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REMOVAL SITE EVALUATION CONTAMINATED RIPRAP AT THE FEMP OUTFALL TO THE GREAT MIAMI RIVER JUNE 1992

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Removal Site Evaluation Contaminated Riprap at the FEMP Outfall to the Great Miami River

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio

June 1992

Removal Site Evaluation
Contaminated Riprap at the FEMP Outfall to the Great Miami River

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SECTION 1

INTRODUCTION

Wastewater from the Fernald Environmental Management Project (FEMP) is discharged through an National Pollutant Discharge Elimination System (NPDES) permitted outfall line into the Great Miami River. This outfall has been used since the plant was operated in the mid-1950s.

The original outfall toppled in 1965 because of the river's movement. As a result of this incident, sheet piling was placed on both sides of the outfall line for protection. This sheet piling extends approximately 105 feet from the end of the outfall back into the bank of the river. Only a small portion of the sheet piling is currently exposed. Concrete was used to encapsulate the outfall line located within the sheet piling.

In 1968, it was discovered that additional erosion was occurring around the sheet piling/concrete outfall structure. Riprap was placed around the outfall to prevent further erosion. Thirty to forty loads of construction rubble from a worksite (not associated with the FEMP) were placed at the outfall for use as riprap.

Additional riprap has been placed at the outfall since 1968. Construction rubble from the FEMP has reportedly been used as some of this additional riprap. The outfall line is scheduled to be decommissioned and replaced with another outfall line (that runs parallel to the existing line) in early 1993.

In April 1992, a concern was raised, based on finding contaminated construction rubble in another area (near the waste pits located on-site) and interviews with employees that the same type of material could have been placed at the outfall line. DOE surveyed the outfall line area and discovered that contaminated riprap exists in this area. It is believed that this riprap was placed at the outfall approximately 10 years ago. Wastewater from the outfall has contained radiological constituents (WEMCO 1990); however, the wastewater is not suspected to be the source of this contamination because the contaminated riprap is located on the bank at an elevation well above the outfall. A Radiological Survey Report (Attachment A, dated April 28, 1992) indicates that nine contaminated items were identified in this location. Exhibit 1-1 contains photographs of some of the contaminated riprap and soil found at the outfall. The materials that are marked with blue-green paint are contaminated. As can be seen from these photographs, the quantity of material is very small.

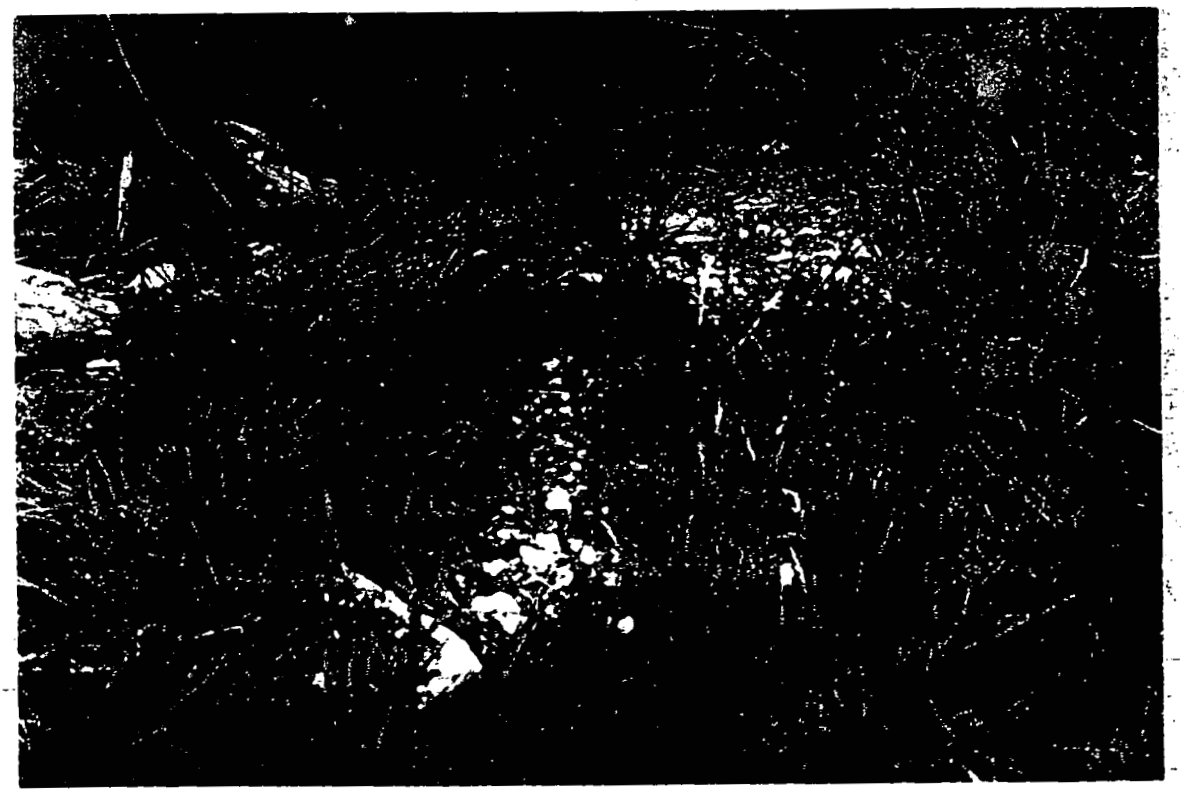

Exhibit 1-1 - Photographs of Contaminated Riprap and Soil (Page 1 of 2)

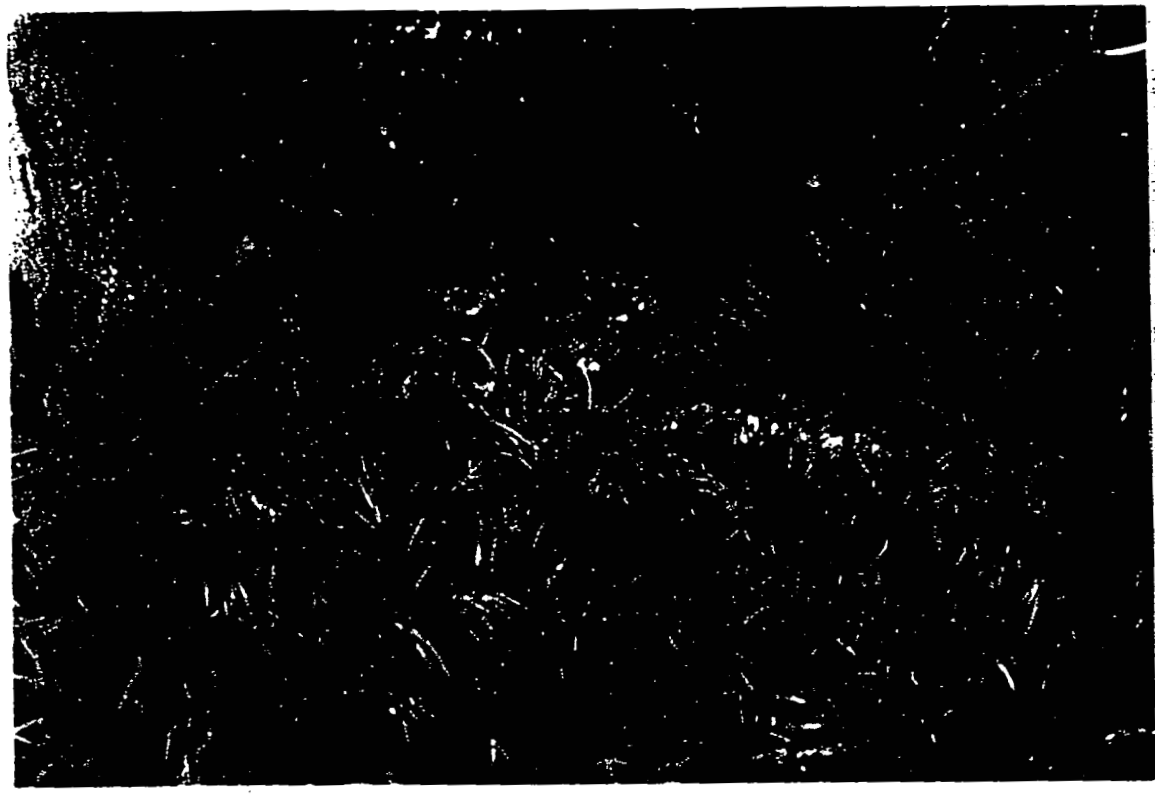

Exhibit 1-1 - Photographs of Contaminated Riprap and Soil (Page 2 of 2)

SECTION 2

IDENTIFICATION OF SOURCE TERMS

Construction rubble has been placed at the FEMP outfall on the Great Miami River as a method controlling erosion of the outfall structure. This material was initially provided by a non-FEMP sou in 1968. However, additional riprap placed at the outfall since 1968 has reportedly come from t FEMP.

Following the discovery of the contaminated rubble at the Waste Pit area, a series of interviews w conducted with site personnel to determine if other areas contained the same type of material. Additior interviews followed by radiological surveys in the field determined that contaminated riprap was plac at the FEMP outfall line. It was determined that approximately 10 years ago, a load of rubble was plac at the outfall which contained radiologically contaminated rubble. The majority of the material concrete with reinforcing steel present in some pieces. The contamination is expected to be similar that of other radiologically contaminated rubble at the FEMP.

A radiological survey performed at the outfall determined the locations of the contaminated riprap. Tab 2-1 presents the results of this survey. Attachment A contains a copy of the original survey.

The survey indicates a high beta-gamma count in relation to the alpha count. The geometry of th material surveyed did not allow for accurate alpha counts. The beta-gamma count, however, considered to be more reliable and representable as the geometry of the material does not impact the bet gamma survey results.

Table IV-1 of DOE Order 5400.5, dated February, 1990, provides currently allowable total residu surface contamination levels for free release. The levels provided by this DOE Order are considered th most restrictive for this type of contamination. Since the results of the alpha count are questionable alpha contamination was not the determining factor in the need for removing the riprap. The beta-gamm counts exceed the allowable free release residual surface contamination level of 5,000 dpm/100 cm^2 fo fixed plus removable contamination for beta-gamma emitters.

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Table 2-1 - Results of the Radiological Survey Report

Item Number	Location and/or Description	dpm/100cm² Alpha*	dpm/100cm² Beta-Gamma
		Fixed Plus Removable	Fixed Plus Removable
1	Rock (2½' x 2½')	400	15,000
2	Rock	<200	5,000
3	Rock (2' x 2')	<200	6,000
4	Ground	200	10,000
5	Ground	200	10.000
6	Ground and Rubble	<200	5,000
7	Ground and Rubble	<200	5,000
8	Ground and Rubble	<200	5,000
9	Rock (6" x 8")	<200	6,000

* Alpha counts may not be accurate because of the geometry of the material surveyed.

SOURCE: Radiological Survey Report, April 28, 1992.

SECTION 3

EVALUATION OF THE MAGNITUDE OF THE POTENTIAL THREAT

An evaluation of the magnitude of the potential threat includes an assessment of the potential dose that may result from exposure to the contaminated rip-rap material. The development of an exposure assessment requires three considerations to be made: 1) evaluation of the source term, 2) an estimate of the fate and transport of the contaminant. and 3) the development of a specific exposure scenario which includes a receptor, an exposure mechanism, and a estimate of the exposure duration. Both the source term and the transport potential were evaluated, through actual measurement, as provided in Section 2 of this report. The discussion here focuses on a specific exposure scenario.

The exposure scenario evaluated for the purposes of this determination involves a hypothetical receptor who, through common day-to-day activities comes in contact with or is directly exposed to the contaminated material. The receptor is expected to have exposure to radiation as a result of actual contact with and being in the proximity of the contaminated material. The exposure scenario is based on the assumption that the receptor engages in typical leisure activities at the location of the contaminated material.

The exposure durations considered are: 1) a minimum of 4 hours per week spent in direct contact with the material and 2) 10 hours per week spent in the vicinity of the contaminated material (at a minimum distance of 3 feet). This exposure scenario would result in a total exposure duration of 728 hours per year.

The evaluations of the total activity of the contaminated material and the corresponding dose rates were performed in accordance with DOE order 5480.11, Radiation Protection for Occupational Workers. The measurement results, presented in Section 2, indicate that the maximum external dose rates are 5×10^{-2} mrem per hour (converted from 50 micro-rem per hour) on contact and 2.5×10^{-2} mrem per hour (converted from 25 micro-rem per hour). The total dose received by the potential receptor is given by the multiplication of the specific dose rate by the appropriate exposure duration. The potential dose under this scenario is approximately 23 mrem over an entire year.

The maximum allowable dose to a member of the general public is 100 mrem per year (effective dose equivalent) and is specified in DOE Order 5400.4, Radiation Protection of the Public and the Environment. A comparison of the calculated dose, for the year, and the maximum allowable dose, specified by DOE orders, indicates that the calculated dose is less than 25% of the allowable limit.

SECTION 4

ASSESSMENT OF THE NEED FOR A REMOVAL ACTION

Pursuant to 40 CFR 300.410, the DOE has evaluated the appropriateness of a removal action. DOE position is that a CERCLA Removal Action is not warranted because the contaminated riprap does nc pose a substantial danger to human health and the environment. Of the several factors for determinin the appropriateness of a removal action (presented in 40 CFR 300.415(b)(2)), the following apply for thi action:

1) 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.

   Since the outfall area does not have any security fencing, the potential exists for members of th public and animals to come in contact with the contaminated riprap. However, due to th location, the potential for contact is minimal.

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

   The potential exists for precipitation or river flooding to wash contaminants from the riprap. However, there is only a minimal amount of contaminants associated with the riprap.

SECTION 5

APPROPRIATENESS OF A RESPONSE

Based upon the evaluation of the factors in Section 4, it has been determined that a CERCLA remova action is not required for the contaminated riprap at the Great Miami River Outfall. Although some c the riprap exceeds DOE free release criteria, the DOE's position is that the material does not pose substantial danger to human health and the environment in its present location. Therefore, DOE feel that a CERCLA Removal Action is not warranted for this effort.

SECTION 6

REFERENCES

(WEMCO 1990) Westinghouse Environmental Management Company of Ohio, 1990. *Annual Environmental Report for Calendar Year 1990*, FMPC 2245.

ATTACHMENT A

RADIOLOGICAL SURVEY REPORT

3462

Fernald Site
IRSAT - RADIOLOGICAL SAFETY

RADIOLOGICAL SURVEY REPORT

DATE	LOCATION	PRINT NAME	PAGE
1-27-92	Low Rock Animal Shelters Grove	Ben Bechell / Laval Brewer	1 of
TIME 1000	LEVEL 500	SIGNATURE	
REASON FOR SURVEY	Survey of equipment and rubble from back of Main Rock in lieu of Shelters Grove		

INSTRUMENTS

MODEL	SERIAL NUMBER	TYPE (G, B, Y)	CALIBRATION DUE DATE	BKGD. (cpm)	EFF/CF	MDA (dpm)	INSPECTED YES
M-3	77134	BY	Jun 92	50	.10	1K	✓
Bicron	A3238	BY	Aug 92	50	.10	1K	✓
M-19	47105	Y	Aug 92	5	–	–	✓
2-177	40260	α	Jun 92	0	.10	200	✓

ITEM NUMBER	LOCATION AND/OR DESCRIPTION	CPM/100cm² ALPHA REMOVABLE	CPM/100cm² ALPHA FIXED PLUS REMOVABLE	CPM/100cm² BETA-GAMMA REMOVABLE	CPM/100cm² BETA-GAMMA FIXED PLUS REMOVABLE	CORRECTED DOSE RATE (μR/hr) γ CONTACT	β/γ CONTACT	γ AT 3' FT
1	Rock 2½' by 2½'		400		15K	5		1
2	Rock		400		5K	5		1
3	2' by 2' Rock		400		6K	12		14 K
4	Ground		200		8K	50		35
5	Ground		200		10K	46		19
6	Concrete & Rubble		400		5K	40		15
7	" "		400		5K	45		21
8	" "		400		5K	30		20
9	Rock 6" by 5"		400		6K	5		1

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Radiological Safety Supervisor
Facility Supervisor
Operable Unit Manager

NOTIFICATION OF SURVEY RESULTS

SUPERVISOR NOTIFIED	TIME	DATE	NOTIFIED BY	REVIEWED BY	DAT