FINAL PLAN OF REMEDIAL ACTION

ROUTE 4 ORCHARD SITE
NEWARK, DELAWARE

DE-1205

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

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1.0 INTRODUCTION

The Route 4 Orchard (site) is located in Newark, New Castle County, Delaware (Figure 1). In order to determine the potential for environmental liability prior to the commercial development of the site, the current owner, Dr. Abdollah Malekzadeh, entered into the Department of Natural Resources and Environmental Control's (DNREC) Voluntary Cleanup Program (VCP) Agreement under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA). Through a VCP Agreement, Dr. Abdollah Malekzadeh agreed to investigate the potential risks posed to the public health, welfare and the environment. Dr. Abdollah Malekzadeh contracted Duffield Associates, Inc. to perform a remedial investigation (RI) of the site.

The purpose of the RI was to: 1) understand the nature and extent of any soil and/or groundwater contamination at the site, 2) evaluate risks to public health, welfare and the environment associated with any identified contamination, and 3) perform, if necessary, a feasibility study (FS) that would identify and recommend a remedial action, if required by DNREC.

This document is the Department's final plan of remedial action (final plan) for the site. The original proposed plan of remedial action (proposed plan), which was based on the results of the previous investigations performed at the site, was advertised for public comment from Wednesday, February 5, 2003, until Monday, February 24, 2003. One comment letter was received by DNREC prior to the close of business on February 24, 2003. The original proposed plan was revised to reflect some of the comments that were included in that letter. A revised proposed plan was advertised for public comment from Sunday, August 10, 2003, until Tuesday, September 2, 2003. No comments were received prior to the close of business on September 2, 2003. This 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 risk posed by the site.

As described in Section 12 of the Regulations, DNREC provided notice to the public and an opportunity to comment on the revised proposed plan. DNREC did not receive any comments or requests for a public hearing prior to the conclusion of the comment period. DNREC is now issuing this final plan. The final plan will designate the selected remedy, if required, for the site. All prior investigations of the site, the original proposed plan, the revised proposed plan, the comments received from the public, DNREC's responses to those comments, and the final plan will constitute the remedial decision record for the site.

Section 2 presents a summary of the site description, site history and previous investigations of the site. Section 3 provides a description of the remedial investigation results. Section 4 presents a discussion of the remedial objectives. Section 5 presents the final plan of remedial action. Section 6 discusses public participation requirements of the revised proposed plan. Section 7.0 presents the Director's Declaration.

2.0 SITE DESCRIPTION AND HISTORY

The site is a former nursery and farm located on Route 4 in New Castle County, Delaware. The site consists of approximately 7.2 acres of undeveloped agricultural land. On the tax maps of New Castle County, Delaware, the site is tax parcel number 09-018.00-079. The area

surrounding the site is used as both residential and commercial property. There are no buildings or structures currently on the site. Site soils tend to be silts with sandier soils at the surface but tend to be comprised more of clay with depth. Evidence of soil fill material was apparent through observations of bituminous hot mix and a trace of glass. The site is located in a non-critical water resource area. Dr. Abdollah Malekzadeh intends to develop the site as a medical office building with a parking lot.

2.1 Site and Project History

The site was acquired by Mr. Albert Ciamaricone in 1919 and was used for growing vegetables since 1920. A portion of the property was used for growing pine trees since the 1960's.

In December 1999, Duffield Associates, Inc., completed a modified phase I environmental site assessment (ESA) at the site. The purpose of the ESA was to identify potential environmental issues at the site. The ESA included a walking reconnaissance of the site and a review of selected historic and regulatory environmental documentation pertaining to the site and nearby areas. Duffield Associates, Inc. identified several environmental concerns at the site. These concerns included five, approximately 55-gallon capacity, empty metal drums; a solid waste disposal area that contained old appliances, furniture, metal, automobile parts, tires, plastic, and other miscellaneous debris; site boundaries that were not clearly defined; and historical information that indicated the use of pesticides, primarily Rotenone, on crops at the site.

On June 13, 2000, C.A. Copeland, Inc.- Environmental/Construction Management Company was contracted to perform an environmental evaluation/discovery at the site. The purpose of the evaluation was to further assess the environmental concerns that were identified during the phase I ESA. The results of this evaluation included determining that the five, 55-gallon drums, were not located within site boundaries, collecting soil samples from a depth of 6 to12 inches below grade at the solid waste disposal and orchard locations and analyzing these samples for volatile organic compounds (VOCs), polyaromatic hydrocarbons (PAHs), pesticides, herbicides, asbestos, and arsenic, removing the debris located in the solid waste disposal area, and staging the asbestos on plastic for disposal.

The analytical results from the soil samples collected by C.A. Copeland, Inc. detected arsenic in 5 of the 23 samples. Detected concentrations of arsenic ranged from 11 to 100 milligrams per kilogram (mg/kg). These arsenic concentrations exceeded the DNREC Uniform Risk-Based Standard (URS) value of 0.4 mg/kg for arsenic in an unrestricted use, non-critical water resource area. Four out of the five samples that exceeded the URS also exceeded the 11 mg/kg background level established for arsenic in the State of Delaware. No VOCs, PAHs, pesticides or herbicides were detected. This analytical data was used for screening purposes only. The data from the C.A. Copeland environmental evaluation was not qualified to be used for formal risk evaluation purposes.

Dr. Abdollah Malekzadeh entered into a VCP Agreement on April 17, 2001 with DNREC to perform a RI. The objectives of the RI were to evaluate the soil and groundwater at the site.

On May 9, 2001 Duffield Associates, Inc. conducted a limited environmental evaluation of the former wetlands on the site. This evaluation was conducted as an interim response activity due to the time expiration of Nationwide Permit 26, which allowed the 0.33 acres of isolated and

adjacent wetlands associated with a headwater tributary to White Clay Creek on the site to be filled in. During this evaluation, eight soil samples were collected, one surface and one subsurface from former Wetland E and three surface and three subsurface from former Wetland F, as defined in the interim action wetlands investigation work plan.

On October 4, 2001, Duffield Associates, Inc., performed a RI at the site that included investigating surface soil, subsurface soil, and groundwater. Thirteen test pits were used to evaluate the surface soil and subsurface soil. Vironex, Inc., a subcontractor to Duffield Associates, Inc., constructed two temporary wells from two soil borings. From these temporary wells, two groundwater samples were collected on October 11, 2001.

3.0 INVESTIGATION RESULTS

DNREC conducted an extensive review of past investigations performed at the site. After review of the work conducted, DNREC worked with Duffield Associates, Inc., the consultant for Dr. Abdollah Malekzadeh, to develop a RI work plan to address the following:

- Perform an environmental evaluation of the surface soil, subsurface soil, and groundwater at the site in an effort to identify areas of environmental concern prior to site development, and if concerns are present, determine if the concerns pose any unacceptable risks.
- Progress towards obtaining a certification of completion of remedy from DNREC.

The RI work plan called for Duffield Associates, Inc., to perform the following tasks:

- Collect thirteen surface and thirteen subsurface soil samples;
- Collect two groundwater samples from two temporary Geoprobe®-type wells; and
- Analyze samples for VOCs, semivolatile organic compounds (SVOCs), metals, polychlorinated biphenyls (PCBs), and pesticides.

The following is a brief summary of the results of the investigations for the site.

3.1 Soils

Uniform Risk-Based Standard (URS) Comparison

The results of the RI identified elevated levels of arsenic, aluminum, iron, and manganese in site soils. A background level of 11.0 mg/kg for arsenic in soil was established for the State of Delaware and documented in a memorandum dated March 19, 2002. The background level, not the URS value, then becomes the value upon which sample analytical results are compared to for determining remediation standard cleanup goals. Arsenic exceeded the background soil arsenic concentration in sample TP-2B with a concentration 19.3 mg/kg. Aluminum exceeded the URS value of 7,800 milligrams per kilogram (mg/kg) for an unrestricted land use setting in samples HA-4Sa, TP-2A, and TP-2B with concentrations of 14,600 mg/kg, 10,800 mg/kg, and 15,300 mg/kg, respectively. Iron exceeded the unrestricted use URS value of 2,300 mg/kg in three samples, HA-4Sa, TP-2A and TP-2B, with concentrations of 8,050 mg/kg, 17,700 mg/kg and

74,200 mg/kg, respectively. Sample TP-2B also exceeded the restricted land use URS value of 61,000 mg/kg for iron with a concentration of 74,200 mg/kg. Manganese exceeded the unrestricted land use URS value of 160 mg/kg in one sample, TP-2A, with a concentration of 703 mg/kg.

There were no VOCs, SVOCs, pesticides, or PCBs detected in any of the soil samples above the respective URS values for unrestricted use.

3.2 Groundwater

The RI revealed detectable levels of iron and manganese in sample W-1. Iron exceeded the groundwater URS value of 0.3 mg/L with a concentration of 43.5 mg/L. Manganese was reported at a concentration of 0.43 mg/L exceeding the groundwater URS value of 0.05 mg/L. However, the groundwater URS values found in DNREC's remediation standards guidance documents for the contaminants of concern, iron and manganese, are based on the aesthetic qualities of the water such as taste, odor, and color, and do not relate to a human health risk. None of the contaminants of concern that screened above their groundwater URS values in groundwater sample W-1 (iron and manganese) present a human health risk.

There were no VOCs, SVOCs, pesticides, or PCBs detected in any of the groundwater samples above the respective groundwater URS values.

3.3 Summary

The results of the RI indicated that the site contains elevated levels of metals in both soil and groundwater. Arsenic concentrations exceeded the background value in one confirmatory soil sample. However, attainment of the background standard for arsenic was demonstrated using a statistical analysis, specifically the 95% upper confidence lever (UCL) of the arithmetic mean of the samples, in accordance with the Remediation Standards Guidance under the Delaware HSCA (1999). Aluminum, iron and manganese were detected at levels that exceeded the respective URS values for soil in an unrestricted land use setting.

Therefore, a risk assessment was performed for iron, manganese and aluminum due to the fact that these constituents exceeded unrestricted land use URS values. Iron exceeded the hazard index of 1.0 with a calculated non-cancer risk value of 1.21 for unrestricted land use. The calculated non-cancer risk for manganese and aluminum did not exceed the hazard index of 1.0 for unrestricted land use settings for either constituent.

Iron and manganese were detected in groundwater at concentrations that exceeded the URS values. Although iron and manganese concentrations exceeded the respective URS values for groundwater, these URS values represent aesthetic qualities of the water and do not relate to a human health risk. DNREC has determined that they do not pose a risk to human health or the environment.

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.

Remedial options were evaluated utilizing the qualitative and quantitative objectives and the following considerations:

- The site will be redeveloped into a medical office building and parking lot;
- The surrounding land use is to remain commercial and industrial;
- The risk posed to future construction workers through exposure to contaminated soil; and
- The risk posed to human health through the exposure to contaminated soils.

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

- Minimize potential exposure to site contaminants of concern for construction workers at the site.

Quantitative objectives define specific levels of remedial action to achieve protection of human health and the environment. The following quantitative objective is determined to be appropriate for the site:

- Prevent human exposure to soils contaminated by metals that would result in a non-carcinogenic risk exceeding a hazard index of 1.0.

5.0 FINAL PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the site information and the above remedial action objectives, the required action for the site will be the following:

Action #1: Placement of a deed restriction on the property limiting the site to non-residential/restricted land use (i.e., commercial/industrial).

6.0 PUBLIC PARTICIPATION

The Department actively solicited public comments and suggestions on the revised proposed plan of remedial action. DNREC did not receive any comments prior to the conclusion of the comment period. The comment period began on Sunday, August 10, 2003, and ended at the close of business on Tuesday, September 2, 2003.

7.0 DECLARATION

This final plan of remedial action for the Route 4 Orchard site is protective of human health, welfare and the environment, and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

John Blevins
Director, Division of Air and Waste Management

Date

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Figure 1: Site Location, Newark, New Castle County, Delaware.

Figure 2: Soil and Groundwater Sampling Locations.

Table 1: Summary of Analytical Results for Soil Samples.

Table 2: Summary of Analytical Results for Groundwater Samples.