FIVE- YEAR REVIEW REPORT

Keystone Sanitation Landfill

Superfund Site

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Region III

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U. S. Environmental Protection Agency
Region III
Hazardous Waste Management Division
Five- Year Review (Type Ia)
Keystone Sanitation Landfill
(EPA ID# PAD054142781)
Union Township, Adams County, Pennsylvania

I. Introduction

The United States Environmental Protection Agency (EPA) Region 3 conducted this review pursuant to section 121 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U. S. C. § 9621(c); section 300.400(f)(4)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C. F. R. Part 300 (as amended); and OSWER Directives 9355.7- 02 (May 23, 1991), 9355.7-02A (July 26, 1994), and 9355.7-03A (December 21, 1995). The purpose of a five- year review is to ensure that a remedial action remains protective of public health and the environment and is functioning as designed. This document will become a part of the Site file. This Type Ia review is appropriate for the Keystone Sanitation Landfill Site because the response is ongoing at the Site.

This is the first five- year review for the Keystone Sanitation Landfill Site. The triggering action for this statutory review is the date of the initiation of the first remedial action at the Site. That date is March 29, 1994, the date the contractor mobilized to the site for construction of the onsite fence around the perimeter of the 40- acre tract on which the landfill is located. The Site remedy is not complete.

Site History and Characteristics

The Keystone Sanitation Landfill Site (" Site") is an unlined, inactive, privately owned facility that operated from 1966 to 1990. In 1980, the Pennsylvania Department of Environmental Resources (" PADER") issued a permit for the landfill. The landfill was permitted to receive household and municipal wastes and certain types of industrial and construction debris. The landfill contains more than 1.7 million cubic yards of waste, and is approximately 100 feet high.

The horseshoe- shaped landfill is located on a 40- acre tract in Union Township, Adams County, Littlestown, Pennsylvania in a rural residential/ agricultural area. Several buildings occupy the inner portion of the horseshoe including a residence/ office, garage and storage building. The property is bordered to the south by Line Road, to the north by Clouser Road and is approximately 800 feet north of the Pennsylvania- Maryland border. Entrance to the property is via Clouser Road. The landfill is situated on top of a ridge, straddling a surface water drainage divide, where surface water flows from landfill property both north, into an unnamed tributary of Conewago Creek, and south, into an unnamed tributary of Piney Creek, in the State of Maryland. The topography of the area consists of gently rolling hills and valleys formed by elongated, northeast- trending ridges and valleys. Numerous small springs within the vicinity of the Site discharge to surface water bodies. See Figure 1.

Nearly all shallow groundwater beneath the Site discharges to the surface in the form of springs or streams. The deep groundwater exists in fractured bedrock, which underlies the landfill as well as the surrounding area. Deep groundwater flow primarily follows northeast-southwest fractures in the bedrock but also follows minor fractures and can flow radially away from the landfill. Groundwater is the only source of potable water in the area and most residents near the Site rely on private wells for

their drinking water. A few residents rely on springs for their drinking water.

In 1982, the PADER required the landfill owners to monitor groundwater for volatile organic compounds. Samples taken from an onsite monitoring well indicated volatile organic compound (VOC) contamination of the groundwater beneath the landfill. Sampling of the onsite residential well and the nearby Mundorf Spring revealed also VOC contamination. In April 1984, an EPA Field Investigation Team (FIT) performed a site investigation to assess the Site's eligibility for inclusion on the EPA Superfund National Priorities List (NPL). As result of PADER and EPA investigations, the Keystone Sanitation Landfill Site was proposed to the NPL on April 1, 1985. The Site was included on the final NPL by publication in the Federal Register on July 22, 1987, 52 Fed. Reg. 27620.

In 1987, EPA began a fund-lead Remedial Investigation/ Feasibility Study (RI/ FS). The RI/ FS reports were finalized in September 1990. EPA began a second fund- lead RI/ FS to further study the groundwater contamination in the offsite monitoring wells and residential wells in 1995. This second investigation of the groundwater contamination beyond the boundaries of the landfill (herein referred to as " offsite areas" or " offsite") was labeled Operable Unit Two (OU- 2) to distinguish it from the previous studies which were relied upon to select the remedy in 1990. Those RI/ FS Reports were finalized in 1998.

Contaminants Detected

Organic (e. g., trichloroethene, tetrachloroethene, vinyl chloride and 1,1-dichloroethene) and inorganic (e. g., iron, manganese and mercury) contaminants were found in groundwater as well as in certain springs and seeps at and near the Site. Although groundwater flow is the primary contaminant migration pathway away from the Site, other media contamination attributable to the landfill may be the result of groundwater-to-surface water discharges, overland runoff, surface soil contamination from former spray irrigation activities, and/ or fugitive dust emissions. EPA has completed two remedial investigations (RI) at the Site. Based on the first RI, EPA determined that exposure to the plume of contaminated groundwater posed a potential cancer risk to the onsite well users if the existing point-of-use filter failed or was not maintained. (During the OU-1 RI the onsite residence was found to contain a point-of-use filter.) A potential risk to offsite residents also existed. Based on the second RI, EPA determined that offsite risks to human health were unacceptable and warranted remedial action offsite, i. e., beyond the boundaries of the landfill. Four of the residential wells sampled during the OU-2 RI showed non- cancer Hazard Indices derived from Site-related contaminants in excess of 1 and one residential well showed a cancer risk greater than 1E- 4 or an incremental increase of one chance in 10,000 of contracting cancer from a lifetime exposure to contaminants from the site in these wells. Both of these levels exceed EPA's trigger for action.

September 1990 Operable Unit One (OU- 1) ROD

The first Record of Decision (ROD), issued on September 30, 1990, selected a remedy for source control and groundwater remediation, within the physical boundaries of the landfill, and required a second investigation to further study the groundwater contamination in the offsite monitoring wells and residential wells. The September 1990 ROD required remediation within the physical boundaries of the Site and included the following response actions.

- Installation and maintenance of an impermeable cap and gas collection system over the 40- acre landfill.
- Installation and maintenance of onsite groundwater extraction wells and a treatment plant to capture, contain and reduce the concentrations of volatile organic compounds and metals in groundwater.
- Provision of a point- of- use treatment system to onsite residents
- Installation and maintenance of a fence around the Site.
- Monitoring of the groundwater in monitoring and residential wells.
- Monitoring of surface water and sediments.
- Initiation of deed restrictions regarding present and future Site activities.
- A second remedial investigation to evaluate the migration of contaminants to offsite residential wells and surrounding areas.

June 1999 ROD Amendment

After the completion of the second remedial investigation of offsite groundwater contamination, EPA issued a Proposed Remedial Action Plan to amend the 1990 OU-1 ROD in June 1998. EPA received extensive comments on the Proposed Remedial Action Plan. On June 25, 1999, EPA issued a ROD Amendment for the groundwater response actions. This amendment included the following major components to address the migration of contaminants beyond the landfill boundaries via the groundwater and the potential discharge of contaminated groundwater to surface water bodies and adjacent land areas.

- Installation and operation of offsite extraction wells to capture, contain, and remediate contaminated groundwater emanating from the landfill.
- Installation of filters for current and future residences located north of the tributary to Piney Creek and within 3/ 4- mile radius from the center of the landfill. Based on the OU2 Risk Assessment, a filter was also installed for one residence located within the 3/ 4-mile to one- mile radius from the center of the landfill because of a finding of unacceptable current risk.
- Annual monitoring of current and future residential wells north of the tributary to Piney Creek and within a 3/ 4- mile to one- mile radius from the center of the landfill, with provision of filters for residences within this radius if monitoring shows two consecutive exceedances of any cleanup standard. If filters are provided as part of this remedy, the residence will not be included in this annual monitoring.
- Evaluation for inclusion in the monitoring program of homes adjacent to the one-mile boundary from the center of the landfill if Site- related contamination is detected nearby.
- Preparation of a Hydrogeological Evaluation Report after five years of data collection ,
- Sampling of surface water and sediment from local tributaries to monitor for potential impacts to tributaries.

In addition the June 1999 ROD Amendment modified the Site Contaminants of Concern (COCs) and their respective cleanup standards for the onsite pump and treat system. These amendments did not address and / or otherwise pertain to the landfill cap and associated source control measures selected in the September 1990 ROD.

II. Discussion of Remedial Objectives

EPA issued a CERCLA § 106 Unilateral Administrative Order (UAO), EPA Docket No. III- 91- 56- DC on June 28, 1991, as modified on September 6, 1991, for the performance of the September 1999 ROD or Operable Unit One (OU1) ROD to the Noels, site owners and operators, and eight other potentially responsible parties (PRPs) known as the Keystone Respondents Committee (KRC). The KRC are now known as the Original Generator Defendants (OGD) and these parties have entered into a Consent Decree to perform part of the Remedial Action.

The remedial objectives for the entire Site Remedy are 1) to prevent direct contact with contaminated soils and buried waste; 2) prevent the future releases of Site- related contaminants into groundwater; 3) to prevent migration of contaminated groundwater to uncontaminated areas of groundwater, surface water bodies and sediment; 4) to prevent current and future exposure to Site-related contaminants in groundwater that exceed cleanup standards; and 5) restore the aquifer to its beneficial use as potable water source. To meet these remedial action objectives the Site remedy response actions are to contain the waste (source) and to remediate the groundwater Remedial action goals have been established to bring all risks to within 1E- 4 to 1 E- 6 risk range for carcinogenic risks and to a Hazard Index of less than 1 for non- carcinogenic risks.

Operable Units

For purposes of internal tracking, the Site was divided into four parts or operable units.
These are:

Operable Unit One (OU1) - Fence
Operable Unit Two (OU2) - Residential Filters
Operable Unit Three (OU3)- Source Control (Cap and methane gas extraction)
Operable Unit Four (OU4) - Groundwater Pump and Treat.

OU1 and OU3 address source control and exposure to contaminated soils and buried wastes.
OU2 and OU4 address exposure to contaminated groundwater and remediation of groundwater.

The PRPs for this Site have not remained as one consolidated group. Therefore the operable units are being implemented by different groups of the PRPs. OU1 was conducted by the OGD and the Noels. EPA is hopeful that OU3 will be conducted by the owner/ operator group. This group now includes the Noels (Landfill owners), Keystone Sanitation Inc., and Waste Management Inc. OU2 and OU4 are being conducted by the OGD. The OGD group is comprised of the following companies: C& J Clark America, Inc.; The ESAB Group, Inc.; the Genlyte Group, Inc.; Hanover Bronze & Aluminum Foundry, Inc.; Kemper Industries, Inc; Quebecor Printing Fairfield, Inc.; R. H. Sheppard, Inc.; and SKF USA Inc.

OU1- Fence

The OGD and the Noels began the installation of a fence around the perimeter of the 40-acre tract on March 29, 1994. The fence was completed on July 29, 1994. Since the owners reside on the landfill property the driveway to their home is not enclosed by the fence. During the OU2 RI, it was determined that landfill waste extended beyond the fence along Line Road. Also during the installation of the extraction system piping, waste was found outside portions of the fence on the eastern side of the landfill. In both of these areas there is vegetative cover which prevents direct contact with the waste material and contaminated soil. These deficiencies will be addressed during the implementation of OU3. OU1 is partially protective in that it restricts access and trespass to most of the landfill property.

OU4 - Groundwater Pump And Treat

Pursuant to the UAO issued in 1991, EPA Docket No. III- 91- 56- DC, the site owners and eight of the PRPs completed the remedial design for the Site remedy on August 27, 1997. Only the OGD group began implementing the remedial action for OU4. During the onsite construction of the groundwater pump and treat system, the EPA negotiated a Consent Decree with the OGD. The Consent Decree, Civil Action No. 1: CV- 93- 1482, was lodged on June 23, 1998, and entered by the Court on September 10, 1999. In accordance with the Consent Decree, the OGD are implementing the groundwater components of the remedy as modified by the June 1999 ROD.

The OGD began on-site construction of the groundwater extraction and treatment system in August 1998; construction was completed in August 1999. The groundwater extraction system is currently comprised of seven extraction wells and vaults located around the periphery of the landfill, a common force main, and electrical distribution and flow monitoring systems. The treatment plant consists of the following unit operations: an equalization system that consist of two receiving tanks that mix the groundwater from the extraction wells; a conventional, neutralization system that removes the metal salts from the groundwater via precipitation, clarification and sand filtration; and an organic compound removal system that consists of an air stripper, carbon filtration and final pH adjustment system.

In the Fall 1999, it was determined that the groundwater extraction system could not be operated in a safe manner due to migration of methane gas from the landfill. Methane gas was migrating to and collecting in the well vaults. The design of the well vaults was incorrectly specified and therefore the constructed well vaults did not comply with a hazardous location classification (Class l, Division 1, Group D, hazardous location). Well vault and electrical system modifications were necessary to comply with this classification to ensure that well pumps and flow meters could be operated in a potentially explosive environment. All the electrical systems modifications were completed in early August 2000. The well vaults and the immediate area(s) surrounding the well vaults, and the air space above the water line in the extraction wells were reclassified. The extraction and treatment system began initial batch operation with discharge to an onsite storage tank on August 22, 2000. Continuous operation and discharge to the near by stream will commence pending sampling results for discharge of the treated groundwater.

The five-year annual monitoring of all residential wells located within the 3/4 to one mile boundary from the center of the landfill and north of Piney Creek is scheduled to commence in the fall 2000. As of this writing there are 21 homes eligible for the groundwater monitoring program. Baseline data from ground water monitoring wells has been collected and is being evaluated. Quarterly long- term groundwater monitoring to evaluate the extraction system performance will commence in the fall 2000. The OGD will be submitting the interim Remedial Action Report for OU2, Residential Filters and OU4, Groundwater Pump

and Treat by December 2000.

OU2- Residential Filters

In the fall of 1999 the OGD began the process of offering filters to those residents eligible to receive a residential well filtration system. These are current and future residences that are located north of the tributary to Piney Creek and within a 3/4-mile radius from the center of the landfill. In addition the ROD amendment required a filter at one residence located within the 3/4-mile to one-mile radius because of a finding of an unacceptable current risk. As of this writing offer letters were sent to 46 homeowners. Of these 46 owners, 36 accepted the filter offer. Three homeowners failed to return the access agreements. Filters were installed by the OGD's contractor as the access agreements were returned to the OGD's contractor. As new homes are constructed within the area of eligibility the OGD will offer and install filters if accepted by the homeowners. The OGD will be submitting the interim Remedial Action Report for OU2 by December 2000.

OU-3 Source Control

A remedial design for the site remedy was completed on August 22, 1997 pursuant to the UAO, EPA Docket No. III-91-56-DC issued June 28, 1991. In 1997, Waste Management Inc, a then newly identified PRP, proposed an alternative source control remedy that it believed would meet the remedial action objectives for source control presented in the September 1990 ROD. The construction of the source control response actions were suspended pending the completion of a pilot test and a Focused Feasibility Study (FFS) on the Alternate Source Control Remedy. Based on the results of the pilot test and the FFS, on June 1, 2000 the EPA issued the Proposed Remedial Action Plan to change the response actions for source control. The comment period for the Proposed Remedial Action Plan closed on August 4, 2000. EPA is now evaluating the comments and none received appears to suggest significant changes to the Alternate Source Control Remedy as described below. EPA plans to complete this process before the end of the calendar year and issue an Amendment to the Record of Decision which will support any changes which may be made to the previously chosen remedial action.

The proposed changes, known as the Alternate Source Control Remedy, include using an enhanced landfill gas extraction (ELGE) system to remove and destroy volatile organic contaminants and methane from the landfill rather than the impermeable cap which was selected in the September 1990 ROD. This new approach would remove contamination instead of merely containing it, and may also speed up the groundwater cleanup by reducing the source of the pollution. The proposed new approach would include:

- upgrading the existing landfill soil cover so that it is at least two feet thick;
- installing a gas extraction system to actively remove volatile contaminants and methane from the landfill waste;
- monitoring to ensure proper functioning of the system and to evaluate removal of volatile contaminants from the landfill;
- monitoring to determine the impact of the system on the quality of the leachate in the landfill and to ensure that the landfill is not a continued source of VOC contamination to the groundwater;
- installation of surface water management controls to minimize soil erosion and sedimentation;
- maintaining the existing fence;
- placing deed restrictions on the landfill property.

IV. Statement on Protectiveness

The Site remedy is not yet fully protective of human health and the environment since all operable units of the remedy have not been implemented.

OU 1 - Fence, is partially protective in that it restricts access and trespass to most of the landfill property and landfill waste thereby reducing the risk of direct contact with contaminated soil and buried waste. Two areas have been identified where wastes has been found outside the fence line. These areas will be addressed during the implementation of OU3.

OU2 - Residential Filters, is protective since residential filtration systems have been installed in those homes eligible to receive a filter system. Residential filters will address the risk from current exposure or potential future exposure to site- related contaminants in groundwater that have migrated offsite beyond the physical boundaries of the landfill.

OU3 - Source Control, has not been implemented; therefore, remedial action objectives to prevent direct contact with contaminated soils, to reduce contaminant migration into the groundwater and to prevent migration of methane gas are not being met.

OU4 - Groundwater Pump and Treat, is not fully operational and functional (O& F) at this time. When fully O& F OU4 will prevent the migration of contaminated groundwater to uncontaminated areas and will restore the aquifer to its beneficial uses.

The overall remedy for the Site cannot be considered fully protective until all operable units are fully implemented. EPA and the Responsible Parties are taking steps to make the remedy fully protective through the CERCLA remediation process as detailed in Part II of this evaluation.

However based on this five- year review and evaluation of available data, EPA has determined there are no short- term risks to human health and the environment.

V. Next Five- Year Review

A statutory five year review of the remedy is to be conducted within five years from the date of the initiation of the first remedial action at the Site. This date is March 29, 1994, the date the contractor mobilized to the site for construction of the onsite fence. The next five year review will be conducted by September 2005.

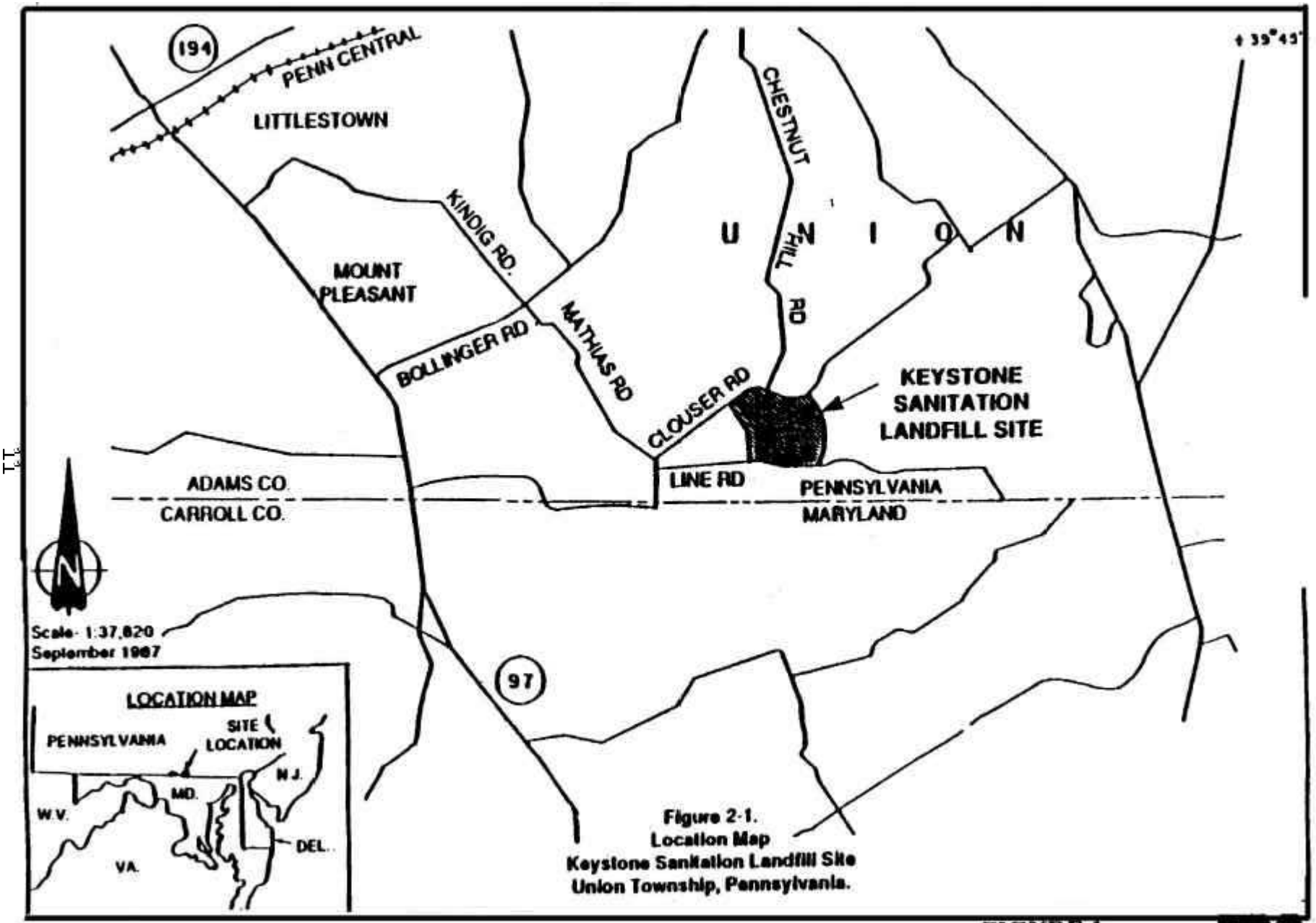

Figure 2-1.
Location Map
Keystone Sanitation Landfill Site
Union Township, Pennsylvania.

FIGURE 1