



Department of Energy

Fermi Site Office
Post Office Box 2000
Batavia, Illinois 60510

September 18, 2018

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 2014-EP-58604,
PRETREATMENT SYSTEM FOR METAL FINISHING RINSEWATERS -
TRIBUTARY TO THE CITY OF BATAVIA WASTEWATER TREATMENT PLANT

Reference: Permit Number 2014-EP-58604 dated April 16, 2014

Enclosed for your review and approval is the renewal application package for the Cavity Processing Laboratory 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
- Attachment 5: Toxic Organic Pollutant Management Plan

We request that the following language be included into our permit when Issued:

**In lieu of monitoring for Total Toxic Organics, the Permittee may include the following certification statement along with the monitoring reports:*

Based on my inquiry of the person or persons directly responsible for managing compliance with the permit limitation for total toxic organics (TTO), I certify that to the best of my knowledge and belief, no dumping of concentrated toxic organics into the wastewater has occurred. I further certify that this facility is implementing the toxic organic pollutant management plan as submitted.

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

Sincerely,

A handwritten signature in blue ink, appearing to read "M. Weis".

Michael J. Weis
Site Manager

Enclosures:
As Stated

cc: N. Lockyer, Fermilab, w/o encls.
T. Meyer, Fermilab, w/o encls.
S. Belomestnykh, Fermilab, w/o encls.
M. Michels, Fermilab, w/o encls.



Illinois Environmental Protection Agency

1021 North Grand Avenue East • P.O. Box 19276 • Springfield • Illinois • 62794-9276 • (217) 782-3397

Application for Permit or Construction Approval WPC-PS-1

For IEPA Use Only

This form must be typewritten or printed legibly. This form may be completed manually or online using Adobe Reader, a copy of it saved locally, printed, and signed before it is submitted to:

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

Reset All Fields

1. Owner Name: U.S. Department of Energy, Fermi National Accelerator Laboratory
- Name of Project: Cavity Processing Laboratory in IB4
- Project Location Address (include nearest street and city address): P.O. Box 500
- City: Batavia Zip Code: 60510
- Township: Winfield County: Kane

2. Brief Description of the 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/Extensions	A/B <input type="checkbox"/>	Spray Irrigation	H <input type="checkbox"/>
Sewer Extension Construction 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: Toxic Organic Pollutant Management Plan No. of Pages: 106

Specifications:

Title: Attached Narratives and process schematic No. of Books/Pages: 4

Other Documents: N/A
(Please specify)

3.1 Illinois Historic Preservation Agency approval letter Yes No

(If you have a copy of the IHPA approval letter, please send in with the Permit Application Package)

4. Land Trust: Is the project identified in item Number 1 therein, 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 7.1.1 must be signed by a beneficiary trustee or trust officer.

5. This is an application for (Check appropriate box):

- A. Joint Construction and Operating Permit
- B. Authorization to Construct (See Instructions) NPDES Permit No. IL00: _____ Issuance Date: _____
- C. Construction Only Permit (Does Not Include Operations)
- D. Operate Only Permit (Does Not Include Construction)
- E. Supplemental Permit Request to Existing State Construction or Operating Permit No.: _____
Issuance Date: _____

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.

Licensed Professional Engineer's Name: _____

Licensed Professional Engineer's Title: _____

Registration Number: _____ License Expiration Date: _____

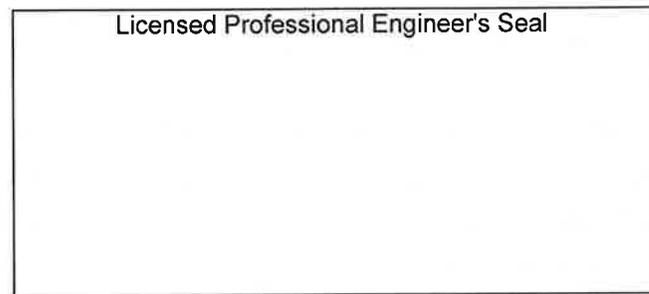
Company: _____

Street Address: _____ PO Box: _____

City: _____ State: _____ Zip + 4: _____

Email Address: _____ Phone: _____

Printed Name: _____



Original Signature

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: _____

Title: _____ Organization: _____

Street Address: _____ PO Box: _____

City: _____ State: _____ Zip + 4: _____

Email Address: _____ Phone: _____

Printed Name: _____

Original Signature

Date

7.1.2 Name of Applicant for Permit to Own and Operate: U.S. Department of Energy, Fermilab

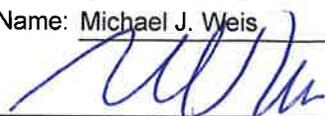
Title: Site Manager Organization: DOE Fermi Site Office

Street Address: _____ PO Box: 2000

City: Batavia State: IL Zip + 4: 60510-5011

Email Address: michael.weis@science.doe.gov Phone: 630-840-3281

Printed Name: Michael J. Weis

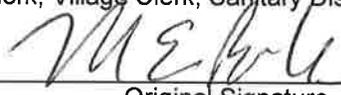

Original Signature

9/17/2018
Date

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

Title: Physical Scientist - Deputy Site Office Manager

City clerk, Village Clerk, Sanitary District Clerk, etc.)


Original Signature

9/17/2018
Date

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 Illinois 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)

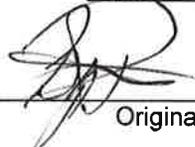
Sewer System Owner: City of Batavia

Address: 100 N. Island Ave.

City: Batavia State: IL Zip + 4: 60510-1930

Email Address: britchas@cityofbatavia.net Phone: (630) 454-2320

Printed Name: Byron Ritchason


Original Signature

9/17/18
Date

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 Illinois 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.
- 3. Not applicable.

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

Sewer System Owner: _____

Address: _____

City: _____ State: _____ Zip + 4: _____

Email Address: _____ Phone: _____

Printed Name: _____

Original Signature

Date

7.5 Certificate by Waste Treatment Works Owner

I hereby certify that (Please check one):

- 1. The wastewater 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 Illinois 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. I also certify that, if applicable, the industrial waste discharges described in the application are capable of being treated by treatment works.
- 4. Not applicable.

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 + 4: 60510

Email Address: britch@cityofbatavia.net Phone: (630) 454-2320

Printed Name: Byron Ritchason


Original Signature

9/17/18
Date

Save Form with New Name

Print Form

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 in IB4

2. <u>FLOW DATA</u>	<u>EXISTING</u>	<u>PROPOSED-DESIGN</u>
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

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

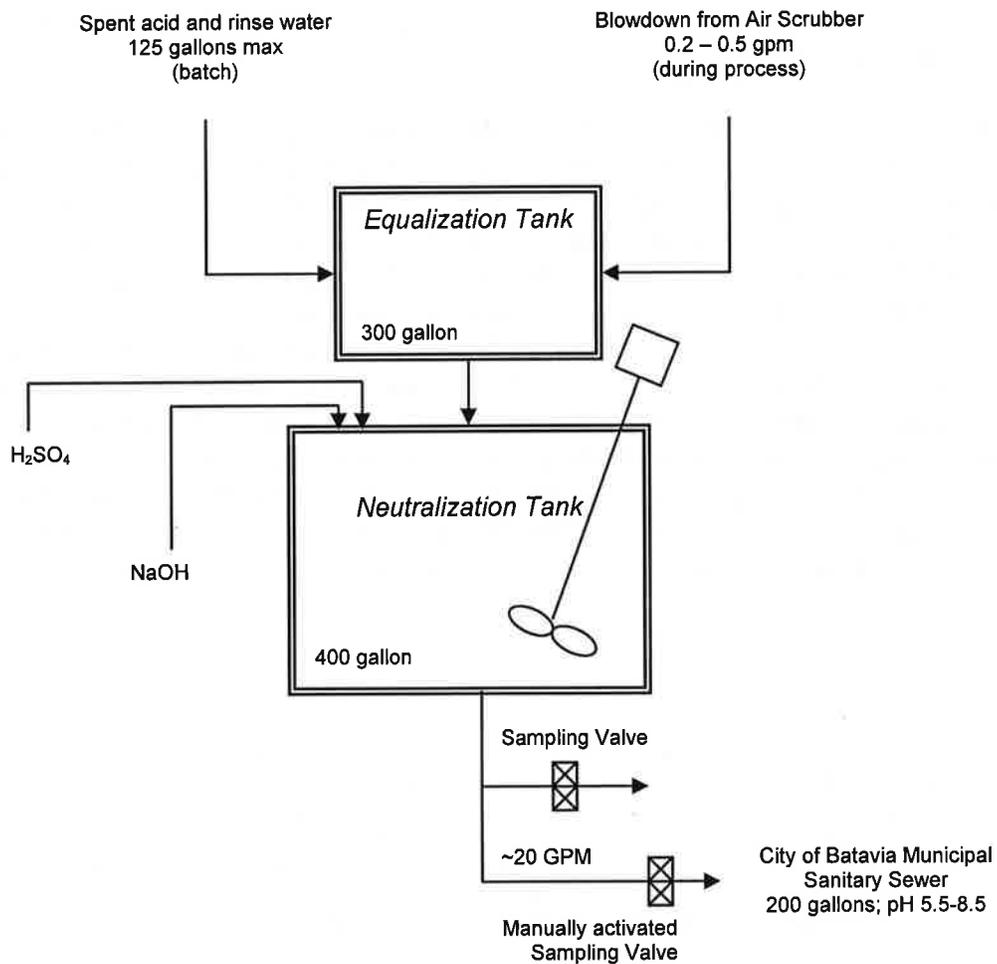
The dilute acid wastewater and scrubber blowdown may include salts of niobium, products of hydrofluoric, sulfuric, nitric and/or phosphoric acids. The wastewater is generated in 125 gallon batches at a frequency of not more than thrice a week. The polishing wastewater and the blowdown from the air scrubber 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 $\frac{1}{2}$ 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.