February 22, 1988

Docket No. 50-298

Mr. George A. Trevors, Division
Manager - Nuclear Support
Nebraska Public Power District
Post Office Box 499
Columbus, Nebraska 68601

Dear Mr. Trevors:

SUBJECT: COOPER NUCLEAR STATION OFFSITE DOSE ASSESSMENT MANUAL (TAC NO. 64801)

By letter dated February 4, 1987, you forwarded a Semiannual Effluent Report containing revisions to the CNS Offsite Dose Assessment Manual (ODAM). Our contractor, the Idaho National Engineering Laboratory (INEL), has reviewed the revised ODAM for conformance to staff guidance on preparation of Offsite Dose Calculation Manuals. A copy of the INEL Technical Evaluation Report (TER) is enclosed. You are requested to review the TER and address the inconsistencies and deficiencies identified in Section 4.

Your response is requested within six months of this date. If you have any questions, please contact me at 301-492-1336.

The reporting and/or recordkeeping requirements contained in this letter affect fewer than ten respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

/S/

William O. Long, Project Manager
Project Directorate - IV
Division of Reactor Projects - III,
IV, V and Special Projects

Enclosure:
As stated

cc w/enclosure:
See next page

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# APPENDIX D

## Evaluation of Changes to the ODCM

(Cooper Nuclear Station)

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## D.1 EVALUATION OF CHANGES TO THE ODCM

The Nebraska Public Power District (NPPD) prepared an Offsite Dose Assessment Manual (ODAM) for the Cooper Nuclear Station (CNS). The Cooper Nuclear Station submitted the Offsite Dose Assessment Manual (ODAM) dated January 1984 to the Nuclear Regulatory Commission (NRC) with letter dated March 7, 1984.[1] The NRC found it to be an acceptable reference as stated in NRC letter dated December 24, 1984.[2]

A revised ODAM dated May 1986 was submitted by the Licensee to the NRC in the Semiannual Operating Report for the second half of 1986 with letter dated February 4, 1987.[3] The NRC forwarded the revised ODAM to the Idaho National Engineering Lab tory (INEL) for review. The ODAM was reviewed and the results and conclusions are presented in the supplement to this appendix.

## D.4 REFERENCES


1. Letter from J. M. Pilant (NPPD) to D. B. Vassallo (NRC), Subject: Proposed Change No. 7 to Technical Specifications Radiological Effluent Technical Specifications (RETS) Cooper Nuclear Station, March 7, 1984.

2. Letter from E. D. Sylvester (NRC) to J. M. Pilant (NPPD), Subject: Acceptance of Offsite Dose Calculation Manual (ODCM) for Cooper Nuclear Station, December 24, 1984.

3. Letter from G. A. Trevors (CNS) to U. S. Nuclear Regulatory Commission, Subject: Semiannual Operating Report-Radioactive Effluents Cooper Nuclear Station, July 1, 1986 through December 31, 1986, February 4, 1987.

SUPPLEMENT 1

to

APPENDIX D

EVALUATION OF CHANGES TO THE ODCM

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# 1. INTRODUCTION

## Purpose of Review

This document reports the review and evaluation of the revised Offsite Dose Assessment Manual (ODAM) submitted to the Nuclear Regulatory Commission (NRC) by the Nebraska Public Power District, the Licensee for the Cooper Nuclear Station (CNS). The ODAM is a supplementary document for implementing the Radiological Effluent Technical Specifications (RETS) in compliance with 10 CFR 50, Appendix I requirements.[1]

## Plant-Specific Background

The Nebraska Public Power District (NPPD) submitted an ODAM dated January 1984 to the NRC with letter dated March 7, 1984.[2] The NRC found the ODAM to be an acceptable reference as stated in NRC letter dated December 24, 1984.[3]

Changes to the approved ODAM were reported in the Semiannual Operating Report for the second half of 1986 to the NRC with letter dated February 4, 1987.[4] The NRC forwarded the revised ODAM dated May 1986 to the INEL for review. The ODAM was reviewed as a whole and the results and conclusions are presented in this Supplement.

## 2. REVIEW CRITERIA

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

NUREG-0472, RETS for PWRs[5]
NUREG-0473, RETS for BWRs[6]
NUREG-0133, Preparation of RETS for Nuclear Power Plants.[7]

The following NRC guidelines were also used in the ODAM review: Branch Technical Position, "General Contents of the Offsite Dose Calculation Manual," Revision 1[8], and Regulatory Guide 1.109.[9]

As specified in NUREG-0472 and NUREG-0473, the Offsite Dose Calculation Manual (which NPPD calls their ODAM) is to be developed by the Licensee to document the methodology and approaches used to calculate offsite doses and maintain the operability of the radioactive effluent systems. As a minimum, the ODAM should provide equations and methodology for the following:

- Alarm and trip setpoints on effluent instrumentation
- Liquid effluent concentrations in unrestricted areas
- Gaseous effluent dose rates at or beyond the site boundary
- Liquid and gaseous effluent dose contributions
- Liquid and gaseous effluent dose projections.

In addition, the ODAM 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 ODAM.

## 3. EVALUATION

The Cooper Nuclear Station is a single unit nuclear site. As stated in the introduction of the ODAM, the manual " describes acceptable methods of calculating radioactivity concentrations in the environment and the potentially resultant personal dose equivalent commitment offsite that are associated with LWR liquid and gaseous effluents" at the Cooper Nuclear Station.

Liquid Effluent Pathways

The Cooper Nuclear Station is located on the west bank of the Missouri River near Brownville, Nebraska. Liquid effluents are discharged with the once-through condenser cooling water into the river. The liquid radwaste system for the Cooper Nuclear Station was designed to accept processed wastes from two nuclear units. It is thus larger than would normally be necessary for the single unit currently in operation. The liquid effluent treatment system is divided into two systems: the liquid radwaste treatment system and the augmented liquid radwaste treatment system. They are operated as batch systems, and the operating procedures are based on batch processing throughout the systems. Liquids with radioactivity levels exceeding specified limits are recycled for further processing. The systems are diagrammed in Figure 3.1A of the ODAM.

The principal feed sources to the liquid radwaste treatment system are the following:

Waste Collector and Surge Tanks
Laundry Waste Tanks

Effluents from the above sources are processed in the liquid radwaste treatment system and are stored in the waste sample tanks.

The principal feed sources to the augmented liquid radwaste treatment system are the following:

Floor Drain Collector Tank
Lab Drain Tanks
Chemical Waste Tank

Effluents from these sources are processed in the augmented liquid radwaste treatment system and are stored in the floor drain sample tank.

Radwastes from either system are analyzed for gross beta/gamma activity and the resulting specific activity is used to determine the discharge flow prior to release. Alternate methodologies are presented for release without prior analysis and for continuous releases. Figure 3.1A of the ODAM shows that discharges from the two separate radwaste treatment systems are released to a common header where they are monitored for radiation. According to Technical Specification Table 3.21.A.1, the radiation monitor provides alarm and automatic isolation for the liquid radwaste effluent line. The liquid radwaste effluents are released to the discharge canal for subsequent discharge into the Missouri River. During liquid releases, the flow rates, and radiation levels are continuously recorded. Therefore, the flow control valves and the radiation monitors are the primary methods for controlling discharges from the liquid radwaste system.

In addition to radioactivity releases from the radwaste treatment system, Technical Specification Table 3.21.A.1 identifies a service water effluent line. Service water effluents are monitored for radiation with a monitor that provides alarm function only.

Liquid Effluent Monitor Setpoints

ODAM Section 2.3.1 contains the methodology for determining the setpoints for the liquid radwaste radiation monitor. The setpoint is calculated at the radioactivity level at which the effluent would exceed the concentration limits of the technical specification. The ODAM states "a monitor may be set to alarm or trip at a lower activity concentration than the calculated setpoint". According to Table 3.2.D note C of the Technical Specifications, the monitor provides alarm and automatic isolation of release, whereas, Section 2.3 of the ODAM indicates the monitor provides alarm function only. The description in the ODAM should be consistent with the requirements of the technical specifications.

ODAM Section 2.3.2 contains the methodology for determining the setpoints for the service water radiation monitor. According to Table 3.21.A.1 of the Technical Specifications, alarm only is provided for the service water effluent line. There is no diagram showing where the service water effluents discharge into the environment.

The methodology described in Section 2.3 of the ODAM for determining the setpoints for the liquid radwaste and service water monitors is, in general, in agreement with the guidelines of NUREG-0133 to provide reasonable assurance that the concentration limits of Technical Specification 3.21.B.1.a will not be exceeded.

Gaseous Effluent Pathways

There are five monitored environmental gaseous effluent release points at the Cooper Nuclear Station:

Main Stack (Elevated Release Point)
Radwaste Building Vent
Augmented Radwaste Building Vent
Turbine Building Vent
Reactor Building Vent

The technical specifications identify noble gas monitors and iodine and particulate samplers installed at each release point to survey gaseous effluent releases. Each release point is continuously surveyed during release of noble gases. Upon experiencing a condition of high radiation, the noble gas monitor will alarm in the main control room. The upscale alarm indicates high radiation and the downscale alarm indicates instrument failure. All gaseous effluent releases from the building vents are treated as ground level releases and the main stack releases are treated as elevated releases.

Gaseous Effluent Monitor Setpoints

Section 3.3 of the ODAM contains the methodology used to determine the setpoint for the noble gas radiation monitor at the main condenser air ejector. The setpoint is set to a value corresponding to a radioactive discharge release rate of 1 Ci/sec. The methodology is, in general, in agreement with the guidelines of NUREG-0133.

Section 3.4 of the ODAM contains the methodology to determine setpoints to monitor noble gas effluents at the environmental release points. Section 3.4.1 contains methodology to determine the setpoints based on dose rates and Section 3.4.2 contains methodology to determine the setpoints based on concentrations. It is not clear which method is actually used to determine the setpoints.

In Section 3.4.1, simultaneous releases from all noble gas release points are not considered when determining each monitor's setpoint. Although a factor P is included to allow adjusting the setpoint to a value less than the calculated value, the factor does not include consideration for simultaneous releases. Also, it is not clear how the total body dose conversion factors for the stack release in Table 3-3 are determined. Without consideration of simultaneous releases, it is uncertain if the methodology will provide reasonable assurance that the dose rate limits of Technical Specification 3.21.C.1.a will not be exceeded.

Section 3.4.2 of the ODAM contains methodology to determine noble gas monitor setpoints based on concentrations. However, the technical specification identifies offsite dose rate limits instead of offsite concentrations. Although the methodology is, in general, in agreement with the guidelines of NUREG-0133 and should provide reasonable assurance that the concentration limits of 10 CFR 20 will not be exceeded, it is not clear why the concentration method is included.

Concentrations in Liquid Effluents

Sections 2.2 and 2.4 of the ODAM contain the methodology for demonstrating that the radionuclide concentrations in the liquid radwaste effluents are in compliance with Technical Specification 4.21.B.1.b. The technical specification requires that measured radioactivity concentrations in liquid releases be evaluated to verify that the average concentration complies with Specification 3.21.B.1.a when "Sr-89, Sr-90 and Fe-55 concentrations are averaged over no more than 3 months and other radionuclide concentrations are averaged over more than 31 days". As written, the technical specification for "other radionuclides" does not require compliance to instantaneous concentrations as recommended in NUREG-0473.

The methodology in Section 2.2 is acceptable for calculating the average concentrations required by Technical Specification 4.21.B.1.b.

Section 2.4 of the ODAM contains methodology for expressing the average concentrations as a fraction of the allowed limit at the unrestricted area boundary. The methodology is not acceptable since the expression in Section 2.4 is not mathematically correct. The expression should be:

$$FMPC = \frac{\sum_k \frac{Q_{ki}}{MPC_i}}{3785 \sum_k F_k \, (TE\text{-}TB)_k}$$

Also TE-TB should be defined as the time interval for the $k^{th}$ release instead of the time interval for the period of interest. Also, the units of μCi should be included in the definition of $Q_{ki}$. Therefore, the methodology in Section 2.4 of the ODAM does not satisfy the requirements of Technical Specification 4.21.B.1.b.

Dose Rates in Gaseous Effluents

The dose rates due to the release of noble gases are assured to be within the dose rate limits of Technical Specification 3.21.C.1.a by correctly determining the setpoints for the noble gas monitors.

Section 3.10 of the ODAM contains the equations for determining the dose rate offsite due to iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days as specified in Technical Specification 3.21.C.1.b. The technical specification allows the dose rate due to these radionuclides to be averaged over no more than 31 days. There are two deficiencies identified in this section. It appears a factor of 8760 hours/year has been omitted from the equations and it is not clear how the $TA_{eani}$ values in Appendix A were determined. The equations in Section 3.10 are, in general, in agreement with the guidelines of NUREG-0133 and Regulatory Guide 1.109. However, with the two identified deficiencies it is uncertain if the methodology will provide reasonable assurance that the dose rate limit of Technical Specification 3.21.C.1.b will not be exceeded.

Dose Due to Liquid Effluents

Section 2.5 of the ODAM contains the methodology for determining the dose or dose commitment to a member of the public due to radioactive material released in liquid effluent to demonstrate compliance with the dose limits requirements of Technical Specification 3.21.B.2.a. According to Section 2.5 of the ODAM, "The requirement is satisfied by computing the accumulated dose commitment to the most exposed organ and to the total body of a hypothetical person exposed by eating fish taken from the river offsite near the discharge canal and drinking water taken from the river

three miles downstream. The age group potentially most exposed via eating fish is expected to be the adult, and the age group potentially most exposed via drinking water from the Missouri River is expected to be the infant." The dose will be calculated using the LADTAP code. The ODAM must identify the site specific parameters input to LADTAP.

The parameter $F_2$ must be defined as the average dilution flow of the discharge canal during the calculation period instead of the river flow during the period of release. Also, the conversion constant $3.785 \times 10^{-3}$ is not defined.

The pathway-to-dose transfer factors, $A_{eani}$, tabulated in Appendix A of the ODAM must be recalculated since the data are based on the methodology and values in Regulatory Guide 1.109 Revision 0 instead of the methodology and values in Revision 1. In addition, an attempt was made to verify the transfer factors using the methodology and parameters in Revision 0 and the majority of the results were not in agreement with those of the ODAM. Therefore, it is unclear how the transfer factors were calculated.

The Licensee should justify the dilution factor of five in the dose calculation for the fish consumption pathway. The dilution factor of five for the drinking water pathway is probably acceptable since the drinking water source in the Missouri River is known to be greater than three miles downstream from the discharge point.

Although the methodology for calculating doses due to the release of radioactivity in liquid effluents is, in general, in agreement with Regulatory Guide 1.109, Revision 1, the identification of the aforementioned discrepancies makes it uncertain if the calculated doses will be assured to be within the limits of Technical Specification 3.21.B.2.a

Dose due to Gaseous Effluents

Sections 3.5 and 3.6 of the ODAM contain the methodology for calculating the cumulative gamma and beta dose to air due to the release of radioactive noble gases to demonstrate compliance with the dose limits of Technical Specification 3.21.C.2.a. The air doses are calculated in accordance with Regulatory Guide 1.109, Revision 1 using NRC computer code GASPAR. However, the site specific parameters input to GASPAR must be identified in the ODAM. An alternate method of calculation is also provided which is in agreement with the guidelines of NUREG-0133. With the exception of identifying the GASPAR parameters, the methodology for calculating the maximum dose to air due to the release of radioactive noble gases is, in general, in agreement with Regulatory Guide 1.109, Revision 1, to provide reasonable assurance that the dose limits of Technical Specification 3.21.C.2.a will not be exceeded.

Section 3.7 of the ODAM contains the methodology for calculating the cumulative dose due to the release of I-131, I-133, tritium, and radionuclides in particulate form with half-lives greater than eight days to demonstrate compliance with the dose limits of Technical Specification 3.21.C.3.a. In Section 3.7.1 the dose commitment to a person offsite associated with the release of radioactive material other than noble gases is calculated in accordance with Regulatory Guide 1.109, Revision 1 utilizing NRC computer code GASPAR. The site specific parameters input to GASPAR must be identified in the ODAM.

An alternate method is contained in Section 3.7.1. The dose factors for the ground plane pathway in Appendix A were verified. However, an unsuccessful attempt was made to verify randomly selected dose factors for the other pathways identified in Appendix A. Since, it is unclear how the dose factors were determined it is uncertain if the methodology will provide reasonable assurance that the dose limits of Technical Specification 3.21.C.3.a will not be exceeded.

Dose Projections

Technical Specification 3.21.B.2.c requires the liquid radwaste treatment system to be operated whenever the prerelease analysis indicates a radioactivity concentration in excess of 0.01 µCi/ml. Therefore, no dose projection is required to determine when to use the radwaste treatment system. However, Technical Specification 4.21.B.2.b requires dose projections at least one time during every 31 days if liquid radwaste is released and the radwaste treatment system is not operated. The dose projection is to project compliance with dose limit Technical Specification 3.21.B.2.a. The method for determining the dose projection in Section 2.6 of the ODAM should provide reasonable assurance of compliance to Technical Specification 4.21.B.2.b.

Section 3.9 of the ODAM contains the methodology for projecting doses due to the release of gaseous effluents to meet the organ dose projection requirements of Technical Specification 4.21.C.4.a. The introductory statement in Section 3.9 is not consistent with the technical specification in that it states air doses will be projected instead of organ doses. It also states the doses are required to be projected over a quarter which is not stated in the technical specification. Additionally, Technical Specification 3.21.C.4.b identifies a dose projection limit of 0.3 mrem to any body organ, however, this technical specification does not identify a time limit for the organ dose. Without a time limit in the technical specification and the inconsistencies in the ODAM, it is not clear if Section 3.9 satisfies the purpose for a dose projection.

Diagrams of Effluent Pathways

Simplified diagrams of the liquid and gaseous radwaste treatment systems are contained in Figure 3.1A and Figure 3-1 of the ODAM, respectively. Figure 3.1A of the ODAM should be modified to show the service water system effluent line and where it discharges into the discharge canal. A simplified diagram illustrating the solid waste treatment system is not included in the ODAM.

Total Dose

Section 4.2 of the ODAM contains the methodology for calculating the dose as required by Technical Specification 4.21.D.1 to assure compliance to the total dose limits of Technical Specification 3.21.D.1. The description contained in Section 4.2 is determined to be an acceptable method for demonstrating compliance to the technical specifications.

Environmental Monitoring Program

Section 5.0 of the ODAM contains the detailed description of the Radiological Environmental Monitoring Program. Information including the distance and direction for each and every sample identified in Table 3.21.F.1 of Technical Specification 3.21.F is contained in Appendix C of the ODAM. Maps of the environmental monitoring program are contained in Figures C-1 and C-2 in Appendix C. The maps, however, are illegible and should be replaced. In addition, there are discontinued sample location numbers included on the maps. The Environmental Monitoring Program described in the ODAM is consistent with the requirements of the Licensee's technical specifications.

Summary

In summary, the Licensee's ODAM uses documented and approved methods that are generally consistent with the methodology and guidance in NUREG-0133 and Regulatory Guide 1.109. However, because of the discrepancies identified in this review, it is recommended that the NRC request another revision to address the discrepancies.

## 4. CONCLUSIONS

The Licensee's ODAM dated May 1986 for the Cooper Nuclear Station was reviewed. It was determined that the ODAM uses methods that are, in general, consistent with the guidelines of Regulatory Guide 1.109. The methodology in most sections of the ODAM should provide reasonable assurance of compliance to the radiological effluent technical specifications. However, it is recommended that a revised ODAM be submitted to address the discrepancies identified in the review.

The following are considered to be major discrepancies:

- In Section 2.5, the dose will be calculated using the LADTAP code. The ODAM must identify the site specific parameters input to LADTAP.

- In Section 2.5, the pathway-to-dose transfer factors, $A_{eani}$, tabulated in Appendix A of the ODAM must be recalculated since the data are based on the methodology and values in Regulatory Guide 1.109 Revision 0 instead of the methodology and values in Revision 1.

- In Section 2.5, the parameter $F_2$ must be defined as the average dilution flow of the discharge channel during the calculation period instead of the river flow during the period of release.

- In Section 2.5, the Licensee should justify the dilution factor of five in the dose calculation for the fish consumption pathway.

- In Section 3.4, simultaneous gaseous effluent releases from the release points are not considered when determining each monitor's setpoint.

- In Section 3.5, the dose will be calculated using the GASPAR code. The ODAM must identify the site specific parameters input to GASPAR.

- In Section 3.10, it appears that a factor of 8760 hours/year has been omitted from both equations in the section.

- In Section 2.4, the equation for FMPC does not mathematically represent an average concentration for a time period expressed as a fraction of the allowed limit. The expression should be:

$$FMPC = \frac{\sum_{ki} \frac{Q_{ki}}{MPC_i}}{3.785 \sum_{k} F_k \, (TE-TB)_k}$$

- In Section 2.4, the time interval "TE-TB" should be defined as the time interval for the $k^{th}$ release instead of the time interval for the period of interest.

- In Table 3-3, it is not clear how the total body dose conversion factors were calculated for the stack releases.

- In Section 3.9, it is not clear how this section determines when to operate the Exhaust Ventilation Treatment System since Technical Specification 3.21.C.4.b does not clearly state the time period for the 0.3 mrem organ dose. NUREG-0473 recommends a time period of 31 days for the 0.3 mrem organ dose.

The following are additional discrepancies:

- In Section 2.5, the expression "$D_{ank}$" in the dose equations should be replaced by "$\Delta D_{ank}$" for consistency with the definition of "$\Delta D_{ank}$".

- In Section 2.5, the constant $3.785 \times 10^{-3}$ is not defined.

- In Section 2.4, the units of μCi should be included in the definition for $Q_{ki}$.

- Figure 3.1A should be modified to show the service water system effluent line and its point of discharge.

- In Section 3.4.2, the methodology for calculating the setpoints for the noble gas monitors is based on dose rates and is also based on maximum permissible concentrations. It is not clear why the concentration method is included since Technical Specification 3.21.C.1.a identifies the limits in dose rates.

- In Section 3.5, a summation symbol is omitted in the definition for $Q_{cvi}$.

- In Section 3.7.2, the expressions for deposition factors, $(D/Q)_s$ and $(D/Q)_v$ have units of $m^{-1}$ and should be replaced with $m^{-2}$.

- In Section 3.9, the projection to determine use of the Exhaust Ventilation Treatment system is based on air doses instead of organ doses as required by Technical Specification 3.21.C.4.b.

- In Section 3.10, the "$D_{ans}$" should be replaced with "$D_{anv}$" in the equation for calculating the dose rate from a ground-level release.

- In Section 3.10, the units for $TA_{eani}$ should be (mrem)per(Ci.sec)/(yr.$m^3$) instead of (mrem)per(Ci.sec)/($m^3$)

- The data tables in Appendix A are illegible.

- A simplified diagram illustrating the solid waste treatment system is not included in the ODAM.

- In Appendix C, the maps showing locations of samplers for the Environmental Radiation Monitoring Program are illegible and must be replaced. In addition, the maps include discontinued station numbers.

The following are not discrepancies in the ODAM, but are suggestions that should be brought to the attention of the Licensee:

- Section 2.3 of the ODAM indicates the radwaste monitor provides alarm function only whereas Table 3.21.A.1 of Technical Specification 3.21.A.1 states the monitor provides automatic isolation of release. The description in the ODAM should be consistent with the requirements of the technical specifications.

- Technical Specification 4.21.B.1.b allows averaging the concentrations from all batches released during a month instead of requiring that the concentrations from each batch released are within the technical specification limits. The technical specification should be rewritten to remove the provision for monthly averaging.

- Technical Specification 3.21.C.4.b should include a time limit for the 0.3 mrem dose to any organ.

## REFERENCES


1. 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."

2. Letter from J. M. Pilant (NPPD) to D. B. Vassallo (NRC), Subject: Proposed Change No. 7 to Technical Specifications Radiological Effluent Technical Specifications (RETS) Cooper Nuclear Station, March 7, 1984.

3. Letter from D. B. Vassallo (NRC) to J. M. Pilant (NPPD), Subject: Acceptance of Offsite Dose Calculation Manual (ODCM) for Cooper Nuclear Station, December 24, 1984.

4. Letter from G. A. Trevors (CNS) to U. S. Nuclear Regulatory Commission, Subject: Semiannual Operating Report-Radioactive Effluents Cooper Nuclear Station, July 1, 1986 through December 31, 1986, February 4, 1987.

5. "Radiological Effluent Technical Specifications for Pressurized Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors, NUREG-0472, September 1982.

6. "Radiological Effluent Technical Specifications for Boiling Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors, NUREG-0473, September 1982.

7. "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, A Guidance Manual for Users of Standard Technical Specifications," NUREG-0133, October 1978.

8. "General Contents of the Offsite Dose Calculation Manual," Revision 1 Branch Technical Position, Radiological Assessment Branch, NRC, February 8, 1979.

9. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I," Regulatory Guide 1.109, Rev. 1, October 1977.