UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Before the Atomic Safety and Licensing Board

In the Matter of	)	
	)	
Philadelphia Electric Company	)	Docket Nos. 50-352
	)	50-353
(Limerick Generating Station,	)	
Units 1 and 2)	)	

APPLICANT'S STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE TO BE HEARD

1. The regional climatology in the vicinity of the Limerick Generating Station is as stated in FSAR Section 2.3.1 and EROL Section 2.3.1.

2. The local meteorology in the vicinity of the Limerick Generating Station is as stated FSAR Section 2.3.2 and EROL Section 2.3.2.

3. The onsite meteorological measurements program for the Limerick Generating Station is as stated in Section 2.3.3 of the FSAR.

4. The diffusion estimates for the Limerick Generating Station are as stated in FSAR Sections 2.3.4 and 2.3.5.

5. The effects of heat dissipation facilities are as stated in EROL Section 5.14.

6. The meteorological modeling of atmospheric conditions in the area of the Limerick Generating Station is as stated in EROL Section 5.2.2.

7. The operation of natural draft evaporative cooling towers for the Limerick Generating Station is as described in EROL Section 3.4.3.

8. Temperature and moisture conditions in cooling tower plumes greater than 1/4 mile are only slightly different from those in the ambient air.

9. It would be extremely difficult for an aircraft to remain in the plume from the Limerick cooling towers for a sufficient time to develop significant carburetor icing, even if the equipment built into the aircraft for dealing with icing were not used.

10. The dimensions of the Limerick cooling tower plumes would seldom allow more than a few minutes of flight time in the plumes.

11. Even when the cooling tower plumes are more extensive, staying in a plume long enought to provide a chance for enhanced icing would be a difficult deliberate maneuver on the part of the pilot.

12. The very rapid mixing that occurs with the ambient atmosphere dilutes the excess heat and moisture of cooling tower plumes within a short distance.

13. Compared with the amount of water vapor naturally present in the air with which the tower release mixes, the 35 million gallons of water vapor per day which would be released from the Limerick towers, is not a significant amount.

14. The Pennsylvania State University (Thomson et al., 1981) made a large number of aircraft flights through the cooling tower plumes from the Keystone power plant in western Pennsylvania for the express purpose of determining what in-plume conditions were like, and how they differed from those in the ambient air.

15. The Pennsylvania State research team found that very close to the towers (i.e., with the aircraft traversing the plume within a quarter of a mile) both temperature and humidity conditions varied sharply as the aircraft traversed the plumes, with both quantities exceeding ambient levels significantly for very short periods.

16. The Pennsylvania State study found that beyond a quarter of a mile, it became difficult to distinguish the temperature in the plume from that of the outside air and the humidity difference dropped to a very small excess above the natural atmosphere.

17. Even though a plume may remain visible for a considerable distance, the conditions within it become essentially those of the surrounding air after a very short distance.

18. The Pennsylvania State study is directly comparable to the Limerick Generating Station situation since the experiments were done under nearly identical climatic conditions.

19. During the American Electric Power Service Corporation's extensive study of cooling tower plumes, over

340 experiments were completed involving the use of light aircraft.

20. Of these 340 individual AEP tests, visible plumes ten miles and longer were observed only six times, and of these six cases, three were at temperatures well below 20°F.

21. During the AEP tests, the pilots found plumes with the adequate length and temperature criteria for potential carburetor icing less than 1% of the time.

22. The Electric Power Research Institute's SACTI computer code uses the plant thermal output and the cooling tower water vapor and air volume releases at maximum power as input data, treating the two towers simultaneously and it combines this information with data from the Limerick meteorological tower facility and with data on above-ground meteorology to develop a series of seasonal and annual distributions of pertinent information about the plume behavior and effects.

23. The SACTI modeling study predicts that the length of the plumes would be expected to reach or exceed ten miles in less than 4% of the cases and the maximum frequency of these long plumes would be toward the west (0.6%).

24. The SACTI code predicts that the Limerick plumes will always reach a height of at least 1,000 feet above ground before leveling off, if they have not dissipated before reaching that altitude.

25. The conditions responsible for carburetor ice formation are well understood.

26. In carburetor-equipped aircraft, the fuel enters the airstream at the throttle valve.

27. The vaporization of the fuel, combined with the rapid expansion of air as it passes through the carburetor, causes a cooling of the mixture.

28. The water vapor content of the intake air may condense, and if the temperature in the carburetor reaches 32°F or below, the moisture will be deposited in the fuel intake system as frost or ice which may reduce or block the passage of the fuel/air mixture to the engine.

29. Due to the venturi effect of a partially closed throttle valve, when the throttle is partially or fully closed the temperature of air passing downstream of the throttle valve may drop as much as 60°F.

30. On very dry days, or when the temperature is well below freezing, the moisture content of the atmosphere is generally too small to cause icing.

31. If the temperature is between 20°F and 90°F, and moderate humidity or visible moisture is present, there is a potential for carburetor ice.

32. Approximately 8 minutes of flying time under adverse conditions without carburetor heat would be required to create medium to heavy carburetor ice that would represent a significant hazard to aircraft.

33. If a pilot were to fly across the visible plume from the Limerick Generating Station at any angle, it is improbable that he would remain in the plume long enough to accumulate any detectable icing.

34. Cooling tower plumes are almost never more than one mile wide.

35. Even flying at an oblique angle at a typical speed for light aircraft, an aircraft traversing the visible plume would only be in the plume on the order of two minutes.

36. If a pilot would be flying along the plume axis, descending with a nearly closed throttle at a rate which matched the slope of the plume, he would have to stay in the plume for more than 10 miles for serious icing to be encountered.

37. It is quite improbable that a pilot could encounter a plume having the right temperature and moisture conditions for icing, and of sufficient length so that he could inadvertently fly in the core of the plume for eight minutes or more.

38. The Pennsylvania State program has shown that conditions more than 1/4 mile downwind of a tower are virtually identical to those in the ambient air, whether inside or outside of the visible plume.

39. Pilots are taught about the risk of carburetor ice in ground school and are trained

to use carburetor heat, an anti-icing device that preheats the air before it enters the carburetor.

40. Carburetor prehearing is used to melt any ice or snow entering the intake, to melt any ice that may have formed in the carburetor passages (provided the accumulation is not too great), and to keep the fuel/air mixture above the freezing point to prevent formation of ice.

41. A pilot's first indication of carburetor ice is a drop in engine RPM for aircraft with fixed pitch propellers, and a drop in manifold pressure for aircraft equipped with variable pitch propellers.

42. Aircraft with fuel injection or turbine engines do not experience carburetor ice.

43. The vast majority of small airplanes flying at relatively low altitude (below 10,000 feet) are carburetor-equipped and have carburetor heat controls.

44. Pilots are trained to check carburetor heat controls during the preflight check, and to apply heat at the first indication of carburetor ice and during operations when the throttle is closed or nearly closed.

45. Pilots who are not instrument rated, equipped, and on an instrument flight plan must avoid flying in or near the visible cooling tower plume because it appears as a cumulus-looking cloud.

46. VFR (Visual Flight Rule) pilots are to avoid clouds by at least 2,000 feet horizontally and they must also

remain at least 1,000 feet above and 500 feet below clouds in the Limerick area.

47. While on a few occasions during the year the operation of the Limerick cooling towers may cause slight deviations in approach, departure or flight paths for VFR pilots, this situation is no different than that which would be encountered by such pilots having to avoid natural cloud formations.

48. IFR (Instrument Flight Rule) aircraft could enter the plume, either purposefully or inadvertently, but their residence time in the plume would be brief and their aircraft must have carburetor heat controls to be instrument-equipped.

49. Plumes from the large hyperbolic towers do not cause any buildup of local moisture.

50. Plumes from hyperbolic towers originate far above the ground, at altitudes where completely calm winds are almost never found and the moisture is therefore transported away from the source.

51. When stagnant conditions exist close to the ground and the winds are very light, the great buoyancy of the hyperbolic cooling tower plumes carries the moisture far above the top of the tower, usually to several thousand feet above the terrain.

52. The Roxborough incinerator is a small incinerator in which a water spray is used to reduce the effluent

temperature to levels commensurate with the design of the electrostatic precipitator.

53. The meteorological data from the National Weather Service for April 9, 1982, (the day on which AWPP alleged that the incinerator produced local fog) clearly indicate that snow and fog were observed most of the day at the Philadelphia International Airport.

54. 10 or 15 plants of the size of the Limerick Generating Station would have to be clustered in a small geographical area to initiate a thunderstorm.

55. Based upon numerous traverses of cooling tower plumes by aircraft, nothing more than light turbulence and slight updrafts would be encountered.

Respectfully submitted,

CONNER & WETTERHAHN, P.C.

Mark J. Wetterhahn
Counsel for Philadelphia
Electric Company

September 27, 1983