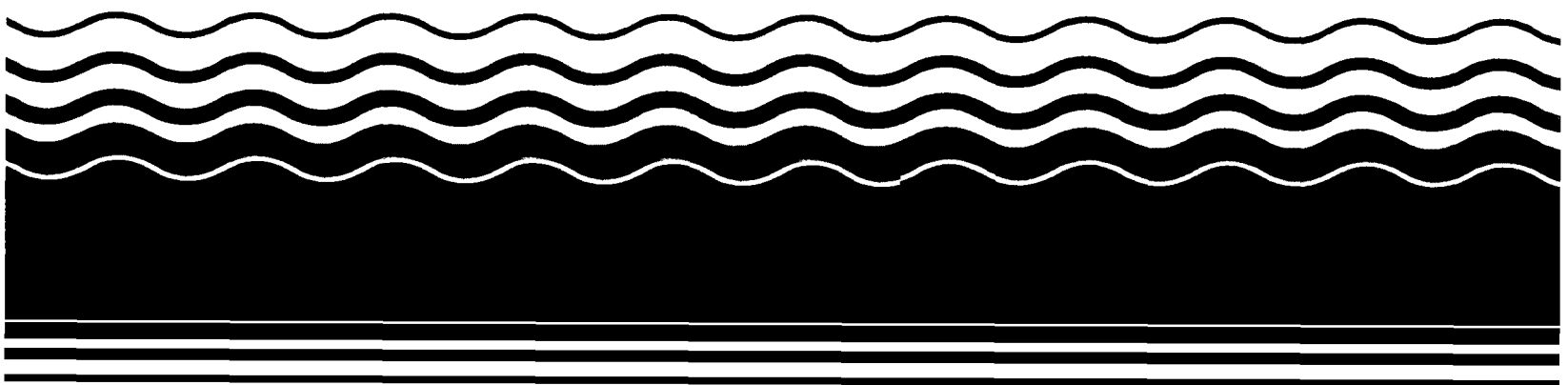




Superfund Record of Decision:

**Adams County Quincy
Landfill #2 & #3, IL**



REPORT DOCUMENTATION PAGE		1. REPORT NO. EPA/ROD/R05-93/238	2.	3. Recipient's Accession No.
4. Title and Subtitle SUPERFUND RECORD OF DECISION Adams County Quincy Landfill Site #2 & #3, IL First Remedial Action - Final			5. Report Date 09/30/93	
			6.	
7. Author(s)			8. Performing Organization Rept. No.	
9. Performing Organization Name and Address			10. Project Task/Work Unit No.	
			11. Contract(C) or Grant(G) No. (C) (G)	
12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460			13. Type of Report & Period Covered 800/800	
			14.	
15. Supplementary Notes PB94-964123				
16. Abstract (Limit: 200 words) The 56-acre Adams County Quincy Landfill #2 and #3 site is a former municipal landfill in Quincy, Adams County, Illinois. Land use in the area is predominantly agricultural, with a residential area located one mile north of the site. The site is bounded by pastureland to the east, a wooded tract to the south, private land to the west, and Old Broadway Road to the north. Although the area is generally rural, there are residences across Old Broadway Road located to the north and within one hundred yards of the site. From 1967 to 1972, the site was used for the stabling and pasturage of livestock. Later in 1972, the City of Quincy leased the landfill and redesignated the site as Quincy Municipal Landfill #2. Prior to 1974, records of the types of materials received were not maintained, although liquids disposal and unsupervised dumping was known to occur. In 1974, EPA granted a permit for the development of 15 contiguous acres to be called Quincy Municipal Landfill #3. In 1978, the site was closed and a final cover was applied. From 1967 to 1978, the site received solid, hazardous, and liquid waste. In 1981, the City of Quincy acknowledged that the landfill had accepted unknown quantities of inorganics, solvents, heavy metals, mixed municipal wastes, and unknown wastes, and in 1982, the City of Quincy purchased the site. In 1983, EPA completed a (See Attached Page)				
17. Document Analysis a. Descriptors Record of Decision - Adams County Quincy Landfill Site #2 & #3, IL First Remedial Action - Final Contaminated Media: gw, leachate Key Contaminants: VOCs (benzene, toluene), metals (arsenic, lead), other organics (PAH) b. Identifiers/Open-Ended Terms c. COSATI Field/Group				
18. Availability Statement		19. Security Class (This Report) None		21. No. of Pages 64
		20. Security Class (This Page) None		22. Price

Abstract (Continued)

preliminary assessment of the site that estimated that approximately 3,000 people were potentially affected by ground water contamination resulting from landfill contaminants migrating from the site. In 1984, EPA completed a site inspection that estimated that the site received approximately 343,000 gallons of sludge, 2,800,000 gallons of oily waste, 312,000 gallons of solvents, 343,200 gallons of organic and 180,000 gallons of inorganic chemicals, and 180,000 gallons of bases. A detailed topographic survey was performed by the City of Quincy, which included placement of an additional clay cap over leachate seeps, installation of new ground water monitoring wells, and approval of the City's erosion control proposal. In 1985, the State identified contamination in several adjacent residential wells and ordered the wells closed; and in 1986, the city extended the public water supply to the two affected residents. This ROD addresses a first and final remedy for the source contamination. The primary contaminants of concern affecting the ground water and leachate are VOCs, including benzene and toluene; other organics, including PAHs; and metals, including arsenic and lead.

The selected remedial action for this site includes improving the landfill cap; collecting and treating leachate onsite using neutralization, metals precipitation, gravity separation, air stripping, and/or carbon adsorption, as determined during the RD phase; discharging of the treated leachate either onsite or offsite; providing a contingency for installation of a ground water pump and treat system to minimize contaminant migration; providing a public water supply for nearby affected residences, if ground water monitoring indicates that contamination exceeds compliance levels; monitoring leachate and ground water; installing surface engineering controls, including berms, lined ditches, and catch basins to direct surface infiltration away from known disposal areas; and implementing institutional controls, including deed restrictions, and site access restrictions, including fencing. The estimated present worth cost for this remedial action is \$3,040,611, which includes an estimated annual O&M cost of \$216,702.

PERFORMANCE STANDARDS OR GOALS:

Chemical-specific leachate cleanup goals are based on SDWA MCLs, and include benzene 0.005 mg/l.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Adams County Quincy Landfills 2 & 3
Quincy, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document serves as United States Environmental Protection Agency (USEPA) concurrence with and adoption of the remedial action decision for the Adams County Quincy Landfills 2 & 3 site, as approved by the Illinois Environmental Protection Agency (IEPA), and pursuant to sections 104(d) and 117 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The IEPA selected this remedial action in accordance with the Illinois Environmental Protection Act and has provided USEPA with documentation to demonstrate that the State's selection of the remedy conforms with the requirements of CERCLA and the NCP to the extent practicable.

The State has sought USEPA concurrence in selection of the remedy based on the attached documents and the adequacy and completeness of those documents as represented by the State.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The remedial action addresses two areas of concern--leachate and groundwater. The leachate remedial action addresses the source of the contamination by collecting and treating on-site waste. The function of this action is to control the landfill site as a source of groundwater contamination, to reduce the risks associated with exposure to contaminated materials, and to prevent untreated leachate from running off site. The groundwater remedial action involves long-term monitoring with cleanup levels. Failure to meet those cleanup levels will trigger remedial action.

The major components of the selected remedy include:

- Installation of a security fence around the landfill site;
- Deed restrictions to prohibit groundwater use and building construction on the site;

- Leachate collection, treatment, and monitoring;
- Installation of surface controls to reduce erosion;
- Landfill cap improvements to provide a minimum three feet of cover on the landfill;
- Provision of a public water supply to nearby residents;
- Groundwater monitoring;
- Groundwater containment and treatment if groundwater cleanup levels are not met and maintained.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on site, the State is expected to supply information such that the USEPA can conduct a review within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Based on the information described above, USEPA concurs with the decision the IEPA has made in the exercise of the State's authority in selecting this remedy under an agreement between USEPA and IEPA pursuant to section 104(d) of CERCLA for implementation of the remedy.

for David A. Adamkus
Valdas V. Adamkus
Regional Administrator

9/30/93
Date

Attachments

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Adams County Quincy Landfills 2 & 3
Quincy, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Adams County Quincy Landfills 2 & 3 in Adams County, Illinois, which was chosen in accordance with the Illinois Environmental Protection Act, Ill. Rev. Stat. 1983, ch. 111 1/2, pars. 1001 et. seq., the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site. The United States Environmental Protection Agency (USEPA) Region V concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

The remedial action addresses two areas of concern--leachate and groundwater. The leachate remedial action addresses the source of the contamination by collecting and treating on-site waste. The function of this action is to control the landfill site as a source of groundwater contamination, to reduce the risks associated with exposure to contaminated materials, and to prevent untreated leachate from running off site. The groundwater response action involves long-term monitoring with cleanup levels. Failure to meet those cleanup levels will trigger further remedial action.

The major components of the selected remedy include:

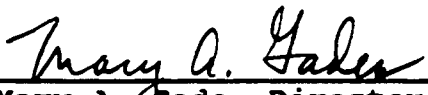
- Installation of a security fence around the landfill site;
- Deed restrictions to prohibit groundwater use and building construction on the site;
- Leachate collection, treatment, and monitoring;
- Installation of surface controls to reduce erosion;
- Landfill cap improvements to provide a minimum three feet of cover on the landfill;
- Provision of a public water supply to nearby residents;

- Groundwater monitoring;
- Groundwater containment and treatment if groundwater cleanup levels are not met and maintained.

DECLARATION

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.



Mary A. Gade, Director
Illinois Environmental Protection Agency

9/29/93

Date

SUMMARY FOR THE RECORD OF DECISION

Site Name, Location, and Description

The Adams County Quincy Landfills 2 & 3 site is located in a rural area on Old Broadway Road south of Illinois Route 104 approximately 5 miles east of the City of Quincy within the eastern 1/2 of Section 1, Township 2 South, Range 8 West in Melrose Township, Adams County in west-central Illinois (Figure 1). The site's northern limit is bounded by Old Broadway Road, the eastern boundary is adjacent to pastureland, the southern limit is bounded by a wooded tract, and the western boundary is bordered by a private lane (Figure 2).

The fifty-six acre site is wire fenced on all sides with a locked access gate on the northern boundary. The wire fence is in disrepair in some areas, particularly the western boundary, and allows easy access to anyone wishing to walk on site. The only structure on site is a metal storage building located near the north entrance gate. The remnants of an unmaintained gravel roadway cross the middle of the site from the entrance gate on the north to the southwestern side of the site.

The landfill is located on an upland of the Mississippi River and the topography of the area is generally hilly, sloping from the north to the south and southwest. Surface drainage on the site flows to the south and southwest to an unnamed stream tributary to Mill Creek. A drainage ditch on the western boundary of the site collects surface runoff and discharges to the stream.

No leachate collection or containment system was ever installed on site. Numerous leachate seeps occur throughout the landfill. Most seeps are located on the southwestern side of the site, although several have been seen in the old roadway and a large seepage area occurs in a low-lying area in the middle of the site. Leachate collects in low areas and drainages, then runs off site primarily in two locations--along the western boundary fence and on the southwest to the nearby stream.

The site overlies Mississippian-Age limestone. Site investigative borings found fracturing in the uppermost bedrock, with slope to the west northwest. The area is generally overlain with pre-Illinoisan glacial drift containing mostly till with some outwash sands and gravels, silt and clay, and pebbles with occasional cobbles. Silty clay and wind-blown loess overlay the till.

Site groundwater movement is influenced by limestone bedrock, glacial till, and relic channel sands. The Keokuk-Burlington limestone bedrock formation is a significant regional aquifer with

most area municipal and domestic wells obtaining water from this unit. Groundwater flow in the unit is generally in a west northwest direction across the site consistent with bedrock topography (Figures 3 and 4).

The glacial till deposits across the site are heterogeneous and variable with small discontinuous sand zones. The silty clay matrix has low permeability and restricts vertical infiltration of precipitation into the till aquifer and restricts flow between sand lenses. The predominant groundwater flow direction in the till is west southwest, generally corresponding to topography. Glacial deposits at the site vary in thickness from thirty-five feet to over two hundred feet. Deposits of relic channel sands often underlay the till in the area.

A 72-hour pump test was performed on the deep channel sand aquifer as part of the Supplemental Remedial Investigation. No leakage from the till units into the deep channel sand aquifer formation was observed; test results indicated that the deep channel sand and underlying bedrock are interconnected.

The northern part (approximately two-thirds) of the landfill, which was the area of landfill operation, is vegetated with herbaceous plants though some woody shrubs and small trees occur throughout the area. Woody vegetation, including large deciduous trees, with an herbaceous understory occurs in the drainage along the stream and on the southern part of the site where no disposal activities occurred. No wetlands have been identified on or near the site.

The site is located in a semi-rural setting where agriculture is the most common land use. Pastureland and a small wooded tract immediately adjoin the site. Cattle, hogs, sheep, and goats are raised in the vicinity and corn and beans are the primary crops. A rock quarry is located approximately one-half mile west of the landfill.

Though the area is generally rural, there are numerous houses nearby. Residences occur just across Old Broadway Road to the north within one hundred yards of the site. A small subdivision is located approximately one mile north of the site and the Village of Burton is the closest community, located to the northeast within approximately one and one-half miles of the site.

Site Operational History

Prior to initiation of landfill operations, the site was used for the stabling and pasturage of livestock. On January 11, 1967, the Adams County Health Department approved an application permit submitted by Ronald Thomas to develop an 11.75 acre landfill at the site. On March 8, 1971 the Illinois Environmental Protection Agency (IEPA or Agency) approved Permit #1971-3, submitted by Ronald Thomas and Marion Neill, to operate 11.75 acres at the site as "R&M

Landfill". Marion Neill's association with the landfill ceased on October 16, 1971. On February 16, 1972 the Agency granted Permit #1972-1 to Ronald and Sarah Thomas to operate 11.75 acres at the site as "Ron's Landfill". The City of Quincy leased the landfill from Ronald Thomas on September 25, 1972 and redesignated the site as "Quincy Municipal Landfill #2". On January 17, 1973 the Agency granted Permit #1973-7 to the City of Quincy for operation of the landfill. On July 24, 1974 the Agency granted Permit #1974-192 to the City of Quincy for a 5.7 acre expansion of the landfill. The Agency granted Permit 1975-45-DE to the City of Quincy for the development of 15 contiguous acres to be called "Quincy Municipal Landfill #3". The site was closed to receipts on August 8, 1978 and final cover was applied in the fall of 1978 and the spring of 1979. On April 29, 1982 the City of Quincy purchased the site from Ronald and Sarah Thomas.

Records of the types of materials received at the site were not maintained prior to 1974. However, it is known from Agency files that on May 25, 1971 the Agency revised Permit #1971-3 to allow the receipt of liquid wastes at the site. During Thomas' operation of the landfill, access was not always restricted and dumping was not always supervised.

Under operation by the City of Quincy, the landfill received liquid wastes which were retained in holding pits located on the north and west portions of the site near completed landfill trenches. Liquid wastes were pumped into the completed trenches by well point injectors and covered with fill. The site's permit was revised on August 22, 1974 to allow the use of a perforated pipe to inject liquid wastes into the filled portion of the landfill.

The Adams County Quincy Landfills 2 & 3 site was the only operating landfill in Adams County from January 1967 to August 1978 and thus received the majority of the solid waste generated in the county, as well as large amounts of hazardous waste from the City of Quincy's industrial sector. Agency file records document the disposal at the site of liquid industrial wastes including solvents, acids, sludges containing heavy metals, spent non-halogenated solvents, spent halogenated solvents used in degreasing, wastewater treatment sludges from electroplating operations, hydraulic oil, machine coolants, thinners, paint solvents, methylchloroform, selenium, toluene, methylene chloride, acetone, and chloroethene. All disposals at the landfill predate the Agency's January 1979 manifesting requirements. It is also important to note that the landfills operated only prior to the November 19, 1980 effective date of the Resource Conservation and Recovery Act.

Site Enforcement Activities

On May 19, 1981 the City of Quincy completed a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Notification of Hazardous Waste Site form for the Adams County Quincy Landfills 2 & 3 site. The notification acknowledged the landfill disposal of unknown quantities of inorganics, solvents, heavy metals, mixed municipal wastes, and unknown wastes. Additional notices were received from generators of wastes disposed at the site.

On July 1, 1983 a preliminary assessment of the site was completed by Ecology and Environment, Inc., as field investigative team contractor for the United States Environmental Protection Agency (USEPA). The preliminary assessment estimated that approximately 3000 people were potentially affected by groundwater contamination from spent halogenated solvents used in degreasing, wastewater treatment sludge from electroplating operations, and 1,1,1-trichloroethane accepted at the site.

On March 7, 1984 the same USEPA contractor completed a site inspection. It was estimated that the site had received 343,000 gallons of sludge containing paint and toluene; 2,800,000 gallons of oily waste; 312,000 gallons of solvents; 343,200 gallons of other organic chemicals; 180,000 gallons of inorganic chemicals; 180,000 gallons of bases. Estimates were based on IEPA supplemental permits for disposal at the site.

On March 12, 1984 USEPA's contractor prepared a preliminary score for the site in accordance with the Hazard Ranking System model. The site scored 12.48 which is insufficient for consideration for the National Priorities List (NPL), but above the score of 10 necessary for consideration for the IEPA's State Remedial Action Priorities List (SRAPL). On December 14, 1984 the site was proposed for inclusion on the SRAPL and was included on July 24, 1985.

In response to the proposed SRAPL listing, the City of Quincy proposed, in a letter dated February 15, 1985, to perform corrective measures at the site to consist of a detailed topographic survey, follow-up construction to correct drainage problems, placement of additional clay cap material over leachate seeps, and installation of new groundwater monitoring wells. In June 1985 the IEPA collected twelve residential water well samples from homes in the vicinity of the landfill. On July 24, 1985 the IEPA approved the City of Quincy's groundwater monitoring program and on September 13, 1985 the IEPA approved the City's erosion control proposal. Analysis of the residential well samples was completed in August 1985 and found contamination in two nearby wells--the Allen and Jacobs wells. The contaminants detected were methylene chloride; 1,1-dichloroethane; dichloroethylene; chloroform; 1,1,1-trichloroethane; dichlorobromomethane; tetrachloroethylene; vinyl chloride; and benzene. The two wells were resampled in October 1985 and the contamination was confirmed. In March 1986, the IEPA sent letters to the owners of the two contaminated wells and recommended that use of the wells be

discontinued. In April 1986 the City of Quincy extended Mill Creek Water District service to the two affected residences. The two wells were taken out of service but have not been plugged and abandoned.

Because of the apparent release of landfill wastes into groundwater that migrated off site, the IEPA, pursuant to provisions of the Illinois Environmental Protection Act, issued a Section 4(q) Notice to the City of Quincy and eight other potentially responsible parties (PRPs). The June 12, 1986 notice required a remedial investigation and a feasibility study at the site. The IEPA issued a subsequent notice on December 14, 1986 which named eight additional parties.

The parties named in the June 1986 notice are City of Quincy; Harris Corp.; Huck Fixture Co.; Moorman Manufacturing Co.; Master Tank and Welding, Inc.; Gardner-Denver Co.; Colt Industries Operating Corp.; Motorola, Inc.; and Firestone Tire and Rubber Co. The eight additional parties are E.L. Smith and Sons Co.; Quincy Soybean Co.; Brower Manufacturing Co.; Litteral Manufacturing-Speedrack, Inc.; Browning-Ferris Industries of Quincy; Woodworth Cesspool Service; Blickhan Trucking Co.; and The Celotex Corp.

In August 1986, only those nine parties named in the June 12, 1986 notice formed the Quincy Landfill Participating Respondent Group (PRG) and proposed to the Agency that under the terms of the 4(q) Notice and without a consent order, a remedial investigation and feasibility study would be conducted at the site. The PRG's contractor completed a preliminary report in February 1987.

The IEPA prepared a preliminary score for the site in accordance with the Hazard Ranking System with consideration given to an observed release to groundwater, and in September 1987 the site received a score of 34.21 making it eligible for consideration for the NPL. In July 1988 the site was proposed for addition to the NPL and was placed on the NPL on August 30, 1990. Through an agreement between the Agency and USEPA, the site was designated a "State Lead" enforcement case with USEPA in the "Support Agency" role.

International Technology Corp. (IT), the PRG's contractor, performed remedial investigation activities in 1987 and 1988 and submitted a revised final remedial investigation report to the Agency in May 1989. In July 1989, IT drafted a work plan for a supplemental remedial investigation (SRI). The SRI and a risk assessment were performed in 1990 and a focused feasibility study for the site was completed in 1992 by John Mathes & Associates, Inc., also known as Burlington Environmental.

Community Relations Activities

The Agency began conducting community relations activities on an ad

hoc basis at this site soon after the residential well contamination was found. In April 1986 a public meeting was held to discuss groundwater contamination near the site. State and local government representatives were available to respond to citizens' questions and to discuss the results of private well monitoring. Several informal "living room" question and answer sessions were also held at residents' homes with Agency staff available to answer questions and address concerns.

In September 1988 a press release issued by the Agency announced the availability of the Remedial Investigation report. The Focused Feasibility Study report and the Proposed Plan were made available to the public in March 1993 in both the administrative record and an information repository maintained at the Quincy Public Library.

The notice of availability of the Focused Feasibility Study report and the Proposed Plan was published in the Quincy Herald-Whig on March 29, 1993; April 5, 1993; and April 12, 1993. The notice included the announcement of a scheduled public hearing and a public comment period from March 29, 1993 through May 28, 1993.

The public hearing was held on April 28, 1993 pursuant to the provisions of the Agency's "Procedures for Informational and Quasi-Legislative Public Hearings" at 35 Illinois Administrative Code 164. Representatives of the Agency and USEPA responded to questions and accepted comments on the proposed remedial action plan. A response to comments is included in the Responsiveness Summary which is part of this Record of Decision.

This decision document presents the selected remedial action for the Adams County Quincy Landfills 2 & 3 site in rural Quincy, Illinois, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and, to the extent practicable, the National Contingency Plan (NCP). The decision for this site is based on the administrative record.

Scope and Role of Response Action

Remedial action at this site addresses two areas of concern--leachate and groundwater. The leachate remedial action addresses the source of the contamination by treating on-site waste. The function of this remedial action is to control the landfill site as a source of groundwater contamination and to prevent untreated leachate from running off site.

The groundwater remedy initially involves long-term monitoring to determine if groundwater contamination exceeds cleanup levels. Monitoring addresses the threat that on-site contamination may have migrated, and may continue to migrate, off site into groundwater which is a potential source of drinking water for nearby residents. If monitoring shows that groundwater contamination exceeds the cleanup levels, remedial action will be triggered and groundwater

will be treated in order to minimize contaminant migration and to prevent exposure to contaminants in groundwater.

Summary of Site Characteristics

The Adams County Quincy Landfills 2 & 3 site, as the only operating landfill in Adams County from 1967-1978, received solid waste generated in the county and large amounts of hazardous waste from the City of Quincy's industrial sector. Based on IEPA supplemental permits for disposal at the site, in 1984 a USEPA contractor estimated site receipts of materials for disposal; those estimates are listed in the Site Enforcement Activities section of this document. The trench and fill method of operation at the landfill resulted in direct contact of site environmental media with the disposal materials which are the only known sources of site contamination.

The site investigative work was performed in four phases: the IT Preliminary Activities, the IT Phase I Investigation, the IT Phase II Investigation, and the Mathes Supplemental RI (see Figures 5 and 6 for monitoring locations). Remedial Investigation analytical results for subsurface soils, groundwater, surface water, sediment, and leachate are reprinted in Tables 2-1 through 2-5.

Summary statistics of on-site subsurface soil analytical results are shown in Table 2-1. Ethylbenzene, xylenes, Aroclor 1254, mercury, and zinc were considered chemicals of potential concern for further evaluation in the risk assessment.

Summary statistics of groundwater analytical results for both on-site monitoring wells and nearby residential wells are shown in Table 2-2. All positively detected organic compounds were considered chemicals of potential concern for evaluation. Included were chloroethane; 1,1-dichloroethane; 1,1-dichloroethene; tetrachloroethene; trichloroethylene; 1,1,1-trichloroethane; vinyl chloride; benzene; ethylbenzene; toluene; and xylene. Other parameters selected for further evaluation in the risk assessment were manganese, mercury, and zinc.

Summary statistics of surface water analytical results are shown in Table 2-3. Manganese, mercury, nickel, and silver were considered chemicals of potential concern.

Summary statistics of sediment analytical results are shown in Table 2-4. The presence of polycyclic aromatic hydrocarbons was attributed to an upstream source and no inorganic chemicals were considered to be of potential concern.

Summary statistics of leachate analytical results are shown in Table 2-5. All detected organic constituents and arsenic, barium, lead, manganese, mercury, silver, and zinc were considered chemicals of concern for further evaluation in the risk assessment.

The Remedial Investigation, the Supplemental Remedial Investigation, and the Risk Assessment reports should be consulted for a detailed description of the sampling methods and analytical procedures utilized in site investigation and data evaluation.

The ambient air medium was eliminated from further consideration based on the absence of elevated HNU readings from soil boreholes, the relatively low concentrations of volatile organic compounds (VOCs) detected in subsurface soils, and the presence of clayey soils which are expected to minimize the upward migration of VOCs.

A groundwater plume which connects the site groundwater to the off-site groundwater wells has not been found. Contaminants and concentration ranges for the off-site residential wells and for the on-site monitoring wells are similar; however, bedrock and till groundwater monitoring well clusters situated between the landfill and the affected residential wells to intercept contaminant migration did not demonstrate detectable contamination with any of the observed contaminants. The scientific complexities of contaminant fate and transport in highly fractured and channeled karst limestone bedrock such as that underlying the site, could obscure a transport route from the landfill as a source to off-site groundwater. No other possible source of the off-site well contamination has been identified, and the Agency has always taken the position that on-site contamination is a continuing potential threat to off-site receptors. Therefore, on-site leachate will be addressed as a means of controlling a source of groundwater contamination.

Summary of Site Risks

The 1991 Risk Assessment performed by John Mathes and Associates, Inc. for the PRG, characterizes existing and future health risks posed by residual contamination associated with site conditions. The risk assessment was performed by the PRG using the current methodology and techniques described in the USEPA's Risk Assessment Guidance for Superfund-Human Health Evaluation Manual (1989) and the Risk Assessment Guidance for Superfund-Environmental Evaluation Manual (1989). The Risk Assessment report should be consulted for a detailed description of the assessment procedures.

The risk assessment analyzes the toxicity and degree of hazard posed by substances related to the site and describes the routes by which these substances could come into contact with humans and the environment. Separate calculations are made for those compounds that can cause cancer and for those that can have other health effects. For the compounds that can cause cancer--carcinogens--risks are estimated as the additional possibility of developing cancer due to a lifetime of exposure to the compounds. The National Oil and Hazardous Substances Contingency Plan (NCP) establishes acceptable levels of risk for Superfund sites ranging from 1 in 10,000 (1×10^{-4}) to 1 in 1,000,000 (1×10^{-6}) excess

cancer cases. "Excess" means the number of cancer cases in addition to those that would ordinarily occur in a population of that size under natural conditions. For the non-cancer causing compounds--noncarcinogens--a risk number called the hazard index is calculated so that if the risk is less than or equal to 1, no adverse health effects would be expected. If the risk is greater than 1, adverse health effects are possible.

To evaluate potential current and future threats to human health and the environment, risk estimates were developed for the following exposure scenarios: domestic use of groundwater from hypothetical wells downgradient of the site (includes both ingestion of drinking water and inhalation of VOCs during showering); domestic use of water from the Allen and Jacobs wells at some time in the future, assuming the public water supply is not used (includes both ingestion of drinking water and inhalation of VOCs during showering); and dermal contact with leachate by local children.

Table 2-6 shows the calculated incremental lifetime cancer risks and total hazard indices for the scenarios listed above.

The estimated incremental cancer risk level (CRL) and the hazard index (HI) for domestic use of groundwater in the hypothetical downgradient well under reasonable maximum exposure (RME) conditions are 1.86×10^{-6} and 0.108, respectively. The CRL under RME conditions exceeds the point-of-departure risk level. The calculated hazard index is less than one.

The estimated incremental CRL and HI for domestic use of groundwater in the Allen well under average exposure (AE) conditions are 2.47×10^{-5} and 0.176, respectively. Under RME conditions the CRL is 7.34×10^{-5} and the HI is 0.281. The estimated CRLs exceed the point-of-departure risk level. The calculated hazard indices under both exposure conditions are less than one.

The estimated incremental CRL and HI for domestic use of groundwater in the Jacobs well under AE conditions are 4.11×10^{-5} and 0.173, respectively. Under RME conditions the CRL is 2.34×10^{-4} and the HI is 0.268. The estimated CRLs exceed the point-of-departure risk level. The contaminant that was the primary contributor to this risk is vinyl chloride. The calculated hazard indices under both exposure conditions are less than one.

It should be noted that in 1986 a public water supply through the Mill Creek Water District was made available to nearby residents whose drinking water wells were contaminated, including the Allen and Jacobs residences. The Allen and Jacobs wells are reported to be abandoned and no longer used for domestic purposes.

The estimated incremental CRL and the HI for dermal contact with leachate are 9.40×10^{-9} and 0.0000203, respectively, under RME conditions. The estimated CRL is below USEPA's point-of-departure risk level of 1×10^{-6} and the calculated HI is less than one, which indicate that adverse health effects are not anticipated.

Although the data used in the risk assessment resulted in the determination that no excess risk exists from dermal contact with leachate, the Agency has taken the position that if it were to conduct a risk assessment at this time, the evaluation would result in the presence of excess risk from dermal contact with leachate. Also, on-site leachate is considered a source of groundwater contamination and the potential exists for degradation in leachate quality.

Risk associated with future use of the landfill site was also evaluated, although continued landfill maintenance is the only anticipated future land use at the site. Residential or commercial development is unlikely due to the topography and remote location of the site. Dermal contact with leachate during a future hypothetical recreational use was considered and would only slightly increase the associated risk to the 10^{-7} risk level at the RME if exposure were to occur on a daily basis.

When the site investigation and risk assessment activities were performed, the procedures for addressing environmental risk were not so standardized as they are for human health risk assessment. No critical habitats, endangered species, or habitats of endangered species were identified or evaluated in the RI/FS or risk assessment process. However, the U.S. Department of the Interior Fish and Wildlife Service has identified two Federally endangered species which may be present in the vicinity of the site. The Indiana bat (Myotis sodalis) and the bald eagle (Haliaeetus leucocephalus) may be indirectly impacted by contamination associated with the site.

Previous surveys conducted by the Illinois Natural History Survey have documented the presence of Indiana bats at a cave near Burton, Illinois, which is near the site. Since bats feed on flying insects along stream corridors and have been known to forage as far as one and one-half miles from a given roost or cave site, it is likely that bats from the Burton cave site may be foraging along Mill Creek. The contaminants identified in landfill materials may bioaccumulate in aquatic invertebrates in surface waters; therefore the landfill may be a source of contaminants to foraging Indiana bats in that vicinity.

The bald eagle breeds and winters in Adams County, Illinois, primarily along the Mississippi River, and in the winter this species feeds on fish in open water areas. It roosts at night in large trees adjacent to the river. This species may be impacted indirectly through bioaccumulation of contaminants in the food

chain. However, there is no critical habitat designated for this species in Illinois.

Based on data gathered in the Remedial Investigation and risks identified in the Risk Assessment, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of Alternatives

Nine remedial action alternatives were considered in the Focused Feasibility Study for the cleanup of leachate and groundwater at the Adams County Quincy Landfills 2 & 3 site (see Table 5-1). The No Action alternative--Alternative 1A--is a baseline for comparison to other alternatives; its inclusion is mandated by the Superfund Amendments and Reauthorization Act of 1986 (SARA). The alternatives are described below.

ALTERNATIVE 1A: NO ACTION. The Superfund program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. No remedial activities would be implemented with this alternative and the site would remain in its present condition. However, leachate and groundwater would be monitored.

Construction Costs: \$0
Annual O&M Costs: \$82,000
Present Worth: \$773,007

ALTERNATIVE 1B: INSTITUTIONAL AND SURFACE CONTROLS. This alternative includes access restrictions, deed restrictions to prohibit groundwater usage, providing a public water supply to replace current groundwater usage, leachate and groundwater monitoring to track the potential impact of site constituents, surface controls to reduce infiltration into and through the former waste disposal areas, and continued maintenance of site cover.

Physical access restrictions include upgrade and continued maintenance of a security fence around the site with warning signs to inform the public of potential site hazards.

Land use restrictions included in the property deed would prohibit groundwater usage on site and building construction and drilling on site except for purposes of continued site remediation or groundwater investigation.

Six nearby residences northwest of the site would be provided a public water supply to replace use of groundwater wells.

A groundwater monitoring program would be implemented to track the

changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding pre-established levels pursuant to the Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing effective corrective action.

Monitoring would continue for a minimum of five years with duration of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters of the State of Illinois. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304.

Surface controls including berms, lined ditches, and catch basins would be installed to manage surface water infiltration into the landfill. Some portions of the landfill would be hydraulically isolated from current surface water input by the construction of surface water diversion and collection structures to direct infiltration away from known disposal areas.

Construction Costs: \$646,880
Annual O&M: \$135,600
Present Worth: \$1,925,170

ALTERNATIVE 2A: LEACHATE CONTAINMENT WITH RECIRCULATION. This alternative includes access restrictions, deed restrictions to prohibit groundwater usage, providing a public water supply to replace current groundwater usage, leachate and groundwater monitoring to track the potential impact of site constituents, surface controls to reduce infiltration into and through the former waste disposal areas, continued maintenance of site cover, containment of leachate on site via a network of subsurface drains

with a collection system, and recirculation on site of collected leachate.

Physical access restrictions include upgrade and continued maintenance of a security fence around the site with warning signs to inform the public of potential site hazards.

Land use restrictions included in the property deed would prohibit groundwater usage on site and building construction and drilling on site except for purposes of continued site remediation or groundwater investigation.

Six nearby residences northwest of the site would be provided a public water supply to replace use of groundwater wells.

A groundwater monitoring program would be implemented to track the changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding pre-established levels pursuant to the Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing effective corrective action.

Monitoring would continue for a minimum of five years with duration of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters of the State of Illinois. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304.

Surface controls including berms, lined ditches, and catch basins would be installed to manage surface water infiltration into the landfill. Some portions of the landfill would be hydraulically

isolated from current surface water input by the construction of surface water diversion and collection structures to direct infiltration away from known disposal areas.

Leachate would be collected and contained on site via a network of subsurface drains located south and west of the landfill disposal area which would recirculate the collected leachate back into the landfill cells.

Construction Costs: \$812,510
Annual O&M: \$147,250
Present Worth: \$2,200,623

ALTERNATIVE 2B: LEACHATE CONTAINMENT WITH DISCHARGE TO A POTW (Publicly Owned Treatment Works). This alternative includes access restrictions, deed restrictions to prohibit groundwater usage, providing a public water supply to replace current groundwater usage, leachate and groundwater monitoring to track the potential impact of site constituents, surface controls to reduce infiltration into and through the former waste disposal areas, continued maintenance of site cover, containment of leachate on site via a network of subsurface drains with a collection system and discharge to a POTW.

Physical access restrictions include upgrade and continued maintenance of a security fence around the site with warning signs to inform the public of potential site hazards.

Land use restrictions included in the property deed would prohibit groundwater usage on site and building construction and drilling on site except for purposes of continued site remediation or groundwater investigation.

Six nearby residences northwest of the site would be provided a public water supply to replace use of groundwater wells.

A groundwater monitoring program would be implemented to track the changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding pre-established levels pursuant to the Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing effective corrective action.

Monitoring would continue for a minimum of five years with duration of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters of the State of Illinois. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304.

Surface controls including berms, lined ditches, and catch basins would be installed to manage surface water infiltration into the landfill. Some portions of the landfill would be hydraulically isolated from current surface water input by the construction of surface water diversion and collection structures to direct infiltration away from known disposal areas.

Leachate would be collected and contained on site via a network of subsurface drains. The collected leachate would be transported via tank truck to the City of Quincy POTW. Transport of leachate off site would require waste stream authorization pursuant to 35 Illinois Administrative Code 809. Discharge to the POTW would require a sewer connection permit pursuant to 35 Illinois Administrative Code 309. The discharge is also subject to the General Pretreatment Regulations for Existing and New Sources of Pollution at 40 CFR 403 and 35 Illinois Administrative Code 307, including the POTW's general and specific discharge limitations and permitting requirements and State indirect discharge standards for mercury and cyanide.

Construction Costs: \$1,018,410
Annual O&M: \$233,716
Present Worth: \$3,221,631

ALTERNATIVE 2C: LEACHATE CONTAINMENT WITH TREATMENT AND NPDES (National Pollutant Discharge Elimination System) DISCHARGE. This alternative includes access restrictions, deed restrictions to prohibit groundwater usage, providing a public water supply to replace current groundwater usage, leachate and groundwater monitoring to track the potential impact of site constituents, surface controls to reduce infiltration into and through the former waste disposal areas, cap improvements, continued maintenance of site cover, containment of leachate on site via a network of subsurface drains with a collection system, on-site treatment of leachate with discharge to surface water.

Physical access restrictions include upgrade and continued maintenance of a security fence around the site with warning signs to inform the public of potential site hazards.

Land use restrictions included in the property deed would prohibit groundwater usage on site and building construction and drilling on site except for purposes of continued site remediation or groundwater investigation.

Six nearby residences northwest of the site would be provided a public water supply to replace use of groundwater wells.

A groundwater monitoring program would be implemented to track the changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding pre-established levels pursuant to the Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing effective corrective action.

Monitoring would continue for a minimum of five years with duration of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters of the State of Illinois. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304.

Surface controls including berms, lined ditches, and catch basins would be installed to manage surface water infiltration into the landfill. Some portions of the landfill would be hydraulically isolated from current surface water input by the construction of surface water diversion and collection structures to direct infiltration away from known disposal areas.

Leachate would be collected on site via a network of subsurface drains and treated on site by one or more of the following processes: neutralization, metals precipitation, gravity separation, air stripping, carbon adsorption. Treated leachate would be discharged to a nearby stream. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304. The treatment works would have to be operated under the supervision of a certified operator pursuant to 35 Illinois Administrative Code 312. The air stripper would be subject to 40 CFR 264, Part AA, under the authority of the Resource Conservation and Recovery Act (RCRA), which limits organic material emissions. Residues from treatment processes (if any are generated), including precipitated metals and spent carbon, would have to be Toxicity Characteristic Leaching Procedure (TCLP) tested to determine if they are RCRA hazardous pursuant to 40 CFR 261 in order to determine the disposal method.

Construction Costs: \$997,780
Annual O&M: \$216,702
Present Worth: \$3,040,611

ALTERNATIVE 2D: MULTIMEDIA CAP, LEACHATE CONTAINMENT WITH DISCHARGE TO A POTW (Publicly Owned Treatment Works). This alternative includes access restrictions, deed restrictions to prohibit groundwater usage, providing a public water supply to replace current groundwater usage, leachate and groundwater monitoring to track the potential impact of site constituents, surface controls to reduce infiltration into and through the former waste disposal areas, continued maintenance of site cover, containment of leachate on site via a network of subsurface drains with a collection system and discharge to a POTW, and the installation of an improved cap over the approximately forty-two acres of former landfill operational area.

Physical access restrictions include upgrade and continued maintenance of a security fence around the site with warning signs to inform the public of potential site hazards.

Land use restrictions included in the property deed would prohibit groundwater usage on site and building construction and drilling on site except for purposes of continued site remediation or groundwater investigation.

Six nearby residences northwest of the site would be provided a public water supply to replace use of groundwater wells.

A groundwater monitoring program would be implemented to track the changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding pre-established levels pursuant to the

Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing corrective action.

Monitoring would continue for a minimum of five years with duration of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters of the State of Illinois. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304.

Surface controls including berms, lined ditches, and catch basins would be installed to manage surface water infiltration into the landfill. Some portions of the landfill would be hydraulically isolated from current surface water input by the construction of surface water diversion and collection structures to direct infiltration away from known disposal areas.

Leachate would be collected and contained on site via a network of subsurface drains. The collected leachate would be transported via tank truck to the City of Quincy POTW. Transport of leachate off site would require waste stream authorization pursuant to 35 Illinois Administrative Code 809. Discharge to the POTW would require a sewer connection permit pursuant to 35 Illinois Administrative Code 309. The discharge is also subject to the General Pretreatment Regulations for Existing and New Sources of Pollution at 40 CFR 403 and 35 Illinois Administrative Code 307, including the POTW's general and specific discharge limitations and permitting requirements and State indirect discharge standards for mercury and cyanide.

The landfill cap would be designed to minimize the production of leachate by reducing infiltration and directing surface water away

from subsurface waste materials. The cap would consist of an eight inch layer of clay, a drainage layer, and a cover layer equal to the average frost level of approximately three feet, above the clay layer. The cover layer would consist of two and one-half feet of native soil and one-half foot of topsoil. Geotextile layers would be placed on either side of the drainage net.

Construction Costs: \$7,842,940

Annual O&M: \$213,828

Present Worth: \$9,858,678

Alternatives 3A, 3B, and 3C are included in the Focused Feasibility Study as potential alternatives for groundwater remediation if groundwater monitoring results as described in Alternatives 1A, 1B, 2A, 2B, and 2C trigger further groundwater remediation at the site. However, a comparative analysis for the three alternatives was not performed as it was considered beyond the scope of the Focused Feasibility Study. The Agency and USEPA determined that Alternative 3B would be implemented if groundwater monitoring data indicate that further remedial action is warranted.

ALTERNATIVE 3A: GROUNDWATER CONTAINMENT, EXTRACTION, AND DISCHARGE TO A POTW (Publicly Owned Treatment Works). This alternative includes the extraction and collection of contaminated groundwater and discharge of the groundwater to a POTW for treatment. The extraction system would limit groundwater migration off site.

The groundwater extraction system would include extraction wells and sufficient piping to connect to the City of Quincy's sanitary sewer system. Discharge to the POTW would require a sewer connection permit pursuant to 35 Illinois Administrative Code 309. The discharge is also subject to the General Pretreatment Regulations for Existing and New Sources of Pollution at 40 CFR 403 and 35 Illinois Administrative Code 307, including the POTW's general and specific discharge limitations and permitting requirements and State indirect discharge standards for mercury and cyanide.

Construction Costs: \$1,853,450

Annual O&M: \$160,830

Present Worth: \$3,369,581

ALTERNATIVE 3B: GROUNDWATER CONTAINMENT, EXTRACTION, TREATMENT, AND NPDES (National Pollutant Discharge Elimination System) DISCHARGE. This alternative includes the extraction and collection of contaminated groundwater. The extraction system would limit groundwater migration off site. Collected groundwater would be treated on site and discharged to surface water.

The groundwater extraction system would include extraction wells and a collection system. Collected groundwater would be treated on site with air stripping as the primary treatment technology and

granular activated carbon, biological treatment or chemical oxidation as the add-on secondary treatment technology to be utilized if air emissions violate emissions standards. Treated groundwater would be discharged to a nearby stream. The discharge would be subject to the NPDES program at 40 CFR 122, which in Illinois is implemented pursuant to 35 Illinois Administrative Code 309. The discharge would be subject to the standards at 35 Illinois Administrative Code 302 and 304. The treatment works would have to be operated under the supervision of a certified operator pursuant to 35 Illinois Administrative Code 312. The air stripper would be subject to 40 CFR 264, Part AA, under the authority of the Resource Conservation and Recovery Act (RCRA), which limits organic material emissions. Residues from treatment processes (if any are generated), including precipitated metals and spent carbon, would have to be Toxicity Characteristic Leaching Procedure (TCLP) tested to determine if they are RCRA hazardous pursuant to 40 CFR 261 in order to determine the disposal method.

Construction Costs: \$454,090
Annual O&M: \$201,972
Present Worth: \$2,358,063

ALTERNATIVE 3C: GROUNDWATER CONTAINMENT WITH IN SITU BIOLOGICAL TREATMENT. This alternative includes the extraction and collection of contaminated groundwater with biological treatment and reinjection of the treated groundwater on site.

The groundwater extraction system would include extraction wells and a collection system. Collected groundwater would be treated on site by air stripping to reduce the concentration of volatile organic compounds, followed by the addition of hydrogen peroxide and nutrients to stimulate the growth of micro-organisms which degrade organic materials in groundwater, then reinjected on site. The air stripper would be subject to 40 CFR 264, Part AA, under the authority of the Resource Conservation and Recovery Act (RCRA), which limits organic material emissions. Reintroduction of the treated groundwater on site would be subject to the operator certification requirements of 35 Illinois Administrative Code 312 and the groundwater standards at 35 Illinois Administrative Code 620. Residues from treatment processes (if any are generated), including precipitated metals and spent carbon, would have to be Toxicity Characteristic Leaching Procedure (TCLP) tested to determine if they are RCRA hazardous pursuant to 40 CFR 261 in order to determine the disposal method.

Construction Costs: \$447,120
Annual O&M: \$351,212
Present Worth: \$3,757,965

Summary of the Comparative Analysis of Alternatives

The National Contingency Plan requires evaluation of alternatives

based on nine criteria by which technical, economic, and practical factors associated with each remedial alternative must be judged. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The nine evaluation criteria are summarized below.

Threshold Criteria must be satisfied in order for an alternative to be eligible for selection. The two threshold criteria are:

- 1) **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
- 2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet all of the ARARs of other Federal and State environmental laws and/or justifies a waiver.

Primary Balancing Criteria are used to weigh major tradeoffs among alternatives. These criteria are:

- 3) **Long-term Effectiveness and Permanence** refer to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, after cleanup goals have been met.
- 4) **Reduction of Toxicity, Mobility, or Volume through Treatment** is the anticipated performance of the treatment technologies a remedy may employ.
- 5) **Short-term Effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.
- 6) **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
- 7) **Cost** includes estimated capital and O&M costs, also expressed as net present worth costs.

Modifying Criteria are usually taken into account after public comment is received on the Feasibility Study report and the Proposed Plan. These criteria are:

- 8) **State/Support Agency Acceptance** reflects aspects of the preferred alternative and other alternatives that the support agency favors or objects to, and any specific comments regarding State ARARs or the proposed use of waivers.

9) **Community Acceptance** summarizes the public's general response to the alternatives described in the Proposed Plan and in the Feasibility Study report based on public comments received.

A detailed discussion of the evaluation of the alternatives based on the nine criteria has been provided in the Focused Feasibility Study report. However, the FFS did not include a comparative analysis of Alternatives 3A, 3B, and 3C since one of these alternatives would be implemented **only** if groundwater monitoring data indicate that further groundwater remediation is necessary.

The National Contingency Plan requires that the "No Action" alternative be evaluated to establish a baseline against which all other alternatives are measured.

Overall Protection of Human Health and the Environment

Alternatives 2A, 2B, 2C, and 2D all provide protection of human health through leachate collection and leachate source control which should reduce the risk associated with groundwater. Alternative 2D provides protection through capping the landfill in addition to providing a leachate collection system with off-site treatment. Alternatives 2B and 2C provide protection by providing a leachate collection system with treatment. Alternative 2B provides off-site treatment, while Alternative 2C provides on-site treatment. Alternative 2A provides protection by collection of leachate. Alternative 1B provides limited protection through institutional controls including access restrictions. Alternative 1A provides essentially no protection.

Alternatives 1B, 2A, 2B, 2C, and 2D all provide protection of human health through the provision of an alternate drinking water supply to prevent ingestion of contaminated groundwater. Exposure is significantly reduced, therefore risk is also reduced. Alternative 1A provides no reduction in risk from exposure to contaminated groundwater.

Alternative 2D provides environmental protection by decreasing the potential for infiltration into the landfill waste areas that may cause contaminant transfer to groundwater and by preventing off-site discharge of contaminated leachate. Alternatives 2B and 2C provide protection by decreasing the potential for contaminant transfer to groundwater by reducing and by preventing off-site discharge of contaminated leachate. Alternative 1B provides protection by reducing groundwater contamination through surface controls and site vegetative cover maintenance, but contaminated leachate is likely to be discharged off site. Alternative 1A provides no protection because no leachate control or collection system is provided, and lack of source control provides no protection from groundwater contamination.

Compliance with Applicable or Relevant and Appropriate Requirements

(ARARs)

Alternatives 2B, 2C, and 2D would comply with chemical-specific, location-specific, and action-specific ARARs for the leachate response action. Alternative 2A may not comply with any of the ARARs for the leachate response action. Alternatives 1A and 1B do not comply with action-specific ARARs for the leachate response action. None of the alternatives complies with groundwater standards beyond the site boundary. However, all alternatives include a groundwater monitoring program pursuant to 35 Illinois Administrative Code 620 to evaluate the effectiveness of the selected remedy in helping achieve compliance with groundwater standards and to trigger further groundwater remedial action, if warranted.

Alternatives 1A and 1B are not further considered for evaluation criteria because threshold criteria are not satisfied.

Long-term Effectiveness and Permanence

Alternatives 2A, 2B, 2C, and 2D eliminate residual risk associated with contaminated groundwater if residents discontinue use of their groundwater wells.

Alternative 2B provides reliable protection through leachate collection and off-site treatment. Alternative 2C provides reliable protection through leachate collection and on-site treatment. Alternative 2D is reliable if cap integrity is maintained. Alternative 2A provides less than reliable protection because leachate collection and recirculation are dependent on seasonal climatic conditions.

Reduction of Mobility, Toxicity, or Volume through Treatment

None of the alternatives would reduce the toxicity or volume of the in situ landfill wastes.

Alternatives 2B, 2C, and 2D provide treatment which reduces leachate toxicity and volume. Alternative 2C provides reduction of toxicity by on-site treatment of leachate, including air stripping which is expected to remove 99% of the volatile organic compounds (VOCs). The carbon adsorption treatment necessary to minimize transfer of VOCs to the air will generate spent carbon which is typically regenerated and reused, while recovered organic materials are reused or destroyed.

Alternatives 2B and 2D rely on treatment processes at the POTW for an expected 80% removal of VOCs from leachate. Nonbiodegradable VOCs will be transferred to the air medium at the POTW without further treatment. Sludges generated at the POTW are ultimately land applied.

Alternative 2A provides no treatment.

Short-term Effectiveness

All alternatives result in a temporary increase in the generation of dust during construction of the subsurface drain system. Alternative 2D substantially increases the generation of dust during cap construction. Alternatives 2B and 2D also result in increased vehicle traffic and resulting dust due to leachate transportation to the POTW.

As a precaution, on-site workers should be protected from exposure to landfill debris; nuisance dust protection for on-site workers is also recommended. Worker health and safety practices will be instituted.

Alternatives 2A, 2B, and 2C are expected to require six months to construct. Alternative 2D is expected to require twelve months to construct, occurring over two construction seasons.

Implementability

Alternatives 2B and 2C would be easily implemented with the remedy components readily available, simple to construct and operate, easily monitored for effectiveness, and allowing for future expansion of the proposed leachate collection system. Alternative 2A would be simple to construct but somewhat difficult to operate due to the recirculation system's seasonal dependence on evapotranspiration rates. Alternative 2D would be difficult to construct because a large volume of earth is required for construction of the cap, and this material is not available on site; however, cap technology is well established and implementable. Future expansion of the proposed leachate collection system would be difficult after the cap is installed.

Cost

The present worth costs for the alternatives range from \$2,200,623 for Alternative 2A to \$9,858,678 for Alternative 2D. The large volume of earthwork included in Alternative 2D is responsible for making Alternative 2D's estimated cost more than three times as much as the other source control alternatives under consideration. Alternative 2B has a present worth cost of \$3,221,631. Alternative 2C has a present worth cost of \$3,040,611.

State/Support Agency Acceptance

USEPA Region V, as the designated support agency for this site, concurs with the Illinois Environmental Protection Agency's recommendation of Alternative 2C as the selected remedy for the Adams County Quincy Landfills 2 & 3 site.

Community Acceptance

The public has been given the opportunity to review and comment on the Remedial Investigation report, the Focused Feasibility Study report, and the Proposed Plan for site remediation. Both a public comment period and a formal public hearing were held. The community expressed interest in the proposed remedy via attendance at the public hearing (approximately 45 persons attended) and with verbal questions and comments, but generally did not oppose it.

The Participating Respondent Group (responsible parties for the site) also generally supports the selected remedy.

Specific responses to questions and comments are addressed in the Responsiveness Summary, which is attached to this decision summary as Appendix B.

Evaluation of Alternatives 3A, 3B, and 3C

The Agency and USEPA have determined that Alternative 3B would be implemented if monitoring data indicate that further groundwater remediation is required. Alternative 3A requires installation of approximately five miles of sewer connection pipe to discharge untreated groundwater to the City of Quincy POTW, while Alternative 3C includes an unproven and therefore potentially unreliable treatment technology. Alternative 3B could be easily implemented through the use of the selected remedy's components by treating collected groundwater in the existing on-site leachate treatment system and discharging the treated groundwater via the same discharge point as the treated leachate. Regulatory requirements for groundwater treatment and discharge to surface waters would be essentially the same as for the leachate treatment system and discharge point. Alternative 3B is the least costly of the three alternatives. Alternative 3B satisfies the NCP's nine evaluation criteria.

The Selected Remedy

Based on consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, both IEPA and USEPA Region V have determined that Alternative 2C is the most appropriate remedy for the Adams County Quincy Landfills 2 & 3 site in rural Quincy, Illinois. Alternative 2C is a leachate management alternative including leachate collection, treatment, and discharge to surface waters, in addition to implementation of a groundwater monitoring program which may trigger the groundwater remedial action described as Alternative 3B. See Table 6-8 for a cost estimate summary of the selected remedy.

The selected final remedy for this site is the same preferred alternative presented in the Proposed Plan developed and issued by the IEPA. Details of the components of the remedy may be altered

as a result of the remedial design and field conditions encountered during construction and facility startup. The IEPA will continue to provide direct oversight of the design, construction, and long-term remedial action phases and any modifications.

The remedy includes physical access restriction with upgrade of the existing fence and/or installation of additional fencing so that the site will have a six-foot high cyclone fence with barbed wire at the top, around the entire site sufficient to prevent the public from easily entering the site. The fence shall be posted with numerous (at each of the four points of the compass and at other obvious access areas, such as the entrance gate) visible warning signs to inform the public of potential site hazards.

The site's real estate deed shall be amended to include prohibition of on-site groundwater use; on-site building construction; and on-site drilling except for the purposes of remedial design, sampling, monitoring, and remedial action.

A public water supply shall be supplied to six nearby residences located northwest of the site in order to eliminate the groundwater exposure pathway to those persons consuming groundwater. This will supplement the 1986 extension of the Mill Creek Water District to nearby residences.

The remedy includes a groundwater monitoring program to track the changes in impact of site constituents on groundwater, which would then be used to determine if additional actions are triggered by concentrations exceeding levels pursuant to the Illinois Groundwater Quality Standards at 35 Illinois Administrative Code 620. It should be noted that a contaminated groundwater plume migrating off site has not been scientifically identified and located. However, no other source of off-site groundwater contamination has been identified.

This Record of Decision does not require the immediate implementation of an active groundwater remedy because existing data indicate that relatively few sampling results show groundwater contamination at levels of concern. The leachate source control remedy should have a positive impact on groundwater quality, and effective source control combined with natural attenuation may adequately address low level groundwater contamination. However, if groundwater monitoring indicates that contamination exceeds compliance levels, a groundwater pump and treat system will be installed to minimize contaminant migration.

The monitoring program would be consistent with 35 Illinois Administrative Code 620.505 and 620.510. A groundwater management zone as described at 35 Illinois Administrative Code 620 must be established for areas undergoing effective corrective action.

Monitoring would continue for a minimum of five years with duration

of monitoring dependent on results of the statistical evaluation of groundwater data. Monitoring may cease after standards at 35 Illinois Administrative Code 620.410 have been complied with for a minimum of one year.

Pursuant to the requirements of 35 Illinois Administrative Code 724.195 a groundwater point of compliance must be established at the site boundary, which is also the source boundary. Compliance shall be determined by analysis for the parameters in Appendix I at 35 Illinois Administrative Code 724.

A leachate monitoring program would be implemented that tests leachate for five-day biochemical oxygen demand, chemical oxygen demand, total suspended solids, dissolved iron, pH, and any other parameters known present based on analytical data or believed present at the point of leachate discharge into surface waters. Any discharge to surface waters of the State would be subject to the NPDES program at 40 CFR 122, which is implemented in Illinois pursuant to 35 Illinois Administrative Code 309. The point of wastewater discharge--either on site or off site--has not been determined and will be established in the design phase of this remedy. If the discharge point is located on site, no permits are required, but the discharge standards at 35 Illinois Administrative Code 302 and 304 are applicable. If the discharge point is located off site, permits are required and those permits will include the stated discharge standards.

Surface controls including berms, lined ditches, and catch basins (refer to Figure 7) would be installed to manage surface water infiltration into the landfill and to minimize landfill surface erosion. The purpose of the controls is to direct infiltration away from known disposal areas.

Components of the remedy will be constructed and maintained pursuant to the requirements of 35 Illinois Administrative Code 807 and 811, Solid and Special Waste Management Regulations, specifically regarding final cover and closure requirements. This includes a minimum of three feet of clay cover over the landfill surface, particularly in areas of cap erosion (see Figure 8), and leachate management. Site vegetative cover will be maintained.

Site leachate would be collected through a network of subsurface drains. Preliminary estimates have determined that approximately 1,000 linear feet of three-foot-wide drains would be installed at a depth of 11 feet.

Collected leachate shall be treated on site by one or more of the following processes, to be determined by treatability testing and/or pilot studies: neutralization, metals precipitation, gravity separation, air stripping, carbon adsorption. The treated leachate shall be discharged to a nearby unnamed stream tributary to Mill Creek. The discharge is subject to the NPDES program at 40

CFR 122, which is implemented in Illinois pursuant to Illinois Administrative Code 309. The point of wastewater discharge--either on site or off site--has not been determined and will be established in the design phase of this remedy. If the discharge point is located on site, no permits are required, but the discharge standards at 35 Illinois Administrative Code 302 and 304 are applicable. If the discharge point is located off site, permits are required and those permits will include the stated discharge standards. The wastewater treatment works shall be operated under the supervision of a certified operator pursuant to 35 Illinois Administrative Code 312. The air stripper is subject to the RCRA requirements at 40 CFR 264, Part AA which limits organic material emissions. Any residues generated from treatment processes, including precipitated metals and spent carbon, shall be disposed of pursuant to applicable solid waste disposal standards, such as the RCRA requirements at 40 CFR 261.

Statutory Determinations

The selected remedy must satisfy the requirements of Section 121 of CERCLA to protect human health and the environment; comply with ARARs; be cost effective; utilize permanent solutions and alternate treatment technologies to the maximum extent practicable; and satisfy the preference for treatment as a principle element of the remedy.

Protection of Human Health and the Environment

Implementation of the selected remedy will reduce and control potential risk to human health from exposure to groundwater through institutional controls, containment, and treatment technologies. The remedy will reduce risk to within the acceptable range of 1×10^{-4} to 1×10^{-6} excess cancer risk and the hazard indices for non-carcinogens will be less than one. To the extent groundwater monitoring indicates that unacceptable risks remain or groundwater cleanup levels are not met, further groundwater remediation will be required. The selected remedy also provides environmental protection from potential risks posed by contaminants discharging to surface waters, soils, sediment, and the ambient air.

No unacceptable short-term risk or cross-media impacts will be caused by implementation of the selected remedy.

Compliance with ARARs

With respect to any hazardous substances, pollutants, or contaminants that will remain on site, Section 121 (2) (A) of CERCLA requires the USEPA to select a remedial action which complies with legally applicable or relevant and appropriate standards, requirements, criteria or limitations (ARARs), or to justify a waiver of ARARs. The selected remedy will comply with Federal ARARs or State ARARs where State ARARs are more stringent, as

determined by USEPA. USEPA has not identified any ARAR waivers which are required at this time. The remedy will be implemented in compliance with applicable provisions of CERCLA and the NCP.

To Be Considered Criteria (TBCs) are included in the discussion of ARARs; however, TBCs are not ARARs, but they may be used to design a remedy or set cleanup levels if no ARARs address the site, or if existing ARARs do not ensure protectiveness. TBCs may include advisories and guidance.

Chemical-Specific ARARs: Chemical-specific ARARs regulate the release to the environment of specific substances having certain chemical characteristics. Chemical-specific ARARs typically define the extent of cleanup at a site.

- Safe Drinking Water Act (SDWA) National Primary Drinking Water Standards (40 CFR 141), MCLs are applicable and proposed MCLs are to be considered.
- Safe Drinking Water Act (SDWA) National Primary Drinking Water Standards (40 CFR 143) non-zero MCLGs are applicable and non-zero proposed MCLGs are to be considered.
- Federal Water Pollution Control Act (also known as the Clean Water Act--CWA) (40 CFR 122, 125, 129, 131), ambient water quality criteria and NPDES requirements are applicable to direct discharge of treated leachate, storm water runoff, and groundwater; delegated NPDES program in Illinois is implemented at 35 Illinois Administrative Code 302, 304, and 309.
- Illinois Groundwater Quality Standards (35 Illinois Administrative Code 620.410) are applicable for groundwater standards.
- Clean Air Act National Ambient Air Quality Standards (40 CFR 50), are applicable to air emissions; delegated program in Illinois is implemented at 35 Illinois Administrative Code 201.
- National Emissions Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR 61) are applicable to air emissions; delegated program in Illinois is implemented at 35 Illinois Administrative Code 232.
- IEPA COT/CROPA cleanup objectives based on a combination of ARARs which are listed independently in other bullets in this section, TBCs, or risk calculations to the 10-6 risk target levels were determined in August 1991 and are included in Table 8. They consist of a combination of ARARs and TBCs for contaminants of concern in a Class I

drinking water aquifer and Class I soils.

Location-Specific ARARs: Location-specific ARARs are those requirements that relate to the geographic location of a site.

- Federal Endangered Species Act of 1973, as amended. The Endangered Species Act requires that actions must be performed to conserve endangered or threatened species located in and around the site. Activities must not destroy or adversely modify the critical habitat upon which endangered species depend.

Action-Specific ARARs: Action-specific ARARs are requirements that define acceptable treatment and disposal requirements for hazardous substances. The substantive requirements of the following may be ARARs.

- Resource Conservation and Recovery Act (RCRA) (40 CFR 264 Subparts AA & BB), is applicable to air stripper emissions; delegated program in Illinois is implemented at 35 Illinois Administrative Code 724 Subparts AA & BB.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 261) is applicable for definition and identification of hazardous wastes for identifying proper disposal of wastes and may be relevant and appropriate for sampling activity; delegated program in Illinois is implemented at 35 Illinois Administrative Code 721.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 262) is applicable for generators of hazardous wastes if such materials are disposed off site; delegated program in Illinois is implemented at 35 Illinois Administrative Code 722.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 263) is applicable for transporters of hazardous wastes; delegated program in Illinois is implemented at 35 Illinois Administrative Code 723.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 268) is applicable for soil excavation and treatment residuals if soils test TCLP hazardous (LDRs) if those materials are to be moved or placed outside of an area of contamination and/or are to be disposed off site; delegated program in Illinois is implemented at 35 Illinois Administrative Code 728; 35 Illinois Administrative Code 808 Solid and Special Waste Management Regulations are applicable if soils test not-TCLP hazardous.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 264

Subpart B) is relevant and appropriate for general facility standards; delegated program in Illinois is implemented at 35 Illinois Administrative Code 724 Subpart B.

- Resource Conservation and Recovery Act (RCRA) (40 CFR 264 Subpart D) is relevant and appropriate for contingency planning; delegated program in Illinois is implemented at 35 Illinois Administrative Code 724 Subpart B.
- Illinois Groundwater Quality Standards (35 Illinois Administrative Code 620 Subpart E) are applicable for the groundwater monitoring remedy component.
- Resource Conservation and Recovery Act (RCRA) (40 CFR 264 Subpart F) is applicable for groundwater monitoring; delegated program in Illinois is implemented at 35 Illinois Administrative Code 724 Subpart F.
- Illinois Solid Waste and Special Waste Handling Regulations (35 Illinois Administrative Code 807, 811, 812, 814, and 815) are applicable for the leachate collection system, final cover, and closure requirements.
- Illinois Solid Waste and Special Waste Handling Regulations (35 Illinois Administrative Code 808 and 809) are applicable for any off-site special waste hauling.
- Treatment Plant Operator Certification (35 Illinois Administrative Code 312) is applicable for certification of the wastewater treatment works operator.

Cost Effectiveness

Cost effectiveness is determined by evaluating the overall effectiveness proportionate to costs, such that the selected remedy represents a reasonable value for the money to be spent. The estimated net present worth value of the selected remedy is more than three times less than the costs associated with the most expensive alternative, which includes installation of a multi-media cap, yet the selected remedy will be effective in the long term due to a significant reduction in the mobility and toxicity of on-site contamination. The selected remedy, with provisions for further monitoring and if necessary, further remediation of groundwater contamination, provides a high degree of certainty that hazards posed by contamination at the site will be eliminated or reduced to within acceptable levels.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy meets the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable in a cost-effective manner. Of those alternatives that are protective of human health and the environment and comply with ARARs, IEPA and USEPA have determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; short-term effectiveness; implementability; and cost while considering the statutory preference for treatment as a principal element and considering USEPA and community acceptance.

The selected remedy provides a high degree of long-term effectiveness and permanence when compared to the leachate recirculation and multi-media cap alternatives. The leachate collection and treatment system provides contaminant containment and on-site treatment, resulting in reduced contaminant mobility and toxicity. The leachate recirculation alternative is less reliable at providing source control due to some unreliability of the technology, thereby increasing the possibility of contaminant mobility, while the multi-media cap alternative is significantly more costly when compared to the amount of risk reduction provided. IEPA and USEPA have determined that the calculated site risks do not justify the expense required to install and maintain the multi-media cap.

The selected remedy treats the principal threat posed by contaminated leachate by removing an expected 99 percent of the volatile organic materials (VOCs) from the leachate by air stripping; additional removal will be provided if carbon treatment is added on to the air stripper. The selected remedy also provides a less costly treatment option than the off-site POTW treatment of leachate.

Preference for Treatment as a Principal Element

The selected remedy addresses one of the principal threats posed by the site through the use of treatment technologies to reduce the threat posed by contaminated leachate. By providing source control through leachate collection and treatment, groundwater quality is expected to improve, thereby providing reduction of risk. Therefore, the statutory preference for remedies that employ treatment as a principal element is satisfied.

Documentation of Significant Changes

The Proposed Plan for the Adams County Quincy Landfills 2 & 3 site was issued for public comment on March 29, 1993. The Proposed Plan identified Alternative 2C as the preferred alternative. The public comment period ended on May 28, 1993.

The Agency reviewed all public questions and comments presented at

the April 28, 1993 public hearing and all written comments received during the public comment period (see Responsiveness Summary in Appendix B). The Agency determined that no significant changes to the remedy as it was identified in the Proposed Plan are necessary.

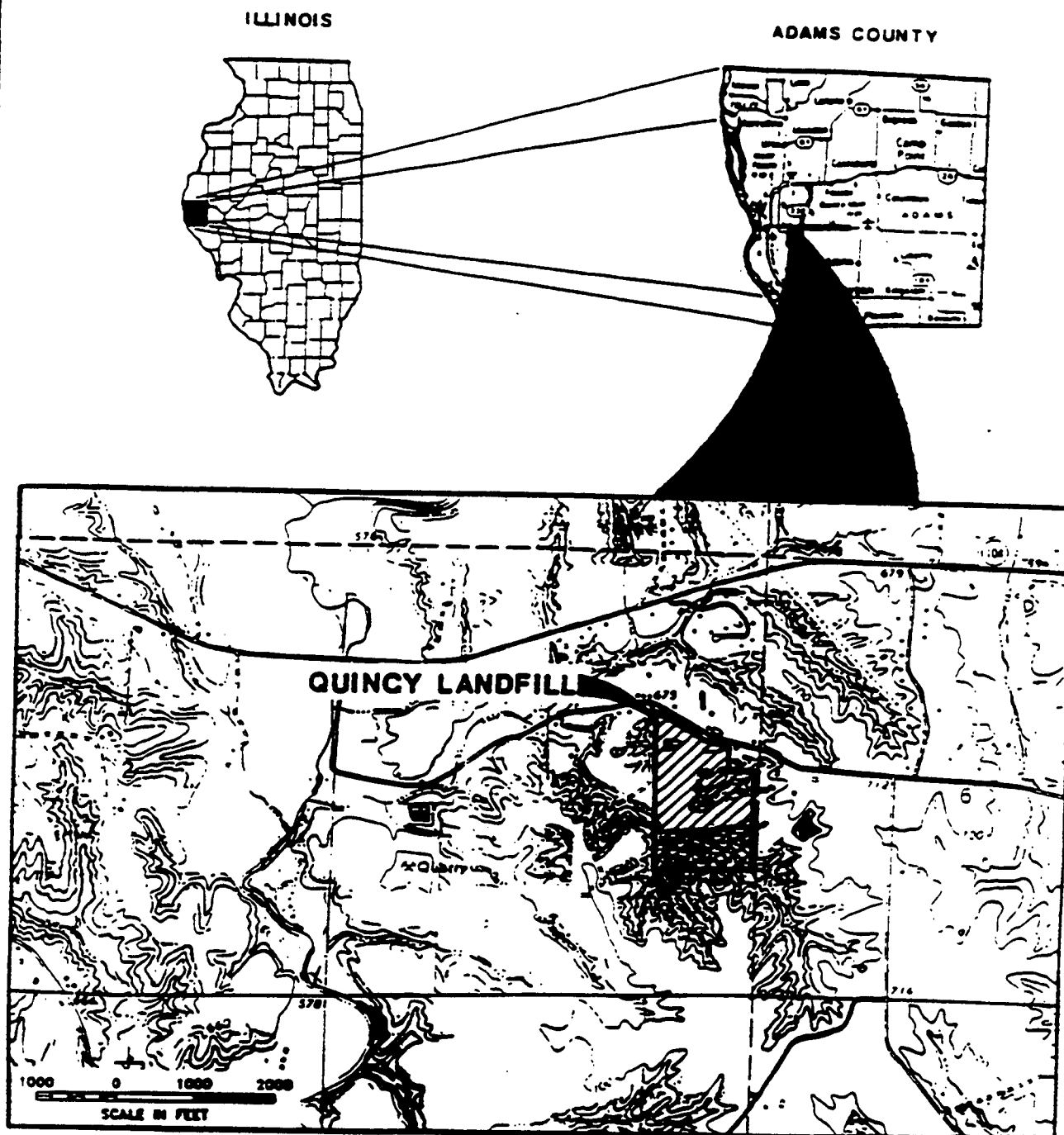
APPENDIX A

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- Figure 4. Groundwater Flow Direction.
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FIGURE 1. Site Location.



SCALE IS VARIABLE



John Mothes & Associates, Inc.

SITE LOCATION MAP

Modified from U.S. Geological Survey Quincy East,
Illinois, quadrangle, photorevised 1971

QUINCY LANDFILL
QUINCY, ILLINOIS
124040

FIGURE 2-1

FIGURE 2. Site Vicinity Map.

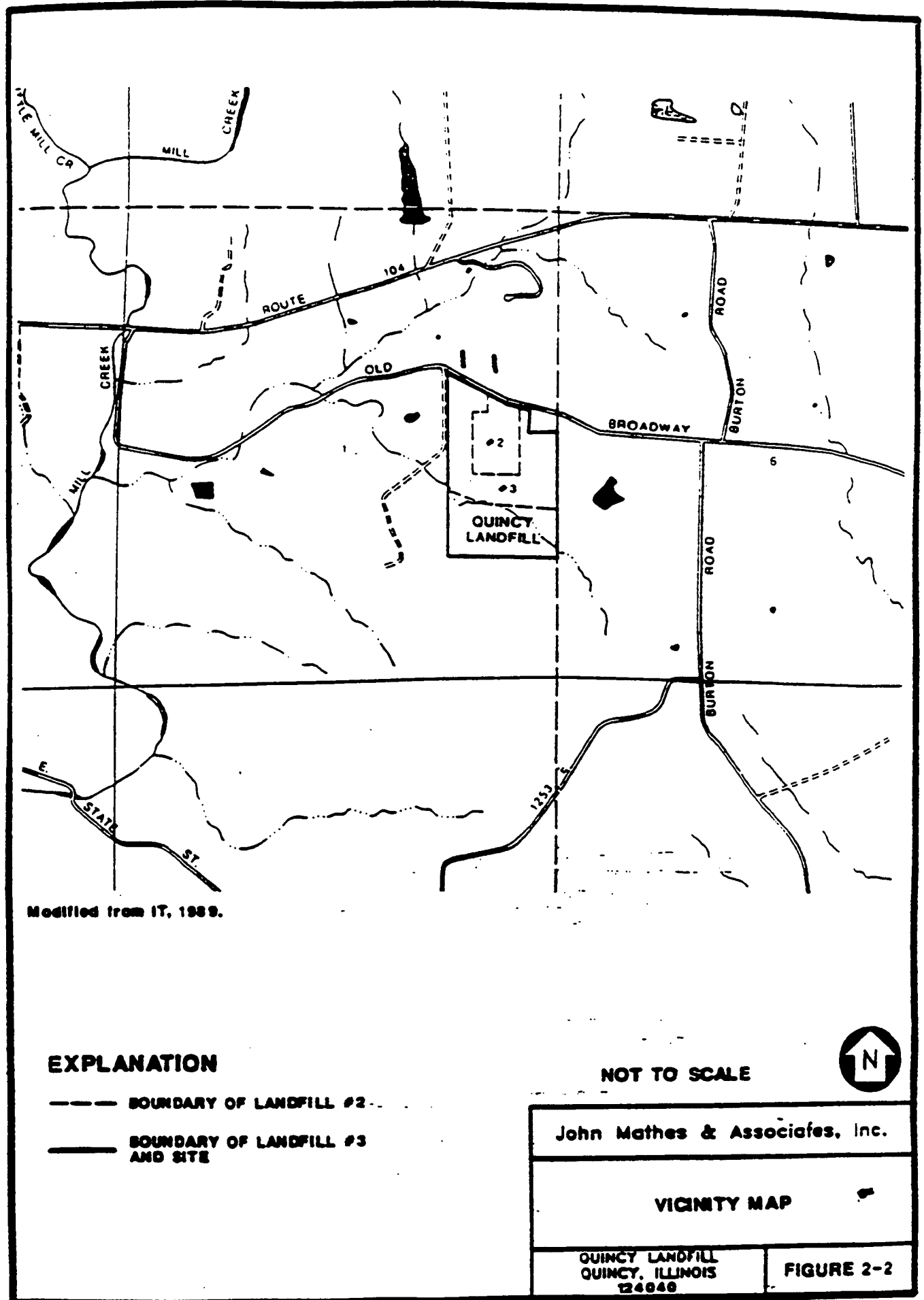
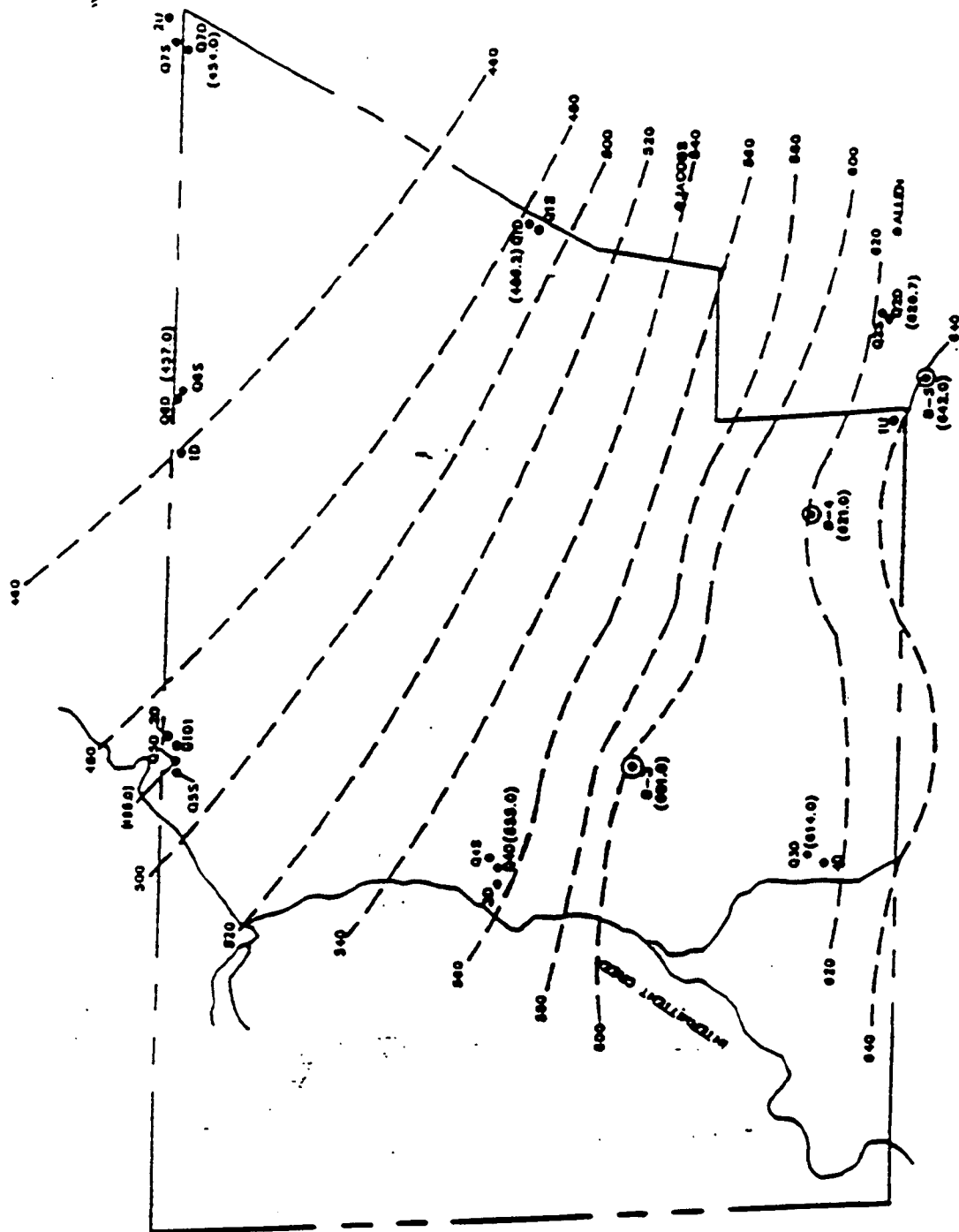


FIGURE 3. Bedrock Elevation.



LEGEND

- QJ-1 MONITORING WELL LOCATION
- QUINCY LANDFILL PROPERTY BOUNDARY
- 320 — BEDROCK ELEVATION CONTOUR (IN FEET)
- ⊙ BORING LOCATION

NOTE:
ONLY THOSE WELLS AND BORINGS
DRILLED TO BEDROCK WERE USED TO
GENERATE ELEVATION OF BEDROCK.
ELEVATIONS ARE INDICATED
IN PARENTHESES.

Modified from IT, 1985.

NOT TO SCALE



John Mathes & Associates, Inc.

BEDROCK ELEVATION

QUINCY LANDFILL
QUINCY, ILLINOIS
124040

FIGURE 2-5

The map displays the Fort Belknap Reservation, Montana, with the Fort Belknap River flowing through it. The river is depicted as a solid line, and the surrounding land is divided into parcels by dashed lines. Key features include:

- Fort Belknap River:** A solid line flowing from the top left towards the bottom right.
- Land Parcels:** Dashed lines delineate various parcels, many of which are labeled with numbers and names.
 - Parcel 10: (603.30)
 - Parcel 11: (603.30)
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 - Parcel 13: (603.30)
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 - Parcel 15: (603.30)
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 - Parcel 96: (603.30)
 - Parcel 97: (603.30)
 - Parcel 98: (603.30)
 - Parcel 99: (603.30)
 - Parcel 100: (603.30)
- Other Labels:**
 - JACOBS
 - ALLEN
 - 603
 - 610
 - 613
 - 620
 - 623
 - 627.37
 - 628
 - 630
 - 635
 - 640
 - 645
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 - 980
 - 985
 - 990
 - 995
 - 1000

030
 MONITORING WELL LOCATION

 CLUSTY LANDFILL PROPERTY BOUNDARY
 --- 000
 POTENTIOMETRIC SURFACE UNCLUSTY AQUIFER, JANUARY 1992, CONTOUR (IN FEET)
 GROUNDWATER FLOW DIRECTION

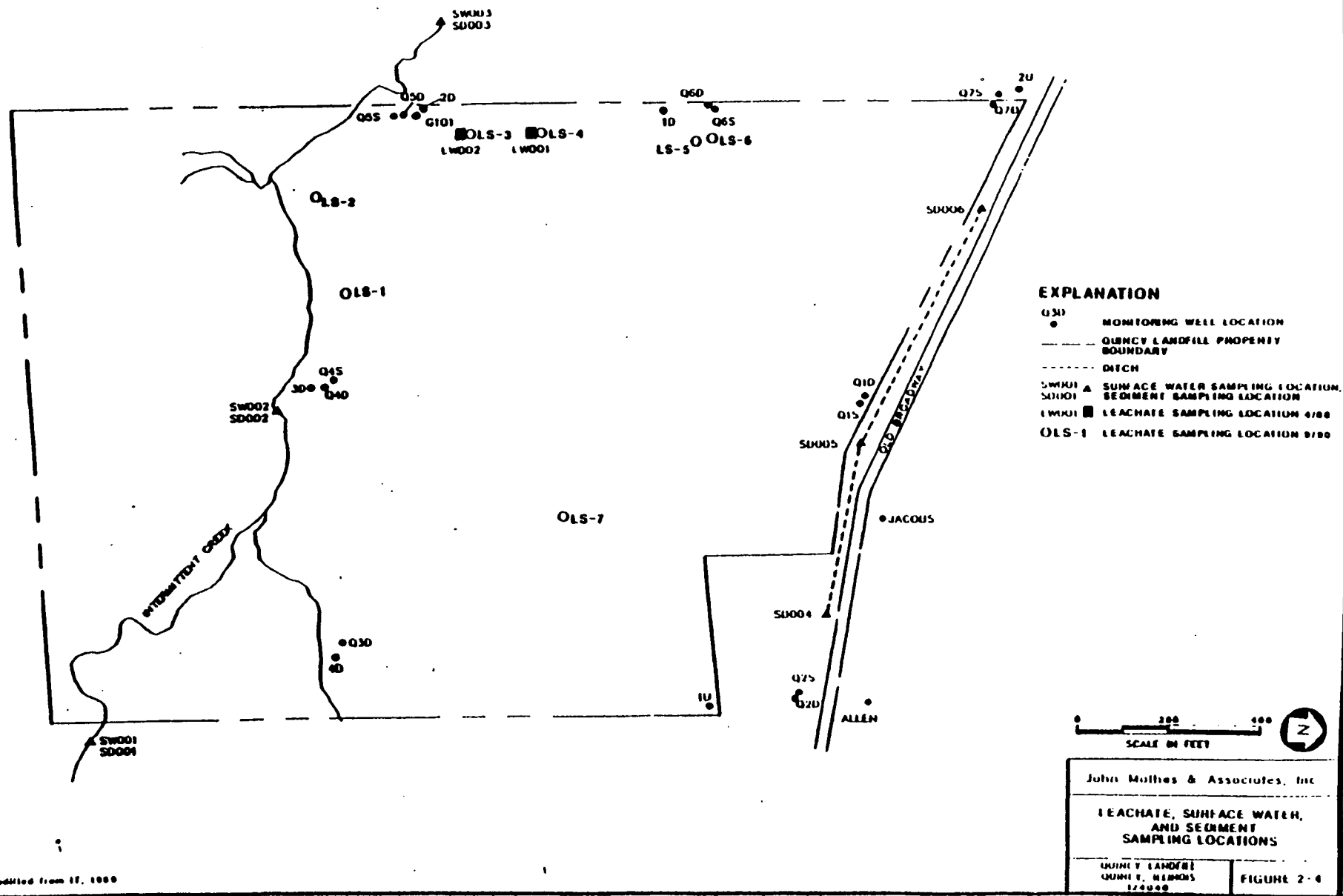
Modified from IT, 1988.

**POTENTIOMETRIC SURFACE
LIMESTONE AQUIFER
JANUARY 1968**

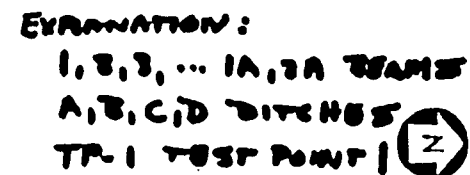
QUINCY LANDFILL
QUINCY, ILLINOIS
124040

FIGURE 2-6

FIGURE 6. Monitoring Locations.

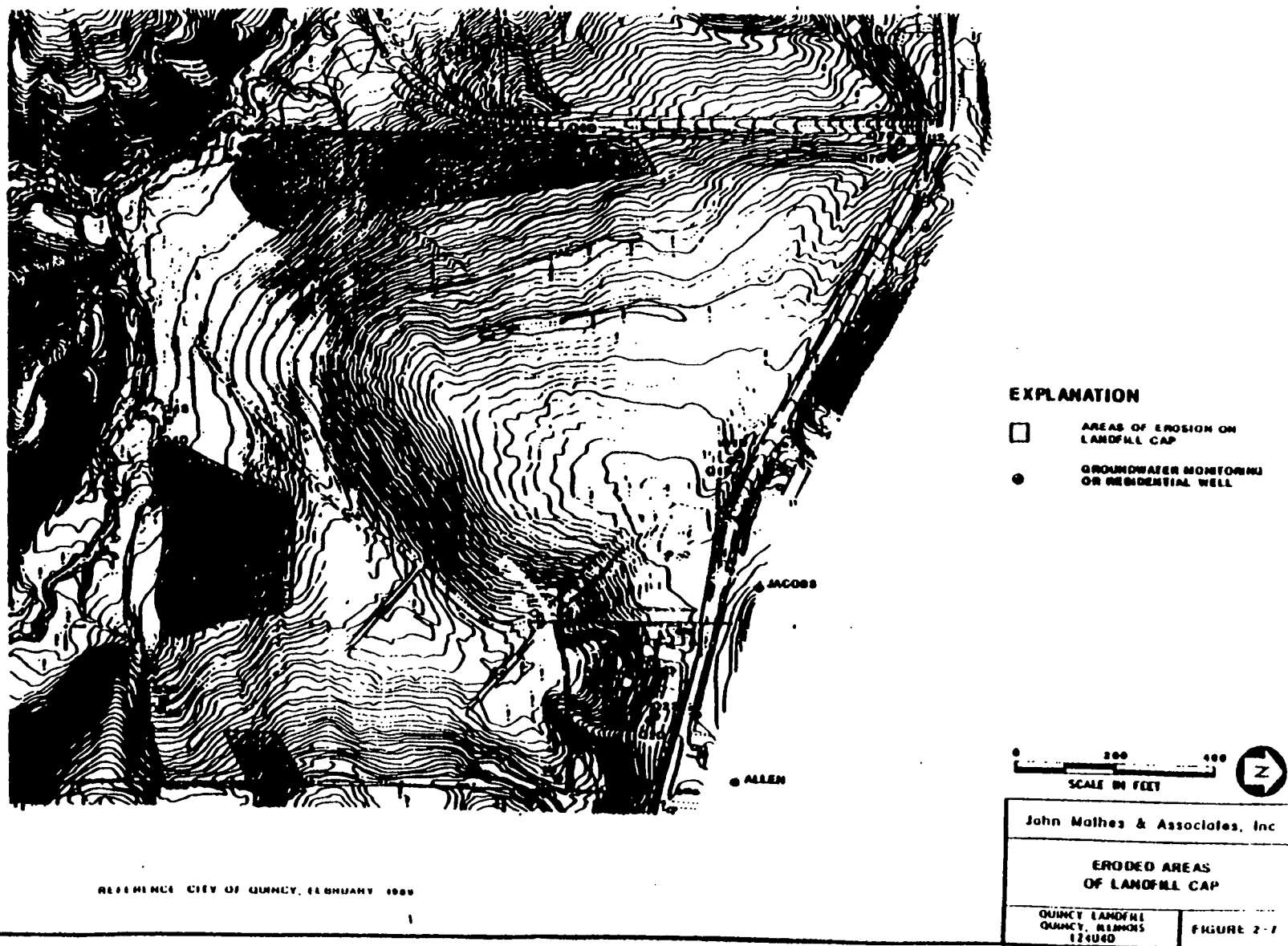


SKETCH 1



- NOT TO SCALE -
PROPOSED DRAINAGE PLAN

FIGURE 8. Areas of Cap Erosion.



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Table 2-1

SUMMARY STATISTICS FOR DETECTED ANALYTES IN SUBSURFACE SOIL

FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/kg)	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	Background Levels* (mg/kg)
SVOCs					
Di-n-butyl phthalate	1/9	0.4 - 0.4	1.5 - 1.5	0.344444	---
VOCs					
Ethylbenzene	1/9	0.005 - 0.006	0.008 - 0.008	0.003444	1.0 - 5.0
Nylenes (total)	1/9	0.005 - 0.006	0.029 - 0.029	0.005778	1.0 - 5.0
PCBs					
Aroclor 1254	1/9	0.04 - 0.2	0.23 - 0.23	0.058889	---
Metals					
Aluminum	9/9		610.0 - 5,920.0	4,048.667	10,000.0 - 300,000.0
Arsenic	5/9	0.1 - 1	1.0 - 3.6	1.194444	1.0 - 40.0
Barium	8/9	10.0 - 10.0	15.0 - 140	46.22222	100.0 - 3,500.0
Beryllium	1/9	0.5 - 0.5	0.61 - 0.61	0.29	1.0 - 10.0
Cadmium	6/9	0.5 - 0.5	0.87 - 3.3	1.346667	0.01 - 7.0
Calcium	9/9		1,150.0 - 37,500.0	20,610.0	100.0 - 400,000.0
Chromium	9/9		1.5 - 64.0	13.14444	5.0 - 3,000.0
Cobalt	4/9	5.0 - 5.0	5.0 - 13.0	5.3	1.0 - 40.0
Copper	6/8	2.5 - 2.5	5.9 - 10.0	6.3	2.0 - 100.0
Iron	9/9		5,770.0 - 21,300.0	11,562.22	7,000.0 - 550,000.0
Lead	4/8	20.0 - 20.0	29.0 - 30.0	19.875	2.0 - 200.0
Magnesium	9/9		650.0 - 7,690.0	3,944.444	600.0 - 6,000.0
Manganese	9/9		78.0 - 355.0	231.1111	100.0 - 4,000.0
Mercury	6/9	0.004 - 0.05	0.01 - 4.3	0.491667	0.01 - 0.08
Nickel	9/9		4.0 - 18.0	8.522222	5.0 - 1,000.0
Potassium	9/9		52.0 - 570.0	390.2222	400.0 - 30,000.0

Table 2-1, Continued

SUMMARY STATISTICS FOR DETECTED ANALYTES IN SUBSURFACE SOIL

FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/kg)	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	Background Levels* (mg/kg)
Metals, Continued					
Sodium	3/9	500.0 - 500.0	500.0 - 550.0	338.8889	10.0 - 100.0
Vanadium	8/9	4.0 - 4.0	9.2 - 16.0	11.57778	20.0 - 500.0
Zinc	9/9		5.3 - 460.0	68.92222	10.0 - 300.0

Note: Arithmetic mean calculated using 1/2 method for undetected compounds. Includes results flagged 9.

mg/kg Milligrams per kilogram.
PCBs Polychlorinated biphenyls.
SVOCs Semivolatile organic compounds.
VOCs Volatile organic compounds.
* Oregon, 1988.

Table 2-2

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN GROUNDWATER
ON-SITE MONITORING AND RESIDENTIAL WELLS
PHASE I RI, PHASE II RI, AND
OCTOBER 1990 SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/L)	Range of Detected Concentrations (mg/L)	Arithmetic Mean (mg/L)	Background Levels (mg/L)
SVOCs					
bis(2-Ethylhexyl) phthalate	4/20	0.01 - 0.02	0.002 - 0.15	0.01795	ND - 0.102
VOCs					
Acetone	4/24	0.005 - 0.05	0.007 - 0.12	0.019333	...
Benzene	13/60	0.005 - 0.005	0.001 - 0.006	0.002642	ND - 0.22
Chloroethane	10/59	0.005 - 0.01	0.004 - 0.025	0.006203	...
Chloroform	1/60	0.005 - 0.01	0.003 - 0.003	0.00255	ND - 0.0002
1,1-Dichloroethane	11/60	0.005 - 0.005	0.031 - 0.23	0.020225	ND - 0.0003
1,1-Dichloroethene	6/60	0.005 - 0.005	0.002 - 0.005	0.0026	ND - 0.0026
1,2-Dichloroethene	1/10	0.005 - 0.005	0.015 - 0.015	0.00375	ND - 0.0026
Ethylbenzene	3/60	0.005 - 0.01	0.001 - 0.007	0.002583	ND - 0.00087
Methylene chloride	1/12	0.005 - 0.005	0.023 - 0.023	0.004208	0.005 - 0.0053
Tetrachloroethene	10/60	0.005 - 0.005	0.003 - 0.029	0.004567	ND - 0.0017
Toluene	5/31	0.005 - 0.005	0.002 - 0.073	0.004871	ND - 0.0029
trans-1,2-Dichloroethene	8/50	0.005 - 0.005	0.002 - 0.017	0.00342	ND - 0.0026
Trichloroethylene	12/60	0.005 - 0.005	0.001 - 0.016	0.00345	ND - 0.0011
1,1,1-Trichloroethane	5/59	0.005 - 0.005	0.008 - 0.026	0.003475	ND - 0.0125
Vinyl chloride	4/60	0.01 - 0.01	0.002 - 0.007	0.005017	ND - 0.046
Xylenes (total)	2/60	0.005 - 0.01	0.008 - 0.055	0.003508	ND - 0.75
Metals					
Aluminum	23/54	0.2 - 0.2	0.013 - 0.75	0.161296	0.014 - 0.290
Antimony	1/54	0.06 - 0.06	0.075 - 0.075	0.030833	...
Arsenic	3/54	0.01 - 0.01	0.008 - 0.086	0.007944	ND - >0.005
Barium	33/54	0.2 - 0.2	0.035 - 0.9	0.176259	ND - >0.25
Boron	1/29	0.2 - 0.2	0.34 - 0.34	0.108276	...
Cadmium	5/54	0.005 - 0.005	0.004 - 0.007	0.00275	ND - >0.002
Calcium	51/54	5.0 - 5.0	0.96 - 404.0	97.05389	...

Table 2-2, Continued

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN GROUNDWATER
ON-SITE MONITORING AND RESIDENTIAL WELLS
PHASE I RI, PHASE II RI, AND
OCTOBER 1990 SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/L)	Range of Detected Concentrations (mg/L)	Arithmetic Mean (mg/L)	Background Levels (mg/L)
Metals, Continued					
Chromium	1/54	0.01 - 0.01	0.005 - 0.005	0.005	ND - 0.049
Cobalt	3/54	0.05 - 0.05	0.01 - 0.16	0.02787	---
Copper	8/54	0.025 - 0.025	0.004 - 0.15	0.01663	ND - 0.47
Cyanide	5/22	0.02 - 0.02	0.02 - 0.02	0.012273	---
Iron	26/54	0.1 - 0.1	0.011 - 86.0	5.373407	1.0 - 10.0
Lead	8/81	0.005 - 0.2	0.006 - 0.053	0.021901	ND - 0.182
Magnesium	47/54	5.0 - 5.0	2.92 - 130.0	33.34722	---
Manganese	40/54	0.015 - 0.015	0.001 - 7.2	0.377593	<1
Mercury	6/53	0.0002 - 0.002	0.0001 - 0.0009	0.000225	ND - >0.002
Nickel	9/54	0.04 - 0.04	0.007 - 0.042	0.019481	ND - 0.012
Potassium	27/54	5.0 - 28.0	0.82 - 27.0	5.199444	---
Selenium	6/54	0.005 - 0.005	0.005 - 0.029	0.003519	ND - 0.065
Silver	6/54	0.01 - 0.01	0.006 - 0.15	0.008037	ND - 0.040
Sodium	50/54	5.0 - 5.0	5.0 - 430.0	76.60574	ND - 402.0
Vanadium	10/54	0.05 - 0.05	0.004 - 0.04	0.022998	---
Zinc	34/54	0.02 - 0.02	0.012 - 1.1	0.101241	---

Sources of Background Level: USEPA, 1990c (Ni, Cu); USEPA, 1985 (B, Vinyl Chloride); USEPA, 1985 (As, Ba, Cd, Cr, Pb, Hg, Sb, Al, Ag, Na, E, I, K); and ISWS, 1988 - Chlorinated Hydrocarbons (1,1-Dichloroethene, Methylene Chloride, trans-1,2-Dichloroethene, 1,1-Dichloroethane, Chloroform, 1,1,1-Trichloroethane, Trichloroethylene, Tetrachloroethene, Chlorobenzene).

Note: Arithmetic mean calculated using 1/2 method for undetected compounds. Includes results flagged B.

mg/L Milligrams per liter.

SVOCs Semivolatile organic compounds.

VOCs Volatile organic compounds.

Table 2-3

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN SURFACE WATER
PHASE II RI SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/L)	Range of Detected Concentrations (mg/L)	Arithmetic Mean (mg/L)	Background Levels ^a (mg/L)
VOCs					
Chloroform	1/4	0.005 - 0.005	0.002 - 0.002	0.002375	---
Metals					
Aluminum	3/4	0.2 - 0.2	0.036 - 0.046	0.05675	0.016 - 1.167
Barium	3/4	0.2 - 0.2	0.17 - 0.4	0.2425	---
Calcium	2/4	5.0 - 120.0	100.0 - 100.0	65.625	4.3 - 38.0
Copper	1/4	0.025 - 0.025	0.01 - 0.01	0.011875	ND - 0.304
Iron	2/4	0.1 - 0.1	0.03 - 0.1	0.0575	0.02 - 0.06
Magnesium	3/4	5.0 - 5.0	16.0 - 56.0	28.375	3.35 - 10.0
Manganese	3/4	0.015 - 0.015	0.042 - 2.3	0.777375	<1
Mercury	2/4	0.0002 - 0.0002	0.001 - 0.0012	0.0006	---
Nickel	2/4	0.04 - 0.04	0.013 - 0.02	0.01825	ND - 0.008
Potassium	2/4	5.0 - 5.0	27.0 - 53.0	21.25	1.3 - 2.9
Silver	3/4	0.01 - 0.01	0.005 - 0.009	0.0065	ND - 0.004
Sodium	3/4	5.0 - 5.0	9.0 - 150.0	62.875	ND - 402.0
Vanadium	3/4	0.05 - 0.05	0.011 - 0.014	0.0155	---
Zinc	1/4	0.02 - 0.02	0.013 - 0.013	0.01075	---

Sources of Background Levels: USEPA, 1990c (Ni, Cu); USEPA, 1985 (Al, Ag, Ba, T); USGS, 1985 (Ca, Fe, Mg, Mn, K, Na).

Note: Arithmetic mean calculated using L/2 method for undetected compounds. Includes results flagged B.

mg/L Milligrams per liter.
VOCs Volatile organic compounds.

Table 2-4

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN SEDIMENTS
PHASE II RI SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/kg)	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	Background Levels* (mg/kg)
SVOCs					
Anthracene	1/7	0.3 - 0.3	0.2 - 0.2	0.157143	---
Benzo(a)anthracene	1/7	0.3 - 0.3	0.4 - 0.4	0.185714	0.0 - 0.01
Benzo(a)pyrene	1/7	0.3 - 0.3	0.3 - 0.3	0.171429	0.0 - 8.0
Benzo(b)fluoranthene	1/7	0.3 - 0.3	0.7 - 0.7	0.228571	0.0 - 0.03
Benzo(g,h,i)perylene	1/7	0.3 - 0.3	0.2 - 0.2	0.157143	0.0 - 0.02
Chrysene	1/7	0.3 - 0.3	0.4 - 0.4	0.185714	5.0 - 0.04
Fluoranthene	3/7	0.3 - 0.3	0.05 - 0.8	0.221429	0.0 - 0.04
Fluorene	1/7	0.3 - 0.3	0.06 - 0.06	0.137143	---
Indeno(1,2,3-c,d)pyrene	1/7	0.3 - 0.3	0.2 - 0.2	0.157143	0.0 - 0.015
Phenanthrene	1/7	0.3 - 0.3	0.9 - 0.9	0.257143	---
bis-(2-Ethylhexyl) phthalate	1/7	0.3 - 0.3	0.4 - 0.4	0.185714	150.0 - 925.0**
Pyrene	3/7	0.3 - 0.3	0.05 - 0.7	0.207143	---
Metals					
Aluminum	7/7		830.0 - 9,670.0	4,300.00	10,000.0 - 300,000.0
Arsenic	6/7	6.0 - 6.0	1.3 - 7.4	4.085714	1.0 - 40.0
Barium	7/7		15.0 - 140.0	70.57143	100.0 - 3,500.0
Beryllium	4/7	0.3 - 2.0	0.3 - 1.3	0.835714	1.0 - 10.0
Cadmium	1/7	0.3 - 2.0	0.4 - 0.4	0.557143	0.01 - 7.0
Calcium	7/7		3,330.0 - 108,000.0	35,955.71	100.0 - 400,000.0
Chromium	7/7		2.8 - 16.0	8.314286	5.0 - 3,000.0
Cobalt	4/7	20.0 - 20.0	2.6 - 10.0	7.914286	1.0 - 40.0
Copper	4/7	2.0 - 10.0	3.2 - 22.0	6.685714	2.0 - 100.0
Iron	7/7		3,160.0 - 128,000.0	5,640.0	7,000.0 - 550,000.0
Lead	7/7		3.3 - 82.0	27.48571	2.0 - 200.0
Magnesium	7/7		30.0 - 11,400.0	3,290.0	600.0 - 6,000.0
Manganese	7/7		220.0 - 2,020.0	802.8571	100.0 - 4,000.0
Mercury	7/7		0.011 - 0.052	0.028143	0.01 - 0.08
Nickel	6/7	20.0 - 20.0	2.3 - 20.0	10.0	5.0 - 1,000.0
Potassium	7/7		300.0 - 1,190.0	738.5714	400.0 - 30,000.0

Table 2-4, Continued

SUMMARY STATISTICS FOR DETECTED ANALYTES IN SEDIMENTS
PHASE II RI SAMPLING ACTIVITIES

FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/kg)	Range of Detected Concentrations (mg/kg)	Arithmetic Mean (mg/kg)	Background Levels* (mg/kg)
Metals, Continued					
Silver	1/7	0.6 - 4.0	4.0 - 4.0	1.264286	0.1 -
5.0					
Vanadium	7/7		6.0 - 29.0	17.71429	20.0 - 500.0
Zinc	7/7		5.0 - 290.0	61.0	10.0 - 300.0

Note: Arithmetic mean calculated using L/2 method for undetected compounds. Includes results flagged 8.

mg/kg Milligrams per kilogram.

SVOCs Semivolatile organic compounds.

VOCs Volatile organic compounds.

* Drogen, 1988.

** Data presented as mg/kg organic matter.

Table 2-5

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN LEACHATE SAMPLES
PHASE II RI AND OCTOBER 1990 SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/L)	Range of Detected Concentrations (mg/L)	Arithmetic Mean (mg/L)	Background Levels* (mg/L)
SVOCs					
1,4-Dichlorobenzene	1/4	0.01 - 0.05	0.024 - 0.024	0.01975	---
2-Methylnaphthalene	1/4	0.01 - 0.05	0.01 - 0.01	0.01625	---
Naphthalene	2/4	0.05 - 0.05	0.054 - 0.054	0.0395	---
VOCs					
Acetone	1/7	0.005 - 0.08	0.052 - 0.052	0.025286	---
Benzene	5/9	0.005 - 0.008	0.007 - 0.016	0.006889	ND - 0.22
Chlorobenzene	5/9	0.005 - 0.008	0.008 - 0.026	0.009111	ND - <0.0005
Ethylbenzene	7/9	0.005 - 0.008	0.001 - 0.17	0.051778	ND - 0.00087
Chloroethane	3/9	0.008 - 0.01	0.013 - 0.26	0.035222	---
1,1-Dichloroethane	3/9	0.005 - 0.008	0.001 - 0.003	0.0025	---
Toluene	1/5	0.005 - 0.008	0.031 - 0.032	0.0087	ND - 0.00162
Xylenes (total)	8/9	0.005 - 0.008	0.021 - 0.69	0.2715	ND - 0.0052
PCBs					
Aroclor 1242	2/7	0.0005 - 0.0005	0.0013 - 0.0014	0.000564	ND - 0.0014
Aroclor 1254	1/7	0.001 - 0.001	0.001 - 0.001	0.000571	ND - 0.0014
Metals					
Arsenic	5/9	0.005 - 0.01	0.006 - 0.02	0.007889	ND - >0.005
Barium	6/9	0.01 - 0.2	0.15 - 0.73	0.272222	ND - >0.250
Cadmium	1/9	0.005 - 0.01	0.0067 - 0.0067	0.004356	ND - <0.01
Calcium	1/4	5.0 - 5.0	101.0 - 101.0	27.125	---
Chromium	2/9	0.01 - 0.02	0.02 - 0.02	0.01	ND - 0.025
Iron	3/4	0.1 - 0.1	0.4 - 59.0	14.9975	---
Lead	1/9	0.005 - 0.05	0.05 - 0.05	0.017778	ND - 0.0325
Magnesium	3/4	5.0 - 5.0	25.0 - 107.0	59.875	---
Manganese	1/4	0.015 - 0.015	0.57 - 0.57	0.148125	---
Mercury	2/9	0.0002 - 0.005	0.0007 - 0.0012	0.001622	ND - 0.002
Potassium	3/4	5.0 - 5.0	120.0 - 360.0	153.125	---
Silver	1/9	0.01 - 0.01	0.02 - 0.02	0.006667	---

Table 2-5, Continued

**SUMMARY STATISTICS FOR DETECTED ANALYTES IN LEACHATE SAMPLES
PHASE II RI AND OCTOBER 1990 SAMPLING ACTIVITIES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Parameter	Frequency of Detection	Range of Sample Quantitation Limits (mg/L)	Range of Detected Concentrations (mg/L)	Arithmetic Mean (mg/L)	Background Levels* (mg/L)
<u>Metals, Continued</u>					
Sodium	3/4	5.0 - 5.0	27.0 - 280.0	99.875	...
Zinc	2/4	0.02 - 0.02	0.031 - 0.064	0.03375	...

Note: Arithmetic mean calculated using 1/2 method for undetected compounds. Includes results flagged B.

mg/L Milligrams per liter.

PCBs Polychlorinated biphenyls.

SVOCs Semivolatile organic compounds.

VOCs Volatile organic compounds.

* USEPA, 1985 (As, Ba, Cd, Cr, Cu, Pb, Hg, E, Chlorobenzene, PCBs, T, M).

Table 2-6

**CALCULATED INCREMENTAL LIFETIME CANCER RISKS
AND TOTAL HAZARD INDICES**

**FOCUSED FEASIBILITY STUDY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS**

Receptor Group	Exposure Level	Cancer Risk Level	Total Hazard Index
<u>Current Pathways</u>			
Dermal Contact with Leachate	AE	1.08×10^{-6}	1.71×10^{-6}
	RME	9.40×10^{-6}	2.03×10^{-5}
<u>Potential Future Pathways</u>			
<u>Hypothetical Well</u>			
Inhalation During Showering	AE	6.17×10^{-6}	3.38×10^{-6}
	RME	8.14×10^{-6}	1.73×10^{-5}
Ingestion of Drinking Water	AE	2.08×10^{-7}	2.80×10^{-2}
	RME	1.78×10^{-6}	1.08×10^{-1}
TOTAL	AE	2.14×10^{-7}	2.80×10^{-2}
	RME	1.86×10^{-6}	1.08×10^{-1}
<u>Allen Well</u>			
Inhalation During Showering	AE	7.98×10^{-7}	1.40×10^{-3}
	RME	5.54×10^{-6}	5.37×10^{-3}
Domestic Ingestion	AE	2.39×10^{-6}	1.74×10^{-1}
	RME	6.79×10^{-6}	2.76×10^{-1}
TOTAL	AE	2.47×10^{-6}	1.76×10^{-1}
	RME	7.34×10^{-6}	2.81×10^{-1}
<u>Jacobs Wells</u>			
Inhalation During Showering	AE	1.58×10^{-6}	6.63×10^{-3}
	RME	1.28×10^{-5}	1.62×10^{-2}
Domestic Ingestion	AE	3.96×10^{-6}	1.66×10^{-1}
	RME	2.21×10^{-5}	2.52×10^{-1}
TOTAL	AE	4.11×10^{-6}	1.73×10^{-1}
	RME	2.34×10^{-5}	2.68×10^{-1}

Note: Scientific notation presented as 1.08×10^{-6} which represents 0.0000000108.

AE Average exposure.

RME Reasonable maximum exposure.

Table 5-1

REMEDIAL ALTERNATIVES
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS

RESPONSE ACTIONS		ALTERNATIVES								
		LEACHATE REMEDIAL ALTERNATIVES				GROUNDWATER REMEDIAL ALTERNATIVES*				
		1A	1B	2A	2B	2C	2D	3A	3B	3C
		No Action	Institutional and Surface Controls	Leachate Containment With Redundancy	Leachate Containment With Discharge to a POTW	Leachate Containment With Treatment, NPDES Discharge	Multi Media Cap Leachate Containment Discharge to POTW	Groundwater Containment/ Extraction/ Discharge to a POTW	Groundwater Containment/ Extraction/ Treatment	Groundwater Containment/In Situ Biological Treatment
LEACHATE										
Access Restriction			X	X	X	X	X			
Land Use Restriction			X	X	X	X	X			
Monitoring	X		X	X	X	X	X			
Surface Controls			X	X	X	X	X			
Capping							X			
Leachate Recycling				X						
Subsurface Dikes				X	X	X	X			
Physical/Chemical Treatment						X				
On-Site Discharge (NPDES)						X				
On-Site Treatment (POTW)					X		X			
GROUNDWATER										
Alternate Water Supply			X	X	X	X	X			
Monitoring	X		X	X	X	X	X			
Excavation								X	X	X
On-Site Discharge (NPDES)									X	
Physical/Chemical Treatment									X	
On-Site Treatment (POTW)								X		
In Situ Treatment										X

X Included in Alternative
 NPDES National Pollutant Discharge Elimination System
 POTW Publicly owned treatment works

* Alternatives 3A, 3B, or 3C are provided as potential alternatives if groundwater monitoring triggers active groundwater remediation at the site. These alternatives are provided for relative comparison only and are assumed to be used in conjunction with either the 1 (institutional and surface) or 2 (multi-media cap) remedial alternatives.

Table 6-8
ALTERNATIVE 2C-LEACHATE CONTAINMENT WITH TREATMENT
COST ESTIMATE SUMMARY
QUINCY LANDFILL NUMBERS 2 AND 3
QUINCY, ILLINOIS

Cost Component	Construction Costs	Annual O&M Costs	Present Worth
Institutional Controls	\$156,000	\$125,600	
Surface Controls	\$190,000	\$10,000	
Leachate Containment	\$46,860	\$4,070	
Leachate Treatment with NPDES Discharge	\$140,831	\$77,032	
Construction Subtotal	\$533,691		
Mobilization, bonds, insurance (5%)	\$26,680		
Health and safety (7%)	\$37,360		
Bid contingency (1.5%)	\$80,050		
Scope contingency (20%)	\$106,740		
Construction management (5%)	\$26,680		
Construction total	\$811,200		
Engineering fees (10%)	\$81,120		
Legal fees (5%)	\$40,560		
Services during construction (8%)	\$64,900		
Total capital and implementation cost	\$997,780		
Annual O&M cost		\$216,702	
Net present worth			\$2,042,831
Total present worth			\$3,040,611

NOTE: The present worth calculation was performed by the method shown in App. D at a discount rate of 10 % over 30 years.

TABLE 8.
Draft Soil Cleanup Objectives
Quincy Municipal Landfills

Parameter	Class I Soil Objective (mg/kg)	Class I Basis	ADL (mg/kg)
Acetone	0.7	RfD	0.1
Benzene	0.005	MCL	0.00009
Chloroethane	ND	---	0.001
1,1-Dichloroethane	0.7	RfD	0.0007
1,1-Dichloroethylene	0.007	MCL	0.0007
cis-1,2-Dichloroethylene	0.07	MCL	0.0001
trans-1,2-Dichloroethylene	0.1	MCL	0.0005
Ethylbenzene	0.7	MCL	0.00005
Tetrachloroethylene	0.005	MCL	0.0004
Trichloroethylene	0.005	MCL	0.0001
Methylene Chloride	0.005	PMCL	0.0002
Toluene	1.0	MCL	0.0001
1,1,1-Trichloroethane	0.2	MCL	0.0003
Xylenes (Total)	10.0	MCL	0.0001
1,4-Dichlorobenzene	1.5	20 x MCL	0.0001
Vinyl Chloride	0.002	MCL	0.0002

**Draft Groundwater Cleanup Objectives
Quincy Municipal Landfills**

Parameter	Class I Groundwater Objective (mg/l)	Class I Basis	ADL (mg/l)
Acetone	0.7	RfD	0.1
Benzene	0.005	MCL	0.00009
Chloroethane	ND	---	0.001
1,1-Dichloroethane	0.7	RfD	0.0007
1,1-Dichloroethylene	0.007, and Mixture 1	MCL	0.0007
cis-1,2-Dichloroethylene	0.07, and Mixture 1	MCL	0.0001
trans-1,2-Dichloroethylene	0.1, and Mixture 1	MCL	0.0005
Ethylbenzene	0.7	MCL	0.00005
Tetrachloroethylene	0.005, and Mixture 2	MCL	0.0004
Trichloroethylene	0.005, and Mixture 2	MCL	0.0001
Methylene Chloride	0.005, and Mixture 2	PMCL	0.0002
Toluene	1.0	MCL	0.0001
1,1,1-Trichloroethane	0.2, and Mixture 1	MCL	0.0003
Xylenes (Total)	10.0	MCL	0.0001
1,4-Dichlorobenzene	0.075	MCL	0.0001
Vinyl Chloride	0.002, and Mixture 2	MCL	0.0002

NOTES:

ND: Not Determined. Sufficient data were not available for which to base a cleanup objective recommendation.

MCL: Maximum Contaminant Level.

PMCL: Proposed Maximum Contaminant Level.

ADL: Acceptable Detection Limit; lowest Practical Quantitation Limit from SW846.

RfD: Reference Dose.

Mixture 1: In addition to meeting individual Class I objectives, the following equation must be satisfied in order to protect against liver toxicity.

$$\frac{[1,1\text{-Dichloroethylene}]}{0.007 \text{ mg/l}} + \frac{[\text{cis-1,2-Dichloroethylene}]}{0.07 \text{ mg/l}} + \frac{[\text{trans-1,2-Dichloroethylene}]}{0.1 \text{ mg/l}} +$$

$$\frac{[1,1,1\text{-Trichloroethane}]}{0.2 \text{ mg/l}} \leq 1.0$$

Mixture 2: In addition to meeting individual Class I objectives, the following equation must be satisfied in order to protect against liver tumors.

$$\frac{[\text{Tetrachloroethylene}]}{0.005 \text{ mg/l}} + \frac{[\text{Trichloroethylene}]}{0.005 \text{ mg/l}} + \frac{[\text{Methylene Chloride}]}{0.005 \text{ mg/l}} + \frac{[\text{Vinyl Chloride}]}{0.002 \text{ mg/l}} \leq 1.0$$

APPENDIX B

RESPONSIVENESS SUMMARY

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
Springfield, Va. 22161

OFFICIAL BUSINESS

Penalty for Private Use, \$300

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF COMMERCE
COM-211

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