

FIVE-YEAR REVIEW REPORT

East Mount Zion Landfill

Springettsbury Township

York County, PA

Prepared by:

U.S. Environmental Protection Agency

Region III

Philadelphia, Pennsylvania

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Date

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
LEL	Lower Explosive Limit
LFG	Landfill Gas
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PADEP	Pennsylvania Department of Environmental Protection
PCOR	Preliminary Close Out Report
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SCML	Secondary Maximum Contaminant Level
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound

Executive Summary

The remedy for the East Mount Zion Landfill Site in Springettsbury Township, York County, Pennsylvania included the construction of a municipal waste cap over the former landfill, institutional controls, and ground water and landfill gas monitoring. The Site achieved construction completion with the signing of the Preliminary Close Out Report on February 4, 1999. The trigger for this five-year review was the actual start of construction on August 15, 1997.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD). One Explanation of Significant Differences (ESD) was issued to provide for the temporary relocation of some adjacent residents during construction and clarification of the permanent easement to be acquired bordering the southern perimeter of the Site. The remedy is functioning as designed. The immediate threats at the Site have been addressed, and the remedy is expected to be protective of human health and the environment after the ground water cleanup goals are achieved through source control and contaminant attenuation.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from Wastelan): East Mount Zion Landfill Site		
EPA ID (from Wastelan): PAD980690549		
Region: 3	State: PA	City/County: Springettsbury Township/York
SITE STATUS		
NPL Status: Final		
Remediation Status: Completed		
Multiple Ous? No	Construction complete date: 2/4/99	
Has site been put into reuse? No		
REVIEW STATUS		
Lead Agency: EPA		
Author name: John Banks		
Author Title: Remedial Project Manager	Author affiliation: U.S. EPA, Region 3	
Review Period: 12/12/01 to 8/9/02		
Date(s) of site inspection: 12/12/01		
Type of review: Post-SARA		
Review Number: 1 (first)		
Triggering Action: Actual RA On-site Construction at OU# 1		
Triggering action date (from Wastelan): 8/15/97		
Due date (five years after triggering action date): 8/15/02		

Five-Year Review Summary Form, cont'd.

Issues:

Evidence of burrowing animals on northern and southern sides of the landfill cap.

Excessive vegetation in riprap lined drainage swales particularly on the west side of the landfill.

Methane concentrations in perimeter landfill gas (LFG) monitoring wells.

Recommendations and Follow-up Actions:

The burrows are to be repaired by the end of 2002. More frequent mowing to deter burrowing animals and continued monitoring.

Removal of excess vegetation from the swales.

Continue quarterly monitoring of LFG wells with limited monthly monitoring, if deemed necessary. Assess need for further action if 25 % of the lower explosive limit (LEL) is exceeded to the east or west of the landfill, or structures are built to the north and south of the landfill.

Protectiveness Statement:

All immediate threats at the Site have been addressed, and the remedy is expected to be protective of human health and the environment after the ground water cleanup goals are achieved through source control and ground water contaminant attenuation.

Long-term Protectiveness:

Long-term protectiveness of the remedial action will be verified by continued ground water and LFG monitoring. Contaminant concentrations have decreased since the Site has been capped. Continued monitoring data indicates that the remedy is functioning as required to achieve ground water cleanup goals.

Other Comments:

No other comments.

**East Mount Zion Landfill Superfund Site
Springettsbury Township, Pennsylvania
First Five-Year Review Report**

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 identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 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 than each five 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 judgement 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 the NCP; 40 CFR §300.430(f)(4)(ii) 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 the initiation of the selected remedial action.

The United States Environmental Protection Agency (EPA), Region 3, conducted the five-year review of the remedy implemented at the East Mount Zion Landfill Superfund Site in York County, Pennsylvania. This review was conducted by the Remedial Project Manager (RPM) for the entire site from January 2002 through August 2002. This report documents the results of the review.

This is the first five-year review for the East Mount Zion Landfill Superfund Site. The triggering action for this statutory review is the first five-year review date shown in EPA's Wastelan database: 8/15/97. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure and to assess whether the ground water at the Site poses an unacceptable risk.

II. Site Chronology

Table 1 lists the chronology of events for the East Mount Zion Landfill Site.

Table 1: Chronology of Site Events

Date	Event
1955-1972	Charles Fetrow owned and operated the facility which accepted both municipal and industrial wastes.
1983	EPA performed Preliminary Assessment/Site Inspection.
1984	Site listed on the National Priorities List (NPL).
1990	Remedial Investigation/Feasibility Study (RI/FS) completed.
1990	EPA signed the Record of Decision for Operable Unit 1 (OU-1), which required that a municipal waste cap be constructed over the former landfill.
1995	The final design for OU-1 was approved by EPA.
1995	EPA enters into a Superfund State Contract (SSC) with the Commonwealth of Pennsylvania.
1997	U.S. Army Corps of Engineers awards contract to Republic Environmental Systems (RES) for construction of the cap.
1997	Construction activities commence at the Site.
1999	EPA issues Preliminary Closeout Report (PCOR) documenting that construction activities are substantially complete.
1999	Ground water sampling initiated.
2000	EPA and the state certify the remedy as operational and functional.
2002	Institutional controls are implemented for the landfill property.

III. Background

Physical Characteristics

The East Mount Zion Landfill comprises 10 acres, and is located approximately 15 miles southeast of Harrisburg in Springettsbury Township, York County, Pennsylvania. The Site is located on the south side of Deininger Road just before the entrance to Rocky Ridge County Park. The site is bounded on the north, east, and south by Rocky Ridge County Park and by the Doersam Woods residential subdivision to the west (See Attachment 1).

Over the course of its active life (approximately 1955 to 1972), the Site was a repository for domestic and industrial wastes. It operated as an area-type landfill in which areas for filling were excavated (at times to bedrock), filled, and covered with native materials. The Site existed as an open field on which weeds and small woody plants grew. The original cover placed on the Site since it ceased operation was thin, and in some locations waste materials were protruding. On the southern side of the property, the height of the landfill gradually increased from east to west until, at the southwestern end, there was a steep rise culminating with an approximate 70 percent toe slope. The toe slope averaged 70 - 80 percent along the southern edge of the landfill. The northern half of the landfill, which bounds Deininger Road, was flatter and gradually approached the grade of the roadway.

A leachate pond existed in the southeastern corner of the landfill property and numerous leachate seeps were found along the western face of the landfill. Exposed refuse was also evident along the southern face of the landfill.

Land and Resource Use

The current land use for the surrounding area is residential and recreational (Rocky Ridge County Park). It is anticipated that these land uses will continue unchanged into the future. In establishing cleanup requirements for the Site, EPA considered the theoretical possibility that ground water adjacent to the Site could be used as a drinking water source. The Site itself is currently fenced with a locked gate. A ten-acre municipal waste cap has been constructed over the former disposal area.

The Chickies Formation, Hellam Member, constitutes the major aquifer at the Site. Deep ground water flow in this formation is to the north-northwest. Municipal water is available to the residents of the Doersam Woods subdivision and also along portions of Mount Zion, Deininger, Druck Valley, and Ridgewood Roads in the vicinity of the Site. However, some residences still use private wells in the area.

History of Contamination

Over the course of its active life (approximately 1955 to 1972), the Site was a repository for domestic and industrial wastes. It operated as an area-type landfill in which areas for filling were excavated (at times to bedrock), filled, and covered with native materials. There was evidence

that the Site was operated as an open burning dump at some period in its history. Early 1963 inspection reports on the landfill indicated improper disposal of residential and industrial wastes. Notes of interviews conducted by Pennsylvania state personnel indicated that paint thinner, paint filters, and metal sludge wastes were disposed at the Site. Throughout 1969 and 1971, Pennsylvania state personnel completed numerous Sanitation Establishment Inspections on the Site. Discrepancies were frequently cited pointing out that garbage and trash were being placed directly on bedrock in open trenches and that proper cover was not being applied on a daily basis.

Initial Response

The Site was included on the National Priorities List (NPL) in September 1984. The Pennsylvania Department of Environmental Resources (now the Pennsylvania Department of Environmental Protection (PADEP)), under a Cooperative Agreement with EPA, conducted the remedial investigation and feasibility study (RI/FS) at the Site beginning in 1988. After performing the necessary field work to determine the nature and extent of contamination at the Site, the Final Remedial Investigation Report and Final Feasibility Study were submitted to EPA by PADEP in April 1990 and May 1990, respectively. In May 1990, the Proposed Plan identifying EPA's preferred remedy was presented to the public, starting the period for public comment.

Basis for Taking Action

Contaminants

Hazardous substances that have been released at the Site in each media include:

Ground Water

Benzene
Vinyl Chloride
1,1-Dichloroethane
chlorobenzene
ethylbenzene
1,4-Dichlorobenzene
Bis(2-ethylhexyl)phthalate
Manganese
Iron
Lead

Surface Water/Leachate

Benzene
1,1-Dichloroethene
Trichloroethene
Toluene
Bis(2-ethylhexyl)phthalate
Barium
Copper
Lead
Mercury
Zinc
Cyanide

Landfill Waste

acetone Cadmium
2-Butanone Chromium

Toluene	Lead
Chlorobenzene	Zinc
Ethylbenzene	Copper
Xylenes	Iron
Dieldrin	Mercury
PCBs	

Exposure pathways quantitatively evaluated in the risk assessment for the Site were for the theoretical ingestion of ground water at the Site perimeter, residential wells, and non-residential wells. Evaluation of the monitoring well data indicated that there would be a potential risk associated with the ingestion of ground water on-site and at the site perimeter. The total carcinogenic risk as calculated in the 1990 risk assessment under average and reasonable worst-case exposure scenarios was 1.7E-4 and 3.8E-4, respectively.

The principal contaminants of concern at the Site were arsenic, vinyl chloride, benzene, 1,1-dichloroethane, and bis(2-ethylhexyl)phthalate. Federal maximum contaminant levels (MCLs) for drinking water established pursuant to the Safe Drinking Water Act, 42 U.S.C. §§300f et seq., were exceeded for vinyl chloride and benzene in ground water.

EPA determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in the ROD, could present an imminent and substantial endangerment to public health, welfare, or the environment.

IV. Remedial Actions

Remedy Selection

The ROD for the East Mount Zion Landfill Site was signed on June 29, 1990. Remedial Action Objectives (RAOs) were developed as a result of data collected during the remedial investigation to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs for the East Mount Zion Landfill Site, as stated in the ROD, were:

- To prevent ingestion of ground water which had concentrations (that are related to the East Mount Zion Site) that are greater than the MCL; and
- Protect downstream water quality to assure concentrations of parameters associated with the East Mount Zion Site met federal and state water quality criteria.

The major components of the source control remedy selected in the ROD included the following:

- (1) Installation and maintenance of an impermeable cap over the 10 acre landfill;
- (2) Installation and maintenance of surface water control systems for the cap;
- (3) Installation and maintenance of a fence around the Site;
- (4) Monitoring ground water contaminant attenuation after installation of the cap; and
- (5) Initiation of a deed restriction regarding future activities at the Site.

On July 3, 1996, EPA issued an Explanation of Significant Differences (ESD) that delineated two significant differences from the original remedy selected in the ROD. Specifically, these were as follows:

- (1) EPA determined that it would be necessary to provide for the temporary relocation of some of the residents in the Doersam Woods subdivision located on the Site's western boundary. During remedial action, a significant amount of refuse relocation would occur. Open excavations and exposed refuse could be a potential source of hazardous and odorous emissions from the Site. Although air dispersion modeling revealed that concentrations of hazardous substances at the nearest residence would not significantly impact the nearest residences, as a precautionary measure, due to the proximity of some of the residents to the construction area, EPA determined to temporarily relocate some of the residents during construction. Two families in the Doersam Court subdivision were offered temporary relocation during construction. One family accepted the temporary relocation and was placed in a comparable rental home for approximately 14 months. The second family declined the temporary relocation and remained in their residence.
- 2) The ROD stated that the purchase of property may be necessary to ensure efficient access during construction. The ESD clarified the nature of this property acquisition as a permanent easement. During the remedial design, it became apparent that a permanent easement along the southern perimeter of the Site would be required to accommodate the installation and maintenance of a drainage swale to convey surface water runoff from the cap to the detention basins. This permanent easement is located on the southern border of the Site in Rocky Ridge County Park and is approximately 0.75 acres in size.

The Commonwealth of Pennsylvania on March 28, 1995, entered into a Superfund State Contract (SSC) concerning the remedial action at the Site. The SSC includes language in accordance with Section 104(j) of CERCLA assuring that the Commonwealth will accept transfer of the acquired permanent real estate interests following completion of the remedial action.

In addition to the permanent easement, temporary work area easements around the perimeter of the Site were required during construction for staging areas and access. The temporary easements would expire with the completion of the remedial action.

Remedy Implementation

Landfill Cap

The remedial design was completed in September 1995. The U.S. Army Corps of Engineers (USACE) awarded the remedial action contract to Republic Environmental Systems, Inc. (RES) on May 30, 1997, and construction started on August 15, 1997. Another contractor, Geosyntec Consultants, was retained as an independent quality assurance/quality control (QA/QC) contractor that was present during the entire remedial construction activities.

In order to achieve the required 4:1 slope requirements as specified in the remedial design, approximately 60,000 cubic yards of refuse had to be excavated from the western side of the landfill and the landfill perimeter and relocated and compacted on-site. The refuse relocation was necessary to cut back the approximate 80% toe slopes on the western and southern perimeter of the landfill. During the refuse relocation period, it was discovered that landfill refuse extended beyond the landfill property along the north side of the landfill along Deininger road in Rocky Ridge County Park property. This area was subsequently over-excavated to remove the refuse from the park property and relocate it back on the landfill property.

The cap construction entailed the placement of the appropriate geotextile fabrics; installation of permanent settlement monuments; placement of a gas collection layer, geosynthetic clay liner, geonet-geotextile composite drainage layer, final cover soil, top soil and vegetative cover. Storm water management systems for the cap consisted of the construction of detention basins, overflow structures and rip rap drainage channels. A fence was also constructed around the perimeter of the landfill property to restrict access to the landfill.

Following the completion of the landfill cap construction disturbed areas outside the landfill property and within the temporary construction easements obtained to implement the remedy were relandscaped with a variety of trees including white pine, hemlock, douglass fir, and red sunset maples among others. These trees when mature will provide a visual barrier of the landfill from the adjacent Doersam Court subdivision and the road leading into Rocky Ridge County Park.

The Site achieved construction completion status when the Preliminary Close Out Report was signed on February 4, 1999.

Institutional Controls

The ROD requires institutional controls for the East Mount Zion Landfill property. The

property is currently owned by Ridge Developers Inc. In September 2001, the EPA issued an Administrative Order to Ridge Developers to place institutional controls on the landfill property to ensure the protection of the cap. A “Notice of Access and Use Restriction” was recorded on April 11, 2002 in the Office of the Recorder of Deeds for York County, Pennsylvania, in Book 1489, Pages 7293 - 7299.

Pursuant to the SSC which EPA and the Commonwealth of Pennsylvania entered into on March 28, 1995, the Commonwealth of Pennsylvania agreed to accept interest in a permanent easement which was placed on Rocky Ridge County Park property along the southern perimeter of the East Mount Zion Landfill property for the maintenance of a drainage swale for the cap. The U.S. Army Corps of Engineers is currently in the process of transferring interest in this permanent easement to PADEP.

Landfill Gas Monitoring

The remedial design did not call for the installation of permanent landfill gas (LFG) monitoring wells at the perimeter of the landfill, only that the passive LFG vents on the landfill itself be monitored. In order to quantify the LFG present at the landfill property boundary a series of temporary LFG piezometers were installed and monitored. The initial temporary LFG piezometers were installed along the western side of the landfill property within the fence line. The objective of the LFG monitoring along the western perimeter was to evaluate if landfill gas was migrating along the Doersam Woods development property and whether methane gas concentrations at the fence line conform with PADEP regulations. The first monitoring event was completed in July 1998 prior to the completion of the cap construction. An additional four (quarterly) monitoring events occurred subsequent to the construction of the cap in November 1998, and February, May, and August of 1999. Based upon the initial findings, methane was detected at elevated levels in the far southwest corner of the landfill property. Therefore, it was determined that long-term LFG monitoring was required and permanent LFG monitoring points should be installed along the entire perimeter of the landfill property within the fence line. A total of fifteen LFG wells were installed in May 2000.

System Operation/Operation and Maintenance

Pursuant to the SSC, PADEP has assumed responsibility for conducting operation and maintenance (O&M) activities at the East Mount Zion Landfill Site. PADEP is performing long term ground water monitoring, LFG monitoring, and post-closure inspection and maintenance at the East Mount Zion Landfill Site. PADEP collects ground water samples annually and monitors landfill gas quarterly and submits the results to EPA when these activities are completed. These activities are being conducted in accordance with the “*Operation and Maintenance Plan, East Mount Zion Landfill Closure*” dated January 2000. The primary activities associated with O&M include the following:

- Visual inspection of the cap with regard to the condition of the vegetative cover, stability

and any need for corrective action.

- Inspection of drainage swales with regard to any erosion or blockage and any subsequent corrective action.
- Inspection of the condition of ground water and LFG monitoring wells
- Annual monitoring of ground water and quarterly sampling of the LFG monitoring wells.

The primary cleanup of the East Mount Zion Landfill Superfund Site involved the construction of a municipal waste cap over the 10-acre landfill. The landfill cap was designed to mitigate the flow of water through the landfill by providing an impermeable cover which prevents rain water from infiltrating into the landfill producing leachate which would ultimately contaminate ground water at the Site. The cap, therefore, effectively removes the source of the on-going ground water contamination by reducing the leachate generation. The primary O&M activities have been geared towards monitoring ground water at the Site perimeter in the existing monitoring wells, monitoring of landfill gas generation and movement, and inspections and maintenance of the cap and fence around the site.

O&M costs include routine operation and maintenance (i.e., inspections, mowing, revegetation, erosion repairs, etc.), annual ground water sampling and analysis, and quarterly LFG monitoring for a minimum of five years. Annual costs for operation and maintenance are expected to be approximately \$39,000 for the first five years and decrease slightly in years 6 - 30 as monitoring of landfill gas is reduced.

V. Progress Since the Last Five-Year Review

This is the first five-year review for the East Mount Zion Landfill Superfund Site.

VI. Five-Year Review Process

Administrative Components

PADEP and USACE were notified of the initiation of the five-year review on December 12, 2001. On that date, a Site visit was conducted with PADEP, USACE, and RES as a final Site walk through prior to contract closeout with RES. During that Site visit, the opportunity was also taken to evaluate the Site for the five-year review. The East Mount Zion Landfill Site five-year review team was led by John Banks of EPA, Remedial Project Manager (RPM) for the East Mount Zion Landfill Site, and the Project Officer from PADEP, Ms. Noreen Wagner.

The five-year review included the following administrative components:

- Community Involvement;

- Document Review;
- Data Compilation and Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review

Community Involvement

Activities to involve the community in the five-year review were initiated by interviewing residents adjacent to the East Mount Zion Landfill Superfund Site. In addition, meetings were conducted with the Springettsbury Township Manager and the Superintendent of Rocky Ridge County Park. EPA developed a brief questionnaire for the purpose of conducting and documenting these interviews.

During the interviews, representatives of EPA summarized the findings of the five-year review inspection at the East Mount Zion Landfill Site and asked for any input or concerns on the protectiveness of the remedy. None of the residents expressed any concerns over the protectiveness of the remedy.

Following signature on this Five-Year Review document, a notice will be sent to a local newspaper announcing that the Five-Year Review report for the East Mount Zion Landfill Superfund Site is complete, and that the results of the review and the report are available to the public in the information repository located at the Springettsbury Township Municipal Building.

Document Review

This five-year review consisted of a review of relevant documents including the 1990 ROD, O&M records, and monitoring data. Applicable ground water cleanup standards, as listed in the 1990 ROD were also reviewed.

Data Review

Ground Water Monitoring

Ground water monitoring has been conducted at the East Mount Zion Landfill Site since 1988. In general, most volatile organic compounds (VOCs) were detected at their highest levels early in the remedial history of the Site. These high contaminant levels were followed by a reduction in contaminant levels. The drop in contaminant levels may have been the result of the source control remedy which entailed capping of the landfill.

Since the remedy was completed in February 1999, VOC levels in ground water have decreased. Ground water samples were collected and analyzed quarterly by EPA during the operational and functional period following completion of the cap construction. Ground water

samples were collected in March, June, September, and December of 1999 (See Attachment 2 for the location of the ground water monitoring wells). EPA and PADEP subsequently determined that the remedy was operational and functional on March 6, 2000. At that time, PADEP assumed responsibility for operation and maintenance activities at the Site. Pursuant to the 1990 ROD, ground water samples are to be collected and analyzed annually. PADEP collected ground water samples at the Site in November 2000 and attempted to collect samples in December 2001. During the November 2000 sampling event one of the wells was found to be dry. Samples were collected from the remaining wells which had sufficient water. During the December 2001 sampling event, only one well contained sufficient water for a sample to be obtained. Because only one well could be sampled in December 2001, PADEP resampled the wells in April 2002, at which time four wells had sufficient water volume for sampling. Pennsylvania is currently experiencing a drought which may account for the dry monitoring wells in the vicinity of the Site.

The primary organic contaminants which contributed significantly to the carcinogenic risk from ground water ingestion at the Site were vinyl chloride and benzene. Both these contaminants exceeded their respective MCLs during the original remedial investigation at the Site. Post-construction ground water sampling to date has not detected vinyl chloride in any of the monitoring wells sampled. In addition, although benzene has been detected in Site ground water, it has not been detected above its MCL in any well. Other organic contaminants detected include chloroform, bromodichloromethane, chlorobenzene, 1,4 dichlorobenzene, and bis(2-ethylhexyl)phthalate. Of these compounds only bis(2-ethylhexyl)phthalate exceeded its MCL of 6 ug/l. Out of all the sampling rounds, bis(2-ethylhexyl)phthalate exceeded the MCL only during the November 2000 sampling event in wells EA-2M (8.78 ug/l) and EA-4D (11.4 ug/l).

Manganese and iron have been detected consistently in all the monitoring wells at the Site in both unfiltered and filtered samples, and in general, above their respective secondary maximum contaminant levels (SCMLs) of 50 ug/l and 300 ug/l, respectively. Other inorganic contaminants that have been detected include arsenic, lead, vanadium, chromium, and mercury. These inorganics were detected only sporadically and not consistently between sampling events or monitoring wells. In addition, these inorganics were detected only in unfiltered samples. Ground water samples results for filtered metals were non-detect for these contaminants.

EPA also sampled some residential wells to the north - northwest of the Site during the construction activities in 1998. No residential wells were found to contain site-related contamination.

With respect to the remedial action objective pertaining to the protection of surface water and downstream water quality. The capping remedy has effectively stopped all leachate seeps at the Site thereby preventing any further discharges to the ground surface which may ultimately reach other surface water pathways.

Landfill Gas Monitoring

EPA sampled the 15 permanent LFG monitoring wells quarterly for the first year after installation in May 2000 (See Attachment 3 for the location of the LFG monitoring wells). Subsequent monitoring of the LFG monitoring wells was conducted by PADEP on a quarterly basis beginning in December 2001. The first year of quarterly monitoring by EPA from May 2000 - May 2001 revealed that methane emissions were generally higher from gas monitoring wells located on the north and south sides of the landfill from those located on the east and west sides of the landfill.

PADEP regulations for gas control and monitoring require that combustible gas levels may not equal or exceed the following:

- 25% of the lower explosive limit (LEL) for methane in a structure within the site
- The LEL for methane at the boundaries of the site
- 25% of the LEL for methane in an adjacent area, including buildings or structures on adjacent areas

The LEL for methane is 5% concentration. Therefore, combustible gas concentrations for areas adjacent to the Site, which are to be less than 25% of the LEL, are required to have a methane concentration of less than 1.25% (e.g., 25% of 5% methane). Likewise, combustible gas concentrations at the boundary of the landfill may not exceed 5% methane.

The results up to May 2001 revealed that methane was present in the landfill gas at or above the LEL along the northern and southern perimeters of the landfill fence line. However, methane was not detected above regulatory levels along the western or eastern perimeters of the Site. After discussion with PADEP, at that time, it was determined that the landfill gas should continue to be monitored quarterly for at least three years and biannually thereafter. If methane gas is present in excess of 25% of the LEL (1.25% methane) on the west side of the landfill adjacent to Doersam Woods or in the east corner adjacent to Rocky Ridge County Park, future remedial measures may be required.

Since PADEP assumed the monitoring of the landfill gas in December 2001, methane levels have generally remained consistent; however, there were some exceptions. Methane was detected above 25% of the LEL in LFG monitoring wells GMW-1 (2.2%), GMW-2 (20.9%) and GMW-3 (7.2%) along the western perimeter of the Site during the March 2002 monitoring event in the unpurged samples. However, after purging one well volume from each well, methane levels decreased, particularly in GMW-2. Methane levels in the purged samples were 2.1%, 5.1%, and 5.6% for GMW-1, GMW-2, and GMW-3, respectively. These LFG monitoring wells subsequently revealed 0% methane in the July 2002 monitoring event. The March 2002 event appears to be an anomaly.

Methane was also detected above 25% of the LEL in GMW-10 and GMW-11 along the

eastern perimeter during the March and July 2002 monitoring events. Methane was detected at GMW-10 in the pre-purged samples at 1.5% and 1.8% in March and July 2002, respectively. However, post-purge samples for GMW-10 were 0% during both events. Methane was detected in GMW-11 in both the pre- and post-purge samples during March and July 2002. The pre- and post-purge results for GMW-11 were 1.7% vs. 1.3% and 2.3% vs. 1.8%, respectively. These levels are relatively close to the 25% LEL action level set for the eastern perimeter of the Site.

Site Inspection

Inspections at the Site were conducted on December 12, 2001 by the EPA RPM (John Banks), and PADEP Representative (Noreen Wagner). Other parties present were the USACE representative (Bill Werntges) and RES' Project Manager (Paul Butsavage). The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of a fence with a locked gate to restrict access, the integrity of the cap and the integrity of the monitoring wells.

The cap vegetation was in excellent condition with no signs of significant bare spots or areas of erosion. Excessive growth of vegetation was noted however in the riprap lined drainage swales along the perimeter of the landfill. Numerous ground hog holes (more than 10) were evident on the south and north sides of the landfill. During the inspection it was noted that although the security fence was intact, the gates along Deininger Road and the southwest corner of the landfill were damaged. Neither gate would lock properly and appeared to be tampered with since the bolting mechanism did not fit securely within the gate. The gates were subsequently secured with a chain and lock on that same day.

Interviews

Interviews were conducted with various parties connected to the Site. EPA conducted meetings with the Springettsbury Township Manager and the Superintendent of Rocky Ridge County Park. In addition, a door to door survey was conducted of the residents of Doersam Court subdivision which is located immediately adjacent to the west side of the landfill. Of those residents interviewed, none of the residents expressed any concerns regarding the landfill.

VII. Technical Assessment

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

The review of documents, applicable or relevant and appropriate requirements (ARARs), risk assumptions, and the result of the site inspection indicates that the remedy is functioning as intended by the ROD. The capping of the landfill achieved the remedial objectives to minimize the migration of contaminants to ground water and surface water. The effective implementation

of the institutional controls will protect the future integrity of the cap.

Operation and maintenance of the cap and drainage structures has for the most part been effective. Several areas showed evidence of ground hog burrows along the north and south sides of the landfill. The burrows did not appear to penetrate beyond the soil layer and so do not affect protectiveness. PADEP is arranging for the repair of these holes in 2002, and inspection for burrowing animals is part of future routine operation and maintenance inspections. The monitoring well network provides sufficient data to assess the ground water. Contaminant concentrations, in general, have decreased at the Site. The LFG monitoring network provides sufficient information to assess landfill gas migration. Methane has been consistently detected at elevated concentrations at the fence line of the Site along the northern and southern perimeters. However, Rocky Ridge County Park borders the landfill to the north and south and there are no structures adjacent to the Site in these areas. Methane was detected above 25% of the LEL along the western perimeter of the Site in 3 of 6 LFG monitoring wells during one monitoring event in March 2002. Although there is no immediate concern, since the Doersam Court subdivision does border the Site, possible methane migration to the west is a long term concern. Likewise, a picnic pavilion and playground located in Rocky Ridge County Park adjacent to the east side of the landfill, and possible methane migration in this area is also a long term concern. Out of all the sampling rounds, methane was found at or near 25% of the LEL only in the March and July 2002 monitoring events along the eastern perimeter of the landfill. All other monitoring events for LFG wells on the eastern perimeter were 0% methane.

The elevated levels of methane along the western perimeter during the March 2002 event appears to be an anomaly. With respect to the eastern perimeter, although methane was detected for two consecutive quarters in March and July 2002, the detected levels were at or only slightly above 25% of the LEL and should not pose problem under current Site conditions. These areas will continue to be monitored quarterly. If circumstances warrant, monitoring may be conducted monthly, on a limited basis, to further assess methane levels in these areas.

The institutional controls that are in place include prohibitions on activities that would disturb the integrity of the cap. No activities were observed that would have violated the institutional controls. The cap and surrounding area were undisturbed, and no new uses of ground water were observed. The fence around the Site is intact and in good repair.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered

All action specific ARARS for the Site have been met. The cap was constructed pursuant to

Pennsylvania’s municipal waste management regulations codified in PA Code 25 Chapter 273. ARARs that still must be met at this time and that have been evaluated include Pennsylvania’s “background” ARAR for cleanup of ground water. In 1990, when the ROD was issued, Pennsylvania’s ARAR for remediation of ground water to “background” was the standard applied to the East Mount Zion Site because at that time Pennsylvania’s standard was more stringent than the federal standard (i.e., MCLs). However, since that time, the background standard has been modified by Pennsylvania pursuant to the Land Recycling and Environmental Standards Act, 35 P.S. §§ 6026.101 et seq. (“Land Recycling Act”). The passage of the Land Recycling Act, may allow EPA to modify the ground water cleanup standards at the East Mount Zion Site from “background” to federal MCLs under the Safe Drinking Water Act as codified under 40 CFR Part 141. Such a modification would be documented in an Explanation of Significant Differences (ESD) for the Site. Any decision to modify the ARAR for ground water has not yet been made and would have to be discussed with PADEP. However, if such a modification is made in the future, the federal ARAR would be fully protective to human health and the environment.

Changes in Exposure Pathways, Toxicity and Other Contaminant Characteristics

The exposure assumptions used to develop the Human Health Risk Assessment included both current and potential future exposures. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

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

There is no other information that calls into question the protectiveness of the remedy.

Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews the remedy is functioning as intended by the ROD. There have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The action specific ARAR for the closure of municipal waste landfill codified under 25 Pa Code 25 Chapter 273 has been met. ARARs for ground water remediation have not been met at this time. There have been no changes in the risk assumptions used in the baseline risk assessment, and there have been no changes to the risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Table 2 - Issues

Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Evidence of burrowing animals on southern and northern sides of cap	N	N
Excessive vegetation in riprap lined drainage swales particularly on west side of landfill	N	N
Methane concentrations in perimeter LFG monitoring wells	N	N

IX. Recommendations and Follow Up Actions

Table 3

Issue	Recommendations/Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness ? (Y/N)	
					Current	Future
Groundhog burrows in cap	Repair current burrows; more frequent mowing; continued monitoring	PADEP	EPA/ PADEP	12/30/02	N	N
Excessive vegetation in swales	more frequent mowing; vegetation removal from swales	PADEP	EPA/ PADEP	12/30/02	N	N

Issue	Recommendations/Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness ? (Y/N)	
					Current	Future
Methane concentrations in perimeter LFG monitoring wells	continued quarterly monitoring; monthly monitoring if deemed necessary; assess need for further action if 25% of LEL is exceeded to the east or west of landfill, or structures are built to the north and south.	PADEP/ EPA	EPA/ PADEP	ongoing	N	N

X. Statement on Protectiveness

The remedy is expected to be protective of human health and the environment upon attainment of ground water clean up goals through source control and natural attenuation. In the interim, exposure pathways are controlled since public water is available adjacent to and in the vicinity of the Site. Based on sampling during the remedial investigation and again in 1998, residents utilizing private wells were not impacted by site related contamination. Since ground water contaminant concentrations, in general, have decreased, it is unlikely that private wells would be impacted in the future. All threats at the Site have been addressed through the capping of the landfill, the installation of the fence, and the implementation of institutional controls restricting activities on the landfill property and the cap.

Long-term protectiveness of the remedial action will be verified by continued ground water and LFG monitoring. Contaminant concentrations have decreased since the Site has been capped. Continued monitoring data indicates that the remedy is functioning as required to achieve ground water cleanup goals.

XI. Next Five-Year Review

The next five-year review will be completed no later than August 15, 2007. The ground water and LFG monitoring and general site maintenance will continue over the next five years.

ATTACHMENT 4

List of Documents Reviewed

East Mount Zion Site Final Remedial Investigation Report, April 1990

East Mount Zion Landfill Site Record of Decision, June 29, 1990

Explanation of Significant Differences, East Mount Zion Landfill Site, July 3, 1996

East Mount Zion Landfill Site Operation & Maintenance Plan, January 2000

East Mount Zion Quarterly and Annual Ground Water Monitoring Reports, 1999 to 2002

East Mount Zion Quarterly Landfill Gas Monitoring Reports, 1998 to 2002

Superfund State Contract, March 1995

ATTACHMENT 5

Applicable or Relevant and Appropriate Requirements (ARARs)

Medium/Authority	ARAR (Citation)	Status	Requirement Synopsis	Action to be taken to Attain ARAR
Surface Water/ PA Water Quality Criteria	25 PA Code Chapter 93.1 <u>et. seq.</u>	Relevant and Appropriate	Establishes water quality criteria for protection of freshwater aquatic life, human health, fish consumption	ARAR met. Capping has eliminated leachate seep discharges from the landfill.
Air/PA Air Quality Standards	25 PA Code Chapter 123.1(c)	Applicable	Establishes requirements for fugitive dust emissions	ARAR was addressed during construction phase during refuse relocation and capping. Perimeter air monitoring was established.
Ground Water/ “background” Quality for Ground Water	25 PA Code Chapter 75.264(n)	Applicable	Hazardous substances in ground water must be remediated to “background” quality	The selected remedy will attain state standards in the ground water after completion of remedial activities.
Landfill/ PA Municipal Waste Regulations	25 PA Code Chapter 273	Applicable	Applies to closure of municipal waste landfills	This ARAR has been met. The landfill was capped in accordance with 25 PA Code Chapter 273.

Air/OSHA	Federal - Occupational Health and Safety Act (OSHA) (29 CFR Part 1910)	Applicable	Health and Safety standards for employees engaged in hazardous waste operations	Action levels for air contaminants were established for the construction phase on-site. Perimeter and work-zone air monitoring was conducted during all intrusive activities.
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APPENDIX

SUMMARY OF COMMUNITY INTERVIEWS

On July 25, 2002, EPA interviewed the Springettsbury Township Manager, a Superintendent from Rocky Ridge County Park, and three residents adjacent to the vicinity of the East Mount Zion Landfill Site. An EPA flyer was left at the front door of those residents in the Doersam Woods subdivision who were not home informing them of the five-year review and to contact EPA if they had any questions or comments. No additional comments were received.

The following is a brief summary of the interview questions and the responses received:

Question 1: How long have you lived in the community?

Life resident
19 years
17 years
1 year
no response

Question 2: In general, what issues have received the most attention locally?

Hunting and the danger to children
Traffic and Park expansion
Bad soil/septic systems/ new sewer system/municipal trash incinerator
Development/traffic/biological solids/odor control/wastewater/stormwater
The Aryan Nation group/terroristic threats

Question 3: How sensitive is the local area to environmental issues on a scale of one to ten?

10
5 (3 responses)
7

Question 4: Do you think there is community interest or concern about the environmental status of the Site?

There was (2 responses plus “a good job was done finishing the Site”)
Zoning status of the Site not likely to change/have not heard from the community on the issue/ no questions on this coming into local government
No
Only one or two neighbors expressed concern about the Site’s appearance (i.e., mowing schedule)/bugs/trees/rodents

Question 5: Do you want to be on our mailing list?

Yes, have not received any updates (3 responses)
No response
No

Question 6: What is your overall impression of the East Mount Zion Landfill Site?

OK, it's very secluded
Never crosses people's minds/out of sight out of mind
Good job
no complaints
Big improvement over what it did look like

Question 7: In your opinion, what effects has the Site had on the surrounding community?

Local residents say they are satisfied that the Site was addressed
Concerns about property values
Not that close to it/acceptable today
Previous uncertainty/property values/now a non-issue
Little

Question 8: Are you aware of any community concerns regarding the Site or its operation or administration?

No (4 responses)
Need increased mowing on the Site to prevent rodents

Question 9: Are you aware of any events, incidents or activities at the Site such as vandalism, trespassing or responses from local authorities?

No (5 responses)

Question 10: Would you like more frequent information concerning the Site maintenance and operation activities?

Yes (3 response)
No
Update the repository

Question 11: Do you have any comments, suggestions, or recommendations regarding the Site's management or operation?

Yes, mowing maintenance
I want contact yearly on the status of the Site
Want more information
No (2 responses)