

TO: Mayor and Board of Trustees
Village of Buchanan
218 Westchester Avenue
Municipal Building
Buchanan, New York 10511

May 6, 1975

Presentation to Village Board - by Dr. William W. Shuster
Impact of Cooling Towers on Village of Buchanan

It is a real pleasure to have the opportunity to meet with you and to share with you some thoughts regarding the impact that a large power generating station, such as the one at Indian Point, has on a community such as Buchanan.

I believe that we all realize that within the framework of our present way of life and our present level of economy there are tremendous demands for large, continuous and reliable reservoirs of electrical power. To supply this demand we require substantial numbers of large generating stations such as the one at Indian Point. Such installations require not only large investments of time, talents and money, but they are also demanding of fuel resources as a source of energy and they impact markedly on surrounding areas because of the large quantities of heat energy which is associated with power generation and which cannot be directly utilized and which must be dissipated.

In the generation of electrical power some type of fuel (nuclear or fossil) is utilized to generate large quantities of high pressure steam from water. This steam is allowed to expand in driving steam turbines which, in turn, are connected to electrical generators which yield the large amounts of desired electrical energy. After doing its work in the turbines, the steam emerges from the turbine as low pressure steam and must be condensed before being returned to the boilers for reuse. To condense the steam, large quantities of cold water are taken from the Hudson River and used to absorb the heat from the steam. At the present time, this cooling water which has become elevated in temperature is returned to the Hudson River.

In evaluating the impact that this large heat load has on the environment, the U. S. Nuclear Regulatory Commission has recommended that the Consolidated Edison Company, who operates the generating plant, cease using a once-through type of cooling process, and instead, design, build and operate a closed cycle system of cooling. Based upon studies of various alternatives, it appears that natural draft wet evaporative cooling towers would be the most suitable alternative to

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once-through cooling. What is not so apparent are magnitudes of the impact of the alternatives on the surrounding environment.

When I was first asked to express an opinion on the relative merits of the alternatives, I had considerable misgivings about reaching a definitive decision. Both alternatives seemed to have both advantages and disadvantages and it was not at all obvious which was the better direction to take. However, after considerable study of all aspects of the matter, I have become convinced that there are particular features of the situation at Indian Point, perhaps not found typically at other locations, that suggest that the best solution from a balanced point of view can be found through the use of once-through cooling, rather than by such alternate means as a closed system using natural draft cooling towers. This opinion I express with full knowledge, as an environmental engineer, of possible effects from the discharge of heated effluents to the Hudson River.

The principal arguments which have been presented against the use of once-through cooling include the following:

1. The withdrawal of cooling water from the river will result in the killing of substantial numbers of fish by impingement on the intake screens.
2. The discharge of heated effluent will, under certain conditions, be in violation of the New York State thermal discharge criteria.
3. Discharged cooling water will contain objectionable levels of residual chlorine resulting from treatment used to prevent development of biological growths on heat exchange equipment.
4. That thermal discharges will interfere with the life cycle of fish and other aquatic life, especially the striped bass.
5. That dissolved oxygen levels in the river will be seriously depleted.

While these arguments are well-considered and important, it would be well to examine them closely.

1. It is indeed important that steps be taken to minimize the effects of inflow on the impingement of fish on inlet screens. It is felt that a number of possibilities exist for redesigning the intakes to alleviate this condition. It is felt that innovative approaches can solve or at least markedly reduce the magnitude of the problem.

2. Whether the discharge of heated effluent will violate New York State thermal discharge criteria is highly in doubt. Predictions of behavior are based on mathematical models which depend upon field data which is largely inadequate, and upon numerous unproven assumptions. This has been clearly stated in the Impact Statement of the U. S. Nuclear Regulatory Commission. Even with the results of such models, any predicted violations are marginal.
3. It is anticipated that any residual chlorine in discharged water will rapidly be dissipated by dilution and by consumption by oxidizable materials naturally present in the river water.
4. It seems highly unlikely that the heated discharges will have any marked effect on life cycles of aquatic species, since the temperature levels at worst will barely exceed acceptable limits. Even under these relatively rare occurrences, which by-the-way are most likely to occur at times other than normal spawning times, most life forms may find that they can adjust to such minor excesses, or avoid them entirely. It may be noted that some reports have indicated that some life forms instead of being injured by thermal discharges, actually thrive in them.
5. Again occasional marginal temperature excesses, if they occur at all, will hardly have a significant effect on dissolved oxygen content in excess of that anticipated for temperatures within acceptable limits.

Of all possible alternatives to once-through cooling, it has been suggested that the best would be to use a natural draft wet evaporative cooling tower to cool the condenser water in a closed system. It is strongly felt that such an alternative would be entirely unsatisfactory for the following reasons:

1. The extremely large investment required would result in a significant increase in the cost of electric power furnished. The use of cooling towers would result in increased turbine back pressure resulting in lost energy output which would result in added costs to replace.
2. The towers are huge (560 feet high) and would represent an aesthetically displeasing imposition.

3. The particular location of the plant and direction of prevailing winds results in the tower discharge of water vapor and salt droplets impinging upon the Town of Buchanan and surrounding territory.
4. The vapor plume can impact on Buchanan in several ways:
 - (a) It has been reported that tower vapor plume can effect local weather conditions quite markedly through fogging, icing and by reducing solar energy input. It has been predicted that such effects in Buchanan would be minimal but this remains to be proven.
 - (b) More seriously, because the cooling water is recycled in a closed system and because of the relatively high salt concentration in the river water used in cooling, the plume from the tower will contain droplets of salt solution which will be distributed over an appreciable area which includes portions of the Town of Buchanan and surrounding areas. Various estimates of salt deposition rates have been made for various distances from the plant, but a rate of about $400 \text{ Kg/Km}^2/\text{mo.}$ seems to be about average. Just what does this mean to the average land-owner in Buchanan? I have estimated that a medium size car will occupy about 117 ft.^2 of ground area, and based upon the above rate, one can expect that about 4.4 grams of salt will be deposited. The heaviest deposits are most likely during periods when there will be the least rainfall to wash off salt deposits from various surfaces. In terms of deposits on homeproperties, it is estimated that close to 2 lbs. of salts will be deposited on a 1/2 acre plot of ground. The effects of salt deposits on vegetation are not completely known but it appears to be clear that at least three species of trees have the potential for severe injury. They include hemlock, dogwood and white ash, all of which are common in the area. The damage to vegetation can be expected to vary with location and specific conditions but may range from slight damage to outright killing of some forms.

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In addition to damage to vegetation, various other effects from salt deposition can be anticipated. Deposits on metal surfaces may well hasten rates of corrosion and cause local problems. Recent findings have indicated that salt deposits on high voltage transmission lines have increased the occurrence of arcing and increased the likelihood of ozone generation with its attendant hazards to plant, animal and human life.

In summary, the particular characteristics associated with the location and mode of operation of the Indian Point Plant strongly suggest that the use of cooling towers is not a satisfactory method of handling heated water from this plant. The impact of heated discharges on the Hudson River is not at all clear at present and at worst, its effects seem to be marginal. Before eliminating this method of operation, it is strongly urged that more complete studies of the impact of such discharges be made and thoroughly evaluated. The use of cooling towers would be aesthetically disastrous and have serious impacts on property values in surrounding areas. While one can be coldly objective and say that the destructive effects of cooling towers involve a relatively small area and only a moderate number of people, the people of Buchanan are human beings and their rights are just as important as those who are making decisions from afar.

I believe that those making decisions should be entirely honest in answering the question, "Would I prefer to forevermore stare at the structure of a cooling tower pouring out a plume of vapor from which salt is raining down on my property and my possessions in which I have invested my life savings, in preference to very uncertain effects resulting from thermal discharges to the river on the biological life in the river?"

Thank you for your attention.

THE LETTER REGARDING THE MAY 8, 1976, MEETING WAS SENT TO THE FOLLOWING PEOPLE:

Supervisor Muriel H. Morabito
Town of Cortlandt
Municipal Building
Croton-on-Hudson, New York 10520

Mayor Fred J. Bianco
City of Peekskill
City Hall
Peekskill, New York 10566

Honorable Representative Hamilton
Fish, Jr.
Congress of the United States
House of Representatives
Washington, D. C. 20515

Governor Hugh L. Carey
State of New York
Executive Chamber
Albany, New York 12224

Honorable Senator Bernard G. Gordon
1420 Riverview Avenue
Peekskill, New York 10566

Honorable Assemblyman Willis H.
Stephens
Brewster
New York 10509

Honorable Senator Jacob K. Javits
United States Senate
Washington, D. C. 20510

Honorable Alfred B. DeBello
County Executive
Office of the County Executive
White Plains, New York 10601

Honorable Edward M. Gibbs, County
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County of Westchester
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Ogden Reid, Commissioner
State of New York
Dept. of Environmental Conservation
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Mr. David McCoy
Senior Landscape Architect
Palisades Interstate Park Commission
Bear Mountain, New York 10911

Mayor John Loconto
Village of Croton-on-Hudson
Municipal Building
Croton-on-Hudson, New York 10520

Honorable Representative Peter Peyser
Congress of United States
House of Representatives
Washington, D. C. 20515

Town Supervisor Albert Capellini
Town of Yorktown
363 Underhill Avenue
Yorktown Heights, New York 10598

Town Supervisor Joseph Percacciolo
Town of Phillipstown - Town Hall
238 Main Street
Cold Spring, New York 10516

Honorable Representative Richard Ottinger
United States Congress
House of Representatives
Washington, D. C. 20515

Senator James L. Buckley
United States Senate
Washington, D. C. 20510