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Vice President

Consolidated Edison Company of New York, Inc.  
Indian Point Station  
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December 31, 1986

Re: Indian Point Unit No. 2  
Docket No. 50-247

Ms. Marylee M. Slosson, Project Manager  
Project Directorate #3  
Division of PWR Licensing A  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Ms. Slosson:

This letter responds to a request for additional information concerning our December 27, 1985 application to amend the Indian Point Unit No. 2 (IP-2) operating license to provide that the date upon which the unit operating license would expire would be 40 years from the date of issuance, September 28, 2013. The additional information requested in your November 19, 1986 letter is included in Attachment A to this letter.

Please contact us if you have further questions concerning this submittal.

Very truly yours,

*Murray Selman*

cc: Office of Senior Resident Inspector  
U.S. Nuclear Regulatory Commission  
P.O. Box 38  
Buchanan, N.Y. 10511

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Attachment A

Additional Information to Support the  
License Amendment Request dated December 27, 1985

Consolidated Edison Company of New York, Inc.  
Indian Point Unit No. 2  
Docket No. 50-247  
December, 1986

Consolidated Edison of New York

Additional Information to Support the  
License Amendment Request Dated December 27, 1985

1. Provide a projection of occupational radiation exposure expected for Indian Point 2 for the period of extension (2006-2013). Identify projected outage years and doses for each unit.

Response

In 1985, a year in which there was no refueling outage, aggregate exposure was less than 175 man-rem. In 1986, monthly exposures during periods of full operation have averaged approximately 10 man-rem. Total exposure in the twenty-four month period from January 1985 through December 1986 has been 1380 man-rem. We currently anticipate that occupational exposures in the period of extension will approximate our recent experience, although as described below there is some basis for anticipation that exposures, particularly those which are outage-related, could decline somewhat in the extension period compared to recent accumulations.

The seven year period from 2006-2013 would include four refueling outages if a twenty-four month operating cycle is achieved, or one additional refueling outage if the current cycle length is assumed. It is possible that a major in-service inspection, including ASME boiler code inspections, may also occur during this period. Other factors could affect the annual occupational dose in the 2006-2013 period, including possible steam generator replacement (which can be expected to reduce dose due to improved materials lowering crud formation and reduced inspection and maintenance), increased use of robotics in maintenance achieved through expected improvements in robotics technology, and possible increases in unspecified maintenance activities (which could increase annual dose). Planned decontaminations of the full reactor coolant system and all eight steam generator channelheads would also reduce the annual occupational dose.

Based upon the foregoing, two-year exposures in the 2006-2013 time frame are estimated, in man-rem, as follows:

<u>Activity</u>	<u>High</u>	<u>Median</u>	<u>Low</u>
60 day Refueling Outage	800	600	400
One-fifth of an ISI (10 year frequency)	100	80	60
22 - month operating period	220	200	180
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Total	1120	880	640

Additional Information to Support the License  
Amendment Request Dated December 27, 1985 (Cont'd)

Thus, for the seven year period from 2006-2013, average collective exposure estimates are:

high: 3920 man-rem, or 560 man-rem per year.  
median: 3080 man-rem, or 440 man-rem per year.  
low: 2240 man-rem, or 320 man-rem per year.

2. Provide the most recent available low population zone (LPZ) census data for Indian Point 2. Indicate the most recent population projections for the LPZ for the year 2013. Indicate the nearest population centers with over 25,000 population in the vicinity of the plant, in accordance with the latest census (1980) and any recent projections of such (e.g., 2013).

Response

The Indian Point Unit 2 Updated Final Safety Analysis Report defines the boundary of the LPZ as a circle centered at the plant with radius of 1100 meters (0.68 mile), and states that the LPZ has a population of about 50 persons. The LPZ population in 2010 is projected to be approximately 88, based on the Indian Point Unit 3 Final Safety Analysis Report in Table 2.4-1. The nearest population center to the site with over 25,000 population is the City of White Plains. The population of White Plains according to 1980 Census Bureau data is 46,999. The projected population of White Plains in the year 2010 according to a 1986 projection from the Westchester County Department of Planning is 45,900. Leonard Soffer, an NRC witness in the 1983 Indian Point Special Proceeding (Docket Nos. 50-247-SP and 50-286-SP), testified that:

"I examined [population] projections made by the Bureau of Economic Analysis of the U. S. Department of Commerce. These are called the BEA regional projections, and they were published in July 1981. They examined a 28-county region which I would say encompasses that region within about 50 miles of Indian Point, and they generally project that the population from 1990 to the year 2010 will either remain essentially the same or decline very slightly, say about 2 or 3 percent." (Transcript at 8685).

Also, as stated in the original license amendment request for extension, the New York State Department of Commerce projects no substantial increases in population in any of the four counties in the vicinity of Indian Point. The overall immediate local and near-vicinity populations are not expected to increase significantly from 1986 to 2013.

Additional Information to Support the License  
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3. Identify specific land use changes which have affected offsite dose calculations, particularly those for ingestion pathways for child thyroid. Provide a summary of the results of any such revised calculations.

Response

A complete discussion of the offsite dose calculations as pertain to ingestion pathways is set forth in the Indian Point Unit 2 Updated Final Safety Analysis Report at Chapter 11. No specific land use changes have occurred which would affect offsite doses calculations, and specifically including those affecting ingestion pathways for child thyroid. Annual surveys of milching animals, by location, number and use, have indicated of that there are no commercial milkers in the near vicinity of the plant (0-5 miles). A single milker in the year 1984 was identified in Putnam County, NNE of Indian Point, at a distance of ten miles. No milkers were identified in 1985 or 1986 whose products are used for human consumption. The surveys include a substantial number of visual observations, discussions with market and commercial interests and requests for information on milching animals from the State of New York. The surveys also disclose that feed sources are flown or trucked in for most local milching animals.

The maximum individuals' doses for the ingestion and milk pathways for 1985 are provided below. This data is typical of the dose assessments from each year of plant operation to date and is expected to remain typical through the year 2013.

<u>Ingestion Pathway (Vegetable)</u>	<u>Milk Pathway</u>
Organ: Thyroid	Organ: Thyroid
Age Group: Child	Age Group: Infant
Sector: SW	Sector: WSW
Distance: 2560 meters	Distance: 8045 meters
Thyroid Dose: 0.273 mrem	Thyroid Dose: 0.0338 mrem

4. Provide a general comparison of the radiological impacts on man as assessed in the FES with those actually experienced during plant operations.

Response

The following table is a summary of the most recent Indian Point Unit 2 offsite radiation dose assessments, which cover the period January 1 through December 31, 1985. In addition, a comparison of the annual release of radioactive nuclides in both gaseous and liquid effluents for the year 1985 (which we find to be a typical year) with those anticipated in the FES was performed. The results indicate that our actual releases are substantially lower than those evaluated in the FES.

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	<u>Indian Point Unit 2</u> <u>Gaseous Doses</u>	<u>10 CFR Part 50</u> <u>Appendix I Guidelines</u>
1. Maximum Total Body Dose	0.323 mRem/yr	10 mRem/yr
2. Maximum Total Skin Dose	0.728 mRem/yr	20 mRem/yr
3. Maximum Dose to Any Organ	1.370 mRem/yr	15 mRem/yr

	<u>Indian Point Unit 2</u> <u>Liquid Doses</u>	
1. Maximum Whole Body	0.006 mRem/yr	3 mRem/yr
2. Maximum Dose to Any Organ	0.009 mRem/yr	10 mRem/yr
5. Provide clarifying information on the disposition of spent fuel and solid radioactive waste.		

Response

At the present time there are 980 spent fuel assembly storage spaces, of which 464 are filled. A 1982 rerack created the 980 space capacity. Storage capacity, with reserve for a full-core discharge, will be sufficient until 1993, and with another rerack, until 2001. Beyond this date, other technologies will be employed to increase spent assembly storage capacity. We are also presently investigating fuel consolidation and dry storage technologies. Dry storage has been licensed elsewhere and fuel consolidation demonstration efforts are underway at another utility. Since these technologies are feasible and licensable, there is a reasonable basis for expecting that the unit's spent fuel storage requirements will be met throughout the license extension period.

The volume of solid radwaste generation has decreased steadily from 1981 to 1986. Annual generation for the years 1987 through 1990 are projected by station management to be less than the 1986 total generation of 325 cubic meters. The 1990 generation is expected to be 225 cubic meters, which is less than one-quarter of the 1981 total volume. Volumes of radwaste generated during the extension period are most difficult to project at this time. Future restrictions on the burial of low-level radioactive waste will ensure a strategy for minimizing the generation and volume of these solid wastes. In legislation passed in July 1986, Chapter 673 of the Laws of 1986, New York State committed to having an operational low level nuclear waste disposal facility by 1993.

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6. Provide more specific information on modifications to the plant which have affected the offsite or occupational dose either favorably or unfavorably.

Response

See response to Question 1. Previous plant modifications, such as construction of the Maintenance and Outage Building, have increased work efficiency, the staging and storing of equipment and the recovery from major outage and maintenance tasks. An equipment and tool decontamination facility was recently installed in a recovered area of Unit 1 to provide service to Units 1 and 2. Permanent lockable doors have replaced ones that were temporarily erected to control access to high radiation areas. The waste and boron evaporator systems have been supplanted by demineralizers. We have increased the fresh fuel storage enrichment limit so as to allow the design of fuel cycle lengths longer than the current 18 month cycle (16 months of operation and 2 months of refueling outage). This would reduce the number of refueling outages over the life of the plant and thus reduce personnel radiation exposure. Plant primary system chemistry changes have significantly reduced filterable activity and adsorbed resin activity. Resin and filter shipments are now infrequent. At the present time, a complete system is being installed to provide extensive radiation monitoring of plant areas, process fluids and effluents. These modifications have reduced effluents, occupational exposure, and the number of radwaste shipments.

7. Provide a discussion of the Indian Point 2 ALARA program.

Response

The ALARA program, integral to the radiation protection program, is part of all normal and special work processes. Procedures, designs, modifications, work packages, inspections, surveillance, maintenance activities and plant betterment activities are subject to ALARA reviews to ensure dose reduction actions are taken. Operational and design ALARA training programs are provided to station and support engineering and technical groups. ALARA is taught in radiation worker qualification courses.

Independent assessments by company, contractor, industry and regulatory groups have concluded that Indian Point conducts its operations ALARA. Occupational exposure in 1985 was, by far, the lowest recorded since start-up. Monthly exposures during operating periods are half what they were a few years ago. Outage exposure goals are carefully evaluated; annual exposure goals are established in advance. We have, on occasion, provided industry groups with information on the organization, content, goals and experience of our ALARA program.