U. S. NUCLEAR REGULATORY COMMMISSION

REGION III

Report No. 50-341/89029/(DRSS)

Docket No. 50-341 License No. NPF-43

Licensee: The Detroit Edison Company
6400 North Dixie Highway
Newport, MI 48166

Facility Name: Fermi 2

Inspection At: Fermi Site, Newport, Michigan

Inspection Conducted: October 3-6, 1989 (Onsite)
October 16 and 20, 1989 (Telephone Discussion)

Inspectors: R. A Paul — Date 10/31/89

J. E. House — Date 10/31/89

Approved By: M. Schumacher, Chief
Radiological Controls and
Chemistry Section — Date 10/31/89

Inspection Summary

Inspection on October 3-6, 1989 (Report No. 50-341/89029(DRSS))
Areas Inspected: Routine unannounced inspection of the licensee's radiation protection program during an outage, including organization and management controls (IP 83729); external and internal exposure controls (IP 83729); ALARA, planning, and preparation (IP 83729); and nonradiological confirmatory measurements (IP 79701).
Results: The licensee's radiation protection adequately protects the health and safety of workers. Good engineered ALARA controls were implemented and observed by the inspectors. Some weaknesses in the radiation protection program are discussed in Section 8. The licensee performed well in the nonradiological confirmatory measurements. No violations were identified.

1. Persons Contacted

*R. Andersen, Radiation Protection Manager
*S. Bartman, Supervisor, Radiological Effluents
*R. Baum, Sr. Radiological Engineer, ALARA
*S. Bump, Supervisor, Radiation Protection
*S. Catola, Vice President, Nuclear Engineering Services
*J. Czech, Senior Chemistry Technician
*R. DeLong, Radiation Protection Engineer
*R. DeWulf, Chemical Engineer
*R. Eberhardt, Superintendent, Radiation Protection
*D. Gipson, Plant Manager
*L. Goodman, Director, Nuclear Licensing
*H. Higgins, General Supervisor, Radiation Protection
*E. Kokosky, Supervisor, Radiation Protection
*F. Lehmann, Environmental Engineer
*R. McKeon, Superintendent, Operations
*W. Orser, Vice President, Nuclear Operations
*J. Pendergast, Licensing Engineer
*T. Riley. Supervisor, Compliance
*R. Stafford, Director, Nuclear Quality Assurance
*W. Torrasi, General Supervisor, Chemistry
*T. VanderMey, Radiological Engineer

*W. Rogers, NRC Senior Resident Inspector
*P. Pelke, NRC Project Inspector

The Inspectors also interviewed other licensee personnel in various departments in the course of the inspection.

*Denotes those present at the plant exit interview on October 6, 1989.

2. General

This inspection began on October 3, 1989. Reviewed was the operational health physics program during a major refueling and maintenance outage. Also reviewed were several DERS. Several tours of licensee facilities were made including the drywell to review posting, labeling, access and contamination controls, and to observe engineered controls. Several independent direct radiation surveys were performed. Special attention was given to station implementation of its ALARA program and good ALARA practices.

The primary purpose of this inspsection was to assess the adequacy of implementation of the health physics program when challenged by major outage maintenance and refueling conditions. The interactions between station health physics, contractor health physics, and contract maintenance/labor personnel were observed/reviewed during the course of the inspection; the observed interactions appeared good.

No violations or deviations were identified.

3. Organization, Management Controls, and Staffing (IP 83750)

The inspectors reviewed the licensee's organization and management controls for radiation protection, including changes in the organizational structure and staffing, effectiveness of procedures and other management techniques used to implement the program, and experience concerning self-identification and correction of program implementation weaknesses.

Since the previous inspection (Inspection Report No. 341/89014), there have been no significant changes. The Radiation Protection Manager (RPM) continues to report directly to the Superintendent, Radiation Protection, and during the outage the RPM reports directly to the plant manager. The radiation protection staff remains stable, qualified and is gaining commercial plant experience. The licensee contracted about 80 radiation protection technicians (RPTs) to support work being performed during this outage. Also contracted were health physics specialists to supplement the ALARA staff.

No violations or deviations were identified.

4. External Exposure Control and Personal Dosimetry (IP 83750)

The inspectors reviewed the licensee's external exposure control and personal dosimetry programs, including: changes in facilities, equipment, personnel, and procedures; adequacy of the dosimetry program to meet routine and emergency needs; planning and preparation for maintenance and refueling tasks including ALARA considerations; required records, reports, and notifications; effectiveness of management techniques used to implement these programs; and experience concerning self-identification and correction of program implementation weaknesses.

The station sets annual person-rem goals for each year. For 1989, the goal was set at 300 person-rem including 250 person-rem for the ongoing first major outage. Through October 24, 1989, with most of the major radiation producing outage jobs accomplished, the station dose was 195 person-rem; no individual received a dose in excess of 1.5 rem during the same period.

For this refueling/maintenance outage, the licensee established a temporary radiation protection entrance/exit and dosimetry control station; personnel needing access to the drywell were channeled through this station. RPTs continually man the control station where drywell related RWPs, associated survey maps, and secondary dosimetry are maintained and issued. Minimum personal monitoring requirmements for drywell access include a TLD, self reading dosimeter (SRD), and an electronic dosimeter. Technicians manning the control station issue the electronic dosimetry, and record on dose cards the exposures received by drywell workers. The flow of materials, equipment, and personnel to and from the drywell entrance is monitored by the technicians manning the station. In addition, contract RP technicians are assigned each shift to cover RWP work in the drywell.

The inspectors selectively reviewed RWP's and associated radiation surveys, observed instructions provided to individuals when they sign RWPs, and

observed work being performed under selected RWPs, including drywell work; no problems were noted.

No violations or deviations were identified.

5. Internal Exposure Control and Assessment (IP 83750)

The inspectors reviewed selected aspects of the licensee's internal exposure control and assessment programs, including: determination whether engineering controls, respiratory equipment, and assessment of intakes meet regulatory requirements; and planning and preparation for maintenance tasks including ALARA considerations.

The licensee's program for controlling internal exposures during this outage includes the use of protective clothing, respirators, and portable ventilation equipment as well as control of surface and airborne radioactivity. The inspectors selectively reviewed the licensee's air sampling and survey program for drywell activities; it appeared that sufficient air samples are collected and analyzed, and that sufficient direct and smear surveys are performed.

The licensee used a vendor supplied commercial whole-body counter during this outage for base-line counting of incoming contractor personnel. The inspectors spoke to the RPT performing the whole-body counts and found him knowledgable in the use of the equipment and WB procedures. No person exceeded the 40-hour control measure, and no significant internal deposition was identified. Contractor personnel are counted when they complete their work at the station.

The inspectors selectively reviewed the licensee's relevant whole-body count procedures and the WBC facility and equipment. The inspectors noted that the vendor performed a full calibration of the system after it was installed at the licensee's facility.

The licensee is using numerous portable HEPA ventilation units for various ventilation/filtration activities during this outage. The portable air equipment is used for the containment and reduction of airborn contamination, or for ventilation in which an area may require continuous supply of air in order to maintain proper environmental controls; it appeared the field application of this equipment is effective.

No violations or deviations were identified.

6. Outage Planning, Preparation, and Changes (IP 83729)

The inspectors reviewed the outage planning and preparation performed by the licensee, including: additional staffing, special training, increased equipment supplies, and related health physics considerations. The inspectors also reviewed changes in organization, personnel, facilities, equipment, programs and procedures that could affect the outage radiation protection program.

During the current outage, the plants RPTs, professional HP staff, and the radiation protection supervisors are providing continuous coverage by working 12 hour days, six days per week. The licensee's radiation protection staff is augmented by contract personnel. Plant and contract RPTs are providing RP coverage for all jobs; with the contract RPTs providing the main coverage for drywell work. Based on plant tours in the auxiliary, reactor and turbine building and the drywell, observation of work activities, and post-job interviews with workers who performed tasks not directly observed by the inspectors, it appeared tha RP coverage was good. It also appeared that the supply of portable instruments and ventilation equipment, protective clothing, and respiratory protection equipment for the outage was sufficient.

No violations or deviations were identified.

7. Maintaining Occupational Exposures ALARA (IP 83750)

The inspectors reviewed the licensee's program for maintaining occupational exposure ALARA including changes in ALARA policy and procedures; ALARA considerations for the maintenance and refueling outage, worker awareness and involvement in the ALARA program, and establishment of goals and objectives and effectiveness in meeting them. Also reviewed were management techniques used to implement the program and experience concerning self-identification and correction of implementation weaknesses. The inspectors reviewed the effectiveness of engineered controls and dose control programs.

The ALARA group is currently staffed with an ALARA supervisor, two ALARA engineers, three RPTs, and supplemental helpers. Two of the ALARA engineers are contract health physicists. The ALARA staff appears to have the necessary qualifications and dedication to implement an effective ALARA program.

The ALARA group reviewed engineered designed work modifications, and maintenance work packages that involve almost all dose produdcing jobs. Information gained from previous coverage of tasks at Fermi and other facilities was used to aid in the planning and preparation of similar jobs during this outage. The station identified high exposure jobs, determined shielding and contamination requirements, established an interface between work groups and developed outage and task person-rem projections. For this outage, development and implementation of engineering controls are the shared responsibility of ALARA and radiation protection; first-line supervisors were responsible for pre-job briefings. Also, the program included ALARA shift coverage during the outage, a photo library of equipment and components, video tapes of certain tasks, lessons learned and dose savings documentation.

The major dose producing jobs for this outage included mechanical stress improvement program, drywell insulation removal/installation, drywell weld inspections, RWCU heat exchanger diaphragm replacement, refuel/vessel ISI/fuel inspections, drywell snubber ISI and MOV preventive maintenance. ALARA initiatives taken for the outage include: considerable use of temporary shielding of heat exchangers, piping, recirculation nozzles, RWCU lines, and the reactor bottom head drains and pumps; tenting and

venting of the RWCU heat exchanger diaphragm replacement and several other jobs; use of remote welding and cutting machines and TV cameras; placement of temporary dams in valves to prevent stellite introduction into the system; flushing of valves, pump drain lines and crud traps; use of ARMs and CAMs; periodic decontamination of areas where contamination producing jobs were in progress, and good preplanning of maintenance and refueling activities.

The inspectors observed that radiation protection management appeared to have adequate control of outage activities.

The licensee has a cobalt reduction program in place. The program includes assuring that a cobalt-reduction line item is included in the ALARA check lists used in procedures by engineering; guidelines to prevent cobalt particle migration into the core; short and long term programs to replace valves containing stellite in valves/materials with the potential for causing increased radiation levels; and for replacement of non-stellite control blades. Twenty stellite control-blades in inventory were refurbished with non-stellite material, (stainless steel pins and rollers) and will be installed during this outage.

No violations or deviations were identified.

8. Deviation Event Reports (DERs) (IP 83729)

DER No. 89-1211

This DER addresses observations made prior to this inspection by the NRC senior resident inspector (SRI) of General Electric employees performing routine inspections for Crud Induced Corrosion (CILC). The SRI noted that at one step in the procedure the fuel rod under inspection is connected to a handling tool that is, in turn, manipulated by a wire rope in the hand of the worker. The work involves lateral movement of the rod over a short distance within the fuel pool but there is no mechanical or electrical device to inhibit vertical movement of the rod.

This matter was discussed with licensee representatives during the current inspection. Licensee controls for this operation included an alarming ARM placed at the edge of the pool near the worker's feet in addition to the one on the bridge crane. There is also an RPT assigned to the general work but not specifically to observe the fuel rod manipulation. The licensee's RPM agreed to evaluate this operation to determine the need for imposition of more stringent conttols during future outages. This will be followed under Open Item (No. 50-341/89023-01).

DER No. 89-1112

The inspector reviewed licensee followup of a September 30, 1989, incident wherein an employee working in a HEPA filtered tent slightly exceeded an administrative exposure limit. The worker wore an alarming dosimeter, a whole body TLD, and SRD and TLD extremity monitors in accordance with the RWP requirements. Intermittent RPT coverage was provided for this job. The licensee's investigation identified weaknesses concerning the use of alarming dosimeters, RPT coverage of

jobs in enclosed/restricted areas, the daily/weekly dose tracking system and radiation worker responsibilities. Licensee corrective action included radiation worker requalification training for the workers involved, reinforcement to all RP personnel ensuring periodic visual examination/observation of personnel activities and personnel special dosimetry when working in enclosed areas, strengthening the setpoint function of the alarming dosimetry, and insuring the dose tracking cards are used properly.

This matter which was discussed at the exit meeting is considered licensee identified and corrected.

9. Nonradiological Confirmatory Measurements (IP 79701)

The inspectors submitted chemistry samples to the licensee for analysis as part of a program to evaluate the laboratory's capabilities to monitor nonradiological chemistry parameters in various plant systems with respect to various Technical Specification and other regulatory and administrative requirements. These samples had been prepared, standardized, and periodically reanalyzed (to check for stability) for the NRC by the Radiological Sciences Division of Brookhaven National Laboratory (BNL). The samples were analyzed by the licensee using routine methods and equipment.

A single dilution was made for each sample by licensee personnel as necessary to bring the concentrations within the ranges normally analyzed by the laboratory, and run in triplicate in a manner similar to that of routine samples. The results are presented in Table 1 and the criteria for agreement in Attachment 1. These criteria for agreement are based on comparisons of the mean values and estimates of the standard deviations (SD) of the measurements. Modifications made to these criteria (Attachment 1 Notes) are based on the consideration that the uncertainties (SD) of the licensee's results were not necessarily representative of the laboratory's because they were obtained by one analyst over a short period of time.

The licensee will also prepare a sample of reactor coolant spiked with fluoride, chloride and sulfate to be split with BNL. The licensee will determine the concentrations of the analytes and the results will be sent to Region III for comparison with the values determined by BNL. This will be followed under the Open Item (No. 50-341/89029-02).

The licensee determined 9 analytes at three concentrations each. Of the initial 27 analyses 25 were in agreement (93%). The two disagreements were the low and high boron samples. Licensee representatives stated that during the analysis there appeared to be a malfunction in the pH electrode on the Autotitrator. This electrode was replaced, all three boron unknowns reanalyzed and the results were agreements.

Although the results of the nonradiological confirmatory measurement program were good, the inspector pointed out several assays in which biases existed. The silica assays (all three) exhibited a negative bias of up to 10% which is high for this analysis. In some instances

agreements occured in the presence of a bias due to the large standard deviation (s.d.) obtained by either BNL or the licensee. The low and middle sulfate assays exhibited negative biases of 8%. These biases are usually due to calibration errors, instrument drift or contamination. The licensee agreed to review instrument calibration as this is the most likely source of the biases.

The three sodium analyses (agreements) displayed a negative bias in excess of 10%. This assay is performed on the Ion Chromatograph with a strip chart recorder. The BNL sodium and lithium unknowns are combined in a common solution. The sodium and lithium peaks were not well separated with the lithium peak eluting first and the sodium peak eluting on the tail of the lithium. This caused a problem in determining the peak height of the sodium, which is used to quantitate the unknowns, and may have been the cause of the bias. BNL uses atomic absorption to measure sodium and lithium. The licensee (a BWR) does not measure lithium as it is not normally present in the water systems. This assay bias was an artifact created by the combination of the two alkali metals in the same unknown solution and assay conditions such as eluant strength. The licensee recognized the coelution problem and discussed it with the inspector.

No violations or deviations were identified.

10. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee, or both. Open items disclosed during the inspection are discussed in Sections 8 and 9.

11. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives at the conclusion of the inspection on October 6, 1989. The inspectors discussed the open items in Sections 8 and 9, the DERs in Section 8, observations on the radiological controls implemented for the outage and the nonradiological confirmatory measurements results. During the exit interview, the inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector. Licensee representatives did not identify any such documents or processes as proprietary.

Attachments:

1. Table 1, Nonradiological Interlaboratory Test Results, October 3-6, 1989
2. Attachment 1, Criteria for Comparing Analytical Measurements (Nonradiological)

TABLE 1
Nonradiological Interlaboratory Test Results
Fermi 2 Nuclear Generating Plant
October 3-6, 1989

Analyte	Analytical Method[b]	NRC[a] Y ± SD	Licensee[a] X ± SD	Ratio Z ± SD	Comparison[c] ±2 SD
		Concentration, ppb			
Chloride	IC	13.9 ± 0.1	14.0 ± 0.3	1.007 ± 0.023	A
		9.3 ± 0.1	9.4 ± 0.2	1.011 ± 0.024	A
		19.1 ± 0.3	18.9 ± 0.3	0.990 ± 0.022	A
Sulfate	IC	14.6 ± 1.1	13.4 ± 0.2	0.918 ± 0.070	A
		9.6 ± 0.7	8.9 ± 0.1	0.927 ± 0.068	
		19.5 ± 0.6	19.3 ± 0.4	0.990 ± 0.037	A
Iron	ICP	465 ± 13	481 ± 5	1.034 ± 0.031	A
		995 ± 13	970 ± 8	0.975 ± 0.015	A
		1463 ± 38	1487 ± 11	1.016 ± 0.027	A
Nickel	ICP	507 ± 15	473 ± 6	0.933 ± 0.040	A*
		1043 ± 31	979 ± 29	0.939 ± 0.039	A+
		1513 ± 63	1486 ± 10	0.982 ± 0.041	A
Copper	ICP	500 ± 8	504 ± 8	1.008 ± 0.023	A
		1008 ± 38	1000 ± 3	0.992 ± 0.038	A
		1500 ± 38	1511 ± 8	1.007 ± 0.026	A
Chromium	ICP	495 ± 13	506 ± 2	1.022 ± 0.027	A
		963 ± 13	1000 ± 2	1.038 ± 0.019	A*
		1450 ± 25	1522 ± 11	1.050 ± 0.025	A*
Sodium	IC	12.1 ± 1.4	10.8 ± 0.3	0.893 ± 0.106	A
		21.2 ± 1.2	18.6 ± 0.3	0.877 ± 0.075	A*
		15.8 ± 0.9	13.8 ± 0.1	0.873 ± 0.076	A*
Silica	SPEC	52.8 ± 2.8	46.7 ± 0.6	0.884 ± 0.071	A*
		104.0 ± 4.0	96.0 ± 0.0	0.923 ± 0.053	A*
		157.0 ± 4.7	147.0 ± 4.4	0.936 ± 0.040	A+

		Concentration, ppm			
Boron[d]	TITR	1002 ± 10	1069 ± 9	1.067 ± 0.015	D
		2970 ± 23	2995 ± 42	1.008 ± 0.016	A
		4918 ± 48	5097 ± 66	1.036 ± 0.017	D
Boron[d] (Rerun)	TITR				
		1002 ± 10	1016 ± 4	1.014 ± 0.011	A
		2970 ± 23	2957 ± 17	0.996 ± 0.010	A
		4918 ± 48	4915 ± 23	0.999 ± 0.011	A

a. Value ± standard deviation (SD); number of BNL analyses is 6 to 9. The number of licensee analyses is 4.

b. Analytical methods: Titr - titration

c. A = Agreement
D = Disagreement

d. NRC (BNL) values replaced by mean values of plants in Region III.

a. Value ± standard deviation (SD); number of BNL analyses is 6 to 9. The number of licensee analyses is 3 to 4.

b. Analytical methods:

Titr	- Titration
IC	- Ion chromatography
Spec	- Spectrophotometric
ICP	- Inductively coupled plasma spectroscopy

c. A = Agreement
D = Disagreement

d. NRC (BNL) value replaced by mean values of plants in Region III.

* Substituted the BNL uncertainty for licensee's uncertainty.

\+ Substituted 3% relative SD for BNL and licensee's SDs.

ATTACHMENT 1

NOTES

I. The uncertainties may be modified in cases of disagreement:

a. If the licensee's SD, S_x is smaller than that of the NRC, the NRC's relative standard deviation (RSD) (S_y/Y) will be substituted for that of the licensee (S_x/X), and the agreement criteria recalculated.

b. If a disagreement and the RSDs appear to be unreasonably low, RSDs of 3% will be substituted for those of both the NRC and the licensee. This will not be done for the boron analyses where the expected RSDs are 0.5-1%.

II. Due to some uncertainties in the values of the 1987 (87) boron standards, the mean values of the concentrations obtained by the plant laboratories in Region III are used as the NRC values. These results appear to have resolved the problem of the consistently negative biases between the licensees and BNL boron analyses. The licensees generally reported similar values of the 1000-ppm standard with a relatively small RSD of ±1.7%, although the analytical methods differed.