# PROPOSED PLAN OF REMEDIAL ACTION

Red Lion Road and Route 13 Site
Bear, DE

DNREC Project No. DE 1100

MAY 2001

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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# 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) and Routes 13 and 1 (Figure 1). The "Site" is comprised of two operable units ("OU"); 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 DNREC 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") under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 ("HSCA"). Through an amended VCP Agreement, Reybold agreed to investigate the potential risks posed to the public health, welfare, and the environment. Reybold contracted WIK Associates, Inc. to perform various investigations of the Site. The purposes of the amended VCP Agreement were to:

1. Identify potential sources of contamination within the property.
2. Develop remedial action plans, if required, to insure that upon completion, the levels of protection for public health and the environment either meet or exceed the criteria provided by DNREC-SIRB.
3. Obtain a Certification of Completion of Remedy from DNREC-SIRB for the Site.

This document is the Department's Proposed Plan of Remedial Action ("Proposed Plan") for the Site. It is based on the results of the previous investigations performed at the Site. This 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-SIRB will provide notice to the public and an opportunity for the public to comment on the Proposed Plan. At the comment period's conclusion, DNREC-SIRB will review and consider all of the comments received and then DNREC-SIRB will issue a Final Plan of Remedial Action ("Final Plan"). The Final Plan will designate 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 Remedial Investigation results. Section IV presents a discussion of the Remedial Action Objectives. Section V presents the Proposed 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, a closed and capped Tybouts Corner Landfill (a federal National Priority List Site to the southwest) and Red Lion Road to the northwest. South and east of the Site is primarily open land with some wetlands and several residences. It was discovered that landfill gases, including methane and volatile organic compounds ("VOC"), were migrating through the subsurface across the Tybouts Corner Landfill boundaries. U. S. Environmental Protection Agency ("US EPA") has determined that it was necessary to extend the perimeter gas venting system along the landfills eastern and southeastern boundary out to U. S. Route 13, which is part of the property line that the landfill shares with OU I property. At the present time, OU I is vacant with no improvements and 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. The land inside the berm has also been filled with similar material. 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 filling 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 north and east sides, and there is a dense stand of young pine trees inside the southwest property line.

**The State Property (OU II)**

OU II property consists of seven (7) separate parcels, which are owned by the State of Delaware Department of Transportation ("Del DOT"). 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 (DE-1100) to the north, and by Route 13 to the south. The New Castle County tax parcel numbers of 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 closed and capped 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 and Project History*

The historic uses of the Red Lion Road Property were investigated by WIK Associates, Inc., 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 farm land 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 Associates, Inc., 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 any filling on the property has been found to date. Delaware Department of Transportation ("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 Certification of Completion of Remedy, 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. The objectives of the RI 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 Facility Evaluation (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 policies and procedures. The analytical information collected by WIK was supplemented with data from previous environmental investigations on other properties in and around the site.
Prior to HSCA analysis, soil samples were screened for Volatile Organic Compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), pesticides and polychlorinated biphenyls (PCB's). 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 first 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 restricted URS. Four surface soil samples were analyzed for VOCs and none were detected. Five surface soil samples were analyzed for semivolatile organic compounds (SVOCs) and no SVOCs were detected with the exception of benzo(a)anthracene and benzo(a)pyrene 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 and 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 analyses. Subsurface soil sample TP01 had aluminum and iron concentrations of 20,600 mg/Kg and 27,200 mg/Kg, respectively, which exceed 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 and none 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 EPA 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, 1,1-dichloroethene, dichlorodifluoromethane, methylene chloride, tetrachloroethene ("PCE"), toluene, trichloroethene (TCE), and vinyl chloride. Although there is no Region III RBC for Freon 114, it was also found in soil gas samples SG01 and SG02.

Methane was detected in the soil gas sample locations SG-02 and SG-08 at concentrations of 120,000 $mg/m^3$ (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 (deep well in the Potomac Formation) contained acetone, benzene, toluene, ethylbenzene, and PCE. Only benzene and PCE exceeded its 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 metals results of the groundwater sample 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 groundwater sample location, MW02 (shallow well in the Columbia Formation) with concentrations of 2710 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 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 the cumulative risks, carcinogenic and non-carcinogenic are below 4.2E-06 and below a hazard index of one, 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 because of the number of the data points is too small. 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 does pose an unacceptable risk to human health and the environment.

**State Property (OU I)**

WIK performed the following to characterize the existing conditions resulting from past industrial operations and uses: a Phase I Environmental Site Assessment (ESA)(WIK, March 2000); and a FE (WIK, November 2000) including test pit excavation; 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, which comprise a FE (WIK, November 2000) for the Property. These were performed in accordance with the Regulations and the SOPCAP guidance documents, and other DNREC-SIRB policies and procedures. The analytical information collected by WIK was supplemented with data from previous environmental investigations on other properties in and around the Site.

Surface and subsurface soil samples, soil gas and groundwater samples were collected as part of the OU II property RI. 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 first 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 4.0mg/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 estimated. These concentrations are below the unrestricted use URS. Very low concentrations of DDE and PCB's (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, 73, 55, 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 in sample location TP12-S002 at a concentration of 98 J 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/m3 (18%) and 120,000 mg/m3 (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 EPA Region III Risk-Based Concentration Screening levels for Ambient Air (RBCs)(May 1999).

Groundwater

The results of the groundwater samples revealed that iron and manganese exceeded its 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 location, Geoprobe Water-1, revealed iron concentrations of 304 micrograms per liter (µg/L) which is in excess of the iron drinking water SMCL standard of 300 µg/L. Manganese was detected in all groundwater sample locations with concentrations ranging from 355 µg/L to 2640 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 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 operations, and its effectiveness testing results are expected in April 2001. 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.
e) Inhalation is the potential exposure pathway of soil gas containing methane and 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, 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. PROPOSED PLAN OF REMEDIAL ACTION

As stated in Section III of this Proposed Plan, the contamination at the Site appears to be in the soil gas and ground water. In order to meet the RAOs and based upon the information and results of the investigation performed at the OU I Property and OU II Property, DNREC-SIRB's recommended plan of remedial action for the Site should include the following:

1. An evaluation of the short term and long term effectiveness of the active gas migration system, which was installed at the Tybouts Corner Landfill Site along the southern perimeter, for the control of methane and VOC migration to OU-I and OU-II prior to any construction taking place on the Site.

2. Appropriate controls should be designed during the remedial design so that any methane and VOC soil gas contaminants that remain on the Site, or which have the potential to enter/accumulate in the building structures on the Site, will be mitigated. Background soil gas information for building design will be gathered by soil gas survey prior to building construction to ensure that the cumulative risk posed by the Site is below a carcinogenic risk of $1 \times 10^{-5}$ and a non-carcinogenic Hazard Index of 1.

3. Design of the soil gas mitigation system(s) will be dependent upon the soil types, building structures, etc., in order to mitigate the methane and VOC soil gas concentrations.

4. The placement of an institutional control (i.e., deed restriction) which will restrict the use of the Site to commercial and industrial uses only and prohibit use of groundwater on the Site by restricting the use of the groundwater without the prior written approval of DNREC-SIRB.

5. A Groundwater Management Zone ("GMZ") will be placed on the Site to protect public health, welfare and the environment.

## VI. PUBLIC PARTICIPATION

The Department actively solicits public comments or suggestions on the 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: Mandeep Talwar

The comment period begins May 14, 2001, and will end on June 4, 2001 at the close of the public hearing. The public hearing will be held on June 4, 2001 at 6:00 p.m. at the Ommelanden Hunter Education Training Center, 1205 River Road, New Castle, DE 19720-5107.

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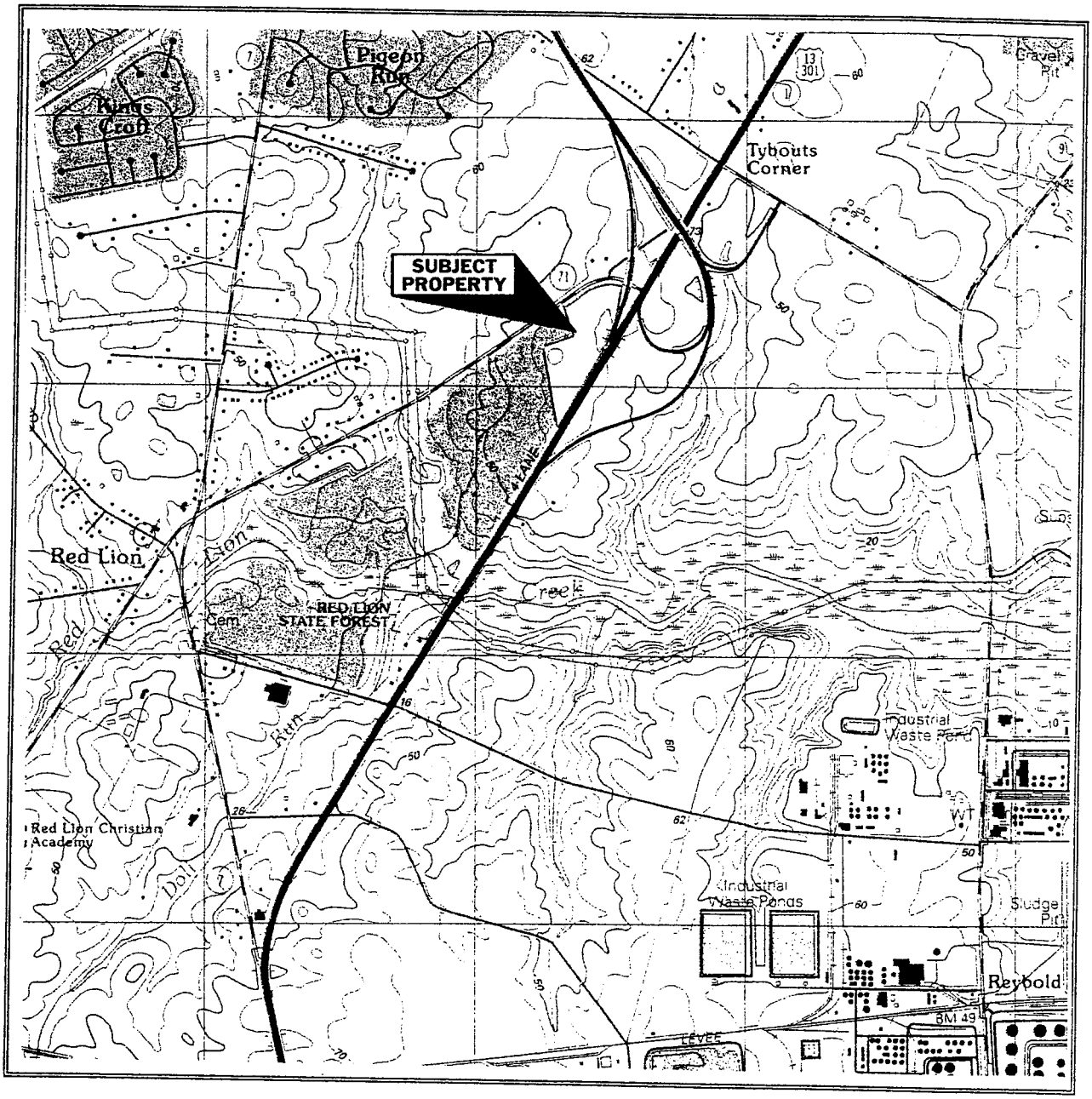
## Figures 1, 2, 3 & 4 from Remedial Investigation Report

Prepared by WIK Associates




# FIGURE 1

## Site Location/Topographic Map

Saint Georges Quadrangle: 7.5 minute series

State Property and Red Lion Road Property

Bear, Delaware

File: 1097.24.21

N

0 2000

feet

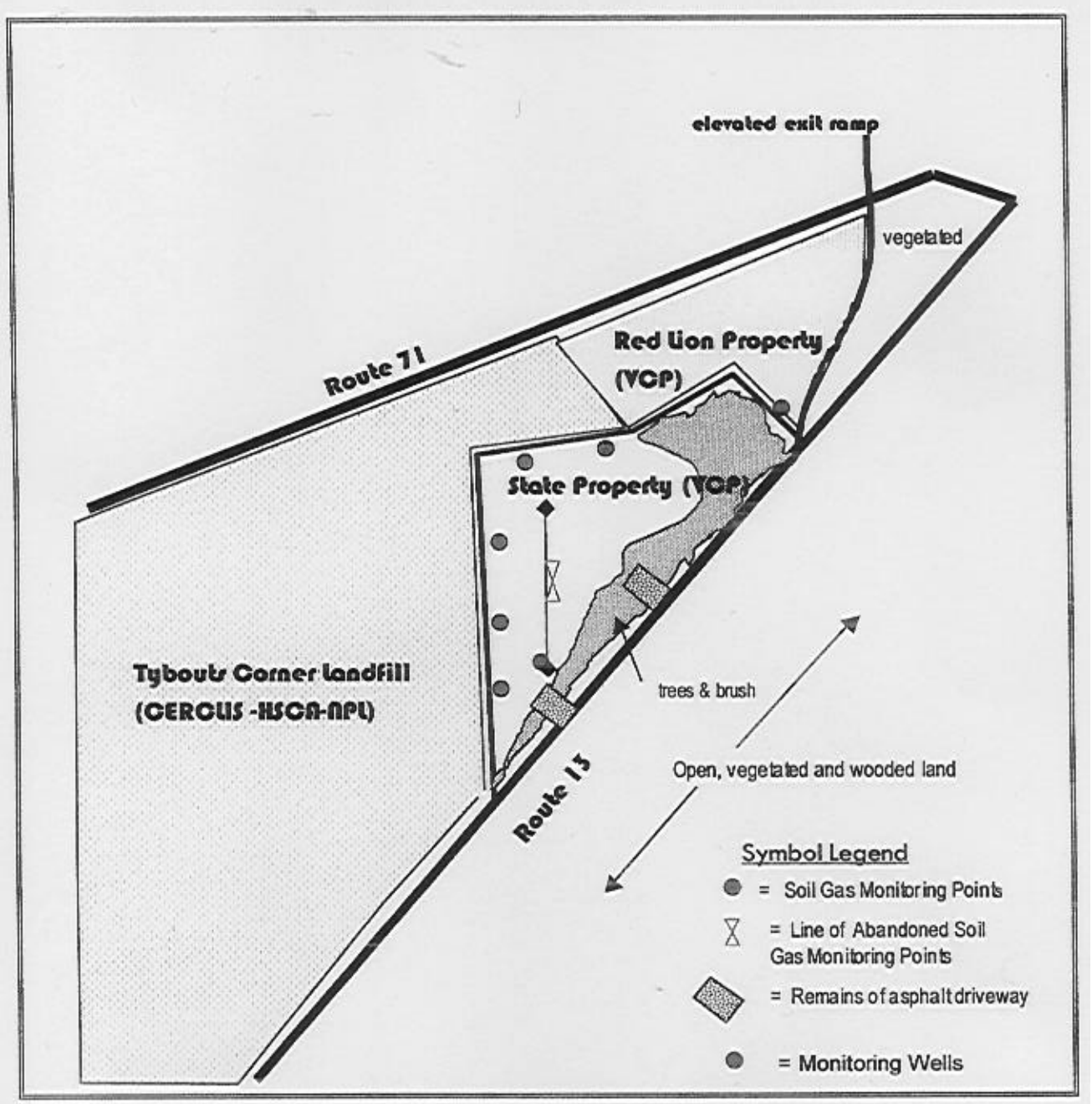



**FIGURE 2**
**Site Map**
State Property and Red Lion Road Property
Bear, Delaware
File: 1097.24.21

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**Note: not drawn to scale**

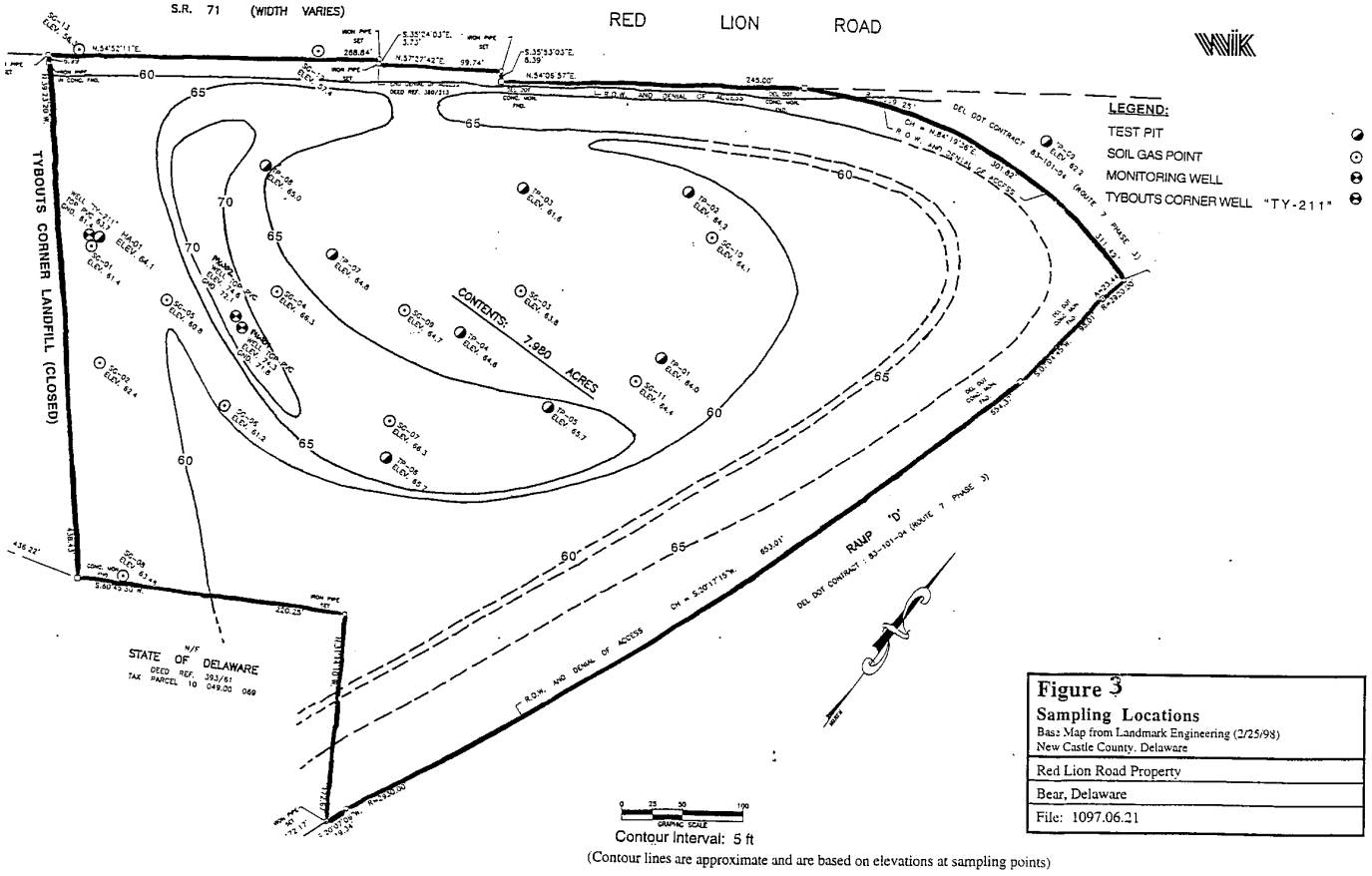


**Figure 3 Sampling Locations - Red Lion and Route 13 Property**

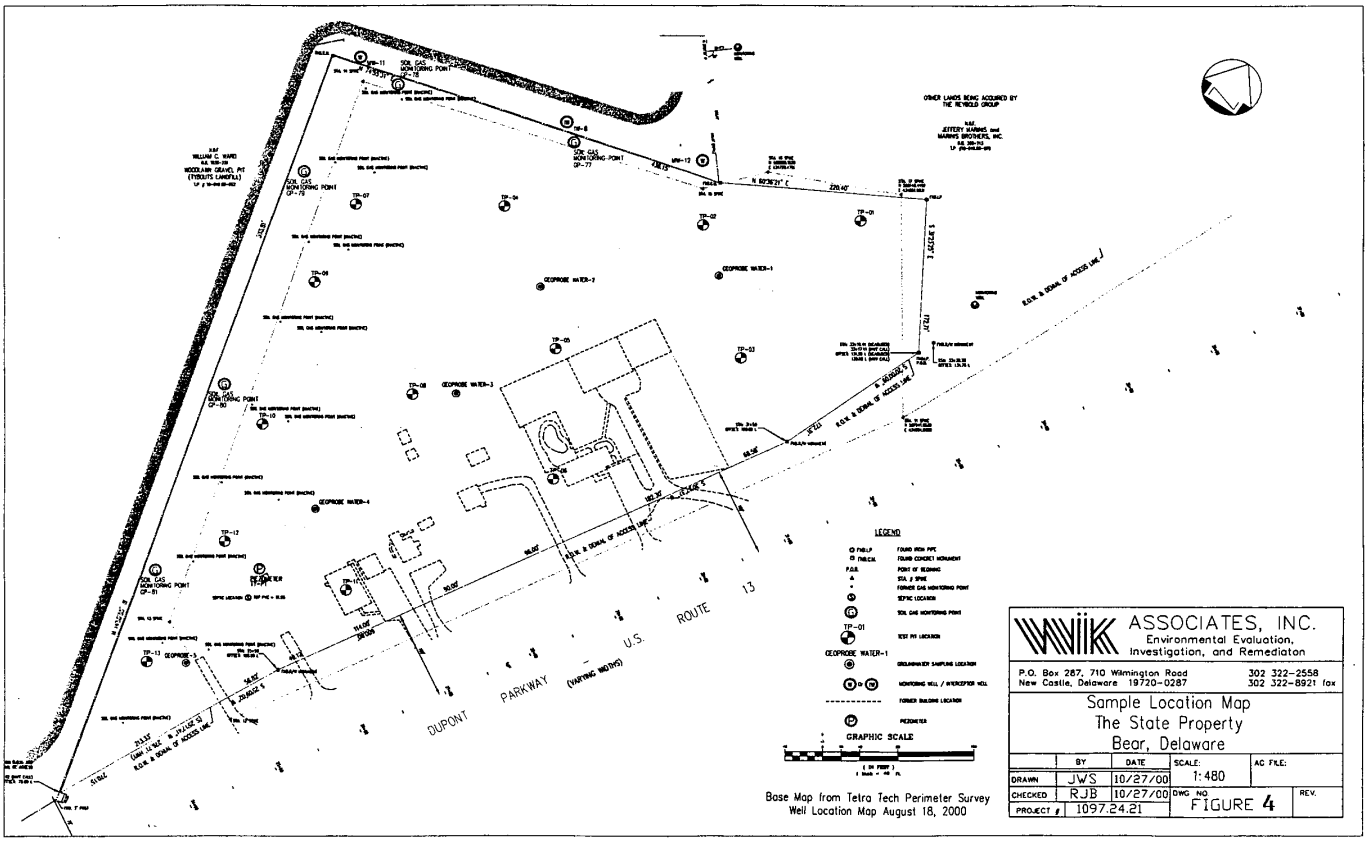


**Figure 4 Sampling Locations - State Property**