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SUSQUEHANNA STEAM ELECTRIC STATION
REQUEST FOR ADDITIONAL INFORMATION ON SSES
TECHNICAL SPECIFICATION CHANGE DELETING
CHLORINE DETECTION SYSTEM REQUIREMENTS
AND BASES
PLA-4305 **FILE R41-2**

Docket Nos. 50-387
and 50-388

This letter serves to forward supplemental information regarding the probability of hazardous off-site chlorine release in response to NRC's request for additional information dated 3/20/95.

If you have any further questions, please contact Mr. James B. Wesner at (610) 774-7911.

Very truly yours,

R. G. Byram

Attachment: Summary of PP&L Study EC-RISK-1043

copy: NRC Region I
Ms. M. Banerjee, NRC Sr. Resident Inspector-SSES
Mr. C. Poslusny, NRC Sr. Project Manager-OWFN

A001

DETERMINATION OF OFF-SITE CHLORINE RELEASE RISK

The methodology used to address the risk-frequency of off-site chlorine release is based on analysis previously performed for SSES and documented in Section 2.2 of the FSAR. Based on discussion in the FSAR, truck traffic is expected not to be a significant hazard and only rail shipments are considered here. Because the only significant frequency of rail traffic occurs on the Canadian Pacific rail line east of the Susquehanna River, only accidents on this rail line are considered. Frequency calculations make use of the data and equations found in Regulatory Guide 1.78. Two methods are used to evaluate chlorine release risk:

1. "Bounding" calculation using conservative assumptions, and

2. Frequency guidelines from Reg. Guide 1.78.

Bounding Calculation

A bounding estimate of the risk from off-site chlorine release is obtained by making conservative assumptions about the accident frequency, wind direction, frequency of atmospheric stability classes, plume width, and core damage frequency. The risk from chemical release is:

Release Risk = (No. trips/yr)X(miles/trip)X(Prob. of Accident/mile)X
(Prob. of major release/accident)X(Prob. wind blowing toward site)X
(Prob. stable plume)X(Prob. plume hits site)X
(Prob. of Rad. Release given chemical intrusion to control room)

The number of trips per year equals 12 because chlorine is currently shipped in 90 ton loads with perhaps 1 load per month on the track of interest. The miles per trip is ascertained by measuring from topographical maps of the area and is about 12.5 miles of track within a five mile radius of SSES. Thirteen miles is used for conservatism. The probability of accidents per mile is taken from the FSAR analysis as 8 E-8/mile. The probability of a major release given an accident is conservatively taken to be 12% for all track. This value is conservative because in the FSAR analysis it is reduced to 2% for track beyond 3 miles from SSES. The probability that the wind is blowing toward the site is taken to be that for the most frequent wind direction measured at SSES, regardless of track orientation to the site. This value is 16%, observed for the ENE direction and is the maximum observed frequency of any wind direction in any year since 1973. The probability that the plume is stable enough so that dispersion does not reduce its toxicity is taken to be the sum of the probabilities that the atmosphere is either Pasquill stability class E, F, or G, regardless of track distance. Note that in the FSAR analyses, only for close track is class E significant. The probability that class E, F, or G is observed is less than or equal to 60%, for all years from 1973 through 1993. For the stability classes and distances in question, the plume width is less than the width of the "wind rose". Depending on the distance between the track and the site, the plume width may be only 15% to 33% of the wind rose. For this conservative calculation, the probability that the plume will hit the site given that the wind is blowing toward the site is taken as a constant 33%. Finally, it is assumed that the frequency of core damage and

radioactivity release in excess of the limits of 10CFR100 is 10%, given that the plume impacts the site. This estimate is also conservative, given the NRC SER for the Prairie Island unit; that self-contained breathing apparatus and isolation of the control room are available to the control room staff; that the plume will pass the site in a matter of minutes; and that automatic equipment is available for core protection (HPCI, RCIC, ADS and LPCI). It is expected that this conditional estimate of radioactivity release is high by at least 5 or 6 orders of magnitude.

Using the method and data explained above, a bounding risk of off-site chlorine release is calculated as:

Release Risk = (12 trips/yr)X(13 miles/trip)X(8 E-8 accidents/mile)X
(0.12 severe releases/accident)X(0.16 wind is blowing toward site)X
(0.60 Pasquill class E, F, or G)X(0.33 plume hits site)X
(< 0.1 rad. release/toxic chemical intrusion)

(4.7 E-8 toxic chemical intrusion/yr)X (< 0.1 rad release/intr.)

< 4.7 E-9 core damage/yr from chlorine release off-site

Frequency Guidelines from Regulatory Guide 1.78

Reg. Guide 1.78 provides that "If hazardous chemicals such as (chlorine) are known or projected to be **frequently** shipped by rail . . . within a five-mile radius of a nuclear power plant, estimates of these shipments should be considered in the evaluation of control room habitability" (emphasis added). The guide defines "frequently" as "30 per year for rail traffic".

Comparison of the estimated frequency of chlorine shipments by rail past the SSES site is made to this definition of "frequently". Chlorine is shipped past the SSES site only about once per month, about 12 times/yr. Thus, chlorine is not frequently shipped past SSES and does not need to be considered in evaluations of control room habitability.

Conclusions

Both evaluations of chlorine release risk show the risk to be small. The numerical estimate shows the risk to be less than the SRP lower radioactivity release frequency limit of 1 E-7/yr. The current chlorine shipping frequency is less than the minimum considered significant in Reg. Guide 1.78. Thus, off-site chlorine release is judged to be insignificant for radiological impact on the safety and health of the public. Further, because of the amount of chlorine released, any "puff" is expected to pass the station in minutes. Self contained breathing apparatus and control room isolation are available to mitigate the on-site consequences of chlorine release. Even if control room personnel are incapacitated by the effects of chlorine, automatic equipment actuation is sufficient to prevent core damage. Thus, Susquehanna's Defense-in-Depth is satisfied.