APPLICATION FOR LICENSE

TO RECEIVE, POSSESS, REPACKAGE

FOR SHIPMENT, TRANSFER, AND STORE

SPECIAL NUCLEAR MATERIALS

THE DETROIT EDISON COMPANY

Enrico Fermi Atomic Power Plant
Unit 2

Docket No. 50-341

PREFACE

The Detroit Edison Company (Detroit Edison) is incorporated in the States of New York and Michigan, with its principal office located at 2000 Second Avenue, Detroit, Michigan. The corporate officers' names and titles are listed in Table 1. All are American citizens and use the same business mailing address: 2000 Second Avenue, Detroit, Michigan, 48226. To the best knowledge of the applicant, Detroit Edison is not owned or controlled in any way by an alien, foreign corporation, or foreign government. Detroit Edison shares ownership of the Fermi 2 facility with two electric cooperatives, Northern Michigan Electric Cooperative, Inc. (Northern) and Wolverine Electric Cooperative, Inc. (Wolverine), who own 11.22 percent and 8.78 percent of Fermi 2, respectively. Both cooperatives are incorporated in the State of Michigan. Northern's business mailing address is: Post Office Box 138, Boyne City, Michigan, 49712, and the address for Wolverine is: Post Office Box 1133, Big Rapids, Michigan, 49301. Their corporate officers are listed in Table 2; all are American citizens. Neither is owned or controlled in any way by an alien, foreign corporation, or foreign government.

Detroit Edison herein presents information in support of an application for a license to receive, possess, repackage for shipment, transfer, and store special nuclear materials and other associated radioactive material. This license is required to receive and store unirradiated fuel assemblies at the Fermi 2 site. The duration of the license is requested as two years from the date of issuance.

Furthermore, Detroit Edison hereby requests an exemption from the requirements contained in 10 CFR 70.24, "Criticality Accident Requirements." Information in support of Detroit Edison's request for an exemption is presented in Section 2.2.5.

The format and content of the following material has been prepared in accordance with Regulatory Guide 3.15, "Standard Format and Content of License Applications for Storage Only of Unirradiated Reactor Fuel and Associated Radioactive Material."

TABLE 1

OFFICERS OF THE DETROIT EDISON COMPANY

William G. Meese
Chairman of the Board and
Chief Executive Officer

Walter J. McCarthy, Jr.
President and Chief Operating Officer

Ernest L. Grove, Jr.
Vice Chairman of the Board

Charles M. Heidel
Executive Vice President - Operations

Robert W. Lundgren
Executive Vice President - Administration

Leon S. Cohan
Senior Vice President and General Counsel

Wayne H. Jens
Vice President - Nuclear Operations

John W. Johnson, Jr.
Vice President - Finance

M. Jane Kay
Vice President - Employee Relations

Frank M. Kehoe
Vice President and Secretary

Claybourne Mitchell, Jr.
Vice President - Planning and Research

Burkhard H. Schneider
Vice President - Divisions

Harry Tauber
Vice President - Engineering and Construction

O. David Whiddon
Vice President - Operations

John C. Kennedy
Treasurer

William A. Basse
Controller

Arnold J. Benes
General Auditor

TABLE 2

OFFICERS OF THE FERMI-2 COOPERATIVES

Northern Michigan Electric Cooperative, Inc.

Truman Cummings, Jr.
Chairman

Wayne B. Nordbeck
Vice Chairman

Melvin Basel
Secretary

Harold Beldo
Treasurer

Wolverine Electric Cooperative, Inc.

Willard Haenke
President

Clare Shull
Vice President

John Tyndall
Secretary

Burton Scott
Treasurer

1.0 GENERAL INFORMATION

1.1 Reactor and Fuel

1. The Enrico Fermi Atomic Power Plant Unit 2 (Fermi 2) is a 1150-MWe BWR facility presently under construction at a site thirty (30) miles southwest of Detroit, Michigan. The Construction Permit was issued on September 26, 1972, in Docket No. 50-341.

2. Fermi 2 will utilize a General Electric prepressurized 8 x 8 fuel assembly with two water rods in a "C-Lattice" configuration. Information on this fuel assembly is given in Section 4.2 of the Fermi 2 FSAR, and generally described in General Electric (GE) Topical Report NEDO-20944, "BWR/4 and BWR/5 Fuel Design."

   A fuel bundle contains 62 fuel rods and two water rods clad in Zircaloy-2 which are spaced and supported in a square 8 x 8 array by the lower and upper tie plates which are fabricated from stainless steel (SS-304). Seven (7) fuel spacers are located along the length of the assembly to provide lateral support and spacing. The fuel spacers are fabricated from Zircaloy-4 with Inconel-X springs. The fuel bundle is enclosed by a Zircaloy-4 fuel channel which serves to: separate parallel flow paths, guide the control rods, and provide rigidity for the bundle.

   Table 1-1 contains the significant fuel data associated with the Fermi 2 fuel. Figure 1-1 shows a typical "C-Lattice" fuel arrangement.

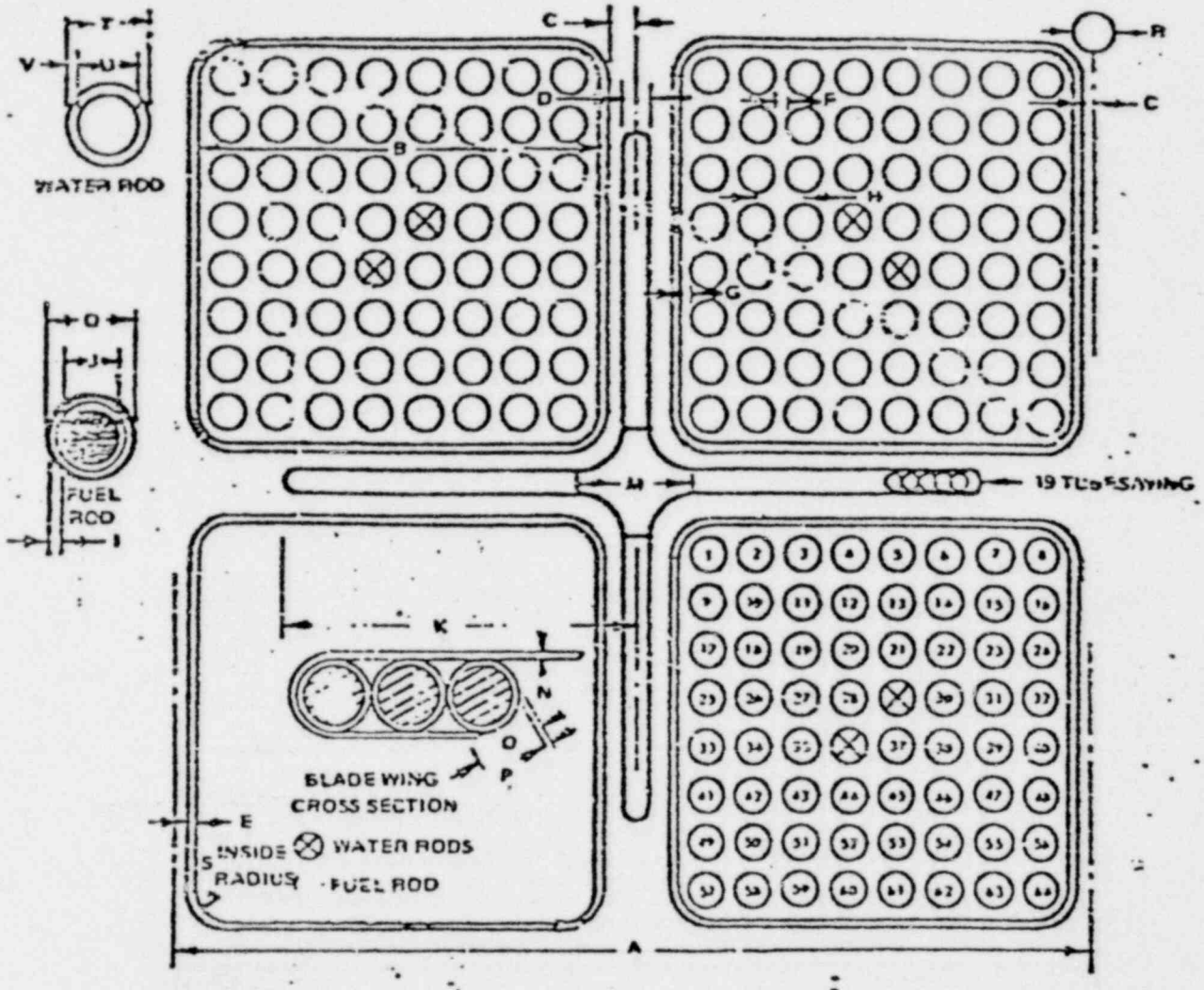
3. The data shown in Table 1-2 describe the fuel bundle types that will be received at the Fermi 2 site.

TABLE 1-1

Fermi 2
General Fuel Data

Fuel Assembly Data	
Overall Length, in.	176.16
Nominal Active Fuel Length, in.	150.0*
Fuel Rod Pitch, in.	0.640
Fuel Rod Spacing, in.	0.157
Fuel Channel Wall Thickness, in.	0.100
Channel Width (inside), in.	5.278
Fuel Rod Data	
Outside Diameter, in.	0.483
Cladding Inside Diameter, in.	0.419
Cladding Thickness, in.	0.032
Fission Gas Plenum Length, in.	9.48
Pellet Immersion Density, %TD	95.0
Pellet Outside Diameter, in.	0.410
Pellet Length, in.	0.410
Water Rod Data	
Outside Diameter, in.	0.591
Inside Diameter, in.	0.531

* Includes six inches of natural uranium at the top and bottom of the fuel column.



DIM IDENT	A	B	C	D	E	F	G	H
DIM INCHES	12.0	5.278	0.261	0.250	0.100	0.157	0.1575	0.640

DIM IDENT	I	J	K	L	M	N	O	P
DIM INCHES	0.032	0.410	4.875		1.562	0.030	0.188	0.025

DIM IDENT	Q	R	S	T	U	V
DIM INCHES	0.483	1.062	0.330	0.591	0.531	0.030

FIGURE 1-1

C-Lattice Dimensions

TABLE 1-2

Fermi 2

Fuel Assembly Types

Designation	1	2	3
Number	92.0	240.0	432.0
Enrichment (w/o U-235) Core Average = 1.88	.711	1.761	2.191
UO_2 (kg)	207.58	207.31	207.00
U (kg)	182.96	182.73	182.45
U235 (kg)	1.30	3.22	4.00
$Gd_2 0_3$ (kg)	0.0	.20	.442
Total weight of assembly with channel (lbs.)	680.0	680.0	680.0
Total weight of assembly without channel (lbs.)	600.0	600.0	600.0

4. Based upon the data in Table 1-2, a total of 764 assemblies containing approximately 2620 kg of U-235 will be received. Detroit Edison requests a license for 3000 kg of U-235 to allow for manufacturing tolerances and for the receipt of spare assemblies if required.

1.2 Storage Conditions

1. New fuel will be stored in either the new fuel storage vault, which has a capacity of 230 fuel assemblies, or the fuel storage pool, which has a nominal capacity of 2300 fuel assemblies utilizing high-density spent fuel racks. Figure 9.1-3 (Sheet 2 of 2) of the Fermi 2 FSAR shows the location of the new fuel storage vault and the fuel storage pool.

2. Normal construction activities required to prepare the Fermi 2 facility for initial operation will be undertaken in the vicinity of the fuel storage locations. Loads that are required to be moved over the fuel storage locations will be handled using the reactor building crane. The reactor building crane, described in the Fermi 2 FSAR, Subsection 9.1.4.2.1, utilizes a single-failure-proof design. The new fuel storage vault shield plugs will be installed when access to the new fuel storage vault is not required.

3. The following structures and components are associated with moving or storing new fuel:

   a. New Fuel Storage Vault

      The seismic Category I new fuel storage vault, as described in the Fermi 2 FSAR, Subsection 9.1.1.2.1, provides dry storage for 230 new fuel assemblies in 23 seismic Category I new fuel storage racks. The new fuel storage racks are designed to resist an uplift force of 6,000 pounds. The vault is closed at the top by a segmented shield plug twelve (12) inches thick with redundant lifting rings. Dry storage is insured by the slope of the vault floor which leads to an open drain.

b. Fuel Storage Pool

The seismic Category I fuel storage pool is described in Subsection 9.1.2.2.1 of the Fermi 2 FSAR. The fuel storage pool has an inside length of 34 feet an inside width of 40 feet and is 39 feet, one inch deep. The pool is constructed of poured, reinforced concrete with a welded stainless steel liner and is separated from the refueling cavities by two self-sealing gates with a monitored drain between them. The water level in the pool is maintained at an elevation of 683 feet, six inches by scuppers. Water level, temperature, and purity are maintained by the fuel pool cooling and cleanup system which is described in Subsection 9.1.3 of the Fermi 2 FSAR. At the option of Detroit Edison, new fuel may be stored in the fuel storage pool without water in the pool.

The high-density spent fuel racks are described in Appendix 9C of the Fermi 2 FSAR. These seismic Category I racks are designed to withstand an upward force equal to the maximum capacity of the refueling bridge and a horizontal force of 1,000 pounds applied at the top of the racks, and will withstand the impact of a falling object with a kinetic energy of 2,000 ft-lbs. In addition to fuel storage, the fuel storage pool has areas for storage of control rods, fuel-related maintenance such as channeling, and storage of a spent fuel cask.

c. Fuel Handling Cranes

Subsection 9.1.4.3.1 of the Fermi 2 FSAR describes the arrival and handling of new fuel at the Fermi 2 site. During new fuel receiving operations (uncrating, inspection, and insertion in the fuel storage pool), the fuel will be handled by the reactor building auxiliary hoist, the new fuel handling crane, or a mobile crane. New fuel is transferred between the new fuel storage vault and the fuel storage pool by the auxiliary hoist. This crane will be modified to have a maximum capacity less than the maximum uplift resistance of the new fuel storage racks.

d. Fuel Inspection Stand

The fuel inspection stand is described in Subsection 9.1.4.2.2 of the Fermi 2 FSAR and is typical of the type of stand supplied by General Electric. The stand will accommodate two (2) fuel assemblies.

4. The fire protection analysis for Fermi 2 is described in Appendix 9B to the Fermi 2 FSAR. The refueling floor, where the new fuel will be received and stored, is located on the fifth floor of the reactor building at elevation 684 feet, six inches. Subsection 9B.4.1.10.3 of the Fermi 2 FSAR describes the fire detection and fire suppression equipment which is shown in Figure 6A721-2409 of the Fermi 2 FSAR. Subsection 9B.4.1.10.3 of the Fermi 2 FSAR concludes that, "The objective for this fire zone (Zone 9, fifth floor of the reactor building) is to prevent the spread of a fire in this zone to another fire zone. This objective is achieved through low zone fire loading, and the provision of an early warning detection system, manual hose and portable fire extinguishers."

5. A detailed security plan is on file with the NRC. The general provisions for preventing unauthorized access to the fuel storage areas are described in Subsection 13.7.2.1 of the Fermi 2 FSAR. All fuel storage areas are within a vital area. Subsection 13.7.2.1 states the following with regard to such areas: "Personnel access requirements to vital buildings, rooms, and spaces, including the main control room and containment, are considered individually and covered by written procedures. Access control is established and controlled by procedures for entrances to those buildings. Portal protection of vital buildings and structures is provided by redundant locking devices. All alarms are self-checking and tamper-indicating. Surveillance of vital areas is accomplished by periodic patrol authorized by operating personnel."

1.3 Physical Protection

This section is not applicable to Fermi 2 since the fuel is enriched to less than 20% in U-235, and contains no U-233 or plutonium.

1.4 Transfer of Special Nuclear Materials

Detroit Edison has contractual agreements with General Electric to deliver the new fuel to the Fermi 2 site. General Electric typically ships the fuel by enclosed truck in three (3) shipments per week, with sixteen (16) containers per shipment (32 fuel bundles).

1.5 Financial Protection and Indemnity

Because Detroit Edison is an applicant other than a Federal agency or a nonprofit educational institution, Detroit Edison comes under the requirements of Title 10 CFR, Part 140, Subpart B, Section 140.13, which requires a holder of a construction permit, who is also a holder of a license under 10 CFR Part 70, authorizing ownership, possession, and storage of Special Nuclear Material, to have and maintain financial protection in the amount of $1,000,000. Proof of financial protection should meet the requirements of 10 CFR Part 140, Section 140.15.

Detroit Edison intends to obtain a policy of liability insurance in the amount of $1,000,000 which is an acceptable form of financial protection as stated in 10 CFR Part 140, Section 140.14, "Types of Financial Protection." The policy will be effective prior to receipt of fuel at the Fermi 2 site. Proof of financial protection will be supplied to the NRC as a copy of the liability policy, together with a certificate of authenticity provided by the insurer, as provided by 10 CFR Part 140, Section 140.15 (a) (1).

2.0 HEALTH AND SAFETY

2.1 Radiation Control

1. The radiation protection program is described in Section 12.3 of the Fermi 2 FSAR. The plant staff organization is shown in Figure 13.1-2 of the Fermi 2 FSAR. The radiation protection program is under the direction of the Rad-Chem Engineer, Mr. Gary W. Bethke, whose training and experience are summarized in Subsection 12.4.3.1 of the Fermi 2 FSAR. The daily health physics activities are under the direction of the Health Physicist, Mr. Paul Lavely, who reports to the Rad-Chem Engineer. Mr. Lavely's experience and training are described in Subsection 13.1.3.3.12 of the Fermi 2 FSAR.

2. Subsection 12.4.2 of the Fermi 2 FSAR describes the receipt of radioactive materials, including fuel. Both portable survey monitors and smear counters will be used to check for contamination. A detailed plant procedure for receipt of radioactive material, including fuel, is under development. If contamination is detected, appropriate action will be taken in accordance with plant procedures. These procedures are presently under development. Appendix 13A of the Fermi 2 FSAR describes various emergency responses, including Local Room Evacuation.

   Various monitoring systems are located in the plant which provide local and remote indications of contamination. These systems are described below:

   a. The area radiation monitor system (ARMS), sensitive to gamma radiation from 80keV to 7MeV, is described in Subsection 12.1.4 of the Fermi 2 FSAR. An ARMS monitor is located on the refueling bridge. Alarms sound both locally and in the control room.

   b. Fixed continuous airborne monitors (CAMs) are described in Subsection 11.4.2 of the Fermi 2 FSAR. The reactor building monitor is of the B-Scint type.

c. Portable CAMs are described in Subsection 12.2.4.7 of the Fermi 2 FSAR. These are beta-gamma sensitive.

d. Air sample counters are described in Subsection 12.2.4.7 of the Fermi 2 FSAR. Filter papers and planchets are counted with an internal proportional counter to detect alpha-and-beta emitting particles.

3. Portable survey instruments are calibrated quarterly when in use, as described in Subsection 12.3.2.2.4 of the Fermi 2 FSAR. The ARMS monitors are calibrated with portable calibration units on a quarterly basis as described in Subsection 12.1.4.6. The fixed and portable CAMs are calibrated semi-annually as described in Subsections 11.4.4.2 and 11.2.4.8, respectively. The portable air samples are calibrated quarterly as described in Subsection 12.2.4.8.

Subsection 12.3.2.4 of the Fermi 2 FSAR describes the calibration room where the source wells and other calibration equipment are located. The calibration of sources and instruments is described in Subsection 12.3.2 of the Fermi 2 FSAR.

2.2 Nuclear Criticality Safety

1. The fuel may be temporarily stored in the shipping containers. These containers are described in Subsection 9.1.4.3.1 of the Fermi 2 FSAR. The container is a General Electric Model RA Series 3 container licensed under NRC Certification #2986, Rev. 1., Docket #71-4986. Each RA-3 container holds a maximum of two assemblies and is designed to prevent criticality even under the most adverse conditions.

2. It is the intent of Detroit Edison to move the new fuel to the new fuel storage vault and/or the fuel storage pool as expeditiously as possible.

The safety evaluation for the new fuel storage vault is contained in Subsection 9.1.1.3 of the Fermi 2 FSAR. The new fuel storage vault is designed as a dry storage facility that does not rely on neutron poisons to

maintain K_{eff}. The design of the fuel racks is such that proper spacing and lateral support for the fuel is maintained. Under dry conditions, a K_{eff} of $<.90$ is maintained. Under flooded conditions, in the most reactive configuration, a $K_{eff} < .95$ would be maintained.

The fuel storage pool can provide dry or wet storage. The fuel storage racks contain a neutron poisoning material sandwiched between the stainless steel plates of the storage racks. The racks are constructed so as to provide for rigid spacing of the fuel assemblies to maintain $K_{eff} < .95$ under the most reactive, water-flooded conditions.

3. As discussed in item 2 above, evaluation of fuel storage locations will be made assuming water flooding, and the most reactive configuration with a resulting $K_{eff} \leq .95$.

4. In accordance with GE recommendations on the handling of new fuel, no more than three (3) fuel assemblies are to be outside normal storage locations or the fuel shipping containers; an edge-to-edge spacing of twelve (12) inches or more shall be maintained from all other fuel. It has been determined that no possible orientation of these three remaining assemblies could create a critical configuration.

5. The design of the new fuel storage facility and procedures for handling the fuel preclude the achievement of criticality. Based on these measures, Detroit Edison requests an exemption from the requirements of 10 CFR Section 70.24.

2.3 Accident Analysis

Since criticality is precluded, potential accidents could result from mechanical damage to a fuel assembly as a result of dropping, or by object falling into the new fuel storage vault or fuel storage pool. Even in the event of mechanical damage, local contamination would not be extensive since the fuel is not irradiated. Any damaged assembly would be removed from storage and packaged under controls associated with the radiation protection program for return to the manufacturer.

The design features of the fuel racks in the new fuel storage vault and the fuel storage pool make concurrent damage to several fuel assemblies unlikely. Fermi 2 FSAR Subsection 9.1.1.3 provides a safety evaluation for the new fuel storage vault while an evaluation of the fuel storage pool is contained in Subsection 9.1.2.3. The new fuel storage vault and fuel storage pool fuel racks are securely restrained from accidental uplift resulting from crane use. In addition, the fuel racks in the new fuel storage vault and the fuel storage pool will withstand the impact resulting from a falling weight possessing 2,000 ft-lbs. of kinetic energy.

3.0 OTHER MATERIALS REQUIRING NRC LICENSE

Detroit Edison is currently the holder of Material License No. 21-02335-10, as amended, which allows receipt and possession of the sealed sources and instruments itemized in the license and subsequent amendments.

THE DETROIT EDISON COMPANY

By: C. M. Heidel

Charles M. Heidel
Executive Vice President - Operations

February 28, 1980