



# Department of Energy

Fermi Area Office  
Post Office Box 2000  
Batavia, Illinois 60510

RECEIVED

APR 22 2002

Environment,  
Safety & Health Section

APR 18 2002

Mr. Gerald Brown, Associate  
Director for Operations Support  
Fermilab  
P.O. Box 500  
Batavia, IL 60510

Dear Mr. Brown:

SUBJECT: NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DETERMINATION AT  
FERMI NATIONAL ACCELERATOR LABORATORY - "MI-31 E-COOL"  
PROJECT

Reference: 1. Letter, same subject, G. Brown to J. Monhart, dated 04/12/02.  
2. Letter, Subject: NEPA Determination for Recycler Electron Cooling – Phase 1, J. Monhart to G. Robertson, dated 06/15/00.

I have reviewed the Fermilab Environmental Evaluation Notification Form (EENF) transmitted by your referenced letter for this proposed project. This project is essentially Phase 2 of the project approved by Reference 2. Based on the information provided in the EENF, I have approved the following project as a categorical exclusion (CX):

<u>Project Name</u>	<u>Approved</u>	<u>CX (s)</u>
MI-31 E-Cool	04/18/2002	B1.15, B3.10

I am returning a signed copy of the EENF for your records. No further NEPA review is required. This project falls under a categorical exclusion(s) provided in 10 CFR 1021, as amended in 1996.

Sincerely,

Jane L. Monhart  
Area Manager

Enclosure: Signed EENF

cc: M. Witherell, w/o encl.  
K. Stanfield, w/o encl.  
B. Chrisman, w/o encl.  
C. Trimby, w/o encl.  
S. Nagaitsev, BD, w/o encl.  
B. Griffing, ESHS, w/encl.  
T. Dykhuis, ESHS, w/o encl.

SCANNED *Server*  
Posted on the *Web*  
Date 9-25-02

A component of the Chicago Operations Office

*file: EE's -*

*logged 4/22/02*

## FERMILAB ENVIRONMENTAL EVALUATION NOTIFICATION FORM

**Project/Activity Title** MI-31 E-Cool

**ES&H Tracking Number** 01018

**Funding Source** AIP

**Fermilab Project Manager** Sergei Nagaitsev

**Signature** S. Nagaitsev

**Date** 04/08/02

**Fermilab NEPA Reviewer** Teri L. Dykhuis

**Signature** Teri L. Dykhuis

**Date** 04/11/02

### I. Description of the Proposed Action

The MI-31 building project would be comprised of the construction of a new 4000 square foot building to the south of the existing MI-30 building in the Main Injector complex. The new building would consist of a 3,150 square foot high bay area with an adjacent 850 square feet Control Room. Some 28 feet below the grade level would be a lower level where an electron cooling system would be located. This system would be integrated with the existing antiproton recycler magnets located in the Main Ring Enclosure in preparation for Run IIB.

A large pressure vessel called the pelletron would be located in the lower level of the high bay area. This pelletron would supply electrons to the antiproton recycler magnet string in the Main Injector enclosure via a narrow below-grade connecting enclosure. This enclosure would extend from the lower level of the high bay to the nearby existing Main Injector enclosure.

The electrons supplied by the pelletron would interact with the antiprotons in the Recycler through a process called electron cooling, which would allow it to store more efficiently (i.e., faster stacking, larger stacks), both antiprotons recycled from the Tevatron collider and antiprotons from the Accumulator. This, in turn, would allow the Recycler to provide more antiprotons to the Tevatron and thereby substantially increase the luminosity of the collisions.

An excavation would be dug to El. 710' where a base mat slab would be constructed for the Lower Level of this structure. Foundation walls would be built up to Grade Level where additional floor space would be constructed to the south of the Lower Level. Upon this concrete foundation a steel superstructure with metal siding would be erected. The building would contain a Control Room, truck bay and an open area overlooking the Lower Level below. A 15-ton capacity, overhead, traveling crane would lower heavy loads from trucks to the Lower Level. A narrow concrete enclosure would connect the Lower Level and the Main Injector Ring Enclosure. Refer to drawings 6-6-43 CDR-1 through CDR-6 for plans and sections.

Following completion of the civil work, the pelletron (a type of electron accelerator) would be installed in the Lower Level of the new MI-31 Building. The pelletron has already been constructed in the Wide Band Lab and is currently undergoing testing. The pelletron would generate an electron beam of 500 mA @ 4.4 MeV during normal operation. The NEPA review for the Wide Band Lab activities resulted in DOE approval of categorical exclusions B3.10 and B1.15. Supply and return lines would connect the relocated pelletron to the existing Recycler Accelerator through a narrow concrete enclosure constructed between the Lower Level and the Main Injector Ring Enclosure. After installation of the pelletron and a period of commissioning tests lasting about one year, the pelletron would begin full-time operation.

### II. Description of the Affected Environment

The amount of topsoil to be removed in the area of construction covers 8,700 square feet: 4,300 square feet for the building area and 4,400 square feet for the driveway and parking area. Excavation for this structure would require 8,200 cubic yards to be removed and hauled to the NUMI stockpile. The floor at the Lower Level would have 2,300 square feet of usable space while building at grade level would encompass 4,300 square feet. The construction area for the MI-31 Building is entirely within the area previously disturbed during construction of the nearby Main Injector Ring Enclosure, the MI-30 Service Building, utilities and roadwork.

Trenching would be required adjacent to the Main Ring Road for 4,900 feet of Domestic Water Service (DWS) from the MI-8 Service Building to the MI-31 Building. A sump discharge line, 160 feet long, would run from the MI-31 Building to the nearby cooling pond and 100 feet of Industrial Cooling Water (ICW) that would tie into a nearby, existing ICW line. A 5,000-gallon holding tank for sanitary sewage would be installed below-grade near the new building. Additionally a concrete-encased power and communication duct would extend 200 feet from an existing manhole to the building.

The pelletron is contained within a cylindrical tank 12 feet in diameter and 24 feet high. It would be filled with sulfur hexafluoride (SF<sub>6</sub>) gas, as would a 22,000-gallon storage tank to be installed nearby the building. This storage tank is currently in use at the Wide Band Lab for use with the pelletron there. Concrete shielding blocks would be installed at appropriate locations to limit radiation levels when the machine is operating. A portable chilled water system would be installed and connected to the existing Main Injector Low Conductivity Water (LCW) system through the MI-30 Building.

**III. Potential Environmental Effects** (Provide comments for each checked item and where clarification is necessary.)

A. Sensitive Resources: Will the proposed action result in changes and/or disturbances to any of the following resources?

- Threatened or endangered species
- Other protected species
- Wetland/Floodplains
- Archaeological or historical resources
- Non-attainment areas

B. Regulated Substances/Activities: Will the proposed action involve any of the following regulated substances or activities?

- Excavation
- Noise
- Asbestos
- PCBs
- Chemical storage or use
- Pesticides
- Hazardous, toxic or criteria air emissions
- Liquid effluents
- Underground storage tanks
- Hazardous waste
- Radioactive waste
- Radioactive exposures

C. Other relevant Disclosures

- Threatened violation of ES&H permit requirements
- Siting/construction/major modification of waste recovery or TSD facilities
- Disturbance of pre-existing contamination
- New or modified permits

- Public controversy
- Action/involvement of another federal agency
- Public utilities/services
- Depletion of a non-renewable resource

#### IV. NEPA Recommendation

Fermilab has reviewed this proposed action and conclude that the appropriate level of NEPA determination is a Categorical Exclusion. The conclusion is based on the proposed action meeting the applicable requirements in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B1.15, and B3.10 (beam energy would be approximately 4.4 MeV).

#### V. DOE/CH-FRMI Group NEPA Coordinator Review

Concurrence with the recommendation for determination:

NEPA Coordinator reviewer J. P. Cooper

Signature Jonathan P. Cooper

Date 4/18/2002

Fermi Group Manager Jane Monhart

Signature Jane L. Monhart

Date 4/18/02

#### VI. Comments on checked items in section III.

Excavation: Prior to the start of any construction on this project, the contractor would submit an Erosion Control Plan prepared per the requirements of FESHM 8012. After approval by Fermilab and before any work on the project site commences, a silt fence would be installed to prevent any soil from being washed away. An area of 8,700 square feet would then be stripped of topsoil in the immediate vicinity of the new building and hauled to a local stockpile. Excavation of 8,200 cubic yards of earth would be excavated and hauled to the NUMI stockpile. Both stockpiles have (or would have) a silt fence. In addition, the contractor would maintain acceptable slopes on the stockpiles to prevent erosion.

Chemical Use or Storage: An outdoor, 22,000-gallon storage tank for SF<sub>6</sub> would be located immediately to the north of the new MI-31 Building. Transfer lines from this tank to the pelletron would be below grade. SF<sub>6</sub> is currently used at the Fermilab's LINAC as a dielectric for power applications. It would be used for the same purpose at the pelletron. SF<sub>6</sub> is not a regulated air contaminant under the Clean Air Act. SF<sub>6</sub> is an extremely stable, chemically inert, nonflammable nontoxic, noncorrosive gas and is noncondensable at low temperatures. Since SF<sub>6</sub> is heavier than air and can displace oxygen, it is a health hazard. For this reason, it is considered a hazardous substance according to Emergency Planning and Community Right-to-Know (EPCRA) Regulations (40 CFR Part 370.2). The EPCRA reportable threshold is 10,000 pounds and the capacity of both tanks combined is only 7,500 pounds. The SF<sub>6</sub> would be continually recycled and reused. A ventilation system and floor sensors are being integrated into the design as safety measures.

There is the potential for generating toxic decomposition products in the SF<sub>6</sub> gas if there is the presence of moist air and electrical discharges occur in the pelletron. Over the past year of operation at the Wide Band Lab, the amount of moist air contamination found within the SF<sub>6</sub> gas supply has been less than 0.02% by mass. Toxic decomposition products with concentration level include, SOF<sub>2</sub> (0.005%), HF (0.01%), SOF<sub>4</sub> (0.00085%), SO<sub>2</sub>F<sub>2</sub> (0.00006%), and SO<sub>2</sub> (0.00002%). A recirculation system is incorporated in the pelletron system that continuously filters, dries and cools the SF<sub>6</sub> gas. The moist air and toxins are

absorbed in the dryer of the recirculation system, which contains activated alumina. The alumina is reactivated periodically.

Liquid Effluent: Liquid effluents from the 5,000-gallon holding tank for sanitary sewage would be emptied by a commercial vehicle designed for such a purpose. It would be scheduled for once-a-month pickup service or for more/less frequency as required.

Radiation Exposure: During construction of the building, adequate shielding from the Main Injector Ring would be maintained at all times. The connecting concrete enclosure would be constructed during a period when the accelerator would not be operating for an extended period of time. During excavation for this connecting enclosure, there is a possibility that radioactive soils located near the Main Injector Ring Enclosure wall and ceiling may be encountered. At this time the soils would be continuously surveyed to determine if they are contaminated. If radioactive soil is detected, that soil would be placed into a separate pile nearby the excavation. A conservative estimate of the soil that might be radioactive at the location of this excavation is about 14 cubic yards. When this excavation is backfilled the contaminated soil would be placed adjacent to the wall of the Main Injector Ring Enclosure and the elevation and coordinates recorded for future reference. (Note: At other recent projects requiring soils near the Main Injector Ring to be excavated, it has been found that the soil was minimally radioactive or not at all.)

Upon completion of this project, interlocked gates would protect personnel from entering radiation areas. The pelletron would produce only x-rays during operation. The affected areas would be shielded and equipped with interlocks, ensuring that exposures are maintained within the limits specified in the Fermilab Radcon Manual. No materials, air, or groundwater would be activated and there would be no exposure to the public.

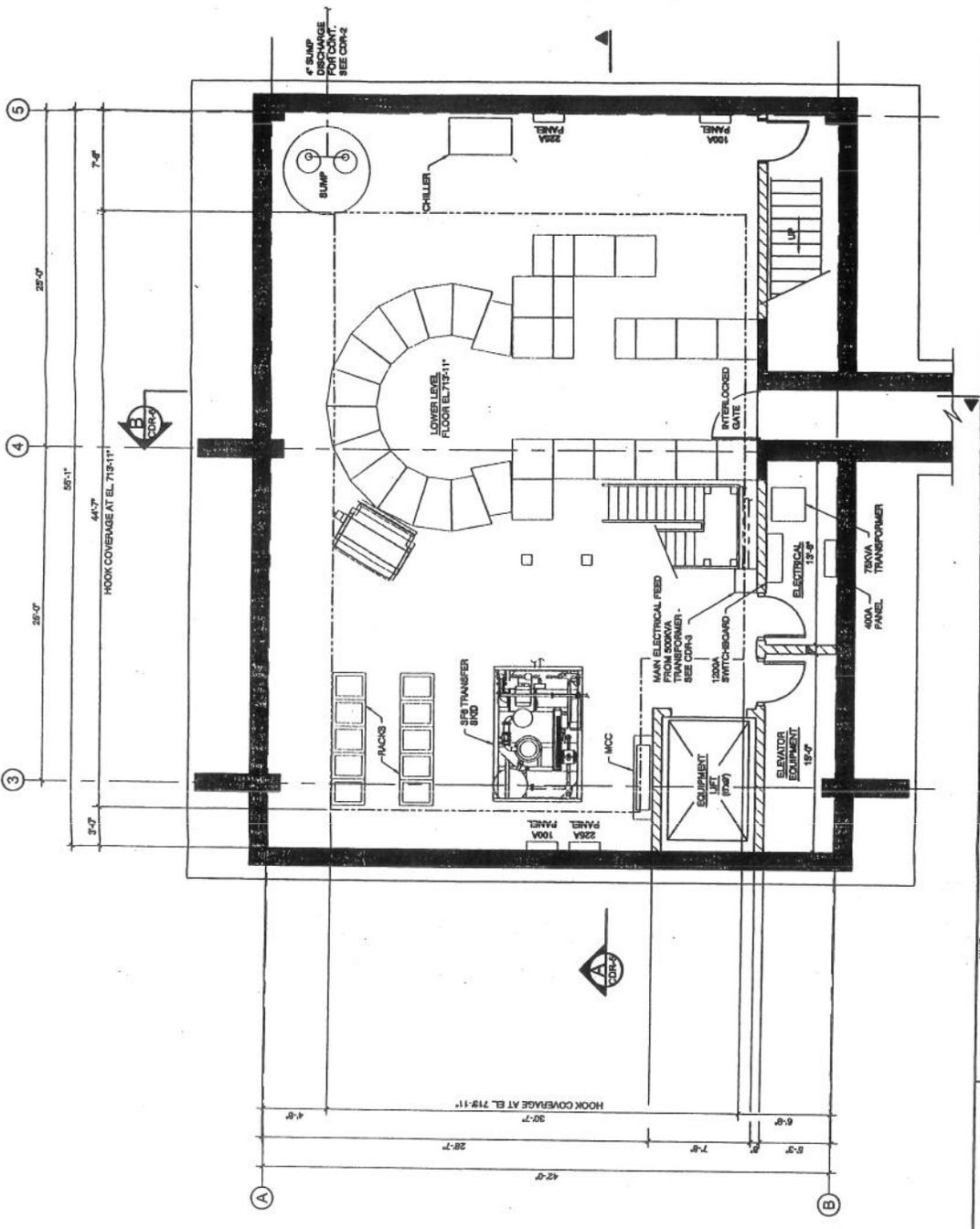
Personnel in the MI-31 Building itself would be shielded from accidental beam loss in the Main Injector by installing an adequate amount of steel shielding at the east end of the connection tunnel near the Main Injector Ring Enclosure and an interlocked gate at the tunnel's west end to prevent access. Thus, personnel would be protected by both distance and shielding.



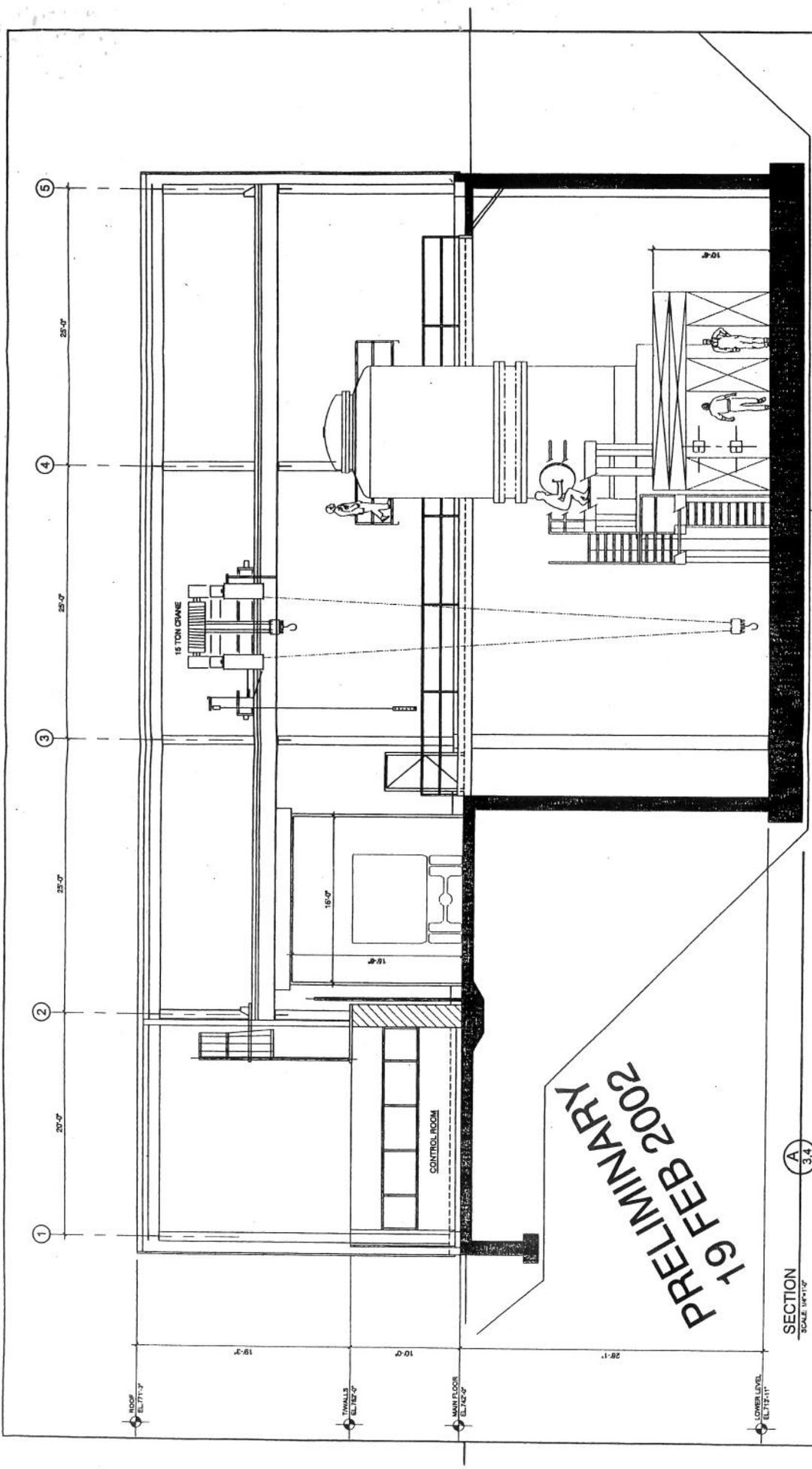




PRELIMINARY  
19 FEB 2002



		<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> <small>UNITED STATES DEPARTMENT OF ENERGY</small>	
<b>MI-31 E-COOL</b> <b>LOWER LEVEL FLOOR PLAN</b>		<b>CDR-4</b> REV.	
		<b>SCALE:</b> <small>1/4" = 1'-0"</small> <small>1" = 12'-0"</small>	
DESIGNED	DATE	NAME	DATE
DRAWN			
CHECKED			
APPROVED			
REVISIONS			



PRELIMINARY  
19 FEB 2002

SECTION  
SCALE 1/4"=1'-0"

A 3.4

<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> <small>UNITED STATES DEPARTMENT OF ENERGY</small>		<b>MI-31 E-COOL</b> <b>BUILDING SECTION</b>		<b>CDR-5</b> <small>REV.</small>
		<b>6-6-43</b> <small>DRAWING NO.</small>		
<b>SCALE:</b> 1/4"=1'-0" <small>SCALE</small>				
DESIGNED	DATE	NAME	DATE	
DRAWN				
CHECKED				
APPROVED				
SUBMITTED				
REV.	DATE	DESCRIPTION	REVISIONS	



## FERMILAB ENVIRONMENTAL EVALUATION NOTIFICATION FORM

Project/Activity Title MI-31 E-Cool

ES&H Tracking Number 01018

Funding Source AIP

Fermilab Project Manager Sergei Nagaitsev

Signature S. Nagaitsev

Date 04/08/02

Fermilab NEPA Reviewer Teri L. Dykhuis

Signature Teri L. Dykhuis

Date 04/11/02

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**IV. NEPA Recommendation**

Fermilab has reviewed this proposed action and conclude that the appropriate level of NEPA determination is a Categorical Exclusion. The conclusion is based on the proposed action meeting the applicable requirements in DOE's NEPA Implementation Procedures, 10 CFR 1021, Subpart D, Appendix B1.15, and B3.10 (beam energy would be approximately 4.4 MeV).

**V. DOE/CH-FRMI Group NEPA Coordinator Review**

Concurrence with the recommendation for determination:

NEPA Coordinator reviewer J. P. Cooper  
 Signature Jonathan P. Cooper  
 Date 4/18/2002

Fermi Group Manager Jane Monhart  
 Signature Jane L. Monhart  
 Date 4/18/02

**VI. Comments on checked items in section III.**

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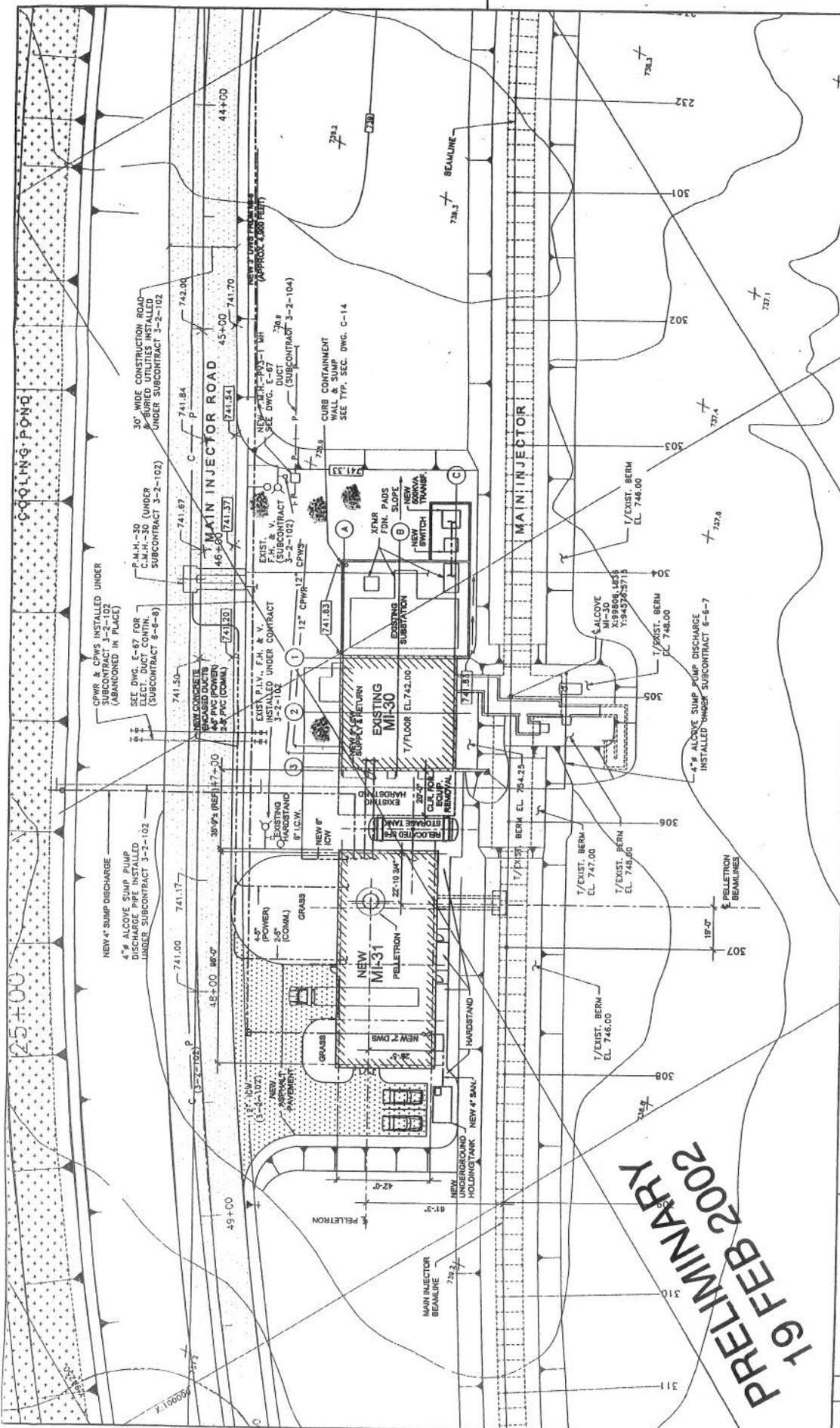
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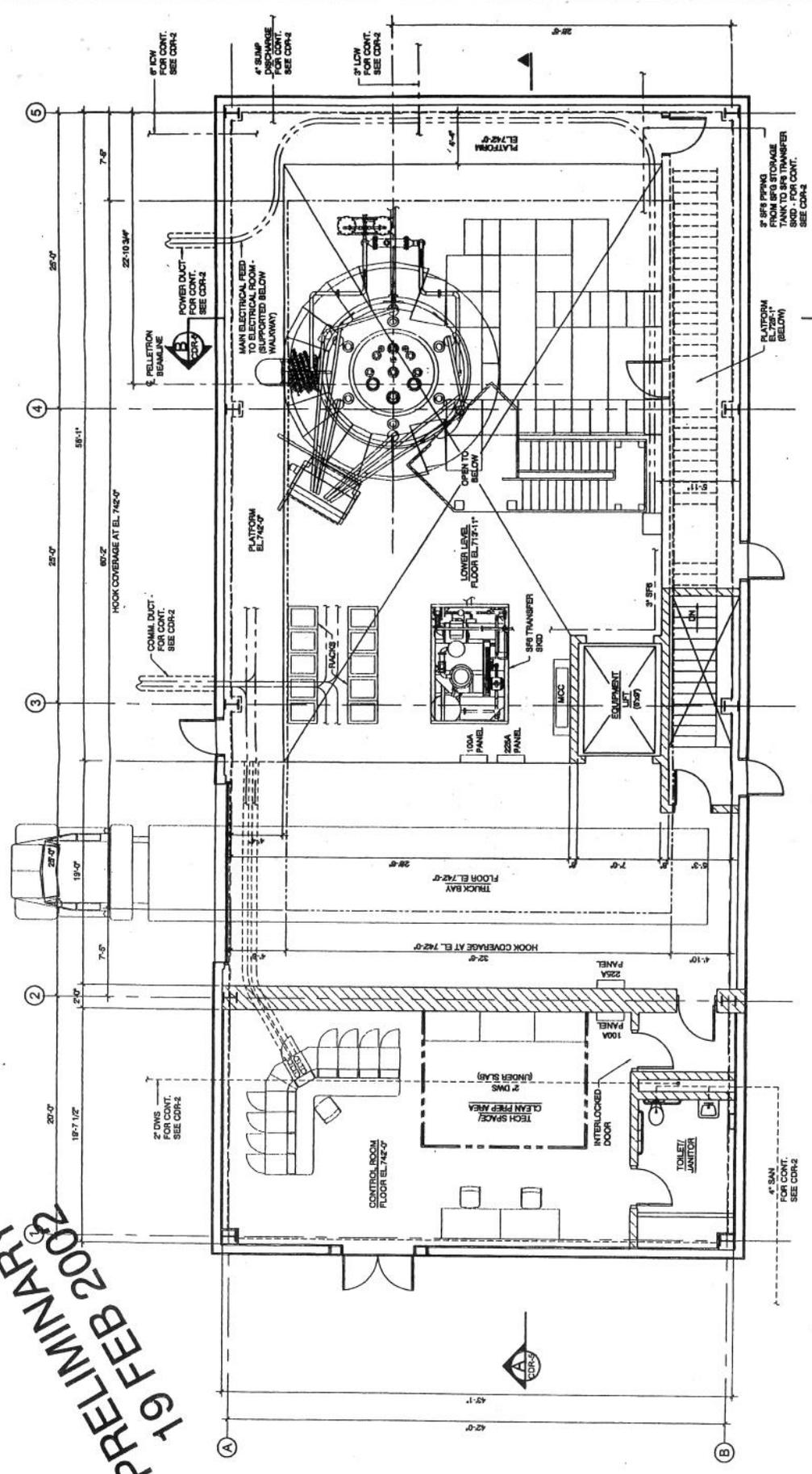




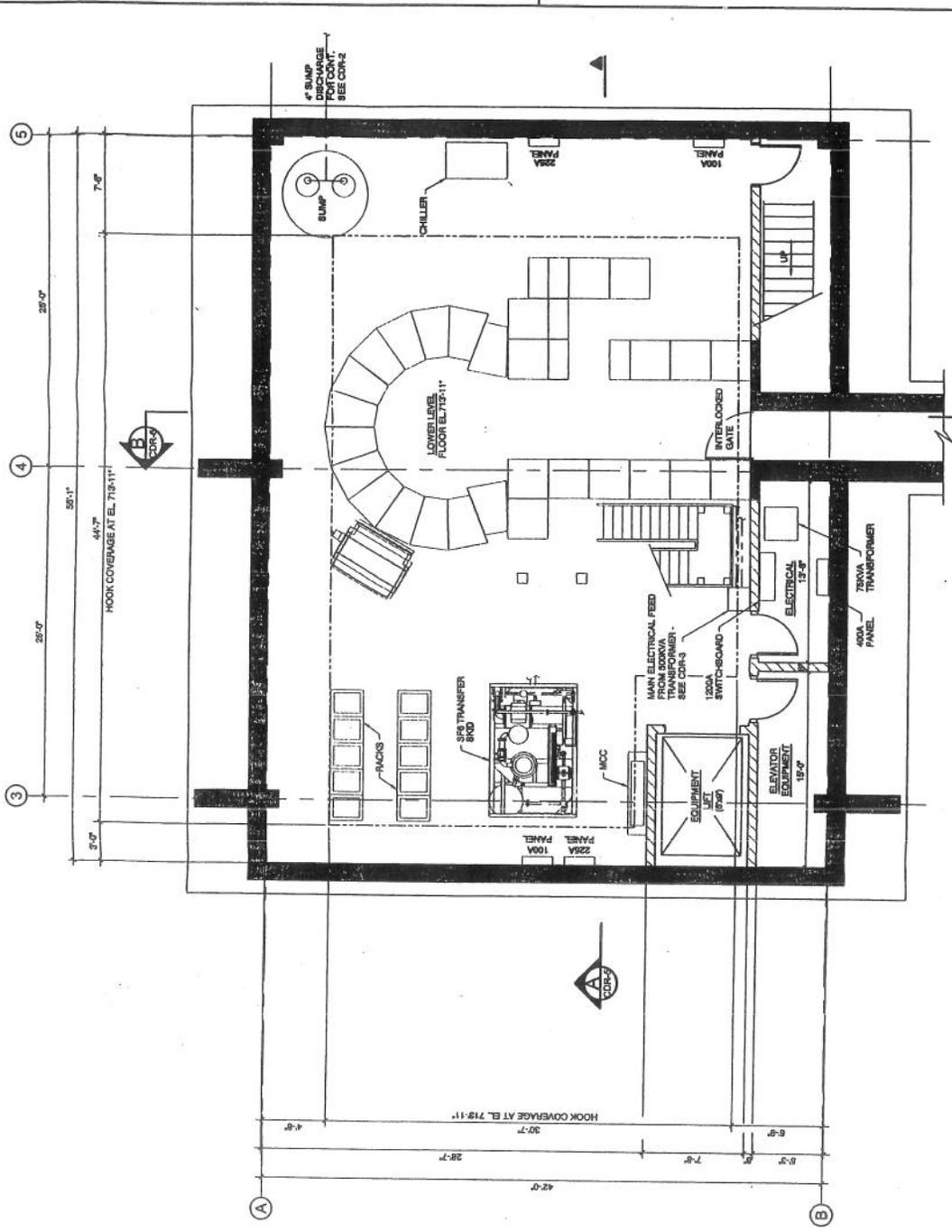
PRELIMINARY  
19 FEB 2002

<b>FERMILAB NATIONAL ACCELERATOR LABORATORY</b> <small>UNITED STATES DEPARTMENT OF ENERGY</small>	
<b>MI-31 E-COOL</b> <b>SITE PLAN</b>	
DRAWING NO. <b>6-6-43</b>	CDR-2 REV.
DESIGNED: _____ DRAWN: _____ CHECKED: _____ APPROVED: _____ SUBMITTED: _____	DATE: _____ NAME: _____
SCALE: 1" = 30'-0" SCALE 	

**PRELIMINARY**  
**19 FEB 2002**

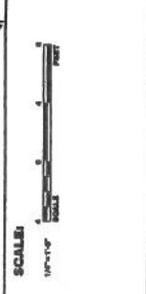


<b>FERMI NATIONAL ACCELERATOR LABORATORY</b> UNITED STATES DEPARTMENT OF ENERGY			<b>MI-31 E-COOL</b> <b>MAIN LEVEL FLOOR PLAN</b>	DRAWING NO. <b>6-6-43</b> REV.
SCALE: 1/4" = 1'-0" 1" = 12'-0"				
		DESIGNED: _____ DRAWN: _____ CHECKED: _____ APPROVED: _____ SUBMITTED: _____		
REV.	DATE	DESCRIPTIONS/REVISIONS		



PRELIMINARY  
19 FEB 2002

**FERMI NATIONAL ACCELERATOR LABORATORY**  
 UNITED STATES DEPARTMENT OF ENERGY  
**MI-31 E-COOL**  
**LOWER LEVEL FLOOR PLAN**  
 DRAWING NO. **6-6-43** REV.



DESIGNED	DATE

NAME	DATE

DESIGNED	DRAWN	CHECKED	APPROVED	SUBMITTED

REV.	DATE	DESCRIPTION	REVISIONS



