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March 21, 1962

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BONUS VAPOR SPHERE RELEASE RATES

ORB:JAL

In response to your verbal request, we have considered the off-site conditions resulting from the release of the BONUS Vapor Sphere contents following the collection of the volatile fission products from a superheater fuel element. It is noted that the calculations may be extended to more than one element failure by doubling or tripling, etc., the number of days of permissible maximum release consumed.

We have considered the following two cases:

- A. All of the volatile fission products listed on Page 403-3 of the BONUS hazards report are to be released. In this case, there are a total of 635 curies at twenty-four hours after shutdown. The mixture in this case has a weighted MPC of  $1.1 \times 10^{-9}$  uc/cm<sup>3</sup>. This weighted MPC has been calculated from Table II of Appendix B in 10 CFR Part 20 and NBS Handbook 69.
- B. In this case, we have assumed that the sphere contents have been recirculated through existing traps and filters in the system and that 90% of the Iodine and Cesium has been removed. All of the rare gases are still assumed to be present. In this case, there are a total of 385 curies at twenty-four hours decay with a calculated weighted MPC of  $6.7 \times 10^{-9}$  uc/cc.

REPOSITORY *Safe Release Operations*  
 COLLECTION *Records - Shipping area*  
 BOX No. *H-18-9 Bldg. 2714 H*  
 FOLDER *S. A. Lenhard*  
*1962 Reading File*

The stack discharge rate is 50,000 CFM or  $2.1 \times 10^{12}$  cm<sup>3</sup>/day. In case A, where the permissible concentration is  $1.1 \times 10^{-9}$  uc/cm<sup>3</sup>, we could, therefore, continuously discharge  $2.3 \times 10^3$  uc/day up the stack without assuming any environmental dilution. However, the enclosure to this memorandum indicates that a dilution factor of  $10^4$  may safely be assumed. One could, therefore, continuously discharge 23 curies/day up the stack. Since there are 635 curies to be discharged in case A, we would consume about twenty-seven days continuous discharge.

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In case B, where the permissible concentration is  $6.7 \times 10^{-9}$  uc/cm<sup>3</sup>, we could continuously discharge 140 curies/day. Since there are only 385 curies to be discharged, about three days continuously discharge would be consumed.

The contents of the vapor sphere may, therefore, be instantaneously discharged up the stack (after twenty-four hours decay) during relatively favorable meteorological conditions, without violating 10 CFR 20 (except as later noted). It would, of course, be advisable to discharge during the daily land breeze, over a few hours period. We have computed; however, on the assumption there are members of the general population in the downwind direction.

There are two points which should be clarified with DL&R. The first is that BONUS should have permission to operate under Paragraph (a) rather than Paragraph (c) of Section 20.106 in 10 CFR 20. The second point involves the concentration reporting level in Section 20.403. For BONUS, these levels should be reportable only if they occur off-site, not if they occur in our stack.

Please advise if we can be of further assistance in this regard.

J. A. Lenhard

Enclosure:  
Cy Memo dtd 3-21-62 from  
WMC to JAL

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Bio. Br. Res. & Dev.

Lenhard/ndw