Instructions for Handling Attached Correction and Additions to Supplement No. 1 to Economic and Environmental Impacts of Alternative Closed-Cycle Cooling Systems for Indian Point Unit No. 2

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suggested for recreational, commercial and industrial land use by the U.S. Environmental Protection Agency. Accordingly, it is not necessary to consider using measures which are unproven and potentially deleterious to cooling tower operation. Noise reduction measures for the type mechanical draft cooling towers proposed were examined (by Con Edison) and dismissed for reasons similar to those described above for natural draft cooling towers. We believe that it is imprudent to employ unproven noise control methods which might jeopardize cooling tower operation. Furthermore, the present license does not allow time for a research and development project to reduce noise emissions.

Mechanical-draft cooling towers, which are noiser than natural-draft cooling towers, are estimated to exceed Buchanan noise limits in both residential and non-residential zones. Operation of mechanical-draft cooling towers is estimated to cause greater risk of community dissatisfaction to noise in residential zones. Accordingly, to minimize potential noise impact, natural-draft cooling towers were selected as the acoustically preferred alternative.

Revised
9/30/75

Question III.12

Provide a descriptive analysis of the vegetative habitat at the regions of maximum predicted salt deposition. This information need only be of reconnaissance-level type.

Response:

Literature review, vegetation sampling, and field reconnaissance are the basis for the descriptive analysis of the vegetative habitat at the regions of maximum predicted salt deposition.

Figures 1 and 2, which are based on the 1973 Dames and Moore report (Appendix D of the Indian Point Unit No. 2 cooling tower report) depict the relationship between vegetative habitats within a two mile radius of Indian Point and the approximate size and location of maximum salt deposition areas. These areas are predicted to be susceptible to injury from salt drift from a mechanical draft or a natural draft cooling tower at Indian Point, assuming 14 consecutive rainless days. The vegetative habitats in the maximum salt deposition areas consist of combinations of 4 basic cover types:

1) eastern deciduous hardwoods
2) meadows
3) marshland
4) other (e.g. street plantings and ornamentals)

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These four basic habitats are closely interspersed throughout the Indian Point area. Any area that is within several kilometers of the Indian Point site and equivalent in size to areas for which maximum saline deposition is predicted, will therefore contain essentially the same basic cover types.

Forest cover types in areas of maximum saline deposit near Indian Point, New York are characteristic of the "Central Forest Region" of the United States (Society of American Foresters, 1975).* This forest region extends from the prairies of Nebraska to Cape Cod , ranging north into Canada and south to northern Georgia and Alabama. A great variety of forest cover types are found within this broad classification. Forested land in the two counties where maximum saline deposition is predicted, i.e. Westchester and Rockland, New York is further classified as part of the five county Hudson Highlands Subregion of the New England Highlands. Forests cover approximately 450,000 acres in this subregion, in which young stands of pioneer hardwoods and oaks are most common, while northern hardwoods are less commonly found. (Stout, 1948).

Table 1 presents major tree and shrub species found in the sample areas one, two, and three which are

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* Forest cover type is defined as "a descriptive term used to group stands of similar character as regards composition and development due to given ecological factors by which they may be differentiated from other groups of stands." (Society of American Forester, 1950).

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shown in Figures 1 and 2. These major plant species partially comprise an eastern deciduous hardwood habitat generally characterized by several dominant stand types. These dominant stand types are superior to the intermediate and understory stands. Based upon Dames and Moore (1973) and subsequent reconnaissance by Con Edison staff, the dominant overstory species commonly found in the areas of maximum saline deposition are: Oaks, (Quercus rubra, Q. Velutina, Q. alba), shagbark hickory (Carya ovata) and hemlock (Tsuga canadensis). The common understory species are ground canopies of witch-hazel (Hamamelis virginiana), rhododendron (Rhododendron spp.) and flowering dogwood (Cornus florida). Intermediate canopies contain suppressed oaks, hemlock and American hornbeam (Carpinus caroliniana). The common ground covers are Virginia creeper (Parthenocissus quinquefolia), woodfern (Cayptograma crispa), and a great variety of other assorted woodland plants including Indian pipe (Monotropa uniflora), trillium (Trillium spp.), poison ivy (Rhus radicans), white wood aster (Aster divaricatus) and Solomon-plume (Smilacina racemosa).

The meadow lands within areas of maximum predicted saline deposition are generally characterized by "old field" vegetation in varying stages of succession. Various grasses, forbs, and shrubs dominate.

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Plant species commonly found in old field plant communities are listed in Table 2.

Marshlands within the area of Indian Point, New York are of two broad varieties: freshwater and saltwater.

The vegetative habitat in freshwater marshes within the area of maximum salt deposition is commonly dominated by common reeds (Phragmites communis), and cattails (Typha spp.). Other plant species may include Touch-me-nots (Impatiens biflora), rushes (Juncus spp.) and sedges (Carex spp.), speckled alder (Alnus rugosa), willows (Salix spp.) and purple loosestrife (Lythrum salicaria).

Saltwater marshes contain plant species common to intertidal and shallow subtidal Hudson River coastal areas. Among the plant species characteristic of such plant communities are low marsh cord grass (Spartina alterniflora), salt meadow cordgrass (Spartina patens), saltgrass (Distichlis spicata), tall cord grass (Spartina pectinata and S. cynosuroides common reeds (phragmites communis), and cattails (Typha spp.)

The vegetative habitat characteristic of residential areas consists primarily of those plant species that frequently occur as street and ornamental plantings. The areas in which this type of cover prevails include communities such as Buchanan, Verplanck, Montrose, and Peekskill, New York.

Revised
9/30/75

Based upon field observations and available information, this habitat type can normally be expected to contain a wide assortment of species (Table 3).

Revised
9/30/75

References

Cornman, J. F., Scannell, R. J. and Lieberman, A. S. Trees for the Home Grounds, (New York State College of Agriculture) Cornell Extension Bulletin 1096.

Appendix D of the Indian Point Unit No. 2 Cooling Tower Report, consistent with Text, p. 28-1.

Niagara Mohawk Power Corporation. Trees in Your Community.

Society of American Foresters. Forest Cover Types of the Eastern United States, 1975.

______________________________, Forestry Terminology, 1950.

Stout, Neil J. Atlas of Forestry in New York. State University College of Forestry, Syracuse University, 1948.

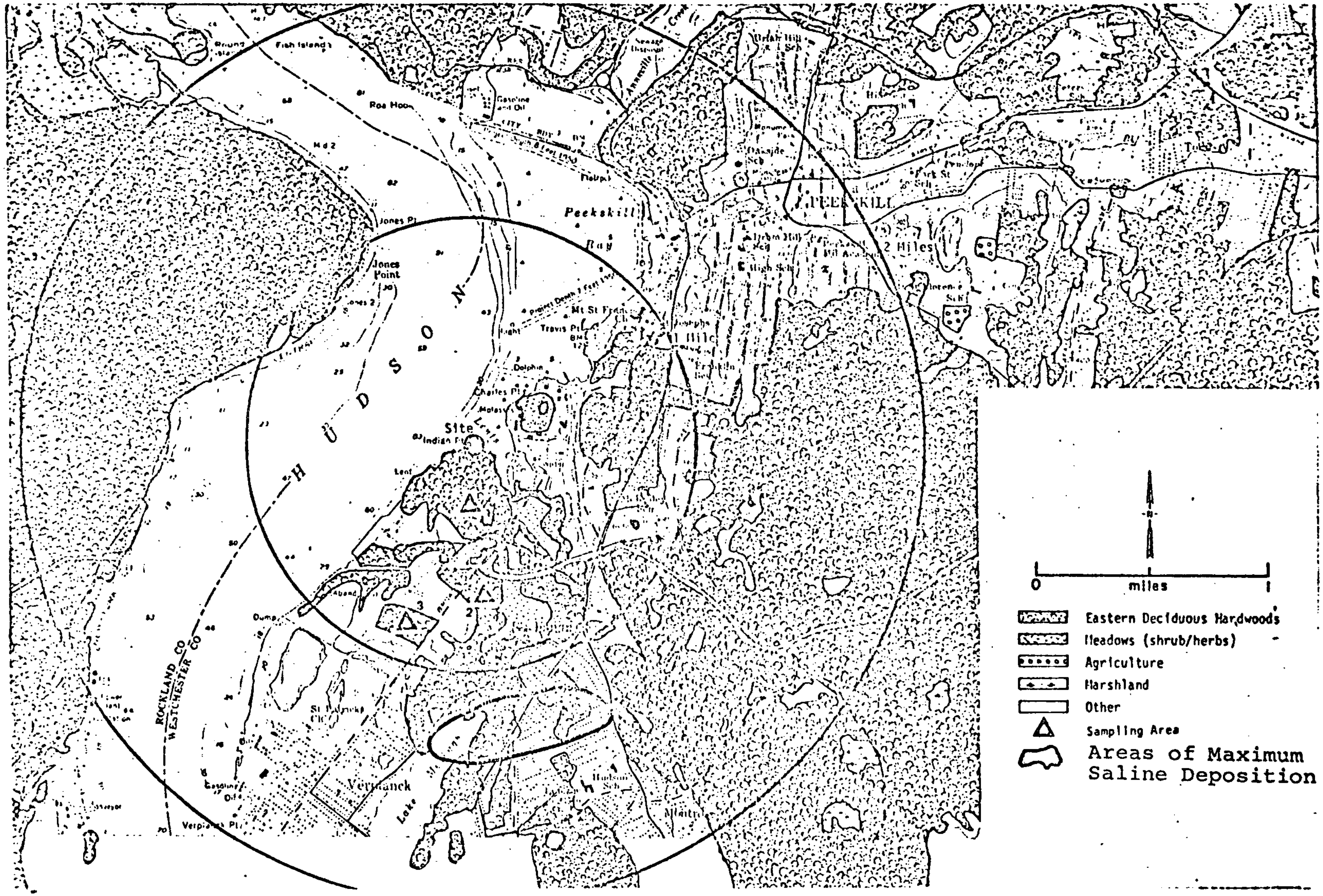

Figure 2. Vegetative Habitat and Areas of Maximum Saline Deposition: Natural Draft, 14 Rainless Days. (Based on Dames & Moore, 1973).

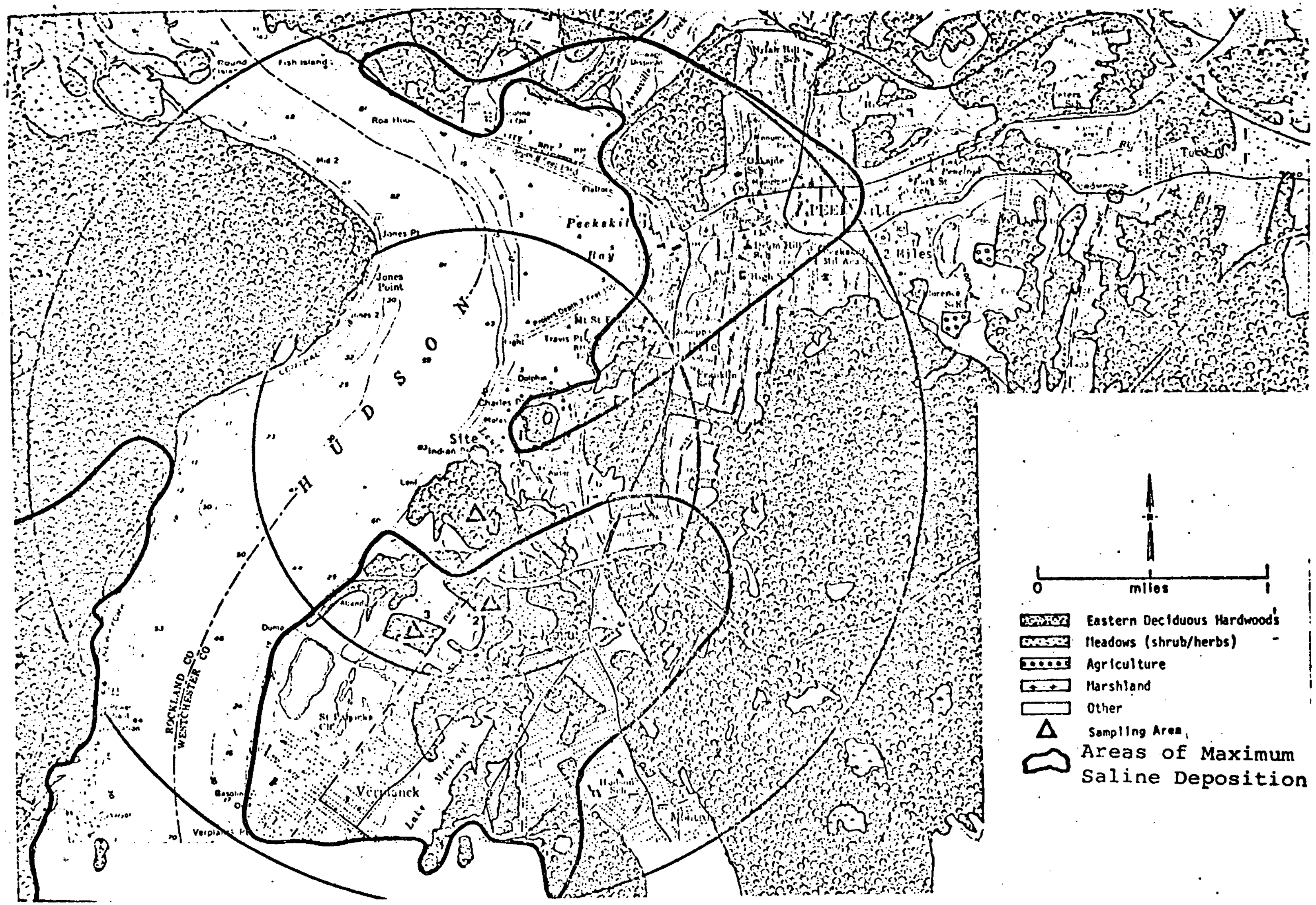

Figure 1. Vegetative Habitat and Areas of Maximum Saline Deposition: Mechanical Draft. (Based on Dames & Moore, 1973).

Table 1

Major Plant Species Found in
Sampling Areas One, Two, or Three

Scientific Name	Common Name
Carya ovata	Shagbark hickory
Pyrus coronaria	Crabapple
Pinus strobus	White pine
Quercus alba	White oak
Q. rubra	Red oak
Q. primus	Chestnut oak
Acer saccharum	Sugar maple
Picea rubens	Red Spruce
Acer rubrum	Red maple
Platanus occidentalis	American sycamore
Salix spp	Willow sp.
Robinia pseudo-acacia	Black locust
Catalpa bignonioides	Catalpa
Fraxinus americana	White ash
Fagus grandifolia	American beech
Prunus serotina	Black cherry
Carpinus caroliniana	Ironwood
Fraxinus nigra	Black ash
Pinus sylvestris	Scotch pine

Table 1 (Continued)

Scientific Name	Common Name
Populus deltoides	E. cottonwood
Nyssa sylvatica	Sour-gum
Tsuga canadensis	E. hemlock
Parthenocissus quinquefolia	Virginia creeper
Cornus florida	Flowering dogwood
Rhus glabra	Smooth sumac
Rhus radicans	Poison ivy
Vitis aestivalis	Wild grape
Ailanthus altissima	Tree of Heaven
Amelanchier intermedia	Swamp juneberry
Prunus virginiana	Choke cherry
Daucus carota	Queen Anne's lace
Vicia angustifolia	Vetch
Artemisia tridentata	Sage
Leucothoe racemosa	Swampt sweetbells
Polygonum pensylvanicum	Smartweed
Melliotus officinalis	Melilotus
Smilax lasioneuron	Smilax

Table 2

Plant Species Common in Old Field Habitats

Blackberry (Rubus allegheniensis)

Goldenrod (Solidago spp.)

Buttercup (Ranunculus acris)

Wild asters (Aster spp.)

Wild strawberry (Frageria sp.)

Clover (Trifolium spp.)

Thistle (Cirsium spp.)

Field grassses (Gramineae spp.)

Chicory (Cichorium intypus)

Queen Ann's lace (Saucus carota)

Milkweed (Asclipias spp.)

Cherry (Prunus spp.)

Timothy (Phleum pratense)

Populars (Populus spp.)

Dandilion (Taraxacum officinalis)

Gray birch (Betula populifolia)

Table 3

Plant Species Common to Suburban Habitats in Westchester County

oriental arborvitae (*Thuja orientalis*)

pfitzer juniper (*Juniperous chinensis Pfitzeriana*)

common juniper (*J. communis*)

forsythia (*Forsythia x intermedia*)

blue spruce (*Picea pungene*)

hemlock (*Tsuga canadensis* or *T. caroliniana*)

white pine (*Pinus strobus*)

Scotch pine (*Pinus sylvestris*)

dogwood (*Cornus* spp.)

flower crabs (*Malus* spp.)

sugar maple (*Acer saccharum*)

red maple (*A. rubrum*).

Norway maple (*A. platanoides*)

pin oak (*Quercus palustris*)

red oak (*Q. borealis maxima*)

scarlet oak (*Q. coccinea*)

London plane (*Platanus occidentalis*)

American elm (*Ulmus americana*)

eastern redbud (*Cercis canadensis*)

saucer magnolia (*Magnolia soulangeana*)

Question III.15

Provide a discussion of the manner of interpretation of toxicity data in Appendix E used to predict 'potential botanical injury' in Table 6.1.

Response:

In order to interpret the many greenhouse experiments, each of which was unique with respect to exposure rate, duration of exposure, or both, it was assumed that the observed effects were not dependent upon exposure rate, but were the result of total accumulated salt deposition. Table 15 on page 74 of Appendix E, which presents the relationship between total salt deposition and the risk of injury on woody plant species, was prepared using this assumption. Table 15 lists, for each level of salt accumulation, the percentage of plants of each species that were observed to exhibit injury. The 95% confidence limit on the probability of injury, based upon the number of plants tested and the number responding, is also presented. By examining the data in Table 15, it was found that the percentage data could be grouped into four ranges of salt accumulation. These groupings were used to prepare Table 6-1.

Revised
9/30/75

The units of salt deposition in Table 15 on page 74 of Appendix E, are ug(Cl^-)cm^{-2} while those in Table 6-1 are Kg(NaCl)Km^{-2}. The conversion factor is 1 ug(Cl^-)cm^{-2} = 16.5 Kg(NaCl)Km^{-2}. In order to clarify the relationship between the table on page 74 of Appendix E and Table 6-1, a table comparing the respective salt accumulation values and the effects thereof has been developed for clarification. This table includes as an additional column, the accumulated salt deposition expressed in ug (Cl^-) cm^{-2}.

Revised
9/30/75

Relationship Between Table 6-1 and Table 15 of Appendix E

Salt Accumulation		Potential Injury
As Given in Table 6-1	As Given in Appendix E	As Given in Table 6-1
0-40	0-2.4	No injury.
40-100	2.4-6.1	All hemlocks injured; between 5-20% of dogwood and white ash experience slight leaf spotting and some loss of fall color.
100-600	6.1-36.4	All hemlocks, dogwood and white ash injured.
>600	> 36.4	All hemlocks, white ash and dogwood injured; between 20-80% of silk trees, forsythia, chestnut oak, black locust, white pine, red pine, red maple injured.

Revised
9/30/75

Question III.25 Provide a supplement to the ER which displays a photographic study of the visual impact of the alternative cooling systems including natural draft, mechanical draft wet, mechanical draft wet/dry, fan-assisted natural draft and circular mechanical draft. The study should include the vantage points listed in Table 6-10. In addition, the study should be expanded to include typical or sensitive vantage points within Peekskill, Buchanan, Verplanck and the Town of Cortlandt. The degree of visual impact from surrounding parks, scenic overlooks, and historical places listed in the National Register of Historic Places should be assessed and where the visual impact might reasonably be considered significant for any of the alternative cooling systems a photographic study should be prepared. The study should provide 8x10 color photographs, one before the alternative cooling system is installed, plus others touched up to represent, at appropriate scale, the five cooling systems alternatives (including their most frequency occurring plume configuration) from at least 10 most impacted vantage points. Additionally, photographic comparisons should be made for a number of the most important scenic vantage points where the systems are visible but where the impact would be considered acceptable. Describe the frequency, duration and seasonal pattern of occurrence of the most typical plume for each alternative. Provide a map indicating the location of the vantage points selected and an estimate of the resident or transient population impacted yearly at each vantage point.

Response: The Commission Staff advised Con Edison on August 13, 1975 that Con Edison is relieved of the requirements to supply the information requested under this question (and Question III.26) (refer to the attached letter from Mr. George M. Knighton to Mr. Carl L. Newman dated September 4, 1975).

Revised
9/30/75

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 50-247

SEP 4 1975

Mr. Carl Newman
Vice President, Engineering
Consolidated Edison Company
of New York, Inc.
4 Irving Place
New York, New York 10003

Dear Mr. Newman:

This letter is to confirm my telephone discussion with Mr. Szeligowski on August 13, 1975.

During this conversation, I advised Mr. Szeligowski that the staff has initiated action to acquire the photographic survey and evaluation requested in questions III-25 and III-26 of the attachment to our letter to Mr. Cahill dated July 10, 1975. Since this is the case, I find that the time and cost to produce similar information is not justified.

On this basis, you are relieved of the requirement to supply the information requested under III-25 and III-26.

Sincerely,

George W. Knighton

George W. Knighton, Chief
Environmental Projects Branch No. 1
Division of Reactor Licensing

cc: Service list

Question III.2

Provide a map indicating the population exposed to a line of sight relationship to the tallest tower alternative in one mile annular rings within the 16 cardinal compass points radiating from the site up to a ten mile distance from the plant.

Response:

The "viewshed of a facility" is a term coined to cover those surrounding land and water areas from which that facility is visible. The figure, provided to the staff in two copies, is a viewshed map indicating areas, within a ten mile radius, from which the Indian Point Unit No. 2 natural draft cooling tower would be visible. Resident viewer population estimated for 1980 has been added to the map, resulting in a graphic representation of the population distribution within a ten mile radius that would be visually impacted by the Indian Point Unit No. 2 natural draft cooling tower. A sight-line/ population analysis such as this is used as a primary tool in studies aimed at quantifying the visual impact on surrounding environs of high structures, such as the Indian Point hyperbolic cooling tower.

In order to construct the viewshed map, a closely spaced series of radial, vertical sections, emanating from the cooling tower, were taken. Each section indicates the terrain profile within ten miles of the cooling tower and a reference elevation of 618 feet MSL, which is the elevation of the top of the tower. Sight-lines are then drawn on the vertical section from the reference elevation to ridges of land forms that would block visibility of the cooling tower beyond -- and the lines of intersection of sight-lines and ridges then plotted on a base map. If the sight-lines emanating from the top of the cooling tower are thought of as light rays, the surfaces of land and water forms illuminated would be the "viewshed" area (light areas on viewshed map), while the areas from which the towers cannot be seen would be in "shadow" (shaded areas on viewshed map).

The viewshed map indicates that the Indian Point hyperbolic tower would be visible to an estimated 1980 population of 81,664 persons which is about 27 percent of the projected

1980 population living within a ten mile radius. This estimate is based on the population projections for 1980, reported in the Final Safety Analysis Report (FSAR) for Indian Point Unit 3 (IP3 FSAR). The "Specified Population Projected for the Year 1980" is in Table 5, page 2.4.P-15 of Supplement 7 to the IP3 FSAR prepared in July, 1972.

Population data presented in the viewshed map is structured into 160 segments. Each is bounded by the intersections of 16 equal radial sectors and 10 concentric one mile circles.

To estimate the viewing population in each segment, the viewshed map was visually inspected to estimate:

1. the percentage of viewshed area in each population segment.

2. the population in each segment.

   (the percentage of population in the five outermost concentric zones was reported, in the IP3 FSAR, as one total population figure for each of the 16 sectors. This data was then proportioned into 5 segments for each of the sectors. Zones in the innermost five mile concentric zones were reported in one mile segments in the IP3 FSAR and did not require interpolation.)

Estimated resident populations were then multiplied by the percentage of segmental viewshed area to obtain the segmental viewing populations shown in the attached table and displayed on the viewshed map.

Data presented is for a resident population. Determination of transient populations travelling through viewshed areas via major transportation corridors (automobile, rail, boat and air) were not considered to be within the scope of this analysis and were not included.

Results of the viewshed methodology are, for the following reasons, considered conservative in the direction of maximizing resident viewed population. First, modifications for seasonal deciduous foliage variation were not made -- and during a large part of the year cooling tower visibility would be reduced because of leaves on deciduous trees. Secondly, tower vision would be delimited by local high landforms less than the chart resolution, and tall structures, but viewshed areas could not be modified to reflect this because of the large numbers of such local obstructions.

However, it should also be noted that the tower exit plume was not included in the viewshed analysis. The plume is a dynamic element not easily factored into such an analysis.

INDIAN POINT UNIT NO. 2

POPULATION EXPOSURE PROJECTION IN 1980 TO THE TOP OF A HYPERBOLIC COOLING TOWER AT 618 FEET MSL BASED ON A LINE OF SIGHT RELATIONSHIP

Sectors

Radial Distance (Miles)	A	B	C	D	E	F	G	H	
1	0	0	0	21	335	109	214	306	
2	0	0	1149	1608	821	862	1314	1962	
3	210	1121	3140	2057	134	217	1025	1426	
4	204	1148	2216	911	300	158	164	794	
5	70	2612	4456	215	128	331	759	386	
6	0	356	1478	2771	141	0	0	0	
7	0	178	1150	2771	706	0	0	0	
8	0	53	985	1108	10	125	0	0	
9	0	106	273	277	10	0	341	500	
10	0	106	205	92	0	0	341	2000	
Sector Totals	484	5680	15,052	11,831	2585	1802	4158	7374	48,966 Sub-Total

Radial Distance (Miles)	I	J	K	L	M	N	O	P
1	20	0	0	0	0	0	0	0
2	907	1282	14	422	583	0	0	21
3	74	370	1017	493	711	13	0	93
4	124	1994	1905	53	0	0	81	0
5	258	2989	930	75	0	0	0	84
6	773	9000	1463	800	200	0	0	700
7	773	750	1755	1000	5	0	0	150
8	0	0	195	133	0	0	0	0
9	0	0	195	0	0	0	0	0
10	0	0	293	0	0	0	0	0
Sector Totals	2929	16,385	7767	2976	1499	13	81	1048

32,698 Sub-Total
81,664 Total

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC. (Indian Point Station, Unit No. 2)	)	Docket No. 50-247

DOCKETED USNRC OCT 3 1975 Office of the Secretary Docketing & Service Section

AFFIDAVIT OF SERVICE BY MAIL

The undersigned being duly sworn, deposes and says: Deponent is not a party to the action, is over 18 years of age and resides at 144-41 Sanford Avenue, Flushing, New York 11355.

That I have this 30th day of September, 1975, served the foregoing revised Responses to the letter dated July 10, 1975 from Mr. George W. Knighton to Consolidated Edison Company of New York, Inc., by mailing copies thereof, first class postage prepaid and properly addressed to the following persons:

Sarah Chasis, Esq.
Natural Resources Defense Council, Inc.
15 West 44th Street
New York, New York 10036

Hon. George V. Begany
Mayor, Village of Buchanan
Buchanan, New York 10511

Hon. Louis J. Lefkowitz
Attorney General of the State of New York
Att: James P. Corcoran, Esq.
Two World Trade Center
New York, New York 10047

Carmine J. Clemente, Esq.
New York State Department of Commerce
99 Washington Avenue
Albany, New York 12210

Joseph Gallo, Esq.
Chief Hearing Counsel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
Att: Chief, Docketing and Service Section

Sworn to before me
this 30th day of September, 1975