U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No.: 50-286/73-05, 50-3/7308

Docket No.: 50-3
50-286

Licensee: Consolidated Edison Company of New York (CE)

License No.: CPPR-5
CPPR-62

4 Irving Place, New York, New York 10003

Priority:

Category:

Unit 1:C
Unit 3:A

Location: Indian Point Station, Units No. 1&3
Buchanan, New York

Type of Licensee: Unit No. 3: PWR 965 MW(e) Unit No. 1: PWR 290 MW(e)

Type of Inspection: Routine, Announced

Dates of Inspection: June 6 - June 8, 1973

Dates of Previous Inspection: None

Reporting Inspector: R. J. Everett
R. J. Everett, Radiation Specialist

7/27/73
Date

Accompanying Inspectors: None

Date

Date

Other Accompanying Personnel: None

Reviewed By: J. P. Stohr
J. P. Stohr, Senior Environmental Scientist

7/30/73
Date

SUMMARY OF FINDINGS

Enforcement Action (Environmental Monitoring)

The following items were found to be in apparent nonconformance with the Environmental Monitoring Program as described in Section 2.9 of the licensee's FSAR for Indian Point 3.

1. Air particulate sampling, using a mobile monitor, was not performed after March, 1973. (Paragraph 7).

2. A tritium analysis was not performed on rainfall samples from any location in January, 1971, January, 1972 and April 1972, nor from the Eastview location in June, 1971, nor from the Indian Point station in October, 1971. (Paragraph 10).

3. A well sample was not taken at the Verplanck location in July, 1972. (Paragraph 9).

One item was found to be in apparent noncompliance with the Environmental Monitoring Survey Program as described in Section 4.10 of the Technical Specifications for Indian Point Unit 1.

1. Environmental records were not available to confirm that a tritium analysis had been performed on well water, lake water, reservoir water and Hudson River water in May, 1972. (Paragraph 8).

Licensee Action on Previously Identified Items (Environmental Monitoring)

None Identified

Design Changes

None

Other Significant Findings (Environmental Monitoring)

A. Three items of apparent nonconformance and one item of noncompliance were found during this inspection. (Paragraphs 7-10).

Unresolved Items

A. The diking of transformers is considered to be an unresolved item. (Paragraph 19).

B. The quality control program and analytical procedures used in CE's Environmental Monitoring Program is considered to be an unresolved item. (Paragraph 17).

Status of Previously Reported Unresolved Items (Environmental Monitoring)

None Identified

Management Interview

A meeting was held on June 8, 1973 in the office of Mr. W. R. Cobean, Plant Manager, following the inspection at the site. The following individuals were in attendance.

Mr. R. J. Everett, Radiation Specialist, AEC, RO:I
Mr. W. R. Cobean, Manager, Nuclear Power Generation Department, CE
Mr. R. W. Vanwyck, Manager, Nuclear Services, CE
Mr. A. Cheifetz, Director, Radiation Safety, CE
Mr. J. Kelly, Nuclear Environmental Engineer, CE

During this meeting, the following items were discussed:

A. Air Particulate Sampling

The inspector stated that air particulate sampling in conjunction with licensee's preoperational Environmental Monitoring Program was in nonconformance with Section 2.9.2 of the FSAR, in that air particulate samples where not taken by the mobile monitor after March, 1973. The inspector also stated that the air sampler locations appeared to have been selected mainly for licensee convenience rather than through a comprehensive analysis of meteorological data, population distributions and postulated reactor accidents. The licensee stated that these locations were now being evaluated by their consultant, NYU. The inspector stated further that the location of one air sampler was such that heavy dust loading could lead to atypical results. The licensee stated that this would be evaluated. (Paragraph 7).

B. Tritium Analysis of Well and Surface Waters

The inspector stated that the analysis for tritium in well water, lake water, reservoir water and Hudson River water, required in

conjunction with the licensee's Environmental Monitoring Program, was in noncompliance with Section 4.10 of the Technical Specifications for Unit one, in that no analysis for tritium was performed in May, 1972. (Paragraph 8,9).

C. Tritium Analysis of Rainwater

The inspector stated that the analysis for tritium in rainwater, required in conjunction with the licensee's Preoperational Environmental Monitoring Program, was in nonconformance with Section 2.9.2 of the FSAR, in that no tritium analysis were performed on rainwater samples from any location in January, 1971, January, 1972 and April, 1972, nor from the Eastview location in June, 1971, nor from the Indian Point station in October, 1971. (Paragraph 10).

D. Well Water Sampling

The inspector stated that the sampling of well water in conjunction with the licensee's Preoperational Environmental Monitoring program was in nonconformance with Section 2.9.2 of the FSAR, in that a sample was not taken at the Verplanck location in July, 1972. (Paragraph 9).

E. The Radiological Environmental Monitoring Program

The inspector stated that the Radiological Environmental Monitoring Program described in Section 4.10 of the Environmental Report does not coincide with the Environmental Monitoring Program described in Section 2.9.2 of the FSAR. The licensee stated that this matter would be reviewed and evaluated. (Paragraph 4).

F. Non-Radiological Monitoring Program

The inspector stated that Section 13.1 of the Environmental Report describes an automated system that would monitor thermal, chemical and hydrological aspects of the Hudson River continuously at the intake and discharge structures. The inspector stated that this program has now been curtailed and inquired as to CE's position on this program.

The licensee stated that this program was part of a research project which was now completed, however, a routine program

has been instituted by CE to continue a non-radiological program at these locations. (Paragraph 5).

G. Milk Sampling

The inspector inquired as to whether milk was sampled as part of the radiological monitoring program. The licensee stated that they had not sampled milk in the past but had recently begun sampling milk at Fitch's Dairy in Millwood (December 1972). (Paragraph 14).

H. Marketable Vegetable Sampling

The inspector inquired as to whether marketable vegetables had been sampled in conjunction with the Environmental Monitoring Program and if these materials would be sampled and analyzed in the future. The licensee stated that the sampling and analysis of vegetables had not been performed in the past, but they planned to start a procedure to analyze for tritium in apples. (Paragraph 15).

I. Wildlife Sampling

The inspector stated that wildlife had not been sampled in conjunction with the Environmental Monitoring Program and asked the licensee if wildlife would be sampled and analyzed in the future. The licensee stated that this aspect of the monitoring program would be evaluated after construction of Unit 3. (Paragraph 16).

J. Quality Control and Analytical Procedures

The inspector stated that a description of the quality control program and analytical procedures used by the licensee's contracting laboratory was not available for inspection. The inspector stated further that this item would be considered unresolved until such time as these Procedures and QA Program could be inspected by the AEC. (Paragraph 17).

K. Ecological Studies and Ecological Survey Program

The inspector stated that after years of intensive ecological research, CE does not have a routine monitoring

program which would call for the sampling and measurement on important aquatic species and conditions in the Hudson River. The licensee stated that beginning in 1974, the resident staff would begin a parallel study with the research group, then take over after one year, and this would be their ecological survey program. (Paragraph 22).

L. Transformer Dikes and Fuel Storage Sites

The inspector inquired as to CE's plans to dike the on-site transformers, and slag pits in order to prevent possible oil spillage into the Hudson River.

The licensee stated that they had not considered this before and would have to study the problem. The inspector stated that this would be carried as a unresolved item. (Paragraph 19).

DETAILS

1. Persons Contacted

Consolidated Edison Company

Mr. W. R. Cobean, Manager, Nuclear Power Generation Department
Mr. J. H. Coulch, Station Manager for Operations & Maintenance
Mr. R. W. Vanwyck, Manager, Nuclear Services
Mr. A. Cheifetz, Director of Radiation Safety
Mr. J. Kelly, Nuclear Environmental Engineer
Mr. R. Rosa, Environmental Coordinator
Mr. P. Crinigan, Supervisor, Nuclear Environmental Monitoring
Mr. R. Wolniewicz, Director, In-Plant Chemistry
Mr. J. Higgins, General Chemistry Supervisor
Dr. P. C. Cota, Manager, Biological Studies
Mr. M. D. Considine, Engineer, Biological Studies

2. General

The inspection consisted of a review of the licensee's Preoperational Environmental Monitoring Program for Indian Point three. The inspection incompased the radiological, non-radiological and ecological aspects of the environmental program. The licensee's Environmental Monitoring program is described in Section 2.9.2 of the Unit 3 FSAR, and Sections 12 and 13 of the licensee's Environmental Report. Samples to be taken with respect to the radiological program include air particulates and iodine, surface water, well water, lake aquatic vegetation, Hudson River aquatic vegetation, Hudson River bottom sediment, Hudson River fish, terrestrial vegetation, soil and ambient radiation levels. The non-radiological program consists of measurements of the inlet and outlet river water for temperature, dissolved oxygen, pH, salinity and copper. The ecological program consists of continuing research by various contractors of the licensee. These programs are designed to fully describe the ecological impact of plant operations at the Indian Point site. The pre-operational Environmental Program for unit three also provides data to satisfy Technical Specifications requirements for units one and two.

Conformance with the licensee's FSAR, and compliance with Unit one Technical Specifications, was based upon: first, a review of sampling and analytical data beginning in January of 1971 to the present time. (This environmental data was reviewed with respect to sample location, frequency and measurement result.); second, interviews with appropriate CE staff; third, a site inspection which included examinations of selected monitoring stations, fuel storage sites, intake and discharge structures and laboratories utilized in CE's ecological research programs.

3. Organization and Administration

The Environmental Monitoring Program for the Indian Point site began in 1958 and has continued to the present with little modification. The CE staff collects samples and maintains the sampling sites. In the radiological program the CE staff performs certain gross analyses then contracts with Isotopes, Inc. to do the specific analyses. These results are reported periodically to Mr. J. Kelly of CE. These analyses are performed by Isotopes, Inc. at laboratories in Westwood, New Jersey, under the direction of Mr. Lewis Cosabona, Project Manager. Research programs that have fed information into the radiological program are studies by the New York University Medical Center (NYU), beginning in 1964 and surveys conducted by the New York State Department of Health.

In the non-radiological program, CE has used the services of the Raytheon Company under a research contract. The work concentrated upon the thermal, chemical and hydrological aspects of the Hudson River at the intake and discharge structures. This contract was terminated in 1972. CE has continued measurements of this type, establishing a new in-house program. The sampling and measurements made under this new program are under the direction of Mr. R. Wolniewicz, Inplant chemistry director.

Ecological research studies are funded and directed through Mr. Harry Woodbury, Executive Vice-President for Environmental Affairs, CE. The Indian Point studies are directed by Dr. Philip C. Cota, Manager, Biological Studies. Dr. Cota reports to Mr. Woodbury thru Mr. George T. Cowherd, director of the Biology Department. Dr. Cota is CE's principal laison officer with the various contracting laboratories. These research studies reportedly will ultimately provide CE's on-site people with indicator organisms and ecological factors that CE can use to set up a routine ecological monitoring program, which they do not have at the present time, and in addition, provide data to describe the full impact of plant operations at the site.

The licensee stated that a new environmental laboratory has been approved which will enable them to do specific analyses in the radiological and biological areas, and conduct a more complete and comprehensive environmental program.

4. The Radiological Environmental Monitoring Program

During the review of the environmental program at the Indian Point Site, the inspector noted that the program began in 1958 with the purpose

of supplying pre-operational environmental data for Unit No. 1. The program has continued with minor modifications until the present time. The present program supplies information that is used to satisfy Technical Specification requirements on Units No. 1 and 2 as well as pre-operational data on Unit No. 3. The inspector observed that throughout the program history, the licensee has performed mostly gross analyses and has not quantified the various nuclides and their distribution in the environment, nor the nuclides making up the external gamma dose. The one exception the inspector observed was a study by NYU in 1970, which identified and measured the distribution of nuclides in bottom sediment and in various aquatic animals and plant life as a result of plant liquid discharge. This type of information is required in order to make reasonable predictions of population doses from plant operations. The licensee stated that the space, equipment and manpower allotted to this program prevented the type of measurements in question. The licensee further stated that present plans call for a new environmental laboratory on-site, whereby they would be able to carry out a more comprehensive program and do specific analyses. The inspector stated that the records and data generated under the environmental monitoring program were recorded in several different locations and in different formats so that it was very difficult to review records and determine compliance. The licensee stated that the record keeping system would be reviewed and improved.

The inspector stated that the radiological monitoring program described in Section 4.10 of the Environmental Report did not coincide with the program described in Section 2.9 of the FSAR, in that locations, materials, and frequencies of sampling are not the same. The licensee stated that the program in the Environmental Report is more recent and should be controlling. The inspector stated that the AEC considered the FSAR as the controlling document and it would be used to judge conformance. The licensee stated that CE considered the FSAR to be only a guide for their program. The inspector stated that statements and descriptions in the FSAR should be consistent with the program being conducted.

5. Non-Radiological Monitoring Program

The Unit No. 3 Environmental Report, Section 13.1, indicates that an Automated Environmental System (AES) would be used to monitor the thermal, chemical and hydrological aspects of the Hudson River environment. The inspector inquired as to the current status of this program. The licensee stated that this program was a research program by the Raytheon Corporation, and since the contract

was now completed, the monitoring program as described in the Environmental Report no longer existed. The inspector inquired as to what program CE had in the non-radiological area. The licensee stated that this program is carried out by CE's chemistry staff and consists of the following sampling and analyses: Prior to October, 1972, a weekly grab sample was taken at the unit one intake structure during high and low tides. As analysis was made for sodium, chloride, hardness (calcium), total dissolved solids, chlorine demand, pH, temperature and conductivity. In October, 1972, additional analyses were for chromium, silicon, sulfate, phosphate, ammonia, boron and dissolved oxygen. In April, 1973, the program was expanded again when a weekly schedule was instituted at the intake and discharge structures at the 15" depth level. The analyses performed on this water are: extractable oils, dissolved oxygen, pH, conductivity, temperature, turbidity, hydrazine, cyclohexane, boron, chromium, chloride, phosphate, total chloramines, calcium, total hardness ($CaCo_3$), alkalinity, sodium, silicon and total disolved solids.

The inspector observed that the sampling and analysis schedule, as described above, had been performed. The inspector inquired as to any chemical releases during unit three construction. The licensee stated that there had been none.

6. External Radiation Monitoring

The FSAR indicates that gamma radiation will be continuously monitored at eleven locations on-site and at selected locations off-site. The dosimetric device will be ionization chambers, film badges or thermoluminescent dosimeters (TLD). These devices will be collected monthly and the amount of absorbed radiation recorded. The FSAR indicates also that once each year spot readings will be made of gross gamma radiation within a five-mile radius, using a portable, direct reading radiation instrument. The licensee stated that the eleven on-site locations are detailed in figure 2.9-2 of the FSAR. Six locations are monitored off-site: NYU Tower, Verplanck (6th and Broadway), Montrose Marina, Buchanan (Factory street), Fleishman Gin Company, and Peekskill (Hamilton street).

The inspector inquired as to how the TLDs were processed and evaluated. The licensee stated that the Harshaw TLD-100 LiF (thallium activated) chips are purchased from Eberline Instruments Corporation. The chips are annealed by heating to 400°C for one hour, quick cooled with ice, then placed at 80°C for 12 hours. After cooling to ambient temperature, the TLDs (5 each) are placed in a black plastic sleeve. This sleeve is sealed with plastic tape and placed in a polyethylene holder for field use. The dosimeters are normally taped

to the side of some existing structure. The TLD packets are dated with the date of placement which according to the licensee is always shortly after annealing. There are 5 chips per package and four packages per site, therefore the radiation exposure recorded is the average of 20 measurements. The licensee stated that the sensitivity of the TLDS was 8 microroentgens per hour, with an accuracy of $\pm$ 25%. The energy response per roentgen of cobalt-60 is reported by the licensee to be unity in the energy range 100-1000 kev. The dosimetric response to beta radiation (Kr-85) was reported by Eberline Instrument Company to be less than 1% relative to cesium-137 exposure. The inspector inquired as to how the TLDS were read out and translated into gamma exposure doses. The licensee stated that the TLDS are read automatically using a Eberline TCR-5 reader. The temperature regine is 140-245^{o}C. The licensee responded further that periodically the Health Physics Staff exposes TLDS to a standard cobalt-60 source for calibration purposes. The inspector inquired as to how the spot readings were made and with what instrument. The licensee responded that a Franklin Systems Company instrument was used which is hand-held about three feet above the ground. The instrument is a scintillation detector, using a 7" diameter polyyinyl toluene sphere. The licensee reported a sensitivity of about 10^{-4} milliroentgens per hour.

The inspector inquired as to the history of the gamma monitoring program. The licensee stated that the Landauer Company held the monitoring contract for a number of years using film badge dosimetry, but in December 1971, CE initiated their own monitoring program using the Eberline TLD system previously described. The Landauer contract was continued until March of 1972, at which time the contract was stopped. The inspector inquired as to the magnitude of exposure registered by the film badges and TLD dosimeters. The licensee stated that most film badge results were essentially background with a few anomalous reading of 30-50 MR per month. The TLDS have measured levels of 5-15 MR/month, usually.

The inspector inquired as to whether a background station, at some distance, had been established. The licensee stated that a remote background location had not been established. The inspector inquired as to the initial evaluation of the proper number and location of the TLDS and whether these factors would be re-evaluated along with the evaluation of the air sampling program. The licensee stated that these factors would be considered and evaluated. During the visit to the monitoring locations, the inspector observed that the TLDS were taped to metal poles and wooden houses that would shield the TLDS and thereby produce results atypical of the exposure. The licensee stated that this practice would be reviewed.

7. Air Particulate Sampling

The FSAR indicates that the concentrations of radioactive particulates in air will be measured weekly from three stations on-site, one station south of the site at Trap Rock and one station north of the site at Standard Brands, Inc. The FSAR also indicates that air sampling will be done at four selected stations off-site using a mobile monitor, on a weekly sampling schedule at each location. The air samples will be collected using membrane filters, .8 micron mesh, followed by a charcoal impregnated filter. The former filter will be analyzed for gross beta activity and the latter for radioiodine. The licensee stated that a typical air sampling station contained a vacuum pump (Gelman, Model 72), a gas flow meter (Rockwell), a 47 mm charcoal impregnated filter preceded by two 47 mm (type AA) membrane filters with pore size of .8 micron. The filters are enclosed in a aluminum housing and connected to the pump by flexible plastic tubing. Samples are taken at one CFM. The filters are positioned vertically. The equipment is housed in a wooden bird house structure with slotted openings for air movement. The maintenance program includes semi-annual calibration of the gas flow meters by the local gas company, and replacement of pump diaphrams every four months.

The licensee stated that the air filters are collected weekly and are allowed to decay for 48 hours to insure radon and thoron decay. The membrane filters are counted directly for gross alpha and beta activity using the internal proportional counter (IPC) described under surface water sampling (Paragraph 8). If the gross beta activity exceeds 2 picocuries per cubic meter, the filter sample is gamma counted using the 4 x 4" NaI detector previously described. The charcoal filter is also gross beta counted and a gamma spectrum run. Filters can be sent to Isotopes, Inc., if specific radiochemical analysis and gamma spectorcopy (GeLi) is indicated. The licensee stated that the present air sampling stations are: Station 1, about 300 yards SE of Unit 3; the service building one mile to SE; the NYU Tower at Trap Rock; Furnace dock about 5 miles south; and the Fleishman Gin Company (near Standard Brands, Inc.) about 1 mile north of the site. The mobile monitor collects air samples at Peekskill, Buchanan, Crugers and Springville at one week periods consecutively.

The inspector stated that a review of air sampling data from the mobile monitor indicated no air sampling results after March, 1973. The licensee stated that they had stopped the program in March, 1973, since the usefulness of this type of air sampling was questionable and preferred to use only stationary stations. The inspector stated that the fact that the mobile program was stopped constituted nonconformance with FSAR

requirements. The inspector inquired as to the adequacy of the number and locations of the present air sampling stations, which appeared to be chosen out of licensee convenience rather than the outcome of a comprehensive analysis of meteorological and population data as well as the type of postulated accident. The licensee stated that the air sampling program was presently under evaluation and tentative plans called for expanded coverage. The inspector inquired as to whether a background air sampling station had been established. The licensee stated that one had not been established, however the need for one would be evaluated. The inspector inquired as to the reason for the vertical mounting of the membrane filter at the NYU meteorological station. The licensee stated that it was mounted vertically to prevent rain water exposure. The inspector stated that location one, near Unit 3, was in a poor location due to close proximity to a dirt roadway and heavy construction work at Unit 3, which could lead to heavy dust loadings and atypical results. The licensee stated that this would be evaluated.

8. Surface Water Sampling

The FSAR indicates that surface water will be sampled monthly at three area lakes: Indian Point Lake, Trap Rock Lake and Lake Meahagh. In addition, drinking water is sampled monthly from three area reservoirs: New Croton, Camp Field and Camp Smith. These water samples are to be analyzed for gross beta and tritium activity. The FSAR also indicates that continuous flow samples will be taken of the condenser inlet and outlet water. This flow is regulated to fill a 50 gallon drum, from which a weekly sample is withdrawn and analyzed for gross alpha, beta activity. In addition, another sample is withdrawn weekly and held for a monthly composite which is analyzed for tritium activity. The licensee stated that, in the event the gross beta activity is greater than 30 picocuries per liter, the sample is gamma counted and if Cesium-137 is identified, a specific analysis for strontium is requested from Isotopes, Inc. The lake and reservoir water samples are taken in grab fashion along the shorelines. The samples are taken in 4 liter plastic containers then returned to the lab where 500 ml is used for evaporation and counting. The water sample residues are placed on stainless steel planchets and alpha and beta counted using a NMC-1110 Internal Proportional Counter (IPC) which has a background of 30-40 counts per minute. The activity is referenced to a lead-210 alpha standard and a Thallium-204 beta standard. Gamma spectroscopy is carried out on water residues using a 4 x 4 NaI detector linked to a TMC-400 gamma spectrometer. Tritium analysis can be carried out inhouse or through CE's contracting laboratory. CE uses a Beckman liquid scintillation spectrometer. The LSS-100

operates at ambient temperature with automatic sample changer. Six milliliters of water are used for each tritium analysis which results in a overall sensitivity of 500 picocuries per liter.

The inspector's review of the environmental data revealed that no water samples have been taken at the Camp Smith reservoir. The licensee stated that the Camp Smith reservoir was closed as a domestic water supply in 1966, therefore, it was meaningless to sample water there. The inspector observed that a tritium analysis was not performed on lake water, reservoir water or Hudson River water at any location in May, 1972. The licensee stated that prior to June of 1972, CE did not have an in-plant capability to analyze for tritium and depended upon an outside contractor. The licensee stated further that the tritium analyses had been run but the data could not be located. The inspector stated that the fact that this data was not available for inspection was in noncompliance with AEC requirements.

9. Well Water Sampling

The FSAR indicates that two monthly grab samples will be taken from two deep wells. One well is on-site (near meteorlogical tower), and the other is on private property in Verplanck. The water is analyzed for gross beta and tritium activities. The water is sampled, treated and counted using the techniques and equipment described under surface water sampling (Paragraph 4). The inspector stated that the environmental records indicate that a tritium analysis was not performed on well water samples at any location in May, 1972. The licensee stated that the tritium analysis were run but the data could not be found. The inspector stated that this fact constituted noncompliance with AEC requirements. The inspector stated further that a well water sample was not taken at Verplanck location in July of 1972. The licensee stated that the well is on private property and the man was not home when they came to take the sample. The inspector stated that the fact that this well sample was not taken constituted nonconformance with FSAR requirements.

The inspector inquired as to the number and coverage of the water well sampling stations since only two wells were sampled and it was well known that some communities, nearby the Indian Point site, use wells for domestic water consumption. No appreciable activity had ever been measured in well water samples, therefore CE did not anticipate an expansion of this program.

10. Rainwater Sampling

The FSAR indicates that monthly samples will be taken of materials deposited by rainwater at two locations: one on-site location and one fifteen miles south at Eastview. The samples are to be collected at the end of each month and analyzed for gross beta and tritium activities. The licensee stated that the samples are collected using a 12 inch diameter stainless steel pot and in the event there is appreciable loss due to evaporation, 1/2 liter of distilled water is added to remove sediment and the resulting mixture is analyzed for gross beta activity. The samples are prepared and counted using the procedures and equipment described under surface water sampling (Paragraph 8).

The inspector stated that a review of records of the environmental monitoring program indicated that no tritium analyses were performed on rainwater samples at any location in January, 1971, January, 1972, April, 1972 nor in June, 1971 at the Eastview location nor in October, 1971 at the Indian Point station. The licensee stated that in most cases the rainwater sample had evaporated and after the addition of distilled water for the gross beta analysis, a tritium analysis would be meaningless. The inspector stated that one can expect evaporation losses in summer but these losses can be reduced and even prevented by several means, therefore, the fact these tritium analyses were not performed constitutes non-conformance with FSAR requirements.

11. Aquatic Vegetation and Bottom Sediment Sampling

The FSAR indicates that during the spring, summer and fall, samples of lake aquatic vegetation will be taken along the shores of Indian Point Lake, Trap Rock Lake and Lake Meahagh. This vegetation will be analyzed for gross beta activity and a gamma spectrum run on each sample. The FSAR indicates also that during the spring, summer and fall, samples of Hudson River aquatic vegetation will be taken at the mouth of the discharge canal, Peekskill Bay, Tomkins Cove, the Lovett plant of Orange and Rockland utilities, and off Verplanck. This vegetation will also be analyzed for gross beta activity and a gamma spectrum run on each sample. The FSAR indicates also that during the spring, summer and fall, samples of Hudson River bottom sediment will be taken at the same locations as the Hudson River aquatic vegetation. These sediment samples are collected from a boat using a Peterson Grab Dredge. These sediment samples are also analyzed for gross beta activity and a gamma spectrum run on each sample. The licensee stated that the aquatic vegetation is sampled

from a boat, using a rake, by the CE environmental staff. Only rooted plants are collected. The vegetation samples are ashed at 400°C and a suitable aliquot (300 mgms) transferred to a counting planchet. The samples are counted using the equipment previously described under surface water sampling (Paragraph 8). The samples are alpha and beta counted then a gamma spectrum analysis is performed. CE can also send the sample to Isotopes, Inc. for more detailed spectoscopy (GeLi) or specific radiochemical analysis.

The inspector stated that the environmental data indicates that the spring samples of aquatic vegetation are often collected as late as July. The licensee stated that vegetation is not available until June or July of each year usually, however, there will be three sampling periods during each year.

12. Fish Sampling

The FSAR indicates that fish will be caught monthly when available in the Hudson River near the site. The samples will be analyzed for gross beta activity and a gamma spectrum run on each sample. The licensee stated that fish samples are collected by the Texas Instruments Company staff and one fish is used in the environmental survey program monthly. The samples are ashed at 400°C, and a suitable aliquot (300 mgms) is taken for gross alpha, beta analysis and gamma spectrum. Both bone and edible fish are analyzed. The samples then are sent to Isotopes, Inc. for gross beta, strontium-90 and gamma spectrocopy.

The licensee stated that until they got further guidance from their research contractor, NYU, the present fish sampling program appeared to be adequate and would be continued as such.

13. Terrestrial Vegetation and Soil Sampling

The FSAR indicates that samples of terrestrial vegetation will be collected in the normal downwind direction and at one point north of the site, once during spring, summer and fall. The samples are to be taken from a 100 square foot area and analyzed for gross beta activity, and a gamma spectrum is to be run on each sample. The FSAR indicates that soil samples will be taken once each year at the same locations as the vegetation samples. The licensee stated that approximately two kilograms of grass is cut from an undisturbed area and gamma counted directly without chemical preparation in order to detect any iodine present. The samples are then ashed at 400°C, and a suitable aliquot (300 mgms) is taken for gross alpha, beta

analysis using the equipment described under surface water sampling (Paragraph 8). The samples are then sent to Isotopes, Inc. for gross beta counting and gamma spectrocopy. The licensee stated further that soil samples are taken with a device that removes a soil sample in the form of a cylinder, with a diameter of about two inches and a height of about two inches. The soil samples are dried and a suitable aliquot is taken for gross beta (300 mgms) and gamma spectral analysis using the equipment described under surface water sampling (Paragraph 8). Sample results are expressed as picocuries per gram.

In response to the inspector's question, the licensee indicated that consideration was being given to deleting requirements for soil and vegetation sampling from Technical Specifications since this analysis data is subject to considerable variability and the usefulness in a environmental program is debatable.

14. Milk Sampling

The inspector observed that the licensee's present program as described in the FSAR does not include milk sampling and analysis. The inspector stated that the importance of measuring certain nuclides in milk and establishing current concentrations could hardly be overstated. The inspector stated further that a survey by New York State Department of Health* in 1971 found 18 farms near the Indian Point site that had milk producing cows. The licensee stated that most of the farms had gone out of business due to industrial pressure and CE has not sampled and analyzed milk as part of their Environmental Program but the area had been sampled by other agencies. The licensee stated further that they had recently begun sampling at Fitch's Dairy in Millwood (December 1972) and the need for a more comprehensive program would be evaluated.

15. Marketable Vegetable Sampling

The inspector observed that the licensee's present program, as described in the FSAR, does not include the sampling and analysis of marketable vegetables and other food corps. The inspector also noted that corn, tomatoes, and apples are grown commercially in the area as well as many home grown vegetables. The inspector inquired as to whether vegetables had been sampled. The licensee stated that vegetables had not been sampled in the past but the Environmental Group had recently been requested to sample apples grown in the area and analyze them for tritium content. The licensee stated that the need for additional sampling of vegetables was not indicated at this time.

* "Environmental and Postoperative Survey for Radioactivity" Sept. 1971, new York State Department of Health

16. Wildlife Sampling

The inspector observed that the licensee's present program as described in the FSAR does not include the sampling and analysis of wildlife samples. The licensee stated that construction activity on the site in the past had discouraged the movement of wildlife into the area and therefore sampling had not been done. The licensee stated that this aspect of the environmental program would be evaluated after construction of Unit No. 3.

17. Quality Control QA and Analytical Procedures

The inspector inquired as to what analytical procedures and quality control measures are used by CE's contracting laboratory, Isotopes, Inc. The licensee stated that Isotopes, Inc. has not been asked for their QA program or analytical procedures but that they had been informed verbally by Isotopes that they had an in-house QA program and were a participant in the analysis of standard samples from EPA. The licensee stated also that he knew in general the types of procedure used analytically by Isotopes but knew nothing of the accuracy of precision of these techniques. The inspector stated that the accuracy and precision of analytical techniques used to obtain pre-operational data was quite important since this data will be compared to operational environmental data. The licensee stated that he often submits blind duplicate samples to Isotopes, Inc., as a check on their QA program. The inspector stated that this item would be considered unresolved until such time the AEC could inspect the contracting laboratory's analytical procedures and QA program.

18. Meteorological Monitoring

The present meteorological tower is located about one half mile south east of Unit No. 3. The licensee stated that the tower, operated by York Engineering, continuously monitors wind speed and direction, solar intensity, dew point and temperature. There are two measurement levels: 25 feet and about 100 feet. The licensee stated that meteorological data has been measured at this tower for about two years and will continue until such time a new 400 foot tower is constructed at the southern end of the property. The licensee stated that this will be a permanent tower, and will be contracted and operated according to Safety Guide 23.

19. Transformer Dikes and Fuel Storage Sites

The inspector inspected two large fuel storage tanks on site and inquired as to the capacity of each and whether the diking was sufficient to contain the fuel upon tank rupture. The licensee stated that each tank held two and one-half million gallons of No. 6 fuel oil and the diking was designed to contain the entire capacity. The inspector also inspected storage tanks for sulfuric acid, sodium hypochlorite, sodium hydroxide and #2 Jet fuel for the gas turbines. The inspector inquired as to whether the slag pits were sufficient to contain the oil from each transformer upon rupture, since none were diked. The licensee stated that each unit would have two main and two auxillary transformers mounted on concrete pads and surrounded by slag. The licensee stated further that the question of diking transformers and slag pits had not arisen before and they would evaluate the need for diking. The inspector stated that this would be carried as a unresolved item until such time as this evaluation can be made.

20. Sanitary Wastes

Section 11.0 and Table 11 of the Unit No. 3 Environmental Report describes the sewage treatment facilities at Indian Point. The licensee stated that sewage treatment at the site consists of one main sewage treatment plant, which treats all sanitary wastes from the nuclear and conventional portions of the site with the exception of the gate house and observation building. These two locations utilize one 545 gallon septic tank each with absorption trenches. The main plant receives new sewage via comminutors in the utility tunnel. The main plant consists of two sedimentation tanks, four sand filter beds and dosing tanks. The licensee stated that the underdrains are capped and therefore there is no discharge into the Hudson River. The inspector inquired as to the present capacity of the plant and its adequacy for the future plant population. The licensee stated that the present system could handle 200 people on site and management had recently requested an engineering study to determine the adequacy of the present system when the site is fully staffed (approximately 700 people).

21. Status of Permits

The inspector inquired as to the status of various permits that CE is required to obtain, prior to start-up of Unit No. 3. The licensee stated that most recently a permit was obtained from the New York State Department of Fisheries to stock fish as part of a ongoing

research program. The licensee stated further that in the event cooling towers were required at Indian Point in the future, CE would have a problem obtaining a permit to operate it since an ordinance of the City of Buchanan prohibits the use of cooling towers.

22. Ecological and Other Research Programs

Section 21 of the Environmental Report describes the factors and considerations that need be addressed in order to describe fully the biological impact of plant operations. The research programs are designed to provide data which will enable a conclusion be drawn on the impact of once-through cooling. The ecological research programs will lead to a final report in 1976. This report will be available for review by control agencies in 1977. Appendix B&T of the Environmental Report lists the ecological and other studies which have been sponsored by CE up to the time of the issuance of the Environmental Report. Current studies are listed in Table 1 of this report.

The main ecological research contractor is Texas Instruments whose onsite director is Dr. Victor Kaczynski. The inspector visited the laboratory facilities used by Texas Instruments south of the plant site.

The New York University (NYU) Institute of Environmental Medicine also has a active ecological research program at the site under the direction of Dr. Gerald Lauer. The NYU studies are centered at the intake structures and are concerned mainly with work on entrainables, as described in Table 1. The inspector visited the laboratory facilities of NYU near the Unit No. 1 intake structure.

Quirk, Lawler and Matusky (QLM) Engineers work to mathmatically model various parameters as described in Table 1. They will also prepare the final report on the biological impact of plant operations in 1976.

The licensee stated that CE utilizes the services of a fish advisary board, a Hudson River policy and technical committee, to advise CE on the adequacy of their ecological studies. These boards and committees are described in Section 12.2 of the licensee's Environmental Report for Unit No. 3.

The inspector inquired as to whether these research studies would respond to the items listed in the AEC's Environmental Impact Statement for Unit No. 2. The licensee stated that these items would be covered as follows:

ITEM

1. Low dissolved oxygen in thermal plume.
   Studies: Physical & Chemical Monitoring. (See Table 1)

2. Discharge of chemicals into the Hudson River.
   Studies: Physical & Chemical Monitoring, Population Dynamics, and Chemical Bioassays. (See Table 1)

3. Chlorides and Chloramines in the thermal plume.
   Studies: Physical & Chemical Monitoring and Population Dynamics. (See Table 1)

4. Fish impingement at the intake structures.
   Studies: Impingement Studies, Population Dynamics. (See Table 1)

TABLE 1

ECOLOGICAL AND OTHER RELATED RESEARCH AT INDIAN POINT

Texas Instruments Company, Inc.

1. Fish Population Dynamics

   a. Sampling of fish for experimentation and tagging.

   b. Tagged recovery study which will yield data on fish size, migratory movements and distribution.

   c. Sub-population studies will yield data on fish morphological differences.

2. Benthic Ecology

   a. Sampling of bottom dwellers to determine relative abundance of certain species.

3. Physical and Chemical Monitoring

   a. Correlation studies between physical and chemical variables such as temperature, salinity, turbidity, pH & DO with biological variables such as population size and spatial distribution.

b. Monitor physical and chemical parameters during man-made influences such as chemical and thermal addition.

4. Impingement Studies

   a. Fish collection data from daily washing of screens.

   b. Test impingement rates varying coolant flow, air curtain flow and intake velocity.

5. Aircraft Flights (Thermal plume studies)

   a. Infra red imaging of the Hudson River.

   b. Correlate flight data with OLM model.

6. Fecundity and Stomach Analyses

   a. Biological characteristics of selected fish, to suport fish population dynamics studies.

7. Chemical Bioassays

   a. Toxicity studies on selected fish using blow-down chemicals.

8. *Striped Bass Stocking Studies

   a. Study feasibility of stocking by raising bass fingerlings in Trap Rock Lake, then adding these to Hudson at selected points.

9. Fish Behavior and Physiology

   a. Temperature tolerance.

   b. Temperature avoidance.

   c. Temperature perference.

   d. Comparative physiology of fish in the discharge canal with the same species in the Hudson River.

10. *Migratory Patterns

   a. Selected seining up and down Hudson River to determine distribution of fish eggs and larva.

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* Cornwall studies under the direction of Dr. Deborah Wallace, CE

11. Contribution of Hudson River striped bass to the Atlantic Ocean population.

    a. Study still in formative stages.

New York University (Institute for Environmental Medicine)(NYU)

1. Intake Abundance Study.

    a. Use of nets to collect and characterize entrainables.

2. Entrainment Effects.

    a. Simultaneous netting at intake and discharge structures to observe the longevity of stressed organisms.

3. River Transects.

    a. Selective seining of Hudson River entrainables across the site front, mid-channel and west shore. Should give distribution of entrainables and what percent of total population flows through the Indian Point site.

Quirk, Lawler and Matusky, Engineers (QLM)

1. Striped Bass Population Model.

    a. Develop mathematical model to describe the abundance and distribution of striped bass in the Hudson River.

2. Simulation of Entrainment.

    a. Use of the Lovett Plant to provide a ΔT of about $15^{\circ}F$, and therefore simulate conditions similar to the Indian Point site intake and discharge.

3. Prepare final report discribing the biological impact of plant operation.