

FEB 18 2014

Illinois Environmental Protection Agency
Division of Water Pollution Control
Permit Section
1021 North Grand Avenue East
P.O. Box 19276
Springfield, IL 62794-9276

To Whom It May Concern:

SUBJECT: RENEWAL APPLICATION FOR PERMIT NUMBER 2009-EE-2646,
PRETREATMENT SYSTEM FOR METAL FINISHING RINSEWATERS -
TRIBUTARY TO THE CITY OF BATAVIA WASTEWATER TREATMENT
PLANT

Reference: Permit Number 2009-EE-2646 dated September 18, 2009

Enclosed for your review and approval is the renewal application package for the Cavity Processing Laboratory (formerly Integrated Cavity Processing Apparatus) located in Industrial Building 4 at the Fermi National Accelerator Laboratory (Fermilab). The application package consists of one original and one copy of the following forms:

Form WPC-PS-1
Schedule N Waste Characteristics
Attachment 1: Cavity Processing Laboratory Narrative
Attachment 2: Schematic Wastewater Flow Diagram
Attachment 3: Centrifugal Barrel Polishing Narrative
Attachment 4: Metallography Polishing Narrative

If you have any questions regarding the renewal application for the permit, please contact Rick Hersemann, of my staff, at (630) 840-4122.

Sincerely,



Michael J. Weis
Site Manager

Enclosures:
As Stated

cc:	N. Lockyer, Fermilab, w/o encls.	bc:	R. Hersemann, w/o encls.
	V. White, Fermilab, w/o encls		J. Scott, w/o encls.
	R. Ortgiesen, Fermilab, w/o encls.		A. Kenney, w/o encls.
	D. Harding, Fermilab, w/o encls.		K. Kosirog, w/o encls.
	M. Michels, Fermilab, w/o encls.		B. Scerini, w/o encls.



Victoria A. White
Directorate

630 840 3936 (phone)
630 840 8752 (fax)
white@fnal.gov

February 4, 2014

Mr. Michael J. Weis
Site Manager
Fermi Site Office
U. S. Department of Energy
P. O. Box 2000
Batavia, Illinois 60510-5011

SUBJECT: RENEWAL APPLICATION FOR PERMIT NUMBER 2009-EE-2646.
PRETREATMENT SYSTEM FOR METAL FINISHING RINSEWATERS –
TRIBUTARY TO THE CITY OF BATAVIA WWTP

Reference: Permit, Subject, U.S. DEPARTMENT OF ENERGY – FERMI NATIONAL
ACCELERATOR LABORATORY – Pretreatment System for Metal Finishing
Rinsewaters – Tributary to the City of Batavia WWTP, Permit Number 2009-EE-
2646, Issued 9/18/2009

Dear Mr. Weis,

Please find the following enclosed for your review, signature, and ultimate submittal to the City of Batavia:

1. Application for Permit or Construction Approval for the Cavity Processing Laboratory or CPL (formerly Integrated Cavity Processing Apparatus) in Industrial Building 4.
 - a. Form WPC-PS-1
 - b. Schedule N
 - c. Attachments 1-4

2. Sample letter to accompany the submittal to the City of Batavia.

BACKGROUND

The activity of chemical etching of metal that is done in Fermilab's CPL facility is regulated under 40 CFR 433.10 and 35 IAC 307.4300 as a National Categorical Pretreatment Standard and therefore requires a wastewater pretreatment permit with the IEPA with prior approval from the City of Batavia. Permit 2009-EE-2646 was issued to Fermilab in September 2009 and expires August 31, 2014. The permit application is due to the IEPA six months prior to expiration on February 28, 2014. The Technical Division has added activities in metal processing that have been approved by the IEPA with the understanding that these activities would be added to the permit renewal application. In addition to the original permitted process of niobium etching and

electro-polishing, the application includes centrifugal barrel polishing and high quality metallography sample preparation. Narratives are included to describe each activity. Schedule N totals waste characteristics from all activities. Certification by a design engineer is not required for this renewal application.

TO DO:

After reviewing, please sign and date on the second page on part 7.1.2 of the IEPA permit application and have a witness attest on the third page on part 7.2. Please make a copy and call Katie Kosirog at x6497 to hand deliver to the City of Batavia for approval signatures. This will expedite the signature process to ensure prompt delivery to the IEPA by February 28, 2014.

After the city reviews and approves our permit application, Katie will pick up and deliver to your office for submittal to the IEPA. Then, the original will need to be sent to the IEPA. There is not a fee associated with this renewal. Please call Katie Kosirog at X6497 to prepare the draft letter for the IEPA at that point.

Sincerely,



Victoria A. White
Chief Operating Officer

cc: G. Bock, w/o attachment
D. Harding, w/o attachment
S. Henderson, w/o attachment
N. Lockyer, w/o attachment
M. Michels, w/o attachment
R. Ortgiesen, w/o attachment
B. Scerini, w/o attachment

ESH&Q File: Permits, Wastewater Pretreatment TD



Illinois Environmental Protection Agency
 Permit Section, Division of Water Pollution Control
 P.O. Box 19276
 Springfield, Illinois 62794-9276

For IEPA Use:

**Application for Permit or Construction Approval
 WPC-PS-1**

1. Owner Name: U.S. Department of Energy, Fermi National Accelerator Laboratory
 Name of Project: Cavity Processing Laboratory (formerly Integrated Cavity Processing Apparatus) in IB4
 Township: Winfield County: DuPage/Kane

2. Brief Description of Project:

The project includes the operation of an equalization tank and batch neutralization tank, chemical feed pump, and auxiliary equipment to effectively neutralize a small volume of air scrubber wastewater from Niobium etching and electro-polishing processes prior to discharge to the City of Batavia Municipal POTP.

3. Documents Being Submitted: If the Project involves any of the items listed below, submit the corresponding schedule, and check the appropriate boxes.

	Schedule		Schedule
Private Sewer Connection/Extension	A/B <input type="checkbox"/>	Spray Irrigation	H <input type="checkbox"/>
Sewer Extension Construct Only	C <input type="checkbox"/>	Septic Tanks	I <input type="checkbox"/>
Sewage Treatment Works	D <input type="checkbox"/>	Industrial Treatment/Pretreatment	J <input type="checkbox"/>
Excess Flow Treatment	E <input type="checkbox"/>	Waste Characteristics	N <input checked="" type="checkbox"/>
Lift Station/Force Main	F <input type="checkbox"/>	Erosion Control	P <input type="checkbox"/>
Fast Track Service Connection	FTP <input type="checkbox"/>	Trust Disclosure	T <input type="checkbox"/>
Sludge Disposal	G <input type="checkbox"/>		

Plans: Title N/A
 _____ No. of Pages: _____

Specifications: Title N/A
 _____ No. of Books/Pages: _____

Other Documents: Attached narratives and process schematic
 (Please Specify)

3.1 Illinois Historic Preservation Agency approval letter: Yes No

4. Land Trust: Is the project identified in item number 1 herein, for which a permit is requested, to be constructed on land which is the subject of a trust? Yes No

If yes, Schedule T (Trust Disclosure) must be completed and item number 7.1.1 must be signed by a beneficiary, trustee or trust officer.

5. This is an Application for (Check Appropriate Line):

- A. Joint Construction and Operating Permit
- B. Authorization to Construct (See Instructions) NPDES Permit No. IL00 _____
- C. Construct Only Permit (Does Not Include Operations)
- D. Operate Only Permit (Does Not Include Construction)

6. Certifications and Approval:

6.1 Certificate by Design Engineer (When required: refer to instructions)

I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

Engineer Name: _____

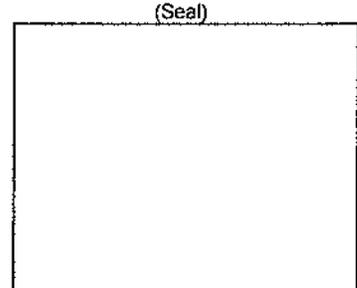
Registration Number: _____
(3 digits) - (6 digits)

Firm: _____

Address: _____

City: _____ State: _____ Zip: _____ Phone No: _____

Signature X _____ Date: _____



7. Certifications and Approvals for Permits:

7.1 Certificate by Applicant(s)

I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board. I/We hereby agree to conform with the Standard Conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name of Applicant for Permit to Construct: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

Organization: _____

7.1.2 Name of Applicant for Permit to Own and Operate: U.S. Department of Energy, Fermi National Accelerator
Laboratory

Address: P.O. Box 2000

City: Batavia State: IL Zip Code: 60510

Signature X _____ Date: _____

Printed Name: Michael J. Weis Phone No: (630) 840-3281

Title: Site Manager, DOE Fermi Site Office

7.2 Attested (Required When Applicant is a Unit of Government)

Signature X _____ Date: _____

Title: _____
(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

7.3 Applications from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or a duly authorized representative.

7.4 Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction of facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary:

8-inch Sanitary Sewer (Wintergreen Terrace)

Sewer System Owner: City of Batavia

Address: 100 N. Island Ave.

City: Batavia State: IL Zip Code: 60510

Signature X _____ Date: _____

Printed Name: Byron Ritchason Phone No: (630) 454-2320

Title: Superintendent of Wastewater

7.4.1 Additional Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction facilities that are the subject of this application.
- 3. Not applicable

Name and location of sewer system to which this project will be tributary:

Sewer System Owner: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Signature X _____ Date: _____

Printed Name: _____ Phone No: _____

Title: _____

7.5 Certificate By Waste Treatment Works Owner

I hereby certify that (Please check one):

- 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB _____ dated _____ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.
- 3. Not applicable

I also certify that, if applicable, the industrial waste discharges described in the application are capable of being treated by the treatment works.

Name of Waste Treatment Works: City of Batavia WWTP

Waste Treatment Works Owner: City of Batavia

Address: 400 S. Shumway Ave.

City: Batavia State: IL Zip Code: 60510

Signature X _____ Date: _____

Printed Name: Byron Ritchason Phone No: (630) 454-2320

Title: Superintendent of Wastewater

Please return completed form to the following address:

Illinois Environmental Protection Agency
Permit Section, Division of Water Pollution Control
P.O. Box 19276
Springfield, Illinois 62794-9276

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 ½, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that section. Failure to do so may prevent this form from being processed and could result in your application being denied.

For IEPA Use:
LOG #
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE N WASTE CHARACTERISTICS

1. Name of Project Cavity Processing Laboratory (formerly Integrated Cavity Processing Apparatus) in IB4

2. FLOW DATA	EXISTING	PROPOSED-DESIGN
2.1 Average Flow (gpd)	<u>N/A</u>	<u><400 gallons</u>
2.2 Maximum Daily Flow (gpd)	<u>N/A</u>	<u>400 gallons</u>

2.3 TEMPERATURE

Time of Year	Avg. Intake Temp. F	Avg. Effluent Temp. F	Max. Intake Temp F.	Max. Effluent Temp F.	Max. Temp. Outside Mixing Zone F
SUMMER	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	
WINTER	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>	

2.4 Minimum 7-day, 10-year flow: N/A cfs _____ MGD.

2.5 Dilution Ratio: N/A ; _____

2.6 Stream flow rate at time of sampling N/A cfs _____ MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ; Existing conditions ; Proposed Permitted Conditions

Type of sample: grab (time of collection batch); composite (Number of samples per day _____)

(see instructions for analyses required)

CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Ammonia Nitrogen (as N)				
Arsenic (total)				
Barium				
Boron				
BOD ₅				
Cadmium				
Carbon Chloroform Extract				
Chloride				
Chromium (total hexavalent)				
Chromium (total trivalent)				

CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Copper	50	N/A	N/A	N/A
Cyanide (total)				
Cyanide (readily released @ 150° F & pH 4.5)				
Dissolved Oxygen				
Fecal Coliform				
Fluoride	27,800	3,620/ 5,480	N/A	N/A
Hardness (as Ca CO ₃)				
Iron (total)				
Lead				
Manganese				
MBAS				
Mercury				
Nickel				
Nitrates (as N)	20,500	7,100/ 14,200	N/A	N/A
Oil & Grease (hexane solubles or equivalent)				
Organic Nitrogen (as N)				
pH	1.0	7/ 5.5-9	N/A	N/A
Phenols				
Phosphorous (as P)				
Radioactivity				
Selenium				
Silver	20	N/A	N/A	N/A
Sulfate	63,000	7,900/ 15,800	N/A	N/A
Suspended Solids				
Total Dissolved Solids				
Zinc				
Others				
Phosphate	31,900	4,020/ 8,050	N/A	N/A

Attachment 1: Cavity Processing Laboratory Narrative

FERMILAB CAVITY PROCESSING LABORATORY IN INDUSTRIAL BUILDING 4

Wastewater Neutralization System

Narrative Description

The Wastewater neutralization system will process the dilute acid wastes from the niobium⁽¹⁾ polishing process and blowdown wastewater from the process related air scrubber prior to discharge to the City of Batavia Municipal Public Owned Treatment Works.

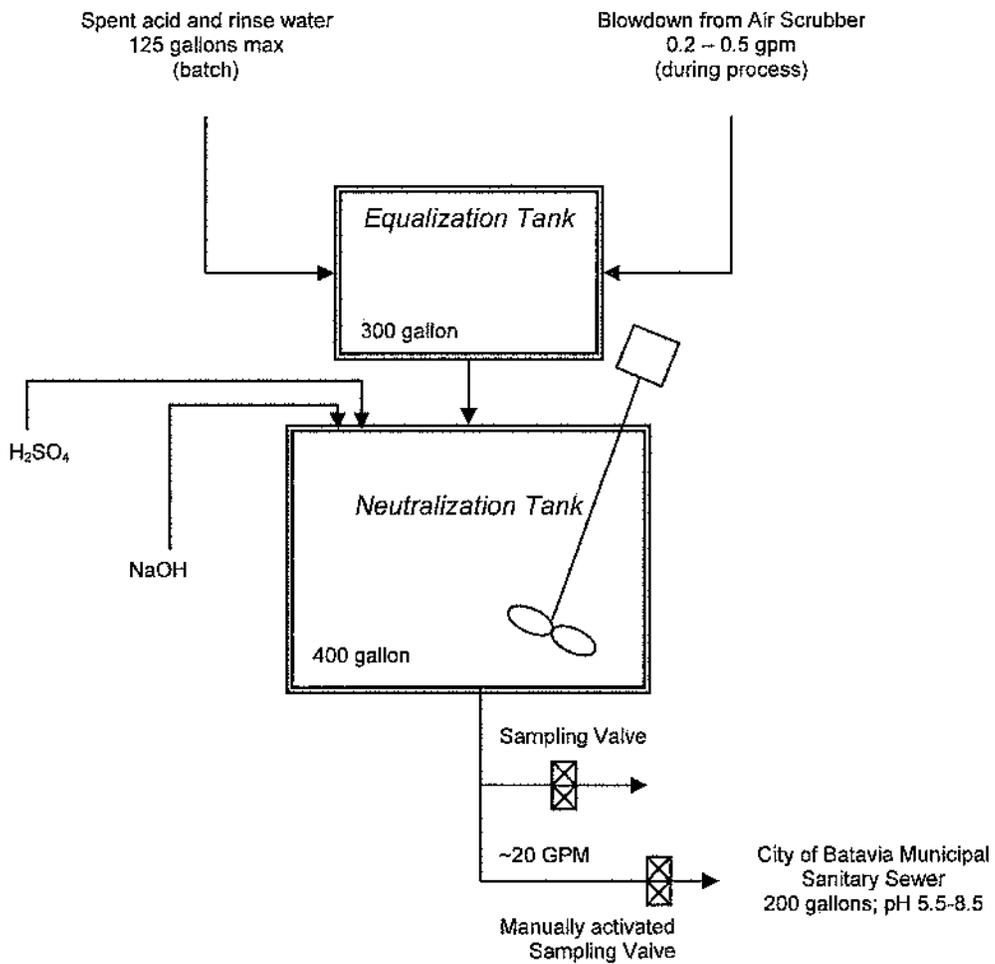
The dilute acid wastewater and scrubber blowdown may include salts of niobium, products of hydrofluoric, sulfuric, nitric and/or phosphoric acids. The wastewater is generated in 125 gallon batches at a frequency of not more than thrice a week. The polishing wastewater and the blowdown from the air scrubber can be accumulated in a 300-gallon equalization tank. Once a sufficient volume of wastewater is collected, the volume is transferred via gravity to 400 gallon neutralization tank. Caustics or acids, H₂SO₄ and NaOH, will then be added to the neutralization tank. A control system has been designed to monitor pH and the chemical addition to achieve the required pH set point. The contents of the neutralized wastewater will be discharged to the sewer approximately once per day. Each neutralized batch of wastewater is sampled prior to discharge to the Fermi Lab sanitary sewer system. The Fermi Lab sanitary sewer discharges to the City of Batavia Municipal Sanitary sewer system.

⁽¹⁾ Niobium is a lustrous, grey, ductile, paramagnetic metal in group 5 of the periodic table that takes on a bluish tinge when exposed to air at room temperature for extended periods. Niobium is a refractory metal with a very high melting point (> 2,000 °C), and is used primarily as a strengthening agent in steels. Precautions: Niobium has no known biological role. While niobium dust is an eye and skin irritant and a potential fire hazard, elemental niobium on a larger scale is physiologically inert (and thus hypoallergenic) and harmless. It is frequently used in jewelry and has been tested for use in some medical implants. Niobium-containing compounds are rarely encountered by most people, but some are toxic and should be treated with care. The short and long term exposure to niobates and niobium chloride, two chemicals that are water soluble, have been tested in rats. Rats treated with a single injection of niobium pentachloride or niobates show a median lethal dose (LD50) between 10 and 100 mg/kg. For oral administration the toxicity is lower; a study with rats yielded a LD50 after seven days of 940 mg/kg. (Ref. <http://en.wikipedia.org/wiki/Niobium>)

Attachment 2: Schematic Wastewater Flow Diagram

FERMILAB
CAVITY PROCESSING LABORATORY
IN INDUSTRIAL BUILDING 4

Niobium etching and electro-polishing process Wastewater Neutralization System



Attachment 3: Centrifugal Barrel Polishing Narrative

FERMILAB CAVITY PROCESSING LABORATORY IN INDUSTRIAL BUILDING 4

Centrifugal Barrel Polishing

Narrative Description

Centrifugal barrel polishing is used to mechanically polish the inside surface of elliptical niobium cavities. In this process the niobium cavities are first filled with water, soap and various abrasive media. The cavities are then rotated at up to 115 rpm. This rotation forces the abrasive media to slide against the inside wall of the cavity creating a smooth uniform surface. When the process is done the water, soap and media are poured into a settling tank with a strainer. The liquid is pumped to drain. The solids are collected, allowed to dry and handled as regulated waste.

The water that goes to drain will likely contain small amounts of niobium. The water may also contain small amounts of the broken down media which is most frequently alumina or silica.

For single-cell cavities there is 1 liter of volume and for 9-cell cavities there is 12 liters of volume. In both instances half of this is water and half is solids. This results in ½ liter of dirty water for a single-cell cavity or 6 liters of dirty water for a 9-cell cavity. At most, 120 liters of dirty water would be generated in a month, while typically it would be around 10 liters a month.

After tumbling is complete, the cavities are rinsed out with ultrapure water using approximately 100 liters of water per cavity. This amount is the same for both single-cell and 9-cell cavities. At most, 2,000 liters of ultrapure rinse water would be generated in a month, while typically it would be around 1,000 liters.

Attachment 4: Metallography Polishing Narrative

FERMILAB METALLOGRAPHY POLISHING WORK IN INDUSTRIAL BUILDING 3

High Quality Metallography Sample Preparation

Narrative Description

The polishing activities are intended to produce samples for analysis by microscopes and other instruments. The sample of interest is embedded and immobilized within a binding material, and the assembly of the sample and its binder become the body that is polished. The polishing process uses abrasives for coarse grinding, abrasives and slurries for fine grinding and lapping, and slurries and suspensions for fine polishing. Slurries and suspensions may use polar and non-polar agents. Water rinsing is used between polishing stages to remove residues. Fibrous media is used to apply abrasives, slurries, and suspensions to the body.

The residues of the polished body, the polishing abrasives, slurries, and suspensions, the suspension agents, the fibrous media, and rinse water comprise the primary waste stream. Primary wastes are collected and allowed to settle. The typical polished body is a cylinder 40 mm long and 40 mm diameter, from which less than 1 mm is removed from one end during polishing over the course of several hours. Typically, the total amount of effluent per week is less than the capacity of a 5-gallon carboy, and the total amount of solid waste sent to settle in the carboy is less than 10 cc. Evaporation of water is the primary waste stream.

Operations take place weekly under procedural controls, which limit the amount of waste. The maximum potential to release waste is 50 gallons per week, but this release would require violation of the procedural controls and excessive use of equipment.

Samples include metals and compounds of niobium, titanium, tin, copper, silver, iron and steels, aluminum, and stable oxides. Binding materials include epoxies, lucite, bakelite, diallyl phthalate, and other thermoset plastics. Abrasives include diamond, silicon carbide, aluminum oxide, silicon oxide, and garnet. Suspending agents are water and mineral oil. Rinsing agents are water and ethyl alcohol. Media includes nylon, cotton, paper, and other fibrous materials.