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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF REGULATORY
DOCKETING & SERVICE
BRANCH

In the Matter of	:	
PHILADELPHIA ELECTRIC COMPANY	:	Docket Nos. 50-352
(Limerick Generating Station,	:	50-353
Unit Nos. 1 and 2)	:	

REPLY OF THE CITY OF PHILADELPHIA TO
NRC STAFF'S AND APPLICANT'S FILINGS
RE: SARA/EROL, SECTION 7 ISSUES

CITY-1

Human errors of commission during accident or transient mitigation have not been considered as an initiator.

The Staff asserts that this concern as stated is vague, lacks specificity and is without basis. The Applicant raises the objections it made to SARA-7, that is, "no specificity given and no basis presented."

Human errors of commission during accident or transient mitigation were implicated in the most serious accident that has occurred to date, i.e., Three Mile Island Unit No. 2. To omit this type of consideration in assessing the risk to Philadelphians and others associated with Limerick's operation would be arbitrary and capricious. Further, it is the Applicant who must do the specific analysis, not intervenors. Certainly this concern, as expressed, would cause reasonable minds to inquire further.

CITY-2

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- A. The evacuation scenarios assumed for the SARA (Section 10.3.2) are not representative of the conditions which would be expected if the plume is moving in the direction of Philadelphia. Thus the values used in the cost-benefit comparisons do not accurately reflect a realistic estimate of the radiological effects (both median and upper estimates) which could result from an accident at either of the two Limerick plants.

The Staff notes, in opposition, that the SARA results cover all directions around Limerick and a full range of meteorological conditions, that the EPZ

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covers ten miles beyond the plant and the City is over twenty miles beyond Limerick. The Applicant did not appear to respond to this issue.

The City asserts the need for the use of realistic evacuation scenarios because of the importance (to the public generally and to the City) of a realistic and accurate cost benefit analysis as a condition of licensing. SARA assumes that evacuees in the direction of the high density population area toward Philadelphia rapidly relocate once they reach the ten mile demarcation. This is unrealistic. As these evacuees approach the greater population areas toward and in Philadelphia it is reasonable to assume there will be a ripple effect, causing traffic jams and slowed evacuation, resulting in increased exposure to citizens in the EPZ and beyond the EPZ, including in Philadelphia. For the cost-benefit analysis to be reliable, the radiological effects resulting from realistic human behavior responses must be presented.

The consequence calculation must be presented with the sectors toward Philadelphia isolated, not "all directions from Limerick" based on a "full range of meteorological conditions." The SARA results, as depicted, mute the effect on Philadelphia of a severe accident and thus do not allow a realistic assessment by the NRC of the City of the risk to Philadelphia of Limerick's operation.

CITY-2

B. The evacuation scenarios assumed for the SARA (Section 10.1.6) in the event of a seismically-initiated accident are unrealistic for the following reasons:

1. The assumption of "normal behavior" beyond the EPZ is unrealistic following an earthquake-initiated accident. The earthquake would result in disruptive behavior such as, for example, uncalled for evacuation, abnormal activity, more people outside shelters.

The Staff recommends consideration of this issue because of its similarity to SARA-4 and the reasons stated in response thereof. Applicant asserts that this

stated concern lacks specificity, basis and fails to advance alternative assumptions. Applicant also asserts the same response raised in opposition to SARA-3.

The City continues to believe that it is important for the NRC to have a SARA analysis that as accurately as can be expected measures the consequences of an accident. It is the Applicant that must present such an analysis. It is not reasonable to assume normal behavior, sheltering, or ad hoc responses beyond 10 miles if the plume moves in the direction of Philadelphia, given the density of the population in that direction.

CITY-2

- C. The SARA uses assumption from WASH 1400 and the LGS-PRA for critical factors in the calculation of consequences which are not representative of the realistic conditions in the vicinity of Limerick, particularly as pertains to the direction toward Philadelphia. These include (Section 10.1.6 of SARA):
1. Unrealistic assumption of complete evacuation of 10 mile circle around the plant.
 2. Unrealistical assumption of "normal" behavior beyond 25 miles.
 3. Assumption of good weather during evacuation; no scenario is derived for evacuation in bad weather.

The Staff asserts that the City's interest in these matters is tenuous because the City is more than 20 miles in distance from the plant. The Staff recommends consideration of these issues, however, for the reasons it stated in its support of SARA-4.

As to City-2-C-1, the Applicant asserts the City has no interest in "total evacuation of the plume EPZ" and further asserts the responses it made to SARA-4. As to City 2-C-2, the Applicant asserts it lacks basis, specificity and fails to advance alternative assumptions; applicant also incorporates its responses to SARA-3. In response to City 2-C-3, the Applicant raises the responses it made to SARA-4.

The City of Philadelphia's closest border to Limerick is about 23 miles. The closeness of the plant to Philadelphia, combined with the demography (high population density), create an unavoidable nexus between the operation of the plant and the health, safety and environmental well-being of the citizens of Philadelphia. A site specific analysis showing realistic evacuation times within 10 miles and realistic behavior expectations beyond this, if the plume does move in the direction of Philadelphia, must be known in order to assess the consequences of Limerick's operation. Similarly, the Applicant must show, in a way that can be reviewed by other, what will happen under bad weather conditions. The plan assumes unrealistically that all of the population in a ten mile circumference will be able to be evacuated. The plan uses generic rather than site specific data. The plan also assumes that beyond ten miles those evacuees as well as the additional population will act normally and be rapidly relocated.

It is asserted by the City that in the SARA cost-benefit analysis, all that can be reasonably predicted about how people will act under these circumstances, a severe nuclear accident, must be considered including site specific data, partial evacuation, limited governmental resources, non-normal behavior, congestion due to the high Philadelphia area population. Furthermore, the sectors toward Philadelphia must be isolated and examined separately so that the Commission and the City can know what the consequences to the City are if the plume moves in this direction. Similarly, the consequences to those sectors must be isolated and examined under adverse weather conditions.

C-2

- D. The SARA uses health effects modeling which is not representative of those applicable to Limerick and are not sufficiently conservative to produce a reliable cost benefit analysis. These include (SARA Section 10.3.3):

1. People beyond 10 mile EPZ are unrealistically assumed to be involved in "normal behavior" for 12 hours, then evacuated.
2. A single breathing rate is assumed for all people which would not be the case.
3. The SARA assumes the low value from a range of values for latent-cancer fatalities, expresses in fatalities/person-rem., (SARA Section 10.3.3).

Staff asserts that 2-D-1 is ambiguous, lacks specificity, and does not assert how this underestimates risks; that 2-D-2 is too broad and non-specific, that there is no indication that average breathing rate assumptions are inaccurate or that an alternative would result in better modelling; that 2-D-3 is too broad and non-specific, that a multiple of three can be used to obtain a higher estimate of latent cancer fatalities, according to the Applicant; that "not sufficiently conservative" is not defined.

Use of assumptions as to "normal behavior" of humans during high stress conditions is ipso facto unreasonable and unrealistic. Similarly, it is not realistic or reasonable to assume one average breathing rate under stressful conditions. It is reasonable to assume that many sub-groups, if not the majority of the population, will perceive a severe accident as an anxiety-producing event and will exhibit breathing rates that reflect this. In order to have a reasonable range measuring potential consequence the Applicant must present consequence results that measure these two factors more reasonably. To do otherwise renders the cost benefit analysis valueless for its purpose of measuring environmental impact.

As to 2-D-3, the same reasoning applies. The Commission must be able to review the cost-benefit results in toto which includes a medium and high range of values for latent-cancer fatalities with some reviewable discussion of the literature and the ranging values chosen for analysis.

CITY-3

The SARA does not contain the necessary information for making decisions and policies necessary to reduce the radiological effects of an accident and thus its results and cost-benefit analysis do not comply with the requirements of 10 CFR 51.20 and 10 CFR 51.21 nor does it provide sufficient basis for analysis pursuant to 10 CFR 51.23 and 10 CFR 51.26. The specific reasons are as follows:

- A. The dose distance relationship is missing from the analysis in SARA. The SARA states that a bone-marrow dose of 200 Rem, where hospitalization is often required, "is rarely exceeded beyond 40 miles downwind ...", (SARA at p. 12-16). However, it does not give the likelihood of receiving this serious dose at 25-35 miles which is the distance a plume would travel to reach major population of the City of Philadelphia.
- B. The absence of dose-distance curves does not allow the assessment of the likelihood of exceeding the EPA Protective Action Guides (PAG's) at locations within the EPZ and at locations in the Ingestion Pathway which includes the City of Philadelphia.
- C. The consideration of evacuation only up to 25 miles from the plant does not give the true indication of possible reductions in public risk in the case where the plume is moving toward a large population zone beyond this distance (such as the City of Philadelphia which is 25-35 miles from Limerick).
- D. The comparisons of alternate evacuation strategies show that it is possible to reduce the number of fatalities by different evacuation strategies (SARA figures 10-23, 10-24) and reducing evacuation delay time (SARA figure 10-25) but it does not provide the necessary information to assess if this is true in all directions of plume travel, including toward the City of Philadelphia.

The Staff responded that City-3 "is lacking in specificity and basis and should be denied," but noted that "a considerable number of the figures in SARA ... contain consequence data ... encompassing the City of Philadelphia."

Applicant states the City has pointed to no requirement that it present the data requested nor pointed to the "use to which [the data] would be put in the licensing process." Applicant asserts that risk results "as a whole" were provided and are the only analysis required, analogizing to a request that a cost-benefit analysis be done covering electrical consumers only. Applicant further characterizes City-3-A and B as challenges to the Commission's emergency planning regulations.

The City of Philadelphia seeks disclosure of the precise impact on the public if the plume travels in the direction of the City. As presented the data does not isolate the unique risks presented under that scenario. Because of the high density population in this direction, without presentation of that data, a reliable and useful cost-benefit analysis cannot be made. Further, reasoned decisions as to how to reduce the adverse impacts of the plant's operation -- either on a design/ construction level or emergency planning level -- cannot be made.

CITY-3

- E. The SARA does not include the potential latent fatalities from consumption of contaminated water from the City of Philadelphia water sources which are located within or flow through the EPZ.

As noted in Point 3 at p. 1 of the Statement of the City, the SARA does not address in any fashion the health effects upon the citizens of the City of Philadelphia of contamination of the Schuylkill and Delaware Rivers, the sole sources of drinking water for the City. In this regard, the Applicant presented no analysis of the potential latent fatalities from either the Schuylkill which flows directly past the plant and is within the EPZ or from the Delaware which flows within 12 miles of the plant and is clearly within the plume exposure EPZ. The Staff did not address this contention at all. The Applicant did consider it but opposed on the theory that the contention should be addressed as an emergency planning issue rather than an environmental concern and that it was "excluded from SARA on the basis that multiple drinking water sources existed and that drinking water sources would be isolated until the contamination potential had passed." Applicant's Response at 33. The Applicant's position is totally specious and without factual foundation.

The purpose of SARA is to assess the environmental consequences, including latent cancer-fatalities, of an accident at Limerick. PECO has made no attempt

to measure the latent fatalities resulting from contamination of the drinking water sources. While emergency planning to protect drinking sources may be necessary, there is no indication or support for the conclusion that any of these unidentified emergency planning actions would result in no contamination or consequence, to the public. Moreover, the Applicant proceeded upon wrong information in dropping the water supply issue from the SARA. The only sources of drinking water for the City are the Schuylkill and Delaware Rivers, both of which are in close proximity to the plant. During informal discussion, Applicant's representative, Vincent Boyer admitted that both rivers could be contaminated in an accident, eliminating totally the City's active water supply. The City's reservoir capacity could at best last no more than a day and a half and under adverse conditions only a few hours. Even if only one river was involved, the City's two sources are not 100% redundant.

The Applicant's assertion that the City's water sources could be isolated until contamination had passed is likewise unsubstantiated and cannot provide a basis for the NRC to intelligently assess the reasonableness of the conclusion. The Applicant has done no analysis and cannot predict anything in this regard. The Applicant does not know and the SARA does not consider 1) what isotopes might be present if either or both of these sources are contaminated, 2) in what concentration the isotopes would be present, 3) the cumulative effect of long-term ingestion even if a low level of contamination can be attained, 4) the average and minimum flow rate for each river, 5) the demands on the system, 6) the level of storage available, 7) the expected configuration of the flume of contamination and any other matters relevant to a realistic assessment of the health effects of contamination of one or both rivers.

Without information of this nature, the SARA is grossly deficient and the impact upon the environment of Limerick's operation cannot be properly assessed.

Respectfully submitted,

Martha W. Bush

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Deputy City Solicitor

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BEFORE ADMINISTRATIVE JUDGES OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

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In the Matter of : Docket Nos. 50-353-OL
PHILADELPHIA ELECTRIC COMPANY : 50-353-CL
(Limerick Generating Station, :
Units 1 and 2) : September 15, 1983

CERTIFICATE OF SERVICE

I hereby certify that the Reply of the City of Philadelphia to NRC Staff's and applicant's filings in the above-captioned proceeding have been served on the following persons named on the attached service list by hand delivery or by causing the same to be deposited in envelopes addressed to said persons, first class, postage prepaid, and deposited with the United States Postal Service at Philadelphia, Pennsylvania 19107.

Respectfully submitted,

Martha W. Bush

MARTHA W. BUSH
Deputy City Solicitor

Dated: *October 12, 1983*

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