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Docket Nos. 50-390
and 50-391

MEMORANDUM FOR: Docket Files

FROM: Peter S. Tam, Senior Project Manager
Project Directorate II-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

SUBJECT: WATTS BAR NUCLEAR PLANT - DOCUMENT PROVIDING OUTLINE OF TOPICS TO BE USED IN A CONFERENCE CALL (TAC M77553, M84410)

The enclosed five-page document, prepared by NRC contractor Douglas Akers, is docketed and made publicly available by this memorandum. The information will be used in an upcoming conference call with TVA on or around November 3, 1993.

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5 SUMMARY

Deficiencies and suggestions are summarized below in four categories of decreasing importance. The items in Category A identify the most series deficiencies, including omissions, that cause uncertainty whether the proper methodology is used in the ODCM. Category B contains deficiencies that are less series than Category A, 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.

Category A: The items in this category should be addressed promptly. Some items identify errors or emissions that result in erroneous calculated doses and dose rates. Others identify omissions or inappropriate values that may result in release rate limits being exceeded or reported doses being insufficiently documented.

1. The ODCM should be a stand alone document. The methodologies in the ODCM should be self contained, (e.g., one can duplicate the calculations in the ODCM using the information contained within.)

2. The source of equations used for calculating dose rates and doses should be explicit. There are differences between the calculations in NUREG 0133 and Regulatory Guide 1.109. The equations in NUREG 0133 are abbreviated from those in Regulatory Guide 1.109.

3. If any of the equations referenced in NUREG 0133, Regulatory Guide 1.109, and other approved methodology sources are modified, these modifications must be clearly explained with examples that illustrate the changes. Numerous cases have been specified where this was not the case.

4. The list of missing pages (4) has prevented completion of the review of the WBN ODCM.

5. The possibility of simultaneous batch release of radioactive liquid effluent is not discussed. (4.1) This needs to be clarified. If simultaneous batch releases are possible, the appropriates equations and calculations should be included in the ODCM.

6. Technical specification 3.11.2.7 requires that the quantity of radioactive gas in each gas storage tank at a PWR be limited to a predetermined curie content. It is not applicable to PWRs that use adsorption units for gas holdup, but is applicable for compresses gas storage and for cryogenic storage systems. It is not specified in the ODCM what type of gas storage is used at WBN. This needs to be addressed. If the gas storage is compressed gas or cryogenic, then a calculation showing that the curie limit will not result in a exposure greater than 0.5 rem at the nearest exclusion area boundary, if an uncontrolled release of the tank contents occurs, will be required. (4.6)

7. The symbols in the dose projection equation do not match the symbol definitions. This should be corrected promptly. (4.7)

8. The ODCM should include a detailed presentation of the calculational models used and a complete tabulation of all values assigned to each parameter. This is in general not the case. This should be corrected promptly.

9. The WBN ODCM does not contain an adequate discussion of liquid effluent concentrations and calculations. The methodologies of liquid effluent concentrations, calculations and examples should be specified in the ODCM. This needs to be addressed promptly.

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

1. Example calculations need to be included in the ODCM. These examples should illustrate plant specific values. These example calculations are used to verify that the equations used are correct.

2. For gaseous releases from stacks, the height of the stack should be specified in the ODCM. Are the stacks greater than 80 meters. The dose calculations are dependent on the height of the release point.

3. The setpoint calculations for both gaseous and liquid radioactive effluents use a factor called an administrative factor, such factors require justification and/or derivation and examples of how the setpoint results are changed by the administrative factors.

4. WBN ODCM does not indicate if the alarm and the automatic control trip are separate devices. If they are, the alarm/trip setpoint in the ODCM should list the separate trip setpoints. (4.2)

5. There are several references to flow paths that are not specified. These need to be clarified. Flow paths could be illustrated in a diagram. (4.1)

6. Table of liquid and gaseous effluent setpoint locations, setpoint identification and setpoint limits in numerical or symbolic form should be included.

7. ODCM Section 6.2.2.2, Continuous Release Monitor Setpoints, does no specify how or what the setpoint limits are. Setpoints for the continuous release points, the steam generator blowdowns and the turbine building sump monitors should normally be very low, because the water is not expected to be radioactive, unless there is a primary or secondary leak. It is recommended that the setpoints be a low multiple of detector background.

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

1. To improve readability, a numbering system should be used consistently for the equations. (4)

2. Use the word "use" instead of "utilize." This will improve readability of the document.

3. Understanding is improved if a list of acronyms and a list of symbols and notation conventions is included. (4)

4. A compiled list of references would increase clarity. (4)

5. The layout of the table of contents would be improved by placing the page numbers to the right of the contents. (4)

6. There are several errors or emissions in the tabular data. The time period that the data in table 7.6 should be specified in the table or its caption. (4.6) ODCM Section 7.4.1, Organ Dose Calculation, the first paragraph refers to Table 6.1 for χ/Q and D/Q values. This should be Table 7.1 (4.4) The following terms are undefined in Tables 9.1 and 9.2, PM, LM, and TRM. They should be listed in Table 9.2, Table Notation. (4.10)

7. There are several errors or emissions in the figures. In Figure 7.3 the vertical axis label "Fraction Remaining in Plume" should read "p Fraction Of Radionuclide Remaining In plume". (4.6) Figure 7.4 has the following undefined labels, A-G. Figures should have all labels described. Define the vertical axis symbol σ_z. this definition can be included in the figure caption. For example, σ_z is the vertical dispersion coefficient. (4.6)

8. The ODCM contains 4 diagrams, Figures 6.1, 6.2, 7.1, and 7.2, related to radioactive effluent treatment and release routes. However, the diagrams are difficult to read and rely on un-keyed abbreviations. Simplified flow diagrams defining the treatment paths and the components of the radioactive liquid and gaseous waste management systems should be used. Figures 1-5 in the INEL Watts Bar ODCM Technical Review are examples of simplified illustrations of radioactive effluent treatment and release routes. The complicated figures in WBN ODCM should be separated into several simpler illustrations.

9. ODCM Section 7.7.13, Inhalation Dose Factors, it is customary to place numerical constants factors in front of the left hand side of an equation. Move the numerical constant to the front of the left hand side of the equation. (4.6)

Category D: The following items 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. Many conversion factors are known to at least 5 or 6 significant digits, e.g., seconds to days, centimeters to feet, cubic feet per second to milliliters per second, etc. Standardized the number of significant digits, say 3 or 4 to represent conversion factors and other numerical constants if possible. Some of the regulation guides will report numerical constants and conversion factor with 2 or 3 significant digits. If the conversion

factor is stated, e.g. the number of seconds in a year, then the full precision can be provided.

2. Some conversion factors need to be cleaned up. In section 6.7.3 of WBN ODCM the number of hours in a year is stated as 8,760. This is based on a 365 day year. The length of one year is 365.2425 days or 8765.82, a 6 hour difference.

3. There is a data error in Section ODCM 6.7, Table 6.4 adult ingestion dose factors, for H-3 absorption in bone. Table 6.4 is a copy from Regulatory Guide 1.109, Table E-11. In Table E-11 no data is listed. It is not clear if the entry in Table 6.4 is new data. There is a note at the end of Table 6.4 that the tritium dose factor for bone is assumed to be equal to the total body dose factor. What is the bases for this?