



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATING TO ACCEPTANCE OF REVISION 2 TO THE

OFFSITE DOSE CALCULATION MANUAL (ODCM)

NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION UNIT NO. 1

DOCKET NO. 50-220

1.0 INTRODUCTION

On November 2, 1984 the staff issued Amendment No. 66 to Facility Operating License No. DPR-63 for the Nine Mile Point Nuclear Station Unit No. 1 (NMP-1). The amendment incorporated the Radiological Effluent Technical Specifications (RETS) into the NMP-1 Technical Specifications (TS). Section 6.9.1.e of the TS referenced an Offsite Dose Calculation Manual (ODCM) and prescribed the methods for its change.

2.0 EVALUATION

The docketed submittal on March 7, 1984 of an ODCM by Niagara Mohawk Power Corporation (licensee) received NRC approval by letter dated November 2, 1984 from R. A. Hermann to the licensee.

Since 1984, a number of changes have been made in the NMP-1 ODCM and reported to NRC in ODCM revisions in accordance with NMP-1 TS 6.9.1.e. The latest of these, Revision 2, dated February 1986 and submitted February 28, 1986, has been reviewed for us by Franklin Research Center (FRC) as part of our technical assistance contract program. Their report (the enclosed section from TER-C5506-595) provides their technical evaluation of the compliance of the Licensee's submittal with NRC criteria. The staff has reviewed this report, and agrees with the evaluation that the NMP-1 ODCM, Rev. 2, generally uses documented and approved methods that are consistent with the methodology and guidelines in NUREG-0133. Therefore, we conclude that this ODCM is an acceptable reference for use with NMP-1 TS 6.9.1.e on an interim basis. Although a number of discrepancies in the NMP-1 ODCM have been documented in the attached TER, the licensee has shown awareness of these items in the treatment provided them in the NMP-2 ODCM, Rev. 1 recently approved by the staff.

The NMP-1 ODCM Rev. 2 is a significantly different document from the NMP-2 ODCM, Rev. 1. The NMP-2 ODCM is a more extensive working document than the NMP-1 ODCM. It is well cross-referenced to the Technical Specifications and is extensive enough, containing sufficient background, authoritative information, and acceptable methodology for fulfilling the commitments of

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the TS. The approach used in the ODCMs for each plant should, however, be the same with only a few plant specific items different. Therefore, within 6 months, it is recommended that the licensee provide a revised ODCM for NMP-1 addressing the listed deviations and combining the NMP-1 and NMP-2 ODCMs into a single document using the NMP-2 ODCM as the model.

3.0 CONCLUSIONS

The NMP-1 ODCM, Rev. 2 is acceptable on an interim basis. The changes incorporated in Revs. 1 and 2 are in compliance with NMP-1 TS 6.9.1.e. Within 6 months, the licensee should revise the NMP-1 ODCM to address the listed deviations and combine the ODCMs for the two units into a single document using the NMP-2 ODCM as a model.

Principal Contributor: W. Meinke

Dated: August 22, 1986



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APPENDIX D

EVALUATION OF LICENSEE-REPORTED REVISIONS TO ODCM



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

The Licensee has made numerous changes to the existing ODCM that was submitted by the Licensee on March 7, 1984 and approved by NRC on November 2, 1984.* These changes appeared in a complete, revised ODCM (Rev. 2) submitted in the Semiannual Radioactive Effluent Release Report as issued by the Licensee in the second 6 months of 1985; no changes were made to the ODCM by the Licensee during 1984. This revised ODCM has been approved internally by the Licensee's Site Operations Review Committee (SORC) on February 26, 1986.

It is this revised ODCM (Rev. 2) that has been reviewed for this report. The result of the evaluation is intended to be a stand-alone document, and is given in the following attachment as Supplement to Appendix D.

*Letter from R. A. Herman (NRC/DL) to B. G. Hooten (NMPC), November 2, 1984.



SUPPLEMENT

TO

APPENDIX D

EVALUATION OF LICENSEE-REPORTED REVISIONS TO THE ODCM

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1. INTRODUCTION

1.1 PURPOSE OF REVIEW

The purpose of this document is to review and evaluate revisions or updates made to the Nine Mile Point Unit 1 Offsite Dose Calculation Manual (ODCM), through December 31, 1985, as reported in the Licensee's Semiannual Radioactive Effluent Release Reports. These changes update the Licensee's ODCM from the one originally submitted on March 7, 1984 [1] and subsequently approved by NRC by letter dated November 2, 1984 [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 Nine Mile Point Nuclear Station Unit 1, the Niagara Mohawk Power Corporation submitted revisions to the existing ODCM [1] in the Semiannual Radioactive Effluent Release Reports issued by the Licensee. The



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Licensee issued Revision 1 of the ODCM in the first 6 months [8] and Revision 2 in the second 6 months [9] of 1985; no changes were made by the Licensee for 1984 [8].

The Licensee's Semiannual Reports and the revisions 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. It is the latest ODCM (Rev. 2) that was reviewed for this report.



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2. REVIEW CRITERIA

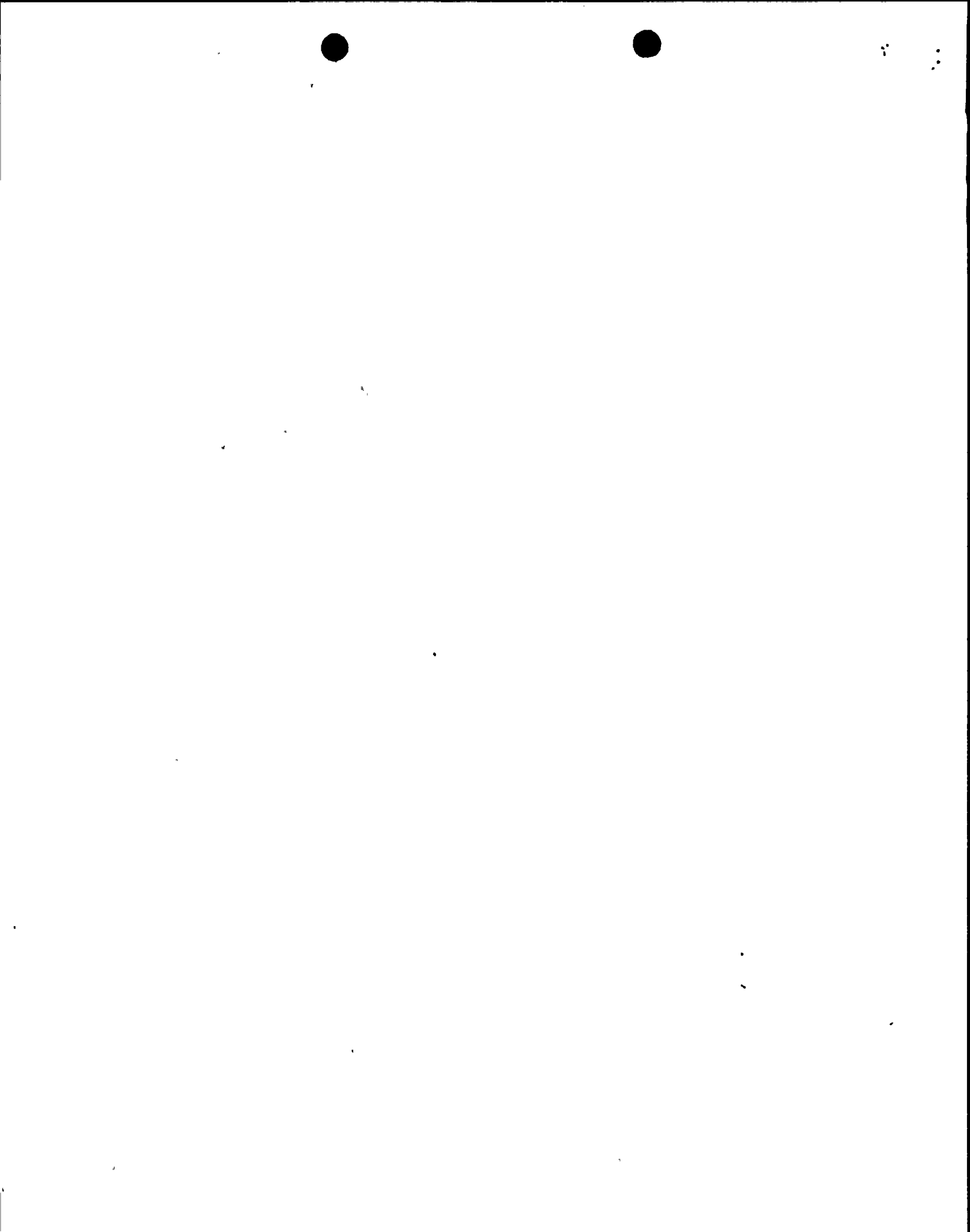
Review criteria for the ODCM were provided by the NRC in three documents:

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, as specified in 10CFR20, will not be exceeded by discharges from various liquid or gaseous release points. The Licensee's method for setpoint calculations meets the guidelines of NUREG-0133. The Licensee, however, has not considered situations when simultaneous discharges are made for liquid effluent releases.

The Licensee has not provided a 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, per the Licensee's newly implemented Technical Specification Section 4.6.15.a (effective January 1, 1985).

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 main stack (stack height 350 ft); those releases are being treated as elevated 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 2.4×10^{-6} for (sec/m³) at the site boundary. The Licensee, however, has not considered the direct radiation contribution from exposure to the finite plume of the elevated stack release, per the method described in NUREG-0133. 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 and ground-plane deposition, although the ground-plane deposition is not strictly required for gaseous dose rate calculations. The Licensee has demonstrated that the described methods and relevant parameters have followed the conservative approaches provided by NUREG-0133 and Regulatory Guide 1.109 [12] for liquid effluent dose rate calculations. However, since the Licensee has not included iodine-133 in the sampling analysis program (Table 4.6.15-2 of the newly implemented RETS), a statement should be added to record the method to estimate for iodine-133 for the dose rate calculation, in accordance with the NRC Branch Technical Position [13].



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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 the suggested key parameters 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. The Licensee, however, has not included the exposure from the finite plume of the elevated main stack.

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 has identified the controlling locations at the cow milk pathway at 2.6 miles in the southeast sector. The Licensee's approaches are consistent with the methodology of NUREG-0133. As in the case for dose rate calculation, the Licensee should also record the method to estimate for iodine-133 for dose calculation.

The Licensee has not demonstrated a procedure to determine the monthly dose and to ensure that the design objectives for the liquid radwaste system and the ventilation exhaust system are not exceeded, as per Licensee's Technical Specification 4.6.16.a (effective January 1, 1985).

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, improvement in legibility of these diagrams is still needed.



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The Licensee has provided a description of the revised sampling locations in the ODCM and has identified them in Table 5.1 and also in Figures 5.1-1 through 5.1-2 of the revised version. These changes are consistent with the sampling locations specified in the Licensee's RETS Table 3.6.20-1 on environmental monitoring, and thus satisfies the guidance of NUREG-0133.

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.



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4. CONCLUSIONS

The Licensee's Revision 2 (dated February 26, 1986) to the existing Offsite Dose Calculation Manual [1], submitted by the Licensee in the Semiannual Radioactive Effluent Release Reports for the period of January 1, 1984 through December 31, 1984, uses documented and approved methods and is consistent with the criteria of NUREG-0133, except for the following discrepancies:

- o In Sections 2.1.2 and 2.1.3 of the submittal, the Licensee has mistakenly designated the dilution factor as $\frac{C_i}{MPC_i}$, which should be $\frac{C_i}{MPC_i}$.
- o The Licensee has not considered simultaneous discharges for liquid setpoint calculation.
- o The Licensee has not provided methodology and parameters for liquid concentrations to demonstrate compliance with 10CFR20 limits, in accordance with the Licensee's Technical Specification Section 3.6.15.a (effective January 1, 1985).
- o The Licensee has not considered the exposure components from the elevated main stack for the following subjects: alarm setpoints, dose rate, and cumulative noble gas dose calculations.
- o The Licensee states that the highest (X/Q) is 1.5×10^{-6} (sec/m³). Table 3-1 of the submittal, however, indicates a higher value, i.e., 2.4×10^{-6} (sec/m³).
- o The Licensee has not provided a method to calculate the direct dose for demonstrating compliance with the total dose (40CFR190) requirement.
- o The Licensee did not provide a section to describe the methodology for monthly liquid dose projection per the Licensee's Technical Specification Section 3.6.16.a (effective January 1, 1985).
- o Improvement in legibility is needed for the Licensee's radwaste treatment flow diagrams with concise explanations are preferred.
- o To demonstrate that the Licensee's Technical Specification Section 3.6.15.b(3) is met, the surveillance requirements specify that the sampling and analysis program be implemented according to Table 4.6.15-2 of the specification. Since the Licensee has not included I-133 in such a program, a method is needed in the ODCM for estimating the release of I-133.



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5. REFERENCES

1. Offsite Dose Calculation Manual for Nine Mile Point Nuclear Station Unit 1, Rev. 0
Niagara Mohawk Power Corporation
NRC Docket No. 50-220
March 7, 1984
2. R. A. Hermann (NRC/DL)
Letter to B. G. Hooten (NMPC)
Subject: NRC/DL Approval of Nine Mile Point ODCM
NRC Docket No. 50-220
November 2, 1984
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," Nine Mile Point Nuclear Station Unit 1, Niagara Mohawk Power Corporation
NRC Docket No. 50-220
August 21, 1984
7. "Semiannual Radioactive Effluent Release Report - July 1 through December 31, 1984," Nine Mile Point Nuclear Station Unit 1, Niagara Mohawk Power Corporation
NRC Docket No. 50-220
April 26, 1985
8. "Semiannual Radioactive Effluent Release Report - January 1 through June 30, 1985," Nine Mile Point Nuclear Station Unit 1, Niagara Mohawk Power Corporation
NRC Docket No. 50-220
August 23, 1985
9. "Semiannual Radioactive Effluent Release Report - July 1 through December 31, 1985," Nine Mile Point Nuclear Station Unit 1, Niagara Mohawk Power Corporation
NRC Docket No. 50-220
April 26, 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
13. W. P. Gamill/F. Congel (NRC)
Memo to ETSB/RAB (NRC)
"Radiological Effluent Technical Specifications (RETS) Provisions for
I-133"
November 29, 1982



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