R-024-202.1

2261

REMOVAL SITE ~~EVALUATIN~~ EVALUATION ~~ACTION~~ ACTIVE FLY ASH PILE CONTROLS SEPTEMBER 1991

~~02-01~~ 10-04-91

17
ENCLOSURE

[redacted]

2261

REMOVAL SITE EVALUATION

ACTIVE FLY ASH PILE CONTROLS

Fernald Environmental Management Project

U.S. Department of Energy

September 1991

1

INTRODUCTION

Historically, operations at the Fernald Environmental Management Project (FEMP) have relied on boiler-produced steam for heat, laundry facility operation, and to support uranium metal production. Since 1989, uranium metal production has been discontinued. Nevertheless, on a daily basis, the FEMP's two coal-fired boilers combust an average of 40 tons of coal during the spring/summer and 87 tons of coal during the fall/winter.

Coal analysis indicates that the Kentucky bituminous coal purchased for use at the FEMP has an ash content of approximately 8%. Ash content in coal represents an impurity when purchased. Ash is a by-product of combustion, produces no heat and must be removed from the furnace and hauled from the plant. Coal combustion at the FEMP generates approximately 7 tons of ash waste per day during fall/winter operations and approximately 3 tons per day during the spring/summer. Ash waste is composed primarily (70%) of bottom ash collected below the boilers. Precipitator ash collected from pollution control devices and fly ash removed from the middle levels of the boiler comprise the remaining 30% of the ash waste. Ash waste is loaded into dump trucks and transported to the Active Fly Ash Pile disposal area every Monday, Wednesday and Friday. The ash pile is graded approximately every three months so that a level working surface can be maintained.

The Active Fly Ash Pile disposal area is located about 3000 feet southwest of the FEMP's former production area. The pile has received ash waste since the mid-1960's. To date, estimates indicate that approximately 59,000 cubic yards of ash have been disposed in this area. The pile has a surface area of approximately 3 to 4 acres with an exposed working surface gently sloped in a northerly direction, with steeply-sloped sides (greater then 45 degrees) on its western and southern ends. Ash pile depth ranges from 3 to 40 feet. The pile has never been covered and surface vegetation is negligible. Photographs of the pile and a topographic plan are provided in Attachment I.

Previous projects have been considered to provide controls to prevent wind-produced dust emissions and uncontrolled surface water run-off. These projects have been placed on hold until other control method alternatives could be evaluated, and pending the completion of RI/FS sampling. RI/FS sample results will indicate ash toxicity and determine if past disposal practices may have contaminated the pile.

Recent events have warranted re-evaluation of methods to provide wind and surface run-off control at the pile. Specifically, in July of 1991, after a period of hot and dry weather and recent grading of the pile, high wind conditions produced a large fugitive ash cloud that was visible off-site. Many local residents witnessed the cloud and have expressed their concern to the DOE. Application of water to the pile as a dust suppressant has been implemented as a short-term control approach to prevent further fugitive air emissions. A longer-term action is required, while awaiting final remediation under the CERCLA program.

INTRODUCTION (Cont'd.)

Surface water run-off control may also be required. In 1988, as part of the Best Management Plan (BMP) Sampling program, water samples collected from the Storm Sewer Outfall Ditch located directly east of the pile, and the drainage ditch located west of the pile, indicated elevated levels of heavy metals and Total Suspended Solids. These high levels may be attributable to ash pile run-off.

This Removal Site Evaluation (RSE) is being initiated by the Department of Energy under authorities delegated by Executive Order 12580 under Section 104 of CERCLA. RSE development was consistent with Section 300.410 of the National Contingency Plan (NCP) to determine if conditions at the fly ash pile warrant the implementation of a CERCLA Removal Action.

PREVIOUS INVESTIGATIONS

In 1987, Roy F. Weston, Inc. conducted a chemical and radiological survey of the FEMP's waste storage and fly ash disposal areas. Collectively, this survey was called the Characterization Investigation Study (CIS). Two samples conducted from the Active Fly Ash Pile area were analyzed for HSL inorganics, pesticides/PCB's, and radionuclide concentrations. A summary of the analytical results is listed in Attachment II.

Sample data indicates the presence of measurable amounts of aluminum, calcium, iron and magnesium. However, these substances are currently not regulated. Other constituents were discovered at levels below regulatory concern.

Review of the radiological data shows that all of the radionuclides analyzed are very low in activity concentration. Isotopic uranium concentrations were reflective of uranium that occurs naturally in coal combusted waste products.

Weston CIS data cannot be validated to the quality level required by the RI/FS. Therefore final site characterization will rely most heavily on the analytical results obtained as part of the RI/FS program. Analytical results for samples conducted in the Active Fly Ash area are due in FY 92.

EVALUATION OF THE MAGNITUDE OF POTENTIAL THREAT

2261

The primary exposure pathways to human populations, relative to fly ash pile releases, are as follows:

1 ▸ Consumption of surface/ground water or crops irrigated with these waters.

2 ▸ Inhalation of fugitive dusts.

The following discussion elaborates the reasons why these exposure pathways are a concern.

WATER PATHWAY

Part 261.4 of Title 40 of the Code of Federal Regulations (40 CFR 261.4) defines ash waste generated from the combustion of coal as a solid waste and not a hazardous waste. In Ohio, however, a distinction is made between non-toxic ash and toxic ash. Ohio's concern is that the E.P. Toxicity Test, formerly used to determine ash toxicity, may not have been reflective of the actual characteristics of leachate generated by disposal areas. With the advent of TCLP, a more-aggressive leach test, ash disposal areas previously classified as non-toxic may now be considered solid or hazardous waste, if leachate exceeds thirty times the Ohio Drinking Water Standards or the appropriate Federal standard, for certain defined heavy metals (i.e., arsenic, barium, chromium, lead, mercury, selenium, and silver).

Upon completion of the RI/FS Risk Assessment, the probability of pile run-off entering the surface water pathway and posing a threat or risk to humans who live in the vicinity of the site will be assessed. As stated in the Introduction, evidence exists that indicates elevated levels of heavy metals in drainage area waters east and west of the pile. Heavy metals can accumulate in humans, especially children, and severely affect the nervous system. The ash pile may or may not be the source of these contaminants. Presumably, heavy metals may have been transported to the out-fall ditch from some upstream source.

In addition to the results of the risk assessment, OEPA Policy 4.07 which references parameters set in OAC 3745-81-11(B), requires run-off control measures to minimize alkalinity, Total Suspended Solids (TSS) and sulfate release at disposal areas, even if the ash is determined to be non-toxic. Furthermore, amendments to 40 CFR Parts 122, 123, and 124 (Federal Register, Nov. 16, 1990) provide guidance relative to permit requirements for those stormwater discharges associated with industrial activity. Section 122.26 (Paragraph (b)(14)(v)) indicates that "land application sites and open dumps that receive or have received any industrial waste" are required to apply for a NPDES permit. It is expected, shortly, that facilities will be required to re-route stormwater discharges to a facility where it can be treated prior to surface water discharge.

4

WATER PATHWAY (Cont'd.)

A NPDES permit has been issued by OEPA at the FEMP that establishes levels of performance in terms of stormwater discharge to surface water at the following locations:

1 ▸ Manhole 175 (Great Miami River),

2 ▸ Storm Sewer Lift Station (Great Miami River),

3 ▸ Stormwater Retention Basin Overflow (Storm Sewer Outfall Ditch).

The majority of the process area stormwater drainage, as well as the projected drainage for the Waste Pit Area Run-off Control Removal Action, is included as part of the permit referenced above. Drainage calculations do not account for stormwater run-off associated with fly ash pile operation. OEPA has been made aware of this and has indicated that uncollected fly ash pile discharges be addressed in a NPDES stormwater discharge permit application, due November 18, 1991. Discharge monitoring would occur at the Storm Sewer Outfall Ditch/Paddy's Run junction.

AIR PATHWAY

Boiler Plant ash, particularly the fly ash, is made up of small particles, including particles of respirable size, that may be passed or possibly captured within the lung tissue. RI/FS sample analytical results will indicate if this ash contains elevated levels of toxic metals, including lead, cadmium, mercury, and arsenic. Inhalation of dusts laden with heavy metals can cause fatigue, labored respiration, and bronchitis. Under these conditions, dust control would be an absolute necessity. Even if analytical data results indicate that the ash is non-toxic, fugitive ash emissions into the air would still represent a public nuisance for those homeowners living near the site.

ASSESSMENT OF THE NEED FOR A REMOVAL ACTION

Consistent with Section 40 CFR 300.410 of the NCP, the Department of Energy shall determine the appropriateness of a removal action. Section 40 CFR 300.415 (b)(2) defines eight factors which should be considered in determining the need of a removal action response. Two of these factors, listed below, are specifically applicable to this assessment.

40 CFR 300.415 (b)(2)(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

40 CFR 300.415 (b)(2)(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

5

These factors are considered appropriate as a result of potential contaminants in the Active Fly Ash Pile area.

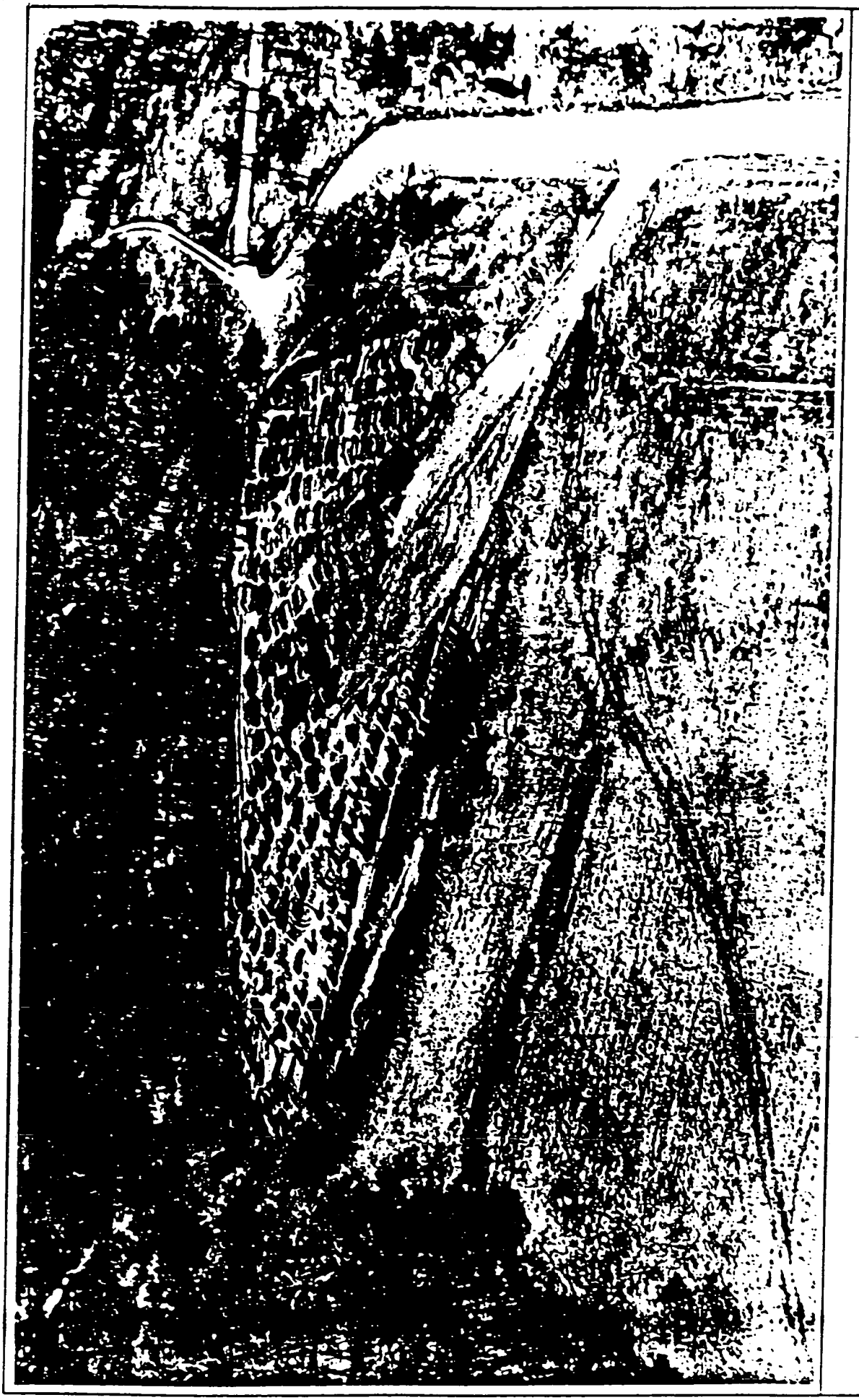
APPROPRIATENESS OF A RESPONSE

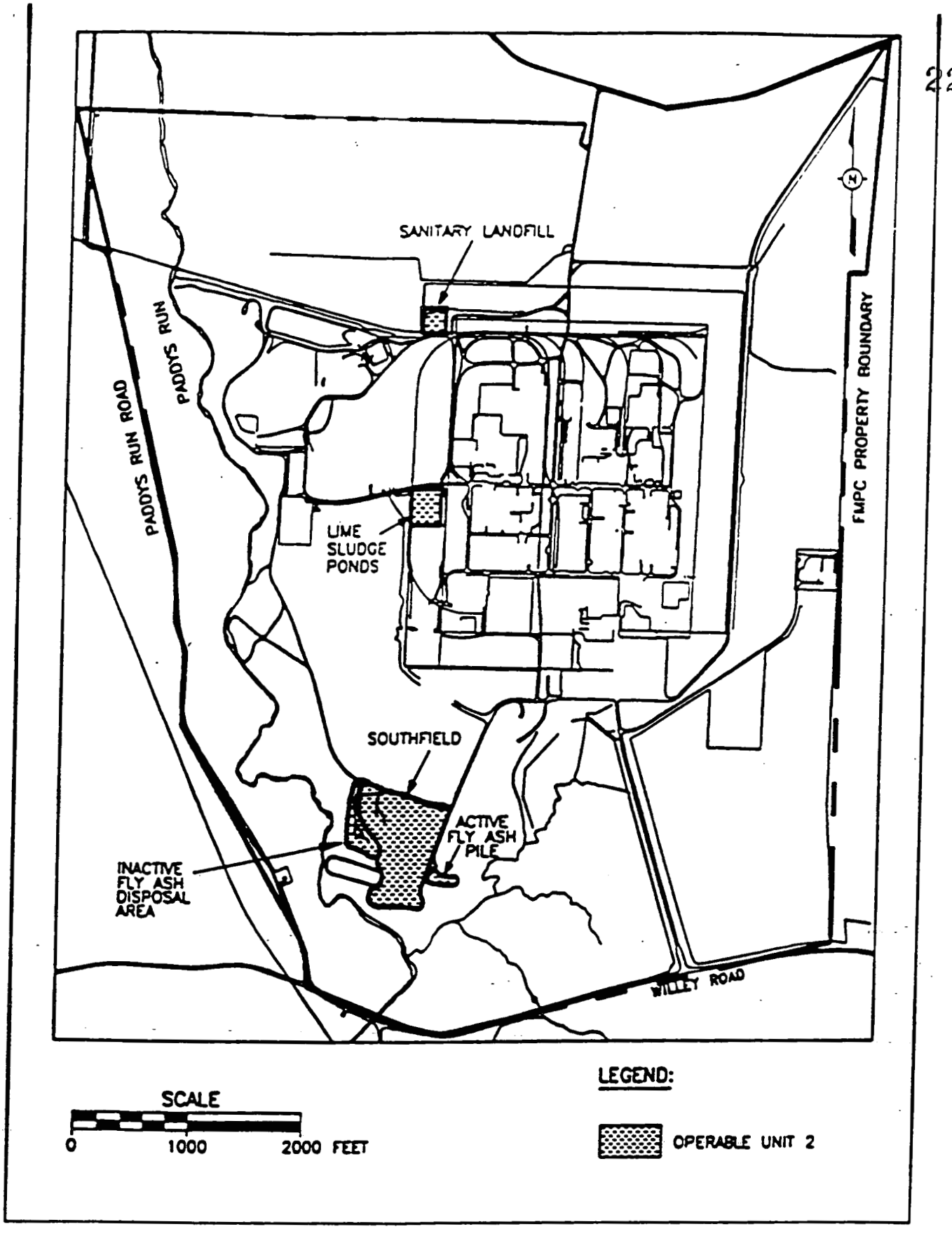
Based on the evaluation of these factors by the U. S. EPA/DOE during the 1991 Consent Agreement Negotiations, it has been determined that a time-critical Removal Action is required to provide fugitive dust and surface water run-off control at the Active Fly Ash Pile. Following the DOE preparation of an Action Memorandum, a Removal Action Work Plan will be prepared that addresses work scope, health and safety, quality assurance and any additional sampling requirements necessary to complete this project.

The FEMP is currently on the National Priorities List and is in the RI/FS process. The final remedial action will address the means of removing or further stabilizing the Active Fly Ash Pile.

ATTACHMENT I

N
ACTIVE
ASH PILE




SANITARY LANDFILL
PADDYS RUN
PADDYS RUN ROAD
FMPC PROPERTY BOUNDARY
LIME SLUDGE PONDS
SOUTHFIELD
ACTIVE FLY ASH PILE
INACTIVE FLY ASH DISPOSAL AREA
WILLEY ROAD
SCALE
0
1000
2000 FEET
LEGEND:
OPERABLE UNIT 2

ATTACHMENT II

TABLE 3-10 RADIONUCLIDE CONCENTRATIONS IN COMPOSITE SAMPLES IN LOWER FLY ASH AREA

Borehole Number (a)	Radionuclide (b)	VQ	Activity Concentration (pCi/g,dry)	Uncertainty (pCi/g,dry)
25-01	PB-210	=	4.00	1.00
	RA-226	=	2.40	.50
	RA-228	=	1.70	.40
	TH-228	<	.10	
	TH-230	=	5.30	.40
	TH-232	<	.10	
	U-234	=	4.50	.30
	U-235	=	.10	.06
	U-238	=	5.10	.30
25-02	PB-210	<	1.00	
	RA-226	=	.40	.10
	RA-228	=	.90	.40
	TH-228	<	.10	
	TH-230	=	.70	.10
	TH-232	=	.10	.10
	U-234	=	5.70	.30
	U-235	=	.20	.06
	U-238	=	6.80	.20

(a) Refer to Table 2-1 in Subsection 2.1.2 for boring numbers and grid locations
(b) RA-226 and RA-228, when reported, were measured by gamma spectrometry and reported on a dry weight basis

Table B-19

Lower Fly Ash Area Inorganic Data Summary

Borehole Number	Sample Id	Batch Number	Parameter	Concentration	Unit Of Measure
25-01	FMP-PS-25-009	8705-466-0080	ALUMINUM, TOTAL	7027.36	MG/KG
			ARSENIC, TOTAL	4.64	MG/KG
			CADMIUM, TOTAL	3.15	MG/KG
			CALCIUM, TOTAL	88166.01	MG/KG
			CHROMIUM, TOTAL	12.62	MG/KG
			COPPER, TOTAL	8.62	MG/KG
			IRON, TOTAL	14896.32	MG/KG
			LEAD, TOTAL	9.29	MG/KG
			MAGNESIUM, TOTAL	32006.04	MG/KG
			MANGANESE, TOTAL	462.88	MG/KG
			MERCURY, TOTAL	.16	MG/KG
			NICKEL, TOTAL	13.25	MG/KG
			POTASSIUM, TOTAL	631.20	MG/KG
			VANADIUM, TOTAL	20.19	MG/KG
			ZINC, TOTAL	42.08	MG/KG
'5-02	FMP-PS-25-011	8705-466-0040	ALUMINUM, TOTAL	3857.10	MG/KG
			ARSENIC, TOTAL	5.33	MG/KG
			CADMIUM, TOTAL	2.36	MG/KG
			CALCIUM, TOTAL	140330.50	MG/KG
			CHROMIUM, TOTAL	7.95	MG/KG
			COPPER, TOTAL	9.03	MG/KG
			IRON, TOTAL	12237.80	MG/KG
			LEAD, TOTAL	12.55	MG/KG
			MAGNESIUM, TOTAL	24918.50	MG/KG
			MANGANESE, TOTAL	645.00	MG/KG
			MERCURY, TOTAL	1.78	MG/KG
			POTASSIUM, TOTAL	752.50	MG/KG
			SODIUM, TOTAL	129.00	MG/KG
			VANADIUM, TOTAL	13.11	MG/KG
			ZINC, TOTAL	30.31	MG/KG

Table B-20

Lower Fly Ash Area Organic Data Summary

Borehole Number	Sample Id	Batch Number	Parameter	Concentration	Unit Of Measure	Qualifier
25-01	FMP-PS-25-009	8705-466-0030	AROCLOR-1260	85.00	UG/KG	J
25-02	FMP-PS-25-011	8705-466-0040	AROCLOR-1260	38.00	UG/KG	J
			METHYLENE CHLORIDE	100.00	UG/KG	J*
			ACETONE	200.00	UG/KG	J*

J = Concentration is below quantification level; * = Common laboratory contaminant

Table 3-23

Activity Concentrations Of Lower Fly Ash Area Profile Samples

Borehole	Begin Depth (feet)	End Depth (feet)	Radionuclide	Vq	Activity Concentration (pCi/g)	Uncertainty Value (pCi/g)
25-01	.00	2.00	RA-226	=	4.30	.90
	.00	2.00	TH-232	<	1.80	
	.00	2.00	U-238	<	8.10	
	2.00	3.00	RA-226	=	3.00	.40
	2.00	3.00	TH-232	<	1.10	
	2.00	3.00	U-238	<	6.60	
	3.00	4.00	RA-226	=	.50	.40
	3.00	4.00	TH-232	<	1.80	
	3.00	4.00	U-238	<	3.80	
	4.00	5.00	RA-226	<	.80	
	4.00	5.00	TH-232	=	.40	.30
	4.00	5.00	U-238	<	2.50	
	5.00	6.00	RA-226	<	.40	
	5.00	6.00	TH-232	=	.50	.20
	5.00	6.00	U-238	<	5.10	
	6.00	7.00	RA-226	<	.50	
	6.00	7.00	TH-232	<	1.20	
	6.00	7.00	U-238	<	5.70	
	7.00	8.00	RA-226	<	.80	
	7.00	8.00	TH-232	=	.80	.50
	7.00	8.00	U-238	<	7.00	
25-02	.00	1.00	RA-226	<	1.80	
	.00	1.00	TH-232	=	.60	.50
	.00	1.00	U-238	=	18.20	4.20
	1.00	2.00	RA-226	=	1.10	.50
	1.00	2.00	TH-232	=	1.10	.40
	1.00	2.00	U-238	=	5.30	2.60
	2.00	3.00	RA-226	=	1.70	.90
	2.00	3.00	TH-232	<	5.80	
	2.00	3.00	U-238	=	8.60	3.60
	3.00	4.00	RA-226	<	.80	
	3.00	4.00	TH-232	=	1.10	.50
	3.00	4.00	U-238	<	7.90	
	4.00	5.00	RA-226	<	.50	
	4.00	5.00	TH-232	<	1.70	
	4.00	5.00	U-238	<	4.40	
	5.00	6.00	RA-226	<	.90	
	5.00	6.00	TH-232	<	.40	
	5.00	6.00	U-238	<	9.90	

Table 3-23

Activity Concentrations Of Lower Fly Ash Area Profile Samples

Borehole	Begin Depth (feet)	End Depth (feet)	Radionuclide	Vq	Activity Concentration (pCi/g)	Uncertainty Value (pCi/g)
25-02	6.00	8.00	RA-226	<	.60	
	6.00	8.00	TH-232	<	2.00	
	6.00	8.00	U-238	<	3.60	
	8.00	9.00	RA-226	<	1.60	
	8.00	9.00	TH-232	<	.30	
	8.00	9.00	U-238	<	4.00	
	9.00	10.00	RA-226	=	.80	.40
	9.00	10.00	TH-232	<	2.60	
	9.00	10.00	U-238	=	4.10	2.60
	10.00	11.00	RA-226	<	.90	
	10.00	11.00	TH-232	=	.40	.30
	10.00	11.00	U-238	<	5.50	
	11.00	12.00	RA-226	=	.80	.10
	11.00	12.00	TH-232	<	.80	
	11.00	12.00	U-238	=	2.80	.80
	12.00	13.00	RA-226	=	.70	.30
	12.00	13.00	TH-232	<	.30	
	12.00	13.00	U-238	<	7.30	
	13.00	14.00	RA-226	=	.70	.50
	13.00	14.00	TH-232	<	.40	
	13.00	14.00	U-238	<	3.50	
	14.00	16.00	RA-226	<	1.00	
	14.00	16.00	TH-232	<	1.80	
	14.00	16.00	U-238	<	4.00	

63 records selected.