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**RENEWAL OF PERMITS TO OPERATE AT THE FERNALD
ENVIRONMENTAL MANAGEMENT PROJECT OEPA ID. NOS.
1431110128, T035, T036, T039, T040, T041, T042, AND
T095**

12/16/94

C:EC:94-0079

FERMCO

HAMILTON COUNTY

45

PTOS



Restoration Management Corporation P.O. Box 398704 Cincinnati, Ohio 45239-8704 (513) 738-6200

December 16, 1994

U. S. Department of Energy
Fernald Environmental Management Project
Letter No. C:EC:94-0079

Mr. Peter Sturdevant
Compliance Specialist
Hamilton County Department
of Environmental Services
Air Quality Management Division
1632 Central Parkway
Cincinnati, Ohio 45210

Dear Mr. Sturdevant:

**RENEWAL OF PERMITS TO OPERATE AT THE FERNALD ENVIRONMENTAL MANAGEMENT PROJECT
OEPA ID. NOS. 1431110128 T035, T036, T039, T040, T041, T042 AND T095**

Enclosed are renewal applications for seven FEMP storage tanks for which the Permits to Operate are scheduled to expire in March 1995.

Please contact Kip Klee of my staff at 738-8640 if you have any questions about these applications.

Sincerely,

A handwritten signature in black ink, appearing to read "Terence D. Hagen". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Terence D. Hagen, Director
Environmental Compliance

TDH:KOK:mhv
Attachments

- c: S. M. Beckman, FERMCO/MS65-2 - w/o attachments
P. B. Spotts, FERMCO/MS65-2 - w/o attachments
W. J. Quaid, DOE-FN/MS45
C. Glassmeyer, FERMCO/62 - w/o attachments
T. A. Parmer, FERMCO/48-2 - w/o attachments
L. E. Parsons, DOE Contract Specialist/MS45
AR Coordinator
File Record Storage Copy 108.6
RTS Files (PTOs T035, T036, T039-T042, T095) - w/o attachments

**OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE**

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T035
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

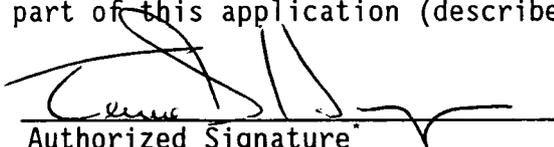
- | | |
|--|---|
| <input type="checkbox"/> Appendix A, Process | <input type="checkbox"/> Appendix L, Solvent Metal Cleaning |
| <input type="checkbox"/> Appendix B, Fuel-Burning Equipment | <input type="checkbox"/> Appendix M, Fugitive Dust Emission Sources |
| <input type="checkbox"/> Appendix C, Incinerator | |
| <input type="checkbox"/> Appendix D, Surface Coating or Printing Operation | |
| <input checked="" type="checkbox"/> Appendix E, Storage Tank | Specify Appendix No. |
| <input type="checkbox"/> Appendix H, Gasoline Dispensing Facility | <input type="checkbox"/> Appendix N, Rubber Tire Manufacturing |
| <input type="checkbox"/> Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal | <input type="checkbox"/> Appendix O, Dry Cleaning Facility |
| <input type="checkbox"/> Appendix K, Surface Coating Line or Printing Line | <input type="checkbox"/> Appendix P, Landfills |
| | <input type="checkbox"/> Other Appendix _____ |
| | <input type="checkbox"/> Compliance Time Schedule |

2. Description of Source (same as used on appendix): D1-130, (2-040), EP2-031

3. Your identification for Source (same as used on appendix): _____
Plant 2/3 Slop Water Storage Tank - D1-130

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title
12/16/94

Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

Operation of an air contaminant source without an effective permit to operate is prohibited to 3704.05 Ohio Revised Code. Page 1 EPA-3161

000002

Source No. ___/___
Application No. ___/___

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number D1-130, (2-040), EP2-031 Date Installed 1952
(month/year)
2. Tank capacity: 2,200 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 6' Height 10' 6" Length --- Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
N/A
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify _____
- Condition of paint: Good Poor
10. If this tank is equipped with or vented to a vapor control system, complete (a) through (c) of this item.
N/A
a) Type of vapor control system _____
Manufacturer _____ Make or model _____
Date installed (month and year) _____
- b) Date tank was equipped with or vented to vapor control system (month & year) _____
- c) Specify the rate of emission or percent control (by weight) for any pollutants being controlled: _____
(Attach calculations and test data to support response, unless previously submitted)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

<u>Type of Vent Valve</u>	<u>Pressure Setting</u>	<u>Vacuum Setting</u>	<u>If pressure relief is discharged to a vapor control, identify the vapor control.</u>
_____	_____	_____	_____
_____	_____	_____	_____

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

Slopwater, Rainwater, Sumpwater and Process Wastewater

a) Material <5g/l Uranium; <1 Normal HNO₃ Trade Name N/A
 Density: 8.3 lbs/gal or -- ° API Producer N/A

b) Temperature of stored material: Average Amb °F and Maximum Amb °F
 (If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2272 psia at average storage temperature
 [Aqueous solution - 0.2872 psia at maximum storage temperature
 essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No

If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 500,000 gallons.

Completed by K. O. Klee

Date 11/28/94

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

Slopwater, Rainwater, Sumpwater and Process Wastewater

a) Material <5g/l Uranium; <1 Normal HNO₃ Trade Name N/A
 Density: 8.3 lbs/gal or -- ° API Producer N/A

b) Temperature of stored material: Average Amb °F and Maximum Amb ° F
 (If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2272 psia at average storage temperature
 [Aqueous solution - 0.2272 psia at maximum storage temperature
 essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No

If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 500,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (2) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (3) The emission factor has been determined to be 6×10^{-06} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (4) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (5) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/05/94
PAGE 1

Identification

Identification No.: T035-1994
City: Cincinnati
State: OH
Company: FERMC0
Type of Tank: Vertical Fixed Roof

Paint Characteristics

Shell Color/Shade: Aluminum/Specular
Shell Condition: Good
Roof Color/Shade: Aluminum/Specular
Roof Condition: Good

Tank Dimensions

Shell Height (ft): 11
Diameter (ft): 6
Liquid Height (ft): 10
Avg. Liquid Height (ft): 5
Volume (gallons): 2115
Turnovers: 240
Net Throughput (gal/yr): 507600

Roof Characteristics

Type: Cone
Height (ft): 0.00
Radius (ft) (Dome Roof): 0.00
Slope (ft/ft) (Cone Roof): 0.0000

Breather Vent Settings

Vacuum Setting (psig): 0.00
Pressure Setting (psig): 0.00

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
LIQUID CONTENTS OF STORAGE TANK

12/05/94
PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Water-borne Uranium solution	All	56.22	49.60	62.84	53.24	0.2272	0.1758	0.2872	18.000			18.00	Option 1

Annual Emission Calculations

Standing Losses (lb): 2.5191
 Vapor Space Volume (cu ft): 169.65
 Vapor Density (lb/cu ft): 0.0007
 Vapor Space Expansion Factor: 0.059042
 Vented Vapor Saturation Factor: 0.932608

Tank Vapor Space Volume

Vapor Space Volume (cu ft): 169.65
 Tank Diameter (ft): 6
 Vapor Space Outage (ft): 6.00
 Tank Shell Height (ft): 11
 Average Liquid Height (ft): 5
 Roof Outage (ft): 0.00

Roof Outage (Cone Roof)

Roof Outage (ft): 0.00
 Roof Height (ft): 0.000
 Roof Slope (ft/ft): 0.00000
 Shell Radius (ft): 3

Vapor Density

Vapor Density (lb/cu ft): 0.0007
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Daily Avg. Liquid Surface Temp.(deg. R): 515.89
 Daily Average Ambient Temp. (deg. R): 511.57
 Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
 Liquid Bulk Temperature (deg. R): 512.91
 Tank Paint Solar Absorptance (Shell): 0.39
 Tank Paint Solar Absorptance (Roof): 0.39
 Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor

Vapor Space Expansion Factor: 0.059042
 Daily Vapor Temperature Range (deg.R): 26.49
 Daily Vapor Pressure Range (psia): 0.111344
 Breather Vent Press. Setting Range(psia): 0.00
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.175832
 Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.287176
 Daily Avg. Liquid Surface Temp. (deg R): 515.89
 Daily Min. Liquid Surface Temp. (deg R): 509.27
 Daily Max. Liquid Surface Temp. (deg R): 522.51
 Daily Ambient Temp. Range (deg.R): 19.20

Annual Emission Calculations

Vented Vapor Saturation Factor
 Vented Vapor Saturation Factor: 0.932608
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Vapor Space Outage (ft): 6.00

Withdrawal Losses (lb):

14.4191
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Annual Net Throughput (gal/yr): 507600
 Turnover Factor: 0.2917
 Maximum Liquid Volume (cuft): 283
 Maximum Liquid Height (ft): 10
 Tank Diameter (ft): 6
 Working Loss Product Factor: 1.00

Total Losses (lb): 16.94

Annual Emissions Report

Liquid Contents	Losses (lbs.):		Total
	Standing	Withdrawal	
Water-borne Uranium solution	2.52	14.42	16.94
Total:	2.52	14.42	16.94

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{16.94 \text{ lb water}}{\text{year}} \mid \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} \mid = 1.02 \text{ E-07 lb U/year}$

Maximum Emissions: $1.02 \text{ E-07 lb U/year} \times 5 = 5.08 \text{ E-07 lb U/year}$

OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T036
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

- Appendix A, Process
- Appendix B, Fuel-Burning Equipment
- Appendix C, Incinerator
- Appendix D, Surface Coating or Printing Operation
- Appendix E, Storage Tank
- Appendix H, Gasoline Dispensing Facility
- Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal
- Appendix K, Surface Coating Line or Printing Line

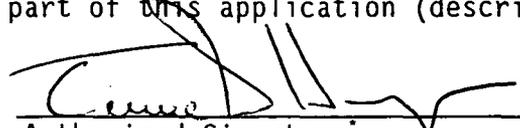
- Appendix L, Solvent Metal Cleaning
- Appendix M, Fugitive Dust Emission Sources
- Specify Appendix No.
- Appendix N, Rubber Tire Manufacturing
- Appendix O, Dry Cleaning Facility
- Appendix P, Landfills
- Other Appendix _____
- Compliance Time Schedule

2. Description of Source (same as used on appendix): D1-129, (2-038), EP2-029

3. Your identification for Source (same as used on appendix): _____
Plant 2/3 Slop Water Storage Tank - D1-129

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title

12/16/94

Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

Operation of an air contaminant source without an effective permit to operate is prohibited to 3704.05 Ohio Revised Code. Page 1 EPA-3161

000008

Source No. ___/___
Application No. ___/___

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number D1-129, (2-038), EP2-029 Date Installed 1952
(month/year)
2. Tank capacity: 3,500 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 7' 6" Height 10' 6" Length --- Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
N/A
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify _____
- Condition of paint: Good Poor
10. If this tank is equipped with or vented to a vapor control system, complete (a) through (c) of this item.
N/A
a) Type of vapor control system _____
Manufacturer _____ Make or model _____
Date installed (month and year) _____
- b) Date tank was equipped with or vented to vapor control system (month & year) _____
- c) Specify the rate of emission or percent control (by weight) for any pollutants being controlled: _____
(Attach calculations and test data to support response, unless previously submitted)

DOE - FEMP
 (Facility Name)
 D1-129, (2-038)
 (tank identification)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

Slopwater, Rainwater, Sumpwater and Process Wastewater

a) Material <5g/l Uranium; <1 Normal HNO₃ Trade Name N/A
 Density: 8.3 lbs/gal or -- ° API Producer N/A

b) Temperature of stored material: Average Amb °F and Maximum Amb °F
 (If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2272 psia at average storage temperature
 [Aqueous solution - 0.2872 psia at maximum storage temperature
 essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No
 If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 500,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (2) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37; Lab #2-9846.
- (3) The emission factor has been determined to be 6×10^{-06} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (4) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (5) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

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PAGE 1

Identification

Identification No.: T036-1994
City: Cincinnati
State: OH
Company: FERMCO
Type of Tank: Vertical Fixed Roof

Paint Characteristics

Shell Color/Shade: Aluminum/Specular
Shell Condition: Good
Roof Color/Shade: Aluminum/Specular
Roof Condition: Good

Tank Dimensions

Shell Height (ft): 11
Diameter (ft): 8
Liquid Height (ft): 7
Avg. Liquid Height (ft): 5
Volume (gallons): 2632
Turnovers: 190
Net Throughput (gal/yr): 500080

Roof Characteristics

Type: Cone
Height (ft): 0.00
Radius (ft) (Dome Roof): 0.00
Slope (ft/ft) (Cone Roof): 0.0000

Breather Vent Settings

Vacuum Setting (psig): 0.00
Pressure Setting (psig): 0.00

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
LIQUID CONTENTS OF STORAGE TANK

12/06/94
PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass. Fract.	Vapor Mass. Fract.	Mol. Weight Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.				
Water-borne Uranium solution	All	56.22	49.60	62.84	53.24	0.2272	0.1758	0.2872	18.000			18.00 Option 1

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/06/94
PAGE 3

Annual Emission Calculations

Standing Losses (lb): 4.4784
 Vapor Space Volume (cu ft): 301.59
 Vapor Density (lb/cu ft): 0.0007
 Vapor Space Expansion Factor: 0.059042
 Vented Vapor Saturation Factor: 0.932608

Tank Vapor Space Volume

Vapor Space Volume (cu ft): 301.59
 Tank Diameter (ft): 8
 Vapor Space Outage (ft): 6.00
 Tank Shell Height (ft): 11
 Average Liquid Height (ft): 5
 Roof Outage (ft): 0.00

Roof Outage (Cone Roof)

Roof Outage (ft): 0.00
 Roof Height (ft): 0.000
 Roof Slope (ft/ft): 0.00000
 Shell Radius (ft): 4

Vapor Density

Vapor Density (lb/cu ft): 0.0007
 Vapor Molecular Weight (lb/lb-mole): 18.00000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Daily Avg. Liquid Surface Temp. (deg. R): 515.89
 Daily Average Ambient Temp. (deg. R): 511.57
 Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
 Liquid Bulk Temperature (deg. R): 512.91
 Tank Paint Solar Absorptance (Shell): 0.39
 Tank Paint Solar Absorptance (Roof): 0.39
 Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor

Vapor Space Expansion Factor: 0.059042
 Daily Vapor Temperature Range (deg.R): 26.49
 Daily Vapor Pressure Range (psia): 0.111344
 Breather Vent Press. Setting Range(psia): 0.00
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.175832
 Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.287176
 Daily Avg. Liquid Surface Temp. (deg R): 515.89
 Daily Min. Liquid Surface Temp. (deg R): 509.27
 Daily Max. Liquid Surface Temp. (deg R): 522.51
 Daily Ambient Temp. Range (deg.R): 19.20

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/06/94
PAGE 4

Annual Emission Calculations

Vented Vapor Saturation Factor: 0.932608
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Vapor Space Outage (ft): 6.00

Withdrawal Losses (lb):

Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.227238
 Annual Net Throughput (gal/yr): 500080
 Turnover Factor: 0.3246
 Maximum Liquid Volume (cuft): 352
 Maximum Liquid Height (ft): 7
 Tank Diameter (ft): 8
 Working Loss Product Factor: 1.00

Total Losses (lb): 20.29

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
INDIVIDUAL TANK EMISSION TOTALS

12/06/94
PAGE 5

Annual Emissions Report

Liquid Contents	Losses (lbs.):		
	Standing	Withdrawal	Total
Water-borne Uranium solution	4.48	15.81	20.29
Total:	4.48	15.81	20.29

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{20.29 \text{ lb water}}{\text{year}} \mid \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} \mid = 1.22 \text{ E-07 lb U/year}$

Maximum Emissions: $1.22 \text{ E-07 lb U/year} \times 5 = 6.09 \text{ E-07 lb U/year}$

OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T039
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

- Appendix A, Process
- Appendix B, Fuel-Burning Equipment
- Appendix C, Incinerator
- Appendix D, Surface Coating or Printing Operation
- Appendix E, Storage Tank
- Appendix H, Gasoline Dispensing Facility
- Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal
- Appendix K, Surface Coating Line or Printing Line

- Appendix L, Solvent Metal Cleaning
- Appendix M, Fugitive Dust Emission Sources
- Specify Appendix No.
- Appendix N, Rubber Tire Manufacturing
- Appendix O, Dry Cleaning Facility
- Appendix P, Landfills
- Other Appendix _____
- Compliance Time Schedule

2. Description of Source (same as used on appendix): F2-608, (2-170), EP2-147

3. Your identification for Source (same as used on appendix): _____
Plant 2/3 Uranyl Nitrate Storage Tank - F2-608

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title
12/16/94

Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

000013

Source No. ___/___
 Application No. ___/___

DOE - FEMP
 (Facility Name)

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number F2-608, (2-170), EP2-147 Date Installed 1952
 (month/year)
2. Tank capacity: 25,500 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 10' Height --- Length 47' Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify Jacketed tank
 with Galvanized Steel covering
 Condition of paint: Good Poor
10. ^{N/A} If this tank is equipped with or vented to a vapor control system, complete (a) through (c) of this item.
^{N/A}
 - a) Type of vapor control system _____
 Manufacturer _____ Make or model _____
 Date installed (month and year) _____
 - b) Date tank was equipped with or vented to vapor control system (month & year) _____
 - c) Specify the rate of emission or percent control (by weight) for any pollutants being controlled: _____
 (Attach calculations and test data to support response, unless previously submitted)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

a) Material Uranyl Nitrate (UNH) Trade Name N/A
Density: 8.5-12. lbs/gal or -- ° API Producer N/A
depending on concentration of UNH

b) Temperature of stored material: Average Amb °F and Maximum Amb °F
(If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2480 psia at average storage temperature
[Aqueous solution - 0.3331 psia at maximum storage temperature
essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No

If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 250,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) At typical tank pressures and temperatures, the vapor pressure of the Uranyl Nitrate solution is equal to that of water.
- (2) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (3) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (4) The emission factor has been determined to be 6×10^{-06} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (5) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (6) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
 EMISSIONS REPORT - DETAIL FORMAT
 TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/06/94
 PAGE 1

Identification

Identification No.: T039-1994
 City: Cincinnati
 State: OH
 Company: FERMCO
 Type of Tank: Horizontal Fixed Roof

Paint Characteristics
 Shell Color/Shade: Aluminum/Diffuse
 Shell Condition: Good

Breather Vent Settings
 Vacuum Setting (psig): 0.00
 Pressure Setting (psig): 0.00

Tank Dimensions

Shell Length (ft): 47
 Diameter (ft): 10
 Volume(gallons): 25500
 Is tank underground? (Y/N): N
 Turnovers: 10
 Net Throughput (gal/yr): 255000

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
 EMISSIONS REPORT - DETAIL FORMAT
 LIQUID CONTENTS OF STORAGE TANK

12/06/94
 PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Uranyl Nitrate	All	58.85	50.52	67.18	54.50	0.2480	0.1822	0.3331	18.000			18.00	Option 1

DETAIL CALCULATIONS (AP-42)

Annual Emission Calculations

Standing Losses (lb): 48.1286
 Vapor Space Volume (cu ft): 2345.22
 Vapor Density (lb/cu ft): 0.0008
 Vapor Space Expansion Factor: 0.074684
 Vented Vapor Saturation Factor: 0.938329

Tank Vapor Space Volume
 Vapor Space Volume (cu ft): 2345.22
 Tank Diameter (ft): 10
 Effective Diameter (ft): 24
 Vapor Space Outage (ft): 5.00
 Tank Shell Height (ft): 47

Vapor Density
 Vapor Density (lb/cu ft): 0.0008
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Daily Avg. Liquid Surface Temp. (deg R): 518.52
 Daily Average Ambient Temp. (deg. R): 511.57
 Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
 Liquid Bulk Temperature (deg R): 514.17
 Tank Paint Solar Absorptance: 0.60
 Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor
 Vapor Space Expansion Factor: 0.074684
 Daily Vapor Temperature Range (deg R): 33.31
 Daily Vapor Pressure Range (psia): 0.150928
 Breather Vent Press. Setting Range(psia): 0.00
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.182208
 Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.333136
 Daily Avg. Liquid Surface Temp. (deg R): 518.52
 Daily Min. Liquid Surface Temp. (deg R): 510.19
 Daily Max. Liquid Surface Temp. (deg R): 526.85
 Daily Ambient Temp. Range (deg.R): 19.20

DETAIL CALCULATIONS (AP-42), CONT.

Annual Emission Calculations

Vented Vapor Saturation Factor
 Vented Vapor Saturation Factor: 0.938329
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Vapor Space Outage (ft): 5.00

Withdrawal Losses (lb): 27.1045
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Annual Net Throughput (gal/yr): 255000
 Turnover Factor: 1.0000
 Tank Diameter (ft): 10
 Working Loss Product Factor: 1.00

Total Losses (lb): 75.23

Annual Emissions Report

Liquid Contents	Losses (lbs.):		Total
	Standing	Withdrawal	
Uranyl Nitrate	48.13	27.10	75.23
Total:	48.13	27.10	75.23

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{75.23 \text{ lb water}}{\text{year}} \times \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} = 4.51 \text{ E-07 lb U/year}$

Maximum Emissions: $4.51 \text{ E-07 lb U/year} \times 5 = 2.26 \text{ E-06 lb U/year}$

OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T040
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

- Appendix A, Process
 Appendix B, Fuel-Burning Equipment
 Appendix C, Incinerator
 Appendix D, Surface Coating or Printing Operation
 Appendix E, Storage Tank
 Appendix H, Gasoline Dispensing Facility
 Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal
 Appendix K, Surface Coating Line or Printing Line

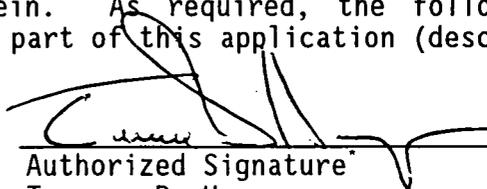
- Appendix L, Solvent Metal Cleaning
 Appendix M, Fugitive Dust Emission Sources
Specify Appendix No.
 Appendix N, Rubber Tire Manufacturing
 Appendix O, Dry Cleaning Facility
 Appendix P, Landfills
 Other Appendix _____
 Compliance Time Schedule

2. Description of Source (same as used on appendix): F2-607, (2-169), EP2-147

3. Your identification for Source (same as used on appendix): _____
Plant 2/3 Uranyl Nitrate Storage Tank - F2-607

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title

12/16/94

Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

Operation of an air contaminant source without an effective permit to operate is prohibited to 3704.05 Ohio Revised Code. Page 1 EPA-3161

000018

Source No. ___/___
 Application No. ___/___

DOE - FEMP
 (Facility Name)

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number F2-607, (2-169), EP2-147 Date Installed 1952
 (month/year)
2. Tank capacity: 25,500 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 10' Height --- Length 47' Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify Jacketed tank
 with Galvanized Steel covering
 Condition of paint: Good Poor
10. ^{N/A} If this tank is equipped with or vented to a vapor control system, complete (a) through (c) of this item.
^{N/A}
 - a) Type of vapor control system _____
 Manufacturer _____ Make or model _____
 Date installed (month and year) _____
 - b) Date tank was equipped with or vented to vapor control system (month & year) _____
 - c) Specify the rate of emission or percent control (by weight) for any pollutants being controlled: _____
 (Attach calculations and test data to support response, unless previously submitted)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.
_____	_____	_____	_____
_____	_____	_____	_____

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

- a) Material Uranyl Nitrate (UNH) Trade Name N/A
 Density: 8.5-12. lbs/gal or -- ° API Producer N/A
 depending on concentration of UNH
- b) Temperature of stored material: Average Amb °F and Maximum Amb °F
 (If temperature is approximately outdoor ambient temperature, write "AMB".)
- c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):
- i.) Actual vapor pressure: 0.2480 psia at average storage temperature
 [Aqueous solution - 0.3331 psia at maximum storage temperature
 essentially water]
- ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi
- iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F
- d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)
- Is it a photochemically reactive material? [] Yes [X] No
- e) Type of waste material (If the material is a waste, answer the question below.)
- Is it a hazardous waste? [] yes [X] No
 If yes, identify type (EPA hazardous waste number) _____
- f) Indicate the year (or 12-month period) for item (g): 1995
- g) Annual throughput of material: 250,000 gallons.

Completed by K. O. KleeDate 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) At typical tank pressures and temperatures, the vapor pressure of the Uranyl Nitrate solution is equal to that of water.
- (2) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (3) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (4) The emission factor has been determined to be 6×10^{-06} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (5) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (6) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/06/94
PAGE 1

Identification

Identification No.: T040-1994
City: Cincinnati
State: OH
Company: FERMCO
Type of Tank: Horizontal Fixed Roof

Paint Characteristics

Shell Color/Shade: Aluminum/Diffuse
Shell Condition: Good

Breather Vent Settings

Vacuum Setting (psig): 0.00
Pressure Setting (psig): 0.00

Tank Dimensions

Shell Length (ft): 47
Diameter (ft): 10
Volume(gallons): 25500
Is tank underground? (Y/N): N
Turnovers: 10
Net Throughput (gal/yr): 255000

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
LIQUID CONTENTS OF STORAGE TANK

12/06/94
PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Uranyl Nitrate	All	58.85	50.52	67.18	54.50	0.2480	0.1822	0.3331	18.000			18.00	Option 1

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/06/94
PAGE 3

Annual Emission Calculations

Standing Losses (lb): 48.1286
Vapor Space Volume (cu ft): 2345.22
Vapor Density (lb/cu ft): 0.0008
Vapor Space Expansion Factor: 0.074684
Vented Vapor Saturation Factor: 0.938329

Tank Vapor Space Volume
Vapor Space Volume (cu ft): 2345.22
Tank Diameter (ft): 10
Effective Diameter (ft): 24
Vapor Space Outage (ft): 5.00
Tank Shell Height (ft): 47

Vapor Density
Vapor Density (lb/cu ft): 0.0008
Vapor Molecular Weight (lb/lb-mole): 18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Daily Avg. Liquid Surface Temp. (deg R): 518.52
Daily Average Ambient Temp. (deg. R): 511.57
Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
Liquid Bulk Temperature (deg R): 514.17
Tank Paint Solar Absorptance: 0.60
Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor
Vapor Space Expansion Factor: 0.074684
Daily Vapor Temperature Range (deg R): 33.31
Daily Vapor Pressure Range (psia): 0.150928
Breather Vent Press. Setting Range(psia): 0.00
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.182208
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.333136
Daily Avg. Liquid Surface Temp. (deg R): 518.52
Daily Min. Liquid Surface Temp. (deg R): 510.19
Daily Max. Liquid Surface Temp. (deg R): 526.85
Daily Ambient Temp. Range (deg.R): 19.20

TANKS PROGRAM 2.0
EMISSIONS REPORT.
DETAIL FORMAT

12/06/94
PAGE 4

DETAIL CALCULATIONS (AP-42), CONT.

Annual Emission Calculations

Vented Vapor Saturation Factor
Vented Vapor Saturation Factor: 0.938329
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Vapor Space Outage (ft): 5.00

Withdrawal Losses (lb): 27.1045
Vapor Molecular Weight (lb/lb-mole): 18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Annual Net Throughput (gal/yr): 255000
Turnover Factor: 1.0000
Tank Diameter (ft): 10
Working Loss Product Factor: 1.00

Total Losses (lb): 75.23

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
INDIVIDUAL TANK EMISSION TOTALS

12/06/94
PAGE 5

Annual Emissions Report

Liquid Contents	Losses (lbs.):		Total
	Standing	Withdrawal	
Uranyl Nitrate	48.13	27.10	75.23
Total:	48.13	27.10	75.23

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{75.23 \text{ lb water}}{\text{year}} \times \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} = 4.51 \text{ E-07 lb U/year}$

Maximum Emissions: $4.51 \text{ E-07 lb U/year} \times 5 = 2.26 \text{ E-06 lb U/year}$

OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T041
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

- | | |
|--|---|
| <input type="checkbox"/> Appendix A, Process | <input type="checkbox"/> Appendix L, Solvent Metal Cleaning |
| <input type="checkbox"/> Appendix B, Fuel-Burning Equipment | <input type="checkbox"/> Appendix M, Fugitive Dust Emission Sources |
| <input type="checkbox"/> Appendix C, Incinerator | |
| <input type="checkbox"/> Appendix D, Surface Coating or Printing Operation | |
| <input checked="" type="checkbox"/> Appendix E, Storage Tank | Specify Appendix No. |
| <input type="checkbox"/> Appendix H, Gasoline Dispensing Facility | <input type="checkbox"/> Appendix N, Rubber Tire Manufacturing |
| <input type="checkbox"/> Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal | <input type="checkbox"/> Appendix O, Dry Cleaning Facility |
| <input type="checkbox"/> Appendix K, Surface Coating Line or Printing Line | <input type="checkbox"/> Appendix P, Landfills |
| | <input type="checkbox"/> Other Appendix _____ |
| | <input type="checkbox"/> Compliance Time Schedule |

2. Description of Source (same as used on appendix): F2-606, (2-168), EP2-147

3. Your identification for Source (same as used on appendix): Plant 2/3 Uranyl Nitrate Storage Tank - F2-606

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title
12/16/94

Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

000023

Source No. ___/___
 Application No. ___/___

DOE - FEMP
 (Facility Name)

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
 STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number F2-606, (2-168), EP2-147 Date Installed 1952
 (month/year)
2. Tank capacity: 25,500 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 10' Height --- Length 47' Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify Jacketed tank
 with Galvanized Steel covering
- Condition of paint: Good Poor
- N/A
 10. If this tank is equipped with or vented to a vapor control system, complete (a) through (c)
 of this item.
- N/A
 a) Type of vapor control system _____
 Manufacturer _____ Make or model _____
 Date installed (month and year) _____
- b) Date tank was equipped with or vented to vapor control system (month & year) _____
- c) Specify the rate of emission or percent control (by weight) for any pollutants being
 controlled: _____
 (Attach calculations and test data to support response, unless previously submitted)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

a) Material Uranyl Nitrate (UNH) Trade Name N/A
Density: 8.5-12. lbs/gal or -- ° API Producer N/A
dependig on concentration of UNH

b) Temperature of stored material: Average Amb °F and Maximum Amb ° F
(If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2480 psia at average storage temperature
[Aqueous solution - 0.3331 psia at maximum storage temperature
essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No

If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 250,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) At typical tank pressures and temperatures, the vapor pressure of the Uranyl Nitrate solution is equal to that of water.
- (2) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (3) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (4) The emission factor has been determined to be 6×10^{-06} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (5) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (6) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/06/94
PAGE 1

Identification

Identification No.: T041-1994
City: Cincinnati
State: OH
Company: FERMCO
Type of Tank: Horizontal Fixed Roof

Paint Characteristics
Shell Color/Shade: Aluminum/Diffuse
Shell Condition: Good

Breather Vent Settings
Vacuum Setting (psig): 0.00
Pressure Setting (psig): 0.00

Tank Dimensions

Shell Length (ft): 47
Diameter (ft): 10
Volume(gallons): 25500
Is tank underground? (Y/N): N
Turnovers: 10
Net Throughput (gal/yr): 255000

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
LIQUID CONTENTS OF STORAGE TANK

12/06/94
PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Uranyl Nitrate	All	58.85	50.52	67.18	54.50	0.2480	0.1822	0.3331	18.000			18.00	Option 1

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/06/94
PAGE 3

Annual Emission Calculations

Standing Losses (lb): 48.1286
Vapor Space Volume (cu ft): 2345.22
Vapor Density (lb/cu ft): 0.0008
Vapor Space Expansion Factor: 0.074684
Vented Vapor Saturation Factor: 0.938329

Tank Vapor Space Volume
Vapor Space Volume (cu ft): 2345.22
Tank Diameter (ft): 10
Effective Diameter (ft): 24
Vapor Space Outage (ft): 5.00
Tank Shell Height (ft): 47

Vapor Density
Vapor Density (lb/cu ft): 0.0008
Vapor Molecular Weight (lb/lb-mole): 18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Daily Avg. Liquid Surface Temp. (deg R): 518.52
Daily Average Ambient Temp. (deg. R): 511.57
Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
Liquid Bulk Temperature (deg R): 514.17
Tank Paint Solar Absorptance: 0.60
Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor
Vapor Space Expansion Factor: 0.074684
Daily Vapor Temperature Range (deg R): 33.31
Daily Vapor Pressure Range (psia): 0.150928
Breather Vent Press. Setting Range(psia): 0.00
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.182208
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.333136
Daily Avg. Liquid Surface Temp. (deg R): 518.52
Daily Min. Liquid Surface Temp. (deg R): 510.19
Daily Max. Liquid Surface Temp. (deg R): 526.85
Daily Ambient Temp. Range (deg.R): 19.20

TANKS PROGRAM 2.0
EMISSIONS REPORT
DETAIL FORMAT

12/06/94
PAGE 4

DETAIL CALCULATIONS (AP-42), CONT.

Annual Emission Calculations

Vented Vapor Saturation Factor
Vented Vapor Saturation Factor: 0.938329
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Vapor Space Outage (ft): 5.00

Withdrawal Losses (lb): 27.1045
Vapor Molecular Weight (lb/lb-mole): 18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
Annual Net Throughput (gal/yr): 255000
Turnover Factor: 1.0000
Tank Diameter (ft): 10
Working Loss Product Factor: 1.00

Total Losses (lb): 75.23

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
INDIVIDUAL TANK EMISSION TOTALS

12/06/94
PAGE 5

Annual Emissions Report

Liquid Contents	Losses (lbs.):		Total
	Standing	Withdrawal	
Uranyl Nitrate	48.13	27.10	75.23
Total:	48.13	27.10	75.23

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{75.23 \text{ lb water}}{\text{year}} \mid \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} \mid = 4.51 \text{ E-07 lb U/year}$

Maximum Emissions: $4.51 \text{ E-07 lb U/year} \times 5 = 2.26 \text{ E-06 lb U/year}$

OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T042
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

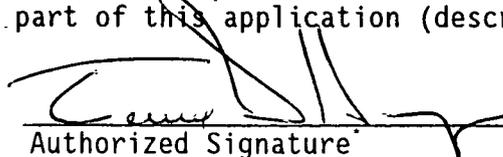
- Appendix A, Process
- Appendix B, Fuel-Burning Equipment
- Appendix C, Incinerator
- Appendix D, Surface Coating or Printing Operation
- Appendix E, Storage Tank
- Appendix H, Gasoline Dispensing Facility
- Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal
- Appendix K, Surface Coating Line or Printing Line

- Appendix L, Solvent Metal Cleaning
- Appendix M, Fugitive Dust Emission Sources
- Specify Appendix No.
- Appendix N, Rubber Tire Manufacturing
- Appendix O, Dry Cleaning Facility
- Appendix P, Landfills
- Other Appendix _____
- Compliance Time Schedule

2. Description of Source (same as used on appendix): F2-605, (2-167), EP2-147
3. Your identification for Source (same as used on appendix): _____
Plant 2/3 Uranyl Nitrate Storage Tank - F2-605

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature

Terence D. Hagen
Director Environmental Compliance
Title

12/16/94
Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

000028

Source No. ___/___
 Application No. ___/___

DOE - FEMP
 (Facility Name)

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number F2-605, (2-167), EP2-147 Date Installed 1952
 (month/year)
2. Tank capacity: 25,500 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 10' Height --- Length 47' Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify Jacketed tank
with Galvanized Steel covering
 Condition of paint: Good Poor
10. ^{N/A} If this tank is equipped with or vented to a vapor control system, complete (a) through (c) of this item.
^{N/A}
 - a) Type of vapor control system _____
 Manufacturer _____ Make or model _____
 Date installed (month and year) _____
 - b) Date tank was equipped with or vented to vapor control system (month & year) _____
 - c) Specify the rate of emission or percent control (by weight) for any pollutants being controlled: _____
 (Attach calculations and test data to support response, unless previously submitted)

DOE - FEMP
 (Facility Name)
 F2-605, (2-167)
 (tank identification)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

a) Material Uranyl Nitrate (UNH) Trade Name N/A
 Density: 8.5-12. lbs/gal or -- ° API Producer N/A
 dependig on concentration of UNH

b) Temperature of stored material: Average Amb °F and Maximum Amb ° F
 (If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2480 psia at average storage temperature
 [Aqueous solution - 0.3331 psia at maximum storage temperature
 essentially water]

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No
 If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 250,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) At typical tank pressures and temperatures, the vapor pressure of the Uranyl Nitrate solution is equal to that of water.
- (2) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (3) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (4) The emission factor has been determined to be 6×10^{-6} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (5) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (6) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/06/94
PAGE 1

Identification

Identification No.: T042-1994
City: Cincinnati
State: OH
Company: FERMCO
Type of Tank: Horizontal Fixed Roof

Paint Characteristics

Shell Color/Shade: Aluminum/Diffuse
Shell Condition: Good

Breather Vent Settings

Vacuum Setting (psig): 0.00
Pressure Setting (psig): 0.00

Tank Dimensions

Shell Length (ft): 47
Diameter (ft): 10
Volume(gallons): 25500
Is tank underground? (Y/N): N
Turnovers: 10
Net Throughput (gal/yr): 255000

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
LIQUID CONTENTS OF STORAGE TANK

12/06/94
PAGE 2

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Uranyl Nitrate	All	58.85	50.52	67.18	54.50	0.2480	0.1822	0.3331	18.000			18.00	Option 1

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/06/94
PAGE 3

Annual Emission Calculations

Standing Losses (lb): 48.1286
 Vapor Space Volume (cu ft): 2345.22
 Vapor Density (lb/cu ft): 0.0008
 Vapor Space Expansion Factor: 0.074684
 Vented Vapor Saturation Factor: 0.938329

Tank Vapor Space Volume

Vapor Space Volume (cu ft): 2345.22
 Tank Diameter (ft): 10
 Effective Diameter (ft): 24
 Vapor Space Outage (ft): 5.00
 Tank Shell Height (ft): 47

Vapor Density

Vapor Density (lb/cu ft): 0.0008
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Daily Avg. Liquid Surface Temp. (deg R): 518.52
 Daily Average Ambient Temp. (deg. R): 511.57
 Ideal Gas Constant R (psia cuft / (lb-mole-deg R)): 10.731
 Liquid Bulk Temperature (deg R): 514.17
 Tank Paint Solar Absorptance: 0.60
 Daily Total Solar Insolation Factor (Btu/sqft^Gday): 1160.00

Vapor Space Expansion Factor

Vapor Space Expansion Factor: 0.074684
 Daily Vapor Temperature Range (deg R): 33.31
 Daily Vapor Pressure Range (psia): 0.150928
 Breather Vent Press. Setting Range(psia): 0.00
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia): 0.182208
 Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia): 0.333136
 Daily Avg. Liquid Surface Temp. (deg R): 518.52
 Daily Min. Liquid Surface Temp. (deg R): 510.19
 Daily Max. Liquid Surface Temp. (deg R): 526.85
 Daily Ambient Temp. Range (deg.R): 19.20

TANKS PROGRAM 2.0
EMISSIONS REPORT
DETAIL FORMAT

12/06/94
PAGE 4

DETAIL CALCULATIONS (AP-42), CONT.

Annual Emission Calculations

Vented Vapor Saturation Factor
 Vented Vapor Saturation Factor: 0.938329
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Vapor Space Outage (ft): 5.00

Withdrawal Losses (lb): 27.1045
 Vapor Molecular Weight (lb/lb-mole): 18.000000
 Vapor Pressure at Daily Average Liquid Surface Temperature (psia): 0.248015
 Annual Net Throughput (gal/yr): 255000
 Turnover Factor: 1.0000
 Tank Diameter (ft): 10
 Working Loss Product Factor: 1.00

Total Losses (lb): 75.23

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
INDIVIDUAL TANK EMISSION TOTALS

12/06/94
PAGE 5

Annual Emissions Report

Liquid Contents	Losses (lbs.):		Total
	Standing	Withdrawal	
Uranyl Nitrate	48.13	27.10	75.23
Total:	48.13	27.10	75.23

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions: $\frac{75.23 \text{ lb water}}{\text{year}} \times \frac{6 \times 10^{-06} \text{ lb U}}{1000 \text{ lb water}} = 4.51 \text{ E-07 lb U/year}$

Maximum Emissions: $4.51 \text{ E-07 lb U/year} \times 5 = 2.26 \text{ E-06 lb U/year}$

**OHIO ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR A PERMIT TO OPERATE
AN AIR CONTAMINANT SOURCE**

6413

D.O.E.-Fernald Environmental Management
Facility Name Project

Mr. Stephen M. Beckman
Person to Contact

7400 Willey Road
Facility Address

Post Office Box 398704
Mailing Address

Fernald Hamilton 45030
City County Zip

Cincinnati OH. 45239-8705
City State Zip

513/ 738-6502
Telephone Area Number

513/ 738-6502
Telephone

#1431110128-T095
(Application no., if this is a renewal application)

4953
Std. Ind. Class. Code

1. Complete and attach any of the following appendices most appropriate to the air contaminant source. In addition, a compliance time schedule form is to be attached when applicable. Check as appropriate the following:

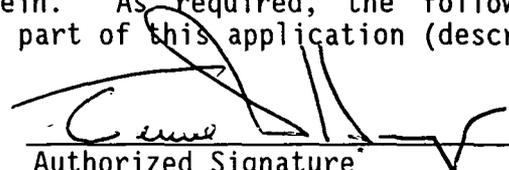
- | | |
|--|---|
| <input type="checkbox"/> Appendix A, Process | <input type="checkbox"/> Appendix L, Solvent Metal Cleaning |
| <input type="checkbox"/> Appendix B, Fuel-Burning Equipment | <input type="checkbox"/> Appendix M, Fugitive Dust Emission Sources |
| <input type="checkbox"/> Appendix C, Incinerator | |
| <input type="checkbox"/> Appendix D, Surface Coating or Printing Operation | |
| <input checked="" type="checkbox"/> Appendix E, Storage Tank | Specify Appendix No. |
| <input type="checkbox"/> Appendix H, Gasoline Dispensing Facility | <input type="checkbox"/> Appendix N, Rubber Tire Manufacturing |
| <input type="checkbox"/> Appendix J, Loading Rack at Bulk Gasoline Plant or Terminal | <input type="checkbox"/> Appendix O, Dry Cleaning Facility |
| <input type="checkbox"/> Appendix K, Surface Coating Line or Printing Line | <input type="checkbox"/> Appendix P, Landfills |
| | <input type="checkbox"/> Other Appendix _____ |
| | <input type="checkbox"/> Compliance Time Schedule |

2. Description of Source (same as used on appendix): 06-F035-TNK, (6-045)
EP6-013

3. Your identification for Source (same as used on appendix): _____
Plant 6 Water Treatment Decantation Tank - 6-045

I, being the individual specified in Rule 3745-35-02(B) of the Ohio Administrative Code, hereby apply for a Permit to Operate the air contaminant source(s) described herein. As required, the following additional documents are submitted as part of this application (describe all attachments):

Appendix E-2
Emission Calculations



Authorized Signature
Terence D. Hagen
Director Environmental Compliance
Title
12/16/94
Date

*Pursuant to OAC Rule 3745-35-02(B) (Permit to Operate).

000033

Source No. ___/___
Application No. ___/___

APPENDIX E-2

INORGANIC MATERIAL STORAGE TANK OR
STORAGE TANK WITH CAPACITY LESS THAN 40,000 GALLONS

1. Tank identification: Name or number 06-F035-TNK, (6-045) Date Installed 1955
EP6-013 (month/year)
2. Tank capacity: 4,000 gallons
3. Tank shape: Cylindrical Rectangular
 Spherical Other, specify _____
4. Tank dimensions: Diameter 9' Height 9' Length --- Width ---
5. Tank shell material: Steel Aluminum Other, specify Stainless Steel
6. Type of tank: External floating roof tank
 Internal floating roof tank
 Fixed roof tank
 Vertical cylindrical tank
 Horizontal cylindrical tank
 Pressure tank
 Other, specify _____
7. Location of tank: Outdoors Indoors Underground
8. Type of filling: Splash Submerged Other, specify _____
9. If this tank is located outdoors and above ground, provide the paint color of the tank
N/A
 Aluminum (specular) Light gray White
 Aluminum (diffuse) Medium gray Other, specify _____
Condition of paint: Good Poor
10. If this tank is equipped with or vented to a vapor control system, complete (a) through (c)
of this item.
N/A
a) Type of vapor control system _____
Manufacturer _____ Make or model _____
Date installed (month and year) _____
b) Date tank was equipped with or vented to vapor control system (month & year) _____
c) Specify the rate of emission or percent control (by weight) for any pollutants being
controlled: _____
(Attach calculations and test data to support response, unless previously submitted)

11. Complete the table below for any pressure or vacuum relief vent valve.

N/A

Type of Vent Valve	Pressure Setting	Vacuum Setting	If pressure relief is discharged to a vapor control, identify the vapor control.
_____	_____	_____	_____
_____	_____	_____	_____

12. Operational Data (complete (a) through (g) of this item for all materials stored or to be stored. Attach additional sheets if necessary.)

a) Material Process wastewaters contaminated w/ Uranium Trade Name N/A
Density: 8.3 lbs/gal or -- ° API Producer N/A

b) Temperature of stored material: Average Amb °F and Maximum Amb ° F
(If temperature is approximately outdoor ambient temperature, write "AMB".)

c) Vapor pressure of stored material (Complete i, ii, iii of this item. If vapor pressure is not known, write "unknown"):

i.) Actual vapor pressure: 0.2560 psia at average storage temperature
0.3507 psia at maximum storage temperature

ii.) Reid vapor pressure: Average Unkn psi and minimum-maximum Unkn - Unkn psi

iii.) If material stored is a gas or liquified gas, provide the pressure at which it is stored: N/A psi gage at N/A °F

d) Type of liquid organic material (If the material is an organic liquid other than a gasoline, fuel oil, kerosene, crude oil, lubricant or other petroleum liquid, answer the question below.)

Is it a photochemically reactive material? [] Yes [X] No

e) Type of waste material (If the material is a waste, answer the question below.)

Is it a hazardous waste? [] yes [X] No

If yes, identify type (EPA hazardous waste number) _____

f) Indicate the year (or 12-month period) for item (g): 1995

g) Annual throughput of material: 500,000 gallons.

Completed by K. O. Klee Date 11/28/94

STORAGE TANK EMISSION REPORT

The calculations for uranium emissions are based on known data where possible and where data for parameters is unknown or incomplete, conservative values producing a "worst case" condition for emissions are used.

The conditions used to determine uranium emissions from the tank are as follows:

- (1) Since uranium does not vaporize at storage conditions the only mechanism for uranium loss from the tank is by entrainment in the aerosol or mist generated during liquid storage and transfer.
- (2) Uranium emissions are determined by multiplying the amount of water lost from the tank by entrainment in the aerosol or mist generated during liquid storage and transfer by an emission factor determined from laboratory tests conducted on Lab sample D-37, Lab #2-9846.
- (3) The emission factor has been determined to be 6×10^{-6} gU/l of solution; the maximum concentration of uranium entrained in the vapor from a boiling solution of 9% uranyl nitrate as determined by the laboratory tests.
- (4) Vapor losses from the tank are calculated using the TANKS software program, version 2.0.
- (5) Maximum emissions are five times the calculated annual emissions.

TANKS PROGRAM 2.0
 EMISSIONS REPORT - DETAIL FORMAT
 TANK IDENTIFICATION AND PHYSICAL CHARACTERISTICS

12/12/94
 PAGE 1

Identification

Identification No.: T095-1994
 City: Cincinnati
 State: OH
 Company: FERMCO
 Type of Tank: Vertical Fixed Roof

Paint Characteristics
 Shell Color/Shade: Gray/Medium
 Shell Condition: Good
 Roof Color/Shade: Gray/Medium
 Roof Condition: Good

Tank Dimensions

Shell Height (ft): 9
 Diameter (ft): 9
 Liquid Height (ft): 8
 Avg. Liquid Height (ft): 5
 Volume (gallons): 3808
 Turnovers: 125
 Net Throughput (gal/yr): 476000

Roof Characteristics

Type: Dome
 Height (ft): 2.00
 Radius (ft) (Dome Roof): 5.00
 Slope (ft/ft) (Cone Roof): 0.0000

Breather Vent Settings

Vacuum Setting (psig): 0.00
 Pressure Setting (psig): 0.00

Meteorological Data Used in Emission Calculations: Dayton, Ohio

TANKS PROGRAM 2.0
 EMISSIONS REPORT - DETAIL FORMAT
 LIQUID CONTENTS OF STORAGE TANK

12/12/94
 PAGE 2

Pressure Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F)			Liquid Bulk Temp. (deg F)	Vapor Pressures (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Water-borne Uranium solution	A11	59.86	50.88	68.84	54.98	0.2560	0.1851	0.3507	18.000			18.00	Option 1

TANKS PROGRAM 2.0
EMISSIONS REPORT - DETAIL FORMAT
DETAIL CALCULATIONS (AP-42)

12/12/94
PAGE 3

Annual Emission Calculations

Standing Losses (lb):	8.0430
Vapor Space Volume (cu ft):	355.94
Vapor Density (lb/cu ft):	0.0008
Vapor Space Expansion Factor:	0.080590
Vented Vapor Saturation Factor:	0.929445
Tank Vapor Space Volume	
Vapor Space Volume (cu ft):	355.94
Tank Diameter (ft):	9
Vapor Space Outage (ft):	5.59
Tank Shell Height (ft):	9
Average Liquid Height (ft):	5
Roof Outage (ft):	1.59
Roof Outage (Dome Roof)	
Roof Outage (ft):	1.59
Dome Radius (ft):	5
Shell Radius (ft):	5
Vapor Density	
Vapor Density (lb/cu ft):	0.0008
Vapor Molecular Weight (lb/lb-mole):	18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.255994
Daily Avg. Liquid Surface Temp. (deg. R):	519.53
Daily Average Ambient Temp. (deg. R):	511.57
Ideal Gas Constant R (psia cuft / (lb-mole-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	514.65
Tank Paint Solar Absorptance (Shell):	0.68
Tank Paint Solar Absorptance (Roof):	0.68
Daily Total Solar Insolation Factor (Btu/sqft^Gday):	1160.00
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.080590
Daily Vapor Temperature Range (deg.R):	35.91
Daily Vapor Pressure Range (psia):	0.165664
Breather Vent Press. Setting Range (psia):	0.00
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.255994
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.185052
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.350716
Daily Avg. Liquid Surface Temp. (deg R):	519.53
Daily Min. Liquid Surface Temp. (deg R):	510.55
Daily Max. Liquid Surface Temp. (deg R):	528.51
Daily Ambient Temp. Range (deg.R):	19.20

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Annual Emission Calculations

Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.929445
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.255994
Vapor Space Outage (ft):	5.59
Withdrawal Losses (lb):	21.2357
Vapor Molecular Weight (lb/lb-mole):	18.000000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.255994
Annual Net Throughput (gal/yr):	476000
Turnover Factor:	0.4066
Maximum Liquid Volume (cuft):	509
Maximum Liquid Height (ft):	8
Tank Diameter (ft):	9
Working Loss Product Factor:	1.00
Total Losses (lb):	29.28

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Annual Emissions Report

Liquid Contents	Losses (lbs.):		
	Standing	Withdrawal	Total
Water-borne Uranium solution	8.04	21.24	29.28
Total:	8.04	21.24	29.28

URANIUM EMISSIONS

These calculations are based on conservative estimates, the actual emissions are expected to be less than those indicated.

Annual Emissions:
$$\frac{29.28 \text{ lb water}}{\text{year}} \times \frac{6 \times 10^{-6} \text{ lb U}}{1000 \text{ lb water}} = 1.76 \text{ E-07 lb U/year}$$

Maximum Emissions: $1.76 \text{ E-07 lb U/year} \times 5 = 8.78 \text{ E-07 lb U/year}$