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July 5, 1979

Mr. Roby B. Bevan, Jr.
Project Manager ORB-3
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: Quad-Cities Station Units 1 and 2
Revisions to ODCM (Offsite Dose
Calculation Manual)
NRC Docket Nos. 50-254 and 50-265

Dear Mr. Bevan:

As a result of the June 6, 1979 meeting between Commonwealth Edison Company and NRC Staff personnel, Commonwealth Edison has prepared responses to NRC comments at that meeting and a draft revision to the Quad-Cities Station Offsite Dose Calculation Manual (ODCM) for your review prior to our July 12, 1979 meeting. Attachment 1 contains Commonwealth Edison's responses to comments generated at the June 6, 1979 meeting and Attachment 2 contains a draft revision of the Quad-Cities ODCM.

One (1) signed original and five (5) copies of this letter and attachments are provided for your use.

Very truly yours,

William F. Naughton

William F. Naughton
Nuclear Licensing Administrator
Pressurized Water Reactors

Attachments (2)

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# Offsite Dose Calculation Manual

## Response to Comments Generated at CECo/NRC Meeting, Bethesda Md. June 6, 1979

1. Comment - Add a summary of the dose calculation techniques to Section 1.0, Introduction.

   Response - See revised Section 1.0.

2. Comment - Clarify the use of historical dispersion data by station operators in Section 3.1.2.

   Response - See revised Section 3.1.2.

3. Comment - In Table 7.2-8 why don't the stack dose factors $S_i$ and $\overline{S}_i$ have the maximum value at the unrestricted area boundary?

   Response - The $S_i$ and $\overline{S}_i$ factors (and as it was discovered later, the $V_i$ and $\overline{V}_i$ factors) are incorrect. New values were computed and are included in the ODCM.

4. Comment - In Section 2.1.1.1.3.1, and other locations, change the beta shielding and occupany factor from 0.5 to 1.0.

   Response - Done

5. Comment - Equation 2.15 can be simplified because the - (minus) $f_f C_i^s$ factor is cancelled by a + (plus) $f_f C_i^s$ value.

   Response - The comment is correct but we prefer the longer equation because it establishes the basis for the determination of $C_i^f$.

6. Comment - Provide data to support the Seasonal Adjustment Factor K = 0.5 in Section 2.1.2.2.

   Response - When dairy cattle are assumed to be grazing year round on pasture grass ODCM equation 2.15 has variables.

   $C_i^s = 0$, Stored Feed Concentration

   $f_f = 1$, The fraction of the year that animals graze on pasture. (Called $f_p$ in NUREG-0133)

   $f_g = 1$, The fraction of daily feed that is pasture grass when the animal grazes on the pasture. (Called $f_s$ in NUREG-0133)

   This leads to

   $C_i^f = C_i^g$

   (Feed Concentration) = (Pasture Grass Concentration)

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   It might reasonably be assumed from our discussions with local dairymen that cattle derive only half or less of their forage from grass in the summer. The remainder coming from uncontaminated feed ($C_i^s = 0$). Therefore, fg = 0.5 would be more appropriate than $f_g = 1$. Consequently, $C_i^f$, $C_i^T$, and the resultant dose are correspondingly reduced by 0.5. In the ODCM this factor was introduced into equation 2.18 by the seasonal adjustment factor $K = f_f \cdot f_g = 1 \times 0.5 = 0.5$ for the pasture season.

Support for the value of $f_g \leq 0.5$ came during a period of fresh weapon's test fallout in 1977 when a comparison study between the pasture/non-pasture situation was made at our Quad Cities Nuclear Station by the Idaho National Engineering Laboratory (INEL). This study found that 100% pasture feeding produced I-131 levels in milk 20-1500 times over those produced by normal feeding conditions on stored feed, green chop, and limited pasture. The results of that study are summarized below. To be conservative a factor 10 times less than the lowest factor (20) was selected to represent the typical dairy conditions of northern Illinois.

Thus, by two separate arguments we have shown K = 0.5 is a conservative adjustment factor to correct a 100% pasture grass calculation to normal feeding practices for the summer, pasture season.

| Date | On-Site Location Sampled by INEL | Decker Location Sampled by INEL | Turner Dairy Sampled by CECO | Hansen Dairy Sampled by CECo |
|---|---|---|---|---|
| | Poor Quality Pasture | Good Quality Pasture | Feed, Green Chop | Feed, Some Pasture |
| 10/1/77 | 123 pCi/l | 608 pCi/l | 0.4 pCi/l | 4.6 pCi/l |
| 10/9/77 | 102 | 423 | 5.8 | - |
| 10/11/77 | 78 | 116 | - | 0.9 |
| 10/14/77 | 56 | 346 | - | 1.1 |
| 10/16/77 | 56 | 271 | < 0.5 | - |

7. Comment - In Table 7.2-1 revise the average flow of the receiving water for fish $F^f$ from $4.7 \times 10^4$ cfs to ____________ cfs.

   Response - Open Item.

8. Comment - In Section 5.1.1 paragraph 1, clearly specify the frequency of dose computations performed by station personnel.

   Response - Dose will be computed monthly. See revised Section 5.1.1.

9. Comment - Clarify the meaning of the entries in Table 7.1-1.

   Response - This was done.

10. Comment - Document the basis for r= 0.5, the crop retention factor for iodine, in Section 2.1.2.1.1 and elsewhere.

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n the ODCM we defined the crop retention fraction to be "the fraction of deposited activity retained on crops." Depositable activity includes elemental iodine ($I_2$) and particulate forms of iodine. The non-depositable fraction includes organic forms (principally methyl iodide, $CH_3I$) and certain inorganic forms (principally hypiodous acid, HOI).

For BWR's we obtained source information from Table 4.7 of reference 1, a summary of I-131 species measurements in BWR ventilation exhausts.

| | Depositable Species | Non-Depositable Species |
|---|---|---|
| Mean (unweighted by source contribution) | 46% | 54% |

In the same publication "normalized" annual airborne releases for BWR's under power generation showed (from Tables 2-2 and 2-3):

| Depositable Species | Non-Depositable Species |
|---|---|
| 49% | 51% |

Thus a value of r = 0.5 seems justifiable for BWR's. Reference 2 supports this conclusion also.

For PWR's we obtained source information from reference 3, Tables 2-7 and 2-8, average normalized I-131 releases.

| Depositable Species | Non-Depositable Species |
|---|---|
| 31% | 69% |

Thus for PWR's, a value of r = 0.5 seems conservative.

In conclusion, for normal releases, a crop retention factor of 0.5 for radioiodine is appropriate. (It must be noted that for making estimates of projected doses during accidents, r is assumed to be 1.0.)

Bibliography

(1) T. R. Marrerô, Airborne Releases From BWR s for Environmental Impact Evaluations, Amendment 2 (Iodine-131), NEDO-21159-2, 77NED140, Class 1, October 1978.

(2) C. A. Pelletier, et.al., Sources of Radioiodine at Boiling Water Reactors, EPRI NP-459, EPRI Research Project 274-1, February 1978.

(3) A. Pelletier, et.al., Sources of Radioiodine at Pressurized Water Reactors, EPRI NP-939, EPRI Research Project 274-1, November, 1978.



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