AMENDED PROPOSED PLAN OF REMEDIAL ACTION

Former Amoco Polymer Plant Site
Operable Unit 1 (OU-1)

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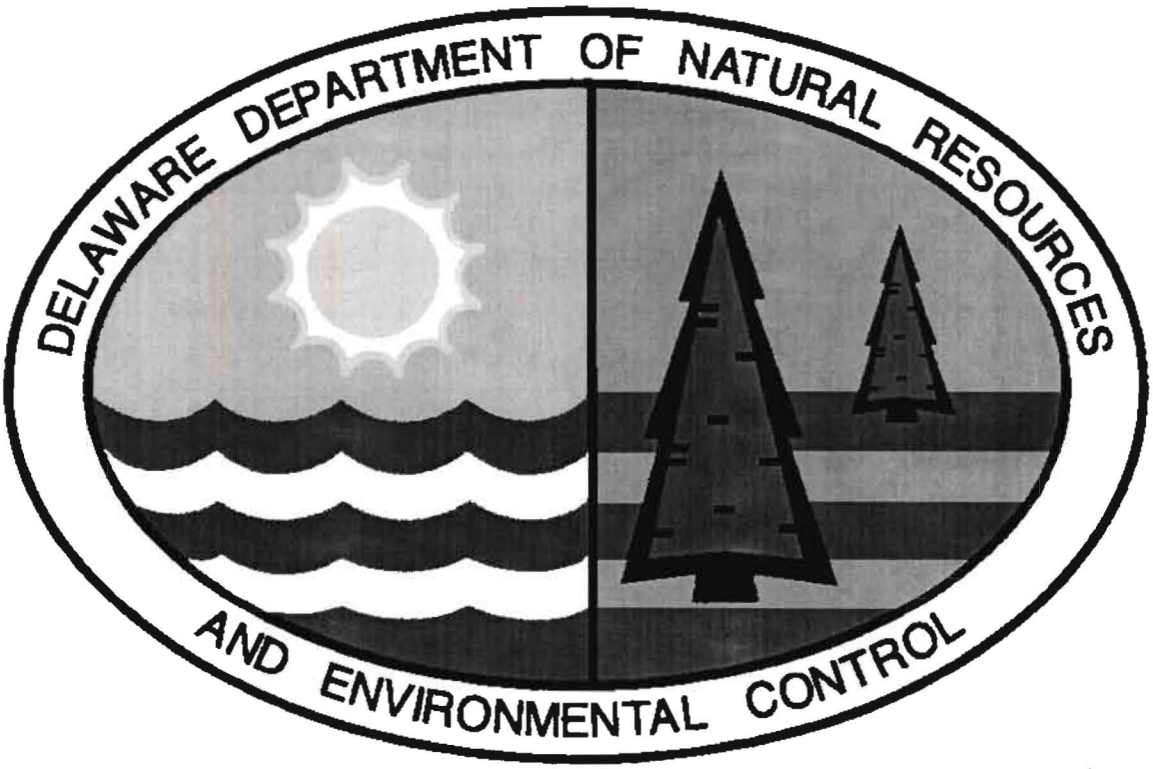

October 2005

Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation and Restoration Branch

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1.0 INTRODUCTION

The Former Amoco Polymer Plant Site (Site) is located on 950 River Road in New Castle, Delaware (Figure 1). The site is bordered by Army Creek to the north, Grantham Lane to the south, River Road to the east, and two Federal Superfund Sites, Army Creek Landfill and Delaware Sand and Gravel, to the west. In order to assess the need for environmental remediation at the site, BP Amoco Corporation (BP Amoco) entered into the Department of Natural Resources and Environmental Control's (Department's or DNREC's) Voluntary Cleanup Program (VCP) in 1996 under the provisions of the Delaware Hazardous Substance Cleanup Act (HSCA), 7 Del. C. Chapter 91. Through a VCP Agreement, BP Amoco agreed to investigate the potential risks posed to public health, welfare and the environment at the site. BP Amoco contracted with RMT, Inc. (RMT) to perform a remedial investigation (RI) of the site.

DNREC divided the Site into two (2) Operable Units (OUs) for the purposes of performing a remedy. Operable Unit-1 (OU-1) consists of the upland portion of the Former Amoco Polymer Plant Site and OU-2 consists of a small portion of the upland and the Army Creek Marsh parcel (Lot 6B, see Figure 1).

The purpose of the RI was to: 1) understand the nature and extent of any soil, sediment and/or groundwater contamination at the site, and to 2) evaluate risks to public health, welfare and the environment associated with any identified contamination. BP Amoco agreed to perform a feasibility study (FS) that would identify and recommend a remedial action, if required by the Department. BP Amoco desires to obtain a Certification of Completion of Remedy from the Department upon completion of all required tasks.

In October 2005, DNREC determined that additional sampling was necessary on OU-1 based on the continued activity on OU-1 and the issuance of the COCR. DNREC conducted surface soil sampling on OU-1 and compared the results to those previously obtained in the RI prior to issuance of the Final Plan of Remedial Action (Final Plan) for OU-1.

Based on the October 2005 sampling event, OU-1 does not present any new risk to public health and the environment, and the remedial action contained in the Final Plan issued in October 2002 remains protective. Therefore, DNREC has determined that no further action is required at OU-1 beyond the remedial action contained in the Final Plan, which shall remain in effect for OU-1.

This document is the Department's Amended Proposed Plan of Remedial Action (Amended Proposed Plan) for the OU-1 portion of the Site. It is based on the results of the RI and the October 2005 sampling performed at the Site. This Amended Final 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 OU-1. All investigation documents related to the site, the Proposed Plan, the Final Plan and the Amended Proposed Plan constitute the remedial decision record.

In October 2002, the Department issued the Final Plan for OU-1 based on previous investigations. As described in Section 12 of the Regulations, the Department provided notice to

the public and provided an opportunity for the public to comment on the proposed plan. No comments were received from the public. The Final Plan designated the selected remedial alternative for OU-1. All remedial actions required by the Final Plan were implemented at OU-1 and DNREC issued a Certification of Completion of Remedy (COCR) in March 2004.

Section 2.0 presents a summary of the site description, site history and previous investigations of the site. Section 3.0 provides a description of the investigation results. Section 4.0 presents a discussion of the remedial action objectives (RAOs). Section 5.0 presents the final plan of remedial action for OU-1.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Setting

The Former Amoco Polymer Plant Site is located at 950 River Road and is bordered by Army Creek to the north and Grantham Lane to the south, River Road to the east, and two Superfund sites (Army Creek Landfill and Delaware Sand and Gravel) to the west (Figure 1). The site consists of approximately 68 acres and consists of the following tax parcels numbers: Lot 7 Tax ID # 100360008, Lot 8 Tax ID # 1003600004, Lot 9 Tax ID # 1003500065, Roadbed Tax ID # 1003500066, Lot 10 Tax ID # 1003500064, Lot 11 Tax ID # 1003500009, and 950 River Road Tax ID # 10003500058. The site currently includes buildings, paved parking lots, foundations and pillars from remnants of the former polymer facility and open space.

2.2 Site and Project History

BP Amoco and Avisun Inc. previously utilized the site as a polypropylene manufacturing facility from 1961 to 1980. In October 1980, an explosion at the plant terminated operations at the polypropylene plant. The remnants of the buildings were demolished and asbestos containing materials were placed in the Amoco Asbestos Landfill (see Figure 1). Prior to the polypropylene operations, OU-1 and OU-2 were maintained as open land. In 1984, BP Amoco donated the facility to the State of Delaware. In 1985, the State of Delaware sold the facility to Dureco Polymers, Inc. (Dureco). Dureco currently owns the site and the OU-1 portion of the site is proposed for future redevelopment. In November 1996, BP Amoco entered into a VCP Agreement with DNREC to conduct the RI.

3.0 Investigation Results

In 1984 and 1985, a preliminary assessment and site inspection (PA/SI) for OU-1 was conducted by the United States Environmental Protection Agency (USEPA). Total metals were detected in the groundwater as part of the PA/SI. In 1986, the USEPA determined that no further action by the Federal Superfund program was required. The OU-1 and OU-2 were deferred by the USEPA to the State of Delaware for evaluation and remediation with the completion of the SI in 1986. In 1990, the HSCA was enacted, and OU-1 and OU-2 were included as HSCA sites.

In November 1998, BP Amoco conducted a Phase I RI on OU-1 and OU-2 to identify and characterize potential releases of hazardous substances, and to evaluate human and ecological risk. To supplement the Phase I RI, a Phase II RI was conducted in May 2001 in order to further delineate the nature and extent of contamination at OU-1 and OU-2. The Phase II RI was conducted to complete the environmental investigation at the site. BP Amoco's Phase I and II RIs consisted of sixty-nine (69) direct push locations with groundwater samples collected from ten (10) locations, thirty-three (33) test pit locations, seventeen (17) hand auger locations, and twelve (12) monitoring wells (see Plate 1). Surface and subsurface soil samples were collected at each direct push and test pit location and analyzed for semivolatiles organics (SVOCs), pesticides/polychlorinated biphenyls (PCBs); volatile organics compounds (VOCs), Target Analyte List (TAL) metals, titanium, cyanide, mirex, kepone, photomirex and Dechlorane Plus.

In addition to the Phase I and Phase II RIs conducted by BP Amoco, Dureco conducted an RI in September 1998 of a soil pile placed on the site from the adjacent Harry Wood Landfill. The soil was evaluated for ecological and human heath risk.

Following the completion of the RIs, a formal risk assessment and focused feasibility study were performed. After the issuance of the COCR in March 2004, DNREC conducted additional surface soil sampling in October 2005.

3.1 Soil Results

The following tables present chemicals of concern from the various RIs. OU-1 has been separated into different lots for remedy consideration due to the site geology and the proximity to a sensitive environment, Army Creek Marsh. Therefore, the remedial goals for each lot vary. The Lots 6A, 7, 9, 10, and 11 and the roadbeds are restricted non-critical water resource areas. Lots 6D, 6C and the Former Amoco Asbestos Landfill are considered restricted critical water resource areas. Lots 6A, 6D, 7, 9, roadbeds and the Amoco Asbestos Landfill contained no VOCs, SVOCs, TAL metals, titanium, cyanide, mirex, kepone, photomirex above the respective Uniform Risk-Based Standard (URS) values. Dechlorane Plus does not have a URS value, but concentrations detected in these areas will not affect human health or the environment based on ecological information associated with the product. The tables below summarize the analytical results from each lot. The highest analytical result is identified after each lot location. Some areas have no contamination above established action levels. The results of the investigations indicate that OU-1 and OU-2 areas contain elevated contaminant concentrations in soil that exceed the URS values for restricted use.

Lot 10 (HA-02)

Compound	Analytical Results (mg/kg)	URS Non-Critical Water Resource Area Action Levels/RAOs (mg/kg)
Hexavalent Chromium	54.1	35
Vanadium	5,200	1,400

Lot 11 (HA-12)

Compound	Analytical Results (mg/kg)	URS-Restricted Non-Critical Water Resource Action Levels/RAOs Area (mg/kg)
Arsenic	121	11
Lead	1,690	1,000

Lot 6B (Mirex Soil Pile)

Compound	Analytical Results (mg/kg)	URS-Restricted Critical Water Resource Area Action Levels/RAOs (mg/kg)
Mirex	39	0.7

Lot 6C (DP-49)

Compound	Analytical Results (mg/kg)	URS-Restricted Critical Water Resource Area Action Levels/RAOs (mg/kg)
C11-C22 PAHs	474	200
Alkyl/nonyl Phenols-Igepal	>100	10*
Mirex	3.6	0.7
Arsenic	14	11

*Remedial action goal established by the Department.

3.2 Groundwater Results

Shallow groundwater results of the RI indicate that the MW-10 is contaminated with VOCs, arsenic and antimony that exceed the DNREC groundwater URS and the MCLs (see table below).

Groundwater (MW-10)

Compound	Analytical Result (mg/l)	Uniform Risk-Based Standard (URS)-Restricted Use Non-Critical Water Resource Area (mg/l)	Maximum Contaminant Level (MCL) if applicable (mg/l)
1,1-Dichloroethene	0.025	0.007	0.007
1,1,1-Trichloroethane	0.470	0.200	0.200
Antimony	0.040	0.006	0.006
Arsenic	0.016	0.050	0.010

There are no known uses of local groundwater as a drinking water source in the area; however, the lower and upper aquifers are connected due to the absence of a significant clay layer between the aquifers at the northern portion of the site (Lot 6C and 6D). The groundwater results are from where the clay layer exists. Groundwater loading values were calculated to evaluate the possible groundwater discharge to the Army Creek and Marsh. No additional groundwater samples were taken in October 2005.

3.3 Results and Relative Risk

Based upon the data evaluated for OU-1 and OU-2, exposure to vanadium, arsenic, hexavalent chromium and lead in shallow soils in Lots 10 and 11 in a 100 x 100 ft. area would result in a carcinogenic risk exceeding $1x10^{-5}$ or a Hazard Index of 1.0. Therefore, these contaminant concentrations in the shallow soils of Lots 10 and 11 would present a health risk for future workers. In addition, the mirex soil pile on Lot 6B has an estimated cumulative increased cancer risk that would exceed $1x10^{-5}$. Surface soils on Lot 6C do not present a health risk. However, the subsurface soils in a portion of Lot 6C do not present an unacceptable risk at this time unless the soils are exposed (see Figure 1).

4.0 REMEDIAL ACTION OBJECTIVES

The Final Plan had a number of remedial action objectives (RAOs) for OU-1. These remain the RAOs for this Amended Final Plan. According to Section 8.4 (1) of the Regulations, site-specific 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. On this site the remedial goals for each lot vary. Therefore the objectives have been set on a lot by lot basis as described in Section 3.1.

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 OU-1:

- Control potential human and ecological exposure (dermal, inhalation and ingestion) to impacted site soils; and
- Control potential human exposure and ecological exposure (ingestion and inhalation) to impacted site groundwater.

These objectives are consistent with the current and proposed use of the site as a non-residential use in an urban setting, state regulations governing water supply, and worker health and safety.

Quantitative objectives define specific levels of remedial action to achieve protection of human health and the environment. Based on the qualitative objectives, the quantitative objectives will be to ensure that future site users, such as site workers, construction workers, visitors, and trespassers, do not come in contact with soils that contain elevated levels of contaminants above the established restricted use URS values.

Based on the qualitative objectives, the quantitative objectives are:

1. Prevent human and ecological exposure to soils and groundwater contaminated by chemicals that would result in a carcinogenic risk exceeding $1x10^{-5}$ or a Hazard Index of 1.0, or lead concentrations exceeding 1,000 mg/kg.

The compounds detected in the groundwater are antimony, arsenic and VOCs. There are no known users of local groundwater as a primary drinking water source in the area and no use of groundwater at OU-1. The groundwater flow direction is to the north and groundwater generally discharges to Army Creek Marsh. BP Amoco conducted a groundwater evaluation on OU-1 at the request of DNREC as part of the RIs. Mass loading calculations indicate that site-related concentrations reaching the Army Creek Marsh would be well below the applicable "Surface Water Quality Criteria for the Protection of Aquatic Life." This additional groundwater investigation was only designed to determine if there was any unacceptable impact on the marsh, based solely on releases of hazardous substances from groundwater on OU-1. The additional groundwater investigation did not evaluate the cumulative effect of releases from any potential off-site sources.

Based on this information, the contaminant concentrations in the groundwater do not pose a current risk to human health or the environment. The shallow groundwater (MW-10) does pose an unacceptable risk as a drinking water source. The shallow groundwater is currently not a drinking water source.

5.0 FINAL PLAN OF REMEDIAL ACTION

As stated in Section 3.0 of this Final Plan, soils in specific areas at the site contain elevated levels of contaminants. The Department determined that in the Final Plan that the following actions were required at OU-1:

1. Removal and disposal of soil from Lots 10 and 11 to restricted use values for arsenic, lead, hexavalent chromium and vanadium in areas defined in Figure 2.
2. Placement of a deed restriction on the property limiting the property to restricted land use (non-residential uses) and prohibiting any digging, trenching or excavation activities on a portion of Lot 6C (see Figure 1) without prior approval of the Department.
3. Placement of a Groundwater Management Zone (GMZ) and associated deed restriction at OU-1 to prevent future use of the groundwater beneath the site without prior approval of DNREC.
4. Development of an Operations and Maintenance (O&M) Plan for the Former Amoco Asbestos Landfill to insure future maintenance of the existing cap, fence and cover at the location. For additional protective measures, the Amoco Asbestos Landfill could be paved.

These remedial actions were completed on OU-1, and DNREC issued a COCR in March 2004.

6.0 Amended Proposed Plan of Remedial Action

As stated in Section 3.0, the sampling conducted in October 2005 found no new risks to public health and the environment at OU-1. Therefore, DNREC proposes that no further action is required at OU-1 beyond the remedial action contained in effect for OU-1. In addition, OU-1 shall be further subdivided into additional Operable Units in order to accommodate future

I. 7.0 PUBLIC PARTICIPATION

The Department actively solicits public comments or suggestions on the amended proposed plan of remedial action and welcomes opportunities to answer questions. The comment period begins on October 9, 2005 and ends at the close of business (4:30 p.m.) on October 28, 2005.

Please direct written comments to:

Attention: Robert S. Schulte
DNREC Site Investigation and Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720

James D. Werner
Director, Division of Air and Waste Management

18 Oct 2005
Date

FIGURE 1 PROJECT LOCATION MAP

PLATE 1 SAMPLE LOCATION PLAN