NEW PROPOSED PLAN OF REMEDIAL ACTION

201 / 205 A Street
Wilmington, DE

DNREC Project No. DE-1228

July 2003

Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720

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1.0 INTRODUCTION

The 201/205 A Street property (site) is located on the southern bank of the Christina River in Wilmington, Delaware. The site is bordered on the west by a parking lot (200 S. Market Street), on the south by A Street, and on the east by a parking lot for the Christina River Club (Figure 1). In order to determine the potential for environmental liability prior to the purchase of the site, the Riverfront Development Corporation (RDC) entered into the Department of Natural Resources and Environmental Control's (DNREC) Voluntary Cleanup Program (VCP) under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA). Through a VCP Agreement, RDC agreed to investigate the potential risks posed to the public health, welfare, and the environment at the site. RDC contracted EA Engineering, Science and Technology, Inc. (EA) to perform a remedial investigation (RI) of the site.

The purpose of the RI was to: 1) collect additional information from the site to refine site knowledge from previous investigations; 2) delineate and determine the extent of petroleum contamination, and its possible migration and environmental impacts; and 3) determine the level of risk posed by the contaminants, and based upon this analysis, evaluate remedial alternatives.

The original proposed plan of remedial action (original proposed plan) the 201/205 A Street site was issued for public comment on October 21, 2001. The public comment period ended on November 12, 2001. No comments were received by DNREC. Thus, the proposed plan was adopted as the final plan of remedial action (final plan) on January 31, 2002. Because the owner of the site changed the intended future use of the property after the proposed plan was issued, DNREC determined that it was necessary to issue an amended proposed plan of remedial action (amended proposed plan) to account for this change in the use of the site. The amended proposed plan was issued for public comment on October 21, 2002. The public comment period ended on November 12, 2002, no comments were received by DNREC. Since the possible design and construction plans for the site requires raising the overall grade of the site from the present elevation, RDC has requested that DNREC revise the final plan to take into account the new construction plans. As a result, DNREC has determined that it is necessary to issue this new proposed plan of remedial action (new proposed plan).

In August 2002, RDC approached DNREC with a request to change the proposed development of the property from commercial/industrial to urban residential (i.e., apartment/condominium). At DNREC's request, RDC agreed to perform an updated risk assessment of the property to take into account the proposed change in land use. The updated risk assessment concluded that elevated risks to human health are posed by soil contamination at the site. DNREC has determined that the initial proposed remedy, which consisted of "hot spot" excavation and removal and containment of residual petroleum-impacted soils underneath structures and a parking lot, would still be protective of human health and the environment provided that no areas of contaminated soil would remain exposed, such as for yards or vegetative buffers.

In January 2003, RDC informed DNREC that a possible component of the final construction plans may consist of raising the overall grade of the site from the present elevation (4 to 5 feet above sea level) to the level of the top of the rebuilt bulkhead, which will be approximately 11 feet above sea level. At a minimum, two (2) feet of clean-fill will be added to the existing grade of site, even if the final construction plans do not require raising the overall grade of the site to

11 feet above sea level. In this case, the construction-related excavation will be in the clean fill above the contaminated soil and the risk to construction workers will be eliminated since there will be no exposure. Another possible component of the final construction plan may include performing construction activities in areas that have extended below the clean fill. When excavation is necessary below the clean fill in areas surrounding GP-3 and other areas containing elevated concentrations of PAHs, the soils will be over-excavated, removed and properly disposed of. The over-excavated areas will be subsequently filled with clean fill. Therefore, any necessary construction activities would then occur within the clean fill.

This document is DNREC's new proposed plan for the site. It is based on the results of the previous investigations performed at the site. This new proposed plan is issued under the provisions of the HSCA and the Regulations Governing Hazardous Substance Cleanup (Regulations). It presents the Department's assessment of the potential health and environmental risks posed by the site.

As described in Section 12 of the Regulations, DNREC will provide notice to the public and an opportunity for the public to comment on the second amended proposed plan. After the comment period concludes, DNREC will review and consider all of the comments received and issue an amended final plan of remedial action (amended final plan). The amended final plan will designate the selected remedy for the site. The RI, the original proposed plan, the amended proposed plan, the new proposed plan, the comments received from the public, DNREC's responses to those comments, the final plan and the amended final plan will constitute the remedial decision record for the site.

Section II presents a summary of the site description, history and previous investigations of the site. Section III provides a description of the RI results. Section IV presents a discussion of the remedial action objectives. Section V presents the new proposed plan of remedial action. Section VI discusses public participation requirements.

2.0 SITE DESCRIPTION AND HISTORY

Site Setting

The site is located along the southern bank of the Christina River in Wilmington, Delaware (Figures 1 & 2). The site is bordered on the north by the Christina River, on the west by a parking lot (200 S. Market Street), on the east by 207 A Street, and on the south by A Street. The site is part of a larger property, which consists of three parcels: 201 A Street, 205 A Street, and 207 A Street, which in total encompass 3.58 acres. However, 207 A Street, which consists of 1.76 acres, was assessed as part of a separate investigation and is not part of the site. The remaining two parcels (combined as tax parcel number 26-050.00.005) constitute the 201/205 A Street site, which is approximately 1.82 acres in size. The Christina River Club Restaurant and a warehouse are located on the site. The remainder of the site is utilized as a paved parking lot. The surrounding land use is generally light industrial and commercial.

Site and Project History

EA, through a review of historical aerial photographs, United States Geologic Survey topographic maps, historical Sanborn fire insurance maps and city directories, investigated the historical use of the site. The 1887 and 1893 Sanborn maps indicated that the site was used as a planing mill, coal and lumberyard, and was owned by the Cold Spring Ice and Coal Company. By the 1920s, the site was occupied by the American Oil Company, and contained an aboveground storage tank farm, several small buildings and railroad sidings. The American Oil Company continued to operate at the property until the 1980s.

The RDC entered into a VCP Agreement in 2001 with DNREC to perform a RI. The objectives of the RI were to evaluate potential risks to human health, welfare and the environment posed by the site.

3.0 INVESTIGATION RESULTS

EA conducted a Phase II investigation at the site in October 1999, which consisted of direct push soil and groundwater sampling. Subsurface soil samples were collected from five direct push soil borings at the site. Groundwater samples were collected from temporary wells constructed in three of the soil boring locations.

Subsequent to the Phase II investigation, a RI was conducted in April and May 2001 by EA, in which soil samples were collected from a total of seven soil borings, with groundwater samples collected from permanent monitoring wells constructed in three of the soil boring locations.

The samples were analyzed for contaminants listed on the Target Analyte List (TAL) and the Target Compound List (TCL). The analytical results were first compared to the DNREC-SIRB Uniform Risk Based Remediation Standards (URS) in a non-critical water resource area, using the unrestricted use risk scenario as a screen in order to determine potential contaminants of concern (COCs). Those chemicals whose concentrations exceeded the unrestricted use URS were selected as COCs and included in a human health risk assessment and ecological risk assessment screening.

The only volatile organic compound (VOC) detected above the unrestricted use URS values was benzene in two (2) Phase II soil boring locations. Benzene was detected at concentrations of 3.4 milligrams per kilogram (mg/kg) from the soil sample collected from soil boring location B-4, and 1.2 mg/kg from the soil sample collected from location B-9 (URS value of 0.8 mg/kg). However, concentrations of benzene did not exceed the unrestricted URS value in 83% of the soil samples collected. In accordance with the 75%/10X rule outlined in the *Remediation Standards Guidance*, attainment of guidance criteria can be obtained if sample concentrations from at least 75% of the samples (from the same media) fall below the respective URS for the contaminant in question, with no single result exceeding the URS value by a factor of 10.

Subsurface soil samples from eleven (11) Phase II and RI soil boring locations contained one or more polynuclear aromatic hydrocarbons (PAHs) at concentrations exceeding the respective unrestricted use URS values. Benzo(a)pyrene exceeded the unrestricted use URS value of 0.09 mg/kg in eleven locations, with concentrations ranging up to 7.1 mg/kg. Other PAHs detected in subsurface soils at concentrations in exceedence of the respective unrestricted URS values include benzo(a)anthracene (up to 6.9 mg/kg; URS of 0.9 mg/kg), benzo(b)fluoranthene (up to 7.7 mg/kg; URS of 0.9 mg/kg), dibenz(a,h)anthracene (up to 1.3 mg/kg; URS value of 0.09

mg/kg), and indeno(1,2,3-cd)pyrene (up to 3.3 mg/kg; URS of 0.9 mg/kg). The highest concentrations of each of the above compounds were detected in samples collected from soil boring B-4, located along the 205/207 A Street parcel boundary. However, all of the contaminant concentrations were below the respective restricted use URS values.

Arsenic and iron exceeded their unrestricted use URS value of 0.4 mg/kg and 2,300 mg/kg, respectively, in every soil sample, at concentrations ranging up to 30.7 mg/kg and 58,000 mg/kg, respectively. However, all of the contaminant concentrations were below the respective restricted use URS values.

The results of the Phase II investigation identified several metals and PAH compounds at concentrations exceeding the respective groundwater URS values. However, due to the sampling method utilized, these groundwater samples contained a high level of suspended fine sediment, and were not considered to be representative of groundwater quality. The RI, which utilized permanent monitoring wells, did not detect any PAH compounds.

Each of the three RI groundwater samples contained arsenic (up to 63 micrograms per liter ["µg/L"], MW-2), iron (up to 28,000 µg/L, MW-3) and manganese (up to 819 µg/L, MW-3) above their respective groundwater URS values. Both the iron and manganese values are based upon drinking water Secondary Maximum Contaminant Levels of 300 µg/L and 50 µg/L, respectively, and represent non-enforceable aesthetic standards. Further, public water is available in this area, and a Groundwater Management Zone (GMZ) restricting use of groundwater in Wilmington is presently in place, both of which prevent human exposure to site groundwater.

Contaminants identified as COCs and retained for inclusion in the human health risk assessment include: benzo(b)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, benzo(a)anthracene, iron, manganese and arsenic. The calculations were conducted using the DNREC Site-Specific Calculator for Multiple Analytes (DNREC May 2000 version). The initial risk assessment that was performed assumed a restricted use risk setting, and development of the site into a multi-story office building. It was performed in order to evaluate the cumulative risk associated with the exposure to soil and ingestion of groundwater on the site. The initial risk assessment calculated a soil cumulative risk to be $4X10^{-6}$, which is below the HSCA action level of $1X10^{-5}$, and a hazard quotient (HQ) below 1.0. Therefore, it was concluded that the soil did not pose an unacceptable risk to human health, given a commercial/industrial risk setting.

Based upon the request to change the proposed development at the site from commercial/industrial to urban residential, a second risk assessment was performed, at DNREC's request, to take into account the proposed change in land use. The exposure pathway evaluation determined that the only potential completed pathway is exposure to contaminated soil by future construction workers. At the present time there are no completed pathways as the majority of the site is covered by asphalt. After development of the site, exposure pathways will be eliminated as the site will be covered by buildings, landscape , and paving. In this case, the only possible exposure pathway would be that of construction workers exposed to direct contact with subsurface soil or to fugitive dust emissions during construction, future utility maintenance, and similar activities.

The results of the risk calculations show that noncancer risk (HQ) to the construction worker was 0.83, which is below the 1.0 threshold. The ingestion route of exposure accounted for 97% of the total risk. Thus the potential for noncancer effects to the construction worker are acceptable. The risk calculations for cancer risk ranged from 2×10^{-7} for benzo(b)fluoranthene and dibenz(a,h)anthracene to 2×10^{-6} for benzo(a)pyrene. The total cancer risk to the construction worker was 4×10^{-6}. Incidental ingestion of soil accounted for 92% of cancer risks. The Regulations set a cleanup and background risk of 1×10^{-5}. Therefore, the total cancer risk level of 4×10^{-6} is acceptable under the Regulations.

Due to the site's location along the Christina River, it was necessary to assess what potential impacts, if any, the site could pose to the environmental health of the river. The site will remain paved and will be re-developed, with the existing bulkhead being maintained, thus precluding erosion of site soils into the river. Groundwater loading values were also calculated to evaluate the possible effects of groundwater discharge into the Christina River. Loading values for all organic and metallic analytes detected in groundwater during both the Phase II and RI investigations were calculated based upon the measured groundwater flow rate at the site and the flow rate of the Christina River. Based upon these calculations, it was determined that there were no exceedences of Delaware's Surface Water Quality Standards (DSWQS) by the discharge of site groundwater into the Christina.

4.0 REMEDIAL ACTION OBJECTIVES

According to Section 8.4 (1) of the Regulations, site-specific remedial action objectives (RAOs) must be established for all plans of remedial action. The Regulations provide that DNREC set objectives for land use, resource use and cleanup levels that are protective of human health and the environment.

Qualitative objectives describe in general terms what the ultimate result of the remedial action, if necessary, should be. The following qualitative objectives are determined to be appropriate for the site:

- Prevent residential exposure to impacted media;
- Minimize potential exposure to site contaminants of concern for construction workers at the site;
- Prevent environmental impacts, specifically to the Christina River, due to impacted media at the site; and
- Continue the use of public water for all purposes to the surrounding community.

These objectives are consistent with the current use of the site as a commercial use in an urban setting, New Castle County zoning policies, state regulations governing water supply and worker health and safety.

Based on the qualitative objectives, the quantitative objectives are:

1. Prevent human exposure to soils and groundwater contaminated by VOCs, PAHs, and metals at concentrations above their respective URS values.

2. Prevent discharge of groundwater contaminated by VOCs, PAHs, and metals into the Christina River above Delaware Surface Water Quality Standards.

5.0 PROPOSED PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the site information and the above remedial action objectives, the recommended remedial actions for the site consist of the following activities as described below:

1. Cap any impacted soils containing the aforementioned constituents at concentrations between the noted 1×10^{-4} levels (above) and 1×10^{-5} levels. The proposed cap would be constructed in accordance with a DNREC-approved remedial action workplan, and in conjunction with development of the property and will include containment of the soils underneath proposed structures and asphalt parking lots and any clean fill needed to bring the site up to grade. A geotextile fabric will be installed immediately above the residual contaminated soil as a marker boundary to identify the presence of the contaminated layer.

2. Maintain the existing bulkhead along the Christina River to contain the existing impacted soils at the site so as to prevent their erosion into the Christina River.

3. Placement of a deed restriction on the property, no longer than ninety days following DNREC's adoption of the final plan: a) prohibiting any digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing activities on the property (including the removal or modification of the bulkhead) below the geotextile fabric marker boundary without the prior written approval of the DNREC; b) requiring written approval from DNREC prior to any repair, renovation or demolition of the existing structures on the property, or any paved surfaces; and c) identifying that the site is included in the GMZ for the City of Wilmington which prohibits the installation of any water well on, or use of groundwater at, the site without the prior written approval of DNREC.

4. Prepare and implement an Operation and Maintenance (O&M) Plan within two years to be approved by DNREC to maintain the integrity of the structures and asphalt cap.

6.0 PUBLIC PARTICIPATION

DNREC actively solicits public comments or suggestions on the amended proposed plan of remedial action and welcomes opportunities to answer questions. Please direct written comments to:

DNREC Site Investigation and Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720

Attention: Kristen Thornton

The comment period begins Monday, July 14, 2003, and ends at the close of business (4:30 p.m.) Monday, August 4, 2003 If so requested, a public meeting will be held on the amended proposed plan. The meeting time and place will be announced if said meeting is requested.

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John Blevins, Director
Division of Air and Waste Management

7/9/03
Date of Review of Amended Proposed Plan

Figures 1 & 2 from Remedial Investigation Report

Prepared by EA Engineering, Science and Technology, Inc., September 2001.

Figure 1. Site location map, 201 and 205 A Street, Wilmington, Delaware. (Source: USGS 7.5 Minute Series Topographic Map, Wilmington South Quadrangle, DE)

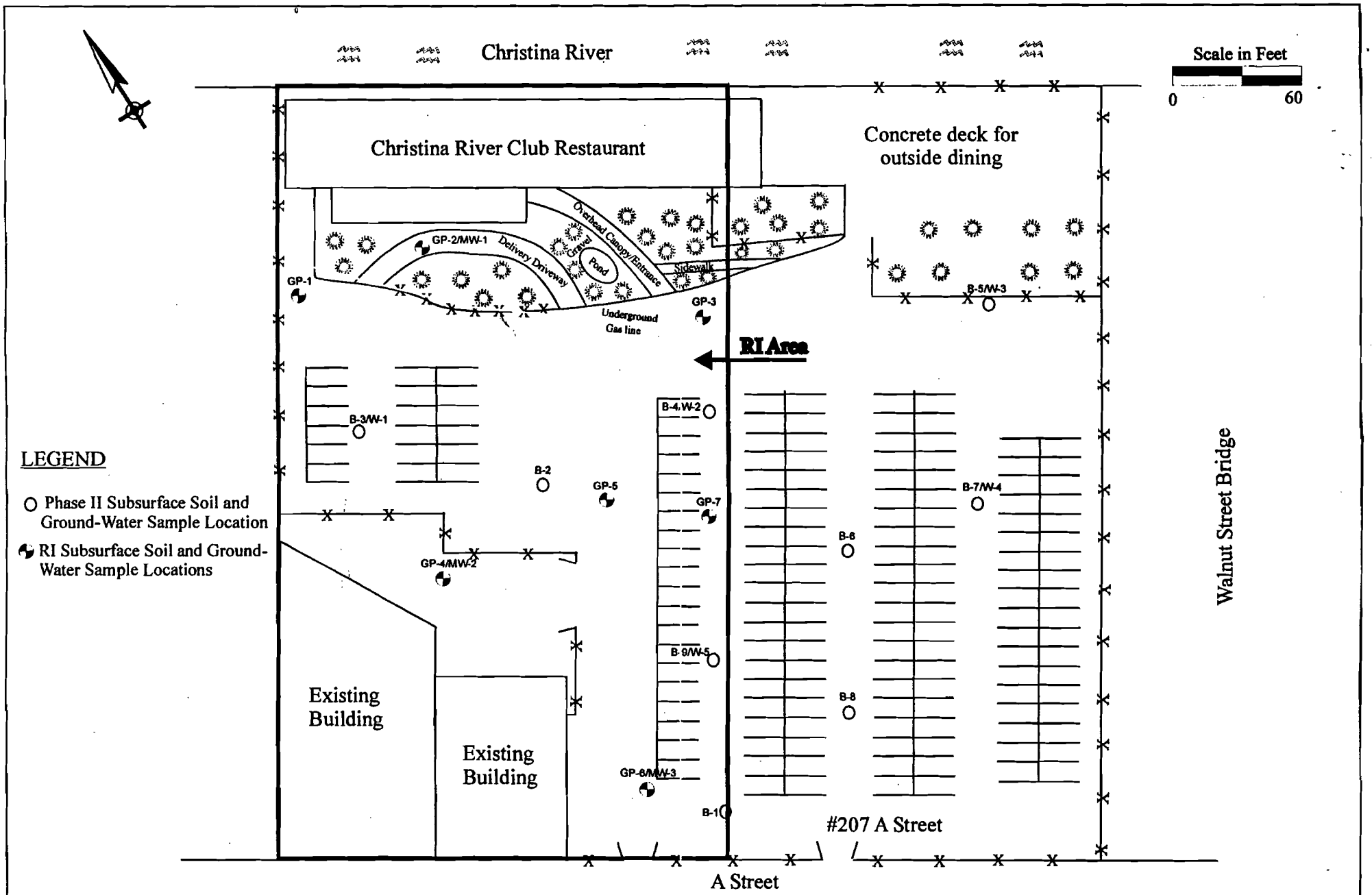

Figure 2. Site sketch of 201, 205, and 207 A Street, Wilmington, DE showing approximate locations of the Phase II sample locations, and the RI sample locations.

APPENDIX A

Ground-Water Analytical Results from the 26 October 1999 Phase II Investigation
TCL VOC

Concentration, µg/L

Constituent	[illegible]	[illegible]	[illegible]	[illegible]
Benzene	**0.4**	<1	**95**	**51**
Toluene	**750**	<1	15	1
Ethylbenzene	**700**	<1	57	1
Total Xylenes	**1,200**	<2	49	6

[illegible]

Ground-Water Analytical Results from the 26 October 1999 Phase II Investigation
TCL SVOC by EPA Method 625
Concentration, µg/L

Phenol	4,000	<8	<8	<8
bis(2-Chloroethyl)ether	0.01	<8	<8	<8
2-Chlorophenol	40	<8	<8	<8
1,3-Dichlorobenzene	0.5	<8	<8	<8
1-4,Dichlorobenzene	0.4	<8	<8	<8
1,2-Dichlorobenzene	64	<8	<8	<8
2-Methylphenol	180	<8	<8	<8
bis(2-chloroisopropyl) ether	0.3	<8	<8	<8
4-Methylphenol	18	<8	<8	<8
N-Nitrosodi-n-propylamine	0.01	<8	<8	<8
Hexachloroethane	1	<8	<8	<8
Nitrobenzene	0.4	<8	<8	<8
Isophorone	71	<8	<8	<8
2-Nitrophenol	NC	<8	<8	<8
2,4-Dimethylphenol	73	<8	<8	<8
bis(2-Chloroethoxy)methane	NC	<8	<8	<8
2,4-Dichlorophenol	20	<8	<8	<8
1,2,4-Trichlorobenzene	70	<8	<8	<8
Naphthalene	20	<8	35	2 J
4-Chloroaniline	15	<8	<8	<8
Hexachlorobutadiene	0.4	<8	<8	<8
4-Chloro-3-methylphenol	NC	<8	<8	<8
2-Methylnaphthalene	12	<8	<8	<8
Hexachlorocyclopentadiene	26	<8	<8	<8
2,4,6-Trichlorophenol	6	<8	<8	<8
2,4,5-Trichlorophenol	370	<21	<21	<21
2-Chloronaphthalene	NC	<8	<8	<8
2-Nitroaniline	0.2	<21	<21	<21
Dimethylphthalate	37,000	<8	<8	<8
2,6-Dinitrotoluene	4	<8	<8	<8
Acenaphthylene	NC	<8	<8	<8
3-Nitroaniline	NC	<21	<21	<21
Acenaphthene	37	<8	<8	<8
2,4-Dinitrophenol	7	<21	<21	<21
4-Nitrophenol	60	<21	<21	<21
Dibenzofuran	2	<8	<8	<8
2,4-Dinitrotoluene	7	<8	<8	<8
Diethylphthalate	5,000	<8	<8	<8
4-Chlorophenyl phenylether	NC	<8	<8	<8
Fluorene	24	<8	3 J	<8
4-Nitroaniline	NC	<21	<21	<21
4,6-Dinitro-2-methylphenol	0.4	<21	<21	<21
N-Nitrosodiphenylamine	14	<8	<8	<8
4-Bromophenyl phenylether	NC	<8	<8	<8
Hexachlorobenzene	0.04	<8	<8	<8
Pentachlorophenol	0.6	<21	<21	<21

Ground-Water Analytical Results from the 26 October 1999 Phase II Investigation
TCL SVOC by EPA Method 625
Concentration, µg/L

Phenanthrene	120	10	23	<8
Anthracene	180	<8	5 J	<8
Carbazole	3	<8	2 J	<8
Di-n-butyl phthalate	NC	<8	<8	<8
Fluroanthene	150	10	31	<8
Pyrene	18	15	32	<8
Butylbenzylphthalate	730	<8	<8	<8
3,3'-Dichlorobenzidine	0.2	<17	<17	<17
Benzo(a)anthracene	0.09	7 J	13	<8
Bis(2-Ethylhexyl)phthalate	5	<8	<8	<8
Chrysene	9	8 J	12	<8
Di-n-octyl phthalate	73	<8	<8	<8
Benzo(b)fluoranthene	0.09	4 J	9	<8
Benzo(k)fluoranthene	0.90	6 J	11	<8
Benzo(a)pyrene	0.01	6 J	10	<8
Indeno(1,2,3-cd)pyrene	0.09	3 J	5 J	<8
Dibenz(a,h)anthracene	0.01	<8	<8	<8
Benzo(g,h,i)perylene	NC	3 J	6 J	<8
TENTATIVELY IDENTIFIED COMPOUNDS				
Anthracene, 2-methyl-		3 J		
Unknown, Total		37 J	233 J	201 J
Anthracene, 1-methyl-		4 J		
Benzene, propyl-			38 J	
Benzene, 1-ethyl-2-methyl-			29 J	
Indane			60 J	
Benzene, 1-methyl-4-(2-propeny)			28 J	
Benzene, 1-ethyl-2,3-dimethyl			89 J	
Benzene, 1,2,3,4-tetramethyl			32 J	
2,3-Dihydro-1-methylindene			81 J	
Indan, 1-methyl-			98 J	
Benzene, (1-methyl-1-propeny)			47 J	7 J
1H-Indene, 2,3-dihydro-1,3-d			37 J	
Benzene, 1-ethenyl-4-methyl-				20 J
Benzene, 1-ethyl-3,5-dimethyl-				9 J
Benzene, 2-ethenyl-1,4-dimethyl-				6 J
Naphthalene, 1-methyl-				6 J
Total TICs		44 J	772 J	249 J
Total PAHs (including TICs)		79 J	162 J	8 J

Subsurface Soil Analytical Results from the 26 October 1999 Phase II Investigation
TAL Metals

Concentration in mg/kg

Elements	URS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aluminum	**7800**	**28000**	6600	4400	**12000**	3200
Antimony	**3**	<2.4	<2.5	<2.3	<2.8	<2.9
Arsenic	**0.40**	**6.1**	**21**	**9.5**	**28**	**6.2**
Barium	**550**	52	190	76	130	73
Beryllium	**16**	0.64	0.52	<0.46	<0.56	<0.59
Cadmium	**4**	<0.96	<2.5	<0.92	<0.56	<0.59
Calcium	**NC**	12000	3800	1600	5700	5100
Chromium	**12000**	30	18	11	32	9.1
Cobalt	**470**	6.6	8.2	6.4	7.1	6.4
Copper	**310**	17	66	30	67	40
Iron	**2300**	**28000**	**58000**	**14000**	**13000**	**9300**
Lead	**400**	38	130	57	310	59
Magnesium	**NC**	8000	690	660	1200	510
Manganese	**160**	120	**210**	110	100	92
Mercury	**10**	<0.12	<0.12	<0.11	1.2	0.41
Nickel	**160**	13	15	16	13	16
Potassium	**NC**	1300	510	380	820	430
Selenium	**39**	<2.4	<2.5	<2.3	<5.6	<2.9
Silver	**39**	<1.2	<1.3	<1.1	<1.4	<1.5
Sodium	**NC**	<120	<130	<110	<140	150
Thallium	**18**	<1.2	<1.3	<1.1	<1.4	<1.5
Vanadium	**55**	41	22	16	24	14
Zinc	**2300**	39	200	51	430	29

[illegible] = Below Laboratory Detection Limit
NC = No Criteria
Delaware Uniform Risk-Based Remediation Standards (URS) for Protection of Human Health, Unrestricted Residential
[illegible] = Non-Cancer Risk Based Screening Criteria (NC) Developed [illegible]
The URS value for [illegible] is [illegible]
Concentration [illegible] Wilmington [illegible] URS value

Subsurface Soil Analytical Results from the 26 October 1999 Phase II Investigation
TCL SVOC by EPA Method 8270C
Concentration, µg/Kg

Phenol	1,000,000	<400	<430	<390	<470	<490
bis(2-Chloroethyl)ether	200	<400	<430	<390	<470	<490
2-Chlorophenol	39,000	<400	<430	<390	<470	<490
1,3-Dichlorobenzene	230,000	<400	<430	<390	<470	<490
1-4,Dichlorobenzene	27,000	<400	<430	<390	<470	<490
1,2-Dichlorobenzene	560,000	<400	<430	<390	<470	<490
2-Methylphenol	390,000	<400	<430	<390	<470	<490
bis(2-chloroisopropyl) ether	9,000	<400	<430	<390	<470	<490
4-Methylphenol	39,000	<400	<430	<390	<470	<490
N-Nitrosodi-n-propylamine	90	<400	<430	<390	<470	<490
Hexachloroethane	46,000	<400	<430	<390	<470	<490
Nitrobenzene	4,000	<400	<430	<390	<470	<490
Isophorone	670,000	<400	<430	<390	<470	<490
2-Nitrophenol	NC	<400	<430	<390	<470	<490
2,4-Dimethylphenol	160,000	<400	<430	<390	<470	<490
bis(2-Chloroethoxy)methane	NC	<400	<430	<390	<470	<490
2,4-Dichlorophenol	23,000	<400	<430	<390	<470	<490
1,2,4-Trichlorobenzene	78,000	<400	<430	<390	<470	<490
Naphthalene	160,000	290 J	280 J	280 J	2100	<490
4-Chloroaniline	31,000	<400	<430	<390	<470	<490
Hexachlorobutadiene	8,000	<400	<430	<390	<470	<490
4-Chloro-3-methylphenol	NC	<400	<430	<390	<470	<490
2-Methylnaphthalene	160,000	<400	<430	<390	<470	<490
Hexachlorocyclopentadiene	10,000	<400	<430	<390	<470	<490
2,4,6-Trichlorophenol	58,000	<400	<430	<390	<470	<490
2,4,5-Trichlorophenol	780,000	<1000	<1100	<970	<1200	<1200
2-Chloronaphthalene	NC	<400	<430	<390	<470	<490
2-Nitroaniline	500	<1000	<1100	<970	<1200	<1200
Dimethylphthalate	1,000,000	<400	<430	<390	<470	<490
2,6-Dinitrotoluene	8,000	<400	<430	<390	<470	<490
Acenaphthylene	NC	98 J	76 J	240 J	390 J	<490
3-Nitroaniline	NC	<1000	<1100	<970	<1200	<1200
Acenaphthene	470,000	270 J	240 J	510	200 J	<490
2,4-Dinitrophenol	16,000	<1000	<1100	<970	<1200	<1200
4-Nitrophenol	63,000	<1000	<1100	<970	<1200	<1200
Dibenzofuran	31,000	290 J	210 J	<390	130 J	<490
2,4-Dinitrotoluene	16,000	<400	<430	<390	<470	<490
Diethylphthalate	1,000,000	<400	<430	<390	<470	<490
4-Chlorophenyl phenylether	NC	<400	<430	<390	<470	<490
Fluorene	310,000	460	300 J	470	380 J	<490
4-Nitroaniline	NC	<1000	<1100	<970	<1200	<1200
4,6-Dinitro-2-methylphenol	80	<1000	<1100	<970	<1200	<1200
N-Nitrosodiphenylamine	130,000	<400	<430	<390	<470	<490
4-Bromophenyl phenylether	NC	<400	<430	<390	<470	<490
Hexachlorobenzene	400	<400	<430	<390	<470	<490
Pentachlorophenol	5,000	<1000	<1100	<970	<1200	<1200
Phenanthrene	1,000,000	2800	2700	4800	3900	320 J
Anthracene	1,000,000	630	650	1200	1400	70 J
Carbazole	32,000	380 J	220 J	260 J	250 J	<490
Di-n-butyl phthalate	NC	<400	<430	<390	<470	<490
Fluroanthene	310,000	2600	3300	6400	9000	280 J
Pyrene	230,000	2300	3200	7900	8300	290 J
Butylbenzylphthalate	930,000	<400	<430	<390	<470	<490
3,3'-Dichlorobenzidine	1,000	<800	<850	<780	<940	<980
Benzo(a)anthracene	900	1200	1700	4300	6900	170 J
Bis(2-Ethylhexyl)phthalate	46,000	<400	<430	<390	<470	<490
Chrysene	87,000	1100	1800	4600	7600	200 J
Di-n-octyl phthalate	160,000	<400	<430	<390	<470	<490
Benzo(b)fluoranthene	900	780	1300	2300	7700	120 J
Benzo(k)fluoranthene	9,000	760	1400	2900	5300	140 J

J = Estimated Value, Below Laboratory Detection Limit
< = Below Laboratory Detection Limit
NC = No criteria

Subsurface Soil Analytical Results from the 26 October 1999 Phase II Investigation
TCL SVOC by EPA Method 8270C
Concentration, µg/Kg

Benzo(a)pyrene	90	850	1400	3200	7100	120 J
Indeno(1,2,3-cd)pyrene	900	410	640	1200	3300	75 J
Dibenz(a,h)anthracene	90	170 J	220 J	450	1300	<490
Benzo(g,h,i)perylene	NC	450	720	1300	3200	97 J
TENTATIVELY IDENTIFIED COMPOUNDS						
Naphthalene, 1-methyl-			420 J			
Butylated Hydroxytoluene		890 J				
Unknown, Total		480 J	700 J	1020	18100 J	5330 J
Anthracene, 2-methyl-			1050 J	1500 J		
Dibenzofuran, 4-methyl-		180 J				
Dodecane, 2, 7, 10-trimethyl-		550 J				
Tetradecane		1000 J				
Eicosane		270 J				
Anthracene, 9-methyl-		290 J	540 J	1900 J		
Tridecane		610 J				
Octadecane, 2,6-dimethyl-		530 J				800 J
4H-Cyclopenta[def]phenanthre			940 J	2900 J		
Naphthalene, 2-phenyl-			350 J	590 J		
9,10-Anthracenedione			300 J	570 J		
Phenanthrene, 2,5-dimethyl			290 J			
Pyrene, 2-methyl-			1680 J	440 J		
11H-Benzo[a]fluorene			760 J	1000 J		
Pyrene, 1-methyl-			390 J	440 J		
Benzo[b]naphtho[2,1-d]thioph			320 J			
Benzo[ghi]fluoranthene			320 J			
Chrysene, 1-methyl-			560 J			
Benzo[e]pyrene			1700 J	2800 J		
Anthracene, 1-methyl-				620 J		
Phenanthrene, 4-methyl-				1200 J		
Phenanthrene, 4,5-methyl-				520 J		
Phenanthrene, 2,3-methyl-				940 J		
Phenanthrene, 3,6-methyl-				420 J		
Cyclopenta(def)phenanthrenon				650 J		
7H-Benz[de]anthracen-7-one				420 J		
Benz[a]anthracene, 8-methyl-				490 J		
Perylene				760 J		
Octane, 2-methyl-					1800 J	
Benzene, propyl-					2900 J	
Indane					2200 J	400 J
Benzene, 1,3-diethyl-					2200 J	
Benzene, 1,2,4,5-tetramethyl-					3600 J	
Benzene, 1,2,3,4-tetramethyl-					1800 J	
Benzene, 2-ethenyl-1,4-dimet					2200 J	
Benzene, 2-ethenyl-1,3-dimet					2900 J	350 J
Benzene, (2-methyl-1-butenyl)					1500 J	
Undecane, 2,6-dimethyl-					1600 J	
1,2,4-Trimethylbenzene						360 J
Decane, 4-methyl-						360 J
Dodecane, 6-methyl-						880 J
Naphthalene, 2,6-dimethyl-						380 J
Naphthalene, 1,3-dimethyl-						410 J
Undecane						960 J
Naphthalene, 1,4,6-trimethyl-						470 J
Total TICs		4,800 J	10,320 J	19,180 J	40,800 J	10,700 J
Total PAHs (including TICs)		16,308 J	29,696 J	60,470 J	68,450 J	3,142 J

Subsurface Soil Analytical Results from the 19 April 2001 Remedial Investigation
TCL VOC

Concentration, µg/Kg

Constituent	URS	GP-1 2-4 ft	GP-2 15-35 ft	GP-3 0-2 ft	GP-4 4-6 ft	GP-5 2-4 ft	GP-6 1-3 ft	GP-7 3-5 ft
Acetone	**780,000**	1,100 B	930 B	860 B	420 JB	650 B	720 B	780 B
Methylene Chloride	**13,000**	180 JB	180 JB	190 JB	180 JB	170 JB	180 JB	180 JB
Benzene	**800**	<300	<300	45 J	36 J	66 J	<310	310 J
Toluene	**650,000**	75 J	38 J	58 J	<310	160 J	34 J	310 J
Ethylbenzene	**400,000**	<300	<300	110 J	<310	36 J	<310	150 J
Total Xylenes	**420,000**	82 J	340	150 J	110 J	220 J	68 J	750

J = Estimated Value, Below Laboratory Detection Limit
< = Below Laboratory Detection Limit
B = Less than the reporting limit but greater than the method detection limit
Delaware Uniform Risk-Based Remediation Standards, URS for Protection of Human Health, Unrestricted Reuse in Natural Non-Critical Resource Area for Subsurface Soil, December 1999
Concentrations in bold highlighted exceed the URS value

Subsurface Soil Analytical Results from the 19 April 2001 Remedial Investigation
TAL Metals

Concentration in mg/kg

Elements	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Aluminum	**7800**	7120	7710	2210	2690	7210	4440	**7810**
Antimony	**3**	<0.25	<0.25	1.2	0.37 B	<0.25	<0.25	<0.25
Arsenic	**0.40**	**4.2**	**5**	**7.7**	**30.7**	**9.8**	**5.7**	**25.6**
Barium	**550**	53.6	77.1	74.4	146	77.8	111	93
Beryllium	**16**	0.36 B	0.49 B	0.32 B	0.29 B	0.42 B	0.25 B	0.29 B
Cadmium	**4**	0.79	0.98	0.89	0.68	1	0.80 B	1
Calcium	**NC**	33000	4390	1330	3630	21200	5620	5190
Chromium	**12000**	18.1	28.8	9	9.8	13.6	11.1	33.8
Cobalt	**470**	7.6	5.5	2.8 B	3.5 B	11.9	3 B	6
Copper	**310**	34.7	18.2	65.8	31.5	18.6	20.9	33.7
Iron	**2300**	**13300**	**15400**	**6500**	**13300**	**16300**	**13400**	**14000**
Lead	**400**	27.2	130	196	130	36.5	43.4	63.1
Magnesium	**NC**	8470	1720	263 B	380 B	1770	548	2650
Manganese	**160**	**238**	**217**	83.7	81.5	**497**	102	**212**
Mercury	**10**	<0.0069	0.024 B	0.037 B	0.085 B	1.8	0.022 B	0.046 B
Nickel	**160**	11.7	8.2	6.2	6.8	12.4	6.8	8
Potassium	**NC**	871	699	154 B	335 B	670	414 B	1530
Selenium	**39**	<0.16	0.18 B	0.68	0.73	<0.16	0.62	0.16 B
Silver	**39**	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27	<0.27
Sodium	**NC**	173 B	125 B	78.8 B	280 B	153 B	221 B	89.2 B
Thallium	**18**	<0.31	<0.31	<0.31	<0.31	0.33 B	<0.31	<0.31
Vanadium	**55**	19.2	27	10	9.4	23.5	14.4	29.3
Zinc	**2300**	49.2	85.6	59.7	51.9	54.5	44.6	116

[illegible] Below laboratory detection limit
Delaware Uniform Risk-Based Remediation Standards for Site Protection of Human Health Unrestricted Residential Use [illegible]
[illegible] Subsurface Soil [illegible] Table 1 [illegible] November 1996
The [illegible] value for [illegible]
Concentrations highlighted [illegible] the [illegible] value

Subsurface Soil Analytical Results from the 19 April 2001 Remedial Investigation
TCL SVOC by EPA Method 8270C
Concentration, µg/Kg

henol	1,000,000	<380	<390	<420	<400	<390	<410	<410
is(2-Chloroethyl)ether	200	<380	<390	<420	<400	<390	<410	<410
lorophenol	39,000	<380	<390	<420	<400	<390	<410	<410
Dichlorobenzene	230,000	<380	<390	<420	<400	<390	<410	<410
-,Dichlorobenzene	27,000	<380	<390	<420	<400	<390	<410	<410
2-Dichlorobenzene	560,000	<380	<390	<420	<400	<390	<410	<410
ethylphenol	390,000	<380	<390	<420	<400	<390	<410	<410
oxybis(1-Chloropropane)	9,000	<380	<390	<420	<400	<390	<410	<410
-methylphenol	39,000	<380	<390	<420	<400	<390	<410	<410
-Nitrosodi-n-propylamine	90	<380	<390	<420	<400	<390	<410	<410
achloroethane	46,000	<380	<390	<420	<400	<390	<410	<410
benzene	4,000	<380	<390	<420	<400	<390	<410	<410
ophorone	670,000	<380	<390	<420	<400	<390	<410	<410
-Nitrophenol	NC	<380	<390	<420	<400	<390	<410	<410
Dimethylphenol	160,000	<380	<390	<420	<400	<390	<410	<410
-Chloroethoxy)methane	NC	<380	<390	<420	<400	<390	<410	<410
4-Dichlorophenol	23,000	<380	<390	<420	<400	<390	<410	<410
2,4-Trichlorobenzene	78,000	<380	<390	<420	<400	<390	<410	<410
hthalene	160,000	190 J	170 J	270 J	720	<390	480	360 J
loroaniline	31,000	<380	<390	<420	<400	<390	<410	<410
exachlorobutadiene	8,000	<380	<390	<420	<400	<390	<410	<410
-Chloro-3-methylphenol	NC	<380	<390	<420	<400	<390	<410	<410
ethylnaphthalene	160,000	250 J	230 J	380 J	890	<390	690	2,100
achlorocyclopentadiene	10,000	<380	<390	<420	<400	<390	<410	<410
4,6-Trichlorophenol	58,000	<380	<390	<420	<400	<390	<410	<410
4,5-Trichlorophenol	780,000	<1900	<2000	<2100	<2000	<1900	<2100	<2100
loronaphthalene	NC	<380	<390	<420	<400	<390	<410	<410
troaniline	500	<1900	<2000	<2100	<2000	<1900	<2100	<2100
imethylphthalate	1,000,000	<380	<390	<420	<400	<390	<410	<410
6-Dinitrotoluene	8,000	<380	<390	<420	<400	<390	<410	<410
naphthylene	NC	<380	71 J	<420	71 J	<390	79 J	<410
troaniline	NC	<1900	<2000	<2100	<2000	<1900	<2100	<2100
cenaphthene	470,000	<380	210 J	<420	<400	<390	<410	410 J
4-Dinitrophenol	16,000	<1900	<2000	<2100	<2000	<1900	<2100	<2100

Subsurface Soil Analytical Results from the 19 April 2001 Remedial Investigation
TCL SVOC by EPA Method 8270C
Concentration, µg/Kg

-Nitrophenol	63,000	<1900	<2000	<2100	<2000	<1900	<2100	<2100
ibenzofuran	31,000	77 J	180 J	110 J	240 J	<390	190 J	360 J
Dinitrotoluene	16,000	<380	<390	<420	<400	<390	<410	<410
ylphthalate	1,000,000	<380	<390	<420	<400	<390	<410	<410
-Chlorophenyl phenylether	NC	<380	<390	<420	<400	<390	<410	<410
luorene	310,000	<380	310 J	50 J	<400	<390	53 J	730
roaniline	NC	<1900	<2000	<2100	<2000	<1900	<2100	<2100
Dinitro-2-methylphenol	80	<1900	<2000	<2100	<2000	<1900	<2100	<2100
l-Nitrosodiphenylamine	130,000	<380	<390	<420	<400	<390	<410	<410
-Bromophenyl phenylether	NC	<380	<390	<420	<400	<390	<410	<410
achlorobenzene	400	<380	<390	<420	<400	<390	<410	<410
achlorophenol	5,000	<1900	<2000	<2100	<2000	<1900	<2100	<2100
henanthrene	1,000,000	330 J	2,000	410 J	770	93 J	610	1,200
nthracene	1,000,000	<380	620	52 J	120 J	<390	80 J	370 J
azole	32,000	<380	180 J	<420	64 J	<390	<410	<410
butyl phthalate	NC	<380	43 J	<420	<400	42 J	<410	<410
luroanthene	310,000	250 J	1,800	220 J	610	160 J	620	800
yrene	230,000	270 J	1,800	220 J	670	160 J	780	850
lbenzylphthalate	930,000	<380	<390	<420	<400	<390	59 J	<410
Dichlorobenzidine	1,000	<380	<390	<420	<400	<390	<410	<410
enzo(a)anthracene	900	160 J	1,100	130 J	330 J	90 J	400 J	440
is(2-Ethylhexyl)phthalate	46,000	52 J	56 J	50 J	80 J	39 J	240 J	130 J
sene	87,000	240 J	1,100	210 J	390 J	88 J	530	450
octyl phthalate	160,000	<380	<390	<420	<400	<390	<410	<410
enzo(b)fluoranthene	900	230 J	1,300	180 J	480	100 J	640	570
enzo(k)fluoranthene	9,000	78 J	440	56 J	160 J	46 J	220 J	190 J
zo(a)pyrene	90	160 J	1,000	120 J	350 J	80 J	440	440
no(1,2,3-cd)pyrene	900	85 J	570	87 J	230 J	46 J	320 J	270 J
ibenz(a,h)anthracene	90	<380	190 J	<420	68 J	<390	97 J	73 J
enzo(g,h,i)perylene	NC	95 J	510	85 J	220 J	46 J	290 J	230 J
l PAHs		2,415 J	13,781 J	2,580 J	6,383 J	909 J	6,519 J	9,843 J

Ground-Water Analytical Results from the 26 October 1999 Phase II Investigation
TAL Metals

Concentration in mg/L

Elements	[illegible]	[illegible]	[illegible]	[illegible]
Aluminum	**0.2**	**7.8**	**5.8**	**7.2**
Antimony	**0.006**	<0.020	<0.020	<0.020
Arsenic	**0.0005**	**0.035**	**0.048**	**0.11**
Barium	**2**	0.40	0.68	0.50
Beryllium	**0.004**	<0.0040	<0.0040	<0.0040
Cadmium	**0.005**	<0.0040	<0.0040	<0.0040
Calcium	**NC**	88	160	280
Chromium	**0.10**	**0.19**	0.029	0.014
Cobalt	**0.22**	0.011	<0.010	<0.010
Copper	**1.3**	0.092	0.072	0.042
Iron	**0.30**	**43**	**42**	**40**
Lead	**0.015**	**0.23**	**0.30**	**0.087**
Magnesium	**NC**	17	23	65
Manganese	**0.05**	**0.58**	**1.5**	**0.94**
Mercury	**0.002**	0.0013	0.00079	<0.00020
Nickel	**0.10**	0.03	<0.020	<0.020
Potassium	**NC**	15	20	120
Selenium	**0.05**	<0.020	<0.020	<0.020
Silver	**0.10**	<0.010	<0.010	<0.010
Sodium	**NC**	110	65	97
Thallium	**0.002**	<0.010	<0.010	<0.010
Vanadium	**0.026**	**0.033**	0.019	0.021
Zinc	**2**	0.38	0.32	0.19

[illegible] = Below laboratory detection limit
NC = No criteria
Delaware Uniform Risk-Based Remediation Standards (URBRS) for Protection of Human Health, Ingestion of Water
[illegible]
The URBRS value for [illegible] is based on [illegible]
Concentration [illegible] exceed the URBRS value [illegible]

Ground-Water Analytical Results from the 14 May 2001 Remedial Investigation
TAL Metals

Concentration in µg/L

Element	URS	MW-[illegible]	MW-[illegible]	MW-[illegible]
Aluminum	**200***	<42.9	<42.9	<42.9
Antimony	**6**	<1.4	<1.4	<1.4
Arsenic	**0.5**	**59**	**63**	**3.2 B**
Barium	**2000**	491	507	896
Beryllium	**4**	<0.87	<0.087	<0.087
Cadmium	**5**	1.5 B	1.4 B	3.9 B
Calcium	**NC**	170000	174000	141000
Chromium	**100**	<0.89	<0.89	<0.89
Cobalt	**220**	<4.2	<4.2	<4.2
Copper	**1300**	<1.4	<1.4	<1.4
Iron	**300***	**9510**	**9880**	**28000**
Lead	**15**	<1.1	<1.1	<1.1
Magnesium	**NC**	33000	34100	24100
Manganese	**50***	**790**	**803**	**819**
Mercury	**2**	<0.011	<0.011	<0.011
Nickel	**100**	<2.4	<2.4	<2.4
Potassium	**NC**	19700	20200	26900
Selenium	**50**	<2.3	<2.3	<2.3
Silver	**100**	<2.2	<2.2	<2.2
Sodium	**NC**	50900	51800	71600
Thallium	**2**	<3.8	<3.8	<3.8
Vanadium	**26**	<3.4	<3.4	<3.4
Zinc	**2000**	<8.6	<8.6	90.4

< = Below Laboratory Detection Limit
B = Reported value is less than the method detection limit
Delaware Uniform Risk Based Remediation Standards: URS for Protection of Human Health, Ground-Water, February 1998, Revised December 1999
The URS value for Aluminum is the secondary value.
* The value is a secondary maximum contaminant level (SMCL) or other aesthetic limit based on concentrations in food, applied to exceed the primary value.