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REMOVAL SITE EVALUATION COLLECT UNCONTROLLED PRODUCTION AREA RUNOFF JANUARY 1992

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ENCLOSURE

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REMOVAL SITE EVALUATION

COLLECT UNCONTROLLED PRODUCTION AREA RUNOFF

Fernald Environmental Management Project
U.S. Department of Energy

January 1992

Introduction

The Fernald Environmental Management Project (FEMP) is a U.S. Government owned, Contractor Operated facility formerly known as the Feed Materials Production Center (FMPC). The FEMP site is located on 1050 acres in a rural area approximately 18 miles northwest of Cincinnati, Ohio (see Figure 1). The FEMP production area is limited to an approximate 136 acre tract near the center of the site (see Figures 1 and 2).

Since the former FMPC facility was established in the early 1950's, various chemical and metallurgical processes were used to manufacture uranium products from natural ore concentrates for use in government defense programs. A substantial quantity and variety of wastes have been generated.

Since 1985, wastes have been processed and stored in drums for either future disposal or reprocessing. Prior to 1985, solid wastes were transferred (by various means) for disposal in pits and silos in a waste storage area located west of the production area (see Figure 2). Production operations were suspended on July 10, 1989. In February 1991, DOE formally notified the U.S. Congress that the FEMP would be closed and that all production missions were terminated. The primary mission of the FEMP is now focussed upon the restoration of the FEMP site environment.

As part of an ongoing Remedial Investigation and Feasibility Study (RI/FS) of the FEMP, the DOE is investigating the effects of past and current FEMP operations upon the liquid exposure pathway by sampling the Great Miami River, Paddy's Run, and groundwater. Some contaminants in these bodies of water may have originated from the FEMP.

Uranium-contaminated runoff to Paddy's Run is believed to migrate to the groundwater via infiltration along the stream bed. While the majority of the uranium-contaminated stormwater originating at the FEMP is controlled by collection systems, and particulates are allowed to settle prior to being discharged to the Great Miami River, some contaminated stormwater is uncontrolled, and runs directly off the FEMP property to Paddy's Run.

There are two routes by which uncontrolled liquid discharge from the FEMP can enter Paddy's Run. The first of these is through overflow of the Stormwater Retention Basin (SWRB), where stormwater is normally collected for settling before discharge to the Great Miami River. In the event of a very large storm, or a series of smaller storms, the SWRB can fill to capacity. Overflow is then discharged to Paddy's Run via the SWRB outfall ditch. The SWRB outfall ditch is one of two National Pollutant Discharge Elimination System (NPDES) permitted discharge points at the FEMP. The permit specifies sample locations, sampling and reporting schedules, discharge limitations, water quality standards, and other restrictions on FEMP discharges to Paddy's Run and the Great Miami River.

A second route is via uncontrolled stormwater surface runoff directly to Paddy's Run. This uncontrolled runoff is produced from rain falling on areas outside the controlled waste pit and production areas shown as the shaded areas in Figures 2 and 3. Although there is no known direct use of the stormwater runoff by members of the nearby community, (e.g., for irrigation), the stormwater runoff to Paddy's Run is considered to be a contributor to the contamination of the underlying aquifer.

2

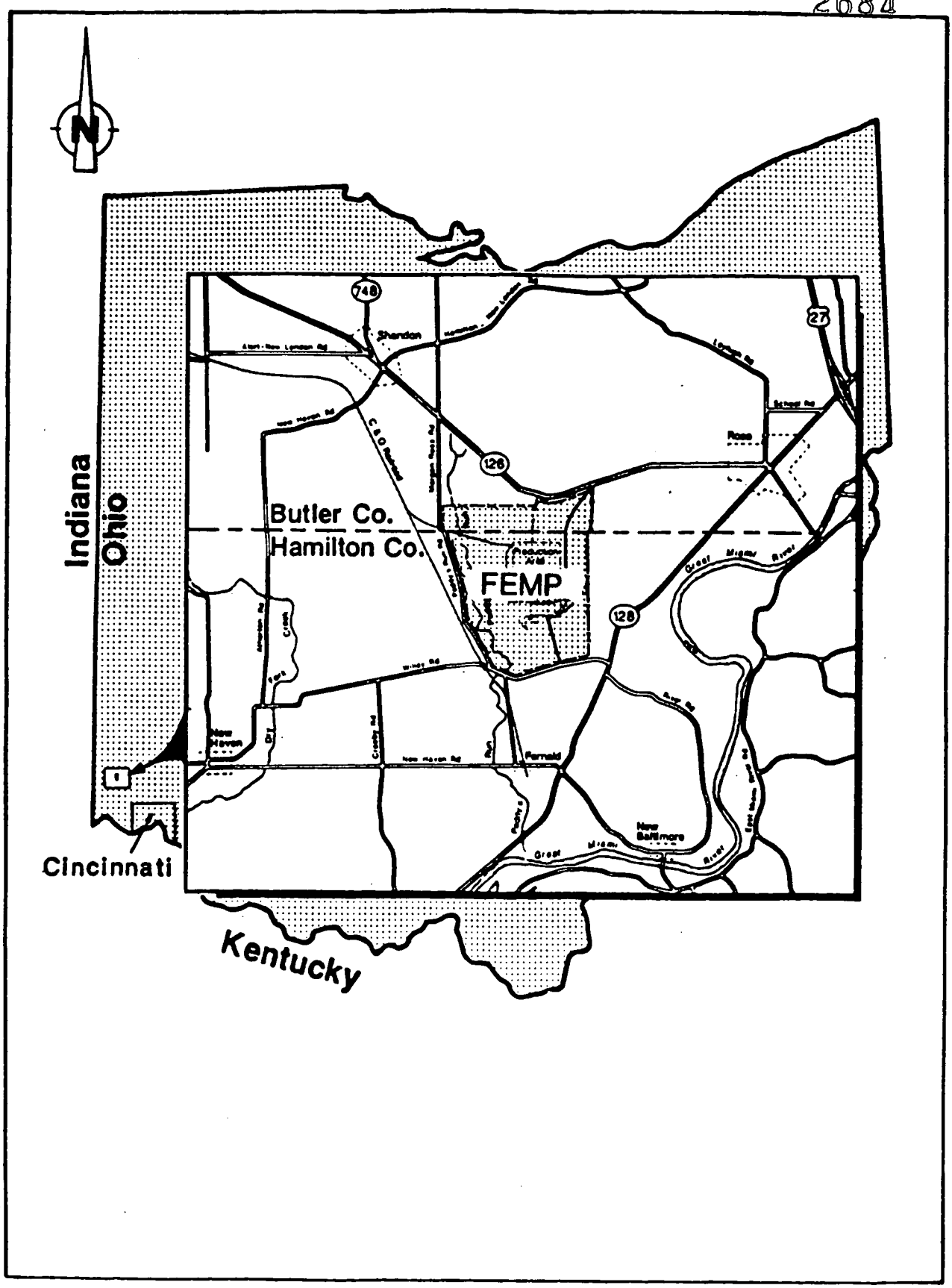


Figure 1 FEMP and Vicinity

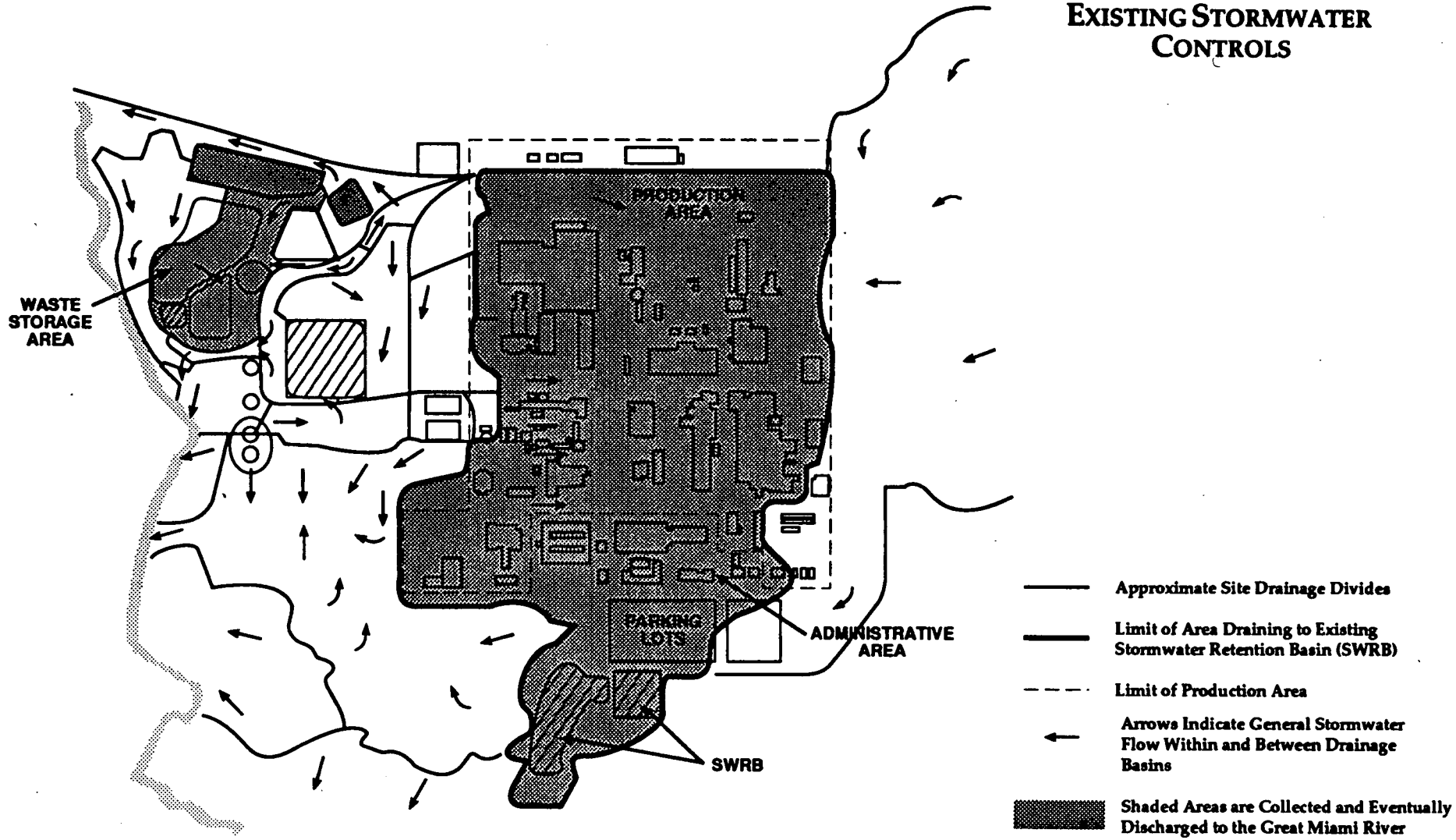
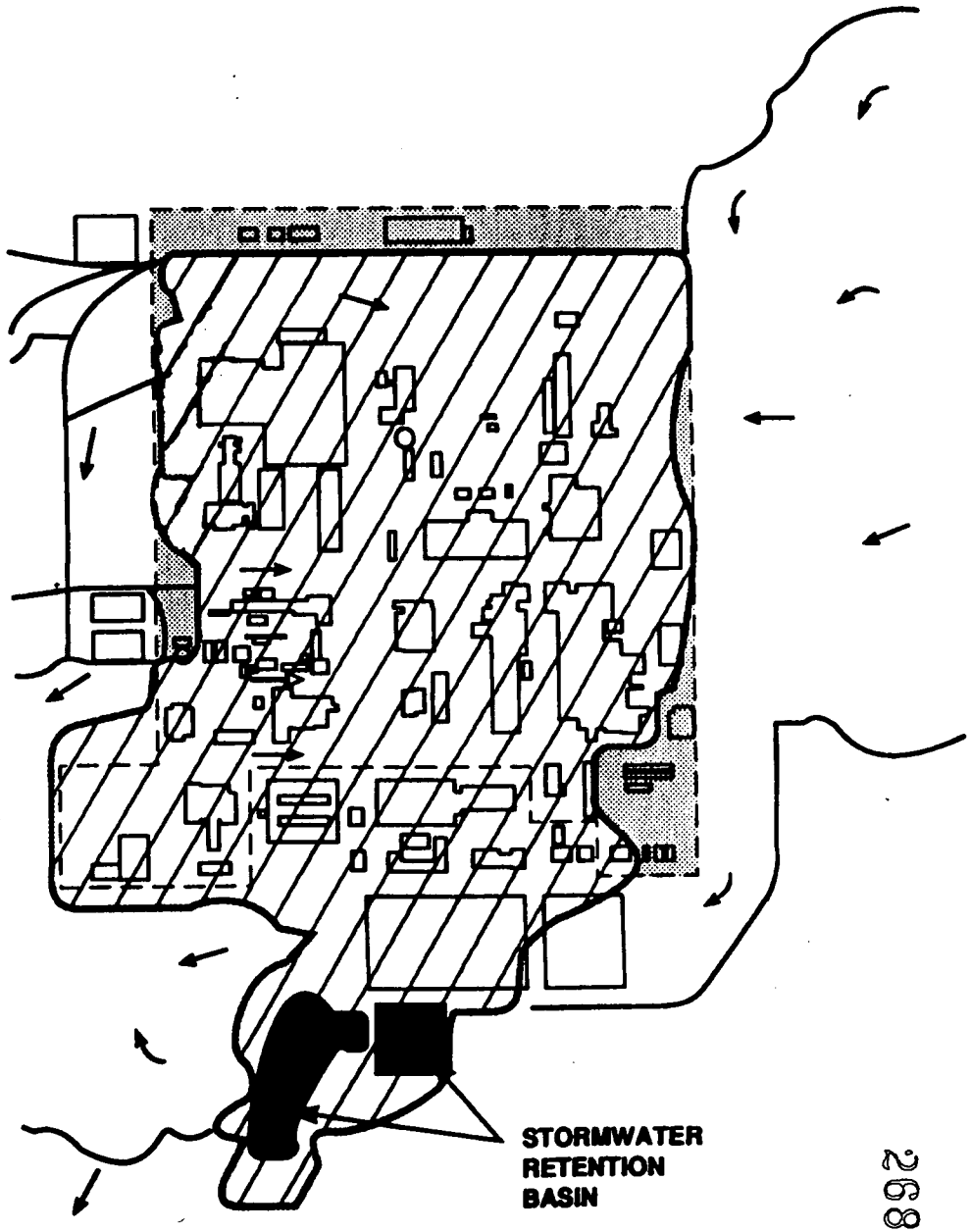

EXISTING STORMWATER CONTROLS
PRODUCTION AREA
WASTE STORAGE AREA
PARKING LOTS
ADMINISTRATIVE AREA
SWRB
Approximate Site Drainage Divides
Limit of Area Draining to Existing Stormwater Retention Basin (SWRB)
Limit of Production Area
Arrows Indicate General Stormwater Flow Within and Between Drainage Basins
Shaded Areas are Collected and Eventually Discharged to the Great Miami River
Defines Boundaries of Clearwell, Surge Lagoon and SWRB

FIGURE 2

STORM SEWER IMPROVEMENTS PROJECT



Approximate Site Drainage Divides

Limit of Area Draining to Existing Stormwater Retention Basin

Arrows Indicate General Stormwater Flow Within and Between Drainage Basins

Shaded Areas are Collected in the Stormwater Retention Basin and Eventually Discharged to the Great Miami River

Shaded Areas Represent Areas to be Collected by the Storm Sewers Improvements Project

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Figure 3

This Removal Site Evaluation (RSE) is being initiated by the Department of Energy under authorities delegated by Executive Order 12580 under Section 300.410 of the National Contingency Plan (NCP), to determine if drainage conditions from the production area warrant the implementation of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Removal Action.

Consistent with regulatory guidance, this preliminary assessment is an evaluation related to the eight factors provided in Section 300.415 of the National Contingency Plan and is conducted under authority delegated through Executive Order 12580 for Section 104 of CERCLA.

Previous Investigations

Collection and analysis of surface water and soil samples from areas surrounding the FEMP Production Area has been ongoing since 1985. Some of this work has been performed by Weston, Inc., in conjunction with the development of the Best Management Practices (BMP) Plan for the FEMP, formerly known as the Feed Materials Production Center (FMPC). Sheet flow (overland flow) of runoff from the controlled production areas makes direct sampling difficult. However, stormwater runoff downstream from these locations, at a point where mixing of uncontrolled flow with flows from other areas has occurred, has been sampled. Sample locations are identified in Figure 4, and analytical results for drainage ditch samples collected by Weston, Inc. in July 1988 are shown in Appendix A, Table 1. Examination of the data presented in Appendix A, Table 1 reflect similar results as those taken since 1987, as part of the Environmental Monitoring Program performed by WEMCO. The results have been reported in the FEMP Annual Environmental Monitoring Report issued pursuant to DOE Order 54001.1. These results consistently indicate elevated levels of uranium when compared to upstream or background samples.

The relevant regulatory limits against which these analytical data can be evaluated are summarized in Appendix A, Table 2. In accordance with 40 CFR 300.400 (g)(3), DOE Orders which provide guidance or criteria for radionuclides, such as Derived Concentration Guide (DCG) limits, can be used as "to be considered (TBC)" requirements for public health protection standards.

A summary evaluation of the Table 1 data against the limits or criteria of Table 2 is presented in Appendix A, Table 3. For purposes of comparison, the DCG limits given in Table 3 correspond to the combined DCGs for U-234 and U-238. The concentrations of these isotopes in samples collected and analyzed by WEMCO have been estimated from the observed data for total uranium. Use of the DOE (DCG) limit for discharge to the environment in evaluating these data is conservative, based on the assumption that the ultimate risk to public health is most likely to occur through the potential ingestion of groundwater and food products which might eventually receive the effluent.

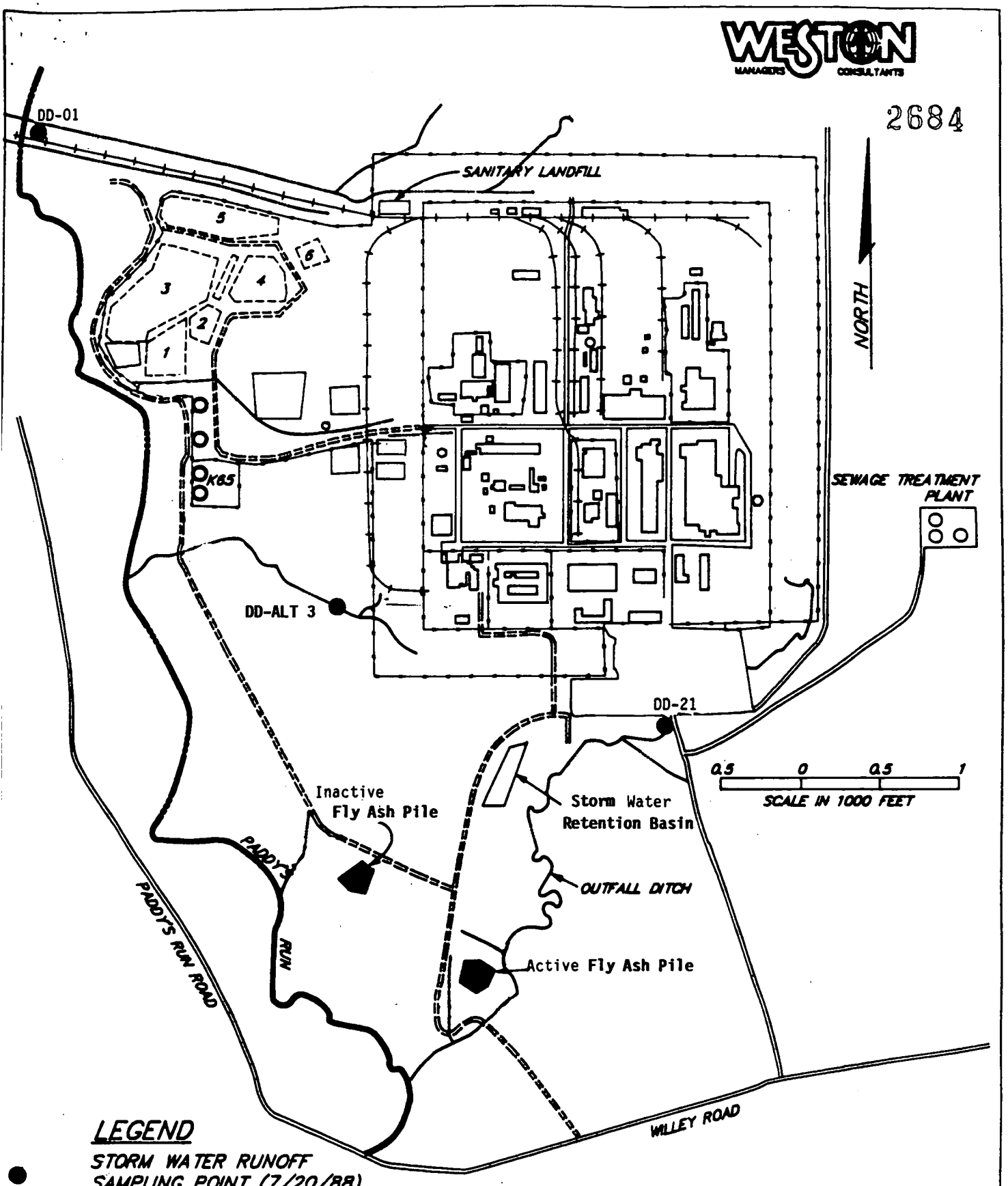

FIGURE 4 DRAINAGE DITCH SAMPLING LOCATIONS

Source Term

The most significant contaminants of concern among the materials handled in the production area were designated for analysis in samples of soil (Appendix B) and runoff surface water collected in the FEMP production area drainage ditches. The non-radiological contaminants were compared to contaminant specific Applicable or Relevant and Appropriate Requirements (ARARs) such as State of Ohio primary and secondary drinking water maximum contaminant levels (MCL) parameters. As stated above, radiological contaminants were compared to TBCs.

Certain standards, such as the Ohio secondary standard for total dissolved solids (TDS), were not expected to be achieved since the samples were collected from drainage areas. Appendix A, Table 1 summarizes for comparison the concentrations of non-radiological contaminants in surface water to the MCL of the State of Ohio primary and secondary drinking water standards as noted in Appendix A, Table 2.

The principal contaminant of concern in stormwater runoff from the FEMP is uranium. Due to its much longer half-life and relatively low specific activity, most of the uranium mass derived through total U analysis is due to U-238. The uranium that has been processed at FEMP has included natural, enriched (in U-234 and U-235), and depleted uranium. The isotopic composition of uranium in effluent, through routine (proportionate continuous sampling) monitoring at Manhole 175, has shown approximately equal activity concentrations of U-234 and U-238 with negligible U-235. Through a Federal Facilities Compliance Agreement (July 18, 1986), and pursuant to the CERCLA, Advanced Sciences, Inc. (ASI) and its subcontractor International Technology (IT), are currently conducting a Remedial Investigation/Feasibility Study (RI/FS) for five operable units at the FEMP. Additional sampling has been performed by ASI/IT as part of their investigation around the waste pit perimeter area. A representative number of samples from the waste pit surface water runoff samples showed a preponderance of uranium-238. While the ratio is variable, the average 238/234 ratio was 3.7:1 ($\pm$ 33% with 68 percent confidence). This ratio was calculated to estimate the concentration of U-234 and U-238 in samples analyzed for total uranium.[1]

Risk Evaluation

Uranium is a potential radiocarcinogen and a chemical toxin. Insoluble uranium compounds primarily pose a radiological hazard resulting from inhalation. Soluble uranium compounds pose both chemical and radiological hazards from ingestion. If ingested at sufficiently high rates, these compounds can lead to kidney damage and arterial lesions. Other potential adverse health effects that can result from ingestion of soluble uranium compounds are damage to the cardiovascular, hematopoietic, endocrine, and immunological systems.

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[1]Removal Site Evaluation for the Waste Pit Area Storm Water Runoff Control, page 9. DOE Letter DOE-1063-90, G. W. Westerbeck to M. B. Boswell, "Removal Site Evaluations for the South Plume and the Waste Pit Area Storm Water Runoff Control Removal Actions," dated May 21, 1991.

From the analytical data herein and from the attendant guidelines for ingestion, the risk can be evaluated on the basis of observed U-234 and U-238 concentrations.

The Derived Concentration Guides for ingestion (from DOE Order 5400.5) are based upon a committed effective dose equivalent limit of 100 mrem/yr. These limits correspond to:

U-238	600 pCi/l	(1.8 mg/l)
U-234	500 pCi/l	(9.7×10^{-5} mg/l)

This forms the basis for the comparison in Table 3 when combined with the analytical data.

Even though U-234 is somewhat more dose limiting, the total uranium mass analysis primarily represents U-238. The mass of U-234 and U-235 will contribute little, if any, to the Total U measurement. An estimate of the relative U-238 to U-234 concentrations by activity is made on the basis of other isotope specific analyses performed by Weston. That basis was described earlier, and the activity ratio used is 3.7:1 for 238 to 234. Table 3 lists the analytical results with either estimated or actual concentrations of these two uranium isotopes along with the multiple of the respective DCG. The sparse and lower level concentrations of other radionuclides were not utilized because their relative contribution to estimated dose is minuscule.

It should be pointed out that the DCGs used in this discussion and in Table 3 represent, if ingested at the normal annual water consumption rate, of 730 liters, intakes of uranium which would result in a committed effective dose equivalent of 100 mrem/yr. The DOE dose standard for drinking water is 4 mrem/yr (from DOE Order 5400.5), which corresponds to a DCG for U-238 and U-234 of 24 pCi/l and 20 pCi/l, respectively. These are compared with TBC public health standards for uranium in drinking water, proposed in 40 CFR Parts 141 and 142 dated July 18, 1991 (MCLG - zero, MCL - 30 pCi/l (or 20 ppb)). Therefore, the risk associated with consumption of water represented by Sample No. DD-ALT3 in Table 3 would be about 25 times greater than water containing U-238 and U-234 at respective concentrations of 24 pCi/l and 20 pCi/l (the DOE drinking water dose standard) and about 20 times greater than the proposed 30 pCi/l EPA drinking water standard.

Magnitude of Potential Risk

It is recognized that the production area and its stormwater runoff will ultimately be restored and/or stabilized based on the Record of Decisions (ROD) for Operable Unit Nos. 3 and 5 of the RI/FS. However, this removal site evaluation addresses the potential need for a removal action. The conservative assumption for pathways to off-site receptors include, but are not limited to, surface water runoff (ingestion) and infiltration of the underlying aquifer with migration to the South Plume (ingestion and irrigation). Potential exposure paths also include resuspension of radionuclides in sediments, which will be addressed in the RI/FS. Groundwater monitoring has shown a uranium contaminated plume south of the site. This is the subject of another removal action.

The analytical data in Appendix B indicates that the soils of the production area, from the surface to a depth of one foot, contain levels of uranium activity which exceed levels currently found in the South Plume groundwater monitoring wells. Coupled with uranium activity levels found at sampling points DD-01, DD-21, and DD-Alt 3 suggests that migration of radionuclides from the production area has occurred. Best management practices demand that this liquid pathway to offsite receptors be controlled in order to prevent the recharge and subsequent infiltration of radionuclides to the underlying aquifer.

Assessment for Need for Removal

There is no apparent or measurable evidence of actual transport to the nearby population, animals, and their food chains; however, due to the observed condition of the stream bed of Paddy's Run, migration to the underlying aquifer and to the South Plume is probable during stream flow. Uranium in the South Plume is measurable, and with components attributable to the FEMP. This could result in the contamination of water for agricultural and wildlife use. Without additional controls the potential for this transport will continue. DOE-FO has approved the implementation of a removal action to pump the uranium contaminated groundwater, defined by the South Plume. In order to be successful, all uranium contaminated sources which feed Paddy's Run and ultimately recharge the South Plume must be addressed.

Precipitation averages 40.0 in/yr (at Greater Cincinnati Airport) with typical monthly rainfall ranging from one to seven inches. This amount of precipitation can result in the migration of surface contamination to off-site areas.

Recently enacted National Pollutant Discharge Elimination System (NPDES) stormwater regulations require monitoring and permitting of all stormwater discharges associated with industrial activities. A stormwater permit application is currently being prepared for the FEMP site. The preparation of this permit is proceeding under the assumption that controls will be placed on the process area stormwater runoff, so that all runoff associated with the process area "industrial activities" will be directed to the Stormwater Retention Basin and therefore be discharged through a currently permitted NPDES monitoring station. This removal action will serve that purpose.

Appropriateness of Response

It is probable that a response can control production area runoff and deter the release of contaminants of concern (uranium) that exceed a specific ARAR (National Primary Drinking Water regulation for radiation dose (4 mrem/yr) as stated in 40 CFR 141.16(b)).

If a planning period of less than six months exists prior to initiation of a response, DOE will prepare an Action Memorandum. The Action Memorandum will describe the selected response and supporting documentation for the decision. This will serve as a decision document for the Administrative Record.

If it is determined that there is a planning period greater than six months before a response is initiated; DOE will prepare an Engineering Evaluation/Cost Analysis (EE/CA) Approval Memorandum. This memorandum is to be used to document the threat to public health and environment. It would then serve as the decision document for the Administrative Record File.

If it is determined that the removal action activities will extend beyond 120 days from the date of initiation, DOE shall pursue community relations activities as per the National Contingency Plan Section 300.415(m)(3)(i).

APPENDIX A

SUMMARY OF SURFACE WATER SAMPLES

FOR

UNCONTROLLED PRODUCTION AREA RUNOFF

TABLE 1
ANALYTICAL RESULTS FOR DRAINAGE DITCH SAMPLES COLLECTED 7-20-88

ANALYTE	UNITS	DD-01 (7-20-88)	DD-21 (7-20-88)	DD-ALT3 (7-20-88)
ALUMINUM	ug/l	869	200u	404
BARIUM	ug/l	217	200u	200u
CALCIUM	ug/l	153000	5000u	70700
CHROMIUM	ug/l	10.0u	10.0u	10.0u
COPPER	ug/l	25.0u	25.0u	25.0u
IRON	ug/l	1080	170	369
LEAD	ug/l	5.0u	5.0u	5.0u
MAGNESIUM	ug/l	31500	5000u	15300
MANGANESE	ug/l	143	20.0	102
SODIUM	ug/l	10100	5000u	15500
ZINC	ug/l	84.4	20.0u	108
TOC	mg/l	14.4	2.8	5.6
TOX	mg/l	41	35	10.0u
TDS	mg/l	692	42.0	370
TSS	mg/l	266	21.0	11.0
OIL & GREASE	mg/l	1.0u	1.1	1.0u
CHLORIDE	mg/l	11.3	2.5	12.6
FLUORIDE	mg/l	0.24	0.10u	1.3
SULFATE	mg/l	317	6.2	102
NITRATE	mg/l	1.0u	6.1	0.10u
1,1,1-TCA	ug/l	NR	NR	NR
TCE	ug/l	NR	NR	NR
PERC	ug/l	NR	NR	NR
GROSS ALPHA	pCi/l	8	3	520
GROSS BETA	pCi/l	13	4	190
THORIUM-228	pCi/l	NR	NR	NR
THORIUM-230	pCi/l	NR	NR	NR
THORIUM-232	pCi/l	NR	NR	NR
URANIUM-234	pCi/l	0.6	0.6	270
URANIUM-235	pCi/l	0.3	0.1	12
URANIUM-238	pCi/l	2.4	1.0	310
RADIUM-226	pCi/l	NR	NR	NR
RADIUM-228	pCi/l	NR	NR	NR
FLOW	gpm	p	40	p
pH	std.	7.6	7.3	7.8
CODUCTIVITY	umhos	700	38	490
TEMPERATURE	C.	25	25	26

NOTES:

1. An "u" indicates the parameter was analyzed for, but not detected. The minimum detection limit for the sample, not the method detection, is reported preceding the "u".
2. NR = Not requested.
3. p = ponded water (not measurably flowing).

SOURCE: WESTON ADDENDUM TO BEST MANAGEMENT PRACTICES PLAN: STORM-WATER SAMPLING PROGRAM RESULTS, TABLE 2, PAGE 9, (10-18-88).

TABLE 2

Relevant Regulatory Limits

Metals (ppm)

	MCL	Ohio EPA ORC
Al	-	-
Ba	1.0	1.0
Ca	-	-
Cr	0.05	-
Cu	1.0	0.012 to 0.043[1]
Fe	0.3	-
Pb	0.05	0.05
Mg	-	-
Mn	0.05	-
Na	-	-
Zn	5.0	0.040 to 0.115[1]

Other General Water Quality Parameters (mg/l)

	MCL	Ohio EPA ORC	NPDES 1988 Permit	
			MH-175	Storm Water Retention Basin
TOC	-	-	-	-
TOX	-	-	-	-
TDS	-	750 (trans.) 500 (month avg.)	-	-
TSS	-	-	40 Daily Max. 20 Daily Avg.	100 Daily Max. 30 Daily Avg.
O&G	-	-	15	15 Daily Max.
Cl^-	-	-	0.10	-
F^-	-	1.0	-	-
SO_4	-	250	-	-
NO_X	10	10	-	-

Volatile Organics (ppm)

	MCL
1,1,1-TCA	0.200
TCE	0.005
PERC	

Table 2 (continued)

Radionuclides (pCi/l)	DOE Guidelines (MH-175)
Gross Alpha	-
Gross Beta	-
Thorium-228	400
Thorium-230	300
Thorium-232	50
Uranium-234	500
Uranium-235	600
Uranium-238	600
Radium-226	30
Radium-228	30

Physical Parameters	Ohio EPA ORC	NPDES 1988 Permit (MH-175)
pH	6.0 to 9.0	6.5 to 9.0
Conductivity (umhos)	1200 trans 800 month avg.	-

NOTE:
1) Variable depending on water hardness.

TABLE 3

Summary of Tables 1 and 2

1.0 Metals

1.1 Calcium levels for DD-01 and DD-ALT3 were 153 ppm and 70.7 ppm, respectively. No MCL or applicable standard for calcium exists.

1.2 Iron and Manganese have maximum concentration levels (MCLS) of 0.3 ppm and 0.05 ppm, respectively. Both of these elements, however, occur naturally in the groundwater in the area of the FEMP at levels exceeding these MCLs[1]. Drainage ditch samples at DD-01 and DD-ALT3 exceeded the MCL for iron and all three samples exceed the MCL for manganese.

1.3 Magnesium concentrations in all three drainage ditch samples exceeded 15 ppm at every location with the high being 31.5 ppm. There are no applicable regulatory data or MCLs for magnesium to which these concentrations can be compared.

2.0 Other Water Quality Parameters

2.1 Results of total dissolved solids (TDS) can be compared to the Secondary Maximum concentration level (SMCL), set at 500 mg/l, and to the Ohio EPA ORC Standard for TDS, which is set at 500 mg/l (monthly average) and 700 mg/l (transient). The sample at DD-01 exceeded the SMCL and the ORC monthly average at 692 mg/l.

2.2 Sample DD-01 exceeded the Ohio EPA ORC Standard for sulfate (SO_4) of 250 mg/l with a reported level of 317 mg/l.

Uranium Concentrations in Water Samples

Sample	U-238 (pCi/l)	Multiple of U-238 DCG[2]	U-234 (pCi/l)	Multiple of U-234 DCG[3]	Total Multiple DCG
DD-ALT3	310	0.517	270	0.540	1.057
DD-01	2.4	0.004	0.6	0.001	0.005
DD-21	1.0	0.001	0.6	0.001	0.002

[1]"Addendum to Best Management Practices Plan: Stormwater Sampling Program Results," prepared by Roy F. Weston, Inc., October 18, 1991, page 14.
[2]600 pCi/l (1.8mg/l)
[3]500 pCi/l (9.7xE-5mg/l)

TABLE 4

COORDINATE LOCATIONS OF SAMPLING STATIONS

Drainage Ditch	Northing[1]	Easting[1]
DD-01	482,622	1,377,511
DD-21	478,857	1,381,315
DD-ALT3	479,759	1,378,252

[1]Units are in feet and tied in with the Ohio coordinate system, south zone, City of Cincinnati datum.

Source: Table 4, "Map Coordinate Locations of Sampling Stations for FMPC Stormwater Sampling Events of April 27, 1988, July 20, and July 21, 1988," taken from the "Addendum to Best Management Practices Plan: Stormwater Sampling Program Results," prepared by Roy F. Weston, Inc., October 18, 1988.

APPENDIX B

SUMMARY OF SOIL SAMPLES

FOR

UNCONTROLLED PRODUCTION AREA RUNOFF

2684

From: S. G. Schneider WMCO:EC(SW):90-227

Date: June 7, 1990

Subject: RCRA DETERMINATION AND RADIOLOGICAL CHARACTERIZATION OF RUBBLE FROM STORM SEWER IMPROVEMENT PROJECT

To : S. M. Peterman

Reference: 1. WMCO Facility Task Force Final Report, WMCO:SR(IA):88-068

2. AEDO Spill Data Base

3. FMPC Site Procedure, FMPC 720, "Control of Construction Waste", issued November 10, 1988

This memo transmits the radiological and RCRA characteristics of the soils and debris which will be generated as a result of the excavation/renovation work for the Plantwide Storm Sewer Project. The rubble to be generated as a result of this project will be soil and concrete debris. The soils generated will be from excavation for the installation of new sections of storm sewer pipe to replace sections of crushed or damaged pipe, waterproofing and plastering damaged manholes. In addition, soil will be generated from the construction of earth berms, shallow ditch grading, catch basins, and ditch reconfigurations. The concrete generated will mainly be from damaged or crushed mainline pipes.

Process Knowledge

The excavated areas are primarily located outside the perimeter of the Process Area. In addition to the 38 soil samples, process knowledge, site history and spill records were researched (Reference 1 and 2) in an effort to determine the possibility of listed wastes and/or hazardous waste characteristics throughout the construction areas. Based upon a review of references 1 and 2, discussions with the project engineer and other FMPC personnel, and usual observations, there were limited or no process activities in the areas of this construction project. There is no reason to suspect storage, transportation, or processing of any solvents, paints, fuels, lubricants, cleaners, or any other chemicals in the construction area. However, based upon the fact that these storm sewer pipes have been in use for a period of 30 plus years, there will be a build-up of sediment in the bottom of these pipes. This sediment material should be segregated, packaged separately, and handled as suspect RCRA material. This material should be sampled and analyzed for Thorium, Thorium 228, Uranium activities, Uranium Isotopes, and EP Tox metals.

Sampling and Analysis

Soil samples were taken at 38 locations throughout the plant (see attachment 1 for locations), representing proposed areas of excavations required for the completion of the project. Two samples were taken at each location - one at the surface, and one at a depth of one foot. Surface samples were analyzed for Thorium, Thorium 228, and Uranium activities, Uranium Isotopes, and EP Tox metals. Samples taken at each depth were analyzed for total Uranium and total Thorium concentrations. These concentrations were converted to estimated specific activities for each locations.

Radiological Characterization

Specific activities for each sample were used to determine the appropriate waste category (I, II, or Low Level Waste). The categories for each sample are shown in Table 1. Attachment 1 shows the distribution of the various categories throughout the project area. From this site plan a few general observations regarding this radiological disposition of the materials can be made:

- Soils in the northwest quadrant are generally Category I, with the exception of surface samples taken from SSI-30 and SSI-26. The material in these areas was determined to be Category II materials.

- Soils in the southwest quadrant are also Category I, for the most part. Some category II material is located on the surface at SSI-22 and SSI-21.

- Much of the soil in the northwest quadrant appears to be Low Level Waste. Areas SSI-1, SSI-3, SSI-5, and SSI-6 all contain Low Level Waste. Areas SSI-2 and SSI-7 through SSI-10 contain Category II material.

- Most samples in the southeast quadrant indicated Category II waste was present. There is no Low Level Material in this area.

Field equipment should be used during excavation to determine the extent of the Low Level and Category II wastes. The attached site plan should be used as a guideline in this effort.

RCRA Determination

The process knowledge, and data from references 1 and 2, the presence of RCRA constituents would not be expected in any of the construction.

In addition, analysis of EP Toxicity for metals was performed on 38 samples (surface and one foot depth) from the construction site in accordance with 40 CFR 261. The results from the samples indicate that the soil does not exhibit the characteristic of EP-Toxicity. Therefore, all available information shows the soil and concrete rubble from the Storm Sewer Improvement Project may be handled as non-RCRA.

The sediment removed from inside the old storm sewer pipe will have to be sampled and analyzed before radiological or RCRA determinations can be made.

S. G. Schneider, Manager
Solid Waste Compliance

Attachments

CGR/bs

c: S. L. Bradley
W. H. Britton
J. E. Clements
J. T. Grumski
S. C. Hoskins
G. T. Howard
C. G. Rieman
J. M. Sattler
E. D. Savage
J. L. Trujillo
C. S. Waugh
P. C. Weddle
W. A. Weinreich
Central Files
SWC File

TABLE 1. ANALYTICAL DATA

SAMPLE NUMBER	SAMPLE LOCATION	SAMPLE DEPTH	THORIUM TOTAL (ppm)	CALCULATED THORIUM ACTIVITY (pCi/g)*	THORIUM 228 (pCi/g)	URANIUM TOTAL (ppm)	CALCULATED URANIUM ACTIVITY (pCi/g)	URANIUM WEIGHT PERCENT		RCRA METALS EP-TOXICITY RESULTS**	CATEGORY
R.C. 0169	SSI-1	surface	n/a	7.7	5.7	n/a	290	U-234	0.006	ALL METALS	LLW
								U-235	0.72	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.26	LIMITS	
R.C. 0170	SSI-1	1 foot	93	20.2	n/a	30	20				II
R.C. 0171	SSI-2	surface	n/a	<3.6	2.4	n/a	50	U-234	0.005	ALL METALS	II
								U-235	0.73	BELOW	
								U-236	0.008	REGULATORY	
								U-238	99.27	LIMITS	
R.C. 0172	SSI-2	1 foot	<23	5	n/a	26	19				I
R.C. 0173	SSI-3	surface	n/a	4.2	3.2	n/a	130	U-234	0.011	ALL METALS	LLW
								U-235	0.71	BELOW	
								U-236	0.01	REGULATORY	
								U-238	99.27	LIMITS	
R.C. 0174	SSI-3	1 foot	<23	5	n/a	18	13				I
R.C. 0175	SSI-4	surface	n/a	<2.9	0.99	n/a	13	U-234	0.004	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.31	LIMITS	
R.C. 0176	SSI-4	1 foot	<23	5	n/a	<11	<7				I
R.C. 0177	SSI-5	surface	n/a	8.7	5.5	n/a	540	U-234	0.003	ALL METALS	LLW
								U-235	0.7	BELOW	
								U-236	<0.001	REGULATORY	
								U-238	99.3	LIMITS	
R.C. 0178	SSI-5	1 foot	24	5	n/a	365	>243				LLW
R.C. 0179	SSI-6	surface	n/a	6.8	6.5	n/a	120	U-234	0.005	ALL METALS	LLW
								U-235	0.47	BELOW	
								U-236	0.12	REGULATORY	
								U-238	99.51	LIMITS	
R.C. 0180	SSI-6	1 foot	29	6.3	n/a	74	40				II

R.C. 0181	SSI-7	surface	n/a	4.2	2.2	n/a	82	U-234	0.005	ALL METALS	II
								U-235	0.72	BELOW	
								U-236	0.007	REGULATORY	
								U-238	99.27	LIMITS	
R.C. 0182	SSI-7	1 foot	<23	<5	n/a	37	27				I
R.C. 0183	SSI-8	surface	n/a	3.4	2.0	n/a	21	U-234	0.004	ALL METALS	I
								U-235	0.67	BELOW	
								U-236	0.003	REGULATORY	
								U-238	99.33	LIMITS	
R.C. 0184	SSI-8	1 foot	24	5	n/a	67	47				II
R.C. 0185	SSI-9	surface	n/a	<3.5	2.2	n/a	30	U-234	0.005	ALL METALS	I
								U-235	0.61	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.38	LIMITS	
R.C. 0186	SSI-9	1 foot	<23	<5	n/a	54	35				II
R.C. 0187	SSI-10	surface	n/a	<3.3	1.8	n/a	21	U-234	0.006	ALL METALS	I
								U-235	0.58	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.41	LIMITS	
. 0188	SSI-10	1 foot	<23	<5	n/a	68	40				II
R.C. 0189	SSI-11	surface	n/a	<3.8	3.0	n/a	12	U-234	0.003	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.01	REGULATORY	
								U-237	99.3	LIMITS	
R.C. 0190	SSI-11	1 foot	<23	<5	n/a	26	20				I
R.C. 0191	SSI-12	surface	n/a	<2.9	0.39	n/a	<6.4	U-234	0.002	ALL METALS	I
								U-235	0.47	BELOW	
								U-236	0.004	REGULATORY	
								U-237	99.52	LIMITS	
R.C. 0192	SSI-12	1 foot	<23	<5	n/a	24	12				I
R.C. 0193	SSI-13	surface	n/a	<2.7	0.45	n/a	16	U-234	0.001	ALL METALS	I
								U-235	0.39	BELOW	
								U-236	0.004	REGULATORY	
								U-237	99.61	LIMITS	
R.C. 0194	SSI-13	1 foot	<23	<5	n/a	83	40				II
R.C. 0195	SSI-14	surface	n/a	<3.1	1.4	n/a	32	U-234	0.005	ALL METALS	I
								U-235	0.7	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.28	LIMITS	
R.C. 0196	SSI-14	1 foot	<23	<5	n/a	27	20				II

R.C. 0197	SSI-15	surface	n/a	3.2	1.6	n/a	59	U-234	0.006	ALL METALS	II
								U-235	0.71	BELOW	
								U-236	0.009	REGULATORY	
								U-237	99.27	LIMITS	
R.C. 0198	SSI-15	1 foot	<23	<5	n/a	33	<20				I
R.C. 0199	SSI-16	surface	n/a	<3.4	2.1	n/a	23	U-234	0.002	ALL METALS	I
								U-235	0.64	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.35	LIMITS	
R.C. 0200	SSI-16	1 foot	<23	<5	n/a	23	13				I
R.C. 0201	SSI-17	surface	n/a	4.8	5.0	n/a	66	U-234	0.002	ALL METALS	II
								U-235	0.42	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.57	LIMITS	
R.C. 0202	SSI-17	1 foot	<23	<5	n/a	110	60				II
R.C. 0203	SSI-18	surface	23	3.3	1.8	95	63	U-234	0.004	ALL METALS	II
								U-235	0.69	BELOW	
								U-236	0.004	REGULATORY	
								U-23	99.31	LIMITS	
R.C. 0204	SSI-18	1 foot	<23	<5	n/a	33	20				I
. 0279	SSI-19	surface	<23	<3.9	1.4	23	12	U-234	0.002	ALL METALS	I
								U-235	0.37	BELOW	
								U-236	0.005	REGULATORY	
								U-237	99.62	LIMITS	
R.C. 0280	SSI-19	1 foot	<23	<5	n/a	23	12				I
R.C. 0281	SSI-20	surface	<23	<3.4	0.95	30	20	U-234	0.005	ALL METALS	I
								U-235	0.72	BELOW	
								U-236	0.01	REGULATORY	
								U-237	99.27	LIMITS	
R.C. 0282	SSI-20	1 foot	<23	<5	n/a	23	13				I
R.C. 0283	SSI-21	surface	<23	<3.2	0.74	66	45	U-234	0.006	ALL METALS	II
								U-235	0.72	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.27	LIMITS	
R.C. 0284	SSI-21	1 foot	<23	<5	n/a	34	24				I
R.C. 0285	SSI-22	surface	23	4.5	2.0	60	41	U-234	0.006	ALL METALS	II
								U-235	0.75	BELOW	
								U-236	0.011	REGULATORY	
								U-237	99.23	LIMITS	
R.C. 0286	SSI-22	1 foot	<23	<5	n/a	34	24				I

C. 0287	SSI-23	surface	<23	<4.3	1.8	20	14	U-234	0.005	ALL METALS	I
								U-235	0.75	BELOW	
								U-236	0.011	REGULATORY	
								U-237	99.23	LIMITS	
R.C. 0288	SSI-23	1 foot	<23	<5	n/a	17	13				I
R.C. 0289	SSI-24	surface	<23	<3.7	1.2	12	7.9	U-234	0.005	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.31	LIMITS	
R.C. 0290	SSI-24	1 foot	<23	<5	n/a	<11	n/a				I
R.C. 0291	SSI-25	surface	<23	<2.9	0.95	27	18	U-234	0.004	ALL METALS	I
								U-235	0.74	BELOW	
								U-236	0.015	REGULATORY	
								U-237	99.24	LIMITS	
R.C. 0292	SSI-25	1 foot	<23	<5	n/a	28	n/a				I
R.C. 0293	SSI-26	surface	n/a	<3.5	1.0	n/a	45	U-234	0.006	ALL METALS	II
								U-235	0.67	BELOW	
								U-236	0.009	REGULATORY	
								U-237	99.32	LIMITS	
R.C. 0294	SSI-26	1 foot	<23	<5	n/a	27	n/a				I
R.C. 0295	SSI-27	surface	n/a	<3.4	0.89	n/a	16	U-234	0.003	ALL METALS	I
								U-235	0.65	BELOW	
								U-236	0.007	REGULATORY	
								U-237	99.34	LIMITS	
R.C. 0296	SSI-27	1 foot	<23	<5	n/a	11	n/a				I
R.C. 0297	SSI-28	surface	n/a	<3.7	1.2	n/a	23	U-234	0.004	ALL METALS	I
								U-235	0.61	BELOW	
								U-236	0.019	REGULATORY	
								U-237	99.37	LIMITS	
R.C. 0298	SSI-28	1 foot	<23	<5	n/a	19	n/a				I
R.C. 0299	SSI-29	surface	n/a	<3.3	0.77	n/a	30	U-234	0.003	ALL METALS	I
								U-235	0.5	BELOW	
								U-236	0.006	REGULATORY	
								U-237	99.49	LIMITS	
R.C. 0300	SSI-29	1 foot	<23	<5	n/a	17	n/a				I
R.C. 0301	SSI-30	surface	n/a	4.4	1.7	n/a	73	U-234	0.007	ALL METALS	II
								U-235	0.66	BELOW	
								U-236	0.004	REGULATORY	
								U-237	99.33	LIMITS	
R.C. 0302	SSI-30	1 foot	<23	<5	n/a	39	n/a				I
R.C. 0303	SSI-31	surface	n/a	<3.0	1.2	n/a	30	U-234	0.005	ALL METALS	I
								U-235	0.88	BELOW	

								U-236	0.02	REGULATORY	
								U-238	99.09	LIMITS	
R.C. 0304	SSI-31	1 foot	<23	<5	n/a	33	n/a				I
R.C. 0307	SSI-33	surface	n/a	<2.6	0.28	n/a	21	U-234	0.002	ALL METALS	I
								U-235	0.58	BELOW	
								U-236	0.003	REGULATORY	
								U-238	99.41	LIMITS	
R.C. 0308	SSI-33	1 foot	<23	<5	n/a	22	n/a				I
R.C. 0309	SSI-34	surface	n/a	2.9	0.98	n/a	24	U-234	0.005	ALL METALS	I
								U-235	0.37	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.62	LIMITS	
R.C. 0310	SSI-34	1 foot	<23	<5	n/a	15	n/a				I
R.C. 0311	SSI-35	surface	n/a	<2.8	0.64	n/a	12	U-234	0.006	ALL METALS	I
								U-235	0.57	BELOW	
								U-236	0.009	REGULATORY	
								U-238	99.42	LIMITS	
R.C. 0312	SSI-35	1 foot	<23	<5	n/a	16	n/a				I
R.C. 0313	SSI-36	surface	n/a	<3.0	1.1	n/a	27	U-234	0.005	ALL METALS	I
								U-235	0.68	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.31	LIMITS	
R.C. 0314	SSI-36	1 foot	<23	<5	n/a	28	n/a				I
R.C. 0315	SSI-37	surface	n/a	<2.8	0.69	n/a	15	U-234	0.004	ALL METALS	I
								U-235	0.6	BELOW	
								U-236	0.007	REGULATORY	
								U-238	99.39	LIMITS	
R.C. 0317	SSI-38	surface	n/a	<2.9	0.93	n/a	18	U-234	0.005	ALL METALS	I
								U-235	0.67	BELOW	
								U-236	0.006	REGULATORY	
								U-238	99.32	LIMITS	
R.C. 0318	SSI-38	surface	<23	<5	n/a	16	n/a				I

Notes: All wastes are categorized according to Uranium Specific Activities since all Thorium activities indicate Category I materials (except sample# R.C. 0170.

Uranium Specific Activities for samples at depth are based on isotopic percentages of the surface samples.

Thorium Specific Activities at depth are based on an assumed ratio of 46ppm/10pCi/g.

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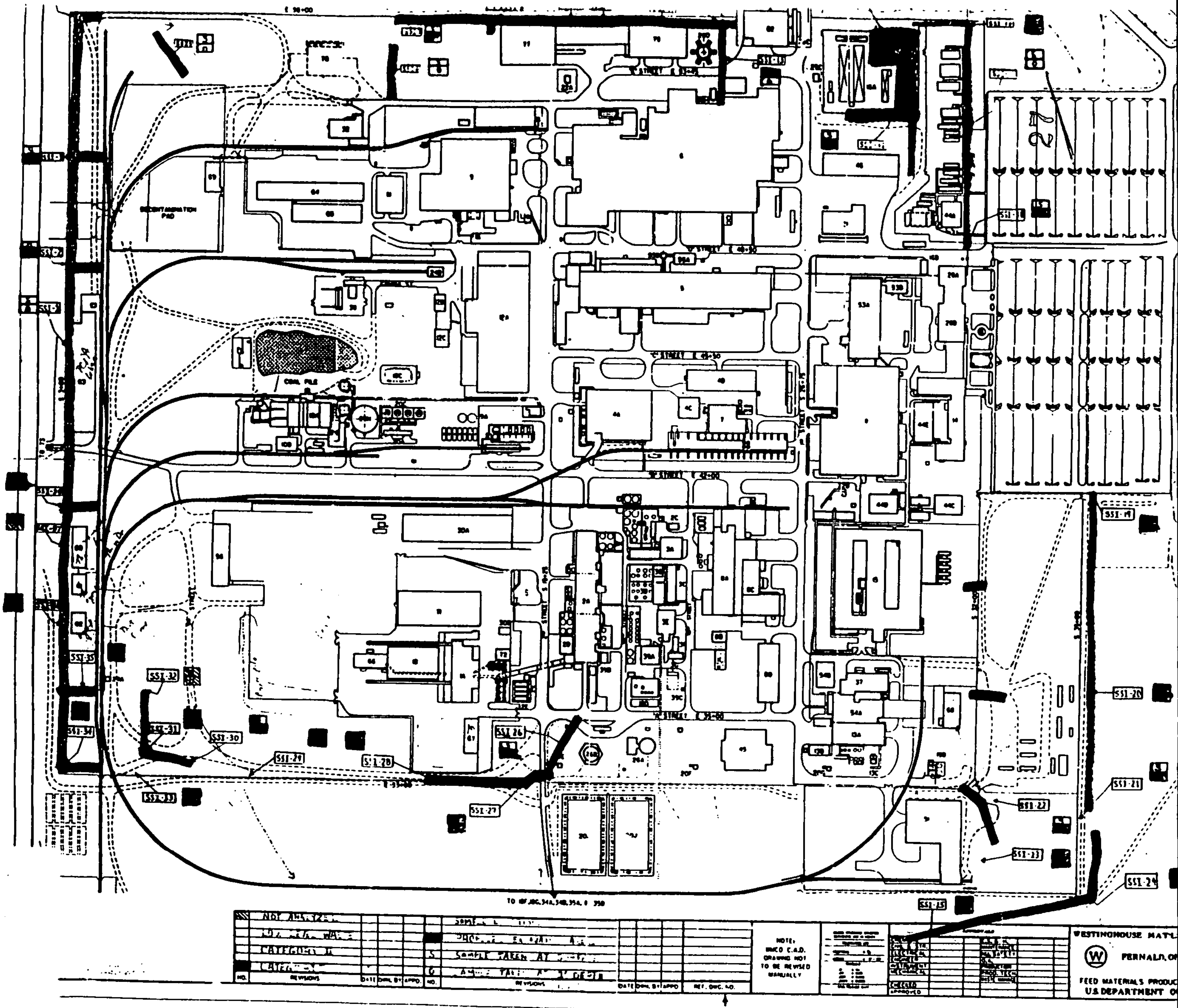

DECONTAMINATION PAD
COAL PILE
SSI-1
SSI-2
SSI-5
SSI-19
SSI-20
SSI-21
SSI-22
SSI-23
SSI-24
SSI-25
SSI-26
SSI-27
SSI-28
SSI-29
SSI-30
SSI-31
SSI-32
SSI-33
SSI-34
SSI-35
NOT ANALYZED
CATEGORY II
SAMPLE TAKEN AT
NOTE: WMCO C.A.D. DRAWING NOT TO BE REVISED MANUALLY
REVISIONS
REF. DWG. NO.
CHECKED
APPROVED
WESTINGHOUSE MAT'L
FERNALD, OH
FEED MATERIALS PRODUC
U.S. DEPARTMENT O