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March 8, 1993
NRC-93-0017

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

References: 1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) Detroit Edison letter to NRC, "Semi-Annual Radiological Effluent Release Report," NRC-91-0026, dated March 1, 1991

3) NRC letter to Detroit Edison, "Fermi 2 Technical Evaluation Report (TER) on Offsite Dose Calculation Manual (ODCM), Revision 3 (TAC No. M82771)," dated December 30, 1992

Subject: Response to NRC Comments on Fermi 2 ODCM

By Reference 2, Detroit Edison submitted Revision 3 of the Fermi 2 Offsite Dose Calculation Manual (ODCM). On January 4, 1993 Detroit Edison received Reference 3 which provided the technical evaluation report from the NRC and its contractor EG&G Idaho, Inc. regarding Fermi 2's ODCM.

In general, the NRC's evaluation report agreed with the methodologies used in the Fermi 2 ODCM, however, it also contained comments in Section 5 concerning deficiencies in the ODCM and suggested improvements. The NRC letter also requested a response within 90 days of receipt of the letter, which is due by April 5, 1993. Some of the recommended improvements have already been incorporated in the current Revision 4 of the ODCM, some will be incorporated in the next revision, and some corrections are not warranted as explained in Enclosure 1 of this letter which provides detailed response to NRC comments on the Fermi 2 ODCM provided as Enclosure 2.

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If you have any questions, please contact Mr. Girija S. Shukla at (313) 586-4270.

Sincerely,

Enclosure

cc: T. G. Colburn
A. B. Davis
W. J. Kropp
M. P. Phillips

DETROIT EDISON RESPONSE TO NRC TECHNICAL EVALUATION REPORT FOR THE EVALUATION OF THE FERMI 2 ODCM, REVISION 3

The subject report, prepared for the NRC by EG&G Idaho, Inc., identifies various items in Revision 3 of the Fermi 2 Offsite Dose Calculation Manual (ODCM) which it describes as errors, ommissions, or deficiencies, and it recommends corrections to each. Some of these recommended corrections are valid and will be incorporated into the next ODCM Revision; some have been corrected in the current ODCM revision (Revision 4); and some are not warranted, as will be discussed below. However, none of the recommended corrections affect the way any dose, dose rate, or setpoint calculations are performed at Fermi 2. This is partly because plant procedures which implement the ODCM and are used to perform these calculations provide more detailed calculational methods than the ODCM. In other words, the recommended corrections are more suggested enhancements rather than substantive technical changes.

In Section 5 of the subject report (provided as Enclosure 2), the NRC comments are listed according to severity, with Category A items being the most serious and Category D the least. Detroit Edison's response to these items are given below:

o Response to Category A Items:

1. This summation sign in Equation 2-7 of the ODCM was omitted in revisions 3 and 4. However, the use of the subscript "i" implies that a summation should be performed, and the current setpoint evaluation for the CWR Decant Line radioactivity monitor includes the summation in the setpoint calculation. The summation sign will be included in the next ODCM revision.

2. Each release point is evaluated separately in a separate plant surveillance package. The site boundary dose rate for each release point is evaluated separately using Equation 3-9, and then is added to the current dose rates from other release points for comparison with the ODCM Control limit. The requirement for this addition will be clarified in the next ODCM revision, either by modifying the equation as recommended, adding a second equation, or requiring the addition in the text. This addition of dose rates for other release points is already implemented by Fermi 2 procedures.

3. The recommended modification of equations listed in Item A.3 is not desirable because the X/Q and D/Q values in the equations are specific to each release point, so that the summation must be performed after the dose for each release point is calculated.

The next revision of the ODCM will clarify the requirement for addition of the doses calculated for each release point, although this addition is implied by the listing of X/Q and D/Q values for different release points in Table 3.0-4. This addition is already implemented by Fermi 2 procedures.

4. Section 3.8.1 refers to Table 3.0-4, which defines compliance with Technical Specification 3.11.2.3 as including evaluation of the milk ingestion, inhalation, and ground plane pathways. All relevant pathways and organs have always been evaluated when evaluating compliance with this specification, as required by Fermi 2 procedures. The next revision of the ODCM will clarify the requirement that this summation is to be performed.

5. The recommended modification is not warranted because different release point have different X/Q values, so the dose for each must be determined separately before summation. Since noble gas releases have been observed and are expected from only one release point, this section does not specifically discuss summing over different release points, but the potential necessity for doing so is clearly implied by the VF term, which is specific to only one release point. The next ODCM revision will clarify the requirement for summation of the doses due to different release points.

o <u>Response to Category B Items</u>:

1. The setpoint formula for the liquid radwaste effluent monitor is correct and does establish the setpoint above the effluent line concentration. (This setpoint formula takes into account the dilution effect of the circulating water decant line, so an alarm would not be received until the MPC fraction in the waste sample tank was well above 1.0.) Also, when the recommended conservative sensitivity factor of 1.0 E6 cps/uCi/ml is used, as is required by Fermi 2 procedures, the monitor will alarm well before an MPC fraction of 1.0 is reached at the point of discharge to Lake Erie. In ODCM revision 4, factors to account for estimated concentrations of pure beta emitters were added to the setpoint formula, adding conservatism to the setpoint. In the next ODCM revision, a statement will be added to this section which will require a safety factor of 0.5 in the setpoint formula if individual radionuclide sensitivities are used.

2. Such a sensitivity factor was added in Equation 6-7 of Revision 4 of the ODCM.

3. This comment is valid, and the next revision of the ODCM will correct this problem, probably by modifying "MPCF" in this formula to refer to the MPC fraction at the discharge point rather than in the waste sample tank. However, the setpoint

calcuation used in the last setpoint change document uses the MPC fraction at the discharge point, and the currently installed setpoint is not invalid.

4. Item B.4 regarding Technical Specification table, now ODCM Table 4.11.1.1-1, was incorporated in ODCM Revision 4.

5. a. The 2.2 minute delay line offgas monitor is not a final effluent monitor at Fermi 2, and for this reason the setpoint methodology for it is not included in the ODCM. The final effluent monitor for the offgas stream is the Reactor Building Exhaust Plenum radiation monitor.

   b. The original design of Fermi 2 provided for the automatic termination of offgas release. However, due to the design of the offgas treatment system, it was determined that this function was not necessary, and the plant was licensed without this capability. Also, any reactor shutdown will terminate offgas release.

   c. The next revision of the ODCM will list all monitors in this table as providing alarm function.

6. The last paragraph of Section 3.3.2 was deleted from ODCM Revision 4. The revised section allows setpoint calculation based on the more limiting value of FRAC, which accounts for the fractions of the whole body and skin dose rate limits.

7. The fact that the value of R_i in Equation 3-9 is for the thyroid is clear from Table 3-5, which is referred to in the definition of R_i. However, this recommendation will be incorporated into the next revision of the ODCM.

8. Footnote g of Technical Specification Table 4.11.2.1.2-1, not footnote c, is applicable to Section 3.6. This is the requirement for daily particulate and iodine sampling after a >15% power change, which is implemented by Fermi 2 procedure 64.713.018, Attachment 7. Footnote c, which requires noble gas sampling after a >15% power change and is implemented by 64.713.018, Attachment 11, applies to Section 3.3.3. Since the sampling requirements are given in the ODCM Controls section of Revision 4, this does not constitute an ODCM deficiency. However, in the next revision of the ODCM, the sampling and analysis frequency requirements for >15% power change (when reactor water DEI or noble gas monitor readings have increased by a factor of 3) will be specified in the appropriate ODCM Calculational Methods sections as well as in the ODCM Control section.

9. The Fermi 2 liquid dose calculation model assumes only the nuclide concentration which prevails during the release, and this concentration is affected only by the dilution factor which prevails during release. Therefore the "release period" for averaging the circulating water decant line flow rate is the period of the release. This will be clarified in the next ODCM revision. During each release operators periodically record this flow rate as required by Fermi 2 procedures and these readings are averaged for use in dose calculation according to Fermi 2 procedures.

10. Although the requirement stated in Item B.10 is already contained in ODCM Surveillance Requirement 4.11.1.2, it will also be included in Section 6.5 of the next revision of the ODCM.

11. In the next revision of the ODCM, the recommended commitment in Item B.11, to describe direct radiation dose evaluation methods in reports such as the Semiannual Effluent Release Report will be added to Section 8.2.2.

o **Response to Category C Items**:

1. The reason DF is used instead of DF + RR is that the use of DF only simplifies the formula and makes the calculated setpoint slightly more conservative. This will be explained in Section 6.3.1 of the next ODCM revision.

2. The frequency requirement for periodic assessment is already contained in ODCM Surveillance Requirement 4.11.2.2. However, in the next ODCM revision, this reference will be changed as recommended, and the frequency requirement will be added as recommended.

3. Item C.3 has been incorporated in ODCM Revision 4.

4. The frequency requirement for periodic assessment is already contained in ODCM Surveillance Requirement 4.11.2.3. However, in the next ODCM revision, this reference will be changed as recommended, and the frequency requirement will be added as recommended.

5. Despite the fact that total body dose need not be calculated to evaluate compliance with ODCM Control 3.11.2.3, the total body dose is calculated using Fermi 2 procedures. As recommended, the phrase "including the total body" will be deleted from the definition of D_{aop} in the next ODCM revision.

6. The next ODCM revision will clarify the first footnote in Table 8.0-2; by stating that this table is not a complete list and that other applicable values may be found in Regulatory Guide 1.109.

o Response to Category D Items:

1. The current method of calculating MPCF is conservative, and liquid effluent concentrations have been such that releases are still far below release rate and setpoint constraints. However, in the next revision of the ODCM, separate MPC fraction calculations for noble gases and other nuclides will be allowed as an option.

2. Since Equation 4-2 (now 8-2) is the only equation in the ODCM for calculating skin dose due to noble gases, it will not be deleted. However, in the next ODCM revision, it will be stated that it is not to be used for evaluating compliance with 40 CFR 190.

SUMMARY

Deficiencies and suggestions are summarized below in four categories of decreasing importance. The items in Category A identify the most serious deficiencies, including omissions that cause uncertainty as to whether the proper methodology is used in the ODCM. Category B contains less serious deficiencies, and Category C contains minor deficiencies and editorial recommendations. Category D contains suggestions for changes the licensee may wish to make to simplify calculations, update data, or remove excess conservatism from the methodology. The number in parentheses at the end of each item (e.g., [4.3]) refers to the section in this review that contains a discussion of the item. Recommended Technical Specification changes are identified with an "*".

Category A:

These items identify errors or omissions that may result in calculated doses, dose rates, or concentrations that are lower than those that would be obtained if the deficiencies were corrected. Therefore, they should be addressed promptly.

1. A summation over "i" should be added to the numerator of Eq. 2-7, for the setpoint of the CWR Decant Line radioactivity monitor. (Corrected in GL 89-01 transfer Draft ODCM)(4.1).

2. The right side of Eq. 3-9, to determine the site boundary dose rate due to radioiodines and particulates in gaseous effluents, should include a summation over all applicable release points. (4.4)

3. The definitions of Q_i's for Equations 3-10, 3-11, 3-12, 3-13, 3-14, and 3-15 should state that "cumulative release" includes effluents from all release points. (4.6.1, 5.6.2)

4. Sections 3.8.1 and 3.8.2 should define the organ dose to be compared with the limits of TS 3.11.2.3 as the total body dose due to radiation from the ground plane plus the sum of the doses via all inhalation and ingestion pathways to a specific organ. (4.6.2)

5. The definition of Q_i in Section 4.2.1 should show a summation of (C_i x VF) over all release points. (4.9)

Category B:

The items below concern information that should be added to make the ODCM more complete, prevent erroneous interpretation of the methodology, or correct methodology that is erroneous.

1. In Section 2.3.1, for the setpoint of the Liquid Radwaste Effluent LIne radioactivity monitor, provisions should be added to establish the setpoint above the concentration in the effluent line and correspondingly lower the maximum effluent flow rate. (4.1)

2. A monitor sensitivity term should also be added to Ea. 2-7 for the radioactivity monitor on the CWP Decant Line. (4.1)

3. The definitions of C_i and MPCF for Eq. 2-7 state that the C_i's are obtained from the CWR decant line and the MPCF is calculated using the concentrations in a Waste Sample Tank. With these definitions (assuming MPCF > 1), the setpoint would correspond to a concentration less than the concentration in the Decant Line, resulting in continuous alarm. The definitions should be corrected and clarified. (4.1)

4.* To be consistent with the recommendation of NUREG-0473, Technical Specification Table 4.11.1.1-1 should show the CWR Decant Line as requiring sampling and analysis. (4.1)

5.* To be consistent with the recommendation of NUREG-0473, TS 3.3.7.12 should not exclude the offgas monitoring system from the requirement that the setpoint be determined in accordance with the methodology and parameters of the ODCM, and TS Table 3.3.7.12-1 should require that the offgas monitor provide automatic termination of release. Also, the meaning of the entries in TS Table 3.3.7.12-1 should be clarified with a statement that all of the required monitors provide an alarm function. This table now indicates that only two of the seven monitors provide alarm. (4.2)

6. The last paragraph of Section 3.3.2 should be rewritten to state that the total body dose rate is a higher fraction of the dose rate limit than the skin dose rate, not that the total body dose rate is higher than the skin dose rate. The justification for this statement should be added to the ODCM. (4.2)

7. The values of R_i in Eq. 3.9 should be identified as those for the thyroid. (4.4)

8. In Section 3.6, the specification of the frequency at which evaluations of the offsite dose rates are required should mention

the sampling and analysis requirements of Notation c of TS Table 4.11.2.1.-1. (4.4)

9. The meaning of the term "release period" should be clarified in Section 2.5. For batch releases it should be stated whether it refers to the time for an individual batch release or the entire time for which the dose is being calculated; i.e., 31 days, calendar quarter, or calendar year. (4.5)

10. Section 2.5 should require that the cumulative dose contributions from liquid effluents for the current calendar year and the current calendar year be determined at least once per 31 days. (4.5)

11. Section 4.2.2 should contain a commitment to describe the methods used to evaluate doses due to direct radiation from the site in any report containing direct doses due to atypical conditions (as identified in the ODCM). (4.9)

Category C:

The items in this category indicate omissions and editorial deficiencies that are not likely to cause significant problems:

1. The discussion in Section 2.3.1 should indicate the reason for using DF for the total dilution flow in Eq. 2-5 instead of (DF + KR) which is used in Eq. 2-1. (4.1)

2. The first sentence of Section 3.7.1 should refer to TS 4.11.2.2 instead of TS 3.11.2.2, and should specify the frequency at which periodic assessment is required; i.e., at least once per 31 days. (4.6.1)

3. The reference to "Appendix C" in Section 3.7.2 should read "Appendix B." (4.6.1)

4. The first sentence of Section 3.8.1 should refer to TS 4.11.2.3 instead of TS 3.11.2.3, and specify the frequency at which periodic assessment is required; i.e., at least once per 31 days. (4.6.2)

5. The definition D_{aop} for Eq. 3-14 does not need to include the total body as an organ. (4.6.2)

6. Table 4.0-2 should include a complete set of values for all applicable pathways, or default values of Regulatory Guide 1.109 should be referenced for those not furnished. (4.9)

Category D:

The following item concern methodology and parameters that the licensee may wish to change because the change may simplify calculations, remove unnecessary conservatism in the calculations, or make use of recent data:

1. The value of MPCF determined using Eq. 2-2 is more conservative than required, because dissolved and entrained noble gases are included in the calculation with MPC_i = 2E-04 uCi/ml.. This is not necessary, since the limit on dissolved and entrained noble gases is independent of the limit on other radionuclies. (4.1)

2. The presence of Eq. 4-2 in Section 4.2.1 implies that the skin is considered an organ for the purpose of assessing compliance with 40 CFR 190. This equation should be removed, since the skin is specifically excluded by 40 CFR 190. (4.9)