United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R03-86/025
September 1986

EPA

Superfund Record of Decision:

Bruin Lagoon, PA
(Second Remedial Action)

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA/ROD/R03-86/025		

4. TITLE AND SUBTITLE	5. REPORT DATE
SUPERFUND RECORD OF DECISION Bruin Lagoon, PA Second Remedial Action	September 29, 1986 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report 14. SPONSORING AGENCY CODE 800/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

Bruin Lagoon is located about 45 miles north of Pittsburgh in Bruin Borough, Butler County, PA. The site occupies over four acres and is located along the western bank of the South Branch of Bear Creek, approximately seven miles upstream of the creek's confluence with the Allegheny River. The site is also partially situated in the 100-year flood plain of the creek. The commercial and main residential areas of Bruin Borough are located less than five blocks from the site and over 30 residences lie within 500 feet of Bruin Lagoon. Beginning in the 1930s, Bruin Oil Company, located on property adjacent to the site, used the lagoon for disposal of wastes resulting from the production of white oil (mineral oil). Disposal operations continued for more than 40 years. In 1968 a breach in the lagoon dike caused an acidic sludge spill into the South Branch of Bear Creek which killed 4 million fish in the Allegheny River. An RI/FS report, begun in July 1981, resulted in a remedial action between August 1983 and May 1984. The first remedial action included: removal of liquid floating on top of the open lagoon and offsite disposal; lagoon and dike stabilization; removal of scrap tanks and equipment; installation of a multi-layer impermeable cap; and construction of a channel to prevent ground water from entering the site. In May 1984 a previously unidentified sludge layer, releasing toxic gases, was penetrated during remedial construction. EPA declared an emergency situation, stopped all remedial activities, and (See Attached Sheet)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Bruin Lagoon, PA Second Remedial Action Contaminated Media: gw, sw, sediments Key contaminants: organics, heavy metals, oils, sludge, inorganics, acids		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report)	21. NO. OF PAGES
	None	34
	20. SECURITY CLASS (This page)	22. PRICE
	None	

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

EPA/ROD/R03-86/025
Bruin Lagoon, PA
Second Remedial Action

16. ABSTRACT (continued)

initiated an immediate emergency action. These actions were terminated in September 1984 after the site was stabilized and secured. EPA, upon completion of the emergency work, determined the need for a reevaluation of the site. The primary contaminants of concern include: toxic gases, heavy metals, oils, inorganics, and acidic sludge.

The selected remedial action includes: onsite stabilization/neutralization of sludge and perched liquid zone; in-situ treatment of bedrock underneath the former lagoon area; completion of dike reinforcement; capping the former lagoon area with a multi-layer cap; monitoring and maintenance of the site, cap and ground water. The estimated capital cost is $2,695,000 with annual O&M of $16,000.

RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

BRUIN LAGOON SITE, BRUIN BOROUGH, PENNSYLVANIA

DOCUMENTS REVIEWED

I am basing my decision principally on the following documents describing the analysis of cost-effectiveness and feasibility of remedial alternatives for the Bruin Lagoon Site.

- Draft Remedial Investigation/Feasibility Study Report, for the Bruin Lagoon Site, Bruin Borough, Pennsylvania, Roy F. Weston Inc., June, 1986.

- Preferred Remedial Alternative for the Bruin Lagoon Site, EPA and PADER Fact Sheet, August 21, 1986.

- Staff summaries and recommendations.

DESCRIPTION OF SELECTED REMEDY

- On-Site stabilization/neutralization of sludge and perched liquid zone.

- In-situ treatment of bedrock underneath former lagoon area.

- Completion of dike reinforcement.

- Capping the former lagoon area with multi-layer cap.

- Monitoring and maintenance of the site cap and groundwater.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the National Contingency Plan (40 CFR Part 300), I have determined that onsite neutralization/stabilization of sludges and perched liquids; bedrock neutralization, and placement of a multi-layer cap over the former lagoon area is a cost-effective remedy which effectively mitigates and minimizes damage and provides adequate protection of public health, welfare, and the environment. The remedial action will be designed to minimize the risk of potential evacuation and temporary inconveniences to the local environment during the sludge neutralization/stabilization and bedrock neutralization efforts.

The State of Pennsylvania has been consulted and agrees with the approved remedy. Following the stabilization of the sludge and capping of the area, operation and maintenance activities will be required to ensure the continued effectiveness and level of protection of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies for a period of one year.

9/29/86
Date

James M. Seif
Regional Administrator

SITE DESCRIPTION AND SUMMARY OF REMEDIAL ALTERNATIVE SELECTION FOR THE BRUIN LAGOON SITE

Site Location and Description

Bruin Lagoon is located about 45 miles north of Pittsburgh in Bruin Borough, Butler County, Pennsylvania. The site occupies over four acres and is located along the western bank of the South Branch of Bear Creek, approximately seven miles upstream of the creek's confluence with the Allegheny River. A spur of the Baltimore and Ohio Railroad runs along the eastern bank of the stream. The site is also partially situated in the 100-year floodplain of the South Branch of Bear Creek.

Private homes and State Route 268 border the site on the west. The commercial and main residential areas of Bruin Borough are located less than five blocks from the site and over 30 residences lie within 500 feet of Bruin Lagoon. An abandoned refinery, which was the source of the wastes desposited in the lagoon, is located adjacent to the site on the south. Two ponds and a small stream, which discharge into the South Branch of Bear Creek, lie along the former refinery property boundary bordering the Bruin Lagoon Site.

The site presently consists of an earthen diked lagoon which has been covered, to varying degrees, by a stabilized sludge/soil mixture. Unstabliized sludge/tar is contained beneath much of the cover and numerous areas of upwelling of the black sludge tar material are evident. The sludge tar is a result of white oil manufacturing (mineral oil) and contains sulfuric acid, heavy metals, and other materials. The lagoon area of the site is generally level and unvegetated.

The entire site is enclosed by a security fence. A dike extends along the north and east sides of the site and separates the lagoon from the South Branch of Bear Creek. It is approximately 25 feet high and is composed of sandy clay and shale. Riprap, gabion cages, and concrete barriers have been placed along portions of the dike to protect it from flood erosion.

Site History

Operations at Bruin Lagoon began in the 1930s when the Bruin Oil Company, located on adjacent property, used the lagoon for disposal of wastes resulting from the production of white oil (mineral oil). Disposal operations continued for a period of over 40 years. Materials deposited in the lagoon included:

- Bottom residues from crude oil storage tanks.
- Spent bauxite, none powder, and charcoal filtering agents
- Non-specification oils

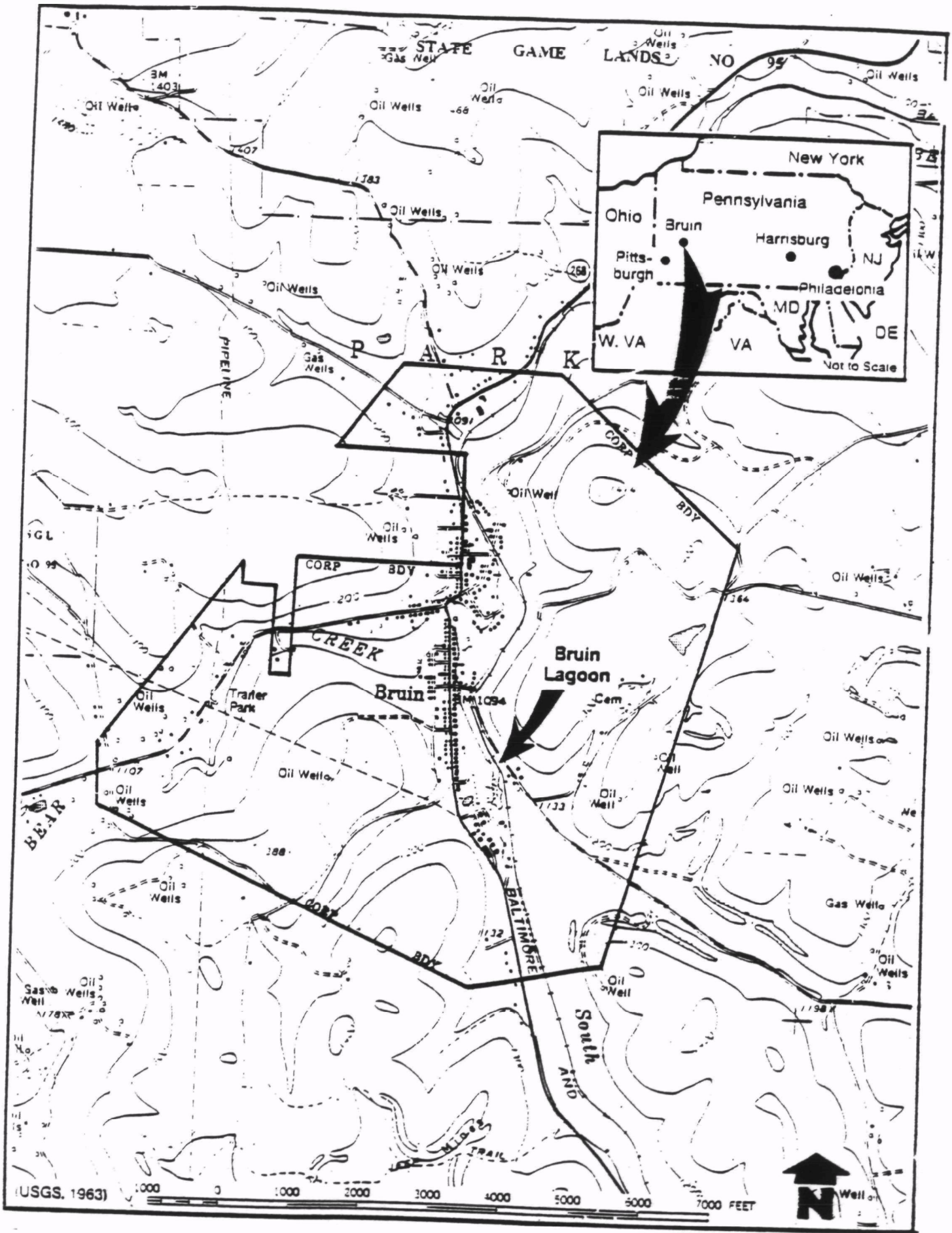


Figure 1 Site Location Map

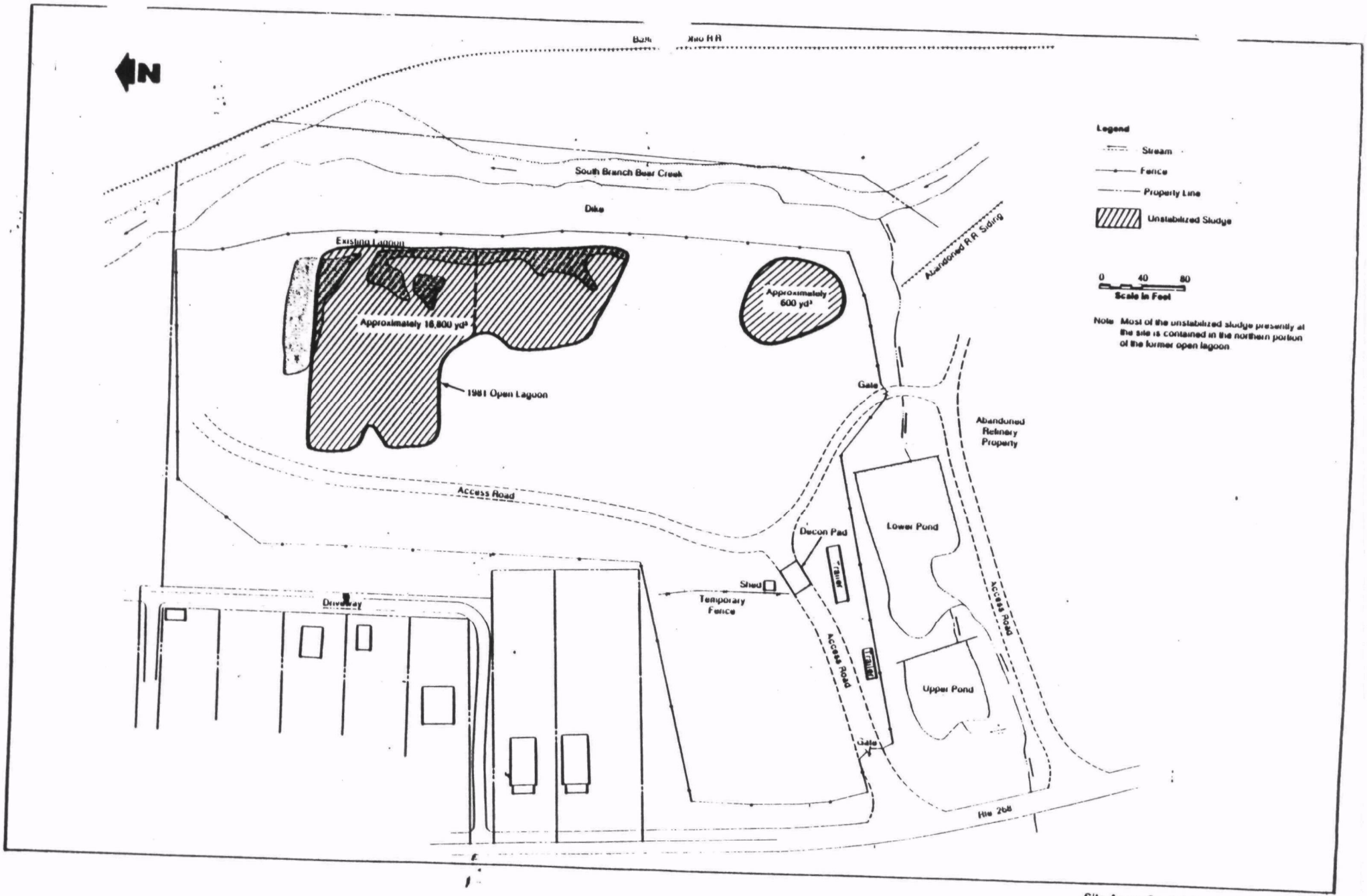


Figure 2

Site Areas Containing Unstabilized Sludge

° Spent Alkali

° Boiler house coal and ashes

° Lime

° Coal fines

In 1968, Bruin Lagoon received national attention when approximately 3,000 gallons of acidic sludge spilled into the South Branch of Bear Creek through a breach in the dike. An estimated four million fish in the Allegheny River were killed as a result of the discharge and evidence of the spill was observed over 100 miles downstream from the site. Many downstream communities had to temporarily shut down their water supply systems.

In July 1981, EPA began a remedial investigation to determine the type and extent of contamination at the site, and conducted a feasibility study to identify alternatives for remedial action. The feasibility study, completed in February 1982 called for: removing the liquid floating on top of the open lagoon and disposing of it offsite, stabilizing the lagoons and dikes, removal of scrap tanks and equipment, building a channel to prevent groundwater from entering the site, and covering the site with an impermeable multilayer cap.

In September 1982, EPA signed a Superfund State Contract with Pennsylvania for implementation of the action. The work was managed by the U. S. Army Corps of Engineers. The site cleanup work began in August 1983 and proceeded until May 1984.

In May 1984, toxic gases containing high concentrations of carbon dioxide, sulfuric acid mist, and hydrogen sulfide were released from the lagoon when a previously unidentified sludge layer was penetrated during remedial construction.

EPA declared an emergency situation at the site and stopped all remedial activities in order to initiate an immediate emergency action at the Bruin Lagoon Site. Emergency actions were terminated in September 1984 after the site was stabilized and secured by backfilling the lagoon and installation of gas recovery wells.

Upon completion of the emergency work, EPA determined that a second remedial investigation and feasibility study was warranted to reevaluate the site.

Present Site Status

EPA Region III completed the second Remedial Investigation/Feasibility Study (RI/FS) on Bruin Lagoon in July 1986. Data collected in the RI and in the previous studies of the site were used to describe the nature and extent of contamination.

The following points summarize the findings of the RI regarding geology, hydrogeology, and concentrations of contaminants detected in the air, soils, bedrock, surfacewater, groundwater, and subsurface gases.

Major Findings of the RI:

- There are elevated concentrations of heavy metals in the majority of soil/sludge samples that were analyzed. A few organic compounds were identified at concentrations less than 1 part per million.
- There are appoximately 17,500 cubic yards of unstabilized sludge.
- There is a hot spot in the unstabilized portion at the lagoon that contains potentially hazardous gases. This is located in the area where the crust was encountered. The gases include sulfur dioxide, hydrogen sulfide, carbon dioxide, and methane.
- The bedrock underlying the site has been contaminated by the lagoon.
- The shallow water in the perched liquid zone of the lagoon is recharged predominantly by onsite precipitation and infiltration.
- The South Branch of Bear Creek is contaminated upstream of the site and, on a day-to-day basis, its water quality is highly variable.
- The groundwater underlying the site exhibits localized inorganic contamination.
- Groundwater flowing underneath the site runs towards the South Branch of Bear Creek.
- Regional ground water quality is generally poor.
- Residential wells, upgradient of the site, do not appear to have been impacted by the site.

Geology

The Bruin Lagoon Site is located in the Appalachian Plateau Province. The bedrock strata are bedded horizontal to subhorizontal and are sedimentary in origin. The Pennsylvania Age Allegheny Group comprises most of the rock formations in the Bruin area. This group consists of cyclic sequences of sandstone, shale, limestone, clay and coal beds. The bedrock encountered immediately underneath the site consists of a gray sandstone.

The Bruin area was extensively mined for coal. However, there are no active surface or underground mines within one mile of the site. An abandoned underground coal mine is located approximately 0.5 mile northeast of the site.

Hydrogeology

Two groundwater systems were identified during the RI: a bedrock groundwater system located in the fractured sandstone and a perched liquid zone located within the soil fill and sludges at the lagoon site.

The bedrock water table aquifer at the site flows in a general northeasterly direction and discharges into the South Branch of Bear Creek.

The groundwater is recharged by infiltration of precipitation upslope as well as direct vertical infiltration on the site itself.

The perched liquid zone is composed of water; viscous petroleum products such as oils, waxes, and emulsions; and acidic wastes. The zone has a radial flow eventually discharging into the South Branch via leachate seeps in the dike or vertically migrating into the bedrock aquifer Recharge of the perched liquid zone is due to infiltration of precipitation.

Air Monitoring

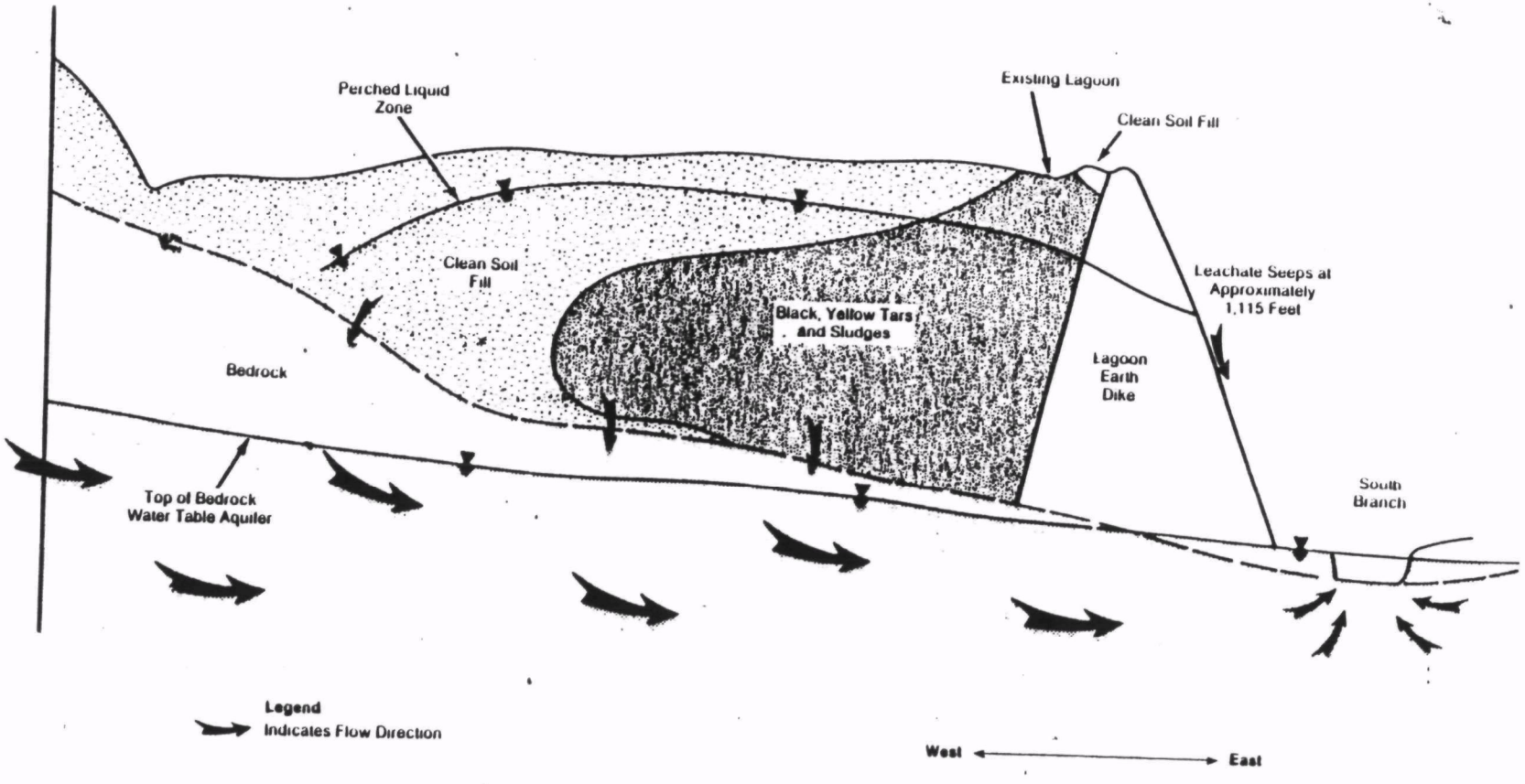
Low levels of organic vapors, sulfur dioxide or hydrogen sulfide were released into the ambient breathing zone when the subsurface of the site was disturbed by drilling operations. However, concentrations of these gases were nondetectable at the site perimeter.

Soils

Soil sampling at this site includes samples taken in the stabilized and unstabilized sludge. The following conclusions are presented:

- The pH of the stabilized sludge is typically greater than 10, while the pH of the unstabilized sludge is generally less than 4. The lowest pH values are usually found in the area of the former open lagoon at depths greater than 15 feet where acidic unstabilized sludges are still present.

- The indicator parameters of TOC and oil and grease are several orders of magnitude higher for stabilized and unstabilized sludges as compared to the apparent background levels as measured in native soil samples.



Generalized Flow Regime of Perched Zone and Bedrock Aquifer

° An area of low pH sludge appears to be located in the former closed lagoon area at the southeast corner of the site.

° Shallow soils at the site perimeter show slight contamination as evidenced by TOC and oil and grease levels greater than background concentrations.

Bedrock

The primary conclusions from the investigation of the bedrock are as follows:

° The top of the bedrock, under portions of the former open and closed lagoons, is impregnated with acidic sludge material. Black and gray staining typically extends 5 to 12 feet into the bedrock, while contamination of fractures may extend 10 to 35 feet into the rock. Also, contaminated rock and fractures are located completely or partially within the zone of saturation of the bedrock aquifer.

° The primary effects of the site on the bedrock appear to be the movement of waste acids vertically into the bedrock under the former lagoon areas. The pH data indicate that acidic conditions extend deeper into the bedrock than the visually observed staining. These conditions probably exceed depths of 20 to 30 feet into the bedrock at various locations. Acidic influences gradually decrease as depth into the bedrock increases.

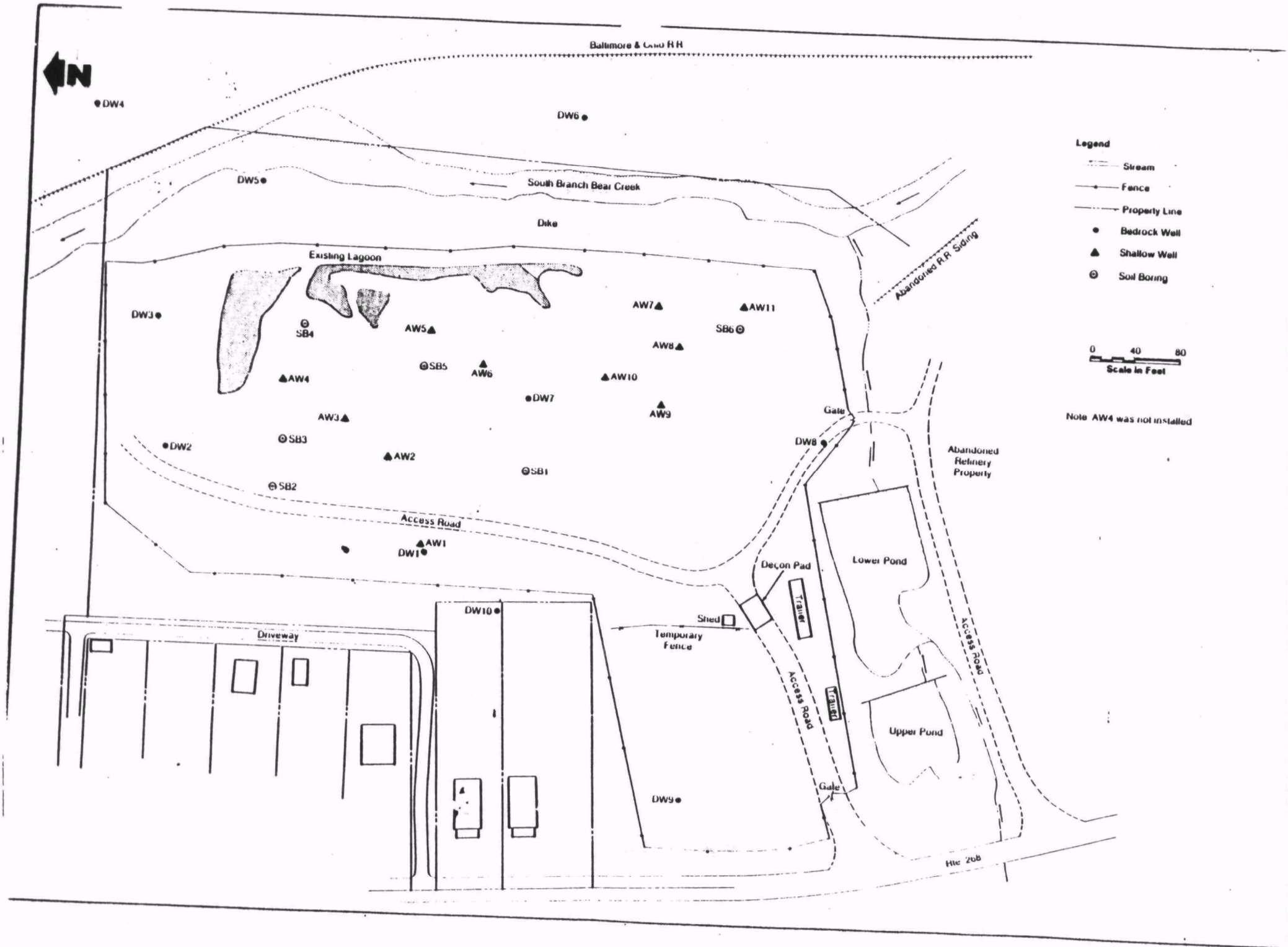
° Site data suggests that unstabilized sludge is not migrating beneath the dike on the eastern boundary of the lagoon site.

Subsurface Gases

° Hazardous subsurface gases are still present under the site. Sulfur dioxide was determined to be the gas of primary concern. It was measured in 6 of the 23 shallow wells, while hydrogen sulfide and sulfuric acid mist were detected in most of the wells.

° The wells where hazardous subsurface gases were found are clustered in the east-central portion of the site, in an area corresponding to the southern part of the 1981 open lagoon. Previous investigations have measured hazardous subsurface gases in this same "hot spot" zone.

° The locations where hazardous subsurface gases were found, generally correspond to the locations where crust has been encountered in the subsurface. Gas generation appears to occur under the crust, and the crust appears to effectively trap and contain the gases.



Monitor Well and Soil Boring Locatio

- The potential for the release of hazardous gases to the atmosphere exists during the implementation of remedial alternatives involving excavation or disturbance of the crust layer. The greatest potential for such a release would occur during activities conducted in the "hot spot" zone in the east-central portion of the site.

Surface Water

Visual observations and analytical data confirm that the water quality of the South Branch of Bear Creek upstream of the Bruin Lagoon site is generally poor and highly variable.

The chemical data indicates that the site may have a slight impact on the water quality of the South Branch. Concentrations of phenol, sulfate, and some metals were at measured somewhat higher levels below the site than upstream of the site.

Groundwater

A. Perched Liquid Zone

- The perched liquid zone is a heterogeneous mixture composed of stratified layers of water, acid wastes, and petroleum-based products. The acidic and petroleum wastes were primarily contained in wells located within the unstabilized sludge of the former open lagoon.

- The materials in the perched liquid zone generally had low pH's and potential impacts are likely to result from the acidic nature of the liquids.

- Liquids having pH values less than 1.0, and specific conductivity values greater than 50,000 umhos/cm, were found in the same wells where hazardous subsurface gases were detected and crust was encountered. These results indicate that concentrated acids are present under the crust and are directly related to the production of hazardous subsurface gases.

- Samples having pH values greater than 11 consisted primarily of water and were collected from wells located in the southern part of the site. This is where lime and stabilized sludge were stockpiled during the remedial construction work.

- The perched liquid zone within some areas of the former open lagoon is comprised solely of oil.

Bedrock Aquifer

Based on a review of the analytical results for indicator parameters, organics, and inorganics from bedrock well samples collected during the remedial investigation, the following conclusions regarding the groundwater in the bedrock aquifer are made:

- The background quality of groundwater in the areas of the Bruin Lagoon site is poor. This is evidenced especially by the high iron, manganese, sulfate, and pH values which exceeded secondary drinking water standards in background wells. The poor quality of the groundwater is related to the local mining and oil industry.

- The site has impacted the groundwater in the bedrock aquifer. Three types of contaminant effects were observed:

  - An acidic impact characterized by low pH values and high sulfate levels.

  - An organic impact characterized by elevated concentrations of TOC, oil and grease, TOX, and volatile organics.

  - An inorganic impact characterized by elevated levels of specific conductivity and metals.

- The impacted groundwater in the bedrock aquifer extends from the western perimeter of the site to the immediate downgradient area along Bear Creek where it discharges into the stream.

- Acetone, benzene, toluene, and xylenes were the organic compounds detected most frequently and at the highest concentrations in the groundwater.

Health Evaluation

In its present condition, the Bruin Lagoon Site represents a potential threat to public health, welfare, and the environment. If the site groundwater were ingested it could pose a risk to human health. The unsolidified sludge at the site poses a threat to both humans and wildlife that might come into dermal contact with it or ingest it. Intermittent ponded water at the site also poses a threat to humans and wildlife since the caustic material could cause tissue damage. Furthermore, if the site were disturbed by digging or drilling of a well, there is the potential for the release of hazardous gases at toxic levels.

Alternatives Evaluation

This section will briefly define the remedial action objectives; the screening methods to determine appropriate remedial technologies; and the specific alternatives considered. The Feasibility Study and Appendix contains a more in-depth analysis of these discussions.

- Remedial Action Objectives:

  - Contain, reduce, and/or eliminate site contaminants identified as representing possible sources of exposure to human and other potential receptors.

Table 1

POTENTIAL EXPOSURE PATHWAYS ASSOCIATED WITH THE BRUIN LAGOON SITE

Receiving Medium	Release Mechanism	Exposed Population	Potential Exposure Route	Complete Pathway	
				Current	Future
Air	Gases emitted from sludge and soil	Downwind receptors: humans and plants	Inhalation, uptake	No	Yes
Soil	Unsolidified sludge	Humans or wildlife on-site	Dermal contact, ingestion	Yes	Yes
Groundwater	Leaching of ions from soil and bedrock by acids	Humans drinking groundwater	Ingestion	No	Yes
Bear Creek	Discharge of groundwater, surface water runoff	Aquatic life in Bear Creek	Contact, ingestion	No	Yes
Intermittent Standing Water	Dissolution of acids	Humans or animals coming into contact with water	Dermal contact, ingestion	Yes	Yes

- Reduce or eliminate exposure of site contaminants to potential receptors by controlling potential contaminant pathways.

- Ensure technical feasibility, protection to public health and the environment, and cost-effectiveness of the remedial actions.

The list of technologies to be considered for Bruin Lagoon was developed by reviewing the sources and pathways of contaminants and their potential receptors and then identifying corresponding potential response actions. For each potential response action various technologies were identified. See table 9-3 for a summary of the response actions and technologies.

° Factors Used for Screening and Remedial Technologies

- Technical Criteria

  ° applicability to site conditions (geology, topography, etc).

  ° applicability to waste characteristics

  ° performance and reliability

  ° implementability (construction, operation, and maintenance)

- Environmental and Public Health Criteria

  ° screened for effectiveness of remediation and efficiency in reducing present and future contaminant exposure

  ° short term and long term risks

- Institutional Criteria (Compliance with other environmental laws)

  ° TSCA

  ° RCRA

  ° CWA

  ° NPDES

  ° etc.

- Cost Criteria

  ° increased cost offering no greater reliability

  ° increased cost offering no greater environmental or public health benefit

For a detailed analysis of technologies screened out see Section 10 of the RI/FS.

Alternatives Considered in Detail

Seven alternatives incorporating the technologies considered in detail were evaluated for remedial action. These seven alternatives were:

1. No action with monitoring

2. Sludge and liquid zone stabilization, soil capping, and monitoring

3. Sludge and liquid zone stabilization, in situ bedrock treatment, RCRA capping and monitoring.

4. Removal, stabilization, and offsite disposal of stabilized and unstabilized sludge, perched liquid zone, and contaminated soils with monitoring.

5. Removal, stabilization, and offsite disposal of unstabilized sludge, perched liquid zone, RCRA capping and monitoring.

6. Onsite incineration of sludge, perched liquid zone, contaminated soils, and monitoring.

7. Offsite incineration of sludge, perched liquid zone and contaminated soils with monitoring.

The onsite and offsite incineration alternatives were not evaluated in the feasibility study but were evaluated separately in Appendix Q of the RI/FS.

Alternative No. 1 - No Action with Monitoring

This alternative was prepared for comparative purposes. The monitoring of groundwater would function as a detection system to warn of increasing contaminant concentrations in the groundwater from the site. This alternative is not appropriate because:

- Without additional remedial actions localized groundwater contamination and subsequent contamination migration to Bear Creek will continue.

- Toxic gas can accumulate under the sludge posing a potential health and environmental hazard if the sludge is disturbed.

- Acidic and caustic puddles on the surface of the lagoon pose a threat to public health and are an environmental hazard.

- This alternative does not meet the goals of CERCLA and would not comply with other environmental regulations.

Alternative 2 - Stabilization of Sludge and Liquid Zone with Soil Capping, Dike Reinforcement, and Post Closure Monitoring

- In this alternative, the unstabilized sludge would be mixed with a soil bulking agent and lime to immobilize the inorganic contaminants and allow the sludge to support a cap. During the excavation, gas monitoring with provisions for gas venting and treating would be necessary. A soil cap would be placed over the former lagoon to reduce infiltration. Dike stabilization would be completed to withstand the maximum probable flood. Post closure monitoring consists of cap maintenance and long term ground water monitoring.

The advantages of this alternative include:

- Stabilization of sludge and perched liquid zone will reduce contaminant migration to ground water and will support a cap.

- The soil cap will reduce infiltration and, therefore, reduce contamination migration to the ground water and surface water.

- Direct contact threats are removed.

- The dike improvements will ensure stability under worse case flood conditions.

The disadvantages associated with this alternative are:

- The sludge impregnated bedrock is not addressed.

- Short term risks due to excavation and stabilization process.

Alternative 3 - Stabilization of Sludge and Liquid Zone with Multilayer cap, Dike Reinforcement, Shallow Bedrock Treatment, and Post Closure Monitoring.

This alternative is similar to Alternative 2 except for the addition of shallow bedrock treatment with a lime slurry and the placement of a multilayer cap instead of the soil cap for alternative 2.

The advantages of this alternative include:

- The mobility and toxicity of inorganic constituents in the waste is reduced.

- Stabilization of sludge and perched liquid zone will reduce contaminant migration to ground water and will support a cap.

- The multilayer cap will significantly reduce infiltration through the stabilized sludge and contaminated soils and thus reduce impact on surface water.

- Dike improvements will ensure stability under worse case flood conditions.

- Treatment of bedrock will address contamination of groundwater from sludge impregnated bedrock.

The disadvantage of this alternative is:

- Short term risks due to excavation and stabilization process.

Alternative 4 - Complete Removal and Off-site Disposal of all Stabilized and Unstabilized Sludge, Perched Liquids, and Contaminated Soil with shallow Bedrock Treatment, Dike Reinforcement, and post closure monitoring.

This alternative offers complete removal of the contaminated sludges, liquids and soil from the site. Monitoring for gases with provisions for venting and gas treatment will be done during the excavation. The material would be transported to an approved RCRA disposal facility. The dike would be reinforced and post closure monitoring would be conducted.

The advantages of this alternative are:

- All contaminants are removed from the site.

The disadvantages of this alternative are:

- High project cost.

- Limited space at RCRA facilities.

- Short term risks due to excavation and transportation of material offsite.

- Transfer of contaminants to a RCRA facility will transfer a risk of future contaminant release to the accepting RCRA facility.

Alternative 5 - Complete Removal Offsite of Unstabilized Sludge and Perched Liquid with Shallow Bedrock Treatment, Dike Reinforcement, Placement of a Multi-layer cap, and Post Closure Monitoring.

This alternative is similar to alternative 4 except that contaminated soils and previously stabilized sludge would remain onsite underneath a multilayer cap.

The advantages and disadvantages are the same as in alternatives 3 and 4.

Alternative 6 - Onsite Incineration of sludge, perched liquid zone, and contaminated soils with onsite or offsite ash disposal, dike reinforcement and post closure monitoring.

In this alternative the sludges, perched liquids and contaminated soils would be incinerated in an onsite mobile incinerator. Costs for the process differ depending on whether the sludge must be stabilized or just neutralized before incineration and also whether the ash would remain onsite or taken offsite to an approved RCRA facility.

The advantages of this alternative are:

- Neutralization and incineration of the sludge will reduce contaminant migration to the groundwater.
- This alternative offers a slightly higher level of environmental effectiveness and reduction of the public health risk as alternative 3.

The disadvantages of this alternative are:

- short term risks due to excavation of the waste
- high project cost
- long time frame for implementation (approximately 3 1/2 - 4 years)
- limited space onsite for incinerator operation
- public acceptability

Alternative 7 - Offsite Incineration of Sludge, Perched Liquid Zone, and Contaminated Soils with Dike Reinforcement and Post Closure Monitoring

This Alternative calls for the containerization of sludges, perched liquids and contaminated soils and shipment to an approved RCRA offsite incinerator. The ash generated at the incinerator would be managed by the commercial facility.

The advantages of this alternative are the same as alternative 4 and 6. The disadvantages are:

- short term risks due to excavation and transportation of the waste
- high project cost
- long time frame for implementation (estimated at 6 to 7 years)
- limited number of commercial facilities available

Costs

Costs for the seven alternatives can be seen in table 2. Values for capital costs, annual operation and maintenance costs, present worth and total present worth are given.

RECOMMENDED ALTERNATIVE

Section 300.68(j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost effective (i.e., the lowest cost alternative that is technologically feasible and reliable) and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare and the environment. In selecting a remedial alternative EPA considers all environmental laws that are applicable or relevant and appropriate. Based on our evaluation of the proposed alternatives, the public comments and the information received from the Pennsylvania Depart-

ALTERNATIVES COST ANALYSIS SUMMARY

Alternative	Capital Cost	Annual Cost	Present Worth*	Total Cost
1. No Action/Monitoring	$ 15,000	$23,000	$216,000	$ 231,000
2. Onsite Stabilization, Soil Cap	2,155,000	16,000	150,000	2,305,000
3. Onsite Stabilization, Multi Layer Cap	2,695,000	16,000	150,000	2,845,000
4. Offsite Disposal, All	36,581,000	9,000	85,000	36,666,000
5. Offsite Disposal, Part	16,029,000	16,000	150,000	16,179,000
6. Onsite Incineration				
a. Neutralized Sludge, Ash Remains	20,981,000	9,000	85,000	21,066,000
b. Stabilized Sludge, Ash Remains	24,230,000	9,000	85,000	24,315,000
c. Neutralized Sludge, Ash Offsite	28,983,000	9,000	85,000	29,068,000
d. Stabilized Sludge, Ash Offsite	33,754,000	9,000	85,000	33,839,000
7. Offsite Incineration				
a. New Jersey Facility	202,117,000	9,000	85,000	202,202,000
b. Illinois Facility	99,837,000	9,000	85,000	99,922,000

* 1986 Dollars, assuming 30 years of use, and a 110 percent average rate of return on private investment

Table 2

ment of Environmental Resources, implementation of Alternative 3, Onsite stabilization of the sludge with a multilayer cap is the recommended alternative. This includes:

- Onsite stabilization/neutralization of remaining unstabilized sludge and perched liquid zone
- gas monitoring during site activities
- gas venting/collecting/treating if necessary
- Geotextile silt fences to control offsite soil transport
- In situ shallow ground water/bedrock neutralization
- Completion of dike embankment reinforcement
- Capping lagoon area with a multilayered cap which complies with RCRA standards
- Grading and vegetating the cap and the surrounding area to promote runoff
- Construction of a surface water diversion which will direct both run-on and runoff away from the site
- Post closure monitoring.

Operation and Maintenance

Operation and Maintenance will consist of maintaining the effectiveness of the RCRA cap, and the periodic monitoring of gases underneath the cap and monitoring of ground water monitoring wells. Long term monitoring of the ground water is necessary to ensure that the remedial action has been effective in reducing the impact of the site on the ground water. State responsibility for O&M would begin one year after the Remedial Construction is completed.

Consistency with Other Environmental Laws

The site will be closed in accordance with the relevant and appropriate landfill closure requirements of 40 CFR § 264.310.

The multilayered surface cap will be designed and constructed in accordance with the requirements of § 264.310(a). The State will perform O&M required by §264.310(b)(1) as necessary on the cover. The State will also maintain and operate the ground water monitoring system required by § 264.310(b)(4). A run-on and run-off control system will be installed by EPA and maintained by the State consistent with the requirements of §264.310(b)(5). Because there will not be any leachate detection or leachate collector systems in place which would require maintenance, the requirements of § 264.310(b)(3) and (4) are not relevant and appropriate.

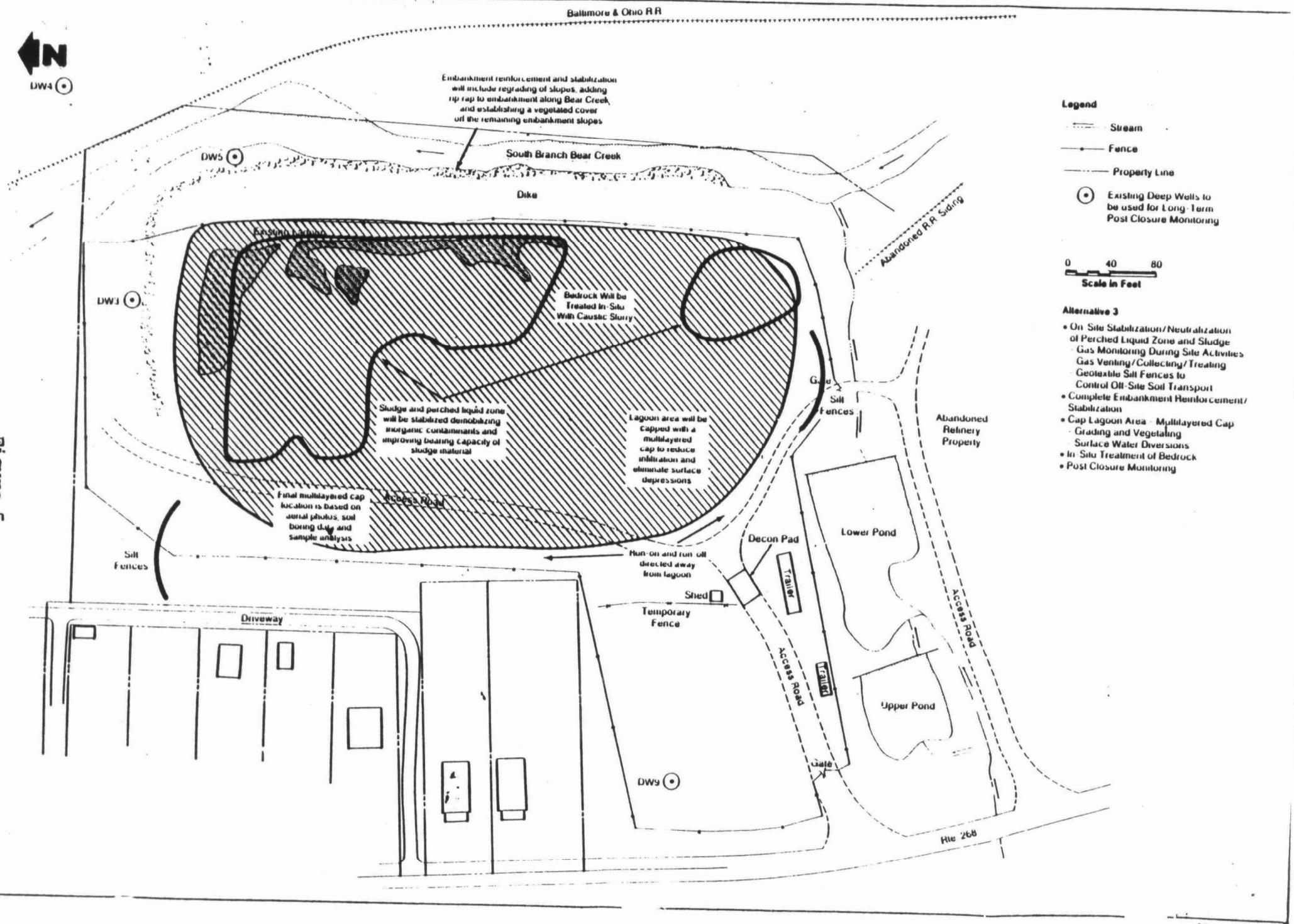


Figure 5

Alternative 3

Schedule

Approve Remedial Action (ROD)	September 1986
* Start Design	November 1986
Finish Design	June 1987
Start Construction	September 1987
Complete Construction	August 1988

* Contingent on CERCLA reauthorization

Evaluation of Alternatives Not Selected

A. Alternative 1, no action with monitoring. This alternative would do nothing to mitigate the potential threats posed by the site, and would not comply with the relevant and appropriate requirements. Because this alternative does not effectively minimize or mitigate the threats posed by this site, it was not selected.

Alternative 2, sludge stabilization, soil capping, dike reinforcement and post closure monitoring. This alternative was not selected because the soil cap would not comply with the RCRA closure requirements and would not effectively reduce rainfall infiltration in comparision to the recommended alternative. This alternative also would not mitigate the threats posed by the contaminated bedrock.

Alternatives 4 and 5, offsite land disposal options would only move the wastes to another facility. Because Alternative 3 will effectively stabilize the waste and significantly reduce the mobility and toxicity of the wastes, the offsite landfilling of unstabilized sludge will not be more effective than the recommended alternative. Also, Alternatives 4 and 5 are substantially more costly than Alternative 3. Because these two alternatives are not as cost-effective and permanent as Alternative 3, they were rejected.

Alternatives 6 and 7, onsite and offsite incineration, were not selected because they are not as cost-effective as the selected alternative. Incineration will only destroy the organic compounds of the sludge and will not affect the metals, so proper handling of the residual metal containing ash would be required. Onsite incineration will take at least 3 to 4 years to complete and offsite will take at least 7 years, if there is sufficient capacity. This is much longer than the one year anticipated for the selected alternative. Onsite incineration will also cause concern in the community because of the potential for air emissions during combustion. Additionally, the costs are an order of magnitude greater than the selected alternative and incineration does not provide substantially greater benefits.

FINAL RESPONSIVENESS SUMMARY

BRUIN LAGOON SITE

BRUIN BOROUGH, PENNSYLVANIA

From August 8, 1986 through August 29, 1986, the U.S. Environmental Protection Agency (EPA) held a public comment period on the draft remedial investigation and feasibility study (RI/FS) report for the Bruin Lagoon site located in Bruin Borough, Butler County, Pennsylvania. The purpose of this document is to summarize comments on the RI/FS report expressed by residents, local officials, and other interested parties during the public comment period and to provide EPA responses to those comments.

This responsiveness summary is divided into the following sections:

Section I — Overview of Technical Activities. This section provides a brief site history and discusses EPA's preferred alternative for remedial action.

Section II — Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Bruin Lagoon site.

Section III — Summary of Major Comments and EPA Responses. All comments are categorized by relevant topics. EPA responses to these comments are also provided.

Section IV — Unanswered Concerns. This section describes remaining community concerns that EPA and the Pennsylvania Department of Environmental Resources (PADER) should be aware of and attempt to address during the remedial design and remedial action at the Bruin Lagoon site.

In addition to the sections above, Attachment A, included as part of this responsiveness summary, identifies community relations activities conducted by EPA during remedial response activities at the Bruin Lagoon site.

I. OVERVIEW OF TECHNICAL ACTIVITIES

The Bruin Lagoon site is located in Bruin Borough, Pennsylvania, approximately forty-five miles north of Pittsburgh. The site covers over four acres and consists of an unlined, earthen-diked, and covered lagoon. Operations began at Bruin Lagoon in the 1930s and continued for over 40

years. The site was used as a disposal area for wastes generated by a petroleum refinery located adjacent to the southern side of the site. Both Bruin Lagoon and the refinery are owned by the AH&RS Coal Company, which is currently involved in bankruptcy proceedings.

Contractors to EPA began the RI/FS at Bruin Lagoon in June 1981. Following release of the RI/FS report in January 1982, EPA and PADER decided to implement a waste containment alternative at Bruin Lagoon. This alternative was selected to stabilize the sludge in the lagoon, reinforce the dike, remove debris from the site area, and cover the lagoon with a multi-layer cap. Design of the selected remedial action began in September 1982 and remedial construction began in September 1983.

Construction activities continued at the site until May 4, 1984 when a previously unidentified crust layer was broken resulting in a release of gas and mist. Following the gaseous release, contractors collected samples of gas and liquid beneath the crust layer. Analytic results showed that the gas contained high concentrations of carbon dioxide, hydrogen sulfide, and sulfuric acid mist. Based on these findings, EPA suspended the cleanup activity and began an immediate removal action to prevent further release of the toxic gas. In addition, EPA's emergency contractor covered the open lagoon with stabilized sludge, installed gas monitoring wells, and collected sludge and soil samples for further analysis. Emergency work at the site was completed in September 1984.

In January 1985, EPA announced that a second RI/FS would be conducted at Bruin Lagoon to reevaluate the nature and extent of contamination at the site. Field activities associated with the second RI/FS began in June and continued through October 1985.

On July 24, 1986, EPA released the draft RI/FS report to the public. In the report, seven alternatives to clean up hazardous waste contamination at the Bruin Lagoon site were discussed. After careful review and consideration of those alternatives, EPA and PADER selected Option 3 as the preferred alternative for implementation at Bruin Lagoon. Specifically this option calls for:

- On-site stabilization/neutralization of remaining sludge and perched liquid zone. Gas monitoring and venting or treating would be conducted during excavation activities.
- Shallow bedrock neutralization using a lime slurry injection.
- Installation of a multi-layer cap over the former lagoon.
- Complete dike embankment reinforcement/stabilization.
- Post-closure monitoring and maintenance, including periodic sampling of monitoring wells up-gradient and down-gradient of the site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Although residents living near Bruin Lagoon have been aware of the site's existence since disposal of petroleum refining wastes began in the 1930s, vocal community concern about Bruin Lagoon dates back to 1981 when the site was proposed for inclusion on the Superfund Interim Priorities List. The interest and involvement of residents and Borough officials has focused primarily on EPA field activities at the site and has increased whenever additional field activities have been proposed and conducted at the site. Major concerns expressed since 1981 during the remedial planning activities at the Bruin Lagoon site are described briefly below.

Use of Superfund monies to clean up the Bruin Lagoon site. Many residents and local officials believed that Bruin Lagoon is not hazardous to the health of local residents and that Federal funds should not be used to clean up the site. Local officials emphasized that the community needs money for sewers and a public water supply rather than for the cleanup of hazardous wastes in the lagoon.

Health effects. Several families who lived near the site were concerned about the release of toxic gas from the lagoon during the 1984 remedial construction activities.

Impact from drilling activity on existing residential wells. Local officials and residents worried that drilling activity might contaminate a drinking water supply aquifer or residential wells located near the site.

Property values. Residents living near Bruin Lagoon feared that the second RI/FS would depress residential property values in the area.

Economic development. Local officials and residents expressed fear that remedial activities at the site would contribute to increasing economic depression and unemployment in northern Butler County.

III. SUMMARY OF MAJOR COMMENTS AND EPA RESPONSES

EPA held a public comment period on the Bruin Lagoon draft RI/FS report from August 8, 1986 to August 29, 1986. A public meeting was held at the Bruin Borough Fire Hall on August 21, 1986 at 7:00 pm. Those attending the meeting included representatives from EPA, the Pennsylvania House of Representatives, a local Congressional office, area press, and approximately 30 community members. During the meeting, EPA staff gave an overview of the Superfund program and discussed the history of the site, the scope and findings of the RI/FS, the proposed remedial alternatives, and EPA's preferred remedial alternative. Following this presentation, EPA opened the floor to all those present. Questions, comments, and concerns received during the meeting are summarized below and are categorized by relevant topics. Each

comment is followed by EPA's response. Oral comments received during the public meeting were the only comments received throughout the public comment period.

Project Cost

Question: A resident asked how much money EPA has spent to date on the Bruin Lagoon site.

Response: EPA stated that approximately $3 to $5 million has been spent to date on the Bruin Lagoon site. These costs include initial site sampling and contractor studies; the RI/FS; the RI/FS report; initiation of construction activities; an emergency removal; a second RI/FS; and a second RI/FS report.

Site Contamination

Question: Several residents asked about gas that was released from the site prior to the 1984 emergency action. Specifically, the residents asked what the gas was composed of, what effect it could have, and whether or not the gas was considered dangerous.

Response: EPA said analytic results showed that the gas contained hydrogen sulfide, sulfur dioxide, and methane. High concentrations of these compounds could potentially be lethal. However, the concentrations of these compounds found leaving the site were not that high.

Question: A resident asked why EPA was concerned with protecting ground water from further contamination.

Response: EPA responded that sampling has shown that the site is not affecting residential wells. If drilling were to take place on site or just below the site, however, the water produced from the well could pose a health risk.

Preferred Remedial Alternative

Question: A resident asked if EPA's preferred alternative was the same as the remedy selected from the initial RI/FS report in 1982.

Response: EPA stated that the stabilization technique is the same in both the preferred remedial alternative outlined in the July 1986 RI/FS report and the initial remedy selected for the Bruin Lagoon site by EPA in 1982. Since the initial RI/FS was completed, however, additional studies have provided EPA with more detailed information about site characteristics that will ultimately make the remedy more effective. For example, because more is known about the gases discovered on site, EPA will be able to monitor them more efficiently. Also, as a result of recent subsurface investigations, the bedrock will be treated with a lime slurry.

Question: Several residents asked questions about the cap recommended for the site including what it will be constructed of, where it will be placed, and how it will work.

Response: EPA replied that capping techniques are designed to reduce the infiltration of precipitation through waste materials and the subsequent potential for contaminants to leach through those same materials. The reduction of infiltration can be achieved through capping with impervious materials or surface-sealing techniques. The cap recommended as part of Option 3 would be placed over the entire site area and would be composed of a multi-layered cover system. The actual composition of that cap will be decided during the remedial design phase of this project.

Question: A resident asked if a total clean up will be done of the contamination found at the Bruin Lagoon site.

Response: EPA stated that in order to remove 100% of the contamination found on site, excavation and off-site disposal of some contaminated materials would be necessary. Although Option 3 does not include excavation and off-site disposal as part of the remedy, EPA believes Option 3 will meet the Superfund goals of minimizing present and future migration of hazardous substances and protecting human health and the environment, while complying with all applicable and relevant Federal public health and environmental standards, guidances, and advisories.

Question: A resident asked if, as part of the remedial action, lime were used to neutralize the bedrock, whether the lime would react with the sulfuric acid present on site to create more gases.

Response: EPA stated that while it is possible for a chemical reaction to occur when neutralizing contaminants, the gases potentially generated from such a reaction would not be the same as the gases that were released from the site in 1984. Nonetheless, EPA added, it will be important for field staff to proceed carefully during the construction of the remedial action.

IV. UNANSWERED CONCERNS

Although EPA representatives responded to many questions and concerns during the public meeting on the RI/FS report, the following issues remain unanswered:

Odor

Question: Many residents described to EPA an odor they claim is emanating from the vicinity of the site. These residents said that the odor is sometimes strong enough to wake them up at night, and has caused headaches and feelings of nausea. In addition, residents reported that the odor is worse some times than at others, is smelled only within Bruin Borough, and had been present for approximately six weeks prior to the public meeting. These residents asked EPA what the odor is and where it is coming from.

Response: EPA replied that site sampling had been completed in February 1986 and, at that time, EPA was unaware of any odor coming from the site.

Question: A resident asked that EPA investigate the odor and find out where it is coming from.

Response: EPA responded that the Agency does not have the authority to conduct an investigation. State and local laws govern the regulation of nuisance odors.

Question: A resident asked if the odors could be generated by tanks located on the refinery property adjacent to Bruin Lagoon.

Response: EPA stated that a site investigation has been conducted at the abandoned refinery next to the Bruin Lagoon site. Whether odors could be emanating from the refinery or not will have to be investigated. EPA will refer residents' concerns to PADER.

Question: A resident asked how EPA could determine whether or not the remedial action is effective if EPA does not investigate odors coming from the site.

Response: EPA replied that they do not believe odors are coming from the site. However, if Option 3 is selected as the remedial action, on-site stabilization may address the odor problem. EPA reminded residents that the Agency does not have the authority to investigate nuisance odors, but added they would relay all the community's questions and concerns to PADER.

Superfund reauthorization

Question: A resident asked what will happen to the Bruin Lagoon site if Superfund is not reauthorized.

Response: EPA responded that Bruin Lagoon will remain in its present state until Federal funds become available. EPA said, however, that, if necessary, emergency activity would be funded.

Question: Several residents asked if Bruin Lagoon is currently stabilized, when it will become unstabilized, and what kind of monitoring would take place at the site in the period before Superfund is reauthorized.

Response: EPA reported that the site is stabilized for the short term, but not for the long term. In addition, EPA responded that it is difficult to determine when the site will become unstabilized. EPA said that any monitoring done prior to reauthorization will have to be negotiated with PADER.

Question: A resident asked if the erosion occurring under the fence located around the site will be addressed even if Superfund is not reauthorized.

Response: EPA said that additional funds would be needed to address soil erosion, but that the site is secure, for the most part. EPA also added that if Superfund is not reauthorized, another public meeting will be held in Bruin Borough so that residents are aware of any change in site plans or developments.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE BRUIN LAGOON SITE

The following list includes community relations activities conducted to date by EPA at the Bruin Lagoon site.

DATE	ACTIVITY
August 1986	Held a three-week public comment period to allow interested citizens the opportunity to comment on the draft RI/FS report.
August 1986	Prepared and released a fact sheet that outlined EPA's preferred remedial alternative.
August 1986	Conducted a public meeting to announce the selection of a preferred remedial alternative and received comments from the public.
March 1986	Revised the community relations plan.
May 1985	Conducted a public meeting to discuss the work plan for the second RI/FS.
September 1982	Prepared the community relations plan.
July 1982	Conducted a public meeting to announce the selection of a remedial alternative.
February 1982	Held a public meeting to present the proposed alternatives for the remedial action.
June 1981	Held a public meeting to discuss the proposed RI/FS.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
Post Office Box 2063
Harrisburg, Pennsylvania 17120

Bureau of Waste Management

717-787-9871

September 19, 1986

Mr. Thomas Voltaggio
Chief, Superfund Branch
U. S. Environmental Protection Agency
Region III
841 Chestnut Building
9th and Chestnut Streets
Philadelphia, PA 19107

Dear Mr. Voltaggio:

The draft Record of Decision for the selection of the alternative for the remediation of the Bruin Lagoon site has been reviewed by DER staff members. The only revision of the ROD that would be necessary is the Operation and Maintenance (Page 16). The State responsibility for O&M would begin one year after the Remedial Construction is completed.

We concur with your assessment of the proposed alternatives and with the selection of the final remediation measures. The selected remedial alternative is stabilization of sludge and liquid zone with a multilayer cap, dike reinforcement, shallow bedrock treatment, and post-closure monitoring. We can then ensure that the selected remedial alternative will adequately protect the public health and the environment of the Commonwealth.

If you have any questions concerning this matter, do not hesitate to contact Donald Becker or Randy Roush at 717-783-7816.

Sincerely,

Donald A. Cazenovia

for James P. Snyder, Assistant Director