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Director of Nuclear Reactor Regulation
Attention: Mr. C. L. Miller, Project Director
Project Directorate I-2
Division of Reactor Projects
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

**SUSQUEHANNA STEAM ELECTRIC STATION
RESPONSE TO QUESTIONS FOR ENVIRONMENTAL
ASSESSMENT FOR POWER UPRATE WITH
INCREASED CORE FLOW**

**Docket Nos. 50-387
and 50-388**

PLA-4092 FILES A17-2/R41-2/P88-1

Dear Mr. Miller:

This letter responds to questions from the staff regarding the environmental assessment for power uprate with increased core flow. Although your questions were directed at the effects of the Unit 2 power uprate, these responses are applicable to the combined effects of both Units 1 and Unit 2 operating at power uprate conditions.

The responses to the staff's questions are provided below:

1. River Water and Circulating Water System

   - **Provide the effects of additional withdrawal of river water and an increase in the blowdown rate from the natural draft cooling tower, for the proposed uprated power operation.**

     The maximum withdrawal rate from the river will increase from the current value of 38,800 gpm to 40,700 gpm after power uprate, an increase of 5%. The maximum blowdown rate will increase from the current value of 10,300 gpm to 10,800 gpm, an increase of 5%.

     After reviewing the additional water withdrawal requirements and increased blowdown rate from the natural draft cooling towers at the Susquehanna SES (SSES) associated with power uprate, PP&L determined that there will be no adverse effects to the river flow or river biota. This conclusion is based on two factors. First, the projected number of fish

estimated to be impinged per day would increase from 20 to 21 and the number of larvae estimated to be entrained would increase by only 13,000 to 363,000 per day. Biologically, these estimated increases represent a negligible impact to the river ecosystem. Second, the maximum cooling tower blowdown flow after power uprate is estimated to increase by only 5% which mounts to 500 gpm. This amounts to less than .5% of the average river flow.

- **Identify the change in the temperature of the cooling water blowdown.**

The cooling blowdown from the cooling tower basin is through a diffuser into the river. The characteristics of the cooling tower are such that there is greater air flow through the tower caused by the higher circulating water return temperature at power uprate conditions. This increased air flow removes the additional heat load resulting in negligible cooling tower basin temperature changes.

- **Discuss any adverse impacts on the terrestrial environment due to the additional drift emissions from the cooling tower on local soils and vegetation.**

Estimates, assuming that both SSES cooling towers are operating at the original 100% power level for a year, would result in 58,000 pounds of solids per year as salt drift, spread over a large area. Modelling indicated the heaviest localized deposition of solids would be 3 pounds/acre/year (SSES Environmental Report Section 5.3.4). The power uprate should have no impact on these estimates, especially with the conservatism built into the model by assuming 100% capacity factor. Note also that the design cooling tower drift is a function of circulating water flow which is not changing for power uprate.

Studies on the possible effects of salt drift have been conducted at the SSES since 1977. These studies have included monthly examination of natural vegetation during the growing season (1977 to date), annual quantitative vegetation studies (1977 to date), a two-year study on the effect of simulated salt drift on corn and soybeans (1985-86), and annual forest inspections since 1982.

The monthly examinations have utilized several transects (salt drift transects) in the vicinity of the power station for possible salt damage to natural vegetation and incidence of parasitic plant diseases. The annual vegetation studies consider possible long-term changes in forest utilized salt spray approximating the composition of the cooling tower drift from the SSES at "worst case" concentration on agricultural crops in two fields.

None of the studies have found evidence for damage to agricultural crops or natural vegetation from salt drift. It should be noted that the water used at the SSES (from the Susquehanna River) does not contain the same salts as brackish water used at estuarine cooing tower; its effects are more like plant micronutrients. The natural vegetation studies

over 15 years have found no salt drift damage and plant diseases in accordance with host presence and location. The simulated salt drift studies utilized concentrations estimated at 5 and 10 times maximum salt drift concentration in the SSES plume. It is therefore unlikely that salt drift damage would occur from an approximate 5% consumptive rise in water usage.

- **Identify any changes in cooling tower water chemistry and intake canal velocity.**

  There will be no changes to the cooling tower water chemistry as a result of power uprate. The pre-uprate levels of cycles of concentration will be maintained. Since there will be a 5% increase in blowdown flow, there will be a 5% increase in chemical discharge to the river.

  The velocity of the intake water will increase by 5% to .37 ft/sec with power uprate which is below the recommended intake design velocity of 0.5 ft/sec.

- **Address any increased noise levels attributed towards power uprate.**

  Sound level monitoring was conducted at both near site (less than 1 mile) and far site locations (greater than 1 mile) from the Susquehanna SES site from 1972 and 1985. This survey was conducted prior to and during construction and during one and two unit operation. The two Cooling Towers were identified to be one of the major site noise sources. The cumulative effects of all noise sources associated with station operation were determined to be less than the U.S. Environmental Protection Agency recommended day-night equivalent sound level limit of 55 dBA at all monitoring locations. It is not expected that this level will be exceeded at any of the locations with the possible exception of an area approximately 2,200 feet southeast of the Cooling Towers where the measured sound level including a nighttime weighting factor of +10 dBA was 54 dBA. Sound levels will be monitored at power rate conditions.

- **Discuss any changes to the river water discharge flow rate, velocity, temperature or thermal plume, or chemical composition due to power uprate. Also address the effects of power uprating on the National Pollutant Discharge Elimination System (NPDES) permit.**

  As indicated previously, water discharge flow from power uprate may increase 5% above the design discharge rate to 10,800 gpm. This is well below the maximum flow of 16,000 gpm reviewed in the SSES Environmental Report (Table 3.3-1) and, therefore, the additional flow from power uprate is not considered to be an adverse impact to the river.

At the Susquehanna SES cooling tower blowdown discharges into the river through a diffuser pipe located on the river bottom. Velocity of this discharge was calculated in Appendix G, Thermal Discharge, Response 1, pages THE-1.1 and 1.2 of the Environmental Report. Water discharges through 72-4" ports into the river. The velocity associated with a 10,000 gpm discharge was calculated to be 5.83 fps and rounded to 6 fps. This rounded off value was used when preparing SSES Environmental Report. The velocity associated with a 10,800 gpm discharge is also approximately 6 fps.

Thermal plume studies conducted in the fall, winter, and spring of 1986-87 indicated a maximum temperature rise of 1°F within an 80 foot mixing zone from the diffuser pipe. Present Pennsylvania Department of Environmental Resources water quality criteria states that ambient river temperature rise from thermal discharges shall not cause the temperature in the receiving water body to rise more than 2°F in one hour. The thermal discharges from the cooling tower blowdown from power uprate will not exceed this water quality criteria.

Chemical composition of the blowdown after power uprate will not exceed the NPDES permit limits.

2. Plant Fuel Management System

- **The increase in spent fuel pool heat load is due to the proposed increase in power level and the use of high density spent fuel storage racks. Address any environmental impacts from the releases of the radioactive materials.**

  The environmental impacts from radioactive materials releases have been reviewed both in the FSAR and Environmental Report. Power uprate will not significantly change the quantities previously evaluated.

  Environmental impacts from releases of radioactivity are discussed in PP&L Licensing Topical Report NE-092-001, in Sections 8.6.1 (Radiation Levels) Normal Operation, 8.6.2, (Radiation Levels) Post-operation and Accident and 9.2, Design Bases Radiological Accidents.

- **Discuss any changes in the liquid radwaste quantities or activity levels due to the proposed power uprate.**

  Liquid radwaste throughput may increase up to 5% to a level which is within the processing capability of the system.

The activity levels of some radwaste streams containing coolant activation products may increase up to 10%, due to the 4.5% core flux increase and a 5% crud increase to the reactor which are assumed to occur.

Since the power uprate level of 3441 MWt is not significanly different from that analyzed previously, it is not anticipated there will be a significant increase in radiological effluents. Also, pre-power uprate technical specification limits will be maintained.

3. Other Systems

- **Discuss any significant increase due to the proposed power uprate in the makeup requirements for the reactor coolant system, component cooling water system, condensate and feedwater system, turbine plant cooling system, auxiliary steam system, water treatment plant, and the fire protection system.**

  There is no significant increase in makeup requirements for any of the systems listed. The reactor coolant and feedwater systems will operate at a slightly higher pressure after power uprate so that any incidental leakage from these systems will increase. Incidental leakage from these systems has historically been small, and the increase will be less than two percent, thus the increase will not be significant with respect to the ability of the makeup capability of the water treatment plant. The leakage from the reactor coolant system is monitored and regulated by a plant technical specification. The plant technical specification value does not change for power uprate thus total allowable leakage will be unaffected.

  The only affect of power uprate on the component cooling water system and turbine plant cooling water system from power uprate is an increased heat load; inventory makeup is not affected.

  Makeup requirements for the auxiliary steam system and the fire protection system are unaffected by power uprate.

- **Identify if there are any changes needed to the environmental protection plan.**

  There are no changes required to the Environmental Protection Plan for the Susquehanna SES. Chapter 3, Consistency Requirements, Section 3.1, Plant Design Operations, of this plan discusses how proposed changes need to be addressed. Through the PP&L Unreviewed Environmental Question Program, changes such as that of power uprate will be reviewed.

Should you have further questions, please call Mr. W.W. Williams at (610) 774-5610.

Very truly yours,

(Signed) R. G. BYRAM

R. G. Byram

cc: NRC Document Control Desk (original)
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