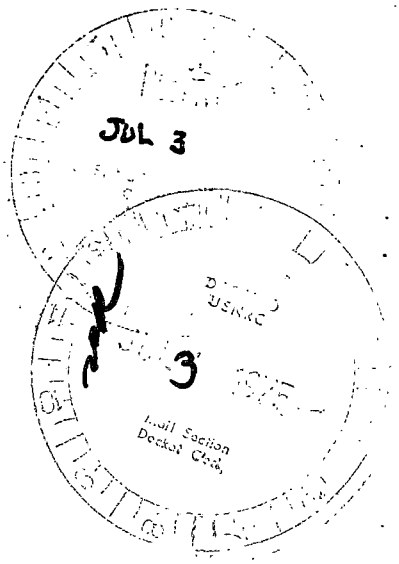
PSE&G

Public Service Electric and Gas Company 80 Park Place Newark, N.J. 07101 Phone 201/622-7000

Regulatory

June 26, 1975



Mr. B. J. Youngblood
Chief Environmental Projects Branch 3
Division of Reactor Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Youngblood:

ENVIRONMENTAL TECHNICAL SPECIFICATIONS
NO. 1 AND 2 UNITS
SALEM NUCLEAR GENERATING STATION
DOCKET NOS. 50-272 AND 50-311

We are enclosing for your review a revised copy of Section 2.1 of the Salem Environmental Technical Specifications (ETS) as requested in your letter of May 28, 1975. Also enclosed is a copy of Table 3.2-2 as per your request.

With regard to your request for a definition for "Designated Mixing Zone", we believe this definition is unnecessary, since the term is not used in the ETS.

The additional information requested regarding bathymetric surveys will be provided in the near future.

All of the above information will also be reflected in Amendment 2 to the ETS, to be submitted in the near future.

A comparison table of condenser discharge isotherms for 13.6°F and 16.5°F ΔT's is enclosed in reply to a telephone request by Mr. F. J. Miraglia of your staff.

Very truly yours,

R L Mittl

R. L. Mittl
General Manager - Projects
Engineering and Construction Department

The Energy People

7117

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 THERMAL

2.1.1 MAXIMUM ΔT ACROSS CONDENSER

Objective

To limit thermal stress to the aquatic ecosystem by limiting the maximum ΔT across the condenser during operation.

Specification

1. The maximum ΔT across the condenser shall not exceed 16.5°F during normal operation with all six circulating water pumps operating.

2. The maximum ΔT across the condenser shall not exceed 27.5°F in the event the system is operating with as many as one circulating water pump per condenser shell out of service at any given time.

3. In the event Specification 2.1.1.1 or 2.1.1.2 are exceeded, no corrective action shall be required other than operating within the limits of Specification 2.1.2.

Monitoring Requirement

The temperature differential across the condenser shall be monitored every hour utilizing the computer printout of the intake and discharge temperature measurements. The intake temperature is measured at each of the two inlets to each condenser shell. The discharge temperature is measured at a point downstream of the condenser in each of the two 84-inch

ID discharge lines from each condenser shell. The range of this instrumentation is 0 - 150°F and the accuracy is ± 0.5°F.

If the plant computer is out of service, the intake and discharge temperatures shall be monitored every two hours utilizing local reading instrumentation until the plant computer is returned to service.

Bases

Organisms entrained in the cooling water will be subjected to a sudden temperature rise in the condenser. This exposure and its effects are limited to, and by, entrainment time in the cooling system. During normal operation (Specification 1), this period of entrainment will be less than 4 minutes. Under conditions covered in Specification 2, entrainment time will be less than 8 minutes for 1/5 of total cooling flow; 4/5 of total flow will be passed through the system within 4 minutes. This time-temperature exposure will effect minimum impact on entrained organisms. Studies by Hoss, et. al.,[1] Schubel[2], and Ichthyological Associates (unpublished) show total survival among potentially entrainable organisms which were exposed for 10 minutes to a ΔT of 16.5°F, and relatively high survival after similar exposure to a ΔT of 27.5°F. Due to handling problems the Cynoscion regalis (Weakfish) and the Anchoa Mitchilli (Bay Anchovy) were not included in these tests. However, the overall impact on all species is not expected to be significant for the following reasons:

1. Infrequency of the occurrence of the 27.5°F ΔT as indicated in the bases for Specification 2.1.2

2. Comparatively small amount of water utilized for cooling purposes compared to tidal flow (on the order of 1%).

3. With respect to weakfish:

   (a) Most are spawned at least 15 miles south of Artificial Island. Relatively few of entrainable size (< 50 mm total length) have been taken by Ichthyological Associates, Inc. in the Artificial Island region.

   (b) The vicinity of Artificial Island is the northern perimeter of a large nursery area which extends south through the Delaware Bay.

With respect to bay anchovy:

   (a) Large numbers occur throughout the Delaware Bay estuary.

   (b) The majority of the population will not be exposed to the Salem intake.

References

1. Hoss, D. E., W. F. Hettler, Jr. and L. C. Coston. 1973. Effects of thermal shock on larval estuarine fish--Ecological implications with respect to entrainment in power plant cooling systems. In the Proceedings of the Symposium on the Early Life History of Fish, Oban, Scotland.

2. Shubel, J. R. 1975. Some comments on the thermal effects of power plants on fish eggs and larvae. In: Fisheries and Energy Production - A Symposium. Saul B. Saila (ed.) D. C. Heath and Co.

2.1.2 MAXIMUM DISCHARGE TEMPERATURE

Objective

To limit thermal stress to the aquatic ecosystem by limiting the plant discharge water temperature.

Specification

1. The maximum condenser discharge water temperature shall not exceed 104°F for more than two consecutive hours with all six circulating water pumps in operation.

2. The maximum condenser discharge water temperature shall not exceed 115°F for more than eight consecutive hours in the event the system is operating with as many as one circulating water pump per condenser shell out of service at any given time.

3. In the event specifications 2.1.2.1 or 2.1.2.2 are exceeded corrective action shall be taken to reduce the condenser discharge water temperature to within specification. Such

corrective action could include cleaning condenser water boxes or reduction of unit power level, unless an emergency need for power exists.

Monitoring Requirement

Discharge temperature shall be monitored every hour utilizing the average of the computer printout of the discharge temperature measurements. The discharge temperature is measured at a point downstream of the condenser in each of the two 84-inch ID discharge lines from each condenser shell. The range of this instrumentation is 0-150°F and accuracy is $\pm$ 0.5°F.

If the plant computer is out of service, the discharge temperature shall be monitored every two hours utilizing local reading instrumentation until the plant computer is returned to service.

Bases

Ichthyological Associates (IA) studies performed from June 1968 through December 1973, show 25 records of river temperatures $\geq$ 84°F. Twenty-one of these records were at river surface and only one was at night. From 1970 through 1973 the U. S. Geological Survey temperature sensor at Reedy Island recorded temperatures $\geq$ 84°F on only four dates. The earliest calendar date of record by IA was June 26 (in 1969); the latest was September 7 (in 1973).

During this period for potentially high temperatures, phytoplankton, zooplankton, and ichthyoplankton have been annually collected. These non-motile organisms encountering the plume can experience mortality only if lethal time-temperature

histories are experienced. At the predicted velocity range, effects on drifting organisms and passive life stages of motile species are minimized by short exposure time. Effects on sessile benthos in the near field (outside the area of maximum temperature and velocity and scouring) will be negligible since the plume will be primarily a surface phenonmenon.

Motile organisms encountering a thermal plume will either (1) pass through it, (2) prefer it over ambient conditions, or (3) avoid it. Avoidance can be considered detrimental in that its result is similar to a loss of potential habitat. However, only a minor portion of the total available habitat will be made unavailable by the temperature-velocity pattern. Delaware River organisms will not be isolated from environmental conditions presently available to them. The discharge velocity will exclude most motile organisms from the maximum temperatures.

For example, when the river temperature is $86^{o}F$ and the condenser ΔT is $16.5^{o}F$, the water surface area which would be at a temperature of $92^{o}F$ or greater will not exceed 1.17×10^{6} ft^{2} (27 acres). This maximum area would occur only during the worst tidal condition (tidal hour 0). Estimated discharge plume areas for different times during the tidal cycle are listed below for a condenser ΔT of $16.5^{o}F$.

	Isotherm Area*, $ft^2 \times 10^6$		
Tidal Hour	$4^{o}F$	$5^{o}F$	$8^{o}F$
0	11.9	4.56	1.17
1-1/2	1.91		
3	3.24		
4-1/2	5.83	2.11	
6	6.52	3.58	

Tidal Hour	Isotherm Area * $ft^2 \times 10^6$ 4°F	5°F	8°F
9	8.83		
10-1/2	12.25		

Should the condenser ΔT reach 27.5°F, higher temperatures in the plume would be expected, but for only a very short duration and relatively infrequently. This occurrence would be anticipated during heavy run-off from storms which carries large deposits of detritus (vegetation) and other debris which may clog the intake screens. This may occur once or twice a year, usually during the spring. Normal operation would be resumed as soon as the screens are cleaned.

Ecological effects due to a condenser ΔT of 27.5°F would be restricted to an enlarged isotherm plume area (compared to the 16.5°F ΔT case) that would be denied as a habitat for most of the species which occur at Artificial Island.

References

1. Salem FSAR, Appendix A.4, Dispersion and Cooling of Water Heat Released into the Delaware River Estuary, Pritchard-Carpenter, Consultants, July, 1968.

2.1.3 RATE OF CHANGE OF DISCHARGE TEMPERATURE

Objective

To minimize thermal stress to the aquatic environment due to sudden changes in water temperature.

* Estimates derived from calculations for mixing zone areas as developed by the NRC Regulatory Staff, Final Environmental Statement, Salem Nuclear Generating Station, April, 1973.

Specification

1. The rate of change of discharge temperature shall not exceed $8^{o}F$ per hour during normal plant shutdowns.

   If this specification is exceeded, the rate of reduction of plant power level shall be reduced such that the rate of change of discharge temperature is within specification.

   This limitation may be exceeded for brief periods as necessary to protect plant equipment and for certain safeguard operations which cannot be limited or negated by plant operation. These safeguard operations include automatic plant trips and compliance with the Safety Technical Specifications.

2. Both units shall not be intentionally shut down concurrently during the period of November through April. This specification is not applicable if shutdown is required to protect the health and safety of the public or for compliance with the Safety Technical Specifications.

Monitoring Requirement

Same as Specification 2.1.2, except that the discharge temperature shall be monitored every 15 minutes during power reductions of greater than 25% of full power.

Bases

All organisms have lower lethal temperatures. In temperate latitudes, such lethal temperatures are generally reached only when the ambient water temperature approaches freezing. The phenomenon of "cold shock" has been found to be most severe

during the period of low ambient water temperatures ($\leq$ 40°F). The likelihood of reaching lower lethal temperatures can be minimized by maintaining a heated discharge during the period when temperatures are $\leq$ 40°F. The potential for cold shock and its effects will be minimized since the thermal effluent from one unit will compensate for possible shutdown of the other unit.

TABLE 3.2-2

Exposure Pathway	Analysis	$\bar{X}_i$	σ	Units
I. Airborne				
A. Air Particulate				
	Gross beta	75	91	10^{-15} µCi/ml
	Sr 89	Note	1	
	Sr 90	Note	1	
	γemitters	Note	2	
	Be 7	54	21	10^{-15} µCi/ml
	Cs 137	2.9	2.8	10^{-15} µCi/ml
	Ce 144	25.0	32.6	10^{-15} µCi/ml
	Zr 95	3.5	4.1	10^{-15} µCi/ml
B. Air Iodine				
	I-131	Note	3	
II. Soil				
	Sr 90	5.2	3.3	10^{-7} µCi/ml
	γemitter	Note 1 and Note 2		
III. Direct				
	Gamma Dose TLD's (Quarterly)	4.4	.6	mrad/std mo.
IV. Water				
A. Surface	H-3	2.4	1.4	10^{-7}µCi/ml
	Sr 89	Note	2	
	Sr 90	Note	2	
	(γemitters)	Note	2	
	K-40	5.4	4.1	10^{-9} µCi/ml

TABLE 3.2-2
(Con't)

Exposure Pathway	Analysis	$\overline{X}_i$	σ	Units
B. Ground	H-3	Note	2	
	(γemitters)	Note	2	
	K-40	8.2	4.3	10^{-8} μCi/ml
C. Drinking	H-3	1.8	.9	10^{-7} μCi/ml
	Sr 89	Note	1	
(raw or treated water)	Sr 90	10.6	5.3	10^{-10} μCi/ml
	Gross beta	4.3	2.6	10^{-9} μCi/ml
	γemitters	Note	2	
V. Aquatic				
Benthos	Sr 89	Note	1	
	Sr 90	Note	1	
	(γemitters)	Note	1	
VI. Ingestion				
A. Milk	I-131	Note	3	
	Sr 89	Note	2	
	Sr 90	4.2	2.5	10^{-9} μCi/ml
	(γemitters)	Note	2	
	Cs 137	Note	2	10^{-6} μCi/ml
B. Fish	(γemitters)	Note	1	
C. Crabs	(γemitters)	Note	1	
D. Fruits or Vegetables	(γemitters)	Note	1	
	I-131	Note	3	
E. Game	(γemitters)	Note	1	

Table 3.2-2 (Con't)

Note 1: Insufficient data

Note 2: Several means and deviations could not be calculated because of abundancy of MDL values.

Note 3: Because most values were MDL means and deviations could not be determined, however the following review points have been established:

I-131 in milk Review point = 2.4 pCi/1

I-131 in leafy vegetables Review point = 110 pCi/1

I-131 in air Review point = .5 pCi/m^3

COMPARISON TABLE OF 4^{o}, 5^{o} AND 6^{o}F ISOTHERM AREAS
13.6°F vs 16.5°F CONDENSER ΔT

Tidal Hour	13.6°F ΔT(2) Isotherm Area, $ft^2 \times 10^6$			16.5°F ΔT(3) Isotherm Area, $ft^2 \times 10^6$		
	4°F	5°F	6°F	4°F	5°F	6°F
0	6.06	2.32	0.59	11.9	4.56	1.17
1-1/2	0.97			1.91		
3	1.65			3.24		
4-1/2	2.97	1.07		5.83	2.11	
6	3.32	1.82		6.52	3.58	
7-1/2	1.37			2.69		
9	0.45			0.88		
10-1/2	0.62			1.23		

Notes:
1) Two units operating, full power
2) Based on Carpenter estimates, FSAR, Appendix A.4.
3) Values extrapolated from Carpenter estimates in Note 2.