FINAL PLAN OF REMEDIAL ACTION

Red Lion Road and Route 13 Site
Bear, DE

DNREC Project No. DE 1100

OCTOBER 2001

Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
391 Lukens Drive
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I. INTRODUCTION

The Red Lion Road and Route 13 Site ("Site") is located in Bear, Delaware at the southwest corner of the intersection of Red Lion Road (Route 71), Routes 13 and 1 (Figure 1). The "Site" is comprised of two operable units ("OUs"); namely OU I (Red Lion Road and Route 13 Property) and OU II (State Property) as shown in Figure 2. The Site is collectively referred to as SIRB site number DE-1100. In order to determine the potential for environmental liability prior to the purchase of the Site, the Reybold Group entered into the Department of Natural Resources and Environmental Control-Site Investigation and Restoration Branch's ("DNREC-SIRB's") Voluntary Cleanup Program ("VCP") Agreement under the provisions of the Delaware Hazardous Substance Cleanup Act ("HSCA"), 7 Del. C. Chapter 91. Through an amended VCP Agreement, Reybold agreed to investigate the potential risks posed to public health, welfare, and the environment. Reybold contracted WIK Associates, Inc. to perform various investigations of the Site. The purpose of the amended VCP Agreement was to:

1. Identify potential sources of contamination within the property.
2. Develop remedial action alternatives, if required, to ensure that upon completion, any contamination is addressed to protect human health, welfare and the environment.
3. Obtain a Certification of Completion of Remedy ("COCR") from DNREC-SIRB for the Site.

This document is the Department's Final Plan of Remedial Action ("Final Plan") for the Site. It is based on the results of the previous investigations performed at the Site. 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 risks posed by the Site.

As described in Section 12 of the Regulations, DNREC-SIRB provided notice to the public and an opportunity for the public to comment on the Proposed Plan. At the comment period's conclusion, DNREC-SIRB reviewed and considered all of the comments received prior to issuing this Final Plan. The Final Plan designates the selected remedy for the Site. The Proposed Plan, the comments received from the public, DNREC-SIRB's responses to those comments, and the Final Plan will constitute the Remedial Decision Record.

Section II presents a summary of the site description, site history and previous investigations of the Site. Section III provides a description of the Facility Evaluation ("FE") results. Section IV presents a discussion of the Remedial Action Objectives. Section V presents the Final Plan of Remedial Action. Section VI discusses public participation requirements.

II. SITE DESCRIPTION AND HISTORY

Site Setting

Red Lion Road and Route 13 Property (OU I)

The OU I property owned by Jerry Marinis & Marinis Bros. is located at the southwest corner of the intersection of Red Lion Road and Route 13 in Bear, Delaware (Figure 2). OU I

encompasses approximately 8 acres and is bounded generally by Route 1 to the northeast, Route 13 to the southeast, Tybouts Corner Landfill (a federal National Priority List Site which has been closed and capped) to the southwest and Red Lion Road to the northwest. Open land is also located to the south and east of the Site with some wetlands and several residences. It was discovered that landfill gases, including methane and volatile organic compounds ("VOCs"), were migrating through the subsurface across the Tybouts Corner Landfill boundaries. The U. S. Environmental Protection Agency ("USEPA") has determined that it was necessary to extend the perimeter gas venting system along the landfill's eastern and southeastern boundaries out to U. S. Route 13, which is part of the property line between the landfill and OU I. At the present time, OU I is vacant with no improvements, and is designated as New Castle County tax parcel number 10-049.00-070. The dominant feature on the Site is a raised, roughly rectangular berm comprised of soil fill mixed with asphalt, gravel and concrete. Similar material can be found within the bermed area. In places, the outside edge of the berm is 10 to 15 feet above the surrounding land surface. A smaller filled area and a pile of stone and gravel fill are present on the northeast end of the Site.

The on-site fill was reportedly generated from nearby road construction/demolition projects; based on historical aerial photographs, it was placed on the property during the 1980s. No detailed information about the fill material has been found to date. There is also a small area of household trash found within the berm outline, and remnants of a garden were seen during the 1997 Phase I investigation. No buildings are currently present on the Site. The Site contains a topographic depression along the northern and eastern sides, and there is a dense stand of young pine trees inside the southwest property line.

The State Property (OU II)

The OU II property consists of seven (7) separate parcels, which are owned by the State of Delaware Department of Transportation ("DelDOT"). OU II is located along Route 13 near the corner of Route 13 and Delaware Route 71 (Red Lion Road) in New Castle, Delaware. OU II encompasses approximately 8.3 acres of vegetated, undeveloped land and is bounded generally by Tybouts Corner Landfill to the west, by the Red Lion Road Property to the north, and by Route 13 to the south. The New Castle County tax parcel numbers for the seven parcels of land in OU II are as follows:

1. 10-049.00-069
2. 10-049.00-068
3. 10-049.00-067
4. 10-049.00-066
5. 10-049.00-065
6. 10-049.00-064
7. 10-049.00-063

OU II is currently vacant and contains vegetated and wooded land. Surrounding properties are generally comprised of open land. The Tybouts Corner Landfill is located on the northern and western boundaries of the State Property. Route 13 comprises the southeast boundary of the property. The northeast boundary of the State Property is the Red Lion Road and Route 13 Property.

The State Property and the Red Lion Road and Route 13 Property together encompass a total of approximately 16 acres.

Site History

The historic uses of the Red Lion Road Property were investigated by WIK Associates, Inc., ("WIK") through a review of aerial photographs and 7.5 minute series topographic maps. Based on the sources reviewed and contacted, it appears that the Red Lion Road & Route 13 Property was historically maintained as farmland prior to the 1970s and was filled during the construction of new roads, probably in the 1980s. The possibility exists for contaminants to have migrated into the subsurface from neighboring properties, most notably the Tybouts Corner Landfill, and from the on-site fill containing solid waste.

Historic aerial photographs investigated by WIK, suggest that the State Property appears to have been used for farming, residential, and open space from 1937 to the late 1980s. No evidence of filling activities on the property has been found to date. DelDOT purchased the six residential parcels and one commercial parcel comprising the State Property in the late 1980s to construct the Route 13 exit ramp.

In order to obtain a COCR, the prospective purchaser entered a VCP Agreement on October 1997 with DNREC-SIRB to perform environmental investigations on the Red Lion Road and Route 13 (OU I) Property. In January 2001, the VCP Agreement was amended to include the State Property (OU II). The amended VCP Agreement designates the Red Lion Road and Route 13 Property as OU I and the State Property as OU II. WIK completed a Facility Evaluation (FE) at the Site in November 2000. The objectives of the FE were to evaluate the soil and groundwater quality at the Site.

III. INVESTIGATION RESULTS

Red Lion Road and Route 13 Property (OU I)

Surface soil, subsurface soil, groundwater, and soil gas investigations were conducted during the FE. Sampling locations are shown on Figure 3. The samples were collected and analyzed in accordance with the DNREC-SIRB approved work plan, the Delaware Standard Operating Procedures for Chemical Analytical Programs ("SOPCAP") guidance documents and other DNREC–SIRB policies and procedures. Prior to HSCA analysis, soil samples were screened for Volatile Organic Compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), pesticides and polychlorinated biphenyls (PCBs). Confirmatory soil samples and all groundwater samples were submitted for laboratory analysis. The samples were analyzed for contaminants listed on the Target Analyte List and the Target Compound List (TAL/TCL). The analytical results were compared to the DNREC-SIRB Uniform Risk Based Remediation Standards (URS) in a non-critical water resource area, using the restricted use scenario.

Soil

Ten surface soil samples ranging in depth from 0.5 to 2 feet below ground surface ("bgs") were analyzed for TAL/TCL per SOPCAP guidelines. All the metals detected were found to be at levels below the restricted URS. Four surface soil samples were analyzed for VOCs; no VOCs were detected. Five surface soil samples were analyzed for semivolatile organic compounds (SVOCs); no SVOCs were detected with the exception of benzo(a)anthracene and benzo(a)pyrene, which were detected in soil sample location

TP01 at concentrations of 8.8 milligrams per kilogram (mg/kg) and 2.9 mg/kg, respectively. These results exceed the restricted URS for benzo(a)anthracene of 7.8 mg/kg and benzo(a)pyrene of 0.78 mg/kg, respectively. Five surface soil samples were analyzed for pesticides and PCBs. The results indicated very low pesticide concentrations of DDD (estimated), DDE, and DDT (estimated) in soil sample location TP04. No herbicides were detected in any of the three surface soil samples.

Ten subsurface soil samples ranging in depth from 3 to 11 feet bgs were analyzed for TAL using HSCA protocols. The results of the subsurface soil samples revealed exceedances for aluminum, iron and beryllium when compared to the restricted use URS for TAL/TCL analysis. Subsurface soil sample TP01 had aluminum and iron concentrations of 20,600 mg/kg and 27,200 mg/kg, respectively, which exceeded the restricted URS for aluminum and iron of 20,000 mg/kg and 12,700 mg/kg, respectively. Two subsurface soil samples were analyzed for TCL VOCs; no VOCs were detected.

Soil Gas

Four soil gas samples were collected and analyzed for TCL VOCs and methane. VOCs were detected in all of soil gas samples. Soil gas sample locations SG01 and SG02 contained concentrations of a number of VOCs above the USEPA Region III Risk Based Concentration ("RBC") Screening Levels for Ambient Air (October 1997). These included 1,1-dichlorethane, 1,1-dichloroethene, 1,2-dichlorethane, benzene, chlorobenzene, chloroethane, dichlorodifluoromethane, methylene chloride, tetrachloroethene ("PCE"), toluene, trichloroethene (TCE), and vinyl chloride. Freon 114, was also found in soil gas samples SG01 and SG02; however, there is no RBC for Freon 114.

Methane was detected in the soil gas sample locations SG-02 and SG-08 at concentrations of 120,000 milligrams per cubic meter ($mg/m^{3)}$ (12 %) and 88,000 mg/m^3 (8.8%), respectively, which is in the severe explosive hazard range of 5 to 15% methane in air (Sax & Lewis, 1987).

Groundwater

The VOC results of the groundwater samples revealed that groundwater sample location MW01 (a deep well in the Potomac Formation) contained acetone, benzene, toluene, ethylbenzene, and PCE. Only benzene and PCE exceeded the respective Maximum Contaminant Level ("MCL") specified in the State of Delaware Regulations Governing Public Drinking Water Systems, as referenced in DNREC-SIRB's Remediation Standards Guidance. The inorganic results of the groundwater sample collected at location MW01 revealed aluminum concentrations of 360 micrograms per liter (µg/L) which is in excess of the aluminum drinking water Secondary Maximum Contaminant Level ("SMCL") standard of 200 µg/L. Manganese was detected in the groundwater sample, MW02 (a shallow well in the Columbia Formation) with concentrations of 2,710 µg/L, which is in excess of the manganese drinking water SMCL standard of 50 µg/L.

A risk assessment was performed to evaluate the cumulative risk associated with the exposure to soil and ingestion of groundwater on the Site. The calculations were conducted using the

DNREC-SIRB Site-Specific Calculator for Multiple Analytes (DNREC May 2000 version) assuming a current and future restricted use scenario.

The soil cumulative risk was calculated using 95% of the upper confidence level (UCL) of the mean of the soil concentrations (USEPA, 1989; DNREC, 1999). The assessment indicated that the cumulative risks, carcinogenic and non-carcinogenic, are below 4.2E-06 and below a hazard index of one (1.0), respectively. These risks are within the DNREC's risk guideline of 1E-05 (DNREC, 1996); therefore, the soil does not pose an unacceptable risk to human health and the environment based on restricted use.

The groundwater cumulative risk was calculated using the mean of the data set, instead of the typical 95% of the UCL of the mean (due to the small number of data points). The assessment indicated that the cumulative carcinogenic risk is approximately 1.2E-05, which is above the DNREC's risk guideline of 1E-05 (DNREC, 1996). The cumulative non-carcinogenic risk hazard index is 0.50, which is below the DNREC-SIRB guideline of 1.0. The cumulative risk calculations for the OU I groundwater indicate that routinely ingesting groundwater from beneath the Site as a primary drinking water source poses a cancer risk. The risk is driven by the individual risk associated with PCE. Therefore, the groundwater poses an unacceptable risk to human health and the environment.

State Property (OU I)

WIK performed the following investigations to characterize the existing conditions resulting from past industrial operations and uses: a Phase I Environmental Site Assessment (WIK, March 2000); and a FE (WIK, November 2000) including test pit excavations; a soil gas survey; soil gas, soil and groundwater sampling and analysis; and a review of DNREC's files. The collection and analysis of soil gas, soil, and groundwater samples, comprised the FE for the State property. These were performed in accordance with the Regulations and the SOPCAP guidance documents, and other DNREC-SIRB policies and procedures.

Surface and subsurface soil samples, soil gas and groundwater samples were collected as part of the FE for the OU II property. Sampling locations are shown on Figure 4. The samples were collected and analyzed in accordance with the DNREC-SIRB approved work plan.

The samples were analyzed for contaminants listed on the TAL/TCL. The analytical results were compared to DNREC-SIRB URS in a non-critical water resource area, using the restricted use scenario.

Soil

Four surface soil samples ranging in depth from 0.5 to 1.5 bgs were analyzed for TAL/TCL. Arsenic was detected in soil sample location TP04 at concentrations of 4.6 mg/kg which exceeds the restricted URS for arsenic at 4.0 mg/kg. Surface soil sample, TP13-S001 contained tetrachloroethene, ethylbenzene, and xylene at concentrations of 120J μg/kg, 83J μg/kg, and 170J μg/kg, respectively, where J represents an estimated value detected below the method detection limit. These concentrations are below the unrestricted use URS. Very low concentrations of DDE and PCBs (Aroclor-1260) were detected which were below the unrestricted URS. Benzo(a)anthracene,

benzo(b)fluoranthene, benzo(a)pyrene and indeno (1,2,3-cd) pyrene was detected at concentrations of 48 µg/kg, 73 µg/kg, 55 µg/kg and 39 µg/kg, respectively. These concentrations are below the restricted URS.

Four subsurface soil samples ranging in depth from 15 to 17 bgs were analyzed for TAL/TCL using HSCA protocols. The results of the subsurface soil samples revealed that aluminum, arsenic, and iron were below the restricted use URS. Xylene was detected at sample location TP12-S002 at a concentration of 98J µg/kg, which is below the restricted URS. No SVOCs, pesticides or PCBs were detected in the subsurface soil samples.

Soil Gas

Methane was detected in the soil gas sample locations GP-79 and GP-81 at concentrations of 180,000 mg/m^3 (18%) and 120,000 mg/m^3 (12%), respectively, which are in the severe explosive hazard range of 5 to 15% methane in air (Sax & Lewis, 1987). The VOC compounds include benzene, 1,3 butadiene, chlorobenzene, chlorethane, 1,4-dichlorobenzene, 1,2-dichloroethane, cis-1, 2-dichloroethene, dichlorofluoromethane, hexane, methylene chloride, tetrachloroethene, trichloroethene, and vinyl chloride at concentrations above the USEPA Region III Risk-Based Concentration (RBCs) Screening Levels for Ambient Air (May 1999).

Groundwater

The results of the groundwater samples revealed that iron and manganese exceeded the respective Secondary Maximum Contaminant Level ("SMCL") specified in the State of Delaware Regulations Governing Drinking Water Systems, as referenced in DNREC-SIRB's Remediation Standards Guidance. The results of the groundwater sample collected at location Geoprobe® Water-1, revealed iron concentrations of 304 µg/L, which is in excess of the iron drinking water SMCL standard of 300 µg/L. Manganese was detected at all groundwater sample locations with concentrations ranging from 355 µg/L to 2,640 µg/L, which are in excess of the manganese drinking water SMCL standard of 50 µg/L.

A risk assessment was performed to evaluate the cumulative risk associated with the exposure to soil and ingestion of groundwater on the site. The calculations were conducted using the DNREC Site-Specific Calculator for Multiple Analytes (DNREC May 2000 version) assuming a current and future restricted use scenario.

The soil cumulative risk was calculated using 95% of the upper confidence level (UCL) of the mean of the soil concentrations (EPA, 1989). The assessment indicated that the cumulative risks, carcinogenic and non-carcinogenic, are below 1E-05 and below a hazard index of 1.0. Therefore, the soil does not pose an unacceptable risk to human health and the environment based on restricted use.

The groundwater cumulative risk was calculated using the mean of the data set. The assessment indicated that the cumulative carcinogenic risk is below 5E-07, which is below the DNREC's risk guideline of 1E-05. The cumulative non-carcinogenic risk hazard index is 0.66, which is

below the DNREC-SIRB guideline of 1.0. Therefore, the groundwater does not pose an unacceptable risk to human health and the environment.

The soil gas, containing methane and VOCs, is in the process of being addressed by the Tybouts Corner Landfill Trust through a recently installed gas extraction system that will intercept the soil gas and prevent it from migrating beyond the Landfill boundary. This active gas migration system, which was completed in December 2000, is along the Tybouts Landfill border with the Red Lion Road and Route 13 Property and the State Property. It is currently in operation, and testing results for its start-up and initial operation is functioning as designed. A further discussion of the Tybouts Corner Landfill history and soil gas migration patterns is available in the DNREC-SIRB Administrative Record file for Tybouts Corner Landfill.

IV. REMEDIAL ACTION OBJECTIVES

DNREC-SIRB considers the data and information generated in the previous investigations of the Site to the meet the criteria of a Remedial Investigation (RI), and hereby adopts the previous investigations as the RI. According to Section 8.4 (1) of the Regulations, site-specific Remedial Action Objectives ("RAOs") must be established for all Proposed Plans of Remedial Action based on the following factors:

a) The OU I Property and the OU II Property ("Site") are currently commercially zoned and vacant.
b) The future Site use is expected to be commercial including buildings, paved roads, parking areas, and open space.
c) Surrounding land uses are generally commercial and residential.
d) Various chemical constituents from the Tybouts Corner Landfill have migrated in the northwest portion of the OU I Property and western portion of OU II. Based on the findings of the investigations, methane and VOCs are the primary contaminants of concern in the soil gas, and VOCs are the primary contaminants of concern in the groundwater.
e) Inhalation is the potential exposure pathway of soil gas containing methane and VOCs.
f) Dermal and ingestion is the potential exposure pathway of groundwater containing VOCs.

Qualitative objectives describe, in general terms, what the ultimate result of the Remedial Action at the facility should be. Considering the Site will be developed for commercial use, the qualitative objectives are to minimize risk to Site users such as construction workers, future employees, and visitors by controlling human contact (dermal, inhalation, or ingestion) with the soil gas and groundwater.

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 future employees, construction workers and visitors are not exposed to soil gas and groundwater contamination above the DNREC-SIRB's risk guideline of 1E-05.

V. FINAL PLAN OF REMEDIAL ACTION

As stated in Section III of this Final Plan, the contamination at the Site primarily appears to be in the soil gas and groundwater. In order to meet the RAOs and based upon the information and results of the investigations performed at the OU I and OU II Properties, DNREC-SIRB's recommended plan of remedial action for the Site will include the following:

1. An evaluation of the effectiveness of the active gas migration control system, which was installed at the Tybouts Corner Landfill Site, along the southern perimeter of the landfill to determine whether methane and/or VOCs in soil gas are continuing to migrate from the Tybouts Landfill to the Red Lion Property. This evaluation must be performed prior to submitting any design or construction plans for future development of the property to DNREC-SIRB for its review and approval.

2. The placement of a deed restriction that requires:

    - Appropriate engineering controls to mitigate any possible explosive or exposure risk posed by contaminants on the property to be incorporated into the design and construction of any structures to be built on the property. All plans for the design and construction of any such structures must be submitted to DNREC-SIRB for review and approval prior to any construction activities taking place.
    - Prohibit digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing activities on the Site without the prior written approval of the DNREC-SIRB.
    - Prohibit the installation of groundwater wells and the withdrawal of groundwater from any well on the Site without the prior written approval of DNREC-SIRB.
    - The Site will be restricted to commercial and industrial uses only.

3. The establishment of a Groundwater Management Zone by DNREC to protect public health, welfare, and the environment.

VI. PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the Proposed Plan of Remedial Action and welcomed opportunities to answer questions. The public hearing was held on June 4, 2001 at the Ommelanden Hunter Education Training Center, 1205 River Road, New Castle, DE to present to the public the Department's Proposed Plan.

The twenty (20) day comment period began on May 14, 2001 and remained open until June 11, 2001 to allow the public the opportunity to comment. Several public comments during the public hearing and two comment letters were received. These comments were addressed by DNREC-SIRB, and are referenced in the Hearing Officer's Report, dated June 17, 2001, and incorporated in Secretary's Order No. 2001-A-0029 dated July 27, 2001. Therefore, Secretary's Order No. 2001-A-0029 adopted the Proposed Plan of Remedial Action as the Final Plan of Remedial Action with the addition of an institutional control as identified in Section V, Item 2.

VII. DECLARATION

This Final Plan of Remedial Action for the Red Lion Road Site is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act ("HSCA").

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John Blevins, Director DATE
Division of Air and Waste Management

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Figures 1, 2, 3 & 4 from Remedial Investigation Report

Prepared by WIK Associates, Inc.

Figure 1 Site Location/Topographic Map

Figure 2 Site Map

Figure 3 Sampling Locations - Red Lion and Route 13 Properties

Figure 4 Sampling Locations - State Property