Docket No. 50-313

SEP 18 1975

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Arkansas Power & Light Company
ATTN: Mr. J. D. Phillips
Vice President & Chief Engineer
Sixth & Pine Streets
Pine Bluff, Arkansas 71601

Gentlemen:

The Commission has issued the enclosed Amendment No. 3 to Facility License No. DPR-51, which includes Change No. 3 to the Technical Specifications of that license. The amendment is in response to your requests of January 17, 1975, April 11, 1975, two dated April 17, 1975, and July 11, 1975.

The amendment incorporates changes to the Appendix B Technical Specifications that (1) modify requirements for monitoring fish impingements; (2) incorporate requirements for two special study programs related to fish impingement; (3) reflect the relocation of the thermal sensor in the discharge flume; (4) modify the types, frequencies and analytical sensitivities for monitoring radiological effluents; (5) provide criteria for specifying milk sampling locations; and (6) clarify or edit original text.

Copies of the related Negative Declaration, the Environmental Impact Appraisal, and the Federal Register Notice are also enclosed.

With respect to your position regarding the overall error for radioiodine analysis of milk sampling, we recommend that you review your procedures with the objective of improving the overall error to ± 25%. The enclosed paper by Thomas demonstrates that formaldehyde or merthiolate can be added to milk at the time of collection to prevent clabbering and will not affect the sensitivity of the radioiodine analysis.

bcc: J. R. Buchanan, HNL
T. B. Abernathy, DTIE
A. Rosenthal, ASLAB
N. H. Goodrich, ASLBP

Sincerely,

Dennis L. Ziemann, Chief
Operating Reactor Branch 2
Division of Reactor Licensing

Enclosures:
1. Amendment No. 3 to License DPR-51
2. Federal Register Notice
3. Negative Declaration
4. Environmental Impact Appraisal
5. Iodine-131 in Milk Samples

For previous concurrences, see attached sheet. (Indicates concurrence in entire package)

OFFICE	RL:EP-3	ADEP	RL:ORB-2	ELD	RL:ADOR
SURNAME	GWilliams FMiraglia/DP BYoungblood	DRMuller	RDiggs WConverse DZiemann	Tourtellotte	KRGoller
DATE	8/20/75	8/ /75	8/25/75	9/10/75	8/ /75

Form AEC-318 (Rev. 9-53) AECM 0240

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Sincerely,

D. L. Ziemann, Chief
Operating Reactor Branch 2
Division of Reactor Licensing

Enclosures:
1. Amendment No. 3 to License DPR-51
2. Revised pages to Appendix B
3. Federal Register Notice
4. Negative Declaration
5. Environmental Impact Appraisal
6. Iodine-131 in Milk Samples

Indicates concurrence in entire package

OFFICE	RL:EP-3	ADEP	RL:ORB-2	ELD	RL:ADOR
SURNAME	GWilliams & FMiraglia & BJYoungblood	DRMuller	RDiggs WConverse & DZiemann		KRGoller
DATE	8/14/75	8/14/75	8/ /75	8/ /75	8/ /75

Form AEC-318 (Rev. 9-53) AECM 0240 ☆ U. S. GOVERNMENT PRINTING OFFICE: 1974-526-166

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

ARKANSAS POWER AND LIGHT COMPANY

DOCKET NO. 50-313

ARKANSAS NUCLEAR ONE, UNIT 1

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 3
License No. DPR-51

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The applications for amendment by Arkansas Power & Light Company (the licensee) dated January 17, 1975, April 11, 1975, two dated April 17, 1975 and July 11, 1975, comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations; and

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public.

2. Accordingly, the license is amended by a change to the Technical Specifications as indicated in the attachment to this license amendment and Paragraph 2.c.(2) of Facility License No. DPR-51 is hereby amended to read as follows:

   "(2) Technical Specifications

   The Technical Specifications contained in Appendices A and B, as revised, are hereby incorporated in the license.

The licensee shall operate the facility in accordance with the Technical Specifications as revised by issued changes thereto through Change No. 5."

3. This license amendment is effective as of the date of its issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann, Chief
Operating Reactors Branch 2
Division of Reactor Licensing

Attachment:
Change No. 3 to Technical
Specifications

Date of Issuance: SEP 18 1975

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 3 TO FACILITY OPERATING LICENSE NO. DPR-51

CHANGE NO. 3 TO TECHNICAL SPECIFICATIONS

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE, UNIT 1

DOCKET NO. 50-313

Revise Appendix B as follows:

Remove pages i, ii, iii, iv, 2-1, 2-2, 2-3, 2-4, 2-9, 2-10, 2-17, 2-18, 2-19, 2-20, 4-7, 4-8, 4-11, 4-12, 4-13, 4-14, 4-15, 4-16, 4-17, 4-18, 4-27, 4-28, 4-29, 4-30, 5-3, 5-4, 5-5 and 5-6; and insert the attached revised pages (no changes made on pages ii, iv, 2-9, 2-20, 4-7, 4-14, 4-16, 4-17, 4-27, 4-30, 5-6). Add pages 4-12a, 4-15a, 6-3 and 6-4. The changed areas on the revised pages are shown by marginal lines.

Effective January 19, 1975, activities under the U. S. Atomic Energy Commission regulatory program were assumed by the U. S. Nuclear Regulatory Commission in accordance with the Energy Reorganization Act of 1974. Any references to the Atomic Energy Commission (AEC) contained herein should be interpreted as Nuclear Regulatory Commission (NRC).

3

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TABLE OF CONTENTS (Cont'd)

2.0 LIMITING CONDITIONS FOR OPERATION

2.1 Thermal

2.1.1 Maximum ΔT Across Condenser

Objective

To limit thermal stress to the aquatic ecosystem by limiting the maximum ΔT across the condenser during operation.

Specification:

a. The maximum differential temperature across the condenser shall not exceed 15°F during normal operation with all four circulating water pumps in operation.

b. If one or two circulating water pumps are out of service at any given time the maximum condenser ΔT shall not exceed 30°F; and Specification 2.1.2 of this Appendix shall be met.

Monitoring Requirement

The temperature differential across the condenser shall be monitored every hour utilizing the computer output of the condenser inlet and the circulating water discharge flume temperature measurements. The range of these measurements shall be 0-150°F and their accuracy shall be ±0.5%. | 3

If the plant computer is inoperable, the condenser ΔT shall be monitored at least once each shift when the plant is operating at steady state power levels. The condenser ΔT shall be measured within two (2) hours after a change in power level has been stabilized and at least once each shift thereafter. The condenser ΔT shall be determined using measurements at the condenser inlet and in the discharge canal. | 1,3

Bases

Maximum ΔT's of 15°F with 4 circulating water pumps operating (~1700 cfs flow) and 30°F with 2 circulating water pumps operating will insure that the limits of the applicable water quality criteria will not be exceeded. The difference in temperature readings of the RTD's at the inlet of the condensers and at the circulating water discharge flume provides the ΔT across the condensers. | 3

Specification 2.1.1.b allows maintenance to be performed on circulating water pumps when the Dardanelle Reservoir ambient temperature is such that Specification 2.1.2 will not be exceeded. Hydraulic model studies have shown that a 30°F ΔT at 850 cfs circulating waterflow will not result in adverse changes in the Dardanelle Reservoir isotherms when

compared to the isotherms resulting from a 15°F ΔT at 1700 cfs except on the surface of the discharge embayment.

2.1.2 Maximum Discharge Temperature

Objective

To limit thermal stress to the aquatic ecosystem by limiting the plant's maximum discharge water temperature.

Specification

The condenser discharge water temperature shall not exceed 105°F for more than two consecutive hours. If the water temperature exceeds 105°F for two hours an investigation of the situation will be undertaken and corrective action shall be taken to maintain the discharge water temperature at 105°F or less. One such corrective action would be a reduction in the plant power level unless there is an emergency need for the lost power. This emergency need would exist when a reduction in power would mean cutting off firm customers. If monitoring (see below) indicates that the temperature at the mouth of the discharge embayment is $\leq$ 105°F, the plant load will not be reduced.

Monitoring Requirements

Condenser discharge water temperature shall be monitored every hour utilizing the average of the computer output of the circulating water discharge flume RTD readings. The RTD's have a 0-150°F range and an accuracy of ±0.5%. 3

If the plant computer is inoperable, the condenser discharge temperature shall be measured at least once each shift. If the condenser inlet temperature exceeds 85°F with all four circulating water pumps running or 70°F with less than four circulating water pumps running, the circulating water discharge flume temperature shall be monitored every two (2) hours. 3

If the circulating water discharge flume temperature exceeds 105°F, plant personnel will be dispatched to the mouth of the discharge embayment to monitor the exit temperature from the embayment. Monitoring of the embayment will continue every two hours as long as the condenser outlet temperature remains at 105°F. 3

Bases

The 105°F maximum discharge water temperature limit is set to assure that the Dardanelle Reservoir temperature does not exceed 95°F as

established by the applicable water quality criteria. The use of the circulating water discharge flume RTD's provides the circulating water discharge temperature prior to mixing with the Dardanelle Reservoir water.

No credit was taken in the analyses and models of the circulating water system for heat exchange within the discharge embayment even though it is expected that the water temperature will be reduced in the embayment. Thus, the average temperature should be <105°F even when the temperature at the circulating water discharge flume is greater.

2.1.3 Maximum BTU/hr

Not applicable.

2.1.4 Rate of Change of Discharge Temperature

Objective

To avoid thermal stress to the aquatic ecosystem due to sudden changes in water temperature.

Specification

In the event of a planned shutdown during the period November through April, the reactor power level shall be reduced to 0% at a rate such that the decrease in the circulating water discharge flume temperature shall be ≤5%F/hr in order to avoid any adverse thermal impact on the aquatic environment in the discharge embayment. As the reduction in power level is made, the number of operating circulating water pumps will be reduced so as to limit the rate of decrease of the water temperature in the discharge embayment. 3

This limitation may be exceeded for brief periods as necessary to protect plant equipment and for certain safeguard operations which cannot be limited or negated by plant operation. These safeguard operations include automatic plant trips and compliance with safety-related technical specifications.

If after a few planned shutdowns at the specified rate, there are no detectable adverse effects on the discharge embayment environment, then future planned shutdowns may be conducted at slightly higher rates. The required monitoring shall be

conducted until it is established that there is no adverse environmental impact associated with plant shutdowns conducted at the higher rate. If there is adverse environmental impact detected, then future planned shutdowns will be conducted at slightly slower rates until a shutdown rate where there is no detectable adverse environmental impact is determined.

Monitoring Requirement

Circulating water discharge flume temperature will be monitored every hour during the power reduction utilizing the average of the computer output of the circulating water discharge flume RTD readings. The RTD's have a 0-150°F range and an accuracy of ±0.5%. 3

If the plant computer is inoperable, the circulating water discharge flume temperature shall be monitored at least once per hour during the power reduction utilizing the condenser temperature recorder which has a 0-150°F range and a ±0.5% accuracy. 3

The aquatic environment of the discharge embayment will be watched during and immediately after planned shutdowns in order to detect any adverse environmental impacts on the embayment, which might occur. A record of the observations made, rate of temperature change, and appropriate data shall be maintained.

Bases

There has been no incidence of adverse environmental impact associated with any operating AP&L power plant. There is also a lack of data or evidence which would support a limiting rate of change of temperature for the specific species that might inhabit the discharge embayment. In view of this, a conservative rate of change, ≤5°/hr, is specified. It is also conservative because the actual rate of change of the discharge embayment will be slower than the rate of change of the circulating water system. A reduction in circulating water flow will further decrease the rate of change of temperature in the discharge embayment.

2.1.5 Heat Treatment of Circulating Water System

Not Applicable.

2.1.6 Deicing Operations

Not Applicable.

b. Averaged over a yearly interval, the release rate of I-131 and other particulate radioisotopes with half lives longer than eight days discharged from the plant should result in a dose in the unrestricted area of less than 15 mrem to the thyroid of a child through the grass-cow-milk chain.

2.4.1 Liquid Discharge

Specification

1. The rate of release of radioactive materials in liquid waste from the plant shall be controlled such that the instantaneous concentrations of radioactivity in liquid waste, upon release from the Restricted Area, do not exceed the values listed in 10 CFR 20, Appendix B, Table II, Column 2.

2. If the cumulative release of radioactive materials in liquid effluents, excluding tritium and dissolved gases, over a calendar quarter, exceeds 2.5 curies, the Licensee shall: 3

   a. Make an investigation to identify the causes for such release rates;

   b. Define and initiate a program of action to reduce such release rates to the design levels; and,

   c. Notify the Director, Directorate of Licensing within 30 days, identifying the causes and describing the proposed program of action to reduce such release rates.

3. The release rate of radioactive liquid effluents, excluding tritium and dissolved gases, shall not exceed 10 curies during any calendar quarter.

4. During release of liquid radioactive waste, the following conditions shall be met:

   a. At least two (2) condenser circulating water pumps shall be in operation to provide a minimum dilution flow of approximately 383,000 gpm in the discharge canal for the liquid waste effluent;

   b. The effluent control monitor shall be set to alarm and automatically close the waste discharge valve such that the requirements of Specification 2.4.1 are met; and,

TABLE 2-2

MINIMUM SAMPLING FREQUENCY

Item	Check	Frequency	Sensitivity of Waste Analysis in Lab[3]	
1. **Filtered Waste Monitor** Tank, Treated Waste Monitor Tank, and Laundry Drain Tank	a. Gamma isotopic analysis	a. **Prior to release of each batch**	a. Gamma Nuclides 5×10^{-7} µCi/ml[4]	3
	b. Radiochemical Analysis Sr 89, 90	b. Sr-89 Sr-90 Quarterly	b. 5×10^{-8} µCi/ml	3
	c. Dissolved Noble Gases	c. Monthly	c. Dissolved Gases 10^{-5} µCi/ml	
	d. Tritium	d. Monthly Proportional Composite[2]	d. 10^{-5} µCi/ml	
	e. Gross Alpha Activity	e. Monthly Proportional composite	e. 10^{-7} µCi/ml	
	f. Ba-La-140, I-131	f. Weekly Proportional Composite[2]	f. 10^{-6} µCi/ml	
2. **Waste Gas Decay Tank**	a. Gamma Isotopic Analysis	a. Prior to release of each batch	a. 10^{-4} µCi/cc	
	b. Deleted	b. Deleted	b. Deleted	3
	c. Tritium	c. Prior to release of each batch	c. 10^{-6} µCi/cc	
3. **Unit Vent Sampling**	a. I-131[1]	a. Weekly	a. 10^{-12} µCi/cc	3
	b. I-133, I-135	b. Monthly	b. 10^{-10} µCi/cc	

TABLE 2-2 (Cont'd)

MINIMUM SAMPLING FREQUENCY

Item	Check	Frequency	Sensitivity of Waste Analysis in Lab(3)	
3. Unit Vent Sampling (Cont'd)	c. Particulates(3)			3
	1) Deleted	1) Deleted	1) Deleted	3
	2) Gross Alpha Activity	2) Quarterly on Weekly Sample	2) 10^{-11} µCi/cc	
	3) Gamma Isotopic Analysis	3) Biweekly Composite	3) 10^{-11} µCi/cc	3
	4) Radiochemical Analysis Sr 89, 90	4) Quarterly Composite	4) 10^{-11} µCi/cc	
	5) Ba-La-140, I-131	5) Weekly	5) 10^{-10} µCi/cc	
	d. Gases			3
	1) DELETED 2) Tritium	1) DELETED 2) Monthly	1) DELETED 2) 10^{-6} µCi/cc	3
4. Reactor Building Purge	a. Gamma Isotopic Analysis	a. Each Purge	a. 10^{-4} µCi/cc	
	b. Deleted	b. Deleted	b. Deleted	3
	c. Tritium	c. Each Purge	c. 10^{-6} µCi/cc	
5. Condenser Vacuum Pump	a. Gamma Isotopic Analysis	a. Monthly	a. 10^{-4} µCi/cc	3
	b. Tritium	b. Monthly	b. 10^{-6} µCi/cc	

TABLE 2-2 (Cont'd)

MINIMUM SAMPLING FREQUENCY

(1) When activity level exceeds 10 percent of the limits of Specification 2.4.2.3.b, the sampling frequency shall be increased to a minimum of once each day. When the gross activity release rate exceeds one percent of maximum release rate specified in Specification 2.4.2.3.a and the average gross activity release rate increases by 50 percent over the previous day, an analysis shall be performed for iodines and particulates. 3

(2) A proportional sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged from the plant.

(3) The detectability limits for activity analysis are based on the technical feasibility and on the potential significance in the environment of the quantities released. For some nuclides, lower detection limits may be readily achievable and when nuclides are measured below the stated limits, they should also be reported.

(4) For certain mixtures of gamma emitters, it may not be possible to measure radionuclides in concentrations near their sensitivity limits when other nuclides are present in the sample in much greater concentrations. Under these circumstances, it will be more appropriate to calculate the concentration of such radionuclides using observed ratios with those radionuclides which are measurable. 3

operational monitoring program described herein. The operational monitoring shall begin with the operation of Unit 1 and shall continue for five years after Unit 2 goes into operation. The effects of plant operation shall be determined by comparison of ecological parameters studied in the preoperational program.

Survey Plan

A map of the survey area showing sampling locations is presented in Figure 4-3. The type and frequency of field sampling shall be as presented in Table 4-3.

Specification

(a) Biological Surveys

1) Plankton

Plankton samples shall be obtained by use of the Wisconsin plankton net. These samples shall be analyzed for plankton (fauna, periphyton, filimentous algae) count and these counts will indicate numbers of organisms per liter of water sample as determined by the strip count method.

2) Benthic Organisms

The bottom organisms shall be obtained by the use of the Ekman dredge. The number of specimens of each group will be listed by sampling areas. Counts shall be made for the number of organisms per one-fourth square foot. Analysis of the plankton and benthic organisms will provide important information regarding the food chain.

3) Fish Survey

a) Gill Net Survey

A fish population and fish species count shall be taken with sizes noted, through the use of gill and trammel nets. A minimum of 16 net-nights' sampling will be accomplished each quarter. At each sampling point two (2) sets of 2 net-nights' sampling will be obtained within 30 days on a quarterly basis. Spines, scale samples, and length/weight frequencies shall be obtained for representatives of each species. 3

Frequencies of sampling were chosen to obtain a trend of aquatic life in the area. Most fish surveys are set up to be conducted in the summer because the fish are more plentiful at this time of year. It is felt that more frequent sampling of the organisms would produce repetitive data. However, less frequent sampling might yield erratic data from which no trend could be detected.

The data will be evaluated in relation to preoperational data obtained by AP&L, UALR, Ark. Tech., and various governmental agencies. By comparing preoperational data with postoperational data, changes in the environment can be detected. It is felt that in this way effects on the aquatic life by ANO can be monitored and controlled.

(2) Impingement of Organisms

Objective

The objective is to monitor those fish impinged on the intake screens to permit an assessment of impingement impacts. Potential impacts of concern are effects on the fishery resource and dissolved oxygen resource of Lake Dardanelle. If these impacts are significant, appropriate state and federal agencies responsible for fisheries shall be consulted, and the necessary modifications to the intake system shall be implemented to satisfactorily reduce these impacts.

Specification

Fish trapped on all of the intake screens shall be sluiced to a collection basket where they shall be identified, counted and weighed following a twenty-four (24) hour sampling period twice each week during the period April 1 through September 30 and three times each week during the period October 1 through March 31. If the weight of fish and trash impinged during any given 24-hour sampling period exceeds 150 pounds, two replicate subsamples of 75 pounds each shall be taken and their averages used for extrapolation and determination species data for the total weight and number of each species impinged. Length and weight of each fish in a subsample shall be determined for each species collected up to 25 fish per specie. If the number of fish in a subsample for a particular species is greater than 25, 25 fish plus 1% of N-25 (where N is the number of fish for a particular species in the subsample) shall have their length and weight measured. Total biomass of all fish impinged shall be estimated regardless of the number impinged. Tabulations of this data shall be made.

3

Fish shall be disposed of in a manner consistent with U. S. Environmental Protection Agency, Arkansas Department of Pollution Control and Ecology and Arkansas Game and Fish Commission guidelines.

Reporting Requirement

Monthly results from this study shall be submitted to the NRC, Division of Reactor Licensing, no later than 30 days after the end of the reporting month. The reports shall contain the following information: the date of the sample, the species collected, the number or estimated number impinged in 24 hours for each species, the modal length (in mm) for each species, the maximum length (in mm) for each species, the modal weight (in g) for each species, and the number of pumps operating during each sample collection.

A summary of the impingement results shall be included in the report required by Specification 5.6.1.

Bases

The purpose of this program is to permit accomplishment of the specification objective. Surveillance frequency is based on previous surveillance data at Arkansas Nuclear One indicating large impingements during the period October through March. Subsampling is done to reduce the sampling effort and replicates are taken to reduce subsampling error. Length and weight determinations are made to determine impingement selectivity. 3

(3) Entrainment of Ichthyoplankton

Objective

The objective of the entrainment study is to determine the effects of operation of the Circulating Water System on the ichthyoplankton.

Specification

A sampling program shall be implemented to determine estimated numbers of ichthyoplankton passing through the circulating water system. Intake samples shall be taken in the intake canal; discharge samples shall be taken from the discharge canal. Samples from the same water mass shall be obtained from the intake and discharge by coordinating their collection with circulating water passage time. Physio-chemical parameters to be monitored at sampling shall include water temperature, dissolved oxygen and pH. Ichthyoplankton shall be sampled monthly during the months of April through September. Samples shall be taken at eight-hour intervals over 24-hour periods.

The samples shall be taken at surface, mid-depth, and near bottom at the intake and at mid-depth at the discharge by a metered plankton net. As an alternative, a high capacity pump sampler shall be used to take samples at surface, mid-depth, and near bottom.

Specimens collected shall be identified to the lowest possible taxonomic level and densities shall be calculated. Immediate mortality shall be determined for intake and discharge samples based on the following criteria:

LIVE: Swimming vigorously, no apparent orientation problems, behavior normal.

STUNNED: Swimming erratically, struggling and swimming on side, some twitching but motile.

DEAD: No vital life signs, no body or opercular movements, no response to gentle probing.

3

Reporting Requirement

Report levels shall be developed from the data collected at the conclusion of the first year study. A summary of the entrainment study shall be included in the report required by Specification 5.6.1.

Bases

This study and subsequent analysis of the results will aid in determining the effect on the ichthyoplankton of passage through the Circulating Water System.

(b) Terrestrial .

Not applicable.

(c) Aerial

Not applicable.

4.2 Radiological Environmental Monitoring

Objective:

To provide information on the radiological effects of station operation on the environment.

Specification:

An environmental radiological monitoring program shall be carried out as defined in Tables 4-1 and 4-2 at locations defined in Figure 4-1 and Table 4-2.

4.2.1 Air Sampling

Continuous air sampling shall be performed at four locations onsite, two off-site within a ten-mile radius of the Plant, and one reference location. Locations have been selected near site boundaries and in existing populated areas for evaluation of possible exposure to airborne particulate and halide radioactivity resulting from station operation. The collection devices for iodine shall contain potassium iodide impregnated charcoal or equivalent, and shall be constructed and operated so as to retain quantitatively the iodine in the air passing through the device. Appropriate analyses of particulate filters and halide collection devices shall be performed on all samples in accordance with accepted techniques and nuclides of interest.

4.2.2 Direct Radiation

Ambient levels of direct external radiation shall be measured at the same locations as air particulate. Measurements shall be made by exposing thermoluminescent dosimeters for periods of three months and six months. 3

4.2.3 Precipitation Sampling

Precipitation sampling shall be carried out at four locations; two onsite, one within a ten-mile radius, and one reference location approximately twenty miles southwest of the plant. Analyses shall be performed as given in Table 4-1.

4.2.10 Milk Sampling

Samples of milk shall be collected within a 10-mile radius of the plant. The milk sampling program shall include:

(a) one (1) sample from the location of the offsite dairy farm or individual milk animal with the highest expected X/Q,

(b) one (1) sample from existing milking animals in each of three (3) areas where infant thyroid doses are calculated to be greater than 1 mrem per year. The infant thyroid dose shall be evaluated in the manner of Regulatory Guide 1.42. 3

(c) one (1) sample monthly from milking animals at a control location (10-20 miles distant and in the least prevalent wind direction).

Samples shall be analyzed for Iodine-131, Strontium-89-90, and gamma emitting isotopes. The sampling frequency for locations nearer than three (3) miles shall be every two weeks during the season animals are on pasture and the locations nearer than 1.5 miles shall be sampled weekly during the season animals are on pasture. Each sample shall be analyzed for I-131 as in Table 4-1, and monthly composites shall be analyzed for radiostrontium and gamma emitters. 3

The analytical procedure used to determine the radioiodine concentration will have a sensitivity of 0.5 picocuries per liter, the overall error (one sigma confidence level) of the analysis will be within $\pm$ 35%. Results will be reported, with associated calculated error, as picocuries of I-131 per liter of milk at the time of sampling.

The area within ten (10) miles of the plant shall be surveyed semiannually for the locations of animals (cows, goats) producing milk for human consumption. The results of this survey shall be included in the Operating Report required by Specification 5.6.1. If it is learned from this survey that milk animals are present at a location which yields a calculated infant thyroid dose greater than from previously sampled animals, the new location shall be added to the milk sampling program as soon as practicable. The sampling location having the lowest calculated dose may then be dropped from the sampling program at the end of the grazing season during which the survey was conducted. Also, any location from which milk can no longer be obtained may be dropped from the program after notifying the NRC in writing that milk animals are no longer present at that location. 3

If milk animals are present in a location where milk cannot be obtained, a sample of the nearest grass shall be analyzed for the isotopes stated above. 3

4.2.11 Vegetation Sampling

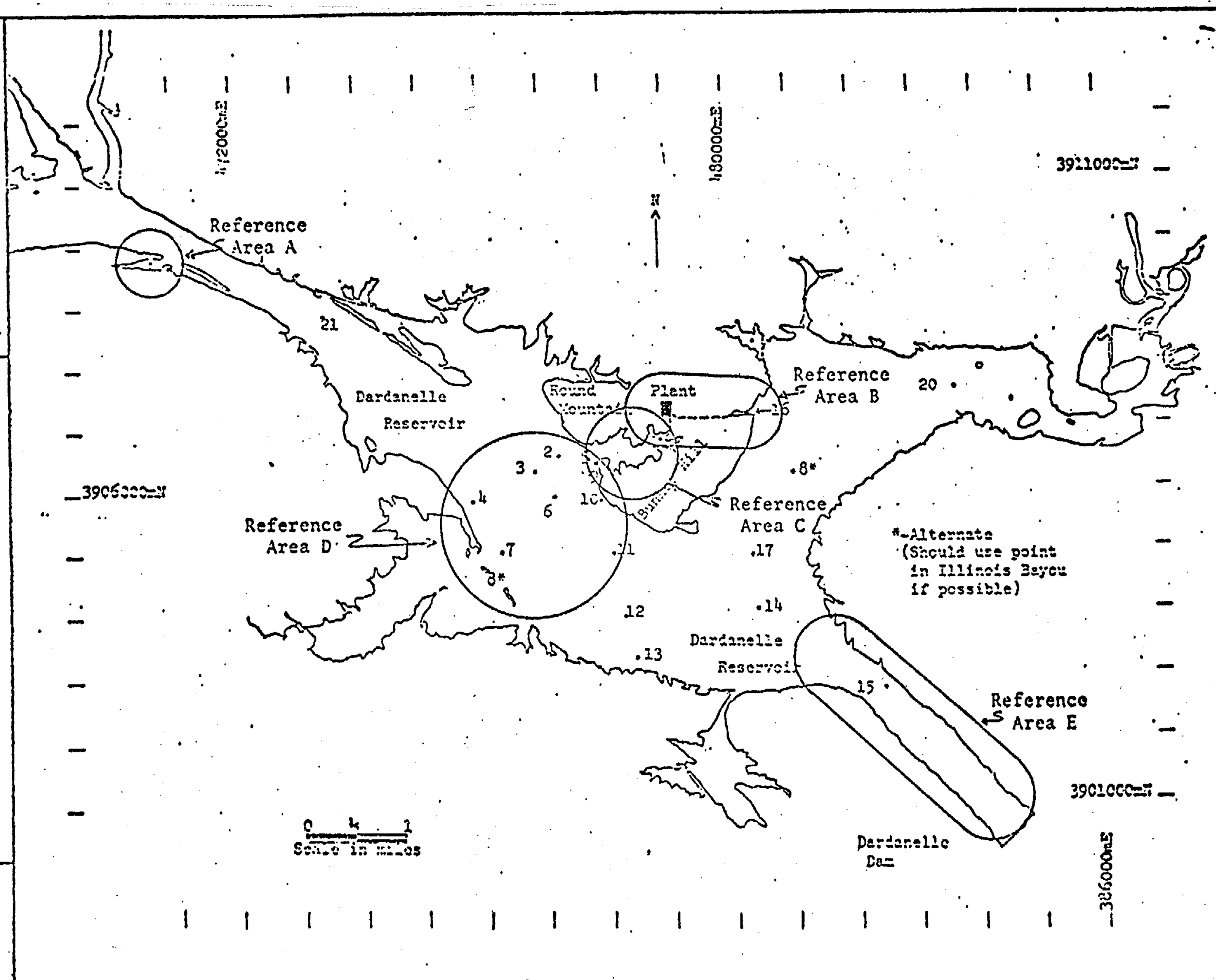
Grass and the leafy portions of other natural vegetation available at each of the air sampling stations shall be collected three times per year (spring, summer, and fall). Food crops and pasturage in the vicinity of the plant also shall be collected as available at harvest time. Appropriate analyses of all samples shall be performed in accordance with accepted techniques and nuclides of interest as given in Table 4-1.

4.2.12 Soil Sampling

Soil samples shall be collected semi-annually at the same locations as vegetation samples and analyzed for gross alpha and gross beta and gamma emitting isotopes as described in Table 4-1. The Fall sample also shall be analyzed for Strontium 89-90.

Bases

One of the limiting conditions for operation of Arkansas Nuclear One is restricting environmental effects due to plant operation in unrestricted areas surrounding the plant site to within limits specified in AEC Regulations 10 CFR - Parts 20, 50, and 100. This Radiological Monitoring Program includes measurements made on the air, water, and land environments to insure that these limits are observed.



ARKANSAS POWER & LIGHT CO.
ARKANSAS NUCLEAR ONE-UNIT 1

AQUATIC SAMPLING POINTS

FIG. NO. 4-5

TABLE 4-2

SAMPLE LOCATION AND SCHEDULE

Sample Station #	Direction and Distance from Plant	Sample Station Location	Sample Types	Sample Frequency	Remarks	
16	295° - 6.0 miles	Piney Creek Area	1) Lake Water 2) Bottom Sediment 3) Aquatic Biota	1) Monthly 2) Semi-annually 3) Semi-annually		
17	Note 1		1) Milk 2) Pasturage	1) Monthly 2) 3 times/year	2) Spring, Summer, Fall	3
18	Note 1		1) Milk 2) Pasturage	1) Monthly 2) 3 times/year	2) Spring, Summer, Fall	3
19	99° - 5.0 miles	Akansas-Tech. Herd	1) Milk 2) Pasturage	1) Monthly 2) 3 times/year	2) Spring, Summer, Fall	

Note 1: These sample stations will be determined as per Specification 4.2.10 and will be reported in the Operating Report as per Specification 5.6.1. 3

TABLE 4-3

AQUATIC SAMPLING LOCATION AND FREQUENCIES

Sample Type	Sample Frequency	Sample Station #	
Plankton	Quarterly - January, April July, October	1, 2, 3, 5, 10, 11, 14, 15, 16, 21	3
Benthic Organisms	Quarterly - January, April July, October	1, 2, 3, 5, 10, 11, 14, 15, 16, 21	3
Gill Net Survey	2 sets of 2 net-nights in each area within 30 days of each quarter	Areas A, B, C, D	3
Trawling Survey	Two samples in each area every other week March, April, May, June	Areas A, B, C, D	3
Trap Net Survey	5 consecutive days Spring and Fall	Areas A, B, D	3
Cove Rotenone Survey	September	Areas A, C	3
Shoreline Seine Survey	Two samples in each area every other week March, April, May, June	Areas A, C,	3
Fish Cage Survey (Mussels)	Semi-Annually	Areas A, B, C, D	3
Chemical	Monthly	3, 5, 7, 8, 10, 11, 13, 14, 15, 16, 17, 21	3
Physical	Monthly	3, 5, 7, 8, 10, 11, 13, 14, 15, 16, 17, 21	3

5.4.3 A report for each occurrence shall be prepared as specified in Section 5.6.2.

5.5 Procedures

5.5.1 Detailed written procedures shall be prepared and followed for all activities involved in carrying out the environmental technical specifications. Procedures shall include sampling, instrument calibration, analysis, and actions to be taken when limits are approached or exceeded. Testing frequency of any alarms shall be included. These frequencies shall be determined from experience with similar instruments in similar environments and from manufacturers' technical manuals.

5.5.2 In addition to the procedures specified in Section 5.5.1, the plant standard operating procedures shall include provisions to ensure the plant and all its systems and components are operated in compliance with the limiting conditions for operations established as part of the environmental technical specifications.

5.5.3 Temporary changes to procedures in 5.5.1 above, which do not change the intent of the original procedure may be made, provided such changes are approved by two members of the plant staff, at least one of whom shall be a Shift Supervisor. Such changes shall be documented.

5.6 Plant Reporting Requirements

5.6.1 Routine Reports

A report on environmental surveillance programs for the previous six months operations shall be submitted as part of the Semiannual Operating Report within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality. The report shall be a summary of the results of the environmental activities for the 6 month period and an assessment of the observed impacts of the plant operation on the environment.

The report shall include a summary of the quantities of radioactive effluents released from the plant as outlined in USAEC Regulatory Guide 1.21, with data summarized on a monthly basis following the format of Appendix A thereof. A summary of the iodine analyses performed on primary coolant as required by Appendix A of these Technical Specifications shall also be included. 3

If statistically significant variations of offsite environmental radionuclide concentrations with time are observed, a comparison of these results with effluent releases shall be provided.

Individual samples which show higher than normal levels (25% above background for external dose, or twice background for radionuclide content) shall be noted in the reports.

Results from all radiological samples taken shall be summarized on a quarterly basis following the format of Table 5-1 for inclusion in the semiannual report. In the event that some results are not available within the 60 day period, the report should be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

5.6.2 Non-Routine Reports

a. Radioactive Discharge

The reporting requirements for radioactive discharges are specified in Section 2.4 of the Technical Specification.

b. Radiological Environmental Monitoring

(1) In the event that a report level specified below is reached, a report shall be made within the designated time period to the Director of Regulatory Operations, Region II, with a copy to the Deputy Director for Reactor Projects. If a measured level of radioactivity in "critical pathway environmental medium samples" indicates that the resultant annual dose to an individual from these levels could equal or exceed 4 times the design objective, a plan shall be submitted within ten days advising the AEC of the proposed action to ensure the plant related annual doses will be within the design objective. For example, with an I-131 design objective of 15 mrem/yr to the thyroid of any individual, if individual charcoal filters show I-131 concentrations in air of 4×10^{-12} $\mu Ci/cm^3$ (4 pci/m^3) or greater (2×10^{-14} $\mu Ci/m^3$ if the milk pathway is involved), or if individual milk samples show I-131 concentrations of 10 pCi/l or greater, the results shall be reported along with a proposed plan of action, as discussed above. For purposes of calculating doses the models presented in WASH-1258 issued in July 1973 and Regulatory Guide 1.42 shall be used. | 3

*Critical pathway is defined by §14 of ICRP Publication 7.

(2) If samples of critical pathway environmental media collected over a calendar quarter show total levels of radioactivity that could result in accumulated plant related doses to an individual for that quarter of 1/2 the annual design objective, the results shall be reported and a plan submitted and implemented within 30 days to limit conditions so that the annual dose to an individual will not exceed the design objective.

c. Nonradiological

In the event a limiting condition for operation is exceeded, or a report level specified in Section 4, Environmental Surveillance is reached, or an unusual event involving a significant environmental impact occurs, a report shall be made within 24 hours by telephone and telegraph to the Director of the Regional Regulatory Operations Office, followed by a written report within ten days to the Director of the Regional Regulatory Operations Office (cc to Director of Licensing). | 3

The written report and to the extent possible, the preliminary telephone and telegraph report, shall: (a) describe, analyze and evaluate the occurrence, including extent and magnitude of the impact, (b) describe the cause of the occurrence and (c) indicate the corrective action (including any significant changes made in procedures) taken to preclude repetition of the occurrence and to prevent similar occurrences involving similar components or systems.

5.6.3 Changes

a. When a change to the plant design, to the plant operation, or to the procedures described in Section 5.5 is planned which would have a significant adverse effect on the environment or which involves an environmental matter or question not previously reviewed and evaluated by the AEC, a report on the change shall be made to the AEC prior to implementation. The report shall include a description and evaluation of the change including a supporting benefit-cost analysis.

b. Changes or additions to permits and certificates required by Federal, State, local and regional authorities for the protection of the environment shall be reported. When the required changes are submitted to the concerned agency for approval, they shall also be submitted to the Deputy Director for Reactor Projects, Directorate

6.3 Diel Changes In Impingement Levels

Objective:

To provide information necessary for quantifying the extent of fluctuations in impingement levels within a 24-hour period.

Program Specification:

Beginning October 1 and continuing to April 1, 1976, subdivisions of a daily impingement sample (See Specification 4.1.2.a.(2)) into three eight hour subsamples shall be performed twice per month during regular impingement monitoring. The results of this study shall be analyzed to identify the extent of fluctuations in impingement levels within a 24-hour period. The data required by Specification 4.1.2.a.(2) shall be collected for each subdivision of the daily sample. 3

Reporting Requirements:

An interpretive report shall be submitted to NRC by June 1, 1976.

Bases

The information provided by this study will indicate whether modifications, if any, to current operating procedures will reduce impingement levels.

6.4 Cove Rotenone Surveys

Objective

To aid in providing a larger base with which to index variations from year to year of fish populations in Lake Dardanelle.

Specification

In addition to those cove rotenone surveys required by Environmental Technical Specification 4.1.2.a(1) three additional cove rotenone surveys shall be done in the summer of 1975 and again in the fall of 1975, one in each of three areas other than those specified in Environmental Technical Specification 4.1.2.a(1). The additional cove rotenone surveys shall be conducted under the supervision of the Arkansas Game and Fish Commission personnel. 3

Reporting Requirements

The results of these surveys shall be reported as part of the report required by Specification 5.6.1 for the period August 1975 through December 1975.

Bases

It is felt that the cove rotenone surveys required by Environmental Technical Specification 4.1.2.a(1) need to be augmented by additional cove rotenone surveys to aid in establishing the base referred to in the objective above.

UNITED STATES NUCLEAR REGULATORY COMMISSION

DOCKET NO. 50-313

ARKANSAS POWER AND LIGHT COMPANY

NOTICE OF ISSUANCE OF AMENDMENT TO FACILITY

OPERATING LICENSE

Notice is hereby given that the U. S. Nuclear Regulatory Commission (the Commission) has issued Amendment No. 3 to Facility Operating License No. DPR-51 issued to Arkansas Power & Light Company which revised Technical Specifications for operation of the Arkansas Nuclear One, Unit 1 located on the northern shores of Lake Dardanelle, in Pope County, Arkansas. The amendment is effective as of its date of issuance.

The amendment modifies the current procedure for monitoring fish impingements and would incorporate requirements for two special study programs which are designed to provide information necessary to determine the environmental impact of winter impingement losses of threadfin shad. In addition, the amendment will incorporate changes; (1) in thermal monitoring requirements to reflect the relocation of the thermal sensor in the discharge flume; (2) in radiological effluent monitoring requirements to reflect the current Commission's staff position on the types, frequencies, and sensitivities of methods used to monitor radiological effluents; (3) in specifying milk sampling locations to reflect current staff practice of specifying criteria for establishing milk sample locations rather than predesignated locations; and (4) of a clarifying and editorial nature.

The applications for the amendment comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations in 10 CFR Chapter I, which are set forth in the license amendment. Prior public notice of this amendment is not required since the amendment does not involve a significant hazards consideration.

For further details with respect to this action, see (1) the applications for amendment dated January 17, 1975, April 11, 1975, two letters dated April 17, 1975 and July 11, 1975, (2) Amendment No. 3 to License No. DPR-51, with Change No. 3, (3) the Commission's related Negative Declaration printed concurrently with this notice; and (4) the Commission's Environmental Impact Appraisal. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the Arkansas Polytechnic College, Russellville, Arkansas.

A copy of items (2), (3) and (4) may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Reactor Licensing.

Dated at Bethesda, Maryland, this 18th day of September 1975.

FOR THE NUCLEAR REGULATORY COMMISSION

Dennis L. Ziemann

Dennis L. Ziemann, Chief
Operating Reactors Branch 2
Division of Reactor Licensing

NEGATIVE DECLARATION

REGARDING PROPOSED CHANGE TO THE

APPENDIX B TECHNICAL SPECIFICATIONS OF LICENSE DPR-51

ARKANSAS POWER AND LIGHT COMPANY

DOCKET NO. 50-313

The Nuclear Regulatory Commission (the Commission) has considered the issuance of changes to the Appendix B Technical Specifications of Facility Operating License No. DPR-51. These changes would modify current procedures for monitoring fish impingements and would incorporate requirements for two special study programs which are designed to provide information to determine the environmental impact, if any, of winter impingement losses of threadfin shad. In addition, the amendment will incorporate changes: (1) in thermal monitoring requirements to reflect the relocation of the thermal sensor in the discharge flume; (2) in radiological effluent monitoring requirements to reflect the current Commission's staff position on the types, frequencies, and sensitivities of analytical methods used to monitor radioactive effluents, (3) in specifying milk sampling locations to reflect current staff practice of specifying criteria for establishing milk sample locations rather than predesignated locations; and (4) of a clarifying and editorial nature.

The U. S. Nuclear Regulatory Commission, Division of Reactor Licensing, has prepared an environmental impact appraisal for the

proposed changes to the Appendix B Technical Specifications of License No. DPR-51, Arkansas Nuclear One Unit 1, described above. On the basis of this appraisal, the Commission has concluded that an environmental impact statement for this particular action is not warranted since there will be no environmental impact attributable to the proposed action other than that which has already been predicted and described in the Commission's Final Environmental Statement for Arkansas Nuclear One Unit 1, published in February 1973.

The environmental impact appraisal is available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., and at the Arkansas Polytechnic College, Russellville, Arkansas.

Dated at Rockville, Maryland, this 18th day of September 1975.

FOR THE NUCLEAR REGULATORY COMMISSION

B. J. Youngblood

B. J. Youngblood, Chief
Environmental Projects Branch 3
Division of Reactor Licensing

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

ENVIRONMENTAL IMPACT APPRAISAL BY THE DIVISION OF REACTOR LICENSING

SUPPORTING AMENDMENT NO. 3 TO DPR-51

CHANGE NO. 3 TO THE TECHNICAL SPECIFICATIONS

ARKANSAS POWER AND LIGHT COMPANY

ARKANSAS NUCLEAR ONE UNIT 1 (ANO-1)

DOCKET NO. 50-313

ENVIRONMENTAL IMPACT APPRAISAL

1. Description of Proposed Action

By letters dated January 17, 1975, April 11, 1975, two dated April 11, 1975 and July 11, 1975, Arkansas Power and Light Company (AP&L) submitted proposed changes to the Technical Specifications Appendix B to License No. DPR-51. The proposed technical specifications include changes: (1) in thermal monitoring requirements to reflect the relocation of the thermal sensor in the discharge flume; (2) in radiological effluent monitoring requirements on the types, frequencies, and analytical sensitivities necessary; (3) in specifying milk sampling locations, and (4) of a clarification and editorial nature. The more substantive changes are described in the April 11, 1975 and July 11, 1975 letters and would modify current procedures for monitoring fish impingements and would incorporate requirements for two special study programs which are designed to provide information to determine the environmental impact, if any, of winter impingement losses of threadfin shad.

The proposed changes of April 11, 1975 and July 11, 1975, were requested in response to staff recommendations made in Daniel R. Muller's letter of January 9, 1975 and meetings of March 5 and June 5, 1975. As a result of these meetings, the staff recommended that to determine the significance of threadfin shad impingements being experienced at ANO-1 certain programs and measures be instituted. These measures included, among other things, modification to the current impingement sampling

required by the technical specifications, and additional cove rotenone surveys to provide a larger data base to index variations in year to year fish populations in Lake Dardanelle.

The changes requested in the January 17, 1975 letter and the two April 17, 1975 letters are for minor modifications to several monitoring requirements as summarized above and for some editorial and clarifying language.

The proposed action will result in the followjng:

a. Modification to Impingement Sampling

The current specification will be modified to include three 24-hour samples per week during periods of high impingements October 1 through March 31. A statistical study performed by Argonne National Laboratory on a similar impingement sampling problem involving a similar species of fish for plants located in the Great Lakes Region has shown that sampling three times per week for 24 hours provides the optimum amount of information necessary for an accurate estimate of yearly impingement losses. Thus the staff has required that three 24-hour samples per week be taken during high impingement periods to estimate impingement losses.

b. Initiation of Two Study Programs Re Threadfin Shad

Since the primary effect of current ANO-1 operation involves the removal of threadfin shad from Lake Dardanelle and since threadfin shad are the primary forage fish for the game and commercial species, demonstration of no appreciable harm to the threadfin shad population may be sufficient to assure that the current high levels of the desirable game and commercial fishes in Lake Dardanelle are not being affected. Such a demonstration can be accomplished by monitoring variations in year to year populations of fish species in Lake Dardanelle using cove rotenone surveys. The additional recommended studies, i.e., the modified impingement study, and the study designed to detect diel changes in impingement levels should result in supportive data characterizing the plant-related impact on the threadfin shad population and should indicate modifications, if any, to plant operation during periods of expected peak impingement that will lessen fish mortality.

The purpose of these studies, therefore, is to examine the effects of plant operation on the threadfin shad and other fish populations to the extent of ensuring the continuance of the present reservoir game and commercial fishery.

The following results are expected from the requested studies:

(1) Cove Rotenone Surveys

(a) Monitor the populations year to year variations in fish in Lake Dardanelle.

(2) Study to Determine Diel Changes in Impingement Levels

(a) Provide information necessary for quantifying the extent of fluctuations in impingement levels within a 24-hour period. The results of this study may indicate that reduced pumping, during certain periods of the day, will reduce impingement.

c. Minor Changes in Biological Monitoring Program

(1) Specification 4.1.2.a.(1).(a).3),a), for gill net survey redistributes but does not change the total number of sampling days.

(2) Table 4-3 and Figure 4.3 are revised to correctly identify sample location 19 and identify sample areas. Establishment of sample areas rather than specific locations for Cove Rotenone Trawling and Shoreline Seine and Fish Cage Surveys.

d. Changes in Thermal Discharge Monitoring

Specifications 2.1.1, 2.1.2 and 2.1.4 now correctly reflect the new location of the thermal sensor in the discharge flume.

e. Changes in Milk Sampling Location

Specification 4.2.10 now specifies the criteria for establishing milk sampling locations rather than identifying specific farms or dairy herds.

f. Changes in Radiological Effluent Monitoring

Table 2.2 now reflects current staff positions with respect to the analytical sensitivities, types and frequencies of methods for monitoring various radioactive effluents.

2. Environmental Impacts of the Proposed Action

All the changes to the Technical Specifications, Appendix B described above and associated with the proposed action involve modification to various environmental monitoring programs or minor editorial clarifications. The proposed action does not authorize any change in the types or amounts of effluents or an increase in power level. The proposed changes will enhance the capabilities of the monitoring programs now in effect to assess the environmental effects of ANO-station operation. In particular, in the area of fish impingement; the revised specifications will provide the information to determine the impact, if any, of the high winter impingement losses on the Lake Dardanelle fishery.

None of the above changes associated with the proposed action involve nor effect matters related to the safe operation of the plant.

The proposed action does not involve significant new safety information of a type not considered by a previous Commission safety review of the facility. It does not involve a significant increase in the probability or consequences of an accident, and does not involve a significant hazards consideration. The Commission has also concluded that there is reasonable assurance that the health and safety of the public will not be endangered by the proposed action.

3. Conclusion and Basis for Negative Declaration

On the basis of the foregoing analysis and the staff evaluation, it is concluded that there will be no environmental impact attributable to the proposed action other than that already predicted and described in the Commission's FES for ANO-1 issued in February 1973. Having made this conclusion, the Commission has further concluded that no environmental impact statement for the proposed action need be prepared, and that a negative declaration to this effect is appropriate.

F. J. Miraglia

F. J. Miraglia, Project Manager
Environmental Projects Branch 3
Division of Reactor Licensing

F. J. Miraglia

for B. J. Youngblood, Chief
Environmental Projects Branch 3
Division of Reactor Licensing

SEP 18 1975

ENCLOSURE 6

DETERMINATION OF LOW CONCENTRATIONS OF IODINE-129 AND IODINE-131 IN MILK SAMPLES

C. W. Thomas

Battelle
Pacific Northwest Laboratories

A procedure is described for the analysis of ^{131}I and ^{129}I in milk samples which permits very accurate measurements of 0.2 pCi/liter. At these concentrations, measurements are possible with a standard deviation of better than ±10%. The milk is preser at sampling by adding 80 mls of formaldehyde containing 20 mg iodi carrier and a few drops of 1 M sodium bisulfite per four liters of milk. This preservative technique has been shown to have littl effect on the overall yield of the procedure. The procedure involv stirring 4 liters of milk with anion exchange resin. The radioiod is subsequently extracted from the resin using a 5% hypochlorite solution. After reduction of the radioiodine with hydroxylamine hydrochloride, it is extracted into carbon tetrachloride, reduced with bisulfite, and back-extracted into water. The radioiodine is then precipitated as palladous iodide. Chemical yield based on added iodine carrier is determined gravimetrically. The ^{131}I is measured by counting in a low background proportional gas flow beta counter.

The following list contains the special apparatus, chemical reagents, analytical procedure required in the procedure.

Special Apparatus

1. Assorted sizes of glass beakers
2. Hot plate
3. Magnetic stirrer
4. Suction filtering apparatus
5. 250-ml and 125-ml separatory funnels
6. Low-background beta counter (nominal background <1 count per min.)
7. Nylon rings and discs, Mylar, glass fiber paper (2.8 cm) (see HASL 300)

Reagents and Chemicals

1. Iodide carrier, 10 mg/ml - dissolve 1.181 grams NaI in 100 ml water
2. Dowex 1 x 8, 50-100 mesh, CL form
3. 2M NaCl - dissolve 116.9 grams NaCl in 1 liter water
4. NaOCl, 5-6% (commercial strength)
5. HNO_3, concentrated
6. Hydroxylamine hydrochloride, crystals
7. CCl_4
8. 1M $NaHSO_3$ - dissolve 1.041 grams of $NaHSO_3$ in 10 ml water (prepare daily)
9. HCl, concentrated
10. Palladous chloride, ~10 mg/ml - dissolve 2.00 grams of $PdCl_2.2HCO$ in 100 ml of water
11. Reagent grade formaldehyde (37%)

Sample Preparation

1. Add 80 mls of formaldehyde containing 2 ml of iodine carrier (10 mg I^-/ml) and few drops of freshly prepared sodium bisulfite to four liters milk sample at time of collection to prevent spoilage.

Analytical Procedure

1. Pour a 4-liter milk sample into a 4-liter beaker and add a 50-ml water slurry of anion resin (Dowex 1 x 8, 50-100 mesh, Cl^- form) to milk. Place a large (6 cm long) magnetic stirring bar in beaker and stir vigorously for 20 minutes. (Note 1)
2. Remove the stirring bar and allow the resin to settle to the bottom of the beaker for 20 minutes. Carefully decant the milk into a second 4-liter beaker leaving the ion exchange resin behind. Wash the resin with distilled water into 600 ml beaker and save.
3. Place the magnetic stirring bar in the second 4-liter beaker, add a second 50 ml water slurry of anion resin to the milk and stir vigorously for 20 minutes.
4. Remove stirring bar and allow resin to settle to bottom of beaker for 20 minutes. Carefully decant the milk and discard. Wash this resin into the 600 ml beaker containing the resin from step 2. Allow it to settle and decant water to waste.

5. To this combined resin add 300 ml of hot water, (about 80-90 C) stir briefly, then allow resin to completely settle. Discard the hot water. Repeat this hot water wash three times.

6. Add 100 ml of 5-6% NaOCl to the resin, place a small (2.2 cm long) magnetic stirring bar in the beaker and stir vigorously for 5 minutes on a magnetic stirrer.

7. Filter the resin slurry through a suction filter and retain the NaOCl solution. (Note 2)

8. Reextract the resin by repeating steps 6 and 7.

9. Discard the resin, combine the two 100 ml solutions of NaOCl and carefully add 40 ml of conc. HNO_3. (Note 3)

10. Pour the acidified NaOCl solution into a 500 ml separatory funnel and add 100 ml of CCl_4.

11. Add 2 grams of hydroxylamine hydrochloride and shake (Note 4). Extract the iodine into the organic phase (about 2 min equilibration). (Note 5)

12. Drain lower organic phase into clean 500 ml separatory funnel and save.

13. Add 100 ml CCl_4 and 1 gm hydroxylamine hydrochloride to the aqueous phase in the first separatory funnel and reextract. Combine organic phases and discard aqueous phase.

14. Add 50 ml and H_2O and 10 drops of freshly prepared 1 M Na to t[illegible] separatory funnel conta[illegible]ing the combined CCl_4 an shake. Equilibrate for 2 minutes. Discard organic (lowe phase (Note 6).

15. Proceed to mounting procedure.

Mounting Procedure

1. Transfer the aqueous (upper phase into a clean 100 ml beaker and add 1 ml of conc. HCl and 10 ml of $PdCl_2$ solution. Stir and let stand for 5 minutes.

2. Using a filter funnel setup similar to that (Teflon or polyethylene - nylon) described in HASL 300, "Procedure Manual," USAEC, filter with suction through a tared glass fiber paper (2.4 cm diameter), using a water wash bottle to effect the transfer.

3. Dry the precipitate for 20 minutes in an oven set at 110°C and weigh to the nearest 0.1 milligram. (Alternati the sample may be dried on a hot plate at low heat for about 30 minutes.)

4. Mount the precipitate on a nylon disc, cover with Mylar (1/4 mil thick), and fasten with ring. (This procedure is described in HASL 300.) (Note 7)

5. Count in a low-background counter for 1000 minutes.

6. If net counting rate of sample is greater than 0.3 cpm (indicating the presence of radioiodine), recount after 7-8 days to confirm the presence of ^{131}I by its decay rat

7. Calculate as picocuries I-131 per liter of milk at the time of sampling.

Notes

1. Resin should be treated to remove any fines. This is accomplished by washing with water and allowing to settle for 5 minutes before decanting water to drain. Repeat until any fines are removed.

2. Resin should be very light straw color after NaOCl extraction; if not light colored, the NaOCl is below strength, and a fresh solution should be obtained. Commercial grade Clorox has been found to be adequate.

3. Add the acid slowly with stirring until the vigorous reaction subsides. Perform in well ventilated hood.

4. Proceed with caution in this step. Excessive gas formation during the extraction can cause the stopcock or cap on the separatory funnel to "pop" with consequent loss of sample. Start by gently swirling the solution to effect mixing. Invert the separatory funnel with the stopcock pointing up and release the pressure by opening the stopcock. Close the stopcock, shake, and repeat the pressure release sequence.

5. Organic phase should be deep red; if not, allow sample to set for few minutes and shake again. Repeat this waiting period if necessary.

6. After back extraction into wat , CCl_4 should be colorless; if not add additional $NaHSO_3$ and reextract.

7. HASL 300 "Procedure Manual" Health and Safety Laboratory, U.S. Atomic Energy Commission, 376 Hudson St., New York, New York 10014.