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**GPU Nuclear**  
P.O. Box 388  
Forked River, New Jersey 08731  
609-693-6000  
Writer's Direct Dial Number:  
January 4, 1984

Mr. Paul C. Kurisko, Chief  
Industrial Waste Management  
Water Quality Management  
New Jersey Department of  
Environmental Protection  
Division of Water Resources  
PO Box CN-029  
Trenton, NJ 08625

Dear Mr. Kurisko:

Subject: GPU Nuclear Corporation (GPUN)  
Oyster Creek Nuclear Generating Station (OCNGS)  
NJPDES Permit NO. 000 5550

The USEPA Steam Electric Effluent Guidelines at 40 CFR 423.13(b)(2) will limit, as of July 1, 1984, the discharge of total residual chlorine in once through cooling water from any single generating unit of 25 or more megawatts to no more than two hours per day unless the discharger can demonstrate that a discharge for longer duration is required for macroinvertebrate control. The OCNGS exceeds this generating capacity and operates a once through cooling system for the station's main condenser and will therefore be subject to these limitations.

The OCNGS' main condenser is divided into six sections and the station's NJPDES permit presently authorizes the chlorination of each of these six sections for up to two hours per day with not more than one section being chlorinated at a time. Therefore the permit allows for a total of twelve hours per day of chlorination of this system.

GPUN believes that this chlorination schedule is not only necessary for macroinvertebrate control of the main station condenser, but also presents less adverse environmental impact than would simultaneous chlorination of all six condenser sections. This belief is based upon the results of a chlorine minimization study conducted at the station in 1976, macroinvertebrate fouling problems encountered at other station systems in the past and environmental evaluations conducted on the station and its various systems. The details concerning these areas are contained in the attachments to this letter.

Consequently, GPUN hereby requests in accordance with 40 CFR 423.13 (b)(2) authorization to chlorinate the main condenser system and discharge Total Residual Chlorine at up to 0.20 mg/l from this system as

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measured at the point of discharge to the receiving waterway for up to twelve hours per day on a schedule that would limit chlorination of each of the six condenser sections to no more than two hours of chlorination per day with no two sections being chlorinated simultaneously. Such authorization is requested to continue beyond the July 1, 1984 statutory deadline and remain in effect for the term of the NPDES permit and subsequent permit renewals.

If you have any questions regarding this request or the attached information, please contact Mr. Ronald Lacey, Manager Environmental Licensing at (201) 299-2271 or our Corporate address.

Very truly yours,



F. B. Fiedler  
Vice President/Director  
Oyster Creek

RKL:dTs:0203f  
Enclosures



Technical Justification for Alternate Chlorination Limitations

Recently adopted Steam Electric Effluent Limitation Guidelines (40 CFR 423) will require the Oyster Creek Station to limit the amount of Total Residual Chlorine (TRC) in its discharge to 0.20 mg/l, and limit the duration of TRC discharge from any single generating unit to 2 hours per day, unless the discharger can demonstrate that more than 2 hours per day is needed for macroinvertebrate control. These limitations apply at the point of discharge to the receiving waters and compliance must be achieved by July 1, 1984.

According to its NJPDES permit, the Oyster Creek Station is presently authorized to discharge Free Available Chlorine (FAC) at concentrations not to exceed 0.50 mg/l maximum and 0.20 mg/l average at the outlet of each condenser section. The station is also authorized to chlorinate each of the 6 condenser sections, in sequence, for up to 2 hours per day, for a total of 12 hours per day of chlorination.

It is GPU Nuclear's contention that the new chlorination guidelines are unnecessarily restrictive and that the present limitations, which meet the intent of the new guidelines, should be maintained for the following reasons:

- 1) GPU has conducted detailed studies of alternative condenser chlorination schemes, designed to determine the minimal acceptable rate of chlorination which would keep biofouling at an acceptable level while minimizing environmental impact (Ebert, 1977, Attachment I-A).

With respect to the duration of chlorination, the results of these studies indicated that the chlorination of each of the six condenser sections for 6 twenty minute periods per day afforded a level of biofouling protection that was comparable to chlorination periods that were of 30% longer duration.

With respect to the amount of chlorine applied, the studies showed that reducing the chlorination rate from 1500 pounds per day (ppd) to 1300 ppd did not result in an observable decrease in condenser protection. Furthermore, chlorination of each condenser section at the latter rate (1300 ppd) for 6 twenty minute periods per day, in sequential fashion, resulted in average FAC concentrations of 0.11 mg/l (range of 0.08-0.17) and average TRC concentrations of 0.16 mg/l (range of 0.08-0.24) at the outlet of the condenser section. No chlorine residuals were detected at the point of discharge to the receiving water body under this chlorination scheme. Although the results of these studies showed that this chlorination scheme provided acceptable levels of condenser protection and no chlorine residuals in the receiving water body, it was concluded that it might



be possible to further reduce the amount of chlorine applied, possibly to as little as 800 ppd. This philosophy has been applied to the chlorination practices at Oyster Creek and during the 1980-1982 period, the average daily rate of chlorination has not exceeded 123 ppd.

- 2) The monthly Discharge Monitoring Reports submitted to the NJDEP, Division of Water Resources, clearly document the fact that the levels of FAC at the point of discharge to the receiving water body rarely exceed the lower limit of detection by Amperometric Titration (0.05 mg/l), confirming the results of the above referenced study. During the 1980-1982 period, the concentration of FAC in the condenser discharge has not exceeded 0.10 mg/l.
- 3) Studies of condenser performance (actual vs. design heat transfer resistance), along with visual inspections of the condenser tubes, tube sheets and water boxes, indicate that significant accumulations of biofouling occur, primarily near the discharge side of the condenser, under the present chlorination scheme. These observations indicate the chlorine demand of the system is such that at the present rate of application, the amount of free chlorine reaching the discharge side of the condenser is insufficient to provide complete biofouling control. This is not surprising given the results of the chlorine monitoring program described above, and is an indication that the present level of chlorination is at or near optimum.
- 4) The lack of other industrial discharges on Oyster Creek precludes the possibility of any synergistic effects such as the formation of chlorinated hydrocarbons from the very low concentrations of chlorine residuals discharged from the station.
- 5) Final confirmation of the innocuous level of chlorine residuals in the discharge of the Oyster Creek Station comes from studies of the organisms inhabiting the discharge canal.

Sessile benthic invertebrates, because of their limited mobility, should be most susceptible to the effects of residual chlorine in the discharge water. The results of studies of the benthic invertebrate community in the discharge canal, however, indicate the presence of a healthy benthic fauna. In a comparative study of the epibenthic fauna in the intake and discharge canals, conducted by the National Marine Fisheries Service, no overall differences in diversity and evenness between the two locations were detected, although some seasonal differences, probably related to the temperature differential between the two locations, were indicated. The authors concluded that "no gross detrimental or beneficial effects of the power plant effluent were found" (Young and Frame, 1976;).



The hard clam, Mercenaria mercenaria, is the most important commercially harvested species in Barnegat Bay. This species has been the subject of aquaculture experiments in the intake and discharge canals of the Oyster Creek Station since 1979. The results of these studies show that clams grown in the heated condenser discharge grow significantly faster than those maintained in the intake canal throughout most of the year. The only exception was when mid-summer water temperatures exceeded the known upper lethal temperature for this species. The results of these studies will be the subject of a report to be issued in January of 1984.

Where larger, more mobile organisms are concerned, although seasonal avoidance of the discharge canal was observed for some species, over the entire year, significantly greater numbers of fish and blue crabs are found in the discharge canal when compared to the intake canal. Based on total annual catch by trawl and gill net, Tatham et. al. (1978) reported that over 1,500 more individual fish (7,045 individuals) and 5 more species (36 species) were found in Oyster Creek than in Forked River (5,501 individuals; 31 species).

Clearly then, the chlorine limitations contained in the current NJPDES Permit for the Oyster Creek Station meet the intent of the new guidelines, that of protecting the environment from the detrimental impact of excessive chlorine residuals in the receiving waters.

#### References

- Tatham, T. R., D. J. Danila, D. L. Thomas and Associates. 1978. Ecological studies for the Oyster Creek Generating Station, progress report for the period September 1976-August 1977, volume one, fin- and shellfish. Report to Jersey Central Power and Light Company by Ichthyological Associates, Inc.
- Young, J. S. and Frame, A. B. 1976. Some Effects of a Power Plant Effluent on Estuarine Epibenthic Organisms.