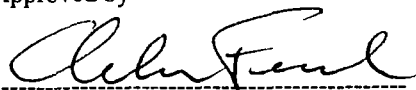


SECOND FIVE-YEAR REVIEW REPORT
FOR
TYBOUTS CORNER LANDFILL SITE
NEW CASTLE
NEW CASTLE COUNTY, DELAWARE
SEPTEMBER, 2005

PREPARED BY

United States Environmental Protection Agency
Region III
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Approved by



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Date

9/29/05

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
AOC	Administrative Order on Consent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DNREC	Delaware Department of Natural Resources and Environmental Control
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
GMCS	Gas Migration Control System
GMZ	Groundwater Management Zone
IC	Institutional Control
MCLs	Maximum Contaminant Levels
mg/kg	milligrams per kilogram (mg/kg)
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations and Maintenance
ppb	parts per billion
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Responsible Party
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
µg/l	micrograms per liter
VOC	Volatile Organic Compound

Executive Summary

The Tybouts Comer Landfill Superfund Site (Site) is located in New Castle, New Castle County, Delaware, approximately 10 miles south of Wilmington. Between 1969-1971, the Site was used by New Castle County as a municipal landfill. Industrial wastes were also disposed of at the Site. The discovery of contamination in drinking water wells in the vicinity of the landfill was followed by investigation, listing on the Superfund National Priorities List, and selection of cleanup actions by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA).

Cleanup actions were selected in two Records of Decision. The first Record of Decision, issued in 1984 (1984 ROD), called for installation of a water line for 42 residences in the vicinity of the landfill. The water line was installed in 1985.

In March 1986, EPA issued a second ROD (1986 ROD) requiring the consolidation of the west landfill into the main landfill, construction of a multilayer cap to prevent infiltration of precipitation, installation of an up gradient trench to prevent the infiltration of clean ground water and installation of a down gradient trench to collect contaminated ground water.

The 1986 ROD was subsequently modified by two Explanations of Significant Difference (ESDs). The first ESD, issued in 1992, replaced the up gradient trench with a slurry wall and the down gradient trench with Interceptor Wells. In 2000, EPA issued a second ESD to enhance the remedy with an active gas migration control system to prevent the off-site migration of landfill gas.

Construction of the remedial action selected by EPA in the 1986 ROD was completed in 1995 by several potentially responsible parties (PRPs) under settlements with the United States. The active gas collection system was completed in December 2000. In the first Five-year Review, completed in September 2000 prior to the construction of the active gas migration control system, EPA found that the Site remained protective of human health and the environment.

The remedy for the Site remains protective of human health and the environment. The remedy has been constructed in accordance with the requirements of the 1986 ROD as modified by the ESDs and is functioning as designed.

To ensure that the remedy continues to remain protective in the future, EPA is recommending that additional data be gathered, including:

- Collection of annual samples from the exhaust stack on top of the landfill,
- Evaluation of the potential for subsurface vapor intrusion at down gradient property that may be developed in the future, and
- Preparation of a revised Operations and Maintenance Manual to ensure adequate monitoring if and when the remaining Interceptor Wells are shut down

These activities should be performed to ensure the long-term protectiveness of the remedy.

Five-year Review Summary Form

SITE IDENTIFICATION		
Site name Tybouts Corner Landfill		
EPA ID DED000606079		
Region 3	State Delaware	City/County New Castle, New Castle
SITE STATUS		
NPL status <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply) <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Construction Completion date 09/11/1995	
Has site been put into reuse? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
REVIEW STATUS		
Lead agency <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name Katherine Lose		
Author title RPM	Author Affiliation EPA	
Review period ** 01/24/2005 to 09/01/2005		
Date(s) of site inspection 06/15/2005		
Type of review <input type="checkbox"/> Post-SARA <input checked="" type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number <input type="checkbox"/> first <input checked="" type="checkbox"/> second <input type="checkbox"/> third <input type="checkbox"/> other _____		
Triggering action <input type="checkbox"/> Actual RA Onsite Construction at OU# _____ <input type="checkbox"/> Actual RA Start at OU# _____ <input type="checkbox"/> Construction Completion <input checked="" type="checkbox"/> Previous Five-year Review Report <input type="checkbox"/> Other (specify) _____		
Triggering action date (from WasteLAN) 09/29/2000		
Due Date (five years after triggering action date) 09/29/2005		

* "OU" refers to operable unit

** Review period should correspond to the actual start and end dates of the Five-year Review in WasteLAN

Five-year Review Summary Form, cont'd

Issues

The PRPs have submitted a proposal for shutting down the three remaining Interceptor Wells. The settlements with the PRPs identify criteria that must be satisfied in order to shut down the Interceptor Wells. EPA is currently evaluating whether these conditions have been met. EPA is working with the PRPs to develop revisions to the Operation and Maintenance Plan to ensure that appropriate monitoring is in place if the wells are shut down. Data should be collected from the Gas Migration Collection System exhaust stack to confirm that the remedy is operating as designed.

There is a possibility that the property south of Route 13 could be developed which requires that data be collected on the subsurface soils.

Recommendations

A revised O&M Plan must be prepared to ensure there is adequate monitoring in place if the Interceptor Wells are shut down.

Collect annual air samples from the exhaust stack to confirm that the remedy is operating as designed.

Perform an investigation and evaluation of soils on the south side of Route 13 to ensure that subsurface soil vapor intrusion will not present a problem for future development.

Protectiveness Statement

The remedy for the Site remains protective of human health and the environment

Other Comments

None

Second Five-year Review Report For Tybouts Corner Landfill Site New Castle, Delaware

I. Introduction

The purpose of the Five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-year Review reports. In addition, Five-year Review reports identify issues found during the review, if any, and recommendations to address them.

The United States Environmental Protection Agency (EPA) has prepared this Five-year Review report pursuant to the Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9621(c), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300 CERCLA § 121(c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in Section 300.430(f)(4)(ii) of the NCP, 40 C.F.R. § 300.430(f)(4)(ii), which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

EPA Region III has conducted a Five-year review of the remedial actions implemented at the Tybouts Corner Landfill Site in New Castle, Delaware (Site). This review was conducted from January to September 2005. This report documents the results of the review. Gannett Fleming, Inc. prepared portions of this review under the Response Action Contract (RAC), EPA contract Number 68-S8-3003, Work Assignment 012-ROOM-0309.

This is the second Five-year review for the Site. The triggering action for this review is the date of the last 5-year review (September 29, 2000). The Five-year review is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unlimited exposure.

II. Site Chronology

Table 1: Chronology of Site Events

Event	Date
The site is a sand and gravel quarry owned by William C. Ward	Prior to 1969
New Castle County uses the site as a municipal sanitary landfill	1969 to 1971
DNREC reports that a private well, located approximately 400 feet southeast of the landfill, is contaminated	1976
EPA tests a private well located approximately 100 feet north of the landfill and finds contamination	1983
The site is placed on the National Priorities List (NPL)	September 1983
EPA issues a Record of Decision (ROD) to install a public water line to 42 residences, while investigation of the nature and extent of contamination continues	September 1984
The public water line is installed	1985
EPA issues a second ROD for a containment remedy for groundwater at the site	March 1986
EPA enters into several Consent Decrees with various parties to implement the clean-up	1988
EPA issues an Explanation of Significant Differences (ESD) to modify the 1986 ROD groundwater containment remedy	1992
The groundwater containment remedy is constructed	1993 to 1995
Methane gas is detected outside of the confines of the landfill	October 1996
A temporary active gas venting system is installed and a landfill gas investigation is initiated	November 1996
EPA issues an ESD to modify the existing active gas venting system	July 2000
First Five-year review	September 2000
The landfill gas migration control system is constructed	July to December 2000
EPA approves a revised groundwater monitoring plan, including discontinued pumping on a trial basis at 5 of the 8 Interceptor Wells	April 2004

III. Background

Physical Characteristics

The Tybouts Corner Landfill Site (Figure 1) consists of an inactive municipal and industrial landfill covering approximately 47 acres, the groundwater underneath the landfill, and groundwater located south and southeast of the landfill that is impacted by Site-related contaminants. The landfill has been capped and is vented by both a passive and active gas migration control system. A groundwater extraction system consisting of eight wells and a pumping station are also located at the Site.

Land and Resource Use

Prior to 1969, the Site was used as a sand and gravel quarry. Between 1969 and 1971, the Site was used as a municipal landfill. Current use of the property appears limited to actions in support of the remediation, including the operation of a groundwater pumping system and landfill gas migration system constructed at the Site. The Tybouts Corner Landfill Trust (Trust)- a consortium of parties required to implement and maintain the remedial action under settlements with the United States - conducts the required maintenance of the remedial action including the cap, pumping station and associated interceptor well system, and the active landfill gas migration control system.

The land area surrounding the Site is primarily residential. A residential development is located north of the landfill and other residential properties are located north, south, and west of the landfill. Route 13, a six lane highway, borders the southern boundary of the landfill. A newly constructed facility consisting of rental storage units is located immediately east of the northern portion of the landfill. The Site is bordered to the west by a power transmission line. Pigeon Run, a tributary of Red Lion Creek, flows along the western boundary of the landfill. A municipal water supply line, installed as part of the remedy for this Site, serves the residents surrounding the landfill.

History of Contamination

Prior to 1969, the Site operated as a sand and gravel quarry. From 1969 to 1971 the New Castle County Department of Public Works used the Site for disposal of municipal and domestic refuse. Industrial wastes were also disposed there during the active life of the landfill.

In 1976 and 1983, two domestic wells in the vicinity of the landfill were found to be contaminated with volatile organic compounds (VOCs). To date, these are the only two domestic wells to have been impacted by the landfill. In September 1983, the Site was placed on the CERCLA National Priorities List (NPL).

In 1984, EPA issued a ROD to install a public water line to 42 residences in the vicinity of the landfill. The water line was installed in 1985. Meanwhile, EPA conducted a Remedial Investigation and Feasibility Study to evaluate the nature and extent of contamination at the Site and possible remedial alternatives.

In March 1986, EPA issued a second ROD (1986 ROD) requiring the consolidation of the west landfill into the main landfill, construction of a multi-layer cap to prevent infiltration of rain water, installation of an upgradient trench to prevent the infiltration of clean groundwater, and installation of a downgradient trench to collect contaminated groundwater. The 1986 ROD was modified in May 1992 with the first of two Explanation of Significant Differences (ESD). The May 1992 ESD was issued to replace the upgradient trench with a slurry wall and the downgradient trench with Interceptor Wells. Construction of this portion of the remedy was completed in 1995.

During routine maintenance, methane gas was detected outside of the confines of the landfill adjacent to Red Lion Road in October 1996. A temporary active gas extraction system was installed along the northern perimeter of the landfill along Red Lion Road in November 1996. In July 2000, EPA issued a second ESD to enhance the remedy with a permanent active landfill gas migration control system along the northern, eastern and southern boundaries of the landfill. Construction of the landfill gas migration control system was completed in December 2000.

Basis for Taking Action

Hazardous substances that were found most commonly in Site groundwater during investigations include:

- Acetone
- Benzene
- 2-Butanone
- Chlorobenzene
- Chloroethane
- 1,2-Dichloroethane
- Ethylbenzene
- Methylene chloride
- Toluene
- Vinyl chloride
- Xylene

Potential exposure to groundwater at the Site was found to be associated with significant human health risks. The greatest concern at the Site at the time of the 1986 ROD was the potential for the contaminated leachate to migrate to the underlying Potomac aquifer, which is a major regional aquifer serving municipalities in the area.

IV. Remedial Actions

Remedy Selection

EPA issued two RODs for the Site. The initial ROD called for installation of a municipal water line to 42 homes in the vicinity of the landfill and was issued by EPA in September 1984. A second ROD, signed in March 1986, set forth EPA's selected remedial alternative for the landfill. Two ESDs modifying the 1986 ROD were signed in 1992 and 2000.

Remedial action goals developed for the Site and articulated in the 1986 ROD and the ESDs consist of:

- Elimination or appreciable reduction of vertical infiltration of rainfall through the landfill
- Elimination or control of lateral migration of groundwater into the landfill
- Elimination or control of the contaminated groundwater presently in the aquifers at the Site
- Elimination or control of the migration of landfill gas outside the landfill boundary

The major components of the remedy include:

- Consolidation of the west landfill into the main landfill
- Construction of a slurry wall along the northeast perimeter of the site to prevent the infiltration of clean groundwater into the landfill
- Installation of eight Interceptor Wells along the southern (downgradient) perimeter of the landfill to capture the contaminated groundwater
- Installation of a multi-layer cap over the main landfill to prevent the infiltration of precipitation into the landfill
- Construction of a pump station to pump the groundwater to the municipal sewer system
- Installation of passive gas vents, groundwater monitoring wells, and perimeter gas monitoring wells
- Installation of an active landfill gas migration control system along the northern, eastern, and southern boundaries of the landfill to prevent the migration of landfill gas outside of the landfill boundary
- Installation of perimeter fencing to prevent direct human contact with Site contaminants
- Institutional controls to prevent use of groundwater during pumping

Remedy Implementation

In 1989, the United States secured settlements with numerous potentially responsible parties (PRPs) under which the remedial action selected in the 1986 ROD was constructed and continues to be operated and maintained.

A multi-layer RCRA-type cap was installed from June 1993 to June 1995 to prevent infiltration of precipitation into the refuse, thereby limiting leachate production and its subsequent migration offsite. The cap consisted of foundation fill, a low permeability soil barrier, flexible geomembrane liner with a geonet drainage layer, select fill, and topsoil with vegetation.

The groundwater containment component consists of a slurry wall, Interceptor Wells, and a pumping station. The slurry wall was installed in October 1993 along the northeast perimeter of the landfill to prevent infiltration of clean groundwater and to lower the water level within the landfill. The wall is 30 inches wide and keyed into low permeability underlying formations.

A network of eight Interceptor Wells was constructed in the summer of 1994 to prevent migration of landfill leachate offsite. Each well was equipped with a submersible pump that pumped the groundwater through buried pipe to the pumping station. The groundwater is discharged to the New Castle County sanitary sewer system. The 1986 ROD required that the level of contaminants in groundwater be reduced to 100 parts per billion (ppb) of total volatile organics with the following contaminant-specific requirements:

- Vinyl chloride 1.0 ppb
- Benzene 5.0 ppb
- 1,2-Dichloroethane 5.0 ppb

In June 2003, the PRPs' groundwater consultant completed a detailed assessment of groundwater conditions which concluded that the combined effluent of the interceptor well system was in compliance with the requirements of the 1986 ROD and the Interceptor Wells could be shut down. However, since some wells exhibited somewhat elevated levels of some constituents, the PRPs proposed that only five of eight Interceptor Wells would be initially shut down. This approach was approved by EPA. Presently, groundwater extracted from the three operational Interceptor Wells exceeds the 1986 ROD standard for benzene. The December 2004 quarterly analytical results for benzene at the Interceptor Wells ranged from non-detect to 13 micrograms per liter ($\mu\text{g}/\text{l}$). The settlements set forth requirements for complete shutdown of pumping, EPA is currently evaluating whether these conditions have been met.

The active landfill gas migration control system, constructed from July to December 2000, consisted of a series of 28 extraction wells connected to an above-ground piping system. The piping system is connected to a blower system located in a building placed on the landfill. The resultant effluent is discharged to the atmosphere via a stack near the center of the landfill. This active system supplements a passive gas migration system consisting of 51 gas vents spaced evenly across the landfill surface.

Institutional controls selected in the 1986 ROD were limited to controls to prevent use of groundwater during pumping. The settlements under which the remedial action was implemented (which included a settlement with the owner of the property upon which the landfill is located), however, provided that the owner shall not obstruct or interfere with the remedy, that no conveyance of title, easement or other interest in the land be made without a provision allowing access as required under the settlement and a provision ensuring that there shall be no obstruction with or alteration of the remedy, that all conveyances of land interests shall contain such covenants necessary to permit the remedial activities and protect the remedy, that New Castle County (a settling party) was required to file a copy of the settlement in the appropriate land records, and that the restrictions and obligations regarding the land were intended to run with the land and be binding on anyone acquiring an interest in the land. The landfill property is currently owned by the Estate of William Ward and has not been transferred (other than by virtue of the passing of William Ward) since entry of the settlements in 1989. New Castle County filed a notice of the settlements as required in August 2001.

System Operation/Operation and Maintenance

Operation and maintenance (O&M) at the Site is ongoing in accordance with the EPA-approved O&M Plan. Quarterly reports are prepared and submitted to EPA and the Delaware Department of Natural Resources and Environmental Control (DNREC). Major components of the O&M plan include:

- Quarterly inspection of Interceptor Wells and vaults
- Quarterly inspection of monitoring points including groundwater monitoring and performance wells
- Quarterly sampling of Interceptor Wells and selected groundwater monitoring wells
- Monthly and quarterly sampling of the pumping station discharge
- Quarterly sampling of surface waters
- Annual inspection of wetlands
- Quarterly inspection of the perimeter fence
- Annual cap inspection, survey, and mowing
- Monthly and quarterly gas probe and gas vent monitoring
- Quarterly inspection of the landfill gas extraction wells, associated piping, and the blower house
- Quarterly monitoring of the system response gas probes and landfill gas extraction wells
- Quarterly monitoring of 14 homes in the Rutledge Subdivision adjacent to the Site for landfill gas

V. Progress Since Last Five-year Review

The first Five-Year Review was completed on September 29, 2000. In that review, EPA concluded that the remedy remained protective of human health and the environment.

The active landfill gas migration control system, in operation since December 2000, was not fully constructed at the time of the last Five-year Review. Since the last Five-year Review, the PRPs have monitored 14 homes and 8 gas probes in the Rutledge Subdivision north of Red Lion Road on a quarterly basis. Methane has not been detected in the homes since the system has been in operation. In addition, six other gas probes along the northern and eastern (east of Route 13) perimeter of the landfill have been monitored on a quarterly basis. An evaluation of the performance of the system is provided in the Data Review Section of this Five-Year Review.

In 1984 EPA installed a water line along Route 13 and Red Lion Road to connect the residences to a public water supply. Some residents chose not to connect to the public water supply. In 1996, the New Castle County Department of Health tested two of the domestic wells on Red Lion Road that were not connected to the public water supply. The results indicated that the domestic wells met the drinking water standards. In the 2000 Five-year Review, EPA recommended an investigation to confirm that all residences identified in the 1984 ROD were connected to the public water supply system. A building survey of residences surrounding the landfill was conducted in October 2000. Addresses from this survey were provided to the utility to confirm

water service. Several of the buildings were not in the utility's database and water service could not be confirmed, therefore, the residents were physically contacted to determine the source of domestic water during a Site visit on July 1, 2003. These residences are not located in the area of ground water contamination and therefore it is unlikely that their wells would have any Site related contamination. A letter and a fact sheet were provided to these residents. In the letter, the EPA Remedial Project Manager (RPM) recommended that any domestic wells be analyzed for Volatile Organic Compounds (VOCs) and biological components such as bacteria and coliform.

In addition, DNREC was contacted to determine if any potable wells had been installed in the vicinity of the landfill. DNREC provided an updated database of wells drilled in the vicinity of the landfill over the last decade. The wells were all monitoring wells and none are used for potable water supply.

The RPM recommended in the 2000 Five-year review that EPA modify the 1986 ROD with a non-significant change to eliminate the need for site-specific institutional controls. The 1986 ROD specified that institutional controls preventing use of groundwater during the pumping period would be implemented. The RPM's recommendation in the 2000 Five-year Review was based on the existence of such controls in the form of local requirements on groundwater well installation and use of groundwater in areas served by municipal water systems. Upon further review, the 1986 ROD does not require site-specific institutional controls regarding groundwater consumption and therefore no modification to the 1986 ROD is necessary.

VI. Five-year Review Process

Administrative Components

EPA notified the PRPs and DNREC of the initiation of the Five-year Review on January 20, 2005. The Tybouts Corner Landfill Site Five-year Review team was led by RPM Kate Lose. Other members included William McKenty (Hydrogeologist), Dawn Ioven (Toxicologist), Bruce Pluta (Biologist), Patricia Flores-Brown (Air Specialist), and Vance Evans (Community Involvement Coordinator). Steps included in development of this Five-Year Review Report included:

- Community Involvement - Notifying the community that EPA is conducting a Five-year Review at the Site and providing information on whom to contact and how to get more information about the process, conducting community interviews to solicit issues and/or concerns and to continue public education efforts, and notifying the community of how to obtain a copy of the second Five-year Review Report upon its completion
- Document and Data Review - Reviewing significant Site documents and environmental monitoring data, checking available published toxicity references for Site-related contaminants to determine if there have been changes since the Site-specific risk assessment that may be relevant to the evaluation of remedy protectiveness

- Site Inspection - Visiting and inspecting the Site to visually confirm and document the condition of the remedial action components, the Site, and the surrounding area, confirming the continued reliability of institutional controls regarding groundwater consumption
- Compiling data and findings for the Five-year Review Report

The Five-year Review schedule extended from January 2005 through September 2005.

Community Involvement

A notice that EPA was conducting a Five-Year Review was published in the *Wilmington News Journal* on June 29, 2005. A letter stating the same was sent to the PRP group performing the remedial action on April 6, 2005, and to the Delaware Department of Natural Resources on March 24, 2005.

EPA interviewed several residents who live across the street from the landfill and have combustible gas indicators in their basements. Currently, these basements are monitored on a quarterly basis when access is provided. Since the construction of the active gas migration control system in 2000, there have not been any detectable levels of methane gas in the gas monitoring probes located between the landfill and the nearby residences. EPA provides copies of quarterly gas monitoring probe data to a representative/resident of the Rutledge Development which is located on the north side of Red Lion Road. This information has been provided to this representative/resident since 1996.

EPA has received no communications from the area citizens in response to the June 29, 2005 newspaper Notice.

Document Review

Documents reviewed in the process of conducting this Five-Year Review included portions of the RI/FS report, the last Five-Year Review, the 1984 and the 1986 RODs, the 1992 and the 1996 ESDs, and the relevant settlement documents under which the remedial action was constructed.

Technical documents reviewed included the following:

- Operation and Maintenance Manual, prepared by DPL Consultants, April 1996,
- Addendum No 2, Gas Migration Control System, Operation and Maintenance Manual, prepared by Conestoga-Rovers and Associates, dated October 2000,
- Air Dispersion Modeling Report, dated September 2001,
- Ground water Assessment Report, prepared by Gannett Fleming, dated February 2003,

- Ground water Assessment Report, prepared by Malcolm Pirnie, Inc , dated June 2003,
- Ground water Summary Report, prepared by Gannett Fleming, dated January 17, 2005,
- Semi-annual Discharge Reports for New Castle County Sewer Discharge Permit,
- Operation and Maintenance Quarterly Reports for 2004 and 2005, prepared by Tybouts Comer Landfill Site Trust Fund.

Data Review

EPA's contractor prepared a remedy assessment report in February 2003 and the PRPs' contractor prepared a ground water assessment report in June 2003. These reviews concluded that the remedy was performing as designed. For this second Five-Year Review, data review included the past five years' worth of monitoring and operations and maintenance data. In addition, EPA contractors collected split samples of ground water samples taken by the PRPs' contractor during August 2003 EPA concluded that the remedy was performing as designed.

Ground Water Monitoring

The remedial action at the Tybouts Comer Site includes a series of eight Interceptor Wells (IW-01 through IW-08) along the eastern and southern perimeter of the capped landfill. The wells were designed to achieve and maintain groundwater capture downgradient of the landfill. Groundwater is pumped through a buried HDPE common header to the on-site pump station prior to discharge to the New Castle County sanitary sewer system.

Quarterly inspections of the Interceptor Wells and water level measurements are performed. Interceptor Wells IW-1, IW-05, IW-06, IW-07, and IW-08 were permanently shut down June 29, 2004 in accordance with the Tybouts Corner "Modification to the Site Monitoring Plan- 2004" approved by EPA and DNREC on April 21, 2004.

Table 1 is a summary of the analytical results of the Interceptor Wells for December 2004. The results show that five of the eight Interceptor Wells satisfy the clean-up standards in the 1986 ROD. Three of the eight Interceptor Wells contain benzene at a concentration slightly above the MCL. IW2, IW3, and IW4 contained 6.5, 13, and 8.7 µg/l, respectively. The MCL for benzene is five (5) µg/l. The concentration of contaminants in the Interceptor Wells has remained relatively constant for several years.

Four off-site monitoring wells are located downgradient of the landfill. These wells are monitored quarterly for volatile organic compounds. The December 2004 sampling results are summarized in Table 2. One well (TY204) exceeds the clean-up standards for benzene and 1,2-dichloroethane. The concentrations of contaminants in the off-site monitoring wells have remained relatively constant for several years.

In April 2004, EPA approved a revised ground water monitoring plan to shut down five of the eight Interceptor Wells. This action had no impact on the concentration of contaminants in the monitoring wells. The plan includes a proposal to shut down the three remaining Interceptor Wells with a phased approach to eventually discontinue ground water monitoring. EPA is evaluating this proposal against the requirements of the 1986 ROD and the settlements under which the remedial action was implemented.

Gas Migration Control System Monitoring

The two major components of the Gas Migration Control System (GMCS) include:

- the collection field which includes the gas wells and the piping system, and
- a blower building with automated controls

The collection field extracts soil gas from the subsurface environment through a series of extraction wells that are connected to an above-ground stainless steel header piping system. The extraction system is located on the perimeter of the Site along the north, east and south.

The automated controls include programming and instrumentation that allows for unmanned operation of the GMCS.

The GMCS was constructed in 2000 to supplement a passive gas venting system consisting of 51 gas vents extending below the base of the landfill cap at an approximately 200 foot grid spacing.

The EPA approved Gas Migration Contingency Plan provides an early warning and response plan if landfill gas is detected above a trigger level so that appropriate steps can be implemented to address any such detection. There are 15 monitoring probe locations established in areas outside of the landfill property limits to act as sentinel monitoring wells. Some of these probe locations are single wells and others are nested. The monitoring probes provide confirmation that landfill gas is not present and/or migrating outside of the landfill limits.

Quarterly monitoring includes inspection and collection of data from the passive gas system, the GMCS, and the monitoring probes located beyond the landfill property limits. The results of the December 2004 monitoring of the GMCS are discussed below.

Gas Vents

The gas vent monitoring indicated none of the vents appear to be obstructed. Of the 51 gas vents, eight vents appear to be tilting slightly but are nonetheless fully operational. Forty-eight of the vents measured 100% of the Lower Explosive Limit, indicating that methane is still being generated and emitted from the landfill. Photoionization Detector (PID) readings from the gases exiting the vents ranged from 0 ppm to 44.2 ppm.

Table 3 provides a summary of the monitoring probe data for the areas beyond the landfill property limits. Methane was not detected in any of the monitoring probes. The data demonstrates that the landfill gas collection system is effective in containing the landfill gases.

Air Emissions

In April 2001, all of the 51 passive gas vents and the discharge vent for the GMCS were sampled. The concentration of the contaminants and the flow rates of the vents were incorporated into an air model to determine if there could be an unacceptable exposure to contaminants at the landfill from exposure to air emissions over time. There has been a reduction in concentration of contaminants in the vents since 1996. Approximately one-third of the passive vents contained only trace levels of contaminants. The air modeling report concluded that the landfill air emissions do not present an unacceptable risk.

Cap Maintenance Records

Cap settlement has been monitored each year since 1997. The data indicates that very little settlement has occurred since construction of the cap was completed in 1995. The cap is mowed on an annual basis. Although there is no evidence of deep rooted vegetation, there is evidence of burrowing animals. The cap's impervious layers have not been jeopardized as a result of the burrowing animals. Regular cap inspections are performed to confirm that the burrowing animals do not impact the integrity of the cap.

A section of the cap was seeded with wildflowers and the wildflowers are starting to spread along the south side of the landfill.

The perimeter drainage ditch is regularly inspected for erosion or obstruction. No erosion or obstructions were observed during EPA's site inspection on June 15, 2005.

Surface Water Monitoring

Quarterly surface water samples were collected from Red Lion Creek, Pigeon Run Creek, and the West Basin from September 1996 through December 2003. The sampling results demonstrated that the landfill did not contribute chemical contamination to the surface water and EPA approved a proposal to discontinue surface water sampling on April 21, 2004.

ARARs Review

The 1986 ROD was issued prior to the 1986 amendments to the Superfund law in which the concept of ARARs was introduced, compliance with ARARs was not discussed in the 1986 ROD. ARARs pertaining to the Gas Migration Collection System (GMCS) were identified in the 2000 ESD. The majority of these ARARs pertain to the design and construction of the GMCS. The gas collection system was constructed to comply with such ARARs and continues to operate in such manner.

Site Inspection

EPA conducted a Site visit on June 15, 2005. EPA representatives included RPM Kate Lose, Hydrogeologist William McKenty, Biologists Bruce Pluta and Katie Davies, and lexicologist Dawn Ioven. EPA was accompanied by EPA's oversight contractor, DNREC's representative, and PRP representatives.

The purpose of the Site Inspection was to inspect monitoring wells, the waste water collection system, gas vents, and gas collection system. In addition, a visual inspection of the vegetation and soil conditions of the capped area as well as the wetland areas was conducted.

Appropriate record keeping files were on Site. The ground water pumping system and the gas collection system are operating as designed. The cap and vegetation were in good condition, vegetation was established and there was no evidence of erosion. The surface water management structures are effective. There were no breaks in the fence and no evidence of any trespassers. A few of the gas vents are tilted, but are continuing to vent landfill gas and the sloping has not impacted the integrity of the cap. The identification marks of the passive gas vents are fading and should be repainted.

There was evidence of animal activity including a few burrow holes. The burrows are not impacting the integrity of the cap.

A copy of the inspection checklist is in the Site file.

Interviews

During the site inspection, EPA interviewed the former chairperson for the Tybouts Corner Trust, S. A. LaRocca, representing the PRP group and Stephen Johnson, representing DNREC. Overall they were satisfied with the remedial action at the Site.

On August 22, 2005, the RPM, Kate Lose, and the Community Information Coordinator, Vance Evans, interviewed people at three separate residences who live adjacent to the Site in the Rutledge development. The Rutledge development is located upgradient from the Site. These residences have their basements monitored on a quarterly basis. In addition, there are Combustible Gas Indicators (CGIs) in their basements.

In the last five years, the quarterly monitoring of the gas monitoring probes as well as the basements has demonstrated that the Gas Migration Control System is working as designed and continued monitoring of the basements is not necessary. EPA discussed eliminating the quarterly monitoring of the basements. Residents who have lived in these homes for several years and plan to continue to live there preferred to have the CGIs maintained in their basements. Other residents who were concerned about the CGIs impacting the value of their property did not wish to have the CGIs in their basement.

One of the three residences felt informed about Site activities. One felt that a fact sheet would be helpful. The third resident had just moved to the home two months earlier and was unaware that

the CGI in the basement was installed because of gas migration from the landfill in 1996.

Copies of the interview reports are in the site file.

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

Remedial action goals developed for the Site and articulated in the 1986 ROD and the ESDs consist of:

- Elimination or appreciable reduction of vertical infiltration of rainfall through the landfill
- Elimination or control of lateral migration of groundwater into the landfill
- Elimination or control of the contaminated groundwater presently in the aquifers at the Site
- Elimination or control of the migration of landfill gas outside the landfill boundary

The remedial action components selected to attain these goals include a multi-layer cap over the consolidated landfill to prevent the infiltration of precipitation into the landfill, a slurry wall along the upgradient perimeter of the Site to prevent the infiltration of clean groundwater into the landfill, Interceptor Wells along the downgradient perimeter of the landfill to capture the contaminated groundwater for pumping to the municipal sewer system, an active landfill gas migration control system along the northern, eastern and southern boundaries of the landfill to prevent the migration of landfill gas outside of the landfill boundary, and institutional controls to prevent groundwater consumption during the pumping period.

A review of documents, ARARs, risk assumptions, and the results of inspections indicates that the remedial action is functioning as intended by the 1986 ROD, as modified by the ESDs.

Ground water pump and treat

The ground water containment system is functioning as designed and has been effective in appreciably reducing the volume of contaminated groundwater in aquifers at the Site. Concentration of contaminants in the capture wells is at, or approaching, the cleanup criteria in the 1986 ROD. The concentration of the contaminants in the capture wells and down gradient monitoring wells has remained relatively constant for the last 3 years

The slurry wall continues to be effective in reducing the amount of clean groundwater migrating into the landfill.

Landfill Cap

The cap continues to be effective in eliminating or appreciably reducing vertical infiltration of rainwater into the landfill. Maintenance of the cap and drainage structures is effective. A few

small areas showed evidence of burrowing of small animals. The burrows do not penetrate beyond the soil layer, and so do not affect protectiveness.

Landfill Gas

The Gas Migration Control System continues to be effective in eliminating or controlling the migration of landfill gas outside the landfill boundary.

Institutional Controls

Institutional controls selected in the 1986 ROD were limited to controls to prevent use of groundwater during pumping. These controls remain in place and are effective. Delaware regulations adopted in February 1997 prevent the installation of potable wells in the vicinity of the landfill. Specifically, these regulations require a permit for the installation of any well (except in certain emergency circumstances) and require that DNREC deny an application for a well permit for a potable well where an approved water supply system is legally and reasonably available. Delaware Regulations Governing Construction and Use of Wells (Well Regulations), §§ 3.01, 3.10(D) The regulations state in relevant part that:

"Where an approved public water supply system is legally and reasonably available to the site to be served, the Department shall deny an application for a well permit for a potable water well. A public water supply system is deemed legally available when a Certificate of Public Convenience and Necessity has been granted to a water utility for the site. A public water supply system is deemed reasonably available when a public water distribution line is located within two hundred (200) feet of the structure or building to be served "

Well Regulations § 3.10(D)

A public water distribution line is located along Red Lion Road and along Route 13, both of which border the Site.

In addition, Section 401 of the Well Regulations restricts the siting of wells in the vicinity of existing sources of contamination. This criterion would prevent the installation of any extraction well that could impact the remedial action.

As an extra layer of protection, DNREC has designated the Site and land down gradient of the landfill as a Ground Water Management Zone (GMZ) which prohibits the permitting of any public or domestic well in the designated areas.

Additional controls have been established pursuant to the settlements under which the remedial action was constructed. The settlements provided, among other things, that the owner shall not obstruct or interfere with the remedy, that no conveyance of title, easement or other interest in the land be made without a provision allowing access as required under the settlement and a provision ensuring that there shall be no obstruction with or alteration of the remedy, that all conveyances of land interests shall contain such covenants necessary to permit the remedial

activities and protect the remedy, that New Castle County was required to file a copy of the settlement in the appropriate land records, and that the restrictions and obligations regarding the land were intended to run with the land and be binding on anyone acquiring an interest in the land.

These controls also appear to remain effective. Operation and maintenance of the remedial action continues to occur without interference (the owner passed away in 1998 and the property remains in his estate) and the notice required by the settlements was filed in the appropriate land records in August 2001.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?

There have been no changes in Site conditions, exposure assessments or toxicity data or newly promulgated standards that call into question the protectiveness of the remedy.

Changes in exposure pathways/land use

There have been no changes to Site conditions or land use that would affect the protectiveness of the remedy.

A rental storage facility was recently constructed on the northeast boundary of the Site. There are ground water and gas monitoring points on the facility to ensure that the remedial action at the landfill continues to be protective.

The Site is bordered to the south by a six lane highway (Route 13). Immediately opposite the highway is privately owned land with two residential homes that are currently vacant. The vacant houses are located on a 64 acre tract of land. The 64 acre tract of land is for sale. A portion of this 64 acre tract of land is down gradient from the landfill. EPA intends to investigate the potential for subsurface soil vapor intrusion in the event the property is sold and developed.

DNREC designated the land down gradient from the Site as a Groundwater Management Zone. In addition to other State regulations as discussed above in Question A, this action will provide another layer of protection to prevent the use of ground water as a drinking water source.

Changes in standards, newly promulgate standards and TBCs

There have been no changes to ARARs or TBCs for this remedial action.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The PRPs have requested permission to shut down the remaining three pumping (Interceptor) wells. Under the 1986 ROD and the settlements, pumping may cease at the earlier of

- 1 The following standards have been met
 - a Total VOCs are less than 100 ppb,
 - b Vinyl chloride is less than 1 ppb,
 - c Benzene is less than 5 ppb, and
 - d 1,2-dichloroethane is less than 5 ppb
- 2 Six years have elapsed since pumping started, the system has "substantially complied" with the Total VOC and vinyl chloride levels, and the Total VOC and vinyl chloride levels " have effectively become constant in each well"
- 3 Ten years have elapsed since pumping started and it is shown that no reasonable system modification would produce a significant improvement within an additional three years.

Pumping of the ground water began in September 1995. The last two years of quarterly sampling of Interceptor Wells indicate that the total VOCs are less than 100 ppb and Vinyl Chloride is less than one ppb. Two of the Interceptor Wells contain concentrations greater than five ppb of benzene and 1,2-dichloroethane. EPA is currently evaluating the PRPs' request against the requirements of the 1986 ROD and the settlements.

VIII. Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Evaluate the PRPs proposal to shut down the three remaining Interceptor Wells to determine if the conditions in the settlements have been satisfied	N	N
Revise O&M Plan to address potential Well Shut Down	N	N
Sample Air Stack on top of Landfill on Annual Basis	N	N
Evaluate Area south of Route 13 for potential Subsurface Soil Vapor Intrusion	N	N
Numbers on gas vents are fading	N	N

IX. Recommendations and Follow-Up Actions

Recommendations for the Tybouts Corner Landfill are listed in the table below.

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Evaluate whether/when the remaining three Interceptor Wells will be shut down	Revise the O&M Plan to ensure there is adequate monitoring in place	PRP will revise O&M Plan	EPA will evaluate Interceptor Well shut down	06/30/06		
Although methane measurements suggest the concentration of gas emission is on the decline, there is no current analytical data to confirm that the remedy is operating as designed	Collect annual air samples from stack on top of landfill	PRP	EPA	06/30/06		
No data on the soils and vapors on the vacant property south of Route 13	Perform an investigation and evaluation of soils to ensure that subsurface soil vapor intrusion will not be a problem for future development	PRP	EPA	06/30/06	N	N
Numbers on gas vents are fading	Repaint numbers on gas vents	PRP	EPA	10/30/05	N	N

X. Protectiveness Statement

The remedial action is functioning as intended by the 1986 ROD and remains protective of human health and the environment.

XI. Next Review

Completion of the next Five-year Review for the Tybouts Comer Landfill Superfund Site is required five years from the signature date of this Five-year Review.

ATTACHMENTS

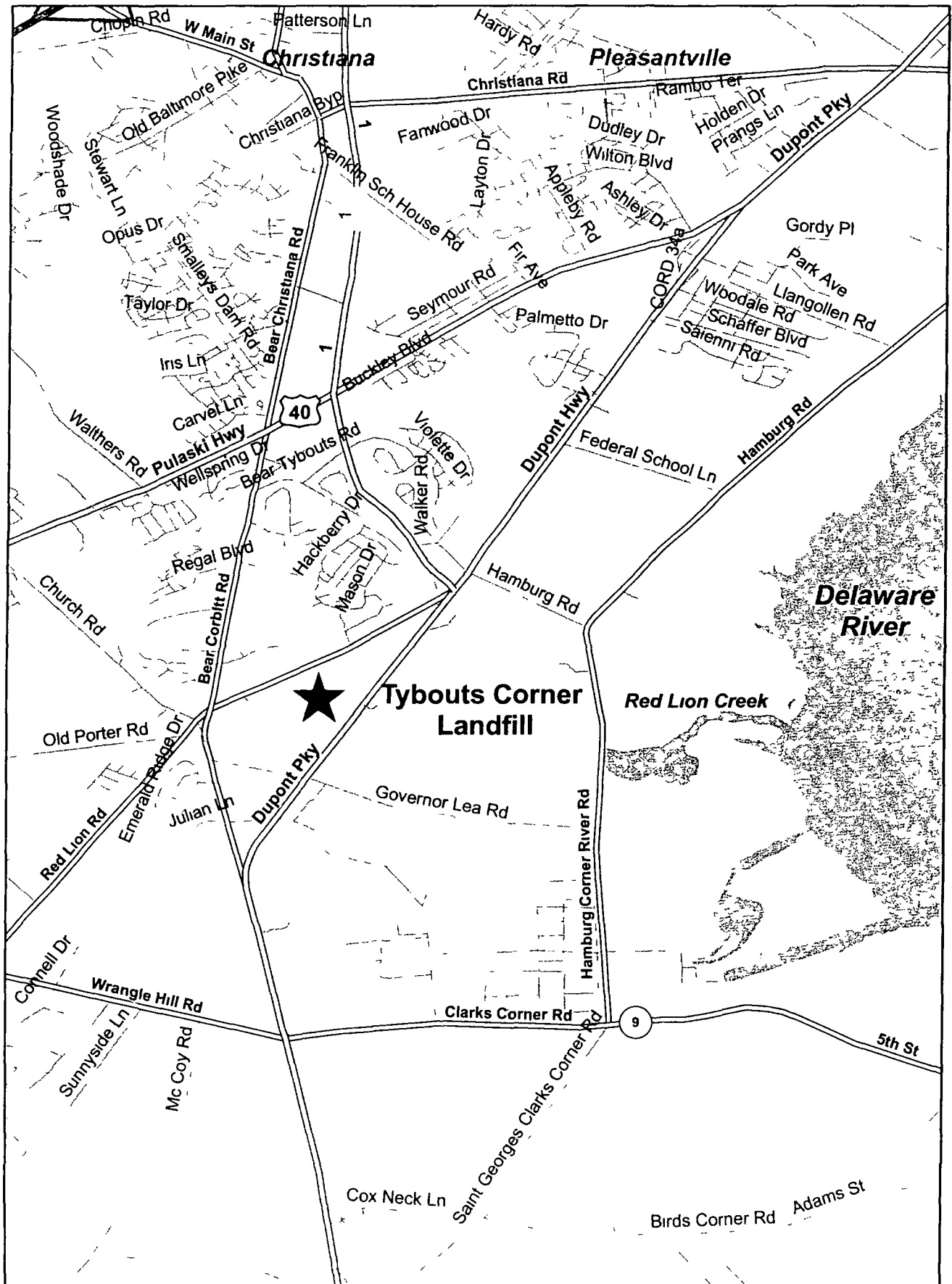


Figure 1 Tybouts Corner Landfill
New Castle County, Delaware

Table 1
Tybouts Corner Landfill
Interceptor Well Analytical Results
December 2004

Compound	IW1	IW2	IW3	IW4	IW5	IW6	IW7	IW8
1,1-dichloroethane	0 14J	0 36J	2 6	1 6	ND	ND	ND	ND
1,2-dichloroethane	3 2	016J	2 2	0 91	ND	ND	ND	0 46J
1,2-Dichloroethene (total)	0 16J	0 33J	0 51	0 46J	ND	ND	ND	ND
2-butanone	ND	ND	ND	ND	ND	ND	ND	1 3J
Acetone	ND	2 2J	ND	ND	ND	ND	2 0J	ND
Benzene	1 4	6 5	13	8 7	0 16J	0 19J	ND	ND
Chlorobenzene	2 8	7	21	17	0 42J	0 40J	ND	0 14J
Chloroethane	ND	0 77	1 5	1	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	0 29J	0 64
cis-1,2-dichloroethene	0 16J	0 22J	0 25J	0 46J	ND	ND	ND	ND
Ethylbenzene	ND	ND	0 17J	ND	ND	ND	ND	ND
Methylene Chloride	ND	0 13J	0 22J	0 13J	ND	ND	ND	0 27J
Tetrachloroethene	0 5	ND	ND	ND	ND	ND	ND	8 9
Toluene	ND	0 23J	0 36J	0 33J	ND	ND	ND	0 13J
Total xylene	ND	ND	1 5	0 92	ND	ND	ND	ND
trans-1,2-dichloroethene	ND	0 11J	0 25J	ND	ND	ND	ND	ND
Trichloroethene	0 17J	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	0 29J	ND	ND	ND	ND	ND

Notes

All results are in ug/l

ND - not detected at detection limit

J - Compound detected below minimum detection limit

Table 2
Tybouts Corner Landfill
Monitoring Well Analytical Results
December 2004

[illegible]

Table 2
Monitoring Well Analytical Results

Compound	MW01	MW02	MW04	MW05	TY118B	TY119B	TY120B	TY204
Toluene	0 35J	0 19J	0 23J	0 13J	ND	0 20J	0 20J	0 21J
Total xylene	0 62	ND	ND	0 15J	ND	0 27J	ND	0 17J
trans-1,2-dichloroethene	ND	ND	0 20J	0 22J	ND	0 15J	ND	0 22J
Trichloroethene	0 11J	ND	ND	ND	ND	0 51	ND	0 84
Vinyl chloride	1 4	1 1	0 28J	ND	ND	ND	ND	0 44J

Notes

All results in ug/l

ND - not detected at detection limit

J - Compound detected at minimum detection limit

Table 3
Gas Monitoring Probe Data
December 2004

Monitoring Point	Methane (% by volume)	Carbon Dioxide (% by volume)	Oxygen (% by volume)
GP66-97	0 0	10 6	5 5
GP67-97	0 0	12 5	4 6
GP69-97	0 0	13 3	9 9
GP70-97	0 0	0 3	21 3
GP71-97	0 0	0 2	21 3
GP72-97(d)	0 0	0 5	21 1
GP72-97(s)	0 0	0 0	21 4
GP73-97(d)	0 0	2 9	19 3
GP73-97(s)	0 0	0 5	21 2
GP74-97(d)	0 0	2 1	20 2
GP74-97(s)	0 0	0 2	21 3
GP100-00(d)	0 0	0 0	21 4
GP100-00(s)	0 0	0 0	21 4
GP101-00(d)	0 0	0 0	21 2
GP101-00(s)	0 0	0 2	21 0
GP102-00(d)	NR	NR	NR
GP102-00(s)	NR	NR	NR
GP94-98	0 0	0 0	21 4
TY204	0 0	0 0	21 4
TY114	0 0	0 0	21 4

NR - Not Recorded due to construction activities