



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO CONFORMANCE WITH REGULATORY GUIDE 1.97

DETROIT EDISON COMPANY

FERMI-2

DOCKET NO. 50-341

1.0 INTRODUCTION

Detroit Edison Company was requested by Generic Letter 82-33 and License Condition C.(2).(17) Attachment 2 Item 2 to provide a report to NRC describing how the post-accident monitoring instrumentation meets the guidelines of Regulatory Guide (R.G.) 1.97 as applied to emergency response facilities. The licensee responded to Item 6.2 of the generic letter on September 30, 1985. Additional information was provided by letters dated October 15, 1987, June 19, 1989, and September 12, 1989.

A detailed review and technical evaluation of the licensee's submittals was performed by EG&G Idaho, Inc., under a contract to the NRC, with general supervision by the NRC staff. This work was reported by EG&G in Technical Evaluation Report (TER), "Conformance to Regulatory Guide 1.97: Fermi-2," dated November 1989. The staff has reviewed the report and concur with the conclusions that the licensee either conforms to, or has adequately justified deviations from, the guidance of R.G. 1.97 for each post-accident monitoring variable except for the variables neutron flux, coolant level in the reactor, primary containment isolation valve position, containment and drywell hydrogen concentration, and containment and drywell oxygen concentration.

2.0 EVALUATION CRITERIA

Subsequent to the issuance of the generic letter, the NRC held regional meetings in February and March 1983 to answer licensee and applicant questions and concerns regarding the NRC policy on R.G. 1.97. At these meetings, it was established that the NRC review would only address exceptions taken to the guidance of R.G. 1.97. Further, where licensees or applicants explicitly state that instrument systems conform to provisions of the regulatory guide, no further staff review would be necessary for those items. Therefore, the review performed and reported by EG&G only addresses exceptions to the guidance of R.G. 1.97. This safety evaluation addresses the licensee's submittals based on the review policy described in the NRC regional meetings and the conclusions of the review as reported by EG&G.

3.0 EVALUATION

We have reviewed the evaluation performed by EG&G and concur with its bases and findings. The licensee either conforms to, or has provided an acceptable justification for deviations from the guidance of R.G. 1.97 for each post-accident monitoring variable except for the variables neutron flux, coolant level in the reactor, primary containment isolation valve position, containment and drywell hydrogen concentration, and containment and drywell oxygen concentration.

- a) R.G. 1.97 recommends Category 1 neutron flux monitoring instrumentation, with a range of 10% to 100% of full power, to monitor reactivity control. The licensee has provided neutron flux monitoring instrumentation with deviations from this recommendation in environmental and seismic qualification, potential single failures, nonclass 1E power sources, and a range that does not encompass the range recommended by the regulatory guide. The justification provided by the licensee for not fully qualifying the neutron flux monitoring instrumentation is that the licensee has participated in the preparation of the Boiling Water Reactor Owners Group (BWROG) Licensing Topical Report, "Position on NRC Regulatory Guide 1.97, Revision 3, Requirements for Post Accident Monitoring System", NEDO-31538, dated March 14, 1988. The licensee has stated their intent to comply with the final outcome of the staff's review of the BWROG topical report.

The staff finds the licensee's justification unacceptable. By letter dated January 29, 1990 the staff informed the industry that the BWROG position was unacceptable. Therefore, it is the staff's position that the licensee should install neutron flux monitoring instrumentation which complies with the Category 1 criteria, of R.G. 1.97. It has been concluded by the staff that the existing neutron flux monitoring instrumentation is acceptable for operation pending satisfactory implementation of a fully qualified indication system.

- b) R.G. 1.97 recommends Category 1 coolant level in the reactor instrumentation with a range extending from the bottom of the core support plate to the centerline of the main steamline or the top of the vessel. The licensee has provided one channel of fuel zone instrumentation that meets all the Category 1 recommendations. The other channel meets these recommendations except for, signal cables routed in a non-seismic raceway, a nonseismically qualified indicator, and indicator illumination power derived from a nonclass 1E source.

The licensee's justification for this deviation is that the licensing basis for Fermi-2 does not require the consideration for coincident loss of coolant accidents and seismic events. The licensee also states that the raceways are constructed in a very similar manner to seismically qualified raceways. Regulatory Guide 1.97 is quite specific that "instrumentation should continue to read within the required accuracy following, but not necessarily during, a safe shutdown earthquake." The licensee has also not shown that the indicator is readable should it lose

its illumination power. The staff considers fuel zone water level to be an important instrument, especially since the licensee has determined it to be a type A variable, therefore, the licensee's justification is unacceptable. The licensee should upgrade this channel of fuel zone coolant level in the reactor instrumentation to comply with the Category 1 criteria.

- c) R.G 1.97 recommends Category 1 instrumentation to indicate the position of the primary containment isolation valves. The instrumentation provided by the licensee meets the Category 1 criteria with the exception of the instrumentation associated with valves B31-F019, B31-F020, B31-F014A, B31-F014B, B31-F016A, B31-F016B, T49-F465, T49-F468, T46-F400, T48-F410, T46-F401, T46-F412, T48-F404, T48-F405, T48-F409, T48-F455, T48-F453, T48-F454, T48-F456, T48-F457, and T48-F458.

For reactor water sample system valves B31-F109 and B31-F020, recirculation pump seal purge isolation valves B31-F014A, B31-F014B, B31-F016A, and B31-F016B, and primary containment pneumatic supply system outboard valves T49-F465 and T49-F468 the licensee states that the position switches have not been verified as being safety-related for this application and, therefore, could not be verified to be environmentally qualified, seismically qualified, or to have had the appropriate quality assurance applied. The licensee has stated that these position switches are maintained as safety-related components and that the position switches are safety-related for other applications within the plant's design. Based on the licensee's description, it appears that these position switches are qualifiable for this application. This being the case, the licensee should revise their list of safety-related components and associated documentation to include these positions switches.

Drywell and suppression pool ventilation system valves T46-F400, T48-F410, T46-F401, T46-F412, T48-F404, T48-F405, T48-F409 deviate from the environmental qualification, seismic qualification, and quality assurance criteria of R.G. 1.97. The position indication cables are not run in seismically qualified cable trays. The valves and their position switches, are located outside the containment in a mild environment.

Since these valves are located in a mild environment seismic qualification is the only concern. These air-operated valves are designed to fail closed, however, a seismic event could cause a false indication of an open containment, that is in fact closed. As this could delay the operator from taking important procedural steps, the licensee should provide the recommended Category 1 instrumentation for these valves.

Nitrogen inerting system valves T48-F455, T48-F453, T48-F454, T48-F456, T48-F457, and T48-F458 have position indication switches that are not seismically qualified, and the position indication cables are run in non-seismic cable trays. Valve T48-F455 is located inside the containment, not environmentally qualified, normally-open, and fails-closed. The other valves are located outside the containment, are normally-closed and fail-closed. While these valve are designed to fail-closed, a seismic

event could cause a false indication of an open containment, that is in fact closed. As this could delay the operator from taking important procedural steps, the licensee should provide the recommended Category 1 instrumentation for these valves.

- d) Regulatory Guide 1.97 recommends Category 1 containment and drywell hydrogen concentration and containment and drywell oxygen concentration instrumentation to monitor the concentration of hydrogen and oxygen in the containment and the drywell. The instrumentation provided by the licensee meets the Category 1 criteria with the exception of a recorder power supply. The justification provided by the licensee is that although the recorder power is deenergized on loss of offsite power, the operator can restore power to the recorder.

It is not the intent of R.G. 1.97 to have the operator restore power to Category 1 instrumentation. Therefore the licensee's justification is unacceptable. The licensee should provide a full-time Class 1E power source for the containment and drywell hydrogen concentration and the containment and drywell oxygen concentration instrumentation.

4.0 CONCLUSION

Based on the above evaluation the staff finds Fermi-2 design, is acceptable with respect to conformance to R.G. 1.97, Revision 2, except for the instrumentation associated with the variables neutron flux, coolant level in the reactor, primary containment isolation valve position, containment and drywell hydrogen concentration, and containment and drywell oxygen concentration.

- a) The staff finds acceptable the existing neutron flux instrumentation for interim operation. It is the staff's position that the licensee should install neutron flux monitoring instrumentation which complies with the Category 1 criteria of R.G. 1.97, Revision 2.
- b) It is the staff's position that information on the coolant level in the reactor is valuable to the operator in evaluation of the accomplishment of accident mitigation. It is also the staff's position that the licensee should upgrade the fuel zone instrumentation to comply with the Category 1 criteria of R.G. 1.97, Revision 2.
- c) It is the staff's position that information on the status of primary containment isolation valve position is valuable to the operator in evaluation of the accomplishment of isolation of the containment. It is also the staff's position that the licensee should upgrade, to meet the Category 1 criteria of R.G. 1.97 Revision 2, the position indication for the following valves: B31-F019, B31-F020, B31-F014A, B31-F014B, B31-F016A, B31-F016B, T49-F465, T49-F468, T46-F400, T48-F410, T46-F401, T46-F412, T48-F404, T48-F405, T48-F409, T48-F455, T48-F453, T48-F454, T48-F456, T48-F457, and T48-F458.

- d) It is the staff's position that Category 1 instrumentation should be powered from Class 1E power sources. It is also the staff's position that the licensee should provide full-time Class 1E power sources for the containment and drywell hydrogen concentration, and containment and drywell oxygen concentration instrumentation.

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Date: May 2, 1990