Five-Year Review Report

Second Five-Year Review Report

for

Buckeye Reclamation Landfill Superfund Site

Belmont County, Ohio

May 2009

PREPARED BY:

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

Richard C. Karl, Director
Superfund Division

[This page intentionally left blank.]

Five-Year Review Report

Table of Contents

Tables

Figures

Appendices

List of Acronyms

ACRONYM	NAME OR TERM
AOC	Administrative Order on Consent
AMD	Acid Mine Drainage
ARARs	Applicable or Relevant and Appropriate Requirements
BRL	Buckeye Reclamation Landfill
B2EHP	Bis(2-ethylhexyl)phthalate
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CIC	Community Involvement Coordinator
CRA	Conestoga-Rovers & Associates
EA	Endangerment Assessment
ESD	Explanation of Significant Differences
FS	Feasibility Study
GWMP	Groundwater Monitoring Program
ICs	Institutional Controls
MCLs	Maximum Contaminant Level
NCP	National Contingency Plan
NPL	National Priorities List
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
O&M	Operation and Maintenance
PAHs	Polycyclic aromatic hydrocarbons
PRPs	Potentially Responsible Parties
RA	Remedial Action
RD	Remedial Design
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SOW	Statement of Work
SVOC	Semi-Volatile Organic Compound
SWCMP	Surface Water Compliance Monitoring Program
UECA	Uniform Environmental Covenants Act
UU/UE	Unlimited Use or Unrestricted Exposure
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
WET	Whole Effluent Test

[This page intentionally left blank.]

Executive Summary

The Buckeye Reclamation Landfill (BRL) Superfund Site is located off of County Road 214, approximately 4 miles southeast of the City of St. Clairsville, and 1.2 miles south of Interstate 70 in Belmont County, Ohio. The BRL Site occupies approximately 100 acres and extends 3,700 feet north to south and is 500 to 1,000 feet wide. Deep coal mining activities occurred on the tract of land until the early 1950s. The Belmont County Health Department licensed the BRL Site in 1971 for use as a municipal solid waste landfill. Estimated total volumes of industrial wastes received between 1976 and 1980 were 2.9 million gallons of liquid and 30,000 tons of industrial sludges. The United States Environmental Protection Agency (U.S. EPA) and the Ohio Environmental Protection Agency (OEPA) conducted preliminary investigations in the early 1980s to determine whether potential risks were posed by the BRL Site to the public health and the environment.

U.S. EPA has prepared this second Five-Year Review Report under Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). The trigger for this five-year review was the previous five-year review, which was signed on May 6, 2004. The next Five-Year Review Report is due within five years of the signature date of this review.

The remedy selected in the August 19, 1991, Record of Decision (ROD) for the BRL Site required construction of a solid waste landfill cap, installation of a collection system for surface leachate seeps and groundwater, monitoring of groundwater, surface leachate seeps & Kings Run stream, and treatment of collected waters with constructed wetlands. An Explanation of Significant Differences (ESD) was issued by the U.S. EPA on July 17, 1997, to revise the remedy by reducing the size of the solid waste landfill cap, eliminating the northern impoundment, realigning and lining of Kings Run, and deferring the construction of the groundwater and leachate treatment system until after cap construction. U.S. EPA and fourteen private parties signed a Consent Decree (CD), entered on March 17, 1998, requiring the parties to carry out the remedy described in the ROD and ESD. New information gained during the Remedial Design (RD) phase led U.S. EPA to review and amend the selected remedy and a second ESD was issued on August 15, 2003. The second ESD implemented the Surface Water Compliance Monitoring Program (SWCMP) and stated that the low pH values in surface water data are directly related to coal mining activities and considered background. The ESD also stated that the results of the two-year surface water monitoring report would be used to determine if discharge standards were being met and whether surface water treatment by a constructed wetland was needed.

The assessment conducted pursuant to this five-year review found that the remedy was constructed in accordance with the ROD and the 1997 and 2003 ESDs. The remedy at the BRL Site currently protects human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and monitored. However, long-term protectiveness requires compliance with effective institutional controls (ICs). Compliance with effective ICs will be ensured through implementing effective ICs and conducting long-term stewardship by maintaining, monitoring and enforcing them as well as maintaining the site remedy components. ICs may include land use restrictions that prohibit interference with the hazardous waste landfill cap along with future use or development of the site, and restrictions on groundwater use.

[This page intentionally left blank.]

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Buckeye Reclamation Landfill		
EPA ID *(from WasteLAN)*: OHD980509657		
Region: 5	**State:** OH	**City/County:** Belmont County, Ohio

SITE STATUS	
NPL status: **X** Final □ Deleted □ Other (specify)	
Remediation status (choose all that apply): □ Under Construction □ Operating **X** Complete	
Multiple OUs?* □ YES **X** NO	**Construction completion date:** 5/14/03
Has site been put into reuse? □ YES **X** NO	

REVIEW STATUS	
Lead agency: **X** EPA □ State □ Tribe □ Other Federal Agency _____	
Author name: Colleen Moynihan	
Author title: Remedial Project Manager	**Author affiliation:** U.S. EPA, Superfund
Review period:** September 2008 to May 2009	
Date(s) of site inspection: 10 / 15 / 2008	
Type of review: **X** Post-SARA □ Pre-SARA □ NPL-Removal only □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead □ Regional Discretion	
Review number: □ 1 (first) **X** 2 (second) □ 3 (third) □ Other (specify) _____	
Triggering action: □ Actual RA Onsite Construction at OU #____ □ Construction Completion □ Other (specify)	□Actual RA Start at OU#____ **X** Previous Five-Year Review Report
Triggering action date *(from WasteLAN)*: 5 / 6 / 2004	
Due date *(five years after triggering action date)*: 5 / 6 / 2009	

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

Five-Year Review Summary Form, cont'd.

Issues:
1) Surface water treatment system (Phase II RA) deferred until surface water monitoring data evaluated.
2) SWCMP was implemented in October 2003 to satisfy the 2003 ESD and establish long-term surface water quality monitoring and sampling. Surface water monitoring results indicate compliance with the SWCMP requirements. CRA proposed SWCMP monitoring program changes.
3) Groundwater Monitoring Program (GWMP) Year 7 Round 2 revision 1 failed to meet the requirements of OAC 3745-27-10(E); CRA submitted revision 2 of the document in response to U.S. EPA and OEPA comments.
4) CRA proposed GWMP monitoring program changes.
5) Initial IC evaluation revealed that additional steps are needed to evaluate and address the long-term protectiveness of the remedy.
6) Signs of trespassing.
7) Odors identified by neighboring resident.

Recommendations and Follow-up Actions:
1) Review and evaluate 60 monthly rounds of surface water monitoring data to determine the need for surface water treatment.
2) Collaborate with OEPA and CRA on proposed SWCMP changes.
3) Review GWMP Year 7 Round 2 revision 2.
4) Review groundwater monitoring reports and evaluate proposed revisions to the GWMP.
5) Develop and implement an IC Plan within 6 months of this Five-Year Review Report. The IC Plan will result in the implementation of effective controls and long-term stewardship to assure long-term protectiveness for any areas of the site which do not allow for UU/UE.
6) Investigate additional tactics to prevent trespassing.
7) Review SWMP reports to determine if odors are site-related and communicate with neighbor(s) about findings.

Protectiveness Statement(s):
The remedy at the BRL Site currently protects human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and monitored. However, long-term protectiveness requires compliance with effective institutional controls. Compliance with effective ICs will be ensured through implementing effective ICs and conducting long-term stewardship by maintaining, monitoring and enforcing them as well as maintaining the site remedy components. ICs may include land use restrictions that prohibit interference with the hazardous waste landfill cap along with future use or development of the site, and restrictions on groundwater use.

Other Comments:
None

Fill in the data below:

Date of last Regional review of Human Exposure Indicator (from WasteLAN): 9/25/2006
Human Exposure Survey Status: Current Human Exposure Controlled
Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): 6/07/2007
Groundwater Migration Survey Status: Contaminated Groundwater Migration Insufficient Data
Ready for Reuse Determination Status (from WasteLAN): Will plan date for Site-Wide Ready for Anticipated Use

Five-Year Review Report

I. Introduction

The purpose of a five-year review is to determine whether the completed remedial action at a site is protective of human health and the environment where hazardous waste remains on-site at levels that do not allow for unlimited use and unrestricted exposure. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

U.S. EPA is preparing this five-year review 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 often 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 judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

U.S. EPA 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.*

U.S. EPA Region 5 has conducted a five-year review of the remedy implemented at the Buckeye Reclamation Landfill (BRL) Superfund Site in Belmont County, Ohio. This review was conducted for the entire site by the U.S. EPA Remedial Project Manager from September 2008 through May 2009. This report documents the results of the review.

This is the second five-year review for the BRL Site. The triggering action for this review is the date of the first Five-Year Review Report, signed on May 6, 2004. This statutory 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

Table 1 - Chronology of Site Events

Event	Date
Deep Coal Mining Activities	Prior to 1950
Licensed as a Public Solid Waste Landfill	1971
Initial Discovery of Problem or Contamination	1980
NPL listing	September 1983
Remedial Investigation / Feasibility Study AOC	October 1985
Remedial Investigation Report	June 1990
Removal Assessments (three)	November 1989-December 1991
Remedial Investigation/Feasibility Study complete	June 1990/April 1991
Record of Decision Signature	August 19, 1991
Remedial Design AOC	February 1992
Remedial Design Report	May 1997
Explanation of Significant Differences	July 17, 1997
Consent Decree for Remedial Action Phase I & II and Remedial Design Phase	March 17, 1998
Phase I Construction Contract Awarded	December 1998
Phase I Construction Start-Completion	May 1999-September 2001
Remedial Action Completion Report	November 6, 2001
Preliminary Close-out Report	May 14, 2003
Explanation of Significant Differences	August 15, 2003
Phase II Remedial Design (Two-Year Surface Water Assessment)	February 2004 (ongoing)
First Five-Year Review Report	May 6, 2004
Year 4 Round 2 Groundwater Monitoring Program Report and Program Changes	January 2006
Two-Year Surface Water Evaluation Report	May 2006
Site Inspection	October 15, 2008
Year 4 Round 2 Groundwater Monitoring Program Report and Program Changes revision 1	December 18, 2008
Year 7 Round 2 Groundwater Monitoring Program Report	January 23, 2009
Year 7 Round 2 Groundwater Monitoring Program Report, revision 1	February 18, 2009

III. Background

Physical Characteristics

The BRL Site is located off of Township Highway 219 (Ebbert Rd), approximately 4 miles southeast of St. Clairsville, and 1.2 miles south of Interstate 70 in Sections 20 and 21 (Township 6 North, Range 3 West) Richmond Township, Belmont County, Ohio (Figure 1). Interstate 470 borders the northeast corner of the site and is located approximately 3,000 feet north of the landfill.

The BRL Site is approximately 100 acres in size as defined by the chain link boundary fence. The site extends 3,700 feet north to south and is 500 to 1,000 feet wide. The access road and Apex Environmental Transfer Station are located at the northern entrance of the site. Property to the east and west is hilly and mostly forested. Farmland and a strip mine are to the west of the site. The land to the south is forested with steep slopes cleared for industrial use along the stream valleys and roadways. Additional farmland extends to the north and northeast.

The BRL Site is situated in the Kings Run drainage ravine and bordered by Kings Run to the east and an unnamed stream to the west. Surface water in Kings Run flows to the south and empties into Little McMahon Creek. Several water bearing bedrock aquifers positioned below the unconsolidated surface material are composed of the Wegee limestone, Waynesberg coal, Uniontown sandstone, and Benwood limestone. The Redstone limestone aquifer underlies the entire site. All the bedrock formations show no indications of any substantial primary porosity or permeability. Groundwater yields are the result of secondary porosity and permeability at joint faces, coal cleats, and among bedding planes (Figure 2). In general, most groundwater emanating from beneath the BRL Site is discharged laterally to surface water before leaving the site.

Land and Resource Use

The original topography of Kings Run valley and the ridge to the west of the BRL Site have been significantly altered because of coal mine refuse disposal activities and landfilling operations that took place for several decades. Deep underground coal mining occurred in the vicinity of the site until the early 1950s. Mine refuse from coal cleaning operations was placed into Kings Run valley pushing Kings Run to the east and onto the valley wall.

The BRL Site is located on a tract of land formerly used for deep coal mining. Coal mine refuse disposal activities created the northern, middle, and southern impoundment. Subsequent landfilling operations resulted in the drainage and filling of the middle and southern impoundments by 1972 and 1976, respectively. The majority of the industrial sludge and liquids accepted by the landfill were received between 1976 and 1979 and deposited in or near the northern impoundment (Figure 3).

Kings Run surface water flows south and empties into Little McMahon Creek. Surface water near the BRL Site and vicinity is not used for drinking water. Aquatic biota is considered to receive the greatest impact from the site via site runoff and acid mine drainage (AMD) contributions to local streams.

History of Contamination

The BRL Site was licensed in 1971 by the Belmont County Health Department for use as a municipal solid waste landfill and operated by Ohio Resources Corporation under the name of Buckeye Reclamation Company until 1991. Landfilling operations occurred on 50 acres of land and the majority of industrial sludge and liquids were deposited in the waste pit.

A 1979 OEPA solid waste disposal questionnaire indicated the following distribution of materials received by the BRL Site:

- 55 Percent Household
- 20 Percent Industrial
- 10 Percent Commercial
- 5 Percent Agricultural
- 5 Percent Construction/Demolition
- 2 Percent Incineration Residue
- 1 Percent Dead Animals

Records indicated a total volume of approximately 49,400 tons of solid waste per year were disposed in the landfill. Solid industrial wastes (e.g., asbestos, carbon black, fly ash) were reportedly commingled with municipal wastes. OEPA landfill inspection records also make references to unspecified industrial waste being disposed in the southeastern portion of the landfill. Industrial sludge and liquids were also accepted. Estimated total volumes of industrial wastes received are 2.9 million gallons of liquids (mostly oily-type wastes) and 30,000 tons of industrial sludge. Transporter records show that the majority of the liquids were mixtures of oils, solvents, and/or waste water. Maleic anhydride wash water sludge, neutralized pickle liquor sludge, sodium sulfide, desulfurization process sludge, maleic and fumaric acid wastes, and recovered liquids from maleic and fumaric acid spills were also known to have been deposited in the general area of the waste pit. In addition, the facility accepted general trash, municipal rubbish, and waste from villages and municipalities within the vicinity of Belmont County.

The majority of the materials received between 1976 and 1980 were deposited in or near the waste pit, an impoundment in the northern section of the landfill area. The waste pit was filled with sludge, mine spoil and overburden soil then covered with soil and garbage then revegetated. Aerial photographs from 1980 indicate that some sludge was buried in place along the slope of the waste pit. A soil berm was created upgradient of the waste pit to divert surface water and to minimize erosion. In 1980, the waste pit was closed following citations from the Belmont County Health Department for receiving industrial wastes.

In the early 1980s, U.S. EPA and OEPA conducted preliminary investigations to determine whether potential risks were posed by the BRL Site to public health and the environment. Twelve contaminants detected in the waste pit, soils, leachate, groundwater, and surface water were identified as indicator chemicals. These contaminants accounted for the majority of health-based risk posed by the BRL Site. The inorganics identified as contaminants of concern were arsenic, beryllium, lead, cadmium, chromium, and nickel. Organic compounds that were identified as contaminants of concern were benzene, trichloroethene, carbon tetrachloride, 1,1-dichloroethene, and carcinogenic polycyclic aromatic hydrocarbons (PAHs). Coal mine refuse,

industrial waste and solid waste were three potential sources of contaminants U.S. EPA identified at the BRL Site in the Record of Decision (ROD) issued on August 19, 1991.

Initial Response

U.S. EPA and OEPA conducted preliminary investigations in the early 1980s to determine whether potential risks were posed by the BRL Site to public health and the environment. U.S. EPA placed the BRL Site on the National Priorities List (NPL) on September 8, 1983. A potentially responsible party (PRP) search was conducted, and a number of parties, including the landfill operator and several generators, were identified. In October 1985, U.S. EPA, OEPA, and a group of PRPs signed an Administrative Order on Consent (AOC) that required the PRPs to conduct a Remedial Investigation (RI) and Feasibility Study (FS). U.S. EPA did not perform removal actions at the BRL Site.

Basis for Taking Action

In October 1985, U.S. EPA, OEPA, and a group of PRPs signed an AOC that required the PRPs to conduct an RI and FS. The RI investigated the contaminant source area (landfill), soils, surface water, sediment, leachate, groundwater, and air. Numerous carcinogenic and noncarcinogenic contaminants were detected in most media sampled. Sampling results identified various levels of contamination in all media sampled, except air. Three sources of the contamination were observed: 1) industrial wastes disposed in or around the waste pit, 2) solid wastes disposed in the general landfill area, and 3) coal mine refuse which was placed in the area before landfilling operations began.

The final phase of the RI included an Endangerment Assessment (EA) in 1991, which received extensive U.S.EPA and OEPA input. The EA was conducted in order to determine the extent of the threat to public health and the environment under present and future conditions, and to determine which aspects of the site merited remediation. The EA concluded that three significant exposure and contaminant routes existed for the BRL Site. These routes are 1) dermal contact/inhalation/ingestion of surface soils, 2) migration of contaminants from surface and subsurface soils into groundwater/ surface water, and 3) ingestion of contaminated groundwater/surface water. Surface/subsurface soils and groundwater/ surface water presented an existing or potential future threat to public health and the environment. Excess cancer risk estimates were identified for exposures to site soil, groundwater and surface water. Site-related potential cancer risk ranged from 6.53×10^{-3} to 1.48×10^{-2} for average and maximum chemical concentrations.

The 1991 EA evaluated current risk and the future use scenario from site-related contamination. The inhalation of fugitive dust was associated with excess cancer risk and identified as an existing exposure pathway for the BRL Site, with current-use cancer risks ranging from 3.76×10^{-4} to 1.05×10^{-3} for average and maximum chemical concentrations, respectively. Arsenic and chromium provide the major contributions to the incremental cancer pathway risk for the fugitive dust exposure. None of the current risk exposure pathways for the BRL Site were associated with noncarcinogenic hazard indices greater than one. Under the future use scenario, both excess cancer risks and noncarcinogenic hazards were identified. From a noncancer hazard standpoint, exposures associated with potential future use activities involving groundwater or surface water utilization (ingestion, vapor inhalation) were of primary concern. Hazard indices for both average and maximum contaminant concentrations at the BRL Site

were greater than one, ranging from 7.81 to 21.3.

The results of the EA indicated that remediation was needed as current and potential future exposures posed health threats. The surface water samples from Kings Run, Unnamed Run, Little McMahon Creek and leachate seeps on and near the BRL Site contained contamination from both acid mine drainage and the landfill. According to the EA, the fish and wildlife in the vicinity of the site may be affected by exposure to site contaminants. The potential for adverse effects from contaminant uptake by fish or wildlife could be passed on to humans if they consume fish or wildlife from the site.

IV. Remedial Actions

Remedy Selection

The remedy selected in the August 19, 1991, ROD addressed principal risks posed by the BRL Site by collecting and treating contaminated surface and ground waters, eliminating exposure to contaminated surface soils, and providing for long-term operation and maintenance at the BRL Site. The Remedial Action (RA) goals at the BRL Site are to protect public health and the environment from contaminants in soils and surface/groundwater. The RA goal for soils is to protect the public health and the environment by limiting direct contact with the waste and addressing the soil as a potential source of groundwater contamination. The RA goal for surface water is to reduce levels of contaminants in surface water leaving the site and adjusting the low pH waters to a more neutral value. The cleanup goals do not allow for unlimited use and unrestricted exposure. Components of the remedy selected in the ROD include the following:

- Solid waste landfill cap
- Institutional controls
- Fencing
- Surface leachate seep collection
- Groundwater monitoring
- Surface leachate seep monitoring
- Monitoring of Kings Run
- Leachate/groundwater treatment by constructed wetlands

The ROD provided for the installation of a leachate and groundwater collection system to intercept AMD, leachate and groundwater from the landfill areas and channel it to the treatment system. New information gained during the Remedial Design (RD) phase led U.S. EPA to review and revise the selected remedy. U.S. EPA issued a fact sheet and held a public meeting to give the public the opportunity to comment on the proposed changes, and after careful evaluation, U.S. EPA issued an Explanation of Significant Differences (ESD) on July 17, 1997, to document the decision (Appendix A). In summary, these changes included:

- Reduction, from 97 to 37 acres, of the area over which a solid waste landfill cap would be constructed;
- Construction of a vegetated soil cap over an area of 24 acres;
- Repair of the existing cap which covered approximately 29 acres;
- Modification of the slope of the cap bordering a portion of Kings Run;

- Realignment and lining of Kings Run;
- Elimination of the Northern Impoundment;
- Deferral of the groundwater/leachate treatment system (Phase II) until after cap construction (and monitoring to determine if a treatment system is required); and
- Modification of the description of groundwater samples to be used for determination of background levels in groundwater.

U.S. EPA and 14 private parties signed a Consent Decree (CD) which was entered in the United States District Court for the Southern District of Ohio on March 17, 1998. The CD and the appended Statement of Work (SOW) require the parties to carry out the remedy described in the ROD and the first ESD, to operate and maintain that remedy, and to pay certain costs incurred by U.S. EPA related to the site. The ROD is incorporated into the CD as an appendix.

A second ESD for the BRL Site was issued on August 15, 2003, to document the decision to further change the remedy described in the ROD. The second ESD (Appendix B) provided that:

- The low pH values are directly related to AMD and would be considered as background;
- The flows from Kings Run channel and the landfill leachate collection system be combined for off-site discharge to Little McMahon Creek;
- The Ohio criteria, as modified by the Ohio Revised Code Chapter 6111 Water Pollution Control Act, reflect the current OEPA risk and ecological information and these changes in general improve the quality of surface waters in the State of Ohio. These new criteria replaced the ROD section A.1 and A.2 Final Effluent Limitations and Monitoring Requirements for the Buckeye Reclamation Landfill;
- Monitoring of the combined flow would be conducted monthly at location KR-2 (see Figure 6), downgradient of the combined flows, for two years starting in February 2004. At the end of two years the data would be evaluated and the monitoring requirements reviewed. If, during or at the end of the two-year monitoring period, the discharge standards were not being met, the provisions in the ROD, CD and SOW for surface water treatment would be revisited; and
- No additional groundwater/leachate collection mechanisms would be required.

Remedy Implementation

The remedy selected in the 1991 ROD addressed principal threats posed by the site by treating contaminated surface and ground waters, eliminating exposure to contaminated surface soils, and providing for long-term operations and maintenance at the BRL Site (Figure 4). The ROD envisioned that the water treatment system would consist of a constructed wetland, proven effective at AMD reclamation projects in Ohio. Based on numerous pre-design studies, a review of site history, and a review of applicable regulations, the U.S. EPA and Ohio EPA agreed to modify the remedy selected in the ROD and an ESD was issued on July 17, 1997. The ESD deferred the design and construction of a groundwater/leachate treatment system until after the solid waste landfill cap was constructed. This modification was made in order to determine the volume and quality of groundwater, leachate and surface water generated by the landfill after the cap was in place. All activities except the leachate/groundwater collection and treatment system and groundwater monitoring plan were approved in the revised Final Phase I RD.

Phase I RA construction began in April 1999. The U.S. EPA and OEPA conducted a pre-final inspection on August 29, 2001, and a final inspection on September 27, 2001, and determined

that the PRPs constructed the remedy in accordance with the Phase I RD plans and specifications. Phase I RA construction was completed in September 2001 and the Remedial Action Completion Report was submitted on November 6, 2001.

The Phase I RA components of the selected remedy included:

- Construction of a solid waste landfill cap over approximately 37 acres with a landfill gas collection vent system
- Construction of a vegetated cap over approximately 24 acres
- Repair of existing cover where necessary over approximately 29 acres
- Realignment and lining of Kings Run
- Elimination of the Northern Impoundment
- Installation of surface water management structures
- Installation of a gas venting system
- Construction of access roads
- Installation of perimeter fencing
- Installation of groundwater leachate seep collection boxes, a french drain, and groundwater/leachate transport pipe

Solid Waste Landfill Cap

The selected remedy required that performance standards for the solid waste landfill cap be taken from the Ohio solid waste regulations, Ohio Administrative Code (OAC) 3745-27-11. Under the regulations, permeability of the low permeability (clay) layer shall not exceed $1x10^{-7}$ centimeters per second. Also, permeability of the drainage layer shall be $1x10^{-3}$ centimeters per second at a minimum. Minimum thicknesses of the cap layers were specified in the regulations. All surface water management structures were designed and constructed to meet the Ohio solid waste closure requirements.

Vegetated Cap

A vegetated soil cover system, consisting of a minimum of nine inches of soil materials, was installed over specific areas outside of the cap.

Existing Cover Repairs

Approximately 29 acres of existing cover were inspected and repairs were made as necessary. Repairs to the existing cover included:

- Reconstructing and installing rock lining along 950 feet of existing channel along the southwestern edge of the landfill;
- Installing rock lining to repair erosion on several existing channels;
- Constructing collection channels to minimize the potential for erosion;
- Installing twin 18-inch culverts to convey runoff under Access Road No. 2 into Kings Run;
- Installing two gas vents; and
- Re-grading and seeding bare areas as required.

Relocation of Kings Run Channel

Approximately 5,200 feet of the existing Kings Run channel was relocated and lined. The upstream 850 feet of Relocated Kings Run was lined with riprap and the remaining 4,300 feet was lined with fabricform over a geosynthetic clay liner.

Elimination of the Northern Impoundment
The southern third of the Northern Impoundment was eliminated by filling it with large diameter rock. The sediment displaced by the rock-filling operation was removed, disposed on-site, covered, and vegetated. The remaining two-thirds of the impoundment was eliminated by solidifying the sediment, in-place, with Portland cement and lime.

Installation of Surface Water Management Systems
The purpose of the surface water control structures is to collect and convey storm runoff from the cover system to the Relocated Kings Run channel while minimizing erosion. Ten channels and berms were constructed on the solid waste landfill cap and the northern recharge area. The channels are lined with grass, riprap, grouted riprap, or fabricform. Two concrete elliptical pipe culverts were installed at the downstream end of Channel No.9 to convey flows under access road No. 2 and into Kings Run.

Installation of a Gas Venting System
A gas venting system, consisting of 40 gas vents, was installed as part of the new solid waste landfill cap. Each gas vent consists of a ten-foot long, two-foot deep granular trench that contains perforated polyethylene gas collection pipes placed directly below the clay barrier layer. A vertical riser pipe extends through the cap and outlets the gas into the atmosphere.

Construction of Access Roads
Approximately 7,100 feet of access roads, consisting of 12 inches of coarse aggregate placed on geotextile, were constructed to provide access within the site. Asphalt was placed on the access roads where they pass over the Kings Run and the Channel No. 9 culverts.

Perimeter Fencing
Perimeter fencing, consisting of a 6-foot chain-link fence with barbed wire, was installed around the waste limits. Lockable gates were provided at key access points around the landfill to provide access. Signs, posted at 200-foot intervals, identify the site as a hazardous area and provide a warning against trespassing.

Installation of groundwater/leachate collection system
Several actions during Phase I RA addressed the problem of managing groundwater and leachate generated by the site. These include the installation of a french drain beneath Kings Run and collection boxes and pipes to transport collected groundwater and leachate to a sedimentation pond at the southern end of the site.

However, the construction of the cap, lining of Kings Run, and elimination of the northern impoundment all could contribute to significant changes in the volume and quality of groundwater and leachate generated. Therefore, during Phase II RD the need for additional collection system components or modifying the system was evaluated. Consistent with the 1997 ESD, four quarterly monitoring events for surface water and leachate flow and quality were completed to evaluate 1) the effect of the newly installed/repaired cap on leachate generation, 2) the elimination of the Northern Impoundment on the quality and quantity of groundwater and leachate generated by the landfill, 3) relocation and lining of Kings Run to determine the need for additional or modified groundwater/leachate collection mechanisms and/or groundwater/ leachate treatment. The results of the quarterly monitoring program were presented in the Southern Toe Sampling and Analysis Plan Report dated April 25, 2003. U.S. EPA & OEPA agreed to make a number of changes to the remedy described in the 1991 ROD based on the

results in the report, and (as described above) U.S. EPA issued a second ESD for the BRL Site on August 15, 2003.

The Surface Water Compliance Monitoring Program (SWMP) was prepared in October 2003 to meet requirements of the Consent Decree and the 2003 ESD, and to fulfill OAC 3745-27 regulations relative to sanitary landfills. The combined surface water flow from Kings Run channel and the landfill leachate collection system were monitored and analyzed for two years to determine if the requirements and effluent limits of the 2003 ESD were being satisfied and/or whether surface water treatment was required. In accordance with the August 2003 ESD and the SWCMP requirements, the PRPs submitted the two-year evaluation report on May 9, 2006. Subsequent monthly surface water samples continue to be collected. Currently, 60 monthly rounds of surface water monitoring data from Kings Run and 10 semi-annual Acute Whole Effluent test results from February 2004 to December 2008 have been documented.

Institutional Controls

Institutional controls (ICs) are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure (UU/UE).

The remedy selected in the ROD included ICs as one component. The ROD specified that either institutional controls would be implemented limiting the development of the property and the placement of any new wells on or adjacent to the property, or the selected remedy would be reevaluated to determine if additional actions should be implemented to ensure the long-term effectiveness of the remedy. The 1998 Consent Decree (into which the ROD was incorporated as an appendix) provided for the construction and implementation of the remedy selected in the ROD. The CD and SOW for the RD and RA reflect the U.S. EPA's decision to require the parties who signed the Consent Decree to "implement institutional controls, including use restrictions applicable to the site, to prohibit future use or development of the site in a manner that is inconsistent with or may defeat or impair the effectiveness of the remedial measures undertaken pursuant to this SOW." The CD also required the owner(s) of the site to record a certified copy of the Consent Decree with the Recorder's Office or Registry of Deeds or other appropriate office in Belmont County, Ohio. The CD requires that any deed, title, or other conveyance of the site property must contain a notice stating that the property is subject to the Consent Decree and restrictions applicable to the property under the Consent Decree.

The long-term protectiveness, effectiveness, and integrity of the remedy depend on compliance with ICs that implement land and groundwater restrictions. The following chart describes areas that must be restricted because the BRL Site does not allow for UU/UE.

Table 2 – Institutional Control Summary

Media, Engineered Controls, & Areas that Do Not Support UU/UE Based on Current Conditions	IC Objective	Title of Institutional Control Instrument Implemented (note if planned)
Ohio Resources Property (Capped Area) – Ohio Solid Waste/RCRA Subtitle D landfill cap (37.2 acres), Vegetated Soil Cap area (24.9 acres), and cap repair areas (29 acres) - Total 91.1 acres.	Prohibit interference with the caps. Prohibit future use or development of the site in a manner that is inconsistent with or may defeat or impair the effectiveness of the remedial measures undertaken pursuant to the SOW.	Consent Decree recorded at vol 737, pages 1-295 at the County of Belmont recorder's office on April 1, 1998. Ohio Revised Code § 3734.02(H) prohibits filling, grading, excavating, building, drilling, or mining on land where hazardous or solid waste facilities were operated without authorization from the OEPA. Restrictive covenants have not been implemented; implementation of UECA covenant is under consideration.
Groundwater – Area of the groundwater that exceeds performance standards (**under the BRL property**)	Prohibit groundwater use until cleanup standards are achieved. Limit the development of the site and prohibit placement of new wells on or adjacent to the site.	There are no zoning regulations or restrictions on the BRL Site. The site is outside the jurisdiction of the City of St. Clairsville and there are no specific zoning regulations in Belmont County. Ohio Administrative Code Chapter 3701-28 et seq., prohibits construction of private wells without a permit issued by the County. (Use of this governmental control under review.) Restrictive covenants have not been implemented; implementation of UECA covenant is under consideration.
Groundwater – Area of the groundwater that exceeds performance standards (**away from the BRL property**)	Prohibit groundwater use until cleanup standards are achieved. Limit the development of the site and prohibit placement of new wells on or adjacent to the site.	There are no zoning regulations or restrictions on the BRL Site. The site is outside the jurisdiction of the City of St. Clairsville and there are no specific zoning regulations in Belmont County. Ohio Administrative Code Chapter 3701-28 et seq., prohibits construction of private wells without a permit issued by the County. (Use of this governmental control under review.)
BRL Site- remedial components (e.g. leachate collection and transport lines, stormwater management controls and monitoring wells)	Prohibit interference with the system.	Consent Decree recorded at vol 737, pages 1-295 at the County of Belmont recorder's office on April 1, 1998. Restrictive covenants have not been implemented; implementation of UECA covenant is under consideration.

Maps which depict the current conditions of the site and areas which do not allow for UU/UE will be developed as part of the IC Plan discussed below.

Implemented and Planned ICs

In December 2008, at the request of U.S. EPA, the PRP group, through their contractor Conestoga-Rovers & Associates (CRA), prepared a draft IC Study. The draft IC Study found that five parcels owned by Ohio Resources Company are partially located within the capped area of the BRL Site. The draft IC Study indicated that certain institutional controls are in place relative to these parcels and have been and will continue to be "effective in preventing unacceptable exposures, maintaining site restrictions, and contributing to attainment of remedy performance standards." Specifically, the draft IC Study identified the following institutional controls:

- The Consent Decree and Notice of Consent Decree filed at Belmont County Register's Office
- Ohio Revised Code § 3734.02(H)
- Ohio Administrative Code, Chapter 3701-28 et seq
- Ohio common law prohibition on trespassing

The draft IC Study also found that no site-specific orders or other restrictions on land use or groundwater use were on file at the Belmont County Health Department. Also, the draft IC Study determined that the site is not within the jurisdiction of the St. Clairsville zoning department or any other zoning department in Belmont County, so therefore would be under the jurisdiction of the State of Ohio zoning regulations. Finally, the draft IC Study described a letter exchange between the Belmont County Health Department and OEPA in 1989-1990 which purports to transfer the administration and enforcement of Ohio solid waste regulation in Belmont County from the Health Department to the OEPA.

While U.S. EPA continues to evaluate the draft IC Study and may require revisions to it, U.S. EPA has drawn some conclusions from an examination of the IC information contained in the document. First, U.S. EPA has determined that the Consent Decree was filed for record in the Office of the Recorder, Belmont County, on each of the Ohio Resources parcels on April 1, 1998, and a notice of the Consent Decree was recorded on each Ohio Resources parcel. While U.S. EPA believes recording of the Consent Decree may be an acceptable and effective informational tool to potential future owners of the parcels, yielding effective short-tem protection of the remedy, it is not a proprietary control or governmental control.

Second, the State of Ohio laws and regulations may provide some governmental controls, but require additional evaluation. The 1989-1990 letter exchange between the Belmont County Health Department and OEPA purported to have OEPA accept responsibility for the Solid Waste program in Belmont County, but is not clear which entity has responsibility for land use or groundwater regulation and enforcement.

Finally, the PRPs are responsible for the operation, maintenance, security, and remedial action for the site. The remedy does not include any operating systems and groundwater at the site is not being used as a source of drinking water. Long-term site monitoring programs include

groundwater and surface water monitoring programs and site conditions are reported to U.S. EPA monthly through progress reports. The PRPs monitor the condition of the landfill cap, which must remain in place indefinitely to prevent exposure to the underlying waste. Observations during site inspections indicate no interference with the Solid Waste/RCRA Subtitle D landfill cap.

These initial IC evaluation activities have revealed that additional steps must be taken to evaluate and address the long-term protectiveness of the remedy. Based upon these conclusions, U.S. EPA intends to prepare an IC Plan for the site within 6 months of this Five-Year Review Report. The IC Plan will incorporate the results of U.S. EPA's review of the IC Study, include a plan for mapping easements and the current conditions on site, and explore the following issues:

- Seek a subordination agreement from pre-existing utility easement holder;
- The possibility of implementing a proprietary control, such as a Uniform Environmental Covenants Act (UECA) covenant for the site, to prohibit interference with the remedy (cap and groundwater);
- The availability and effectiveness of governmental controls, such as State/County regulations and zoning requirements, including a clarification of the relationship between Belmont County and OEPA regarding enforcement of regulations;
- A procedure to provide the holder of any utility easement with information about any ICs and procedures necessary to protect human health and the environment during future utility access of the site;
- An examination of other IC activities, including a plan for long-term stewardship; and
- The creation and implementation of a communication plan to inform the community and any future landowners of the ICs on the site.

The IC Plan will result in the implementation of effective controls and long-term stewardship, as discussed below, to assure the long-term protectiveness for any areas of the site which do not allow for UU/UE.

Long-Term Stewardship

Since compliance with ICs is necessary to assure the protectiveness of the remedy, planning for long-term stewardship is required. Long-term stewardship involves assuring effective procedures are in place to properly maintain and monitor the BRL Site. Long-term stewardship will ensure that the site remedy, including effective ICs, are maintained and monitored so that the remedy continues to function as intended. The IC Plan will require that the Operation and Maintenance (O&M) plan shall be updated to include a requirement for an annual certification to U.S. EPA that ICs are in place and effective. Lastly, the development of a communications plan and the use of the State's one call system shall be explored.

Current Compliance

The BRL Site is in compliance with the response action and IC objectives. Access to the site is limited. Based upon inspections and interviews, there are no non-conforming groundwater uses at the site. However, there has been evidence of trespassing near the southern toe of the

landfill by hunters during hunting season. Apparently, the hunters jump the fence and use the southern part of the site for hunting. The trespassers are not exposed to contaminants since the contamination is contained under the cap. Possibilities to curb trespassing on the site include local enforcement of anti-trespassing laws and exploring additional measures in the IC Plan to further restrict the site usage.

System Operations/Operation and Maintenance

Currently, CRA, the supervising contractor for the Buckeye Reclamation Landfill PRP Group, conducts long-term O&M on the site. Reporting is conducted in accordance with the February 20, 2002, O&M Plan for the Phase I RA work. The O&M activities for the site include remedial components, regular inspections, routine and unscheduled maintenance, quarterly site inspections, and annual explosive gas monitoring and reporting. In addition, BRL Site inspections are conducted quarterly throughout the post-closure period in accordance with Section 3745-27-14 of the OAC (which provides requirements for post-closure care for sanitary landfills).

The following post-closure components are assessed for damage during inspections:

- Cover/cap areas
- Vegetation
- Perimeter fence
- Surface water control structures
- Relocated Kings Run channel
- Access roads
- Gas vents
- Groundwater/leachate collection system
- Kings Run french drain
- Explosive gas monitoring/safety

The remedy for the BRL Site does not include any operating systems. The modified O&M Plan was approved on January 26, 2004. The revised plan includes the two-year monthly sampling of surface water at location KR-2, new discharge standards, semi-annual chemical groundwater monitoring requirements and groundwater elevation measurements of monitoring wells and piezometers, operation of items constructed during Phase I RA activities, site inspections to assess the integrity of the landfill cover and the fence, and performance of repairs as needed. ICs are not a part of the O&M Plan, but will be addressed in the IC Plan.

Long-term site monitoring programs include the Groundwater Monitoring Program (GWMP, February 2002) and Surface Water Compliance Monitoring Program (January 2004). Under the GWMP, the PRPs collect semi-annual groundwater and surface water quality samples. Groundwater quality samples are collected from 23 monitoring wells and piezometers. The monitoring locations are installed within the five zones of saturation which include in order from top to bottom: Unconsolidated Material/Mine Refuse, Wegee Limestone, Waynesburg Coal, Uniontown Sandstone, Benwood Limestone, and the uppermost aquifer system Redstone Limestone, which underlies the entire site (see Figure 2). One surface water quality sample is collected from the Kings Run surface water monitoring station KR-1 and analyzed from the groundwater parameter list. The SWCMP consists of flow monitoring at stations upstream (KR-

3) and downstream (KR-2). Samples are collected on a monthly, quarterly, and semi-annual basis in accordance with the August 2003 ESD and SWCMP requirements.

Currently, the BRL Site is surrounded by a 6-foot high galvanized chain-link fence topped with three strands of barbed wire with one-vehicle gates around the perimeter. The fence restricts unauthorized persons from entering the site. The operation and maintenance contractor performs on-site maintenance, and quarterly post-closure inspection reports indicate slide/slump areas along the eastern slope of Kings Run continue to be prone to erosion. Vegetation continues to be firmly established over the entire landfill cap and perimeter areas, and the fencing is in good condition. No explosive gases have been detected during the monitoring.

Regular inspections, routine and unscheduled maintenance and reporting to maintain the remedial components verify and document O&M activities. The BRL Site inspections have been and will continue to be an effective means to ensure the effectiveness of the maintenance and access restrictions required by the remedy. The PRP group has incurred $100,000 to $125,000 per year base costs for O&M and additional costs for erosion repair work.

V. Progress Since the Last Review

Table 3 – Actions Taken Since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Action Taken and Outcome	Date of Action
Surface water runoff and leachate have been combined and are discharged to Kings Run – unknown whether combined discharge will meet OEPA discharge standards	Conduct monthly monitoring of combined flow for two years, then evaluate monitoring requirements and need for leachate treatment (Phase II RA)	PRPs	PRPs conducted required monitoring and submitted two-year surface water evaluation report;	May 2006
		U.S. EPA & OEPA	U.S. EPA and OEPA evaluating monitoring requirements and need for leachate treatment.	Ongoing

In addition to the actions identified in Table 3 to address the issues identified in the 2004 five-year review, the following additional actions have been conducted by the PRPs since that review: monthly surface water monitoring (beyond the two years of monitoring described above) and reporting; semi-annual groundwater monitoring and reporting; routine O&M and quarterly post-closure inspection reports; and submittal of monthly progress reports.

VI. Five-Year Review Process

Administrative Components

U.S. EPA has conducted this five-year review of the remedial actions implemented at the BRL Site in Belmont County, Ohio. This review was conducted from September 2008 through May 2009 and prepared by Colleen Moynihan, Remedial Project Manager for the site. Kristin Vanecko, OEPA site coordinator, and Jane Jacobs, OEPA geologist, also assisted with the review. Robert Paulson, U.S. EPA Community Involvement Coordinator (CIC), provided community outreach support. The five-year review consisted of a review of relevant site

documents and monitoring data, as well as discussions with OEPA and the PRPs supervising contractors. In addition, a site inspection was performed on October 15, 2008.

Community Notification and Involvement

Activities to involve the public in the five-year review were initiated with a public notice prepared by the U.S. EPA and published in The Times Leader serving Belmont County, Ohio (Appendix C). The public notice summarized the selected remedial actions implemented at the BRL Site and encouraged public comment. U.S. EPA received no public comments during the five-year review process.

For this five-year review Robert Paulson, CIC, conducted a phone interview with Steve Palenicek, the nearest neighbor to the BRL Site. Overall, Mr. Palenicek is satisfied with how the site has been maintained and managed. He confirmed that his drinking water is provided by the county and he does not have a private well. In addition, he commented on the color and occasional odor emanating from the stream behind his house and requested the results of a monthly surface water sampling event. U.S. EPA will follow-up on this request.

This five-year review report will be placed in the site files and local repositories for the BRL Site at the St. Clairsville and Martins Ferry Public Library.

Document and Data Review

This Five-Year Review Report consists of a review of relevant site-specific documents including the ROD, 1997 and 2003 ESDs, the first Five-Year Review Report, post-closure inspections and monthly progress reports. The reports documenting the groundwater and surface water quality monitoring activities and the results were evaluated. A list of the documents and data reviewed in preparing for this five-year review is included in Appendix F.

Groundwater Monitoring

The Groundwater Monitoring Program was prepared to meet the requirements of the Consent Decree and fulfill the OAC 3745-27 regulations for sanitary landfills. Following the completion of the Phase I RA effort and approval of the GWMP in February 2002, monitoring activities were implemented. Long-term groundwater sampling events at the BRL Site are performed to characterize, monitor, and assess groundwater quality in the uppermost aquifer systems and the five significant zones of saturation above the uppermost aquifer system and surface water quality and elevations in Kings Run (Figure 5). The Redstone Limestone aquifer was identified as the uppermost aquifer system underlying the entire BRL Site. Significant zones of saturation above the Redstone Limestone, in descending stratigraphic position, include: the unconsolidated mine refuse/landfill materials, the Wegee Limestone, the Waynesburg Coal, the Uniontown Sandstone, and the Benwood Limestone. The four overlying units do not overlay the entire BRL Site. The parties agreed during a May 2001 meeting between U.S. EPA, OEPA and the PRPs that groundwater sampling activities would include the collection of surface water samples to determine and evaluate whether the landfill materials/leachate impact water quality in Kings Run.

CRA, the PRP group's contractor, conducts semi-annual sampling events and provide the U.S. EPA and OEPA groundwater quality analytical results, groundwater elevation data, groundwater

contour maps, and statistical analysis of the groundwater quality data in accordance with OAC 3745-27-10(C)(10). The GWMP stipulates that groundwater and surface water semi-annual sampling will continue for a period of 29 years. The October 2009 (Year 7, Round 2) GWMP event documented the sixteenth round of groundwater monitoring conducted after completion of remedial action construction work in Fall 2001. For this five-year review U.S. EPA and OEPA reviewed eight years and sixteen rounds of semi-annual groundwater monitoring data. Continued discussions between U.S. EPA, OEPA and the PRPs will resolve the following issues:

- During the October 2005 sampling event, MW-20-RL, the Redstone Limestone aquifer background monitoring well, was found dry. Sufficient groundwater has not been available at well MW-20-RL since the April 2004 sampling round. CRA has proposed using well MW-27-RL, a downgradient monitoring well in the Redstone Limestone, as a replacement background well. U.S. EPA and OEPA reviewed field data and determined MW-27-RL is an unsuitable background well.

- CRA submitted the Year 7 Round 2 Groundwater Monitoring Report, but failed to include a statistical analysis of the groundwater monitoring data. U.S. EPA requested that CRA follow OAC 3745-27-10 and conduct a statistical analysis on the groundwater monitoring data to identify if any monitored parameters at each downgradient groundwater monitoring well are occurring consistently above observed concentrations in the corresponding upgradient background well. CRA submitted Year 7 Round 2 r1 Report with summarized statistical tables, but failed to meet the requirements of OCA 3745-27-10(E). In a March 2009 teleconference with CRA, U.S. EPA and OEPA clarified the requirements of OAC 3745-27-10(E)(D)(6)(b) and requested implementation of a groundwater assessment plan.

- There are four parameters where detection limits are greater than the maximum contaminant level (MCL): antimony, beryllium, vinyl chloride, and B2EHP (bis(2-ethylhexyl)phthalate). The lab should be held accountable to achieve the MCL. The PRPs are required to conduct additional sampling to determine if the increases are a false positive. Following a statistical increase, the PRPs are subject to AOC 3745-21-40(E) and must enter an assessment monitoring program. CRA submitted the GWMP Year 7, Round 2 r1 Report and continues to address detection limits at or below MCLs or Secondary MCLs.

- Groundwater monitoring program changes were proposed by CRA to include deleting parameters, eliminating and abandoning 11 monitoring wells, and reducing monitoring frequency. U.S. EPA and OEPA are reviewing groundwater monitoring data and working with CRA to determine appropriate changes to the groundwater monitoring program.

Groundwater beneath the site contains a number of contaminants of concern exceeding safe drinking water standards. Cadmium and lead in the Mine Refuse unit, B2EHP and arsenic in the Waynesburg Coal unit, arsenic and lead in the Uniontown Sandstone unit, benzo(a)pyrene and nickel in the Benwood Limestone unit, along with nickel and lead in the Redstone Limestone unit, exceed MCLs. However, their concentrations decrease to below detection limits before moving beyond site boundaries. Groundwater at the site is not being used as a source of drinking water and Belmont County supplies the nearest neighborhood's drinking water.

Surface Water Monitoring

The Surface Water Compliance Monitoring Plan was prepared to meet the requirements of the Consent Decree and the August 15, 2003, ESD, and to fulfill the OAC 3745-27 regulations relative to sanitary landfills. The ROD envisioned the treatment of collected water with constructed wetlands, a method of treating acid mine drainage and leachate. Then the 1997 ESD included deferral of the design and construction of a groundwater/leachate treatment system until after the modified cap was constructed. This decision was made in order to determine the volume and quality of groundwater/leachate and surface water generated by the landfill after the cap was in place.

The 2003 ESD provided new surface water discharge limits and required that monitoring of the combined flow be conducted monthly at location KR-2 (downgradient of the combined flows, see Figure 6) for two years, starting in February 2004. The SWCMP consists of flow monitoring at the upstream (KR-3) and downstream (KR-2) monitoring stations. Samples are collected and submitted for chemical analysis (volatile organic compounds (VOCs), semi-VOCs (SVOCs), metals, general chemistry, and whole effluent acute toxicity), and field parameters are also monitored.

For this five-year review, U.S. EPA, OEPA, and the BRL Settling Defendants reviewed the two years of surface water quality monitoring data (February 2004 to February 2006) and subsequent monthly surface water samples (March 2006 to March 2009). Overall, 60 monthly rounds of surface water monitoring data from Kings Run and 10 semi-annual Acute Whole Effluent Test (WET) results were reviewed. The results of the surface water monitoring rounds indicate compliance with the SWCMP requirements. The WET test results continue not to meet the discharge limit and the failure is due to low pH/high acidity from background acid mine drainage, suspended solids, or other causes. The 2003 ESD determined that the low pH values are directly related to acid mine drainage and would be considered as background. CRA proposed to conduct the WET testing on a more frequent basis to determine the root cause of the WET test results. Based on surface water monitoring data results, CRA submitted proposed changes to the SWCMP, including reducing monitoring frequency and field parameters. U.S. EPA, in consultation with OEPA, will further evaluate CRA's proposed revisions to the SWMCP and will make a determination regarding the need for constructed wetlands.

Site Inspection

A BRL Site inspection was conducted on October 15, 2008. The inspection was performed by Colleen Moynihan, Remedial Project Manager for U.S. EPA, Kris Vanecko, OEPA Site Coordinator, and Jane Jacobs, OEPA hydrologist. CRA representative Fred Taylor, Supervising Contractor for the PRP Group and Site Manager for O&M, participated in the site inspection along with Rich Hill of CRA.

The purpose of the site inspection was to evaluate current site conditions and assess the protectiveness of the remedy. Components of the remedy that were inspected included the presence of fencing to restrict assess, the integrity of the solid waste landfill cap, groundwater and piezometer wells, and surface water monitoring locations. A copy of the BRL Site Inspection Checklist (Appendix D) and site photographs (Appendix E) are included in this report.

The following conditions were noted:

- The vegetated soil cap was in good condition;
- Access gates and fence were locked and secure;
- Appropriate information signs were posted;
- No evidence of vandalism or trespassing was observed; and
- The discharge pipe at the southern toe was blocked.

As noted above, the discharge pipe at the southern toe was blocked and the O&M manager was notified. CRA reported that unanticipated O&M costs have been incurred to repair the slide/slump along the northeast portion of the landfill that blocked the access road. At the time of the site visit minimal erosion damage was visible.

Interviews

The CRA site manager and staff were interviewed during the site inspection regarding the on-going site activities. O&M staff reported that they have observed a number of trespassers on the site near the southern toe of the landfill during hunting seasons.

VII. Technical Assessment

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

Yes. U.S. EPA's review of site-specific documents, groundwater and surface water monitoring data results, and Applicable or Relevant and Appropriate Requirements (ARARs) indicate that the remedy is functioning as intended by the ROD, as modified by the 1997 and 2003 ESDs.

The remedy for the BRL Site does not include any operating systems. O&M for the BRL Site consists of monthly surface water sampling at KR-2, semi-annual groundwater well monitoring and piezometer sampling and maintenance, site inspections to assess the integrity of the Phase I RA items (e.g .landfill cap, channels, roads, fence, etc.) and repairs as needed. The site inspections have been and will continue to be an effective means to ensure the effectiveness of the maintenance and access restrictions required by the remedy.

U.S. EPA determined that the solid waste landfill cap, the vegetated soil cap and the lined Kings Run channel on the site comply with all performance standards and ARARs. The cap complies with OAC 3745-27-11 "Final Closure for Sanitary Landfills" as provided in the 1997 ESD. The cap prevents significant amounts of water from infiltrating into the site, limits leachate generation, and protects against direct contact with the remaining wastes.

The results of 60 monthly rounds of surface water monitoring data indicate compliance with the SWCMP requirements including daily maximum concentration limits for surface water quality provided in the August 2003 ESD at KR-2 and KR-3 sampling locations, with the exception of WET test results for KR-2. The failure of the semi-annual WET tests is due to low pH/high acidity from background acid mine drainage, suspended solids, or other causes. Revisions to the SWCMP proposed by CRA include more frequent WET testing (quarterly verses semi-annually) to aid in the determination of the root cause of the WET test results.

Groundwater beneath the site contains a number of contaminants of concern exceeding safe drinking water standards; however their concentrations decrease to below detection limits before moving beyond site boundaries. Groundwater at the site is not being used as a source of drinking water and Belmont County supplies the nearest neighborhood's drinking water.

The BRL Site is currently enclosed by a 6-foot high, chain link fence with three strands of barbed wire. Lockable gates have been provided at key access points around the landfill to provide access. Signs posted at 200-foot intervals identify the site as a hazardous area and provide a warning against trespassing. Exposure pathways that could result in unacceptable risk are being monitored and the IC Plan will result in the implementation of effective controls and long-term stewardship to assure long-term protectiveness for any areas of the site which do not allow for UU/UE. Based upon inspections and interviews, there are no non-conforming groundwater uses at the site. However, even though there appears to be effective measures in place to limit access to the site and maintain the integrity of the remedy, there has been evidence of trespassing by hunters at the southern toe of the landfill during hunting season. Apparently, the hunters jump the fence and use the southern part of the site for hunting. The trespassers are not exposed to contaminants since the contamination is contained under the cap. Based on this information, additional measures will be explored in the IC plan to further restrict the site usage or enforce the existing restrictions.

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

Yes. The remedial objectives used at that the time of the remedy selection are still valid. Other factors are discussed below.

Changes in Standards and To Be Considered Criteria

Except for the OEPA discharge standards contained in the 2003 ESD, there are no other standards identified in the ROD or ESDs which have been revised. There are no newly-promulgated standards or To Be Considered criteria used in selecting the cleanup levels at the Site that have changed and could affect the protectiveness of the remedy.

Changes in Exposure Pathways

There have been no changes in the potential exposure pathways at the site since the implementation of the remedy. There have been no land use changes at the BRL Site nor are any expected in the future.

Changes in Toxicity and Other Contaminant Characteristics

Neither the toxicity factors for the contaminants of concern nor other contaminant characteristics have changed in a way that could affect the protectiveness of the remedy.

Changes in Risk Assessment Method

Standardized risk assessment methods have not changed in a way that could affect the assessment of the protectiveness of the remedy.

Expected Progress Toward Meeting Remedial Action Objectives

Progress toward the remedial action objectives continues at the site. The groundwater and surface water monitoring programs will continue to ensure that any changes in contaminant levels, on- or off-site, will be detected and addressed as necessary.

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

No. According to the data reviewed and the site inspection there is no new information that would suggest that the selected remedy is not protective and functioning as intended by the ROD and subsequent ESDs. In addition, there have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy.

Technical Assessment Summary

The remedy is functioning as intended by the decision documents. The exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection are still valid. There have been no newly identified human health or ecological risks, impacts from natural disasters, or any other information that has been identified that could call into question the protectiveness of the remedy for the BRL Site.

VIII. Issues

Table 4 - Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1. Surface water treatment system (Phase II RA) deferred until surface water monitoring data evaluated	N	Y
2. SWCMP was implemented in October 2003 to satisfy the 2003 ESD and establish long-term surface water quality monitoring and sampling. Surface water monitoring results indicate compliance with the SWCMP requirements. CRA proposed SWCMP monitoring program changes	N	Y
3. GWMP Year 7 Round 2 revision 1 failed to meet the requirements of OAC 3745-27-10(E); CRA submitted revision 2 of document in response to U.S. EPA and OEPA comments	N	Y
4. CRA Proposed GWMP monitoring program changes	N	Y
5. Initial IC evaluation revealed that additional steps are needed to evaluate and address the long-term protectiveness of the remedy	N	Y
6. Signs of trespassing	N	Y
7. Odors identified by neighboring resident	N	N

IX. Recommendations and Follow-up Actions

Table 5 - Recommendations and Follow-up Actions

Issue from Table 4	Recommendations and Follow-up Actions	Party Responsible	Oversight or Support Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1.	Review and evaluate 60 monthly rounds of surface water monitoring data to determine the need for surface water treatment	U.S. EPA	OEPA	November 2009	N	Y
2.	Collaborate with OEPA and CRA on proposed SWCMP changes	U.S. EPA	OEPA	November 2009	N	Y
3.	Review GWMP Year 7 Round 2 revision 2	U.S. EPA	OEPA	July 2009	N	Y
4.	Review groundwater monitoring reports and evaluate proposed revisions to the GWMP	U.S. EPA	OEPA	August 2009	N	Y
5.	Develop and implement an IC Plan within 6 months of this Five-Year Review Report. The IC Plan will result in the implementation of effective controls and long-term stewardship to assure long-term protectiveness for any areas of the site which do not allow for UU/UE	U.S. EPA	OEPA	November 2009	N	Y
6.	Investigate additional tactics to prevent trespassing	PRPs	U.S. EPA and OEPA	November 2009	N	Y
7.	Review SWMP reports to determine if odors are site-related and communicate with neighbor(s) about findings	U.S. EPA	OEPA	November 2009	N	N

X. Protectiveness Statement(s)

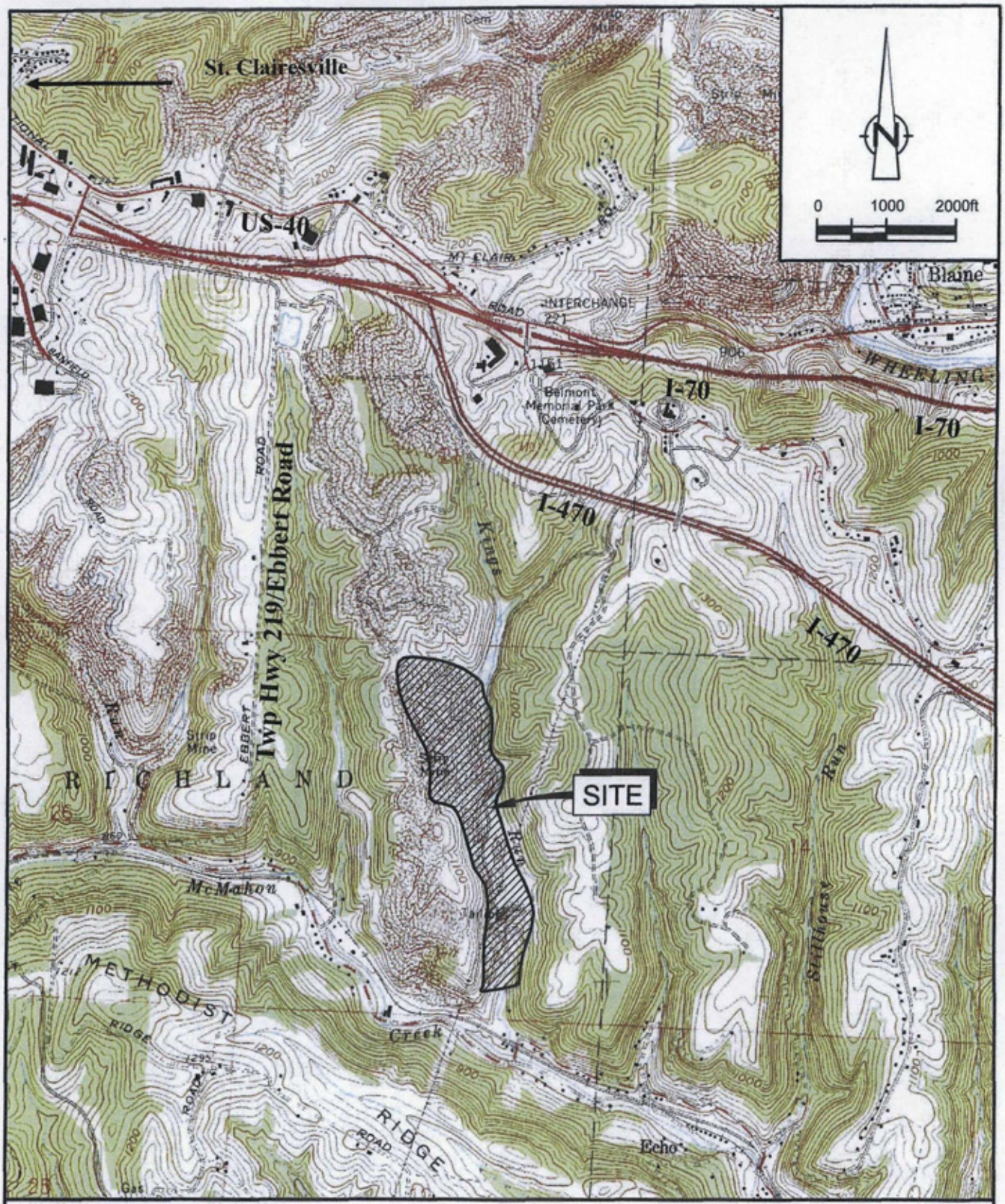
The remedy at the BRL Site currently protects human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled and monitored. However, long-term protectiveness requires compliance with effective institutional controls. Compliance with effective ICs will be ensured through implementing effective ICs and conducting long-term stewardship by maintaining, monitoring and enforcing them as well as maintaining the site remedy components. ICs may include land use restrictions that prohibit interference with the hazardous waste landfill cap along with future use or

development of the site, and restrictions on groundwater use.

XI. Next Review

The next five-year review report for the BRL Site is required within five years from the signature date of this review.

Figure 1. BRL Site Location Map



SOURCE: USGS QUADRANGLE MAP;
LANSING, OHIO

SITE LOCATION
BUCKEYE RECLAMATION LANDFILL
St. Clairsville, Ohio

36144-00(027)GN-WA001 JUL 14/2008

Figure 2. Geologic Cross Section Map

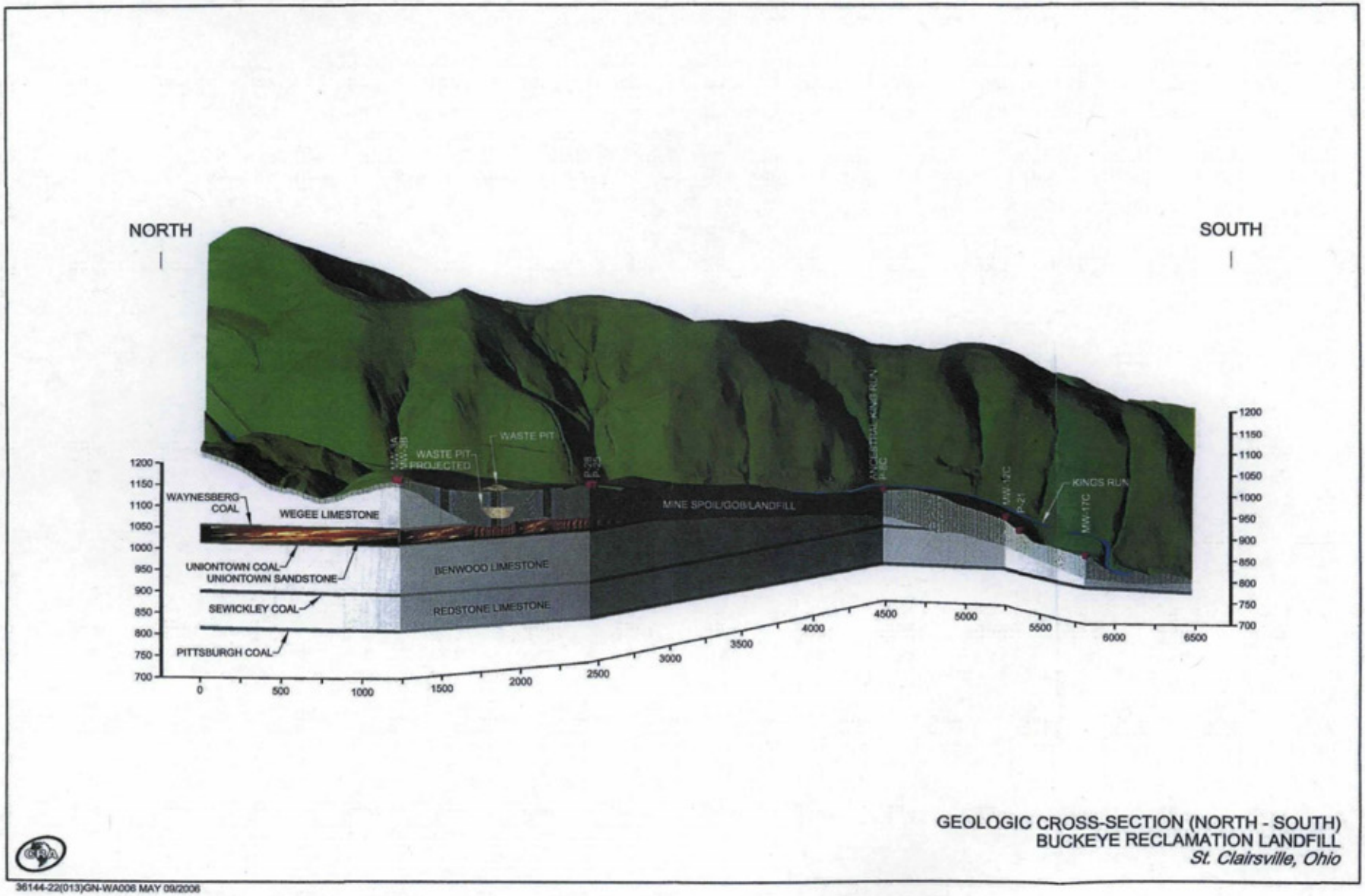


Figure 3. Old BRL Site Map

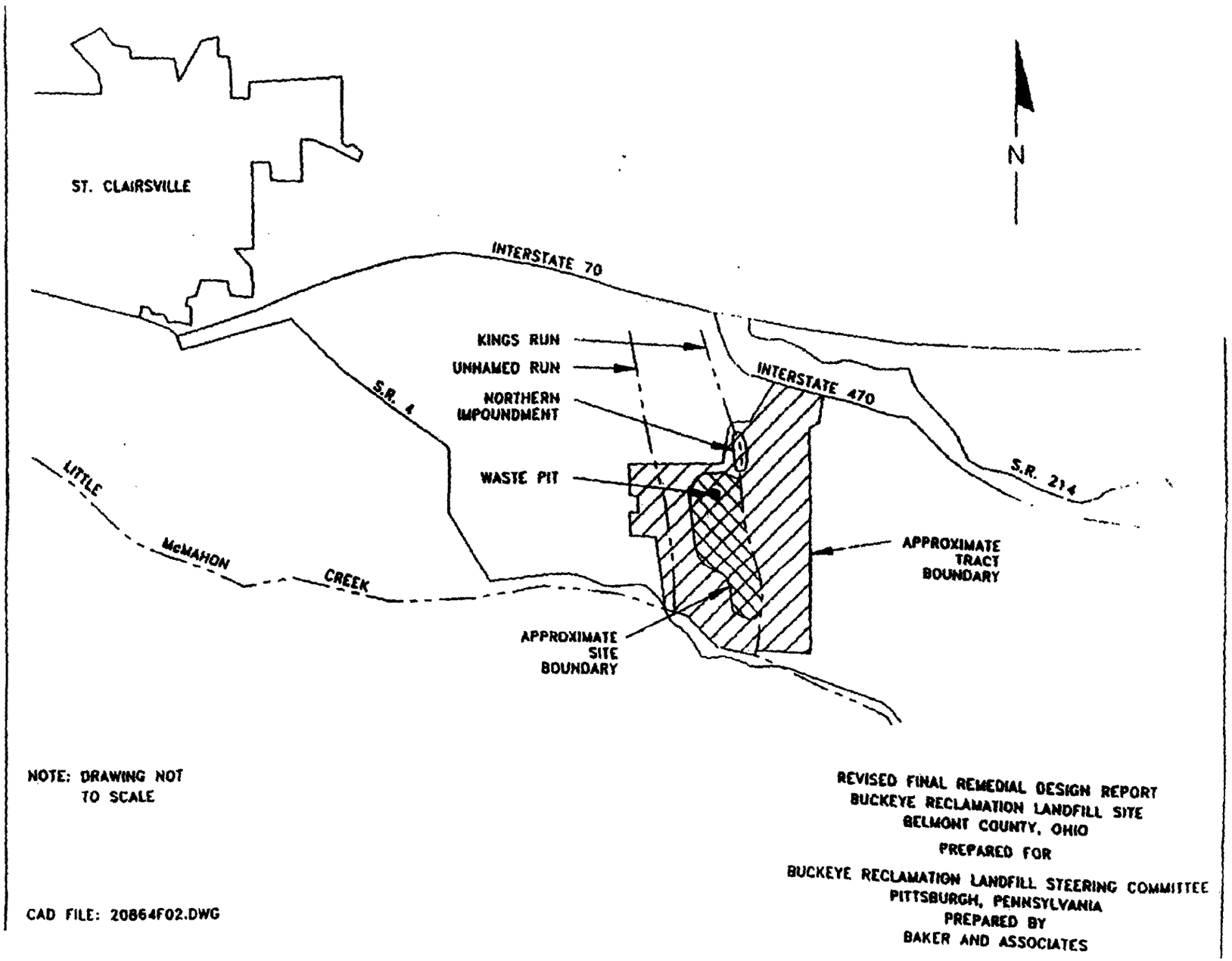


Figure 4. Current BRL Site Map

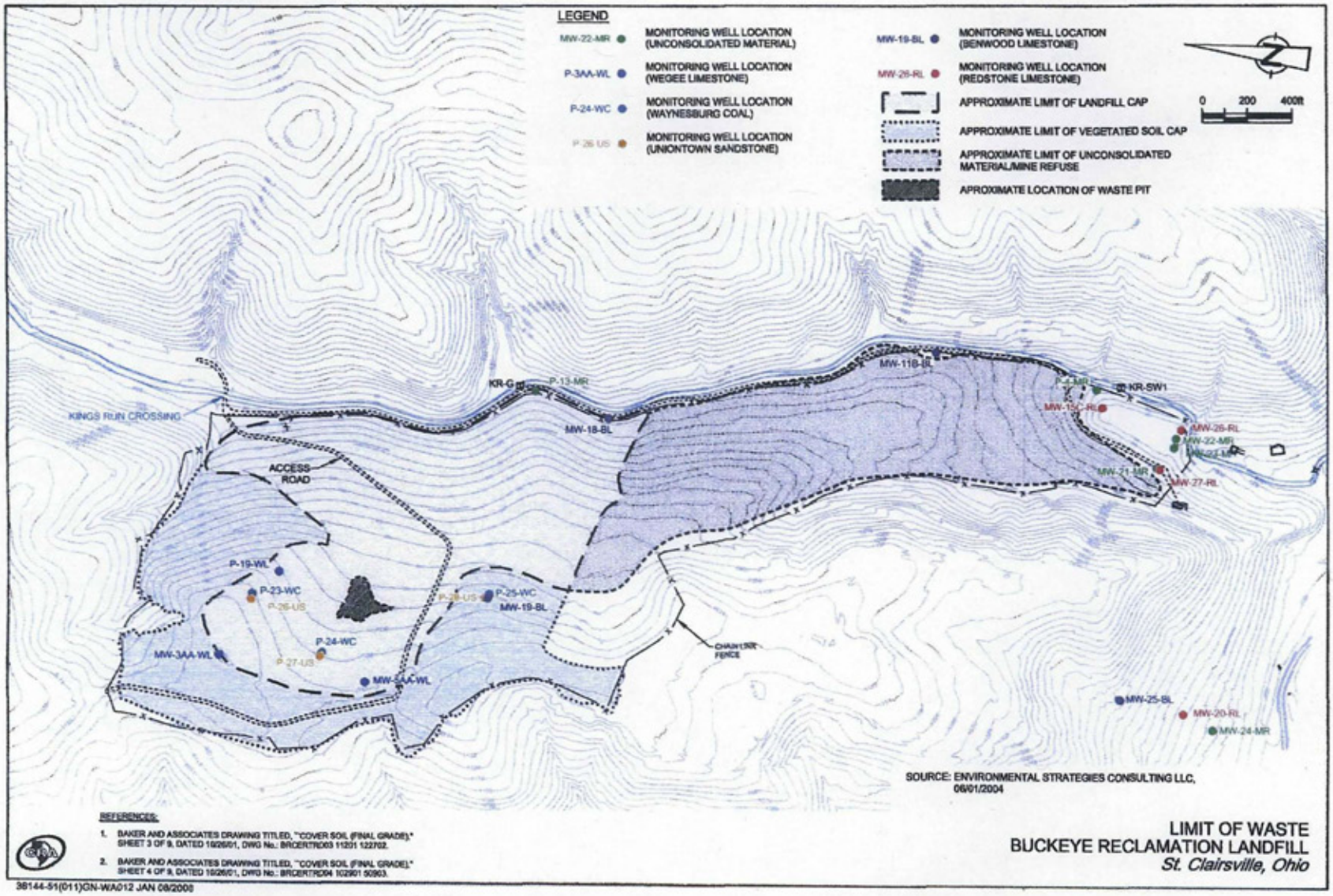
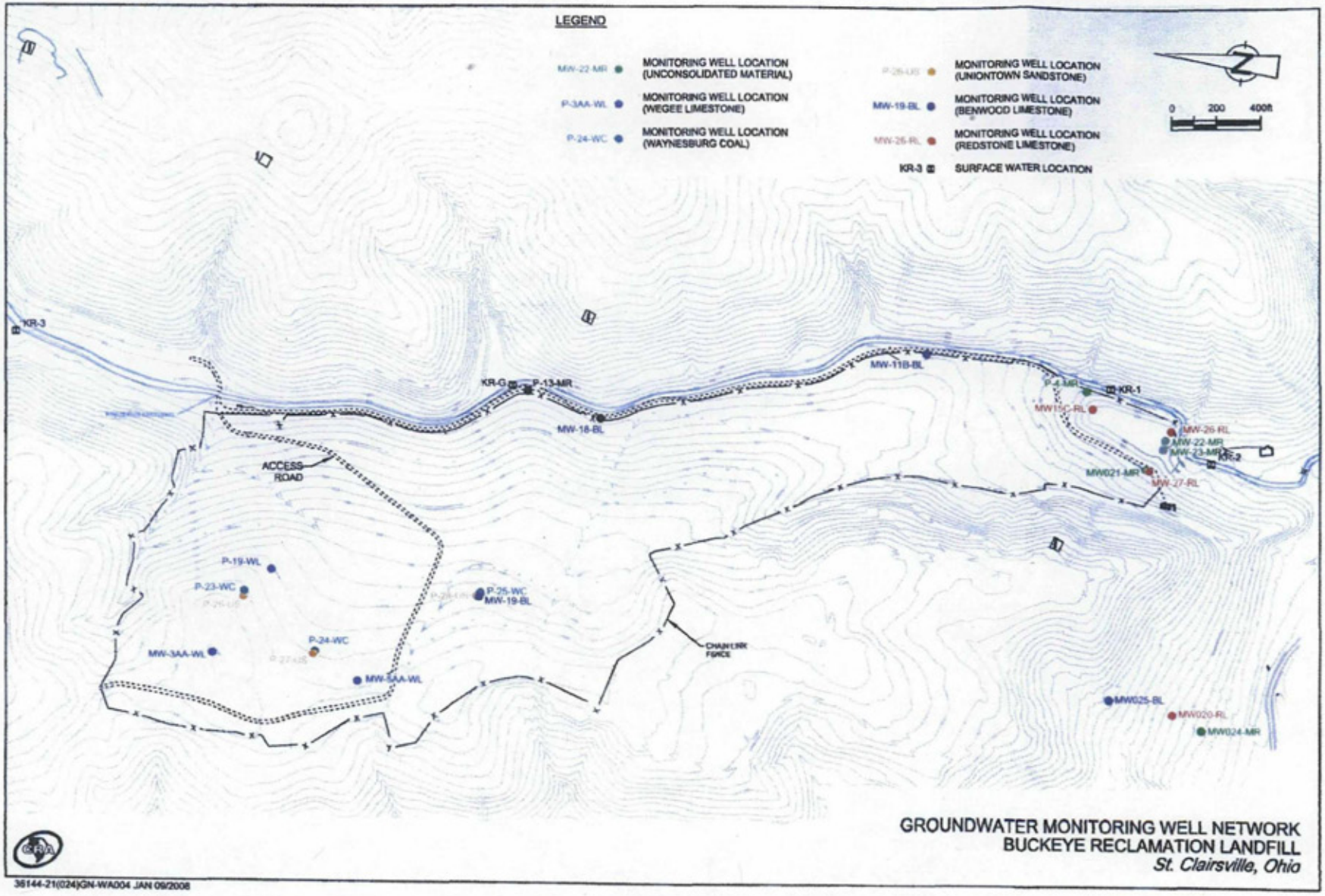
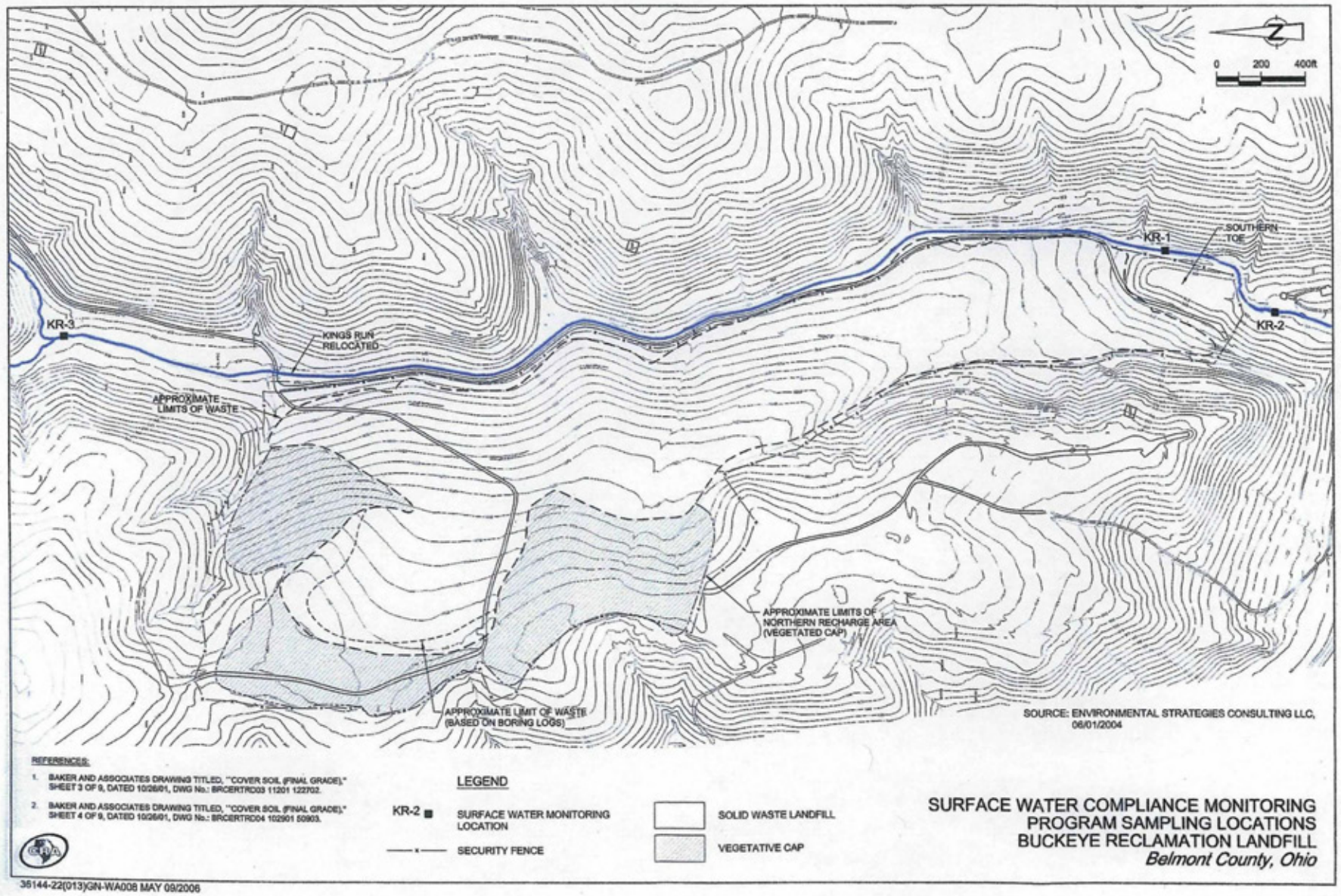


Figure 5. Groundwater Monitoring Well Map



36144-21(024)GN-WA004 JAN 09/2008

Figure 6. Surface Water Compliance Monitoring Map



Appendix A

1997 ESD

EXPLANATION OF SIGNIFICANT DIFFERENCES
BUCKEYE RECLAMATION LANDFILL SITE
St. Clairsville, Ohio

1.0 INTRODUCTION

The Buckeye Reclamation Landfill (BRL) site is located off of County Road 214, approximately four miles southeast of St. Clairsville, and 1.2 miles south of Interstate 70 in Sections 20 and 21 (Township 6 North, Range 3 West), Richland Township, Belmont County, Ohio. Interstate 470 borders the northeast corner of the site property and is located approximately 3,000 feet north of the landfill area. Deep mining occurred beneath and adjacent to the site until the early 1950s. During that time, the site was the disposal area for mine refuse. From 1971 to 1991, the BRL site operated as a municipal waste landfill. However, the landfill also accepted industrial sludges and liquids, primarily during the period from 1976 to 1979.

The BRL site is situated in the Kings Run drainage ravine and is generally bordered by Kings Run to the east and an unnamed run (Unnamed Run) to the west. Surface water in Kings Run flows to the south and empties into Little McMahon Creek. The landfill extends approximately 3,700 feet north to south and its width varies between approximately 500 and 1,000 feet. The property on which the landfill is located occupies 658 acres. Municipal landfilling activity occurred on approximately 64 acres of this area.

The United States Environmental Protection Agency (USEPA) is the lead agency for the site. Ohio Environmental Protection Agency (OEPA) is the support agency.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA), states in Section 117(c), that, "[a]fter adoption of a final remedial action plan:

(1) if any remedial action is taken,
(2) if any enforcement action under §106 is taken, or
(3) if any settlement or consent decree under §106 or §122 is entered into,

and if such action, settlement, or decree differs in any significant respects from the final plan, the President or the State shall publish an explanation of the significant differences and the reasons that such changes were made." Pursuant to this requirement, this Explanation of Significant Differences (ESD) is being written to document the changes in the remedy which resulted from a remedy reevaluation. The reevaluation was prompted by a proposal submitted in March 1995 by a group of Potentially Responsible Parties (PRPs). After much discussion and careful evaluation, USEPA and OEPA agreed to make a number of changes to the remedy described in the 1991 Record of Decision (ROD). In summary, these agreed to changes include:

(1) Reduction of the area over which a solid waste landfill cap will be constructed from 97 to 37 acres;
(2) Construction of a vegetated soil cap over an area of 24 acres;
(3) Repair of existing cap which covers approximately 29 acres;
(4) Modification of slope of cap bordering a portion of Kings Run;
(5) Realignment and lining of Kings Run;
(6) Elimination of the Northern Impoundment;
(7) Deferral of design and construction of a groundwater/leachate treatment system until after cap construction; and
(8) Modification of the description of groundwater samples to be used for determination of background levels in groundwater.

Section 3.0 of this document provides more detailed descriptions of these changes to the 1991 remedy being documented in this ESD.

This ESD will become part of the permanent Administrative Record file for the site, and will be a part of the site repositories available for public viewing at the EPA offices, 77 W. Jackson Boulevard, Chicago, Illinois, and at both the St. Clairsville Public Library, 108 W. Main Street, St. Clairsville, Ohio, and the Neffs Branch, Martins Ferry Public Library, Pike Street, Neffs, Ohio.

If you need further information, you may contact Mary Tierney, Remedial Project Manager, USEPA (SR-6J), 77 West Jackson Boulevard, Chicago, Illinois, 60604, (312) 886-4785, or via Internet at "tierney.mary@epamail.epa.gov".

2.0 SITE HISTORY, CONTAMINANTS, AND REMEDY SELECTED IN 1991 ROD

2.1 Site History

The relief of Kings Run Valley and the ridge to the west have been significantly altered from their original topography because of the mine refuse disposal activities and landfilling operations that took place at the site over several decades. Prior to 1950, coal mine refuse was removed from deep coal mines in the area and deposited in the valley. Refuse placement dammed Kings Run, creating impoundments near the north edge, middle, and southern portion of the site. Subsequent landfilling operations resulted in the draining and filling of the middle and southern impoundments by 1972 and 1976, respectively. The impoundment on the north edge of the site, which still exists, is referred to as the "Northern Impoundment." A fourth impoundment, referred to as the "Waste Pit," was created as a result of the damming of a western tributary of Kings Run by mine refuse.

Deep mining occurred in the vicinity of the site until the early 1950s. During this time, mine refuse was removed from the mines and disposed of at the site, including along the ridge on the

west side of the site as well as in the drainage ravine for Kings Run. In 1971, the area was licensed by the Belmont County Health Department for use as a municipal solid waste landfill. The landfill was operated by Ohio Resources Corporation, under the name Buckeye Reclamation Company, until 1991.

Records of the actual types and quantities of wastes and their on-site location are limited. A 1979 OEPA solid waste disposal questionnaire listed the following waste materials and their estimated contribution to the total amount of waste received by the site:

- 55% household waste
- 20% industrial waste
- 10% commercial waste
- 5% agricultural waste
- 5% construction/demolition debris
- 2% incineration residue
- 1% animal carcasses

Records indicate that approximately 950 tons of solid waste per week, or 49,400 tons per year, were disposed of at the site. The landfill also accepted industrial sludges and liquids. Most of these wastes were received between 1976 and 1979 and deposited in or near the Waste Pit, which was an impoundment in the northern section of the landfill area. Estimated total volumes of industrial wastes received are 4.7 million gallons of liquids and 3,300 tons of industrial solid wastes. Transporter records show that the majority of the liquids were mixtures of oils, solvents, and/or waste water. Maleic anhydride wash water sludge, neutralized pickle liquor sludge, sodium sulfide, desulfurization process sludge, maleic and fumaric acid wastes, and recovered liquids from maleic and fumaric acid spills were also known to have been deposited in the general area of the Waste Pit. In addition, the facility accepted general trash, municipal rubbish, and waste from villages and municipalities in the local area and elsewhere in Belmont County.

In 1980, the Waste Pit was backfilled with sludge, mine spoil and overburden soil, covered with soil and garbage, and seeded. Aerial photographs from that time indicate that some sludge was left in place along the slope of the Waste Pit. A low soil berm was created upgradient of the Waste Pit to route surface water flow around the area and to minimize erosion.

Solid industrial wastes (e.g., asbestos, carbon black, fly ash) were reportedly commingled with municipal wastes in the landfill. OEPA landfill inspection records also make references to unspecified industrial waste being disposed of in the southeastern portion of the landfill.

After the BRL site was listed on the National Priorities List on September 8, 1983, a PRP search was conducted, and a number of parties, including the landfill operator and several generators, were identified. An Administrative Order on Consent (AOC) to conduct remedial investigation and feasibility study (RI/FS) activities at the site was signed on October 31, 1985. Respondents to the RI/FS AOC were the landfill operator, Cravat Coal Company, and the following

generators: Ashland Chemical Company, Aristech Chemical Company, Beazer East, Triangle PWC, and SKF Industries. On June 26, 1986, the RI/FS AOC was modified to include Kittle Hauling, a transporter, as a Respondent. The RI report was completed in June 1990, and the FS report was completed in April 1991. An Administrative Order on Consent for remedial design (RD) (RD AOC) was signed by fourteen PRPs and USEPA on February 10, 1992. The RD for all activities except the leachate/groundwater collection and treatment system and groundwater monitoring plan was approved on May 21, 1997.

2.2 Contaminants of Concern

In the 1991 ROD, twelve contaminants detected in the Waste Pit, soils, leachate, ground water, and surface water were identified as indicator chemicals. These contaminants accounted for the majority of the health-based risk posed by the site. The inorganics identified as contaminants of concern were arsenic, beryllium, lead, cadmium, chromium, and nickel. Organic compounds that were identified as contaminants of concern were benzene; trichloroethene; carbon tetrachloride; 1,1-dichloroethene; carcinogenic polyaromatic hydrocarbons (PAHs); and toluene.

2.3 Remedy Selected in the 1991 Record of Decision

The remedy selected in the 1991 Record of Decision addressed principal threats posed by the site by treating contaminated surface and ground waters, eliminating exposure to contaminated surface soils, and providing for long-term operation and maintenance at the site. The major components of the selected remedy included:

- Solid waste landfill cap
- Institutional controls
- Fencing
- Ground water collection
- Surface leachate seep collection
- Ground water monitoring
- Surface leachate seep monitoring
- Monitoring of Kings Run
- Leachate/ground water treatment by constructed wetlands

The solid waste cap was to be constructed over all areas where landfilling activities occurred, as well as over areas which could act as recharge areas, allowing surface water to infiltrate into the landfill. The ground water and leachate collection and treatment system would serve to eliminate discharge of unacceptable levels of contaminants into Kings Run, and into Little McMahon Creek, the surface water body to which Kings Run discharges at a location approximately 1200 feet downstream.

3.0 DESCRIPTION OF AND BASIS FOR SIGNIFICANT DIFFERENCES

As part of the design activities conducted by the Respondents to the RD AOC, a number of pre-design studies were conducted. These included several hydrogeologic studies, a landfill cap study, a constructed wetlands study, borrow area studies, and a slope stability study. Modifications to the remedy being proposed in this ESD are based on the additional information obtained from these studies, a review of site history, and a review of state regulations. After pre-design studies were completed in 1995, the PRPs submitted a proposal, dated March 7, 1995, requesting several modifications to the remedy. The modifications that were agreed to by USEPA and OEPA and that are being documented via this ESD are described below.

The most significant difference between the revised remedy and the remedy described in the 1991 ROD relates to the landfill cap. The ROD called for a Subtitle D solid waste landfill cap to be constructed over the entire landfill area, the Waste Pit, and suspected recharge areas for the landfill area in compliance with Ohio solid waste regulations for closure of a solid waste landfill, as contained in Ohio Administrative Code (OAC) 3745-27-11, Final Closure of Sanitary Landfill Facilities. The area over which the Subtitle D cap was to be constructed was approximately 97 acres. A Subtitle D cap consists of a two-foot thick vegetated top layer, an intermediate layer for drainage at least one foot in thickness, and a low permeability layer with a minimum thickness of two feet. In the modified remedy, the Subtitle D cap will cover approximately 37 acres of landfill area in the northern part of the site. The cap in this portion of the site will be in compliance with Ohio solid waste regulations published on March 1, 1990 and effective April 1, 1990, and as amended on June 1, 1994.

An additional 24 acres of landfill area in the northern part of the site will be covered with topsoil at least nine inches in thickness. This area of the site was not used for landfilling; however, it serves as a minor source of recharge for the landfill area. The presence of topsoil and dense vegetation in the area will decrease the migration of surface water and precipitation into the subsurface in this part of the site. In addition, repairs to the existing cap, which covers approximately 29 acres of the BRL site, will be completed wherever necessary. Areas that will be repaired include depressions where ponded water could collect, erosion gullies, bare areas and areas with distressed vegetation, and leachate seeps. All cap areas will be seeded (if necessary) and will support vegetation, as called for in the 1991 ROD.

The basis for the modifications described above is OAC 3745-27-11(G)(3), (formerly OAC 3745-27-09(F)(3)(b)), which allows portions of solid waste landfills that ceased operations prior to April 1, 1990, to meet the capping requirements of the 1976 Ohio solid waste rules. The determination of those portions of the landfill that received solid waste prior to April 1, 1990, was made based on review of OEPA solid waste inspection reports for the BRL site and additional information provided by the PRPs. OEPA determined that this portion of the site was eligible for closure in accordance with the 1976 Ohio solid waste regulations without issuance of an ARAR waiver. (Note: The decrease in the total area of cover from 97 acres, based on what was called for in the ROD, to 90 acres in the modified remedy, is due to the change in the slope

of the cap, described below, along a portion of Kings Run.)

The additional modifications to the remedy described in the 1991 ROD are all based on design considerations and requirements that came to light during the course of the pre-design studies and/or preparation of the actual design documents. These additional modifications to the remedy include a modified slope for a portion of the cap along Kings Run, realignment and lining of Kings Run, elimination of the Northern Impoundment, deferral of the design and construction of a groundwater/leachate treatment system until after cap construction, and modification of the description of groundwater samples to be used in the determination of background levels for groundwater.

The modification to the remedy that will include the realignment and lining of Kings Run was the outcome of information gathered during supplemental pre-design hydrogeologic studies that were conducted. These studies demonstrated that a hydraulic interconnection between Kings Run and the landfill existed. Lining Kings Run will eliminate this hydraulic connection, reduce the potential for landfill contaminants to migrate into Kings Run and discharge to Little McMahon Creek, and reduce the amount of leachate being generated. The realignment of Kings Run was a modification that arose from the desire to minimize the volume of waste material that would have to be moved from along the western edge of the landfill and the volume of soil that would need to be moved along the east of the run. This modification prompted the change of the slope of the cap along a portion of the realigned run. Instead of the standard 25% slopes that will be constructed along the majority of the perimeter of the cap area, 33% slopes will be constructed for a portion of the landfill cap on the northeast side of the landfill along Kings Run. A slope stability analysis conducted by the PRPs and approved by USEPA showed that this modification in slope would not significantly decrease the stability of the cap in this location (see "Stability Evaluation of 3H:1V Maximum Solid Waste Cap Slopes" report, Baker and Associates, December 16, 1996).

This modified remedy will also include elimination of the Northern Impoundment. This means that the surface water impoundment will be backfilled and covered. Eliminating the impoundment will have the positive effect of removing a potential recharge source for groundwater and leachate and removing a source of surface water flow that could over time adversely impact the integrity of the lining placed beneath Kings Run. In addition, closing the impoundment will eliminate a potential physical hazard.

Deferral of the design and construction of a groundwater/leachate treatment system until after the cap is in place will be another part of the modified remedy. This modification was made due to the fact that placement of a cap can significantly alter the volume and quality of groundwater and leachate generated by a landfill. Because waste volume and quality are factors that are critical for sizing and designing a treatment system, these two parameters will be monitored for one year following cap completion. As called for in the original ROD, a groundwater/leachate collection system, consisting of a french drain beneath Kings Run, seep collection boxes, and transport pipes to transport collected leachate to the southern end of the site, will be installed during cap

construction.

After one year of monitoring groundwater/leachate volume and quality, additional collection system components, if determined to be necessary, will be designed and constructed. If treatment of groundwater and leachate is determined to be necessary by USEPA, the feasibility of using constructed wetlands as the treatment system will be evaluated. If constructed wetlands is a viable alternative, this type of system will be designed and constructed. If constructed wetlands is not a viable alternative, an appropriate treatment system approved by USEPA will be designed and constructed. As in the original remedy, an Operation and Maintenance Plan will be finalized and Operation and Maintenance will be initiated.

The last modification to the remedy is the description of ground water samples that will be used to establish "background" or upgradient ground water quality. Because the site and surrounding area have been extensively deep mined and used to dispose of mine refuse prior to being used for landfilling, it is difficult to differentiate between ground water impacted by mining material, by landfilling, or by a combination of the two. For the purposes of this site, upgradient groundwater quality will be established using one of the approved methods contained in OAC 3745-27-10 and will be based on samples of ground water impacted by coal mine refuse disposal at the site.

4.0 SUPPORT AGENCY COMMENTS

OEPA is in agreement with the modifications made by USEPA to the August 1991 ROD, as described in this ESD.

5.0 AFFIRMATION OF STATUTORY DETERMINATIONS

USEPA and OEPA believe that the modified remedy described in this ESD remains protective of human health and the environment, complies with federal and state requirements identified in the ROD as applicable or relevant and appropriate to this remedial action at the time the ROD was signed, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

6.0 PUBLIC PARTICIPATION ACTIVITIES

The Administrative Record, which includes this ESD, is available for public review and comment at the repositories listed in Section 1.0 of this ESD. Please direct written comments to:

Ginny Narsete, Community Involvement Coordinator
Office of Public Affairs (P-19J)
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, Illinois 60604

7.0 CONCURRENCE

Richard C Karl for

William E. Muno, Director
Superfund Division

7-17-97

Date

Appendix B

2003 ESD

EXPLANATION OF SIGNIFICANT DIFFERENCES

BUCKEYE RECLAMATION LANDFILL SITE
Belmont County
St.Clairsville, Ohio

I Introduction

The Buckeye Reclamation Landfill Site (Site) is located off County Road 214 approximately four miles southeast of St Clairsville, and 1 2 miles south of Interstate 70 in Sections 20 and 21 (Township 6 North, Range 3 West), Richland Township Belmont County Ohio Interstate 470 borders the northeast corner of the Site property and is located approximately 3,000 feet north of the landfill area Deep underground coal mining occurred beneath and adjacent to the Site until the early 1950s During that time, the Site was the disposal area for mine refuse From 1971 to 1991, the Site operated as a municipal waste landfill The landfill also accepted industrial sludges and liquids, primarily during the period from 1976 to 1980 The Site is situated in the Kings Run drainage ravine and is generally bordered by Kings Run to the east and an unnamed stream (Unnamed Run) to the west Surface water in Kings Run flows to the south and empties into Little McMahon Creek The landfill extends approximately 3 700 feet north to south and its width varies between approximately 500 and 1,000 feet The property on which the landfill is located occupies 658 acres Municipal landfilling activity occurred on approximately 64 acres of this area

The United States Environmental Protection Agency (U S EPA) is the lead agency for the Site Ohio Environmental Protection Agency (OEPA) is the support agency

U S EPA issued a Record of Decision (ROD) on August 19,1991, which described the remedy selection process and selected cleanup action for the Site The State of Ohio concurred with the selected remedy in the ROD

Pursuant to Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U S C §9617(c), U S EPA is issuing an explanation of the significant differences (ESD) from the remedy selected in the ROD that will now be incorporated into the final remedial action (RA) U S EPA has determined that it is appropriate to modify the ROD to include actions necessary to address leachate/groundwater treatment

If you need further information, you may contact Kenneth Glatz, Remedial Project Manager, U S EPA (SR-6J), 77 West Jackson Boulevard, Chicago, Illinois, 60604, (312) 886-1434, or via Internet at "glatz kenneth@epa gov"

II Site History

Deep underground coal mining occurred in the vicinity of the Site until the early 1950s During this time, mine refuse was removed from the mines and disposed of at the Site The relief of Kings Run Valley and the ridge to the west have been significantly altered from their original topography because of the mine refuse disposal activities and landfilling operations that took place at the Site over several decades Refuse placement dammed Kings Run, creating impoundments near the north edge middle and southern portion of the Site Subsequent landfilling operations resulted in the draining and filling of the middle and southern impoundments

In 1971, the area was licensed by the Belmont County Health Department for use as a municipal solid waste landfill The landfill was operated by Ohio Resources Corporation, under the name Buckeye Reclamation Company, until 1991

Records indicate that approximately 49,400 tons of municipal solid waste were disposed of at the Site annually The landfill also accepted industrial sludges and liquids Most of these wastes were received between 1976 and 1980 and deposited in or near the Waste Pit, which was an impoundment in the northern section of the landfill area Estimated total volumes of industrial wastes received are 4 7 million gallons of liquids and 3,300 tons of industrial solid wastes Transporter records show that the majority of the liquids were mixtures of oils, solvents, and/or waste water Maleic anhydride wash water sludge, neutralized pickle liquor sludge, sodium sulfide, desulfurization process sludge, maleic and fumaric acid wastes, and recovered liquids from maleic and fumaric acid spills were also known to have been deposited in the general area of the Waste Pit In addition, the facility accepted general trash, municipal rubbish, and waste from villages and municipalities in Belmont County

In 1980, the Waste Pit was backfilled with sludge, mine spoil and overburden soil, covered with soil and garbage, and seeded Aerial photographs from that time indicate that some sludge was left in place along the slope of the Waste Pit A soil berm was created upgradient of the Waste Pit to divert surface water and to minimize erosion

Solid industrial wastes (e g , asbestos, carbon black, fly ash) were reportedly commingled with municipal wastes in the landfill OEPA landfill inspection records also make references to unspecified industrial waste being disposed of in the southeastern portion of the landfill

After the Site was listed on the National Priorities List on September 8, 1983, a PRP search was conducted, and a number of parties, including the landfill operator and several generators, were identified. An Administrative Order on Consent (AOC) to conduct remedial investigation and feasibility study (RI/FS) activities at the Site was signed on October 31, 1985 The RI report was completed in June 1990, and the FS report was completed in April 1991 An Administrative Order on Consent (AOC) for remedial design (RD) was signed by fourteen PRPs and U S EPA on February 10,

1992 The RD for all activities except the leachate groundwater collection and treatment system and groundwater monitoring plan was approved on May 21 1997 A consent decree (CD) for all remaining activities was signed by thirteen PRPs in June and July 1997 signed by the U S EPA - August 1997 and entered by the Court on March 17 1998 U S EPA issued an ESD in July 1997

Contaminants of Concern

In the ROD, twelve contaminants detected in the Waste Pit, soils, leachate, ground water, and surface water were identified as indicator chemicals These contaminants accounted for the majority of the health-based risk posed by the Site The inorganics identified as contaminants of concern were arsenic beryllium, lead, cadmium, chromium, and nickel. Organic compounds that were identified as contaminants of concern were benzene; trichloroethene; carbon tetrachloride, 1 1-dichloroethene, carcinogenic polyaromatic hydrocarbons (PAHs), and toluene

Remedy Selected in the Record of Decision

The remedy selected in the ROD addressed principal risks posed by the Site by treating contaminated surface and ground waters, eliminating exposure to contaminated surface soils, and providing for long-term operation and maintenance at the Site

The ROD required the construction of a solid waste cap over all areas where landfilling activities occurred, as well as over areas which could act as leachate generation areas The ROD also required the treatment of leachate/ground water. This leachate collection and treatment system would serve to eliminate discharge of unacceptable levels of contaminants into Kings Run

III. Description of and Basis for Significant Difference

The ROD provided for the installation of a leachate and ground water collection system to intercept acid mine drainage (AMD), leachate and surface water from the landfill areas and channel it to the treatment system The 1997 Consent Decree and 1997 ESD provided for phasing of this work. Phase I activities (cap modification and construction) were completed in September of 2001. The ROD envisioned that the water treatment system (Phase II) would consist of a constructed wetland, proven effective at acid mine drainage reclamation projects in Ohio The interim discharge limits and a monitoring program for treated waters from the constructed wetlands are shown in sections A.1 and A.2 of the ROD (Attachment A).

The 1997 ESD included deferral of the design and construction of a groundwater/leachate treatment system until after the cap was constructed This modification was made in order to determine the volume and quality of groundwater, leachate and surface water generated by the landfill after the cap was in place Upon completion of cap construction, and consistent with the 1997 ESD, the Settling

Defendants completed four quarterly monitoring events for surface water and leachate flow and quality to evaluate (1) the effect of the newly installed repaired cap on leachate generation (2) the elimination of the Northern Impoundment on the quality and quantity of groundwater and leachate generated by the landfill (3) relocation and lining of Kings Run to determine the need for additional or modified groundwater/leachate collection mechanisms and/or groundwater/leachate treatment

Data obtained from these sampling events were to be summarized in the Phase II RD Work Plan, along with the Settling Defendants recommendations for groundwater/leachate collection and treatment needs The 1997 ESD specified that at the end of the quarterly monitoring additional collection system components would be designed and constructed if necessary

The results of the quarterly monitoring program were presented in the Southern Toe Sampling and Analysis Plan Report dated April 25 2003 The data showed only marginal exceedence of ROD section A 1 and A 2 criteria (for pH and Total Suspended Solids) The low pH values are directly related to AMD and would be considered as background in accordance with the 1997 ESD The new discharge criteria in this ESD include a "monitor only" criteria for Total Suspended Solids The U S EPA and OEPA agree that no treatment of these streams is currently required and agreed to make a number of changes to the remedy described in the ROD and 1997 ESD to accommodate these findings This ESD provides

1 That the flows from Kings Run channel and the landfill leachate collection system be combined for off Site discharge to Little McMahon Creek

2 That the Ohio criteria as modified by the Ohio Revised Code (ORC) Chapter 6111 Water Pollution Control Act, reflect the current OEPA risk and ecological information and these changes in general improve the quality of surface waters in the State of Ohio These new criteria will replace the ROD section A 1 and A 2 Final Effluent Limitations and Monitoring Requirements for the Buckeye Reclamation Landfill These criteria and procedures are shown in Attachment B

3 That the monitoring of the combined flow will be conducted monthly at location KR-2 (Figure 1) downgradient of the combined flows, for two years At the end of two years the data will be evaluated and the monitoring requirements reviewed If, during, or at the end of the two year monitoring period, it is indicated that the discharge standards of Attachment B are not being met, the provisions in the ROD, CD and SOW for surface water treatment will be considered

4 No additional groundwater/leachate collection mechanisms are required

No other conditions of the ROD, and 1997 ESD, are affected

IV Affirmation of Statutory determinations

This ESD does not fundamentally alter the overall approach intended by the remedy set out in the ROD and 1997 ESD U S EPA and OEPA believe that the modified remedy described in this ESD remains protective of human health and the environment complies with federal and state requirements identified in the ROD as applicable or relevant and appropriate to this remedial action at the time the ROD was signed and is cost-effective

V State Comment

The State of Ohio was consulted regarding these changes and has reviewed this ESD The state agrees that the modifications to the selected remedy are necessary and appropriate

VI Public Participation Activities

This ESD and corresponding documents will become part of the Site Administrative Record File pursuant to NCP 300 825(a)(2), and are available for public review at the following locations during normal business hours

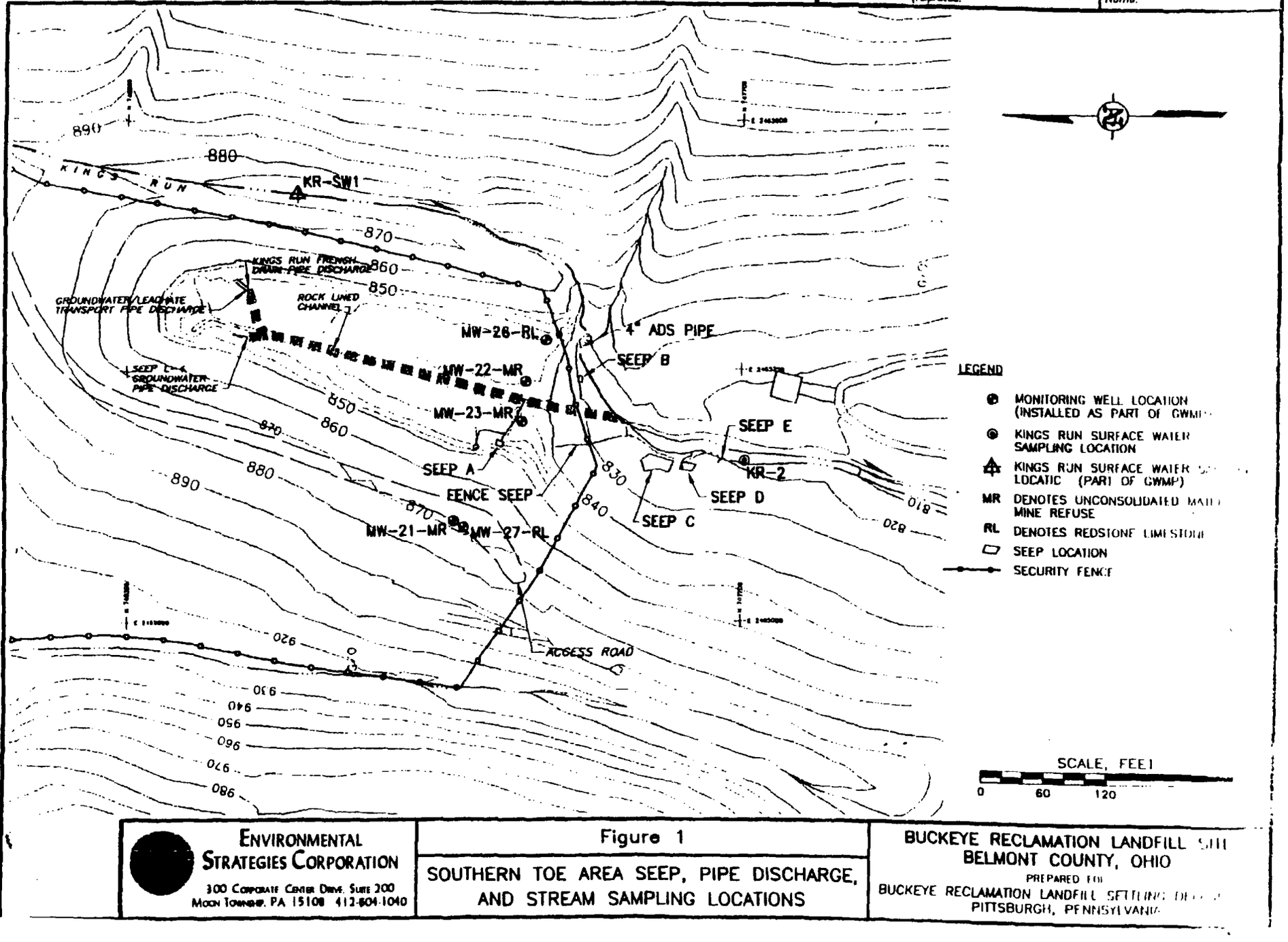
St Clairsville Public Library
108 W Main Street
St Clairsville, Ohio

U S Environmental Protection Agency
Region 5 Records Center- Seventh floor
77 W Jackson Blvd
Chicago, IL 60604

Neffs Branch
Martins Ferry Public Library
Pike Street
Neffs, Ohio

William E Muno, Director
Superfund Division
U S EPA Region V

8/15/03
Date



ENVIRONMENTAL STRATEGIES CORPORATION
300 Corporate Center Drive, Suite 200
Moon Township, PA 15108 412-604-1040

Figure 1

SOUTHERN TOE AREA SEEP, PIPE DISCHARGE, AND STREAM SAMPLING LOCATIONS

BUCKEYE RECLAMATION LANDFILL SITE
BELMONT COUNTY, OHIO
PREPARED FOR
BUCKEYE RECLAMATION LANDFILL SETTLING DEFENDANTS
PITTSBURGH, PENNSYLVANIA

ATTACHMENT A

ROD LIMITATIONS AND MONITORING
REQUIREMENTS FOR THE BUCKEYE RECLAMATION LANDFILL

In compliance with the provisions of the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et. seq.) and the Ohio Water Pollution Control Act (Ohio Revised Code Section 6111),

Buckeye Reclamation Landfill

is authorized by the Ohio Environmental Protection Agency, hereafter referred to as "Ohio EPA", to discharge from the treatment system located approximately 4 miles south of St. Clairsville, Ohio in Belmont County in accordance with the conditions specified below:

A.1. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR THE BUCKEYE RECLAMATION LANDFILL

Buckeye Reclamation Landfill (the entity) is authorized to discharge in accordance with the following limitations and monitoring requirements from the wastewater treatment works, beginning on the first day of authorized discharge and lasting until 44 months from the date the twelfth bioassay is completed (in accordance with the provisions contained in Paragraph C, below):

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS*				MONITORING REQUIREMENT	
		Concentration Other Units (Specify)		Loading kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
01002 UG/L	Arsenic, Total (As)	—	521	—	1.41	2/Week	Grab
01012 UG/L	Beryllium, Total	6.7	13480	0.018	36.38	2/Week	Grab
01027 UG/L	Cadmium, Total	14	57	0.038	0.15	2/Week	Grab
01034 UG/L	Chromium, Total	517	11,300	1.40	30.5	2/Week	Grab
01042 UG/L	Copper, Total	—	157	—	0.424	2/Week	Grab
34371 UG/L	Ethylbenzene	—	—	—	—	2/Week	Grab
39100 UG/L	Bis(2-ethylhexyl)phthalate	43	1,594	0.12	4.302	1/Month	Grab
01051 UG/L	Lead, Total	253	1,883	0.683	5.08	2/Week	Grab
71900 UG/L	Mercury, Total	0.04	1.6	0.0001	0.0043	2/Week	Grab
01067 UG/L	Nickel, Total	—	—	—	—	2/Week	Grab
01077 UG/L	Silver, Total	7.2	51	0.019	0.14	2/Week	Grab
01092 UG/L	Zinc, Total	—	764	—	2.06	2/Week	Grab
78396 UG/L	4-Methylphenol, Total	21	202	0.057	0.545	2/Week	Grab
00610 MG/L	Nitrogen, Ammonia (NH_3) Summer	6	—	16	—	2/Week	Grab
	Winter	—	—	—	—	2/Week	Grab
01097 UG/L	Antimony, Total	—	942	—	2.54	2/Week	Grab
00981 UG/L	Selenium	24	29	0.065	0.078	2/Week	Grab
22456 UG/L	PAHs***	1.8	—	0.0048	—	1/Month	Grab
78356 MG/L	2-Butanone	—	—	—	—	1/Month	Grab
34694 UG/L	Phenol	—	—	—	—	2/Week	Grab
61425 TUa	Acute Toxicity, Ceriodaphnia	—	—	—	—	See Paragraph C, Below	
61427 TUa	Acute Toxicity, Pimephales promelas	—	—	—	—	See Paragraph C, Below	

(CONTINUED)

A.1. FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR THE BUCKEYE RECLAMATION LANDFILL (Continued)

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS*				MONITORING REQUIREMENT	
		Concentration Other Units (Specify)		Loading kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
50050 MGD	Flow Rate	—	—	—	—	Daily	24 Hr. Tota
00550 MG/L	Oil and Grease, Total	15	20	—	—	1/Month	Grab
00530 MG/L	Residue, Total Nonfilterable	30	45	—	—	1/Month	Grab
00310 MG/L	Biochemical Oxygen Demand, 5 day					1/Month	Grab
00680 MG/L	Total Organic Carbon	—	—	—	—	1/Month	Grab
00335 MG/L	Chemical Oxygen Demand	—	—	—	—	1/Month	Grab
99997	Carcinogen Additivity Factor**	—	1(max)	—	—	1/Month	Calculated

* Effluent limitations have been established using a flow value of 0.713 MGD.

** The 30-day average reported values obtained in the monthly sampling period for the following parameters shall be used in the carcinogenic additivity factor evaluation:

Parameter	Average Reported Value (ug/l)
Beryllium	A
Bis(2-ethylhexyl)phthalate	B

The carcinogen additivity factor shall be calculated using the following equation:

$$\frac{A}{6.7 \text{ ug/l}} + \frac{B}{344 \text{ ug/l}}$$

*** The polycyclic aromatic hydrocarbon (PAH) criteria apply t the sum of anthracene, benzo(a)anthracene, benzo(k)flouranthene, 3,4-benzofluoranthene, benzo(b)flouranthene), benzo (g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, flourene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene.

B.1. The pH (Reporting Code 00400) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored 2/Week by grab sample.

A.2 FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR THE BUCKEYE RECLAMATION LANDFILL

Buckeye Reclamation Landfill is authorized to discharge in accordance with the following limitations and monitoring requirements from the wastewater treatment works, beginning 44 months from the date the twelfth monthly bioassay is completed (in accordance with the provisions contained in Paragraph C below) and lasting until the treatment works are no longer in service and there is no discharge from the facility or until these requirements are modified:

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS*				MONITORING REQUIREMENT	
		Concentration Other Units (Specify)		Loading kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
01002 UG/L	Arsenic, Total (As)	—	521	—	1.41	2/Week	Grab
01012 UG/L	Beryllium, Total	6.7	13480	0.018	36.38	2/Week	Grab
01027 UG/L	Cadmium, Total	14	57	0.038	0.15	2/Week	Grab
01034 UG/L	Chromium, Total	517	11,300	1.40	30.5	2/Week	Grab
01042 UG/L	Copper, Total	—	157	—	0.424	2/Week	Grab
34371 UG/L	Ethylbenzene	—	—	—	—	2/Week	Grab
39100 UG/L	Bis(2-ethylhexyl)phthalate	43	1,594	0.12	4.302	1/Month	Grab
01051 UG/L	Lead, Total	253	1,883	0.683	5.08	2/Week	Grab
71900 UG/L	Mercury, Total	0.04	1.6	0.0001	0.0043	2/Week	Grab
01067 UG/L	Nickel, Total	—	—	—	—	2/Week	Grab
01077 UG/L	Silver, Total	7.2	51	0.019	0.14	2/Week	Grab
01092 UG/L	Zinc, Total	—	764	—	2.06	2/Week	Grab
78396 UG/L	4-Methylphenol, Total	21	202	0.057	0.545	2/Week	Grab
00610 MG/L	Nitrogen, Ammonia (NH_3) Summer	6	—	16	—	2/Week	Grab
	Winter	—	—	—	—	2/Week	Grab
01097 UG/L	Antimony, Total	—	942	—	2.54	2/Week	Grab
00981 UG/L	Selenium	24	29	0.065	0.078	2/Week	Grab
22456 UG/L	PAHs***	1.8	—	0.0048	—	1/Month	Grab

(CONTINUED)

RECLAMATION LANDFILL (Continued)

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS*				MONITORING REQUIREMENT	
		Concentration Other Units (Specify)		Loading kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
78356	2-Butanone	—	—	—	—	1/Month	Grab
34694 UG/L	Phenol	—	—	—	—	2/Week	Grab
61425 TUa	Acute Toxicity, Ceriodaphnia	—	1.5	—	—	See Paragraph C, Below	
61427 TUa	Acute Toxicity, Pimephales promelas	—	1.5	—	—	See Paragraph C, Below	
50050 MGD	Flow Rate	—	—	—	—	Daily	24 Hr. Total
00550 MG/L	Oil and Grease, Total	15	20	—	—	1/Month	Grab
00530 MG/L	Residue, Total Nonfilterable	30	45	—	—	1/Month	Grab
00310 MG/L	Biochemical Oxygen Demand, 5 day					1/Month	Grab
00680 MG/L	Total Organic Carbon	—	—	—	—	1/Month	Grab
00335 MG/L	Chemical Oxygen Demand	—	—	—	—	1/Month	Grab
99997	Carcinogen Additivity Factor**	—	1(max)	—	—	1/Month	Calculated

* Effluent limitations have been established using a flow value of 0.713 MGD.

** The 30-day average reported values obtained in the monthly sampling period for the following parameters shall be used in the carcinogenic additivity factor evaluation:

Parameter	Average Reported Value (ug/l)
Beryllium	A
Bis(2-ethylhexyl)phthalate	B

The carcinogen additivity factor shall be calculated using the following equation:

$$\frac{A}{6.7 \text{ ug/l}} + \frac{B}{344 \text{ ug/l}}$$

*** The polycyclic aromatic hydrocarbon (PAH) criteria apply to the sum of anthracene, benzo(a)anthracene, benzo(k)flouranthene, 3,4-benzofluoranthene, benzo(b)flouranthene), benzo (g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, flourene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene.

B.2. The pH (Reporting Code 00400) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored 2/Week by grab sample.

C. Biomonitoring requirements for Buckeye Reclamation Landfill

As soon as possible, but not later than three months after treatment has been installed to meet final chemical-specific limits, the entity shall initiate an effluent biomonitoring program to determine the toxicity of effluent from Buckeye Reclamation Landfill.

Testing Requirements:

1. Acute Bioassays:

The entity shall conduct monthly 48-hour acute bioassays using Ceriodaphnia and 96-hour acute bioassays using the fathead minnow (Pimephales promelas) for a period of one year. If discharges are intermittent and do not occur on a monthly basis, then 12 acute bioassays shall be completed with no more than 1 bioassay occurring per every four weeks or calendar month. The tests shall be conducted using 24-hour composite samples of final effluent from outfall 001. In addition, an instream grab sample will be tested to determine near field toxicity. See item 4 under testing protocol for specifics on sampling locales.

2. Chemical Analysis:

A sufficient volume of effluent shall be collected to allow for chemical analysis. Bioassay effluent sampling may be coordinated with other sampling requirements as appropriate to avoid duplication. The analyses detailed in the *Final Effluent Limitations and Monitoring Requirements* tables should be conducted for the effluent sample. In addition, alkalinity and hardness (as CaCO3) should also be measured. Chemical analysis must comply with Ohio EPA accepted procedures.

Testing Protocol:

1. The test shall be conducted using procedures contained in the Ohio EPA Quality Assurance Manual (or current revisions). Any request to use a different methodology must be approved by the OEPA prior to the initiation of testing.

2. The entity shall determine a median lethal concentration (LC50) and/or median effective concentration (EC50) for acute effects.

3. A minimum of 5 effluent concentrations (e.g., 100, 56, 32, 18, and 10 percent by volume effluent) shall be used in each effluent bioassay. Dilution and control water shall be collected as a grab sample at Station 801 (a site upstream from the outfall outside the zone of effluent and receiving water interaction). Reconstituted water, rearing unit water (water in which the test organisms were reared) or other high quality water shall be used as a second control water. If the primary control and dilution water from Station 801 is demonstrated to contain unacceptable toxicity in a test, then the secondary control shall be used as the diluent in succeeding tests until water from Station 801 is shown to be acceptable for use as a diluent in three successive bioassays where it has been tested at full-strength (i.e., no dilutions). An acute test shall be repeated if mortality, or combination of mortality plus other adverse effects, exceeds ten percent of one of the species of test organisms in both control waters (primary and secondary).

4. Testing of ambient water shall be conducted as follows. In conjunction with the acute tests of the effluent, an instream grab sample shall be collected at Station 901 (a point located within the effluent plume 3 meters (10 feet) downstream from outfall 001). The location of the effluent plume should be confirmed at the time of sampling using temperature measurements, conductivity measurements or a dye study. Bioassays of these instream samples will determine if near field toxicity is occurring.

ATTACHMENT B

EFFLUENT LIMITS AND MONITORING REQUIREMENTS FOR BUCKEYE RECLAMATION LANDFILL AUTHORIZED DISCHARGES

Limits and Monitoring Requirements for Buckeye Reclamation Landfill Authorized Discharges

Parameter	Units	Sample Limits				Basis[b]
		Concentration		Loading (kg/day)[a]		
		30 Day Average	Daily Maximum	30 Day Average	Daily Maximum	
Flow	MGD	Monitor				M
Temperature	°C	Monitor				M
Dissolved Oxygen	mg/l	3.0	2.0 (min.)	--	--	WQS
TOC	mg/l	Monitor				M
COD	mg/l	Monitor				M
$CBOD_5$	mg/l	10	15	--	--	BPJ
Suspended Solids	mg/l	Monitor				M
Ammonia-N	mg/l					
Summer		--	13.0	--	--	WQS
Winter		--	9.9	--	--	WQS
Oil & Grease	mg/l	--	10	--	--	WQS
pH	S.U.	6.5 to 9.0				WQS
Arsenic, T. R.	µg/l	100	340	--	--	WQS
Barium, T. R.	µg/l	Monitor				M
Cadmium, T. R.	µg/l	-	22	--	--	WQS
Copper, T. R.	µg/l	-	52	--	--	WQS
Lead, T. R.	µg/l	100	710	--	--	WQS
Mercury, T.	ng/l	12	1700	--	--	WQS
Nickel, T. R.	µg/l	200	1500	--	--	WQS
Selenium, T. R.	µg/l	Monitor				M
Zinc, T. R.	µg/l	-	390	--	--	WQS
Benzene	µg/l	Monitor				M
Toluene	µg/l	Monitor				M
1,1-Dichloroethylene	µg/l	Monitor				
Trichloroethylene	µg/l	Monitor				M
4-Methylphenol	µg/l	255	744	--	--	ABS/AD
Bis(2-ethylhexyl)						
phthalate	µg/l	59	1100	--	--	WQS
Fluoranthene	µg/l	Monitor				M
Polycyclic Aromatic						
Hydrocarbons	µg/l	Monitor				M
Whole Effluent Toxicity						
Acute	TUa	-	1.0	--	--	WQS

[a] Effluent loadings based on average design discharge flow of NA MGD.

[b] Definitions: ABS = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); AD = Antidegradation (OAC 3745-1-05); BPJ = Best Professional Judgment; M = Monitoring; RP = Reasonable Potential for requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A)); WLA = Wasteload Allocation procedures (OAC 3745-2); WLA/IMZM = Wasteload Allocation

limited by Inside Mixing Zone Maximum. WQS = Ohio Water Quality Standards (OAC 3745-1)

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality

[d] Whole Effluent Toxicity The KR-2 waters should meet WQS (no statistical difference from control water), however, 1.0 TUa is the most stringent limit that can be imposed in a discharge authorization by Ohio EPA See General Condition Part (11) for biomonitoring requirements See Item 11

[e] Monitoring Frequency for all parameters is monthly, except Whole Effluent Toxicity (see note d above) shall be semi-annually, and Fluoranthene and PAH shall be monitored Quarterly Sample type is grab for all parameters except flow which is estimated

[f] The location of this sampling station KR-2, is approximately 150 feet downstream of the southern fence line It is shown on the attached map

[g] T R = Total Recoverable, T = Total

[h] Monitoring Summer - monitoring months are May 1 through October 31. Winter - monitoring months are November 1 through April 30 If monitoring is quarterly, then monitoring shall occur during the months of March, June, August and December

Polycyclic aromatic hydrocarbons (PAHs) to be analyzed include anthracene, benzo(a)anthracene, benzo(k)fluoranthene, 3,4-benzofluoranthene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, fluorene, indeno(1,2,3-c,d)pyrene, naphthalene, phenanthrene and pyrene

GENERAL CONDITIONS

1. Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored flow. Test procedures for the analysis of pollutants shall conform to regulation 40 CFR 136, "Test Procedures For the Analysis of Pollutants" or other U.S. EPA approved methods unless otherwise specified in this authorization. The entity shall periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

2. Definitions

   "Daily load limitations" is the total discharge by weight during any calendar day. If only one sample is taken during a day, the weight of pollutant discharge calculated from it is the daily load.

   "Daily concentration limitation" means the arithmetic average (weighted by flow) of all the determinations of concentration made during the day. If only one sample is taken during the day, its concentration is the daily concentration.

   "30-day load limitation" is the total discharge by weight during any 30-day period divided by the number of days in the 30-day period that the facility was in operation. If only one sample is taken in a 30-day period, the weight of pollutant discharge calculated from it is the 30-day load. If more than one sample is taken during one 30-day period, the 30-day load is calculated by determining the daily load for each day sampled, totaling the daily loads for the 30-day period and dividing by the number of days sampled.

   "30-day concentration limit" means the arithmetic average (weighted by flow) of all the determinations of daily concentration made during the 30-day period. If only one sample is taken during the 30-day period, its concentration is the 30-day concentration for that 30-day period.

   "MGD" means million gallons per day.

   "mg/l" means milligrams per liter.

   "ug/l" means micrograms per liter.

   "ng/l" means nanograms per liter.

3. Recording of Results

   For each measurement or sample taken pursuant to the requirements of this authorization, the entity shall record the following information:

a The exact time and date of sampling; (time of sampling not required on EPA 4500).
b. The person(s) who performed the sampling or measurements;
c The date the analyses were performed on those samples;
d. The person(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of all analyses and measurements.

4 Non-Compliance Notification

a. Effluent Limitations:

If the entity is unable to meet any effluent limitations specified herein, the entity shall submit a written report to the Ohio EPA Southeast District Office within five days of becoming aware of the conditions. The report shall contain the following:

1) The limitation(s) which has been violated;
2) The extent of the violation(s);
3) The cause of the violation(s),
4) The period of the violation(s) including dates and times;
5) If uncorrected, the anticipated time the violation(s) is expected to continue; and
6) Steps being taken to reduce, eliminate, and/or prevent recurrence of the violation(s).

5. Adverse Impact

In the event of either an unauthorized discharge or a violation of effluent limitations, the entity shall take all reasonable steps to minimize or correct any adverse impact on the environment This may include accelerated or additional monitoring to determine the extent of the impact of unauthorized discharge or the violation of limitations. If such additional monitoring is performed, the data collected shall be included in a written report submitted to the Ohio EPA Southeast District Office.

6. Authorized Discharges

All discharges authorized herein shall be consistent with the terms and conditions of this authorization The discharge of any pollutant identified in this authorization more frequently than, or at a level in excess of, that authorized in the table, "Limits and Monitoring Requirements for Buckeye Reclamation Landfill Authorized Discharges" shall constitute a violation of the terms and conditions contained herein.

7. Discharge Changes

The following changes must be reported to the appropriate Ohio EPA district office as soon as practicable

a Any significant change in character of the discharge which the entity knows or has reason to believe has occurred or will occur which would constitute cause for modification or revocation and re-issuance The entity shall give advance notice to the Director of any planned changes in the authorized facility or activity which may result in noncompliance with authorization requirements Notification of authorization changes or anticipated noncompliance does not stay any authorization condition

b For non-publicly owned treatment works, any proposed facility expansions, production increases, or process modifications, which will result in new, different, or increased discharges of pollutants

8 Oil and Hazardous Substance Liability

Nothing in this authorization shall be construed to preclude the institution of any legal action nor relieve the entity from any responsibilities, liabilities, or penalties to which the entity is or may be subject under Section 311 of the Act

9 State Laws and Regulations

Nothing in this authorization shall be construed to preclude the institution of any legal action nor relieve the entity from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act

10 Records Retention

The entity shall retain all of the following records for a minimum of three years

a All sampling and analytical records (including internal sampling data not reported),
b All original recording for any continuous monitoring instrumentation,
c All instrumentation, calibration, and maintenance records,
d All treatment works operation and maintenance records; and
e All reports required by this authorization

These periods will be extended during the course of any unresolved litigation, or when requested by the Regional Administrator or the Ohio EPA The three-year period for retention of records shall start from the date of sample measurement, report, or application

11 Biomonitoring Program Requirements

As soon as possible, but not later than three months after the effective date of this authorization, the entity shall initiate an effluent biomonitoring program to evaluate compliance with the whole effluent toxicity limits of 1.0 TUA contained in the table

General Requirements

All toxicity testing conducted as required by this permit shall be done in accordance with Reporting and Testing Guidance for Biomonitoring Required by the Ohio Environmental Protection Agency (hereinafter, the "biomonitoring guidance"), Ohio EPA, July 1991 (or current revision). The Standard Operating Procedures (SOP) or verification of SOP submittal, as described in Section 1.B. of the biomonitoring guidance, shall be submitted no later than three months after the effective date of this authorization If the laboratory performing the testing has modified its protocols, a new SOP is required

Testing Requirements

a Acute Bioassays

The permittee shall conduct semi-annual definitive acute toxicity tests using Ceriodaphnia dubia and fathead minnows (Pimephales promelas) on samples taken in King's Run at location KR-2. These tests shall be conducted as specified in Section 2 of the biomonitoring guidance. This biomonitoring program shall be re-evaluated after two (2) years of data have been collected

b. Data Review

1) Reporting

Following completion of each semi-annual bioassay requirement, the permittee shall report results of the tests in accordance with Sections 2.H.1., and 2.H.2.a. of the biomonitoring guidance. Based on Ohio EPA's evaluation of the results, this authorization may be modified to require additional biomonitoring, require a toxicity reduction evaluation, and/or contain whole effluent toxicity limits

2) Definitions

$$TU_a = \text{Acute Toxicity Units} = \frac{100}{LC50}$$

3) The purpose of toxicity monitoring is to determine whether KR-2 exhibits toxicity that is statistically greater than control waters, according to the methods listed above. There is no allocation for toxicity at this sampling location, however, 1.0 TUa is the most stringent limit that can be imposed in any discharge authorization by Ohio EPA. If the toxicity at KR-2 is regularly greater than control waters, this authorization may be modified as indicated in B.1. above.

12. Mercury testing shall follow Standard Method 1631.

13. Sample measurements for flow, temperature, dissolved oxygen and pH shall be field measurements.

5210 A Introduction

1 General Discussion

The biochemical oxygen demand (BOD) determination is an empirical test in which standardized laboratory procedures are used to determine the relative oxygen requirements of wastewaters, effluents, and polluted waters. The test has its widest application in measuring waste loadings to treatment plants and in evaluating the BOD-removal efficiency of such treatment systems. The test measures the molecular oxygen utilized during a specified incubation period for the biochemical degradation of organic material (carbonaceous demand) and the oxygen used to oxidize inorganic material such as sulfides and ferrous iron. It also may measure the amount of oxygen used to oxidize reduced forms of nitrogen (nitrogenous demand) unless their oxidation is prevented by an inhibitor. The seeding and dilution procedures provide an estimate of the BOD at pH 6.5 to 7.5.

Measurements of oxygen consumed in a 5-d test period (5-d BOD or BOD_5, 5210B), oxygen consumed after 60 to 90 d of incubation (ultimate BOD or UBOD, 5210C), and continuous oxygen uptake (respirometric method, 5210D) are described here. Many other variations of oxygen demand measurements exist, including using shorter and longer incubation periods and tests to determine rates of oxygen uptake. Alternative seeding, dilution, and incubation conditions can be chosen to mimic receiving-water conditions, thereby providing an estimate of the environmental effects of wastewaters and effluents.

The UBOD measures the oxygen required for the total degradation of organic material (ultimate carbonaceous demand) and/or the oxygen to oxidize reduced nitrogen compounds (ultimate nitrogenous demand). UBOD values and appropriate kinetic descriptions are needed in water quality modeling studies such as UBOD : BOD_5 ratios for relating stream assimilative capacity to regulatory requirements, definition of river, estuary, or lake deoxygenation kinetics, and instream ultimate carbonaceous BOD (UCBOD) values for model calibration.

2 Carbonaceous Versus Nitrogenous BOD

A number of factors, for example, soluble versus particulate organics, settleable and floatable solids, oxidation of reduced iron and sulfur compounds, or lack of mixing may affect the accuracy and precision of BOD measurements. Presently, there is no way to include adjustments or corrections to account for the effect of these factors.

Oxidation of reduced forms of nitrogen, such as ammonia and organic nitrogen, can be mediated by microorganisms and exert nitrogenous demand. Nitrogenous demand historically has been considered an interference in the determination of BOD, as clearly evidenced by the inclusion of ammonia in the dilution water. The interference from nitrogenous demand can now be prevented by an inhibitory chemical.[1] If an inhibiting chemical is not used, the oxygen demand measured is the sum of carbonaceous and nitrogenous demands.

Measurements that include nitrogenous demand generally are not useful for assessing the oxygen demand associated with organic material. Nitrogenous demand can be estimated directly from ammonia nitrogen (Section 4500-NH_3) and carbonaceous demand can be estimated by subtracting the theoretical equivalent of the reduced nitrogen oxidation from uninhibited test results. However, this method is cumbersome and is subject to considerable error. Chemical inhibition of nitrogenous demand provides a more direct and more reliable measure of carbonaceous demand.

The extent of oxidation of nitrogenous compounds during the 5-d incubation period depends on the concentration and type of microorganisms capable of carrying out this oxidation. Such organisms usually are not present in raw or settled primary sewage in sufficient numbers to oxidize sufficient quantities of reduced nitrogen forms in the 5-d BOD test. Many biological treatment plant effluents contain sufficient numbers of nitrifying organisms to cause nitrification in BOD tests. Because oxidation of nitrogenous compounds can occur in such samples, inhibition of nitrification as directed in 5210B.4e6) is recommended for samples of secondary effluent, for samples seeded with secondary effluent, and for samples of polluted waters.

Report results as carbonaceous biochemical oxygen demand ($CBOD_5$) when inhibiting the nitrogenous oxygen demand. When nitrification is not inhibited, report results as BOD_5.

3 Dilution Requirements

The BOD concentration in most wastewaters exceeds the concentration of dissolved oxygen (DO) available in an air-saturated sample. Therefore, it is necessary to dilute the sample before incubation to bring the oxygen demand and supply into appropriate balance. Because bacterial growth requires nutrients such as nitrogen, phosphorus, and trace metals, these are added to the dilution water, which is buffered to ensure that the pH of the incubated sample remains in a range suitable for bacterial growth. Complete stabilization of a sample may require a period of incubation too long for practical purposes; therefore, 5 d has been accepted as the standard incubation period.

If the dilution water is of poor quality, the BOD of the dilution water will appear as sample BOD. This effect will be amplified by the dilution factor. A positive bias will result. The methods included below (5210B and 5210C) contain both a dilution-water check and a dilution-water blank. Seeded dilution waters are checked further for acceptable quality by measuring their consumption of oxygen from a known organic mixture, usually glucose and glutamic acid.

The source of dilution water is not restricted and may be distilled, tap, or receiving-stream water free of biodegradable organics and bioinhibitory substances such as chlorine or heavy metals. Distilled water may contain ammonia or volatile organics, deionized waters often are contaminated with soluble organics leached from the resin bed. Use of copper-lined stills or copper fittings attached to distilled water lines may produce water containing excessive amounts of copper (see Section 3500-Cu).

---

* Approved by Standard Methods Committee A B C 1992 D 1994

Appendix C
PUBLIC NOTICE

school buildings on Nov. 6.

High school and middle school will dismiss at 12:30 p.m., and the elementary school at 1:10 p.m. for parent pick-up and 1:15 for buses.

This is
Driver Safe
Ohio Dep
Safety is
empower
to discove
leading
among our

EPA to Review Buckeye Reclamation Superfund site

St. Clairsville, Ohio

U. S. Environmental Protection Agency is conducting a status review of the Buckeye Reclamation Superfund site. The first review was conducted in 2004. The Superfund law requires regular reviews of sites (at least every five years) where cleanup is complete, but hazardous waste remains managed on-site. These reviews are done to ensure the cleanup continues to protect human health and the environment. Buckeye Reclamation cleanup plan included a solid waste landfill cap over all areas where landfilling activities occurred, relocation and lining of Kings Run, and elimination of the Northern Impoundment. Site inspections, groundwater and gas monitoring ensures the effectiveness of the clean up plan. Kings Run surface water monitoring results will be evaluated as a part of this review. Buckeye Reclamation status review is scheduled to be completed in May 2009.

The site information repositories are located at:

St. Clairsville Public Library
108 W. Main St.

Neffs Branch
Martins Ferry Public Library

Public comment is encouraged. All written comments should be postmarked not later than December 1, 2008. Additional site information can be requested from the team members listed below.

Colleen T. Moynihan
Remedial Project Manager
EPA Region 5 (SR-6J)
77 W. Jackson Blvd.
Chicago, IL 60604
312-353-8196
moynihan.colleen@epa.gov

Robert Paulson
Community Involvement Coordinator
EPA Region 5 (P-19J)
77 W. Jackson Blvd.
Chicago, IL 60604
312-886-0272
paulson.robert@epa.gov

Toll-free 800-621-8431, 9:30 a.m. to 5:30 p.m., weekdays

The Times Leader
Oct. 23. 2008

Appendix D

SITE INSPECTION CHECKLIST

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Buckeye Reclamation Landfill	**Date of inspection: October 15th, 2008**
Location and Region: Ohio, Region V	**EPA ID: OHD980509657**
Agency, office, or company leading the five-year review: U.S. EPA Region V	**Weather/temperature:** Partly Cloudy, Upper 60s

Remedy Includes: (Check all that apply)

- ☑ Landfill cover/containment
- ☑ Access controls
- ☑ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☑ Other: Passive gas collection system with annual explosive gas monitoring.
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☑ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Fred Taylor, CRA (Name) Associate (Title) 10/15/2008 (Date)
   Interviewed ☑ at site ☐ at office ☐ by phone Phone no. (519) 884-0510
   Problems, suggestions; ☑ Report attached: See comments inside; erosion control

2. **O&M staff** Rich Hill (Name) Environmental Technician (Title) 10/15/2008 (Date)
   Interviewed ☑ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☑ Report attached: Rich Hill works for CRA and collects surface water, ambient air and groundwater samples.

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Ohio EPA
Contact Kris Vanecko Site Coordinator 10/15/2008 (740) 380-5271
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency Ohio EPA
Contact Jane Jacobs Hydrologist 10/15/2008 (740) 380-5235
Name Title Date Phone no.
Problems; suggestions; ☑Report attached See comments on groundwater monitoring

Agency _____
Contact _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

Agency _____
Contact _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _____

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☑ O&M manual — ☑ Readily available — ☐ Up to date — ☐ N/A
   - ☐ As-built drawings — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☑ Maintenance logs — ☑ Readily available — ☐ Up to date — ☐ N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** — ☐ Readily available — ☑ Up to date — ☐ N/A
   - ☑ Contingency plan/emergency response plan — ☐ Readily available — ☑ Up to date — ☐ N/A

   Remarks _____

3. **O&M and OSHA Training Records** — ☐ Readily available — ☑ Up to date — ☐ N/A

   Remarks _____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Effluent discharge — ☐ Readily available — ☑ Up to date — ☐ N/A
   - ☐ Waste disposal, POTW — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Other permits _____ — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks _____

5. **Gas Generation Records** — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks _____

6. **Settlement Monument Records** — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks _____

7. **Groundwater Monitoring Records** — ☐ Readily available — ☑ Up to date — ☐ N/A

   Remarks _____

8. **Leachate Extraction Records** — ☐ Readily available — ☑ Up to date — ☐ N/A

   Remarks _____

9. **Discharge Compliance Records**
   - ☐ Air — ☐ Readily available — ☐ Up to date — ☑ N/A
   - ☐ Water (effluent) — ☐ Readily available — ☐ Up to date — ☑ N/A

   Remarks _____

10. **Daily Access/Security Logs** — ☐ Readily available — ☐ Up to date — ☑ N/A

    Remarks: Apex Environmental, transfer station, is located at the entrance (north) of the landfill. Truck traffic is pretty consistent during the day and a guard is stationed at the entrance.

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☑ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date
☑ Funding mechanism/agreement in place
Original O&M cost estimate $100,00-$125,000 yearly base cost ☐ Breakdown attached

Total annual cost by year for review period if available

From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost
From _____ To _____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: Unanticipated O & M costs incurred to repair slide/slump along the northeast portion of the landfill that blocked the access road.

V. ACCESS AND INSTITUTIONAL CONTROLS ☑ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☑ Gates secured ☐ N/A

Remarks: The 6ft chain link fence with three top strand barb-wires is in good condition.

B. Other Access Restrictions

1. **Signs and other security measures** ☑ Location shown on site map ☐ N/A

Remarks: Signs every 200ft are in good condition.

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☑ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☑ No ☐ N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Monitored by PRP contractor

Frequency Quarterly post-closure inspections or as needed

Responsible party/agency PRP Group, CONESTOGA- ROVERS & Associates (CRA)

Contact Fred Taylor Associate 10/15/2008 (519) 884-0510

Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☑ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☑ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☑ N/A

Violations have been reported ☐ Yes ☐ No ☑ N/A

Other problems or suggestions: ☐ Report attached

Institutional Control(s) investigation/study to be prepared by CRA to address the ICs on-site that prohibit interference with the cap, residential use, and future development and or interference with groundwater monitoring system.

2. **Adequacy** ☐ ICs are adequate ☐ ICs are inadequate ☑ N/A

Remarks: IC investigation/study report in progress.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☑ No vandalism evident

Remarks: Rich Hill, environmental technician, observed high number of trespassers on-site near the southern toe of the landfill during hunting season.

2. **Land use changes on site** ☑ N/A

Remarks

3. **Land use changes off site** ☑ N/A

Remarks

VI. GENERAL SITE CONDITIONS

A. Roads ☑ Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map ☑ Roads adequate ☐ N/A

Remarks: Gravel road is in good condition.

B. Other Site Conditions

Remarks: Slump/landslip in 2007 restricted access to the site until debris was removed.

VII. LANDFILL COVERS ☑ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☑ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** ☐ Location shown on site map ☑ Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☑ Erosion not evident
   Areal extent_____ Depth_____
   Remarks: Minor rills_____

4. **Holes** ☐ Location shown on site map ☑ Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** ☑Grass ☑ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☑ N/A
   Remarks_____

7. **Bulges** ☐ Location shown on site map ☑ Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☑ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks: Discharge pipes blocked at southern toe of landfill see picture.

9. **Slope Instability** ☐ Slides ☐ Location shown on site map ☑ No evidence of slope instability
Areal extent_____
Remarks: _____

B. Benches ☐ Applicable ☑N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** ☐ Location shown on site map ☑N/A or okay
Remarks_____

2. **Bench Breached** ☐ Location shown on site map ☑N/A or okay
Remarks_____

3. **Bench Overtopped** ☐ Location shown on site map ☑N/A or okay
Remarks_____

C. Letdown Channels ☐ Applicable ☑N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** ☐ Location shown on site map ☑ No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** ☐ Location shown on site map ☑ No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** ☐ Location shown on site map ☑ No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** ☐ Location shown on site map ☑ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ ☑ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
☑ No evidence of excessive growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations ☑ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☑ Passive
☐ Properly secured/locked ☐ Functioning ☑ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☑ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks: Ambient air sampled on-site and soil gas monitoring off-site

3. **Monitoring Wells** (within surface area of landfill)
☑ Properly secured/locked ☑ Functioning ☑ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☑ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks: Man holes.

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☑ N/A
Remarks_____

E. Gas Collection and Treatment ☐ Applicable ☑ N/A

1. **Gas Treatment Facilities**
   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   ☐ Good condition ☐ Needs Maintenance ☑ N/A
   Remarks_____

F. Cover Drainage Layer ☑ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☑ Functioning ☐ N/A
   Remarks: Collection of sediment clogs the discharge pipe to be repaired by environmental technician

2. **Outlet Rock Inspected** ☑ Functioning ☐ N/A
   Remarks_____

G. Detention/Sedimentation Ponds ☐ Applicable ☑ N/A

1. **Siltation** Areal extent_____ Depth_____ ☑ N/A
   ☐ Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____ ☑ N/A
   ☐ Erosion not evident
   Remarks_____

3. **Outlet Works** ☐ Functioning ☑ N/A
   Remarks_____

4. **Dam** ☐ Functioning ☑ N/A
   Remarks_____

H. Retaining Walls ☐ Applicable ☑ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☑ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** ☐ Location shown on site map ☑ N/A
   ☐ Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** ☐ Functioning ☑ N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☑ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   ☐ Performance not monitored
   Frequency_____ ☐ Evidence of breaching
   Head differential_____
   Remarks_____

C. Treatment System ☐ Applicable ☑ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e.g.*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling/maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☑ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   ☑ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   ☑ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   ☑ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____

D. Monitoring Data

1. Monitoring Data
   ☑ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests: reviewing data monitoring results
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☑ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ All required wells located ☐ Needs Maintenance ☐ N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

See text of Five-Year Review Report for a detailed description of the remedy.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

See text of Five-Year Review Report for a detailed description. Soil erosion and sediment accumulation in channel 4 & riprap channel requires continued inspection. Slump/slide areas on the east side of Kings Run are an ongoing concern.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. N/A

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Review groundwater and surface water monitoring data.

Appendix E

PHOTOS DOCUMENTING SITE CONDITIONS

Sign posted at 200-ft intervals

Kings Run lined outside of fence, facing southeast

Northern portion of the landfill, GW monitoring well on vegetated soil cap facing east

Near the Southern Toe of the landfill facing east, GW monitoring well

Access road outside fence, location of reoccurring erosion repair

Sample port of landfill passive gas vent, on cap

French drain transported collected groundwater and leachate to the Southern Toe.

Southern Toe, surface water, facing down stream (south)

Appendix F

LIST OF DOCUMENTS REVIEWED

List of Documents Reviewed

1. Record of Decision, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, August 19, 1991.

2. Explanation of Significant Difference, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, July 17, 1997.

3. Explanation of Significant Difference, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, August 15, 2003.

4. Preliminary Close Out Report, Buckeye Reclamation Landfill Site, Belmont County, Ohio, U.S. EPA, May 14, 2003.

5. Phase I Remedial Action Construction Completion Report. Baker and Associates, November 6, 2001.

6. Surface Water Compliance Monitoring Program Two-Year Evaluation Report, Prepared by Conestoga-Rovers & Associates, May 2006.

7. Surface Water Compliance Monitoring -Monthly Reports, Prepared by Conestoga-Rovers & Associates, Data January 2007-February 2009.

8. Surface Water Compliance Monitoring Program Buckeye Reclamation Landfill, Prepared by Environmental Strategies Corporation, October 16, 2003.

9. Groundwater Monitoring Program Report Year 4, Round 2 and Monitoring Program Changes, Prepared by Conestoga-Rovers & Associates, January 2006.

10. Groundwater Monitoring Program Report Year7, Round 2 revision1, Prepared by Conestoga-Rovers & Associates, February 2009.

11. Final Groundwater Monitoring Program Buckeye Reclamation Landfill, Prepared by Environmental Strategies Corporation, February 22, 2002.

12. Buckeye Reclamation Landfill Site-Monthly Progress Reports, Prepared by Conestoga-Rovers & Associates, reports January 2006-February 2009.

13. Five-Year Review Report, Buckeye Reclamation Landfill, U.S. EPA, May 6, 2004.

14. Operations and Maintenance Plan for Phase 1 Remedial Action Work, Prepared by Baker and Associates, February 20, 2002.

15. Quarterly Post-Closure Inspection Reports, Prepared by Conestoga-Rovers & Associates, reports 2007-2008.

16. Southern Toe Sampling and Analysis Plan Report, Prepared by Environmental Strategies Corporation, April 25, 2003.