Five-Year Review Report

First Five-Year Review Report
for
Fultz Landfill Superfund Site
Jackson Township, Guernsey County, Ohio

June 2002

Prepared by:
United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

<Original signed by Wm. E. Muno, 7/9/02>

_____ _____

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Executive Summary

The remedy for the Fultz Landfill Superfund site in Jackson Township, Guernsey County, Ohio included: a berm and multilayer cap to reduce infiltration, prevent erosion, reduce contact with contaminated materials, and minimize the release of volatile contaminants and maintenance of this cap; a leachate collection system to collect leachate contributing to the surface seeps; an extraction well system to intercept contaminated groundwater migrating into the coal mine aquifer, if necessary; institutional controls to reduce exposure to site contaminants; a fence to restrict access; long-term monitoring of landfill gas and groundwater; wetlands replacement if wetlands were disturbed during remediation; and an alternate water supply for downgradient residents, if required. The site achieved construction completion with the signing of the Preliminary Close Out Report on September 29, 1998. The trigger for this review was the entry of the Consent Decree for the implementation of the remedial action on June 25, 1997.

The assessment of this five-year review found that the remedy was constructed in accordance with the Record of Decision and the Explanation of Significant Differences. The remedy is functioning as anticipated. Because the remedial actions are protective, the remedy at the site is protective of human health and the environment in the short-term but it is not protective at this time in the long-term because the institutional controls have not been implemented.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Fultz Landfill		
EPA ID *(from WasteLAN)*: OHD980794630		
Region: 5	**State:** OH	**City/County:** Jackson Township/Guernsey County
SITE STATUS		
NPL status: x Final __ Deleted __ Other (specify) _____		
Remediation status (choose all that apply): __ Under Construction x Operating __ Complete		
Multiple OUs?* __ YES x NO	**Construction completion date:** 9/29/98	
Has site been put into reuse? __ YES x NO		
REVIEW STATUS		
Lead agency: x EPA __ State __ Tribe __ Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Remedial Project Manager (RPM)	**Author affiliation:** USEPA, Region 5	
Review period:** 4/5/02 to 6/15/02		
Date(s) of site inspection: 5/14/02		
Type of review:	x Post-SARA __ Non-NPL Remedial Action Site __ Regional Discretion	__ Pre-SARA __ NPL State/Tribe-lead __ NPL-Removal only
Review number: x 1 (first) __ 2 (second) __ 3 (third) __ Other (specify) _____		
Triggering action: __ Actual RA Onsite Construction at OU #___ __ Construction Completion x Other (specify) Entry of Consent Decree	__ Actual RA Start at OU#___ __ Previous Five-Year Review Report	
Triggering action date *(from WasteLAN)*: 6/25/97	**Due date:** 6/30/02	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Issues:
- The institutional controls specified have not been recorded with the authorities.
- Sparse vegetation and standing water were observed on small areas of the landfill cover and nearby.
- Measurements of volatile organic compounds (VOCs) at the vents on the landfill may not be providing correct information.
- At this time the frequency of landfill gas and groundwater sampling can be reviewed to determine if it is appropriate to make changes.
- The Stream A area is not being monitored.

Recommendations and Follow-up Actions:
- The institutional controls (deed restrictions and restrictive covenants) need to be enacted. Work has already begun to have these controls enacted.
- Repair of the small parts of the site that were noted during the inspection as being deficient need to be made.
- Gas samples from the vents need to be taken to check that the measurements that are currently being made are indeed measuring the volatile organics (other than methane) in the gas.
- The data that has been obtained so far will be further evaluated to determine if the frequency of landfill gas and groundwater monitoring can be decreased.
- The information for the Stream A area will be evaluated to determine if additional information is needed.

Protectiveness Statement(s):
The immediate threats at the site have been addressed. Because the remedial actions are protective, the remedy at the site is protective of human health and the environment in the short-term, but it is not protective at this time in the long-term because the institutional controls have not been implemented. Long-term protectiveness of the remedial action will be possible once the institutional controls are implemented and the protectiveness will be verified by obtaining additional groundwater samples to determine that the groundwater contamination no longer is a threat to drinking water supplies.

Fultz Landfill Superfund Site
Jackson Township, Guernsey County, Ohio
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 the five-year review report. In addition, the five-year review report identifies issues found during the review, if any, and identifies recommendations to address them.

This five-year review report is being prepared pursuant to §121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and to the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). 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 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 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 (USEPA), Region 5, which is the lead agency for the site, has conducted the five-year review of the remedy implemented at the Fultz Landfill Superfund site in Jackson Township, Guernsey County, Ohio. This review was conducted for the entire site by the remedial project manager (RPM) through May 2002. This report documents the results of the review.

This is the first five-year review for the Fultz Landfill Site. The triggering action for this statutory review is the reported initiation of the remedial action on June 25, 1997, which was the date the Consent Decree for implementing the remedial action was entered. 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.

II. Site Chronology

Event	Date
Operation of landfill (dump) began	October 1954
Landfill first licensed by Guernsey County District Board of Health	February 1969

Event	Date
Site proposed for inclusion on the National Priorities List (NPL)	12/30/82
Site placed as final on the NPL	9/8/83
Fund-lead combined remedial investigation (RI) and feasibility study (FS) began	9/24/84
Landfill ceased waste disposal operations	December 1985
Draft remedial investigation report for Phase I	3/11/88
Remedial investigation report for Phase II	June 1991
Feasibility study report for Phase II	June 1991
Proposed Plan	6/27/91
Public meeting to discuss the Proposed Plan and other documents	7/11/91
End of comment period for the Proposed Plan	7/27/91
Record of Decision (ROD)	9/30/91
Fund-lead remedial design begins	6/24/92
Explanation of Significant Differences (ESD)	5/19/95
Fund-lead remedial design finished	3/31/97
Consent Decree for remedial action between Fultz Landfill Site Group and USEPA	lodged 11/26/96 entered 6/25/97
Public meeting for the design	8/6/97
Driller mobilized to site and commenced well installation and abandonment	8/18/97
Pre-construction meeting for cap construction	3/11/98
Mobilization to site for landfill remediation activities	3/23/98
Consent Decree for cost recovery between one potentially responsible party (PRP) and USEPA	lodged 12/22/97 entered 4/29/98
Preliminary Close Out Report signifying construction completion	9/29/98
Consent Decree for cost recovery between several PRPs and USEPA	lodged 3/24/99 entered 9/03/99

III. Background

History

The Fultz Landfill Superfund site is located in an agricultural and coal mining region of east-central Ohio, approximately 75 miles east of Columbus, and is situated in Jackson Township in the northwest corner of Military Lot 5, Township 1 North, Range 3 West in Guernsey County, Ohio. The site is about one-half mile northeast of the corporate limits of Byesville, Ohio, and about one mile southeast of the interchange of Interstates 77 and 70. The county seat, Cambridge, lies approximately three miles northwest of the site. Figure 1 shows some of the features around the site.

The Fultz Landfill was a privately-owned landfill where hazardous industrial wastes were co-disposed with municipal waste. The landfill, which closed in 1985, occupied approximately 30 acres of a 58-acre track within Parcel 1 of Military Lot 5. Parcel 1, prior to 1950, was part of a large farm that comprised approximately 200 acres. Land use in the vicinity of the site was and is primarily wooded and grassland with some residential development.

The landfill is situated on the north slope of a ridge that overlies a coal mine in the Upper Free-

port Coal seam, which was abandoned prior to 1940. The north half of the landfill lies in an unreclaimed strip mine in the Upper Freeport Coal seam, where surface mine spoil and natural soils form the "shallow aquifer". The shallow aquifer is a local water table aquifer generally limited to the unconsolidated valley sediments and strip mining spoils in stream valley A. The overall groundwater flow direction in stream valley A is from east to west, with the exception of the region around ponds 2 and 2A where there is a depression in the water table between ponds 1 and 2 that forms a groundwater capture, defined as the "pond 2 groundwater capture area", which causes a groundwater divide, splitting the shallow aquifer into eastern and western systems. The south half of the landfill lies 25 to 80 feet above an abandoned, flooded deep mine in the same coal seam. The flooded deep mine forms an aquifer referred to as the "coal mine aquifer". The City of Byesville obtains water from the coal mine aquifer at a location approximately one mile south of the site. The flow direction in this aquifer is from the landfill toward the Byesville No. 2 well.

The site is located within the Wills Creek drainage basin, a subdivision of the Muskingum River basin. The total area drained by Wills Creek is approximately 850 square miles. Wills Creek flows northward adjacent to the site and through the City of Cambridge, which uses the creek as a municipal water supply approximately three miles downstream. The drainage course on the north side of the landfill, which generally passes through the ponds there, is designated "Stream A". Prior to the existence of the landfill, Stream A was interrupted by surface mining activities, and six ponds were left in unreclaimed mine spoil. These ponds have been numbered 1 through 6. Pond 1 forms pond 1 and pond 1A and pond 2 forms pond 2 and pond 2A during low precipitation periods. The six ponds have been classified as wetlands by the U.S. Army Corps of Engineers. Surface water and leachate running off the landfill discharged into ponds 1, 2, 3 and 6, which border the north side of the landfill, prior to the construction of the remedial components. The stream located south of the site, designated "Stream B", located approximately 800 feet to the south of the property, drains a one-square-mile area consisting of farm land and reclaimed strip mines. It discharges into Wills Creek upstream of the discharge of Stream A into the creek.

The hydrogeology of the site area is complex due to the underground and surface coal mining. The groundwater regime generally consists of two hydrogeologic systems. The first, designated the shallow aquifer system, consists of groundwater at water table conditions within the unconsolidated alluvial deposits and surface mine spoil in the Stream A and Stream B valleys. The second system is the partially-confined "deep mine aquifer" that formed from the flooding of interconnected abandoned underground coal mines of the Upper Freeport Coal seam.

The population of Guernsey County was estimated at about 40,000 in 1988. Byesville had a population of about 2700.

The 30-acre landfill property was owned, developed and operated by Mr. Foster Fultz from October 1954 until his death in 1982. The landfill was then operated by Mr. Fultz's family. The facility operated as an open dump from about 1958 through 1968 and was first licensed by the Guernsey County District Board of Health in 1969, at which time the landfill was permitted to accept household, commercial, and industrial solid waste. During the 1970's the operator was cited for inadequate daily cover of waste, open dumping, receiving unauthorized waste, leachate

runoff, and blowing debris. The Fultz Landfill's 1974 and 1979 Solid Waste Disposal Questionnaires in the Guernsey County General Health District's records indicated a total solid waste volume of approximately 35 tons per operating day or 11,000 tons per year. These records also indicate the following distribution of the types of wastes regularly received: 3% construction/-demolition debris; 25% household; 32% industrial; and 40% commercial. The landfill ceased waste disposal operations in December 1985 when the owner failed to renew the operating permit for 1986.

A Phase I remedial investigation was performed at the site from 1985 through 1987. The Phase II remedial investigation was initiated in late 1988. The reports for the Phase II remedial investigation and the feasibility study were released in June 1991 along with the Proposed Plan.

Extent of Contamination

This section describes the contamination at the site at the time of the remedial investigation.

Surface water and sediment samples collected from the ponds contained several volatile organic compounds (VOCs) and phthalates; manganese was the only inorganic chemical regularly detected above background in the pond water samples.

The eastern shallow aquifer within the influence of the eastern groundwater capture system contained relatively low concentrations of several VOCs. All of the metals analyzed for were detected above background concentrations, with barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese and vanadium present in concentrations greater than 5 times the background concentrations. Contaminants in the eastern shallow aquifer have the potential of moving into the deep mine aquifer via Pond 2 and the coal barrier routes. The coal barrier route is formed by unmined coal which was left in place, between the shallow and coal mine aquifers.

The western shallow aquifer contained low concentrations of several VOCs and bis(2-ethylhexyl)phthalate, which were found mostly in a well that was screened in the landfill. Some metals detected at an off-site well nest located near the joining of Stream A with Wills Creek were also detected in on-site wells immediately downgradient from the landfill. Because groundwater gradients in the western shallow aquifer indicate that groundwater flows from the western half of the site to the sand and gravel aquifer under Wills Creek, it is probable that the metals detected at the well nest near the creek are related to the site.

The deep mine aquifer groundwater near the eastern groundwater capture system contained elevated concentrations of most of the metals found in the shallow aquifer, but did not contain any of the organic compounds found in the shallow aquifer. The deep mine aquifer groundwater near the coal barrier route was found to contain elevated concentrations of only a few metals, but also contained low concentrations of organic compounds including vinyl chloride, 1,2-dichloroethene, and benzoic acid. The vinyl chloride may be a biodegradation by-product of the trichloroethene reportedly disposed of in the landfill. The deep mine aquifer contaminants reflect the effects of contaminated groundwater moving from the shallow aquifer through the coal barrier route into the deep mine aquifer. The contaminants found in the deep mine aquifer at this location may also reflect the effects of contaminated groundwater moving from the bedrock via

secondary permeability in the rocks underlying the southern half of the landfill.

Fourteen polynuclear aromatic hydrocarbons (PAHs) were detected in the Phase II background soil, sediment, and water samples. PAHs can be associated with coal, coal tar or other coal distillation products, as well as coal and petroleum combustion products. Because they are common trace chemicals in the environment, PAHs were not attributed to the landfill based on the available background data and screening criteria. In addition to the typical metals normally associated with coal, such as iron and manganese, several other heavy metals have been documented in the literature as being associated with coal pile leachate, including arsenic, antimony, and selenium. In order for a compound to become a contaminant of potential concern (COPC), it would have to be present at twice the detected background concentration. In the RI, if a contaminant was found on site and not in background samples, it would be considered a COPC.

Site Risks

The major risks at the site were found to be posed by ingestion of groundwater and inhalation of volatile contaminants while showering with groundwater from either the shallow aquifer or the deeper coal mine aquifer, based on future residential use of the landfill. The possibility of residential development on or near the landfill was based on the Ohio Department of Development projection for population growth for the towns of Byesville and Cambridge and the corresponding need for additional land necessary to develop residential areas. The additional population would create a greater demand for water, thereby increasing the use of, at a minimum, the deep mine aquifer as a water supply source. This increased demand could result in a reduction in the then present dilution of contamination in the deep mine aquifer and could increase the migration of contamination from the shallow aquifer to the deep mine aquifer. The cumulative carcinogenic risk posed by ingestion of groundwater or inhalation while showering with groundwater from either the shallow aquifer or the deeper coal mine aquifer would be $1x10^{-3}$ which does not fall within the USEPA's acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$. In addition, the environmental risk assessment concluded that the site posed an unacceptable risk to white-tailed deer, which were used as an indicator species, from the manganese in the surface water.

Basis for Taking Action

Because of the unacceptable risk levels revealed by the human health evaluation and the environmental assessment, a remedy was developed for the site. The primary concerns identified were the vinyl chloride in the groundwater, the manganese in the on-site surface water, and the airborne contaminants coming from the wastes. Capping the landfill and the other measures taken were intended to eliminate the release of leachate to the surface waters, to reduce the amount of contamination reaching the aquifers at the site through a reduction in the amount of moisture entering the wastes, and to prevent possible contact with the wastes, contaminated groundwater, and landfill gas.

IV. Remedial Action

Remedy Selected

The components of the remedy resulting from the 1991 Record of Decision and the 1995 Explanation of Significant Differences (ESD) are:

- a berm and multilayer cap to reduce infiltration, prevent erosion, reduce contact with contaminated materials, and minimize the release of volatile contaminants and maintenance of this cap;
- a leachate collection system to collect leachate contributing to the surface seeps;
- an extraction well system to intercept contaminated groundwater migrating into the coal mine aquifer, if necessary;
- institutional controls to reduce exposure to site contaminants;
- a fence to restrict access;
- long-term monitoring of landfill gas and groundwater;
- wetlands replacement if wetlands were disturbed during remediation; and
- an alternate water supply for downgradient residents if required.

Remedy Implementation

The remedial design was prepared by a USEPA contractor; the components of the final design are dated November 1994. A Consent Decree for remedial action between eight Settling Defendants, operating as the Fultz Landfill Site Group (Group), and USEPA was entered on June 25, 1997. On August 18, 1997 a driller for the Group began well installation and abandonment activities which were substantially completed on October 17, 1997. The Group's engineering representative submitted the final remedial action work plan in December 1997. On March 11, 1998 a pre-construction meeting was held and on March 23, 1998 the Group's construction contractor mobilized at the site and began the landfill remediation activities. The major activities were:

- delineate the wetland area;
- maintain site security;
- manage the borrow area;
- construct the leachate collection system;
- construct the gas venting system;
- construct the surface water drainage system;
- construct a liner test pad;
- construct a multi-layered landfill cap; and
- fertilize and seed the cap area to provide a vegetative cover and fertilize and seed the borrow area and other disturbed areas of the site.

Site fencing was installed by USEPA during the remedial design. The groundwater collection components of the extraction well system (i.e., wells, piping) were installed by the Group, but the system has not been implemented. It is a contingency remedy.

Remedial action construction activities at the site were substantially completed on November 13, 1998. The construction activities were performed in substantial accordance with the approved

final design. The Group reported that it spent nearly $4 million for the remedial action construction activities. Construction completion for the site was reached on September 29, 1998 with the issuance of the Preliminary Close Out Report. Activities at the site were consistent with the ROD and the ESD and the Scope of Work for Remedial Action that was part of the Consent Decree.

It was discovered during the site visit in May 2002 that the Office of the Recorder for Guernsey County had no record that any deed restrictions and restrictive covenants had been placed on the site. Under the 1997 Consent Decree the landowner had agreed to record a notice of the Consent Decree and the deed restrictions and restrictive covenants specified in the Consent Decree. The USEPA Region 5's Office of Regional Counsel has contacted the landowner's attorney regarding this matter.

Operation and Maintenance

The Group's engineering representative has been conducting operation and maintenance according to the March 1999 *Operation and Maintenance (O&M) Plan* following the completion of the remedial action construction activities. The components of the operation and maintenance have consisted of:

- quarterly gas and groundwater monitoring;
- annual residential well and Byesville municipal well #2 monitoring;
- quarterly inspection of the cap and electrical and mechanical components;
- maintenance and repair of cap features;
- leachate disposal (as needed); and
- annual mowing.

During the early period of this work some additional gas probes were installed near two adjacent homes because the existing probes indicated elevated methane levels; these elevated levels were thought to be due to the former existence of septic tank systems near the probes. The new probes did not show an exceedance of the action levels for methane. In addition, methane meters were installed in the basements of two homes. There has also been additional restoration of the borrow area which lies to the east of the waste disposal area.

V. Progress Since the Last Five-Year Review

This is the first five-year review.

VI. Five-Year Review Process

Preparation

The Ohio EPA and contacts for the Group were formally notified by letter on April 5, 2002 that the five-year review was to be conducted. However, there had been earlier discussions between Ohio EPA's site coordinator, Mike Sherron, and USEPA's remedial project manager, Bernard Schorle, who has conducted this review, concerning the review.

Discussions with the regional community involvement coordinator (CIC), Robert Paulson, began about the same time as those with Ohio EPA. The CIC put together a notice about the review which was then sent to the Group's representative, the repositories, and some local residents; the RPM sent copies of a notice to those near the landfill, especially to those in residences whose wells are monitored. This notice was mailed in mid May 2002. The notice told the recipients the locations of the libraries and asked for any comments that they might have. The comments were to be postmarked no later than June 15, 2002. Only one comment has been received. A notice will be sent to the same parties announcing the completion of the five-year review and the availability of the report once the report is signed. Because the site has not generated much interest in the past and there was only comment submitted this time, no interviews were conducted with any local residents.

Document Review

Because the remedial project manager was assigned to this site after the completion of construction it was necessary for him to review a number of documents prepared prior to the time he was assigned in order to acquire additional background knowledge. For the review itself, the periodic reports from the Group and the Group's engineering representative providing updates and covering groundwater monitoring and operation and maintenance were reviewed. The most recent of these reports available was dated April 10, 2002 for the monitoring; the groundwater monitoring report covered the results of the monitoring through January 2002 and it included a table presenting the results for the groundwater monitoring for the wells being monitored that includes data from April 1999 when quarterly monitoring began.

Data Review

The primary concern in the monitoring program has been the vinyl chloride concentrations in the groundwater in the coal mine aquifer downgradient (to the south and southeast) of the waste disposal area. There are nearby residences using this groundwater and one of the City of Byesville's wells is about a mile away, to the south, in this aquifer. Monitoring wells M-19 and M-21 are near the wastes and downgradient while well M-24 is also near the wastes and northeast of the other two wells (see Figure 1 for the well locations). Monitoring well M-22 is farther downgradient than the above three wells and lies along the southern property boundary. Wells M-31 and M-32 are also along the southern property boundary, but further to the east. Well M-33 is to the east of the waste disposal area, along the property boundary. Well M-27 is northeast of the waste disposal area and serves as a background well. Wells M-22, M-31, M-32, and M-33 serve to monitor the migration of contamination off the site.

Table 1 presents the results of the monitoring for vinyl chloride since the construction of the remedy was completed as well as some data from before construction. The Group's engineering representative did a Mann-Kendall statistical evaluation of the vinyl chloride results shown in the table and concluded that the concentrations were decreasing in wells M-19, M-21, and M-24, the wells closest to the wastes, and there was no trend in the concentrations in wells M-22, M-31, and M-32. Well M-33 was not evaluated since the concentrations are below the detection limits. A Mann-Kendall evaluation of the vinyl chloride results obtained since the cap construction was completed indicates that there is no trend in the concentrations in wells M-19, M-21, and M-22

and there is a downward trend in well M-24. The maximum contaminant level (MCL) for vinyl chloride, the action level, is 2 µg/l. As can be seen from the table, the concentrations in well M-19 are well over an order of magnitude greater than the MCL while those in M-21 are about an order of magnitude greater than the MCL and those in M-24 are near the MCL. The concentrations in well M-22 are approximately five times the MCL, those in M-31 are less than twice the MCL, and those in M-32 are below the MCL, generally less than one-fourth the MCL. Vinyl chloride has not been detected in the residential wells that are sampled annually.

Vinyl chloride, a gas also known as ethylene monochloride, contains one chlorine atom per molecule. In groundwater it generally results from the degradation of chlorinated solvents that contain greater numbers of chlorine atoms in the molecule. Wells M-19 and M-21 contain cis-1,2-dichloroethene (MCL equal to 70 µg/l) in the range of 10 to 30 µg/l since early 1999 and well M-22 contains about 10 µg/l. The other wells being discussed here contain even lesser amounts. Well M-21 contains 1,1-dichloroethene (MCL equal to 7 µg/l) at about 0.4 µg/l, but this is generally not detected in the other wells. Wells M-19, M-21, M-24, and M-22 contain 1,1-dichloroethane (no MCL has been established) in the range of 0.2 to 0.6 µg/l, but it is generally not detected in the other wells. Trichloroethene (MCL equal to 5 µg/l) is detected in wells M-19 and M-21, and less frequently in wells M-22 and M-24, at concentrations below 1 µg/l and it is not generally detected in the other wells. Tetrachloroethene (MCL equal to 5 µg/l) has not been detected in these wells. Other VOCs (chlorinated and non-chlorinated) have also been detected in the wells being monitored but generally at low concentrations. The dichlorinated ethenes and ethanes have not been detected in the residential wells, but trichloroethene (twice) and tetrachloroethene (once) have been detected at concentrations less than 40% of the MCLs.

Leachate wells PW2A, PW6A, and M-7 were dry shortly after operation and maintenance began. Well PW3A was dry about 2 years later. Well PW-7A still has some water, but there has been a steady decrease in the level. In February 1999, 9000 gal of leachate was sent off the site for treatment. This was followed by 6000 gal in July 1999 and 3500 gal in May 2000.

The gas vents installed in the waste disposal area are checked for VOCs. An action level of 30 ppm total VOCs has been established. There have been no exceedances of the action level. However, the Group's engineering representative is going to collect samples at selected vents to verify that this is the case and that incorrect readings are not being obtained because of the need to measure very low levels of VOCs in the presence of high concentrations of methane and carbon dioxide rather than air.

There are gas probes installed off the waste disposal area between this area and two nearby residences that are on the western side of the site to monitor for the possibility of landfill gas migrating to or into these residences. The action level at the probes is 5 % methane. There have been exceedances at GP-1 and GP-4, thought to be due to the septic fields that once were used near these probes, so additional gas probes (GP-5 and GP-6) were added between the waste disposal area and the residences, closer to the residences. There have been no exceedances of the methane action level in these probes. Methane detectors installed in the basements of two of the residences have not shown any detections of methane.

There has been no monitoring of the surface water in the Stream A area since the construction of

the remedy. The only substance that was identified as possibly of concern here was manganese. While reviewing what has been done in the past it has been determined that the level of manganese in the ponds that was found during the remedial investigation may not have as adverse an effect as was thought then and the source of the manganese may not have been the landfill but the coal mine spoils present there. Newer information says that the manganese concentration that deer can tolerate is higher than what was used in the environmental risk assessment done then. A quick look at aquatic criteria indicates that most of the concentrations of manganese found in the ponds are acceptable. The low background concentration reported in the remedial investigation was used to say that the manganese in the western ponds was probably due to the leachate flowing into the ponds. The eastern ponds had much higher concentrations than the background concentration. Manganese in the Stream A area will be examined further.

Site Inspection

Inspection of the site was conducted on May 14, 2002 by the RPM, the State's site coordinator and the State's former site coordinator assigned to the site, the Group's engineering representative, and two representatives of the Group. The purpose of the inspection was to observe the site and check on those things that are not generally reported on; the inspection also served as the State's O&M inspection. It had rained fairly steadily the day before the inspection. Except for some minor items noted, the site appeared to be in very good condition. There were a few spots with standing water and a few small spots with sparse vegetation.

While at the site for the inspection, the RPM visited Guernsey County to verify that the institutional controls, in the form of deed restrictions and restrictive covenants, that the landowner agreed to place on the property under the terms of the 1997 Consent Decree were indeed in place. No indication that these controls had been recorded could be found, either with the property containing the waste disposal area or with a small part of this total property that had subsequently been partitioned off to the owner's son.

Comment Response

A comment was received from a resident who lives east of the site. He expressed concerns about: 1) the amount of silt that is now in pond 1, which may be affecting the fish; and 2) the number of seedlings that were planted in the borrow area located to the east of the waste disposal area that have died or appear to be distressed and what will be done with the protection that was placed around them. Regarding the silt, he attributed it to the disturbances in the borrow area during construction, even though there was a silt fence installed near the pond, and possibly, to some land that is not on the site but lies near the pond that has been disturbed since the landfill construction. This will be looked at to determine if anything can or should be done. Regarding the seedlings, it has been learned that the seedlings had been out of the ground a considerable length of time before they were planted and this may be resulting in a high loss, although it is to be noted that it is expected that there will be a noticeable loss in a planting of this type. The protection that has been installed around the seedlings is reportedly a degradeable type.

VII. Technical Assessment

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

The review of the available information indicates that the remedy is functioning as it was intended. Concentrations of vinyl chloride have decreased in groundwater monitoring wells close to the waste disposal area. No clear trends have emerged at wells located further downgradient of the waste disposal area and near the property boundary. The amount of leachate has decreased, which indicates that the cover is functioning as intended. USEPA has no information on the costs of operation and maintenance.

The institutional controls required for the property have not been implemented and USEPA is working on getting them in place.

Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?

There have been no major changes in the physical conditions of the site that would affect the protectiveness of the remedy. The site is being used as anticipated (that is, not being used) so the exposure assumptions that were made do not need to be changed.

The remaining applicable or relevant and appropriate requirements (ARARs) that still have to be attained deal with the quality of the groundwater; these are primarily the MCLs. There have been no changes made in the MCLs for the substances of concern at this site.

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

There has been no new information that would suggest that the remedy that was selected is not sufficient.

Technical Assessment Summary

According to the data reviewed, the site inspection, and discussions with the State's representatives, the Group's engineering representative, and the Group, the remedy is functioning as intended by the ROD as amended by the ESD. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy nor have there been any changes in the ARARs that still need to be met. The concentrations of the primary substance of concern, vinyl chloride, in the groundwater have been holding fairly steady at the property boundary and this substance is not detected in any drinking water supplies. The observed lack of a definite trend of decreasing concentrations at this time does not call into question the protectiveness of the remedy.

VIII. Issues

The issues identified during this review were:

- The institutional controls that have been specified (deed restrictions and restrictive covenants) have not been recorded with the authorities. This does not affect current protectiveness but it does impact future protectiveness of the remedy.

- Sparse vegetation and standing water were observed on small areas of the landfill cover and nearby. This does not currently affect protectiveness but it could in the future if the cover does not provide the protection that it is designed to do.

- There is a possibility that the measurements of VOCs at the vents on the landfill may not be providing the correct information. This does not currently affect protectiveness but it does impact future protectiveness.

- The landfill gas and groundwater and residential well monitoring data that has been collected has provided a certain amount of information. At this time, the frequency of sampling that has been agreed upon can be reviewed to determine if it is appropriate to make changes. This does not currently affect protectiveness nor will it in the future.

- The Stream A area is not being monitored. This does not currently affect protectiveness but it could in the future.

IX. Recommendations and Follow-Up Actions

Institutional controls. The institutional controls must be enacted. The attorney for the landowner has already been contacted about implementing the controls. USEPA will oversee the placement of the controls. It is expected that this will be accomplished within three months.

Maintenance of the site. As specified in the O & M Plan, the Group needs to repair the parts of the site that were noted during the inspection as having sparse vegetation and standing water. (It is to be noted that overall the site has been very well maintained.) The Group is to do the work and USEPA will oversee that the work is done; Ohio EPA expects to inspect the site in the fall after it has been mowed. It is expected that this will be accomplished within the next year.

Measurement of vent gas composition. This issue was actually identified by the Group's engineering representative. It is recommended that the Group follow up on their offer to obtain gas samples from the landfill gas vents to check against the measurements that are made in the current manner. USEPA will oversee this study and consult with Ohio EPA on the decision regarding future gas vent sampling. It is expected that this will be accomplished within a year and a decision can be made regarding the adequacy of the current measurement technique.

Frequency of monitoring. It is recommended that the landfill gas, groundwater, and residential well monitoring data and the requirements for monitoring (the Consent Decree and the regulations that apply to the site) be evaluated by USEPA, working with Ohio EPA, to determine whether it is necessary to monitor each of these as frequently as is being done now. Any changes will be incorporated into the O&M Plan. It is expected that this will be finished within six months.

Stream A area monitoring. It is recommended that the available information for the Stream A area be reviewed to determine if new information should be obtained. USEPA will perform this evaluation. It is expected that this will be accomplished within a year.

X. Protectiveness Statement

The remedy is protective of human health and the environment in the short term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The remedy is not protective of human health and the environment in the long term since the institutional controls that are needed to prevent exposure to, or the ingestion of, contaminated groundwater and exposure to the contents of the waste disposal area have not been implemented. Threats at the site have been addressed through capping, installation of fencing, and monitoring of the site and the groundwater.

Long-term protectiveness of the remedial action will be possible once the institutional controls are implemented and will be verified by obtaining additional groundwater samples to determine that the groundwater contamination no longer is a threat to drinking water supplies. Current monitoring data indicate that the remedy is functioning as required to achieve clean-up goals.

XI. Next Review

The next five-year review for the Fultz Landfill site is required in June 2007, five years from the date of this review.

Table 1. Vinyl Chloride Concentrations (µg/l)

Monitoring Wells/Date	M-19	M-21	M-22	M-24	M-27	M-31	M-32	M-33
12/93	120	33	8	6	--	--	--	--
3/94	100	21	16	3	--	--	--	--
6/94	81	91	25	9	--	--	--	--
9/94	55	46	14	9	--	--	--	--
4/99	49.5	17	4.8	5.5	<1.0	<1.0	<1.0	<1.0
7/99	42.8	--	--	3.8	<1.0	<1.0	<1.0	<1.0
10/99	71.8	--	--	6.2	<1.0	7.6	<1.0	<1.0
1/00	28	--	--	3.8	<1.0	4.7	1.6	<1.0
4/00	29.8	6.4	3.4	2.3	<1.0	1.6	0.6 J	<1.0
7/00	29	21	12	2.4	<2.0	3.3	<1.0	<2.0
10/00	32	19	9.6	2.5	<2.0	3	0.44 J	<2.0
1/01	34	15	1.9 J	3.6	<2.0	3.6	0.41 J	<2.0
4/01	26	5.1	3.6	1.5 J	<2.0	2.1	<2.0	<2.0
7/01	34	19	16	2.6	<2.0	4.0	0.23 J	<2.0
10/01	32	26	--	2.7	<2.0	2.6	<2.0	<2.0
1/02	36	16	9.8	2.1	<2.0	2.7	0.24 J	<2.0

Notes: Data for dates prior to 1999 are from an Ohio EPA report. Data from 1999 and later are from a report from the Group's engineering representative. When there were duplicate samples in the 1999 and later data, the average of the two has been recorded here. In averaging, if vinyl chloride was not found in one of the samples, one-half of the detection limit was used for the concentration.

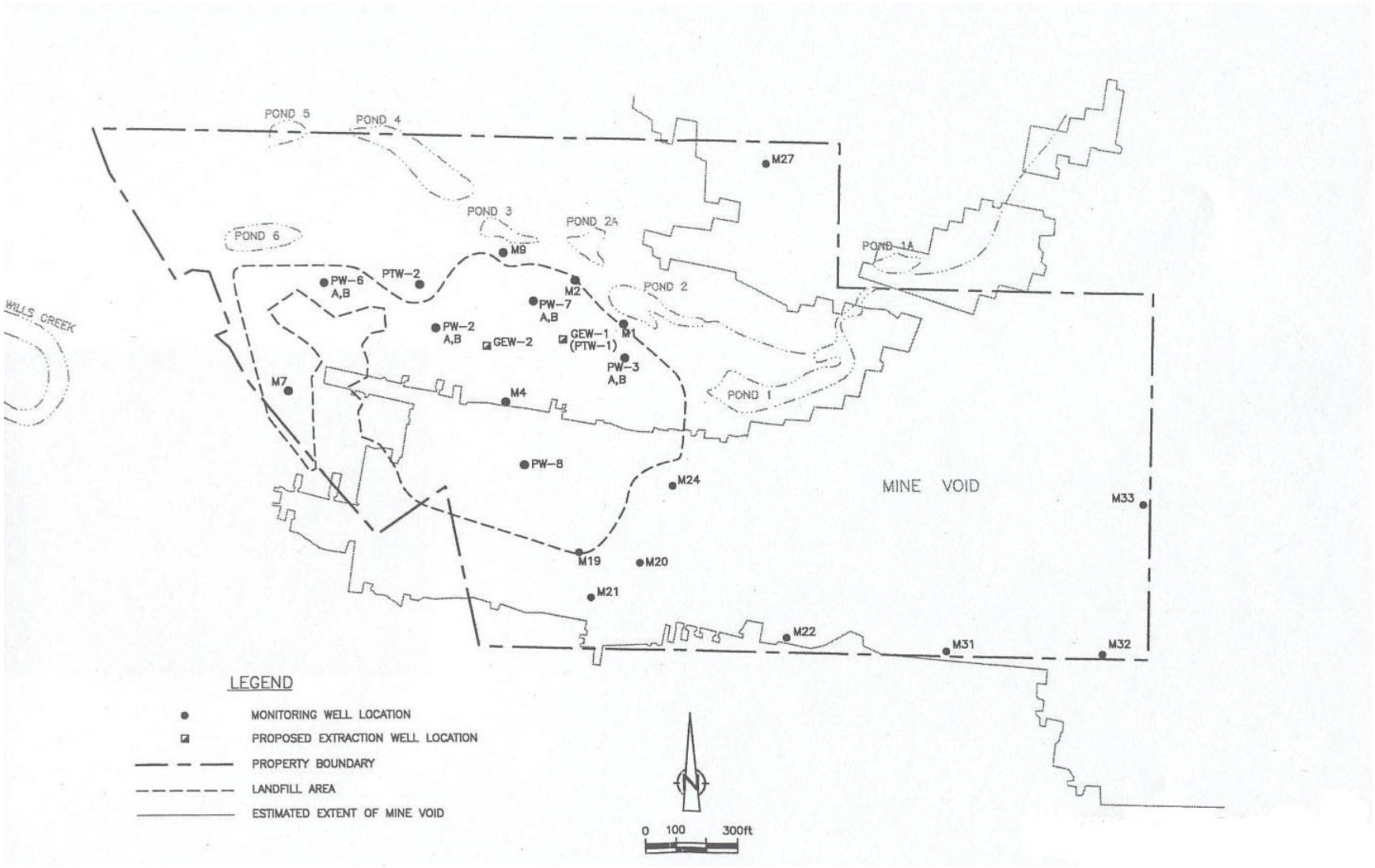

Figure 1. Fultz Landfill Superfund Site (Byesville, Ohio)
(Original Map from Conestoga-Rovers & Associates)