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K-65 AND METAL OXIDE RESIDUE SAMPLING NEPA DOC. NO. 118

08/10/88

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NEPA DOCUMENTATION

COGNIZANT PROJECT ENGINEER	Reed Kaldor/J. Krieger
PROJECT LOCATION	NW Quadrant of FMPC
PROJECT/PROGRAM TITLE	K-65 and Metal Oxide Residue Sampling
PROJECT COST	$600,000
CONSTRUCTION START DATE	9-26-88
PROJECT/PROGRAM NUMBER	
NEPA DOCUMENT NUMBER	118
NEPA SUBMITTAL DATE	REV 2 AUG 10 1988

PROJECT EXECUTIVE SUMMARY

The Feed Materials Production Center (FMPC) is proposing to collect and analyze samples of the contents of the two K-65 Silos (Silo 1 and 2), and the Metal Oxide Silo (Silo 3). These silos received primarily waste raffinate slurries (K-65 residue) and waste calcined raffinate powder (metal oxide) between 1952 and 1958.

The project involves collecting four continuous, full-depth core samples from each silo. A mock run will be conducted on an empty silo (Silo 4) to test the procedures and to train field personnel in the specialized sampling techniques to be used. The samples will be collected using a crane-suspended vibratory corer. A "bagout" technique will be used to [illegible] samples for transport and to reduce radon release during sampling. [illegible]uous cores will be visually characterized and radiologically [illegible]. Selected portions will be sectioned for laboratory analysis. The remainder will be appropriately stored.

PROJECT JUSTIFICATION

This proposed sampling action was developed to respond to Item B of the CERCLA section of the Federal Facilities Compliance Agreement. As part of this agreement, a long-term plan for the radium-bearing wastes is to be developed, approved, and implemented as part of the sitewide RI/FS being conducted at the FMPC. In order to develop a long-term plan for treatment, storage, and disposal of these wastes, a thorough characterization of the silo contents is required. Although samples of wastes were collected during operation of the silos, these samples have not adequately characterized the residue material and chemical changes which may have occurred over time. Additional sampling is required for adequate analysis of silo contents. The cumulative impacts of this project have been assessed, and it has been determined that this action does not have net adverse environmental impacts. Other options have not been precluded by this action.

EXISTING NEPA DOCUMENTATION/DATE SUBMITTED			
X X NONE	N.C.	ADM.	E.A.

THIS NEPA DOCUMENT			
AUG 10 1988 N.C.	ADM.	E.A.	E.I.S.

DO[illegible]VAL [illegible]TED	COGNIZANT PROJECT ENGINEER/DATE	8-5-88
FMPC X X	SITE NEPA COORDINATOR/DATE	8-5-88
	SITE NEPA MANAGER/DATE	8-10-88
DOE/ORO	SITE DOE OFFICER/DATE	8/17/88
DOE/HQ	ADDITIONAL DOE APPROVAL IF NEEDED/DATE	12/29/88

5401.

FMPC NEPA DOCUMENTATION		COGNIZANT PROJECT ENGINEER Reed Kaldor/J. Krieger
		PROJECT LOCATION NW Quadrant of FMPC
PROJECT/PROGRAM TITLE K-65 and Metal Oxide Residue Sampling		PROJECT COST $600,000
		CONSTRUCTION START DATE 9-26-88
PROJECT/PROGRAM NUMBER	NEPA DOCUMENT NUMBER 000118	NEPA SUBMITTAL DATE REV 2 AUG 10 1988

1.0 PURPOSE AND NEED FOR ACTION

Westinghouse Materials Company of Ohio (WMCO) is the prime contractor for the United States Department of Energy (DOE) at the Feed Materials Production Center (FMPC), located near Fernald, Ohio. WMCO is proposing to sample and analyze the contents of the two K-65 silos (Silos 1 & 2), and the metal oxide silo (Silo 3). The results will be used to characterize the silo contents in order to develop a long-term plan for treatment, storage, or disposal of radium-bearing wastes as required in Item B of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) section of the Federal Facilities Compliance Agreement (FFCA) between the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA).

Silos 1 and 2 are reinforced concrete silos constructed in 1951 and 1952, respectively. The silos are used for the storage of radium-bearing residues formed as by-products from uranium processing. The domed silos are 24.4 m in diameter, 8.2 m tall, and filled to depths of 6.1 (Silo 1) and 6.7 m (Silo 2). The silos contain a combined estimated volume of 6,000 m^3 of residue material, with a void space above the waste of approximately 2,500 m^3.

The K-65 silos received waste primarily between 1952 and 1958, from three sources: National Lead of Ohio (NLO) slurry from the FMPC; 25,000 drums from the Mallinckrodt Plant in St. Louis, Missouri; and 6,000 drums from the Lake Ontario Ordinance Works in Lewiston, New York. The 6,000 drums from New York were originally generated at the Mallinckrodt Plant and later shipped to New York. The silos also received a small quantity of soil excavated from the drum handling area adjacent to Silo 3.

The NLO slurry was reported to contain 343 mg/metric ton radium; the Mallinckrodt drums, 551 mg/metric ton; and the New York drums, 688 mg/metric ton. Based on these values, it has been estimated that the silos contain 4.6 kg radium. Other NLO estimates were between 1.6 and 1.7 kg radium. However, based on the NLO concentration of 343 mg/metric ton, the silos are estimated to contain at least 3 kg of radium. The silos are also estimated to contain 11,200 kg of uranium, and have a radium level of 6.1×10^{13} Bq.

As early as 1956, external deterioration was observed on Silos 1 and 2. Large exterior areas of concrete spalling occurred, exposing reinforcing wires which corroded and cracked. In 1964, an asphaltic sealant was applied to the external walls, and an earthen embankment was constructed around the silos to counterbalance the internal load and to reduce direct radiation from the wastes in the vicinity of the silos. A structural evaluation (Camargo, 1985) of the K-65 silos concluded that the base slabs and walls are structurally stable under existing static loads, and have a life expectancy of 5 to 10 years. The centermost 6.1 m diameter portion of the dome, however, was determined to be structurally unsound for any load greater than the existing

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static dead load, and there is no assigned life expectancy. Results of recent video monitoring of the internal surfaces of the K-65 Silo shows no deterioration of the dome areas, however additional loading on the dome may lead to partial dome collapse.

The silos materials continuously generate radon gas, which accumulates under the silo dome where decay or escape to the environment occurs. The silos exchange gas with the surrounding atmosphere by diffusion through the concrete walls and roof and existing cracks in the concrete.

Several interim stabilization projects have been implemented at the K-65 silos. The center dome portion has been covered with a 9.1 m diameter structural steel frame covered with a plywood cap to provide secondary containment in the event of collapse of this section. The exterior dome surfaces have been coated with rigid foam to provide weather protection and insulation. A radon treatment system has been installed to reduce radon gas levels in the dome during future remediation activities.

Silos 3 and 4 were constructed in mid-1952 to the same specifications as silos 1 and 2, and were designed to receive dry materials only. The waste rafinate [illegible]ies from refinery operations were dewatered in an evaporator and spray calcined to produce a dry waste form. The waste was blown under pressure into Silo 3. Silo 3 contains approximately 3,900 m^3 of calcined residues. Silo 3 is estimated to contain 18,000 kg of uranium, 5.5×10^{11} Bq of radium, and an unknown quantity of thorium-230. Silo 4 is empty.

2.0 DESCRIPTION OF PROPOSED ACTION

This proposed action consists of four stages: preliminary preparation, sampling, sample screening, and sample analysis.

Preliminary Preparation. The Examination Trailer will be equipped with a high efficiency particulate air filtration system to control and collect radionuclide releases during the examination and sectioning of the cores. Samples will be collected through existing 20-inch manholes on the silos, which will be marked with permanent metal identification tags. The sampling device will be suspended from a crane. The crane will be delivered to a set-up area for preparation and inspection prior to operation.

Sampling. Twelve (12) continuous core samples will be collected from Silos 1, 2, and 3 (4 cores per silo). One additional core will be collected from Silo 1 and used for bench scale treatment studies. A mock run will be conducted at Silo 4 to refine specialized sampling techniques.

The samples will be collected using a vibratory sampler consisting of an outer steel pipe with a cutting unit, an inner Lexan (plastic) liner, and a drive

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unit. The crane will be positioned at 5 locations to collect the samples. Each crane position will be able to sample multiple silo manholes.

The flange covering each silo manhole will be removed after the radon level within the silo has been substantially lowered by use of the existing radon treatment system. The vibratory sampler will be positioned over the manhole, and turned on. It will slowly penetrate through the residues, in the process collecting a continuous vertical core sample of the silo contents. When the silo base is reached, the sampling will be discontinued, and the crane will carefully raise the vibratory sampler and the sample from the silo, while it is bagged in plastic to minimize spread of contamination.

The bagged core will be separated from the silo and lowered by the crane to a truck to transport the core to the Laydown Area. The flange will then be replaced.

Sample Screening. In the Examination Trailer, the cores will be debagged. The exterior of the steel pipe will be decontaminated by a wipe down procedure using deionized water. The lower cutting unit of the vibratory sampler will be removed, and the Lexan pipe plugged to contain the sample. The outer steel pipe will then be removed, and the Lexan pipe containing the sample will be decontaminated in a similar fashion.

The decontaminated core sample will be subject to visual characterization, video recording, and radiological scanning. The core will then be sectioned into samples for analysis or archiving. Sectioning will occur in a hood under negative pressure. A HEPA system will be operated to control and collect radionuclide releases during the examination and sectioning operations.

Sample Analysis. Selected samples from the cores will be sent to a licensed laboratory to determine engineering properties, to quantify inorganic and organic constituents, and to perform an isotopic analysis of the waste.

This project will be conducted in conformance with DOE, OSHA, and FMPC regulations governing health and safety. The need for permits has been assessed and it has been determined by FMPC personnel & US EPA that no permits are required for this project.

3.0 ALTERNATIVES CONSIDERED

3.1 No Action

Under the No Action alternative, the successful development of a long-term plan for final treatment, storage, or disposal of the wastes as specified in the FFCA (Item B of the CERCLA section) would be significantly impacted because of inadequate characterization of the wastes. The silos would

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continue to be a cause for public concern. The FMPC would continue to be within all applicable DOE and EPA guidelines and regulations, however, unless structural failure occurs.

3.2 Auger Sampling

Under this alternative, the K-65 silo contents would be sampled with a split spoon or shelby tube using an augering technique. Due to the torque involved, the auger drive unit would need to be supported on the silo dome, resulting in a risk of dome failure because of the additional structural load. This sampling methodology would allow collection of either continuous waste cores in discrete increments, or intermittent samples, resulting in increased sample handling time, greater potential for radiation exposure, and a greater possibility of disturbance of the waste layers during collection of the sample in comparison with the preferred alternative.

3.3 Proposed Action

The proposed action, vibratory sampling, is preferred because it provides a continuous core sample of the waste with minimum disruption of the waste layers. Vibration driven sampling will also result in a minimum of field handling time, and reduced radiation exposures consistent with the As Low As Reasonably Achievable (ALARA) principles. The use of a crane for suspending the sampling apparatus eliminates the need for equipment placement on the silo domes.

4.0 POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

Negligible impacts will occur to the existing environment and to the 7 - 10 employees assigned to field or analytical tasks relating to this sampling task.

The overall project impact is beneficial, resulting in characterization data of the residue in the silos to be used for long-term planning for treatment, storage, or disposal of the residue material. Adverse effects that must be considered include the potential for further structural distress or failure of the silo, caused by the sampling operation, the potential release of radon gas to the atmosphere, and the potential release of the residue material to the environment resulting from spills. Operation of construction vehicles, and blowers will generate above-background noise levels for the short project duration. Minor amounts of vehicle exhaust emissions will also occur.

Structural distress to the silos will be reduced by suspending the vibratory sampler from a crane rather than supporting it on the silo dome. The height from the manhole opening to the silo base will be determined during the mock run on Silo 4, and will be marked on the vibratory corer. During actual

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sampling operations on Silos 1, 2, and 3, the vibratory corer will only sample to this level to reduce the risk of penetrating the silo base. A slower rate of penetration will also be used when approaching this level.

Collected gases in the silo headspaces will be treated using the existing radon treatment system, before onset of sampling. Thus, no significant quantities of radon are expected to be released as a result of this sampling action.

A potential exists for release of the sampled residue material to the environment resulting from spills. This risk will be reduced to an acceptable level by utilizing skilled, trained personnel; conducting a mock run to refine specialized sampling techniques; utilizing specially equipped core transport vehicles; and developing standard operating procedures to control sampling operations.

The field operations phase of this project is expected to last three weeks. Approximately 1,300 manhours of effort are anticipated in the field and analytical tasks. No impact to produciton will occur.

Construction required for this project includes temporary roadways for the crane, breached areas in the security fence, and positioning of one temporary field trailer. These construction activities are anticipated to produce only a small quantity of construction rubble, mostly soil, PVC piping, and support lumber (less than 2 ft^3). The temporary roadways will be left in place upon project completion; therefore, no construction rubble is generated from this activity. Updated information reguarding actual levels of scrap generation will be presented in the bi-monthly report (WMCO:SR:(IA):88-0188) upon completion of the project.

The laydown area for core samples shall be surveyed for contamination and decontaminated to controllable levels during the sampling project. Decontamination shall be accomplished at the recommendation of the on-site health physics technician.

Contamination control of sampling equipment, laydown area, personnel anti-contamination clothing respirator canisters, towels, and plastic sleeving are anticipated to produce approximately 25 m^3 of compactable low level solid waste.

No short-term health and safety benefits or emissions reductions are anticipated from this sampling effort. However, this project is being conducted to support development of a long-term plan for treatment, storage, or disposal of the silo contents which will significantly reduce radon

emission rates and radiation levels in the immediate vicinity of the silos. Sampling inspection, and survey operations are anticipated to release a very small amount of activity (<.1 liter/core) of Rn^{222}.

5.0 CONCLUSION

Characterization of the contents of the silos is required to develop a long-term plan for treatment, storage, or disposal, as specified in the FFCA. Adverse impacts from this proposed action are negligible. It is concluded that future actions based on data collected from the proposed action will provide a significant beneficial impact.

FMPC NEPA DOCUMENTATION ATTACHMENT		COORDINATE PROJECT ENGINEER Reed Kaldor/J. Krieger
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PROJECT/PROGRAM NUMBER	THIS NEPA DOCUMENT 118	CONSTRUCTION START DATE 9-26-88
		NEPA SUBMITTAL DATE REV 2 AUG 10 1988

1.0 Will any of the following be encountered, handled, stored, used, disposed of during the construction of the proposed program or projec

Radioactive materials (identify) Uranium238, Radium226, Radon222	(Y)	N	U
Hazardous materials (identify)	Y	(N)	U
Toxic materials (identify) See Attachments 1 & 2	(Y)	N	U
Mixed hazardous and radioactive materials (identify) See Attachments 1 & 2	Y	N	(U)
PCB's (identify source)	Y	(N)	U
Asbestos (identify source)	Y	(N)	U
Organic chemicals (identify)	Y	(N)	U
Heavy metals (identify) See Attachments 1 & 2	Y	N	(U)

2.0 Will program activities involve discharges to any one of the followi systems during the construction of the proposed project?

Low level waste disposal (describe)	Y	(N)	U
Process waste stream	Y	(N)	U
Sanitary waste stream	Y	(N)	U
Storm sewer	Y	(N)	U

3.0 Will any of the following be encountered, handled, stored, used, c disposed of during operation of, or following the proposed progra changes?

Radioactive materials (identify) Uranium238, Radium226, Radon222.	(Y)	N	U
Hazardous materials (identify)	Y	(N)	U
Toxic materials (identify) See Attachments 1 & 2	(Y)	N	U
Mixed hazardous and radioactive materials (identify) See Attachments 1 & 2	Y	N	(U)
PCB's (identify source)	Y	(N)	U

Asbestos (identify source) Y (N) U

Organic chemicals (identify) Y (N) U

Heavy metals (identify) Y N (U)

See Attachments 1 & 2

4.0 Will program activities involve discharges to any one of the following systems during operation of, or following the proposed program changes?

Low level waste disposal (describe) (Y) N U

Anti-contamination clothing, resperatory filters, gloves, plastic sleeving, plastic sheets. (Solid low-level waste.)

Process waste stream Y (N) U

Sanitary waste stream Y (N) U

Storm sewer Y (N) U

5.0 Are uncontrolled emissions, discharges, or spills possible during:

The construction phase of this project? (Y) N U

With the small amount of construction required for this task, minimal amounts are expected (.5 m^3).

The operational phase, upon completion of the project? (Y) N U

Emissions at the current rate shall be expected from the silos.

6.0 Will the project involve any of the following:

Need for aboveground storage during construction?	Y	(N)	U
Need for underground storage during construction?	Y	(N)	U
Need for aboveground storage during operations?	Y	(N)	U
Need for underground storage during operations?	Y	(N)	U

7.0 Is the project located in close proximity to a natural stream or within the floodplain of a natural stream? (Y) N U

8.0 Are controlled emissions or discharges planned during:

The construction phase of this project?	Y	(N)	U
The operational phase, upon completion of this project?	(Y)	N	U

Emissions shall continue at the current level after this task is completed.

ATTACHMENT 1

Potential Elemental Characterization of the
FMPC K-65 Wastes[a]
September 1970

Constituent	Percentage	Weight (metric tons)
(Metals)		
Ag	<0.002	0.176
Al	0.875	77
As	<0.03	<2.64
Au	<0.005	0.44
B	0.015	1.32
Ba	0.07	6.16
Be	ND[b]	--
Bi	ND	--
Ca	3.89	342
Cd	ND	--
Cl	No data	--
Co	0.175	15.4
	0.012	1.06
Cu	0.05	4.4
F	No data	--
Fe	1.2	105.6
Hg	ND	--
La	0.089	7.83
Mg	1.25	110
Mn	0.02	1.76
Mo	0.02	1.76
Na	0.7	61.6
Ni	0.225	19.8
Pb	5.1	448.8
PO_4	ND	--
Sb	ND	--

ATTACHMENT 1 (Cont'd.)

Potential Elemental Characterization of the
FMPC K-65 Wastes[a]
September 1970

Constituent	Percentage	Weight (metric tons)
(Metals)		
Se	No data	--
SiO_2	40.76	3587
Sn	0.008	0.7
SO_4	No data	--
Ti	0.07	6.16
V	0.021	1.85
Zn	ND	--
Zr	0.02	1.76
(Rare Earths)		
Dy	0.003	0.26
Er	ND	--
Eu	ND	--
Gd	0.004	0.35
Ho	<0.0015	0.13
Lu	ND	--
Sm	0.0048	0.42
Tb	ND	--
	<0.0008	0.07
Y	0.004	0.35
Yb	0.0006	0.05

[a]Percentage and weight are based on sample analysis and do not account for total reported amount (8800 MT) of K-65 residues.

[b]ND = not detected.

R FSAR for K-65 storage silos radon mitigation and dome reinforcement project.

ATTACHMENT 1 (Cont'd.)

Potential Elemental Characterization of the FMPC Metal Oxide Wastes (Silo 3)[a]

Constituent	Percentage	Weight (metric tons)
Ag	<0.002	<0.07
Al	2.80	98.67
As	b	
Au	<0.004	<0.14
B	0.02	0.70
Ba	0.02	0.70
Be	b	b
Bi	b	b
Ca	4.10	144.48
Cd	<0.28	
Cl	6.70	
Co	0.25	8.81
Cr	0.05	1.76
Cu	0.25	8.81
F	11.63	
	6.40	225.52
[illegible]	b	b
La	b	b
Mg	8.50	229.52
Mn	0.49	17.27
Mo	0.06	2.11
Na	3.80	133.90
Ni	0.65	22.90
Pb	0.25	8.81
PO	19.40	683.62
Sb_4	<0.015	<0.53

ATTACHMENT 1 (Cont'd.)

Potential Elemental Characterization of the FMPC Metal Oxide Wastes (Silo 3)[a]

Constituent	Percentage	Weight (metric tons)
Se		b
SiO_2	13.10	461.62
Sn	0.04	1.41
SO_4	19.64	692.08
Ti	0.06	2.11
V	0.10	3.52
Zn	<2.11	
Zr	0.03	1.06
Earths)		
Dy	<0.003	<0.11
Er	<0.21	
Eu	<0.04	
Gd	<0.006	<0.21
Ho	<0.003	<0.11
Lu	<0.07	
Sm	<0.006	<0.21
	b	b
Tm	<0.002	<0.07
Y	0.008	0.28
Yb	0.004	0.14

[a]NLO analyses of Silo 3 Metal Oxides.

[b]No data.

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TRANSMITTAL SLIP	DATE: January 5, 1989	
TO:	INITIALS	DATE
1. Jim Reafsnyder, DP-B4, FMPC		
2. Arnold Epstein, DP-132		
3. Kim Hayes-White, DP-133.1		

SUBJECT: Approval of NEPA Fact Sheet No. 118

- No. 118 ("K-65 and Metal Oxide Residue Sampling") has y EH and approved by EH-25. The signed cover sheet and transmittal letter are attached.

cc: Bob Strickler, EH-25
Carol Borgstrom, EH-25
Dick Geiger, EH-232
Bobby Davis, ORO

FROM:
Clarence R. Hickey CR Hickey
OFFICE OF NEPA PROJECT ASSISTANCE (EH-25)

ROOM: 3E-080/FORS
PHONE: 586-4582 (8-896)
FILE: A:FMPCFS22
NEPA No.: 1879

Date Rec'd JAN 05 198
Log C-643
File 5401
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016

From: D. A. Palmer/6529 WMCO:SWE:89-039

Date: May 25, 1989

Subject: K-65 SAMPLING PROJECT CHANGES - IMPACT ON NEPA DOCUMENT #118

To : [redacted] Schonegg

In the subject NEPA document, it is stated that twelve continuous core samples will be collected from Silos 1, 2, and 3 (4 cores per silo) and that one additional core will be collected from Silo 1 and used for bench-scale testing.

However, due to recent project scope changes, in the sampling of Silo 3, only three samples were actually extracted because one of the manways proved structurally inaccessible. Also, a decision has been made to [illegible] the number of samples to be taken from the K-65 Silos 1 and 2 [illegible]ght per silo. This would allow four total cores per silo to be used for bench-scale stabilization studies.

No additional adverse environmental impact will result from the collection of these additional samples nor will this effect the choice of reasonable alternatives stated in NEPA Document #118.

If you require additional information, please contact me.

D. A. Palmer

DAP/ksv

c: S. W. Heisler, Jr.
P. R. Kraus
G. J. Krieger
R. A. Vogel