# APPLICATION FOR LICENSE
# TO RECEIVE, POSSESS, REPACKAGE
# FOR SHIPMENT, TRANSFER, AND STORE
# SPECIAL NUCLEAR MATERIALS

Revision 2

February 1983

THE DETROIT EDISON COMPANY

Enrico Fermi Atomic Power Plant
Unit 2

Docket No. 50-341

## PREFACE

The Detroit Edison Company (Detroit Edison or Applicant) is incorporated in the State of 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. The respective Boards of Directors of Northern and Wolverine recently approved an Agreement and Plan of Reorganization whereby a statutory merger of the two companies will occur and a new entity will be formed: "Wolverine Power Supply Cooperative, Inc." ("WPSC"). The aspects of the proposed merger are set forth in detail in Applicants' Application to Amend Construction Permit No. CPPR-87, filed with the Commission on August 13, 1982. The proposed merger will not affect any activity for which this license is being requested.

TABLE 1

OFFICERS OF THE DETROIT EDISON COMPANY

Walter J. McCarthy, Jr.
Chairman of the Board and
Chief Executive Officer

Charles M. Heidel
President and Chief Operating Officer

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

Leon S. Cohan
Senior Vice President and General Counsel

Burkhard H. Schneider
Group Vice President

Harry Tauber
Group Vice President

Willard R. Holland
Vice President

Wayne H. Jens
Vice President - Nuclear Operations

John W. Johnson, Jr.
Vice President - Finance

M. Jane Kay
Vice President - Administration

Robert C. Kirkby
Vice President - Engineering and Construction

John E. Lobbia
Vice President - Financial Services

Claybourne Mitchell, Jr.
Vice President - Planning and Research

James B. Oliver
Vice President - Employee Relations

William K. Pence
Vice President - Operations

Donald J. Pizzimenti
Vice President - Community and Governmental Affairs

O. David Whiddon
Vice President - Corporate Planning

TABLE 2

OFFICERS OF THE DETROIT EDISON COMPANY CONT'D.)

Leslie L. Loomans
Treasurer

Ronald W. Gresens
Controller

Arnold J. Benes
General Auditor

Kathryn L. Westman
Corporate Secretary

TABLE 2

OFFICERS OF THE FERMI-2 COOPERATIVES

Northern Michigan Electric Cooperative, Inc.

Wayne B. Nordbeck,
President

Melvin Basel,
Vice President

Howard Carson,
Secretary,

Barrie Lightfoot,
Treasurer

Wolverine Electric Cooperative, Inc.

Willard Haenke,
President

Clare Shull,
Vice President

Donald Harmon,
Secretary

Burton Scott,
Treasurer

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 have 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."

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. Construction Permit CPPR-87 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. While in the reactor the fuel bundle will be enclosed by a Zircaloy-4 fuel channel which serves to: separate parallel flow paths, guide the control rods, and provide rigidity for the assembly.

   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.

4. Based upon the data in Table 1-2, a total of 764 bundles containing approximately 2620 kg of U-235 will be received. Detroit Edison requests a license for 3000 kg of U-235 with a maximum pellet enrichment of 4.00 ± 0.05 w/o U-235 to allow for manufacturing tolerances and for the receipt of spare bundles if required. This license is for a maximum nominal bundle enrichment of 3.0 w/o U-235.

## 1.2 Storage Conditions

1. New fuel will be stored uncrated in the new fuel storage vault or the spent fuel storage pool. The new fuel storage vault has a capacity of 230 fuel assemblies; the spent fuel storage pool with high-density racks has a capacity of 2383 fuel assemblies. Figure 9.1-3 (sheet 2 of 2) of the Fermi 2 FSAR shows the location of the new fuel storage vault and the spent fuel storage pool.

The wooden overpacks will not be used for long-term storage. However, new fuel may be stored in the inner metal RA series shipping containers. The dryer-separator pool adjacent to the new fuel storage vault and the spent fuel storage pool, or other open areas on the fifth floor (the refueling floor) of the Reactor Building may be used for storage of the shipping container. The location of these areas is shown in Figure 9.1-3 (sheet 2 of 2) and Figure 1.2-17 of the Fermi 2 FSAR. Although there is a remote chance that part of the dryer-separator pool may become flooded, criticality in this configuration could not be obtained.

This is confirmed in General Electric's RA application submittal which was approved by the NRC in March, 1982.

Refer to: General Electric SNM-1097
License Application, February 24, 1982
Docket No. 71-4986
NRC Certificate of Compliance 4986
Amendment T-15

New fuel may also be stored at Fermi 1 in Warehouse A. New fuel stored in this area will also be kept in the inner metal shipping containers. Figure 1-2 shows the location of the storage area. Figure 1-3 shows the features of Warehouse A.

The new fuel shipping containers are described in FSAR Section 9.1.4.3.1 and are a standard GE offering. Fuel stored in the inner metal shipping containers will be limited to a stack height of four containers. This will be the only limitation on the array size for fuel stored in the inner metal containers.

Occasionally, it may be necessary to "store" new fuel on the transporting vehicle for short periods (less than 24 hours). For example, this might be necessary if a shipment arrived during non-working hours. If this need arises, the vehicle will be parked and locked, and a member of the security force will be posted in the vicinity of the vehicle to monitor access to the vehicle.

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 in the Reactor Building. Loads that are required to be moved over these 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. <u>New Fuel Storage Vault</u>

      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.

As indicated in the FSAR, the design of the new fuel vault ensures that $k_{eff}$ is maintained less than 0.95 if the new fuel vault is accidently flooded. There is a 4" curb around the new fuel vault to prevent flooding.

Inadvertent criticality due to optimum moderation will be mitigated by the procedural controls recommended in General Electric SIL-152. Their controls include keeping the shield plugs installed when access to the new fuel storage vault is not required.

The only identified sources of water on this level are the fire suppression system and the cask washdown connection. The latter is a connection to a system that, when operating, provides a source of high pressure water for cask cleaning. This system is normally shutdown and not pressurized.

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 40 feet, an inside width of 34 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 Section 9.1.2 of the Fermi 2 FSAR. These seismic Category I racks are designed to withstand an upward force of 1,200 pounds, 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.

The spent fuel rack is composed of boraflex absorber material sandwiched between two 0.075 $\pm$0.004 inch stainless steel plates. The fuel assemblies are centrally located in each storage cell on a nominal lattice spacing of $6.22 \begin{smallmatrix} +0.125 \\ -0.000 \end{smallmatrix}$ inches.
The elemental composition of the neutron poison boraflex to be used in the Spent Fuel Racks can be divided into two categories, the polymeric matrix system and the boron carbide ($B_4C$) power. $B_4C$ loadings of 40 wt. % will be

used to assure the specified $B^{10}$ content (0.014 grams/$cm^2$ areal density. Nominal width of the boraflex absorber is 5.91 ±0.0625 inches. These boraflex plates are 152 inches long, extending 1 inch above and 1 inch below the spent fuel rods.

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. Dryer-Separator Pool

The dryer-separator pool is described in Section 3.8.4.1.1 and other parts of Section 3.8 of the Fermi 2 FSAR, and is very similar in design to the spent fuel storage pool. New fuel will be stored in its inner metal containers in this area.

d. Fermi 1 Warehouse A

Warehouse A is a conventional, one-story, metal-sided building with a concrete slab floor. Detroit Edison does not plan to store anything else in this building when new fuel is stored here. Fuel will be stored in its inner metal shipping containers. Detroit Edison expects to move fuel into the warehouse by forklift.

e. 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.

f. 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 buiding at elevation 684 feet, six inches. Subsection 9B.4.1.10 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 [illegible], and the provision of an early warning detection sy[illegible]m, manual hose and portable fire extinguishers." Fire protection in Fermi 1 Warehouse A is provided by a dry pipe sprinkler system and by 2 portable dry chemical extinguishers kept in the building.

5 A security plan is on file with the NRC covering security measures that will be in place during operation. A security plan describing the protection of new fuel is attached.

1.3 <u>Physical Protection</u>

Fuel for Fermi 2 will be enriched to less than 20% in U-235, and will contain no U-233 or plutonium. Therefore, no further information is required in this section of the application.

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 either three (3) shipments or five (5) 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).

1.6 Safety Related Records

1. Plant records will be maintained in accordance with Section 13.6 of the Fermi 2 FSAR. Fuel transfer, receipt or inventory records will be maintained for the life of the plant.

1.7 Radioactive Waste

1. Presently radioactive waste is generated by activities resulting from the use of radioactive materials under our present Byproduct Material License. This waste is processed by a licensed vendor and disposed of at an approved burial ground by the vendor.

2. Waste generated from the handling and use of special nuclear material will be processed onsite, stored, and disposed of as authorized pursuant to 10 CFR 20.301.

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 |

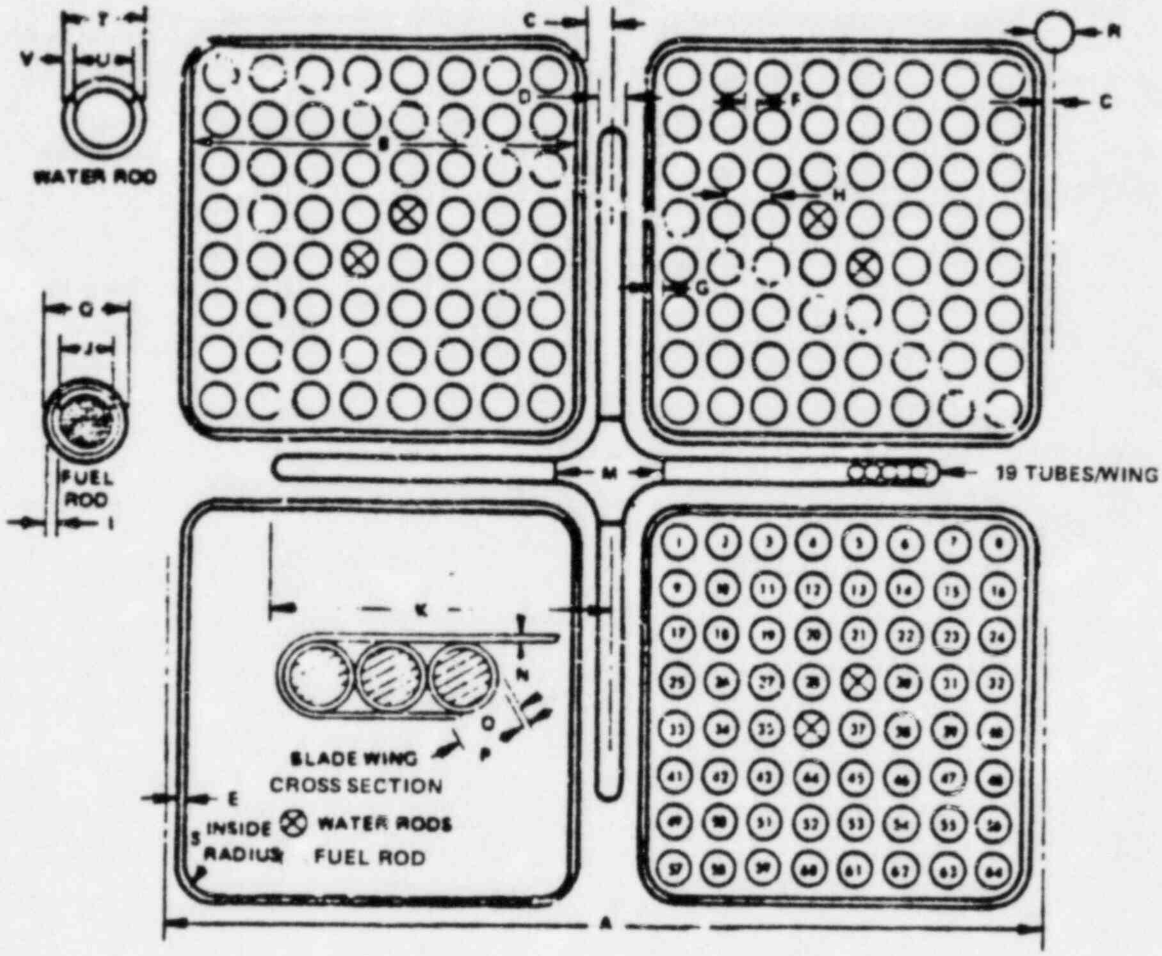
*Includes six inches of natural uranium at the top and bottom of the fuel column.

TABLE 1-2

Fermi 2

Fuel Assembly Types

| Designation | 1 | 2 | 3 |
| --- | --- | --- | --- |
| Number per core | 92.0 | 240.0 | 432.0 |
| Enrichment (w/o U-235)<br>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 |
| $Gd_2O_3$ (kg) | 0.0 | .20 | .47 |
| Total weight of assembly with channel (lbs.) | 690 | 690 | 690 |
| Total weight of bundle without channel (lbs) | 600 | 600 | 600 |




| DIM IDENT | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| DIM INCHES | 12.0 | 5.278 | 0.261 | 0.26[illegible] | 0.100 | 0.157 | 0.1575 | 0.640 |

| DIM IDENT | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|
| DIM INCHES | 0.032 | 0.410 | 4.275 | | 1.580 | 0.030 | 0.188 | 0.025 |

| DIM IDENT | Q | R | S | T | U | V |
|---|---|---|---|---|---|---|
| DIM INCHES | 0.483 | 1.082 | 0.380 | 0.581 | 0.531 | 0.030 |

FIGURE 1-1. C-LATTICE DIMENSIONS

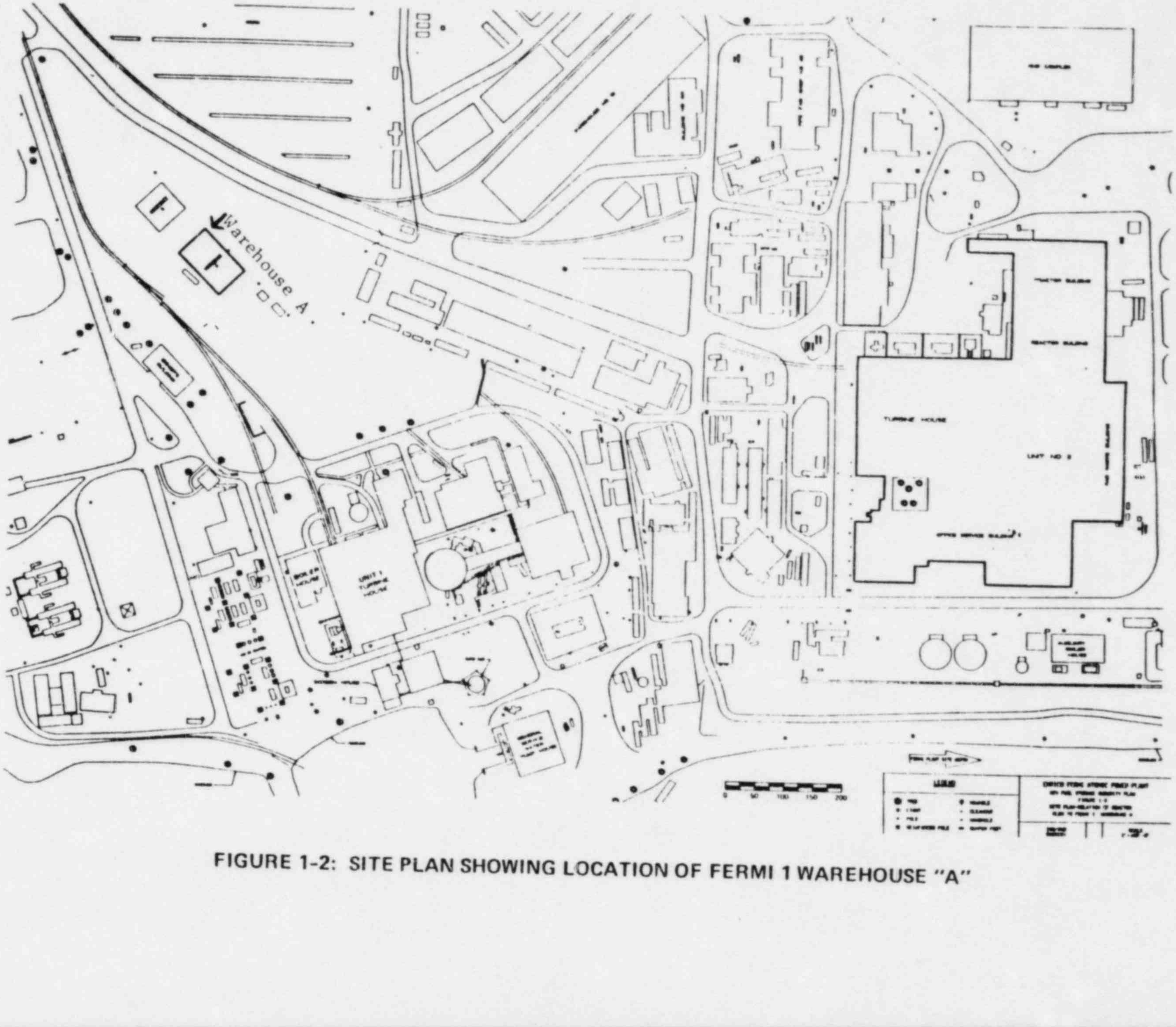



FIGURE 1-2: SITE PLAN SHOWING LOCATION OF FERMI 1 WAREHOUSE "A"

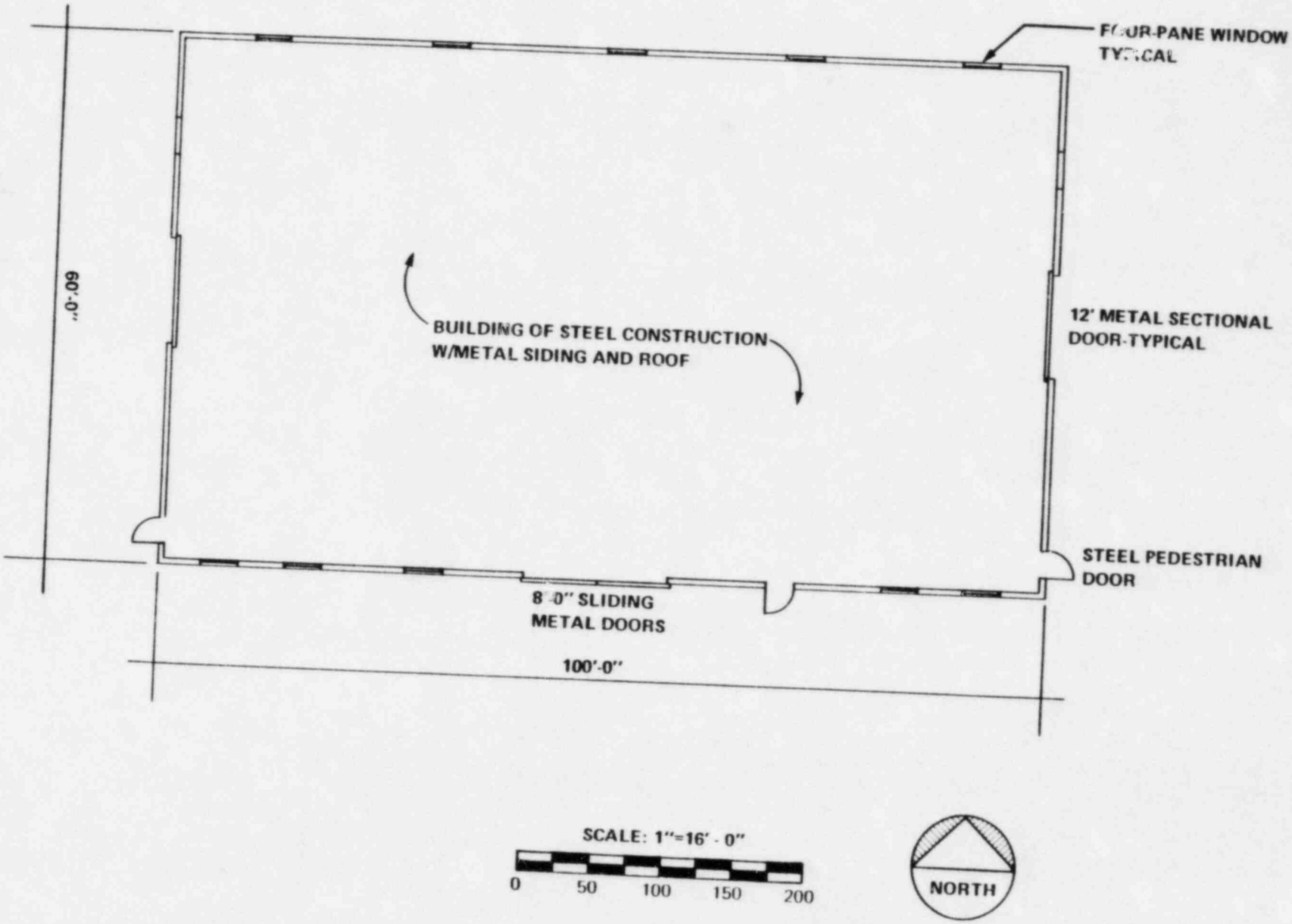



FIGURE 1-3: FLOOR PLAN OF FERMI 1 WAREHOUSE "A"

## 2.0 HEALTH AND SAFETY

The responsibilities, minimum technical qualifications, experience and training of all key personnel are described in Subsection 13.1.4.3 of the Fermi 2 FSAR.

### 2.1 Radiation Control

1. The radiation protection program is described in Section 1.23 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 Radiation Protection-Chemical (Rad-Chem) Engineer. The daily health physics activities are under the direction of the General Supervisor Health Physics, who reports to the Rad-Chem Engineer. The General Supervisor Health Physics may act independently in the event of an emergency.

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, has been developed and is the responsibility of the Radiation Protection-Chemical Engineer. If contamination is detected, appropriate action will be taken in accordance with plant procedures.

The Reactor Engineer is responsible for the procedures involving the handling and control of nuclear fuel. Changes to these procedures require the review and approval of the Onsite Safety Review Organization (OSRO) as specified in FSAR Section 13.5.

Various monitoring systems are located in the plant which provide local and remote indications of radiation and/or contamination. These systems are described as follows:

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 rocm.

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 emitters.

e. The system that performs airborne radioactivity monitoring is described in Subsection 12.2.4 of the Fermi 2 FSAR.

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 12.2.4.8, respectively. The portable air samplers are calibrated quarterly as described in Subsection 12.2.4.8.

Subsection 12.3.2.1.3 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 #4986, 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 new fuel storage vault is described in Subsection 9.1.1.2.2 of the Fermi 2 FSAR. The vault is a 6'4" wide, 23'5" long vault, located just east of the Spent Fuel Storage Pool on the fifth floor of the Reactor Building. This vault will contain 23 new fuel storage racks capable of storing 10 new fuel assemblies each. The nominal spacing between the new fuel storage racks is 11.5 inches center-to-center, while the new fuel assemblies are nominally spaced 6.625 inches center-to-center in each storage rack. This leaves a minimum distance of 5 inches between the fuel assemblies and the concrete walls. There is also a minimum distance of 9.75 inches between the bottom of the fuel assemblies and the concrete floor. There are no steel guide tubes per se, but the fuel assemblies are loaded into a rack through a hole in the top of each rack. Guides are provided to guide the fuel element spacers the full length of their insertion into the rack so that damage to the fuel assemblies is precluded.

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 $K_{eff}$ subcritical. 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 $\leq .90$ is maintained. Under flooded conditions a $K_{eff}$ $< .95$ would be maintained. Under optimum moderation (approximately 0.2 gm/cc) and for the design basis maximum reactivity fuel (1.31 $K_{inf}$ fuel in the uncontrolled reactor core pitch) the calculated $K_{eff}$ for the new fuel storage array is approximately 1.2. As stated in Section 1.2.2 of this application, fireproof shield plugs will cover the new fuel storage vault when access is not required. This precaution should preclude mist from entering the vault and causing an inadvertent criticality.

The new fuel storage vault is designed to be able to store safely any new fuel bundle which can be operated in the core during the anticipated life of the plant. The fuel bundle has evolved through many changes, including a trend to higher average enrichments. Core design, however, has limited the fuel bundle exposure dependent maximum reactivity, i.e. k-infinity. With burnable poisons present, the fuel bundle maximum reactivity is not linearly proportional to enrichment. For this reason, the fuel storage racks were designed to accommodate a limiting reactivity bundle without specific consideration of the bundle average enrichment. Thus, the fuel storage racks were designed to store any fuel bundle which has a k-infinity of less than 1.31 in an uncontrolled reactor core geometry at 20°C. All GE fuel designs are checked against this limit to ensure that the fuel storage bundle k-infinity criterion is not violated.

The fuel storage pool can provide dry or wet storage. Specifications of the storage arrays are contained in Subsection 9.1.2.2.2 of the Fermi 2 FSAR. The quality assurance program used during fabrication of the high density racks is described in Joseph Oat Report TM-586 which is also referenced in Subsection 9.1.2.2.2 of the Fermi 2 FSAR. 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. The results of the criticality analysis including optimum conditions of water-mist density for the high density racks are covered in Joseph Oat Report TM-586.

The high density spent fuel storage provides for a total of 2303 storage locations arranged in 14 modules (storage racks). Thirteen of these racks contain 169 storage cells. The fourteenth rack has 108 cells. The gap between the storage racks is 3.625" at all locations. These storage racks have a minimum 6.22 inch center-to-center distance between fuel assemblies. The minimum gap between the fuel pool wall and rack modules is 1'11-3/4". The module base plate is located 7½" above the concrete pool floor.

The spent fuel racks were manufactured in full compliance with ASME Section III Code Class 1 requirements. The supplier of the racks, the Joseph Oat Company, underwent an audit by Detroit Edison to assure they had an adequate quality assurance program. An audit was also performed on Bisco, the manufacturer of the poison boraflex, by Joseph Oat.

After the spent fuel racks are installed in the Fuel Storage Pool, a poison verification test will be conducted on all 2303 individual storage cells. This test will insure that the poison boraflex has been installed correctly and meets specifications. A summary of test results along with charts of every cell measurement will be provided by the contractor.

An acceleated surveillance specimen strip containing representative poison boraflex coupons will be placed in the pool as soon as it is filled with demineralized water. One coupon is removed just before the placement of the first off-load and tested to provide reference results on unirradiated coupons. At the time of the first off-load of spent fuel, the specimen is surrounded by fuel assemblies from the peak power region of the reactor core. At the time of the second off-load of fuel, the specimen strip is removed and one coupon taken for evaluation. The strip is then replaced in the fuel pool, again surrounded by peak power region fuel assemblies. This arrangement is repeated at each off-load of fuel. By evaluation of the specimens, an accelerated monitor of environmental effects on the poison will be obtained

In addition to the spent fuel storage locations, a rack for defective fuel storage containers, control rods, and control rod guides is also provided. It contains 31 storage locations for defective fuel storage containers/control rods, and 4 locations for control rod guide tubes.

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. This configuration would result if two assemblies were in the inspection stand with a third assembly suspended from a handling crane, but outside of the normal storage location. An edge-to-edge spacing of twelve (12) inches or more shall b. maintained between these three assemblies and all other fuel. General Electric has determined that no possible orientation of the three assemblies would maintain $K_{eff} > 0.90$. The analysis assumed a 12" water reflector to neutronically decouple the array, hence the 12" spacing criteria.

5. As described above, 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 would be limited to mechanical damage to a fuel assembly as a result of droppin , or an object falling onto the fuel. Even in the event of mechanical damage, local contamination would not be exten ive 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: [signature]
Harry Tauber
Group Vice President