GE Nuclear Energy

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October 25, 1993

Mr. Robert C. Pierson
Chief, Licensing Branch
Division of Fuel Cycle Safety & Safeguards, NMSS
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Ref: 1) NRC License SNM-1097, Docket No. 70-1113
2) Application, T.P. Winslow to E. Adensam, 5/10/93
3) Letter, C.W. Emeigh to T.P. Winslow, 7/23/93
4) Telephone Conversation, E.D. Flack, W. Radcliffe and S.P. Murray, R. Robinson, 10/19/93

Subject: Limit on Intake or Derived Air Concentrations (TAC No. L30556)

Dear Mr. Pierson:

In response to Mr. C.W. Emeigh's letter dated July 23, 1993, and the above referenced telephone conversation of October 19, 1993, I am enclosing the additional information requested as an attachment to this letter.

Please contact me on (919) 675-5461 if you have any questions or would like to discuss this subject further.

Sincerely,

GE NUCLEAR ENERGY

T. Preston Winslow, Manager
Licensing & Nuclear Materials Management

/zb
attachment

030061

cc: TPW-93-100

NF12 1/1

Request for Additional Information
Application Dated May 10, 1993
General Electric Co., Wilmington, NC
SNM-1097, Docket No. 70-1113

1. In order to fully evaluate this proposed amendment, it will be necessary to review the methodology used and the results of previous particle size studies. Please forward copies of the 1992 study by James et al, the 1993 study by Hickey et al, the 1985 article by Maher and Laird, and the 1975 article by Twomey.

   Copies of the four (4) documents mentioned above have been forwarded to the NRC.

2. Will adjusted DACs or ALIs be used to assign worker exposures during maintenance activities? If so, how will particle size distribution be determined during these activities?

   No, for non-routine maintenance activities; we often use lapel samplers (equipped with a cyclone head) or other types of portable sampling.

   No, the default ALI/DAC will be used to assign worker's exposures during non-routine maintenance activities.

3. Commitments to reassess particle size distributions after any process changes or during any irregular (e.g. maintenance) activities are required.

We will reassess particle size distributions after equipment/process changes occur which could affect the size of particles generated. Process equipment changes could potentially have a significant impact on the particle-size distribution which will result in (1) falling back to a default AMAD of 1 μm or (2) re-evaluation of the AMAD. (Section 1.8.15 of the proposed amendment has been re-worded.)

4. Please describe how DAC's for personnel not assigned to a particular work station will be assigned/adjusted. This may be addressed in the demonstration section if the appropriate data are presented.

The airborne exposure for personnel not assigned to a particular workstation will be based on adjusted DAC/ALI's for the proportion of time spent at each workstation. If personnel spend time in areas in which we do not have suitable adjusted ALI/DAC values, we will apply the default value.

5. What instruments would be available to assess possible changes to the measured activity median aerodynamic diameters (AMADs) due to change in plant equipment or operating conditions?

Anderson Model 20-830 Cascade Impactor's Non-Viable Ambient Sampler with Pre-separator.

6. How will particle size distributions which exhibit a geometric standard deviation (GSD) much greater than 4 or multi-modal distributions be dealt with?

Multi-modal distributions of particles were seen at many of the locations. Peaks, ranges and geometric mean were established for each (mode) of a multi-modal distribution by the method of Twomey (1975) and by the method of Maher and Laird (1985).

7. Provide data to support the stated solubility classifications in the locations in which DACs will be adjusted. Unless Y-class compounds can be exclusively demonstrated, the adjustments shown in your Figures 1.1 and 1.2 cannot be utilized.

Insoluble uranium oxides are formed by heating uranium in calciners to a minimum temperature of > 400°C (typically > 500°C). Class Y compounds were also confirmed by solubility determinations as part of a study by Batelle.

8. Describe how individual sample results will be averaged to arrive at an actual AMAD for a work location. This will become crucial if a decision is made to group several work locations together as an "area".

Work locations grouped into areas will be used where an identical process exists side-by-side. For example, the grinder area consists of several grinding setups that are identical.

The Committed Effective Dose Equivalent (CEDE) per unit of activity of intake is calculated for the geometric mean for each peak of a multi-modal distribution. Then, each of these values are multiplied by a proportional factor (portion of total activity) to represent the CEDE/unit activity intake for that mode. The values for each mode is summed to give the overall CEDE/unit activity of intake.

Duplicate samples are mathematically treated the same as above and averaged with the above value to give the ALI equivalent to 5 rem CEDE.

9. Section 1.8.15 need to state that the specifications outlined in Section 4 of Regulatory Guide (RG) 8.25, "Air Sampling in the Workplace, Revision 1," dated June 1992 will be followed; or it should specify requirements at least as comprehensive as those outlined in the RG.

It should be noted that the R.G. 8.25 states that 3 measurements should be averaged for each location and we have obtained duplicate results which agree very well and do not see the need for a 3rd measurement.

The plan for reassessment of locations is described in section 1.8.15 of the proposed amendment.

10. Figure 1.1 on page I-1.20(b) appears to be in error. The DAC listed for 1 micron AMAD does not equal 2×10^{-11} μCi/ml, the value listed in Appendix B to 10 CFR Part 20. Also, the DAC at 10 microns should be about 5 times the 1 micron value.

The DAC listed for 1 micron AMAD would equal 2×10^{-11} μli/ml when rounded to one significant figure. The ALI of 0.04 μli (for inhalation of class Y uranium in Revised 10CFR20, Appendix B) when divided by 2.4×10^{9} ml of air breathed by reference man in a year gives a DAC value of 1.67×10^{-11} μli/ml. When this is rounded to one significant figure, it becomes 2×10^{-11} μli/ml.

11. On page II-13.81(b), a reference is made to "the insoluble airborne uranium work areas discussed herein." Does this mean that ALIs will be adjusted only only in areas strictly exposed to insoluble uranium? How will this solubility determination be made?

Yes, the ALI's will be adjusted only in areas strictly exposed to insoluble uranium (UO_2, U_3O_8). Uranium oxides such as UO_2 and U_3O_8 are considered class Y material per 10CFR20, Appendix B.

The process produces UO_2 and U_3O_8 by calcining the uranium to temperatures of at least 400°C (typically > 500°C). Solubility studies were also conducted to confirm the solubility classes. (See also answer to #7).

12. On page II-13.81(c), it is noted that 26 workplace locations were sampled during the recent Batelle studies. What percent of the total work locations were sampled? If any work locations were not sampled, they will need to be. Was there overlap of workplace locations between the two studies?

Of the total workplace locations ~ 50% were sampled. It is impractical to sample all identical work locations. A representative number of locations should and do yield suitable results.

Yes, there was overlap between the 2 studies and results were fairly consistent between the 2 studies. (Refer to complete documents on the two Battelle studies, also).

13. On page II-13(8)c, it is stated that Anderson cascade impactors were used. Will these be the same impactors used to re-evaluate areas? If so, please response to the following: **Yes**

(a) Anderson manufactures several models of impactors. What was the exact model used?

Anderson Model 20-830; Non-Viable Ambient Sampler

with Pre-separator.

(b) How many stages were involved and what was the particle size cutoff for each stage?

9 stages; a pre-separator; 8 collection plates and a

backup filter.

0:	9-10	4:	2.1 - 3.3
1:	5.8-9	5:	1.1 - 2.1
2:	4.7-5.8	6:	0.65 - 1.1
3:	3.3-4.7	7:	0.43 - 0.65

(c) What collection media was used?

Glass fibre filter media

(d) What was the efficiency of the back-up filter for 0.3 micron particles?

99.9%

14. Section 13.4.6 should include, within the "Summary of Typical Particle Size Data," the data for pellet press, blender, powder warehouse, oxidation furnace and radioactive waste sorting areas. These data are necessary to address the adequacy of the review regarding the amendment criteria. Furthermore, the data as presented is insufficient to support DAC/ALI adjustment. Particle size data must be present as AMADs not in the form of ranges or by the predominant peak. The values needed in order to use your Figures 1.1 and 1.2 are AMADs and only when the GSD of the distribution is less than 4.0.

Complete data for these areas were included in documents forwarded to the NRC in answer to question #1.

Figures 1.1 and 1.2 are not needed to calculate the adjusted ALI/DAC, but illustrate an overall equivalent AMAD for a particular ALI/DAC value. In other words, the method used to arrive at an adjusted ALI/DAC is consistent with the graphical representations of Figures 1.1 and 1.2.

15. On page II-13.81(e), it is stated that "work function areas in which site specific particle size measurements have been made ..." Are these "areas" single sample locations or multi-sample locations which exhibit similar particle size distributions? How many work stations will be affected by the particle size measurements?

"Work function areas" are part of our system of delineration (within the factory) which divides areas by processes. For example, the press room is a job function area with nine (9) presses.

All work function areas were multiple sample locations. Approximately nine (9) work function areas contain about 20 workstations which could be affected by adjusted ALI/DAC values.

16. On page II-13.81(e), a commitment is included to the effect that GE will reassess the median diameter biennially "generally in accordance with the guidance given in Regulatory Guide 8.25." Reg Guide 8.25 states that 25 percent of the work locations should be sampled every 6 months, selecting different locations each time. Although this works out to all locations being sampled in a two year cycle, it allows variations with time to be caught and corrected much sooner. Only if a facility can demonstrate, by reassessment, that particle size distributions do not vary with time, should the reassessment period be increased.

Furthermore, if a decision is made to combine work locations which exhibit similar particle size distributions together into "areas", then at least one work location per "area" should be represented during each six-month assessment.

Based on info collected from two (2) separate studies performed 18 months apart, significant variation of ALI/DAC (adjusted) was not observed. Periodic reassessments are described in Section 1.8.15 of the proposed amendment.