

APPENDIX D

EVALUATION OF LICENSEE-REPORTED REVISIONS TO ODCM

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D.1. EVALUATION OF LICENSEE-REPORTED REVISIONS TO ODCM

The Licensee has made numerous changes to the existing ODCM that was issued by the Licensee on January 20, 1981 and approved by NRC on November 16, 1982.* These changes appeared as Revisions 0 through 5 to the ODCM in the Semiannual Radioactive Effluent Release Report as issued by the Licensee in the second 6 months of 1984; no changes were made in both of the two semiannual reports for the first 6 months of 1984 and 1985.

Additional changes were reported on October 10, 1985 when the Licensee submitted the complete ODCM, Revision 6, which has been approved internally by the Licensee's Plant Safety Review Committee (PSRC) and became effective on September 27, 1985. It is this ODCM (Rev. 6) that has been reviewed for this report. The result of the evaluation is intended to be a standalone document, and is given in the following attachment as Supplement A to Appendix D.

*Letter from A. Schwencer (NRC/DL) to J. P. McGaughy, Jr. (MP&L), November 16, 1982.

SUPPLEMENT A

TO

APPENDIX D

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1. INTRODUCTION

1.1 PURPOSE OF REVIEW

The purpose of this document is to review and evaluate the Offsite Dose Calculation Manual (ODCM), updated through September 27, 1985, as revised by the Grand Gulf Nuclear Station Unit 1 since January 12, 1982 [1] when the ODCM* was issued by the Licensee, which was subsequently approved by the NRC [2].

The ODCM is a supplementary document for implementing the Radiological Technical Specifications (RETS) in compliance with 10CFR50, Appendix I requirements [3].

1.2 SCOPE OF REVIEW

As specified in NUREG-0472 [4] and NUREG-0473 [5], the ODCM is to be developed by the Licensee to document the methodology and approaches used to calculate offsite doses and maintain the operability of the effluent system. As a minimum, the ODCM should provide equations and methodology for the following topics:

- o alarm and trip setpoint on effluent instrumentation
- o liquid effluent concentration in unrestricted areas
- o gaseous effluent dose rate at or beyond the site boundary
- o liquid and gaseous effluent dose contributions
- o liquid and gaseous effluent dose projections.

In addition, the ODCM should contain flow diagrams, consistent with the systems being used at the station, defining the treatment paths and the components of the radioactive liquid, gaseous, and solid waste management systems. A description and the location of samples in support of the environmental monitoring program are also needed in the ODCM.

1.3 PLANT-SPECIFIC BACKGROUND

On behalf of Grand Gulf Nuclear Station Unit 1, the Mississippi Power and Light Company submitted changes to the existing ODCM [1] in the Semiannual

*The original ODCM was dated January 20, 1981, and was revised through January 12, 1982.

Radioactive Effluent Release Reports issued by the Licensee. The Licensee issued Revision 5, which incorporated previous changes in Revisions 0 through 4, of the ODCM in the second 6 months of 1984 [7]. No changes were made by the Licensee in the first 6 months of either 1984 [6] or 1985 [8].

An additional revision (Revision 6) of the ODCM was later submitted independently by the Licensee on October 10, 1985 [9].

The Licensee's Semiannual Reports and the changes of the ODCM were transmitted to an independent review team at the Franklin Research Center (FRC) for review. The review was subsequently conducted by FRC, and the results and conclusions of the ODCM evaluation are presented in Sections 3 and 4 of this document.

2. REVIEW CRITERIA

Review criteria for the ODCM were provided by the NRC in three documents:

NUREG-0472 [4], RETS for PWRs

NUREG-0473 [5], RETS for BWRs

NUREG-0133 [11], Preparation of RETS for Nuclear Power Plants.

In the ODCM review, the following NRC guidelines are used: "General Contents of the Offsite Dose Calculation Manual," Revision 1 [10], and NUREG-0133 [11]. Regulatory Guide 1.109 [12] also provides technical guidance for the review. The ODCM format is left to the Licensee and may be simplified by tables and grid printouts.

3. EVALUATION

The Licensee has followed the methodology of NUREG-0133 [11] to determine the alarm and trip setpoints for the liquid and gaseous effluent monitors, which ensures that the maximum permissible concentrations (MPC), as specified in 10CFR20, will not be exceeded by discharges from various liquid or gaseous release points. To augment conservatism in the case of simultaneous releases, the Licensee has introduced conservative safety factors for liquid and gaseous effluent setpoint calculations. The Licensee's method for setpoint calculations meets the guidelines of NUREG-0133.

The Licensee demonstrated the method of calculating the radioactive liquid concentration by describing in the ODCM the means of collecting and analyzing representative samples prior to and after releasing liquid effluents into the circulating water discharge. The method provides for liquid effluent concentration added assurance of compliance with 10CFR20 for liquid effluent releases, and thus satisfies the guidance specified by NUREG-0133.

Methods are also included for showing that dose rates at or beyond the site boundary due to noble gases, iodine-131, iodine-133, tritium, and particulates with half-lives greater than 8 days are in compliance with 10CFR20. In this calculation, the Licensee has considered effluent releases from the building ventilation systems; those releases are being treated as ground level. The Licensee has made a commitment to use the highest annual average values of relative concentration (X/Q) and relative deposition (D/Q) to determine the controlling locations. The revised value for (X/Q) is 4.537×10^{-6} (sec/m³) inside the site boundary and at the west-northwest sector.*

The Licensee intends to use the maximally exposed individual and the critical organ as the reference receptor. The Licensee has also considered pathways from inhalation, food, and ground-plane deposition, although the ingestion pathways from food and ground-plane deposition are not strictly required for gaseous dose rate calculations. The Licensee has demonstrated

*The highest annual average X/Q for the Grand Gulf Nuclear Station site boundary or unrestricted areas inside the site boundary is Hamilton Lake (west-northwest, 0.75 miles).

that the described methods and relevant parameters have followed the conservative approaches provided by NUREG-0133 and Regulatory Guide 1.109 for liquid effluent dose rate calculations.

Evaluation of the cumulative dose is to ensure that the quarterly and annual dose design objectives specified in RETS are not exceeded.

For liquid releases, the Licensee has identified fish consumption as the viable pathway. In the calculation, the Licensee has used near-field and far-field dilution factors specific to the plant; all other key parameters follow the suggested values given in Regulatory Guide 1.109. As in the case of dose rate calculation, the Licensee has used the maximally exposed individual as the reference receptor. To correctly assess the cumulative dose, the Licensee intends to estimate the dose once per 31 days. These approaches to liquid dose calculations satisfy the guidance specified by NUREG-0133.

Evaluation of the cumulative dose from noble gas releases includes both beta and gamma and air doses at and beyond the site boundary. The critical organs under consideration are the total body and skin for gamma and beta radiation, respectively. Again, discrepancies were found in the (X/Q) values used by the Licensee for the controlling locations.

For iodine-131, iodine-133, tritium, and particulates with half-lives greater than 8 days, the Licensee has provided a method to demonstrate that cumulative doses calculated from the release meet both quarterly and annual design objectives. The Licensee has demonstrated a method of calculating the dose using maximum annual average (X/Q) values for the inhalation pathway and has included (D/Q) values for the food and ground-plane pathways. The Licensee's approaches are consistent with the methodology of NUREG-0133.

The Licensee, however, has not demonstrated a procedure to project the monthly dose and to ensure that the design objectives for the liquid radwaste system and the ventilation exhaust system are not exceeded, as specified by the Licensee's Technical Specifications 3.11.1.3 and 3.11.2.5.

Adequate flow diagrams defining the effluent paths and components of the radioactive liquid and gaseous waste treatment systems have been provided by the Licensee. Radiation monitors specified in the Licensee-submitted RETS are also properly identified in the flow diagrams. The information provided by the Licensee has satisfactorily met the guidance of NUREG-0133. However, the Licensee should upgrade the quality of the diagrams so that their legibility in the submittal is substantially improved.

The Licensee has provided a description of the revised sampling locations in the ODCM and has identified them in Table 4.0-1 and also in Figures 4.0-1a through 4.0-1c of the revised versions. These changes are consistent with the sampling locations specified in the Licensee's RETS Table 3.12.1-1 on environmental monitoring, and thus satisfies the guidance of NUREG-0133.

The Licensee, however, has not specifically addressed the total dose (40CFR190 requirement), including direct radiation from the uranium fuel cycle sources, as specified by the Licensee's Technical Specification 3.11.4.

In summary, the Licensee's ODCM and the revised changes use documented and approved methods that are generally consistent with the methodology and guidance in NUREG-0133, and therefore is an acceptable reference.

4. CONCLUSIONS

The Licensee's Revision 6 of the Offsite Dose Calculation Manual, as submitted to the NRC on October 10, 1985 [9], uses documented and approved methods and is consistent with the criteria of NUREG-0133, except for the following discrepancies:

- o The Licensee has not addressed the monthly dose projection requirements as specified by the Licensee's Technical Specifications 3.11.1.3 on liquid waste treatment and 3.11.2.5 on ventilation exhaust treatment.
- o The Licensee has not addressed the total dose (40CFR190) requirement, including direct radiation from the uranium fuel cycle source, as specified by the Licensee's Technical Specification 3.11.4.
- o The Licensee's flow diagrams describing the liquid and gaseous waste treatment systems are of poor legibility; the quality of the diagrams should be improved.

5. REFERENCES

1. Offsite Dose Calculation Manual for Grand Gulf Nuclear Station, Unit 1
Mississippi Power and Light Company
NRC Docket No. 50-416
Submittal of January 20, 1981
(Revised through January 12, 1982)
2. A. Schwencer (NRC/DL)
Letter to J. P. McGaughy (MP&L)
Subject: NRC/DL Approval of Grand Gulf ODCM and PCP
NRC Docket No. 50-416
November 16, 1982
3. Title 10, Code of Federal Regulations, Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion, 'As Low As Is Reasonably Achievable,' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents"
4. "Radiological Effluent Technical Specifications for Pressurized Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors
NRC, September 1982
NUREG-0472
5. "Radiological Effluent Technical Specifications for Boiling Water Reactors," Rev. 3, Draft", intended for contractor guidance in reviewing RETS proposals for operating reactors
NRC, September 1982
NUREG-0473
6. "Semiannual Radioactive Effluent Release Report - January 1 through June 30, 1984," Grand Gulf Nuclear Station Unit 1, Mississippi Power and Light Company
NRC Docket No. 50-416
7. "Semiannual Radioactive Effluent Release Report - July 1 through December 31, 1984," Grand Gulf Nuclear Stations Unit 1, Mississippi Power and Light Company
NRC Docket No. 50-416
8. "Semiannual Radioactive Effluent Release Report - January 1 through June 30, 1985," Grand Gulf Nuclear Stations Unit 1, Mississippi Power and Light Company
NRC Docket No. 50-416

9. L. F. Dale (MP&L)
Letter of Transmittal to H. R. Denton (FRC)
Subject: Offsite Dose Calculation Manual (Rev. 6) for Grand Gulf Nuclear
Station
October 10, 1985
10. "General Contents of the Offsite Dose Calculation Manual," Revision 1
Branch Technical Position, Radiological Assessment Branch
NRC, February 8, 1979
11. "Preparation of Radiological Effluent Technical Specifications for
Nuclear Power Plants, A Guidance Manual for Users of Standard Technical
Specifications"
NRC, October 1978
NUREG-0133
12. "Calculation of Annual Doses to Man from Routine Releases of Reactor
Effluents for the Purpose of Evaluating Compliance with 10CFR50,
Appendix I"
NRC, October 1977
Regulatory Guide 1.109, Rev. 1