINCIPAL HAZARDS

(See attached scope of work.)

3. PPE EQUIPMENT

(See attached scope of work.)

4. HOSPITAL & EMERGENCY NUMBERS

(See attached scope of work.)

5. H & S BRIEFING

The Whitman Field Supervisor will coordinate a health & safety briefing prior to the beginning of the day's work activities. This briefing must be given to **all** Whitman personnel **and** Whitman subcontractors working on-site and will include a summary of all the information contained in this Health & Safety Plan.

6. SIGNOFF SHEETS

All personnel attending the health and safety briefing will sign the Health & Safety Plan Signoff Sheet. Copies of the completed Signoff Sheet must be forwarded to the Whitman Office Safety & Health Coordinator and to the main Whitman file on the project.

ATTACHMENT HASP-1

ROUTE TO HOSPITAL

Yahoo! Driving Directions

Starting from: A 845 Edgewater Rd, Bronx, NY 10474-4901

Arriving at: B 1825 Eastchester Rd, Bronx, NY 10461-2301

Distance: 5.3 miles **Approximate Travel Time:** 11 mins

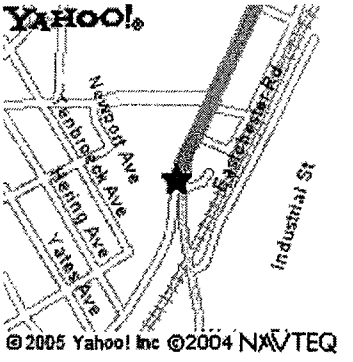
Your Directions

1.	Start at **845 EDGEWATER RD, BRONX** going toward **SENECA AVE** - go **0.3** mi
2.	Turn R on **BRUCKNER BLVD** - go **0.7** mi
3.	Bear R onto **BRONX RIVER PKY NORTH** toward **WHITE PLAINS** - go **2.2** mi
4.	Take exit **#7E/PELHAM PKWY** onto **BRONX AND PELHAM PKY E** - go **1.3** mi
5.	Continue on **PELHAM PKY S** - go **0.3** mi
6.	Turn R on **EASTCHESTER RD** - go **0.5** mi
7.	Continue on a local road - go < **0.1** mi
8.	Arrive at **1825 EASTCHESTER RD, BRONX**

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route

Your Destination



Address:
1825 Eastchester Rd
Bronx, NY 10461-2301

ATTACHMENTHASP-2

DECONTAMINATION PROCEDURES

A. NON-AQUEOUS SAMPLING EQUIPMENT[1]

1. Detergent and tap water - scrub to remove visual contamination.
2. Generous tap water rinse.
3. Distilled and deionized water rinse.

B. AQUEOUS SAMPLING EQUIPMENT

1. Detergent and tap water wash.
2. Generous tap water rinse.
3. Distilled and deionized water rinse.
4. 10% nitric acid rinse[2].
5. Distilled and deionized water rinse[1].
6. Acetone rinse[3].
7. Total air dry or nitrogen blow out[3].
8. Distilled and deionized water rinse[2].

[1] – If visual contamination persists or gross contamination is suspected, the full 8 step decontamination procedure in Item B is required.

[2] - Only if sample is to be analyzed for metals.

[3] - Only if sample is to be analyzed for organics.

ATTACHMENT HASP-3

PERSONAL PROTECTIVE EQUIPMENT LEVELS

LEVEL D Includes:

1. Boots/shoes, chemical-resistant steel toe and shank.
2. Boots, outer, chemical-resistant (disposable).*
3. Safety glasses or chemical splash goggles.
4. Coveralls.*
5. Hard hat.
6. Escape mask.*
7. Face Shield.*

LEVEL C Includes:

1. All of Level D equipment.
2. Full-face or half-mask, air purifying respirators (NIOSH approved).
3. Hooded chemical-resistant clothing (overalls; two-piece chemical-splash suit; disposable chemical-resistant overalls).
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.

LEVEL B Includes:

1. Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
2. Hooded chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls. *
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant, steel toe and shank.
7. Boot-covers, outer, chemical resistant (disposable).*
8. Hard hat.
9. Face shield.*

LEVEL A Includes:

1. All of level B equipment.
2. Totally encapsulating chemical-protective suit.
3. Long underwear.*

* optional equipment (Project Managers decision).

ATTACHMENT HASP-4

NIOSH / OSHA STANDARDS AND PPE

NIOSH Pocket Guide to Chemical Hazards

Benzene

CAS 71-43-2

C_6H_6

RTECS CY1400000

Synonyms & Trade Names
Benzol, Phenyl hydride

DOT ID & Guide
1114 130

Exposure Limits

NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A

OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F

IDLH Ca [500 ppm] See: 71432

Conversion 1 ppm = 3.19 mg/m^3

Physical Description
Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods
NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

NIOSH Pocket Guide to Chemical Hazards

Chlorobenzene

CAS 108-90-7

C_6H_5Cl

RTECS CZ0175000

Synonyms & Trade Names
Benzene chloride, Chlorobenzol, MCB, Monochlorobenzene, Phenyl chloride

DOT ID & Guide
1134 130

Exposure Limits

NIOSH REL: See Appendix D

OSHA PEL: TWA 75 ppm (350 mg/m^3)

IDLH 1000 ppm See: 108907

Conversion 1 ppm = 4.61 mg/m^3

Physical Description
Colorless liquid with an almond-like odor.

MW: 112.6	BP: 270°F	FRZ: -50°F	Sol: 0.05%
VP: 9 mmHg	IP: 9.07 eV		Sp.Gr: 1.11
Fl.P: 82°F	UEL: 9.6%	LEL: 1.3%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations OSHA
Up to 1000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure- demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury

Target Organs Eyes, skin, respiratory system, central nervous system, liver

See also: INTRODUCTION See ICSC CARD: 0642

NIOSH Pocket Guide to Chemical Hazards

p-Dichlorobenzene

CAS 106-46-7

$C_6H_4Cl_2$

RTECS CZ4550000

Synonyms & Trade Names
p-DCB; 1,4-Dichlorobenzene; para-Dichlorobenzene; Dichlorocide

DOT ID & Guide
1592 152

Exposure Limits

NIOSH REL: Ca See Appendix A

OSHA PEL†: TWA 75 ppm (450 mg/m^3)

IDLH Ca [150 ppm] See: 106467

Conversion 1 ppm = 6.01 mg/m^3

Physical Description
Colorless or white crystalline solid with a mothball-like odor. [insecticide]

MW: 147.0	BP: 345°F	MLT: 128°F	Sol: 0.008%
VP: 1.3 mmHg	IP: 8.98 eV		Sp.Gr: 1.25
Fl.P: 150°F	UEL: ?	LEL: 2.5%	

Combustible Solid, but may take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers (such as chlorine or permanganate)

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]

Target Organs Liver, respiratory system, eyes, kidneys, skin

Cancer Site [in animals: liver & kidney cancer]

See also: INTRODUCTION See ICSC CARD: 0037 See MEDICAL TESTS: 0073

NIOSH Pocket Guide to Chemical Hazards

o-Dichlorobenzene

CAS 95-50-1

$C_6H_4Cl_2$

RTECS CZ4500000

Synonyms & Trade Names
o-DCB; 1,2-Dichlorobenzene; ortho-Dichlorobenzene; o-Dichlorobenzol

DOT ID & Guide
1591 152

Exposure Limits

NIOSH REL: C 50 ppm (300 mg/m^3)

OSHA PEL: C 50 ppm (300 mg/m^3)

IDLH 200 ppm See: 95501

Conversion 1 ppm = 6.01 mg/m^3

Physical Description
Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide]

MW: 147.0	BP: 357°F	FRZ: 1°F	Sol: 0.01%
VP: 1 mmHg	IP: 9.06 eV		Sp.Gr: 1.30
Fl.P: 151°F	UEL: 9.2%	LEL: 2.2%	

Class IIIA Combustible Liquid: Fl.P. at or above 140°F and below 200°F.

Incompatibilities & Reactivities
Strong oxidizers, aluminum, chlorides, acids, acid fumes

Measurement Methods
NIOSH 1003; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 200 ppm: (APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)[£]/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; liver, kidney damage; skin blisters

Target Organs Eyes, skin, respiratory system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 1066

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NIOSH Pocket Guide to Chemical Hazards

Ethylene dichloride

CAS 107-06-2

$ClCH_2CH_2Cl$

RTECS KI0525000

Synonyms & Trade Names
1,2-Dichloroethane; Ethylene chloride; Glycol dichloride

DOT ID & Guide
1184 129

Exposure Limits

NIOSH REL: Ca TWA 1 ppm (4 mg/m^3) ST 2 ppm (8 mg/m^3) See Appendix A See Appendix C (Chloroethanes)

OSHA PEL†: TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]

IDLH Ca [50 ppm] See: 107062

Conversion 1 ppm = 4.05 mg/m^3

Physical Description
Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.]

MW: 99.0	BP: 182°F	FRZ: -32°F	Sol: 0.9%
VP: 64 mmHg	IP: 11.05 eV		Sp.Gr: 1.24
Fl.P: 56°F	UEL: 16%	LEL: 6.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112°F.]

Measurement Methods
NIOSH 1003; OSHA 3
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin absorption, skin and/or eye contact

Symptoms Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]

Target Organs Eyes, skin, kidneys, liver, central nervous system, cardiovascular system

Cancer Site [in animals: forestomach, mammary gland & circulatory system cancer]

See also: INTRODUCTION See ICSC CARD: 0250 See MEDICAL TESTS: 0104

NIOSH Pocket Guide to Chemical Hazards

Propylene dichloride

CAS 78-87-5

$CH_3CHClCH_2Cl$

RTECS TX9625000

Synonyms & Trade Names
Dichloro-1,2-propane; 1,2-Dichloropropane

DOT ID & Guide
1279 130

Exposure Limits

NIOSH REL: Ca See Appendix A

OSHA PEL†: TWA 75 ppm (350 mg/m^3)

IDLH Ca [400 ppm] See: 78875

Conversion 1 ppm = 4.62 mg/m^3

Physical Description
Colorless liquid with a chloroform-like odor. [pesticide]

MW: 113.0	BP: 206°F	FRZ: -149°F	Sol: 0.3%
VP: 40 mmHg	IP: 10.87 eV		Sp.Gr: 1.16
Fl.P: 60°F	UEL: 14.5%	LEL: 3.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids, active metals

Measurement Methods
NIOSH 1013; OSHA 7
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, respiratory system; drowsiness, dizziness; liver, kidney damage; in animals: central nervous system depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver & mammary gland tumors]

See also: INTRODUCTION See ICSC CARD: 0441

NIOSH Pocket Guide to Chemical Hazards

Naphthalene	**CAS** 91-20-3
$C_{10}H_8$	**RTECS** QJ0525000
Synonyms & Trade Names Naphthalin, Tar camphor, White tar	**DOT ID & Guide** 1334 133 (crude or refined) 2304 133 (molten)

Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
	OSHA PEL†: TWA 10 ppm (50 mg/m^3)

IDLH 250 ppm See: 91203	**Conversion** 1 ppm = 5.24 mg/m^3

Physical Description
Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers, chromic anhydride

Measurement Methods
NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Molten flush immediately/solid-liquid soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage

Target Organs Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

NIOSH Pocket Guide to Chemical Hazards

Toluene

CAS 108-88-3

$C_6H_5CH_3$

RTECS XS5250000

Synonyms & Trade Names
Methyl benzene, Methyl benzol, Phenyl methane, Toluol

DOT ID & Guide
1294 130

Exposure Limits

NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)

OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)

IDLH 500 ppm See: 108883

Conversion 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

NIOSH Pocket Guide to Chemical Hazards

1,2,4-Trichlorobenzene	CAS 120-82-1
$C_6H_3Cl_3$	RTECS DC2100000
Synonyms & Trade Names unsym-Trichlorobenzene; 1,2,4-Trichlorobenzol	**DOT ID & Guide** 2321 153 (liquid)

Exposure Limits	NIOSH REL: C 5 ppm (40 mg/m^3)
	OSHA PEL†: none

IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 7.42 mg/m^3

Physical Description
Colorless liquid or crystalline solid (below 63°F) with an aromatic odor.

MW: 181.4	BP: 416°F	FRZ: 63°F	Sol: 0.003%
VP: 1 mmHg	IP: ?		Sp.Gr: 1.45
Fl.P: 222°F	UEL(302°F): 6.6%	LEL(302°F): 2.5%	

Class IIIB Combustible Liquid
Combustible Solid

Incompatibilities & Reactivities
Acids, acid fumes, oxidizers, steam

Measurement Methods
NIOSH 5517
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations To be added later

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; in animals: liver, kidney damage; possible teratogenic effects

Target Organs Eyes, skin, respiratory system, liver, reproductive system

See also: INTRODUCTION See ICSC CARD: 1049

NIOSH Home | NIOSH Search | Site Index | Topic List | Contact Us

NIOSH Pocket Guide to Chemical Hazards

Vinyl chloride

CAS 75-01-4

CH_2=CHCl

RTECS KU9625000

Synonyms & Trade Names
Chloroethene, Chloroethylene, Ethylene monochloride, Monochloroethene, Monochloroethylene, VC, Vinyl chloride monomer (VCM)

DOT ID & Guide
1086 116P

Exposure Limits

NIOSH REL: Ca See Appendix A

OSHA PEL: [1910.1017] TWA 1 ppm C 5 ppm [15-minute]

IDLH Ca [N.D.] See: IDLH INDEX

Conversion 1 ppm = 2.56 mg/m^3

Physical Description
Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]

MW: 62.5	BP: 7°F	FRZ: -256°F	Sol(77°F): 0.1%
VP: 3.3 atm	IP: 9.99 eV	RGasD: 2.21	
Fl.P: NA (Gas)	UEL: 33.0%	LEL: 3.6%	

Flammable Gas

Incompatibilities & Reactivities
Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]

Measurement Methods
NIOSH 1007; OSHA 4, 75
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Frostbite
Eyes: Frostbite
Wash skin: No recommendation
Remove: When wet (flammable)
Change: No recommendation
Provide: Frostbite

First Aid (See procedures)
Eye: Frostbite
Skin: Frostbite
Breathing: Respiratory support

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin, and/or eye contact (liquid)

Symptoms Lassitude (weakness, exhaustion); abdominal pain, gastrointestinal bleeding; enlarged liver; pallor or cyanosis of extremities; liquid: frostbite; [potential occupational carcinogen]

Target Organs Liver, central nervous system, blood, respiratory system, lymphatic system

Cancer Site [liver cancer]

See also: INTRODUCTION See ICSC CARD: 0082 See MEDICAL TESTS: 0241

NIOSH Pocket Guide to Chemical Hazards

m-Xylene	**CAS** 108-38-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2275000
Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

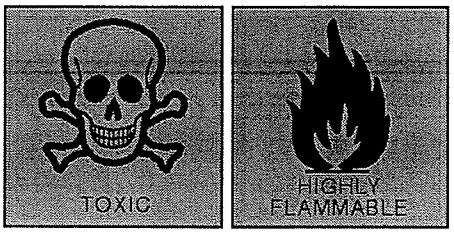
Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

ATTACHMENT HASP-5

MSDS SHEETS

Safety (MSDS) data for benzene



Click here for data on benzene in student-friendly format, from the HSci project

General

Synonyms: benzol, phenyl hydride, coal naphtha
Molecular formula: C_6H_6
CAS No: 71-43-2
EC No: 200-753-7

Physical data

Appearance: colourless liquid
Melting point: 5.5 C
Boiling point: 80 C
Specific gravity: 0.87
Vapour pressure: 74.6 mm Hg at 20 C
Flash point: -11 C
Explosion limits: 1.3 % - 8 %
Autoignition temperature: 561 C

Stability

Stable. Substances to be avoided include strong oxidising agents, sulphuric acid, nitric acid. **Highly flammable.**

Toxicology

This material is a known carcinogen. The risks of using it in the laboratory must be fully assessed before work begins. TLV 10 ppm. Short-term exposure may cause a variety of effects, including nausea, vomiting, dizziness, narcosis, reduction in blood pressure, CNS depression. Skin contact may lead to dermatitis. Long-term exposure may lead to irreversible effects. Severe eye irritant. Skin and respiratory irritant.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)

ORL-MAN LDLO 50 mg kg^{-1}

ORL-RAT LD50 930 mg kg^{-1}

IHL-MUS LC50 9980 ppm

ORL-MUS LD50 4700 mg kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)

R11 R23 R24 R25 R45 R48.

Personal protection

Safety glasses, gloves, good ventilation. Thought should be given to using an alternative, safer product.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)

S45 S53.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for ethylbenzene

General

Synonyms: phenylethane, EB, ethylbenzol, ethyl benzene
Molecular formula: C_8H_{10}
CAS No: 100-41-4
EC No: 202-849-4

Physical data

Appearance: colourless liquid
Melting point: -95 C
Boiling point: 136 C
Vapour density: 3.7
Vapour pressure: 10 mm Hg at 20 C
Specific gravity: 0.867
Flash point: 15 C
Explosion limits: 1 % - 6.7 %
Autoignition temperature: 432 C

Stability

Stable. Incompatible with oxidizing agents. Flammable.

Toxicology

May be harmful by inhalation, ingestion or through skin contact. Causes severe eye irritation. Skin and respiratory system irritant. Experimental teratogen. Narcotic in high concentration.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
ORL-RAT LD50 3500 mg kg^{-1}
SKN-RBT LD50 17800 mg kg^{-1}
IHL-GPG LCLO 10000 ppm

Irritation data
(The meaning of any abbreviations which appear in this section is given here.)
SKN-RBT 15 mg/24h open mld.

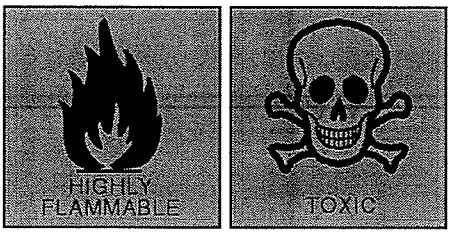
Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R10 R36 R37 R38.

Personal protection

Safety glasses. Good ventilation.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for toluene



Click here for data on toluene in student-friendly format, from the HSci project

General

Synonyms: methylbenzene, phenylmethane, toluol, antisal 1A, CP 25, methacide, methylbenzol, NCI-C07272, RCRA waste number U220, tolu-sol
Uses: Solvent
Molecular formula: C_7H_8
CAS No: 108-88-3
EC No: 203-625-9
Annex I Index No: 601-021-00-3

Physical data

Appearance: Colourless liquid with a benzene-like odour (odour threshold 0.17 ppm)
Melting point: -93 C
Boiling point: 110.6 C
Specific gravity: 0.865
Vapour pressure: 22 mm Hg at 20 C (vapour density 3.2)
Flash point: 4 C
Explosion limits: 1% - 7%
Autoignition temperature: 536 C

Stability

Stable. Substances to be avoided: oxidising agents, oxygen, moisture. **Highly flammable.** Hygroscopic.

Toxicology

Toxic by inhalation, ingestion or by absorption through skin. Serious irritant. Experimental teratogen.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
ORL-RAT LD50 636 mg kg^{-1}

IPR-RAT LD50 1332 mg kg^{-1}
ORL-HMN LDLO 50 mg kg^{-1}
IPR-MUS LD50 59 mg kg^{-1}
IHL-MAM LC50 30 g m^{-3}

Irritation data
(The meaning of any abbreviations which appear in this section is given here.)
EYE-HMN 300 ppm.
SKN-RBT 435 mg mild.

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R11 R20

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN Major hazard class 3.0 Packing group II. UN No 1294. IMDG class 3.

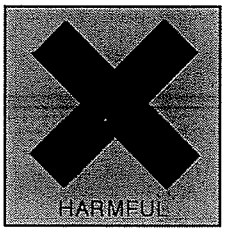
Personal protection

Safety glasses. Good ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S16 S25 S29 S33.

Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for o-xylene



General

Synonyms: ortho-xylene, 1,2-dimethylbenzene
Molecular formula: C_8H_{10}
CAS No: 95-47-6
EC No: 202-422-2

Physical data

Appearance: colourless liquid
Melting point: -24 C
Boiling point: 144 C
Vapour density: 3.7
Vapour pressure: 7 mm Hg at 20 C
Specific gravity: 0.87
Flash point: 32 C (closed cup)
Explosion limits: 1.1 % - 7 %
Autoignition temperature: 463 C

Stability

Stable. Incompatible with oxidizing agents. Flammable. Hygroscopic.

Toxicology

Harmful if swallowed, inhaled or absorbed through skin. Narcotic. May cause lung irritation, chest pain or fatal oedema. **May impair fertility.** Typical STEL 150 ppm.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)
IPR-MUS LD50 1.5 ml kg^{-1}

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R10 R20 R21 R38.

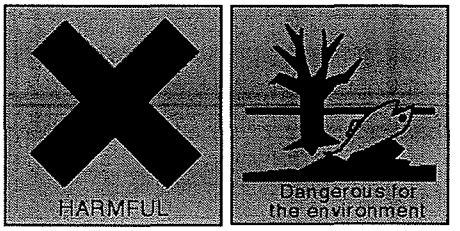
Personal protection

Safety glasses, adequate ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S25.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for chlorobenzene



General

Synonyms: benzene chloride, chlorobenzol, phenyl chloride, monochlorobenzene, tetrosin SP
Molecular formula: C_6H_5Cl

CAS No: 108-90-7
EC No: 203-628-5
EC Index No: 602-033-00-1

Physical data

Appearance: colourless liquid
Melting point: -45 C
Boiling point: 132 C
Vapour density: 3.86
Vapour pressure: 12 mm Hg at 25 C
Specific gravity: 1.107
Flash point: 24 C
Explosion limits: 1.3 % - 7.1 %
Autoignition temperature: 636 C

Stability

Stable. Incompatible with oxidizing agents. Flammable.

Toxicology

Possible carcinogen. Harmful if swallowed, inhaled or absorbed through skin. Skin irritant. Typical PEL 75 ppm.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)

ORL-RAT LD50 1110 mg kg^{-1}
IHL-RAT LC50 2965 ppm
IPR-RAT LD50 1655 mg kg^{-1}

ORL-MUS LD50 2300 mg kg^{-1}
ORL-MAM LD50 2300 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R10 R20 R21 R22 R51 R53.

Environmental information

Harmful in the environment.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1134. Packing group III. Major hazard class 3.0. Transport category 3.

Personal protection

Safety glasses and good ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S24 S25 S61.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety data for naphthalene-d8

General

Synonyms: perdeuteronaphthalene, deuterated naphthalene. [Note: This data sheet is for fully deuterated naphthalene. If you want data on the "normal" non-deuterated material, click here.]
Molecular formula: $C_{10}D_8$
CAS No: 1146-65-2
EINECS No: 214-552-7

Physical data

Appearance: white crystals
Melting point: 81 - 83 C
Boiling point:
Vapour density: 4.4 (air = 1)
Vapour pressure: 0.03 mm Hg at 25 C
Density (g cm^{-3}):
Flash point: 78 C
Explosion limits: 0.9 - 5.9%
Autoignition temperature:
Water solubility:

Stability

Stable. Incompatible with oxidising agents. Flammable.

Toxicology

Carcinogen. Toxic. Long-term contact with the vapour may cause serious and permanent eye damage. May act as an allergen.

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R20 R21 R22 R36 R37 R38 R43 R45.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
CGD UK Major hazard class: 4.1. Packing group: III

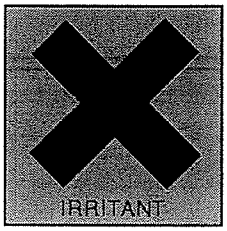
Personal protection

Safety glasses, gloves, good ventilation. Handle as a carcinogen.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S16 S26 S36 S37 S39 S45.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for 1,2,4-trichlorobenzene



General

Synonyms: unsym-trichlorobenzene
Use:
Molecular formula: $C_6H_3Cl_3$
CAS No: 120-82-1
EC No:

Physical data

Appearance: colourless liquid
Melting point: 17 C
Boiling point: 213 C
Vapour density: 6.2 (air = 1)
Vapour pressure:
Density (g cm^{-3}): 1.45
Flash point: 110 C
Explosion limits: 2.5% - 6.6%
Autoignition temperature:
Water solubility: negligible

Stability

Stable. Incompatible with strong oxidizing agents. Combustible.

Toxicology

Skin, eye and respiratory irritant. Typical TLV/TWA 40 mg/m3.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
ORL-RAT LD50 756 mg kg^{-1}

ORL-MUS LD50 300 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 2321. Hazard class 6.1.

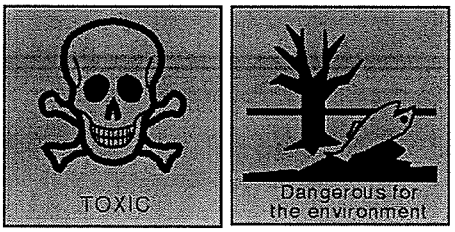
Personal protection

Safety glasses, adequate ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S26 S36.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for 1,2-dichlorobenzene



General

Synonyms: o-dichlorobenzene
Molecular formula: $C_6H_4Cl_2$
CAS No: 95-50-1
EC No: 202-425-9

Physical data

Appearance: colourless liquid
Melting point: -17 C
Boiling point: 179 C
Vapour density: 5.1
Vapour pressure: 1.2 mm Hg at 20 C
Specific gravity: 1.306
Flash point: 65 C
Explosion limits: 2.2 % - 9.2%
Autoignition temperature: 647 C

Stability

Stable. Incompatible with oxidizing agents, aluminium, aluminium alloys. Light sensitive.

Toxicology

Toxic. Harmful if swallowed, inhaled or absorbed through the skin. Eye, skin and respiratory tract irritant. May cause sensitization. Typical PEL 50 ppm.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
ORL-RAT LD50 500 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)

R22 R36 R37 R38 R50 R53.

Environmental information

Extremely harmful to the aquatic environment; may cause long-term damage.

Personal protection

Safety glasses, good ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S23 S60 S61.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for 1,3-dichlorobenzene

General

Synonyms: m-dichlorobenzene, meta-dichlorobenzene
Molecular formula: $C_6H_4Cl_2$
CAS No: 541-73-1
EC No:

Physical data

Appearance: colourless liquid
Melting point: -24.8 C
Boiling point: 173 C
Vapour density:
Vapour pressure: 5 mm Hg at 39 C
Density (g cm^{-3}): 1.29
Flash point: 63 C
Explosion limits:
Autoignition temperature: 648 C
Water solubility: negligible

Stability

Combustible. Incompatible with strong oxidizing agents, aluminium, aluminium alloys. Moisture-sensitive.

Toxicology

May be harmful if inhaled, swallowed or absorbed through the skin. May act as a mutagen.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
IPR-MUS LD50 1062 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)

Transport information

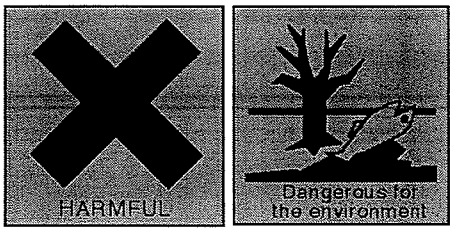
Personal protection

Safety glasses, good ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for 1,4-dichlorobenzene



General

Synonyms: p-dichlorobenzene, para-dichlorobenzene, p-chlorophenyl chloride, p-dichlorobenzol, di-chloricide, evola, globol, NCI-C54955, paracide, para crystals, paradi, paradow, paramoth, paranuggets, parazene, pdcb, persia-perazol, santochlor, various other non-systematic names
Use: Moth repellant and general insecticide, deodorant and disinfectant.
Molecular formula: $C_6H_4Cl_2$
CAS No: 106-46-7
EINECS No:

Physical data

Appearance: colourless or white crystals
Melting point: 53 C
Boiling point: 174 C
Vapour density: 5.1 (air = 1)
Vapour pressure: 0.6 mm Hg at 20 C
Density (g cm^{-3}): 1.25
Flash point: 65 C (closed cup)
Explosion limits:
Autoignition temperature:
Water solubility: negligible

Stability

Stable. Combustible. Incompatible with strong oxidizing agents, aluminium and its alloys, some plastics.

Toxicology

Harmful if swallowed or inhaled; may be harmful if absorbed through the skin. Experimental mutagen, carcinogen and teratogen. Possible human carcinogen. May act as a systemic poison if swallowed. Typical TLV/TWA 75 ppm. Typical STEL 110 ppm. Typical PEL 75 ppm.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)
ORL-HMN TDLO 300 mg kg^{-1}
ORL-MUS LD50 2950 mg kg^{-1}
IPR-MUS LD50 2000 mg kg^{-1}
IPR-RAT LD50 2562 mg kg^{-1}
ORL-RAT LD50 500 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R20 R22 R36 R50 R53.

Environmental information

Very harmful in the environment. Expected to biodegrade very slowly.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1592. Packing group III. Hazard class 6.1.

Personal protection

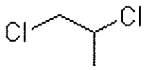
Safety glasses, gloves, adequate ventilation.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S24 S25 S46 S60 S61.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

1,2-Dichloropropane

Synonyms: Propylene dichloride; Dichloropropane; 98%; Aluminium Diethyl Monochloride
Molecular Formula: $C_3H_6Cl_2$
Formula Weight: 112.98
Registry number: 78-87-5



Registry number (RN, CAS): 78-87-5
Density: 1.15
Melting point (Mp): -100-100 °C
Boiling point: 95-96 °C
nD20: 1.438-1.44
Flash point: 15 °C

Hazard Symbol

F  Highly flammable

Xn  Harmful

Risk Description

R11 Highly flammable.
R20/22 Harmful by inhalation and if swallowed.

Safety Description

S16 Keep away from sources of ignition - No smoking.
S24 Avoid contact with skin.

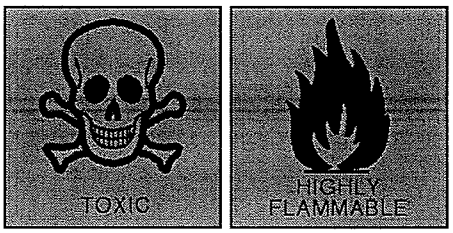
Products commercially available

Supplier	Name and purity	Qtt	Reference
ABCR	1,2-Dichloropropane; 98%	200.00 g	TCD0398 Get offer
Acros	1,2-Dichloropropane 98%	5 ML 50 ML	113670050 Get offer 113670500 Get offer
chemos	98% Propylene dichloride	on request	D0398 Get offer
cnpc	1,2-Dichloropropane	on request	Get offer
dayangchem	1,2-Dichloropropane	on request	DY5158 Get offer
dsl	1,2-Dichloropropane	on request	C012469 Get offer
lancaster	1,2-Dichloropropane 98 98	25g 100g	X03083G0025 X03083G0100
MatrixSwitzerland	1,2-Dichloropropane	semi bulk bulk	Get offer Get offer
yick-vic	Aluminium Diethyl Monochloride	>1000 kg	SPI-0545 Get offer

ChemExper Chemical Directory : find chemicals suppliers

CHEMEXPER

Safety (MSDS) data for vinyl chloride



General

Synonyms: vinyl chloride monomer, monochloroethylene, ethylene monochloride, monochloroethene, VC, VCM, chloroethene, chloroethylene
Molecular formula: C_2H_3Cl

CAS No: 75-01-4
EINECS No: 200-831-0
Annex I Index No: 602-023-00-7

Physical data

Appearance: colourless gas
Melting point: -153.7 C
Boiling point: -13.9 C
Vapour density: 2.2 (air = 1)
Vapour pressure: 2580 mm Hg at 20 C

Density (g cm^{-3}): 0.9106
Flash point: -61 C (closed cup)
Explosion limits:
Autoignition temperature:

Water solubility: 0.11 g 100 cm^{-3} at 25 C
Critical temperature: 156.5 C

Stability

Stable, but may be light sensitive. May undergo autopolymerization. Incompatible with strong oxidizing agents, chemically active metals, copper. **Highly flammable.** Severe explosion risk at concentrations of around 3%. It is reported that "large fires of this material are practically inextinguishable".

Toxicology

This material is a known human carcinogen. Harmful if inhaled or absorbed through the skin. May be a reproductive hazard. Typical TWA 1 ppm.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
IHL-MAN TCLO 500 ppm/4y-i
ORL-RAT LD50 500 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R13 R45.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1086. Major hazard class 2. Subsidiary hazard class 3. Not permitted as cargo on passenger planes.

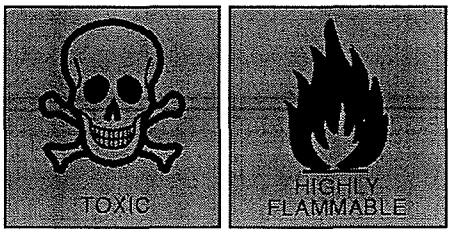
Personal protection

Safety glasses, good ventilation. Handle as a carcinogen.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S9 S16 S44 S53.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Safety (MSDS) data for 1,2-dichloroethane



General

Synonyms: 1,2-bichloroethane, dichloroethylene, ethylene chloride, ethane dichloride, ethylene dichloride, 1,2-ethylene dichloride, glycol dichloride, EDC, NCI-C00511, sym-dichloroethane, alpha, beta-dichloroethane, borer sol, brocide, destruxol, dichloremulsion, dutch oil, di-chlor-mulsion, dutch liquid, freon 150, NU-G00511
Molecular formula: $C_2H_4Cl_2$

CAS No: 107-06-2
EC No: 203-458-1
EC Index No 602-012-00-7

Physical data

Appearance: colourless liquid
Melting point: -35 C
Boiling point: 83 C
Specific gravity: 1.256
Vapour pressure: 387 mm Hg at 25 C
Vapour density: 3.4 (air = 1)
Flash point: 15 C
Explosion limits: 6.2% - 15.6%
Autoignition temperature: 775 F
Water solubility: slight

Stability

Stable. Substances to be avoided include oxidising agents, strong alkalies, strong caustics, magnesium, sodium, potassium, active amines, ammonia, iron, zinc, nitric acid and aluminium. Air and light sensitive. **Highly flammable**.

Toxicology

Probable human carcinogen. Causes liver damage. Mutagen, toxic. Experimental transplacental carcinogen. May cause systemic effects. Narcotic. Regarded as a priority pollutant in many countries. Skin irritant. A long-term MEL of 20 mg per cubic metre (8-hour

TWA reference period) applies to this chemical in the UK.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
ORL-RAT LD50 670 mg kg^{-1}
SKN-RBT LD50 2800 mg kg^{-1}
IHL-RAT LD50 1000 ppm/7h
ORL-HMN LDLO 286 mg kg^{-1}
ORL-MAN LDLO 714 mg kg^{-1}
ORL-DOG LD50 5700 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R11 R22 R36 R37 R38 R45.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1184. Packing group II. Major hazard class 3.0. Subsidiary hazard class 6.1.

Personal protection

Safety glasses. Good ventilation. Use precautions appropriate to a carcinogen.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S45 S53.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

HEALTH AND SAFETY PLAN
SIGN-OFF SHEET

SITE NAME/PROJECT NUMBER: _____

LOCATION: _____

WHITMAN FIELD SUPERVISOR: _____

I have read, understood, and agreed to comply with the provisions of the above referenced job site Health and Safety Plan for work activities on this site.

Name (Print)	Signature	Date

This HASP was prepared by: _____