50-346

ENVIRONMENTAL TECHNICAL SPECIFICATIONS

APPENDIX B

TO

OPERATING LICENSE NO. DPR-

FOR THE

DAVIS-BESSE NUCLEAR POWER STATION, UNIT NO. 1

DOCKET NO. 50-346

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3579

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ENVIRONMENTAL TECHNICAL SPECIFICATIONS

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1.0 DEFINITIONS

Circulating Water System - System for conveying waste heat from the condensers to the cooling tower for rejection to the atmosphere.

Circulating Water - Water used for heat transport in the circulating water system.

Cooling Tower Blowdown - The portion of the circulating water removed from the coldside of the cooling tower and discharged to the lake to maintain circulating water dissolved solids at or below the desired concentration. | 1

ΔT - The temperature difference between the unit's discharge water and ambient lake temperature, as measured at the beginning of the intake canal, in Fahrenheit degrees. | 1

Discharge Conduit - 72 inch diameter conduit, underground and beneath the lake bottom to convey the unit's discharge water from the collection box to the discharge structure in Lake Erie. | 1

Initial Criticality - The first attainment of a self-sustaining fission reaction within the reactor core. | 1

Intake Canal - Open canal, with earthen embankments, to convey lake water from the intake conduit to the intake structure.

Intake Conduit - 96 inch diameter conduit, beneath the lake bottom, to convey lake water from the intake crib to the intake canal.

Intake Crib - Submerged wooden crib in Lake Erie approximately 3,000 feet offshore used as the station water intake.

Intake Structure - Reinforced concrete structure located at the west end of the intake canal forebay containing pumps supplying lake water to the unit's support systems.

Station - Davis-Besse Nuclear Power Station as related to the entire site and not Unit No. 1 in particular.

Unit - Davis-Besse Nuclear Power Station Unit No. 1

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

A. LIMITING CONDITIONS FOR OPERATION

2.1.A Thermal

2.1.1.A Maximum Discharge Temperature Difference, Above Ambient Lake Temperature

Objective

To limit thermal stress to the aquatic ecosystem.

Specification

The maximum discharge temperature for liquid effluents is not to exceed 20°F above ambient lake water temperature. At times when the discharge temperature exceeds this temperature difference dilution water will be supplied, from the dilution pump, to the collection box to keep the discharge temperature difference within the limit specified. | 1

Bases

Tests for sudden temperature changes indicate that sudden change up to 20°F can generally be tolerated by fish found in the vicinity of the site.[1] However, the temperature extremes to | 1

B. MONITORING REQUIREMENTS

2.1.B Thermal

2.1.1.B Maximum Discharge Temperature Difference, Above Ambient Lake Temperature

Objective

To ensure that the temperature of the units intake and discharge are monitored and the discharge ΔT is within the limits specified.

Specification

Temperature measuring elements are located in the discharge conduit and intake canal at the end of the intake conduit, to measure the discharge and ambient lake temperatures. The output from these temperature elements will go to the unit computer where the ΔT will be computed. The discharge, ambient lake temperature, and ΔT will be logged hourly. If the ΔT reaches 19°F an alarm will be actuated. Upon | 1 receipt of this alarm the operator will start the dilution pump so that the discharge temperature does not exceed the specified limit. The temperature sensing elements will have a range of 32°F to 212°F and accuracy of ±0.1°F. Flow measuring devices are provided to measure cooling tower blowdown, service water discharge, and dilution flows.

Bases

The intake canal and discharge conduit temperature elements provide ambient lake and discharge temperatures. The ambient lake temperature element is 2100 feet upstream from the point where service water

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases (Cont'd.)

which fish are subjected can be important. The greatest stress to fish is from a winter cold shock (a fish acclimated to the plume temperature being forced into ambient lake temperature) such as during a unit shutdown. This should not be a serious problem because the 20°F isotherm is extremely small (about 0.1 acres), and few fish could swim against the current long enough to enter and become acclimated to the hottest water. Hot shock tests at 20°F above ambient have shown generally no harm to fish in the spring, fall, or winter, but some stress in summer. Fish which are able to enter the hottest water may suffer temporary immobilization but would be swept away by the discharge velocity to cooler water where they will recover.

Bases (Cont'd.)

will be discharged to the intake canal forebay for winter ice control. There is sufficient separation that the service water will not affect the ambient lake temperature sensing element.

Reference

1. C. E. Herdendorf and J. M. Reutter, Laboratory Estimates of Fish Response to the Heated Discharge from the Davis-Besse Nuclear Power Station, Lake Erie, Ohio, D-J Project F-41-R-4, Study No. II, Ohio Division of Wildlife, 1973.

1

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

A. LIMITING CONDITIONS FOR OPERATION	B. MONITORING REQUIREMENTS
2.2.A Hydraulic	2.2.B Hydraulic
2.2.1.A Intake Velocity	2.2.1.B Intake Velocity
Objective	Objective
To specify a maximum limit on the water velocity through the intake screens in the intake crib to prevent fish from entering the intake crib and being drawn through the intake conduit to the intake canal.	To monitor any fish which might be resident in the intake canal and be drawn onto the intake structure's traveling water screens.
Specification	Specification
No limiting condition for operation in regards to intake velocity is required under present unit design.	The traveling water screens are operated on a periodic basis and as required to remove any impinged material which would tend to block the screens. This material is removed by backwash water which is sluiced to a screen wash catch basin having a screened discharge to retain sluiced debris. If fish are present in the intake canal and have been caught on the traveling water screens they will be removed with the backwash water and retained in the basin. This basin will be monitored weekly for the presence or absence of any fish.

Bases

The velocity through the bar screens of the intake crib will be 0.25 feet per second at a maximum flow of 42,000 gpm and 0.12 feet per second at a nominal flow of 21,000 gpm. These velocities are well below the velocity (1 foot per second) at which the number of entrained small fish was observed to increase greatly at the Indian Point Power Plant. In addition a bubble screen has been provided around the intake crib to discourage the entry of fish. Intake cribs with similar designs, except with

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases (Cont'd.)

no bubble screen, have been in operation at Oregon and Port Clinton, Ohio and have not experienced any fish problems.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

A. LIMITING CONDITIONS FOR OPERATION	B. MONITORING REQUIREMENTS
2.3.A Chemical	2.3.B Chemical
2.3.1.A Biocides	2.3.1.B Biocides
Objective	Objective
The purpose of this specification is to limit discharge concentrations of biocides, in the unit's liquid effluent, so as to protect the biota from lethal and sublethal effects.	To ensure that free available chlorine discharges in the unit's liquid effluent are maintained within the Environmental Technical Specifications
Specification	Specification
The only biocide that is planned to be used at the unit is chlorine. The free available chlorine in the unit's discharge:	Free residual chlorine is monitored on the discharge from the collection box. This testing is performed on a daily (Monday thru Friday) basis during and following chlorination of the circulating water except on holidays.
1. Shall not exceed 0.5 mg/l as a daily maximum.	All test procedures shall be those prescribed in 40 CFR, Part 136, as amended, "Test Procedures for the Analysis of Pollutants".
2. Shall not exceed 0.2 mg/l as a daily average.	
In addition:	
1. Chlorination of the cooling tower circulating water system shall be limited to two (2) hours per day.	
2. Chlorination of the service water system shall be limited to two (2) hours per day when the cooling tower system is out of service.	

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases

The maximum daily limit of 0.5 mg/l and daily average limit of 0.2 mg/l are based on Federally adopted effluent limitation guidelines for the "Steam Electric Generating Point Source Category". These guidelines are listed in 40 CFR, Part 423. Section 423.15 lists the standards of performance for new sources that apply to the Davis-Besse Unit No. 1.

The Davis-Besse Unit No. 1 design and operation is in compliance with these Federally adopted guidelines.

In normal operations when the cooling tower is in service, unit service water will be used for tower makeup. The service water is chlorinated continuously at the intake structure to maintain a low chlorine demand in the cooling tower circulating water. A free chlorine residual of 0.5 mg/l will be maintained in the chlorinated service water used for tower makeup.

During periods when the cooling tower is out of service the service water system discharge, which is normally used for cooling tower makeup, is discharged direct to Lake Erie. Under these conditions the service water system can only be chlorinated two (2) hours per day.

The cooling tower circulating water system is chlorinated four times per day for 30 minutes each time. Chlorine is added at the circulating water pump suction and 0.5 mg/l free residual chlorine will be maintained at the condenser outlet. At the cooling tower outlet, free chlorine residuals will be lower than 0.5 mg/l.

Bases

During operation gaseous chlorine is added to the cooling tower circulating water and service water used for tower makeup. In addition, gaseous chlorine and sodium hypochlorite will be used in the water treating plant and hypochlorite at the sewage plant.

In operation, the effluent of the sewage plant is pumped to the collection box and mixed with the continuous blowdown from the cooling tower. Thus the highest concentration of chlorine that could exist would occur during periods of chlorination of the cooling tower circulating water.

The orthotolidine test is satisfactory for the higher levels of chlorine expected at the condenser outlet, an amperometric titrator may be required to monitor the lower levels of chlorine expected at the effluent of the collection box to the lake.

Discharge of chlorine residual will be associated with cooling tower blowdown during chlorination periods. Since the cooling tower makeup will be continuously chlorinated, a stable chlorine demand is expected in the cooling tower circulating water. This demand is also expected to be significantly lower than in raw lake water prior to any chlorination.

Due to the stable chlorine demand of the circulating water and the fact that chlorine dosages are normally not varied except on a Monday thru Friday basis, a Monday thru Friday testing program will be sufficient to protect the environment.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases (Cont'd.)

The discharge concentration of free available chlorine will, in addition, react with chlorine demanding constituents in the dilution water and entrained lake water at the discharge plume. Concentrations of free chlorine will be near zero at point of discharge and total residual chlorine will be below limits of detection within a short distance from the discharge structure. Because of the high discharge velocity and fast acting nature of the chemical reaction, it is unlikely that any fish or invertebrate species will be subjected to lethal or sublethal levels of chlorine. | 1

2.3.2.A pH

Objective

To limit hydrogen ion concentration within the normal range of ambient lake water so as to protect and preserve aquatic life.

Specification

The pH (hydrogen ion concentration) will be limited to a range of 6.0-9.0 in the effluent from the collection box. | 1

Bases

The pH of a solution is an index of the hydrogen ion concentration and may range from 0-14. Low values indicate the presence of acids or acid-forming salts. High values indicate the presence of alkalies. The most significant effect of extreme values of pH is their possible lethal effect on fish and other aquatic life. The limiting specification is established for the preservation of indigenous species and is consistent with the

2.3.2.B pH | 1

Objective

To ensure that the pH (hydrogen ion concentration) is maintained within limits of the Environmental Technical Specifications.

Specification

The hydrogen ion concentration will be monitored at the discharge of the collection box. Samples will be collected on a daily (Monday thru Friday) basis except on holidays. | 1

Bases

The collection box effluent quality is primarily influenced by the cooling tower blowdown. Spent effluents from regeneration of the makeup demineralizers will be neutralized in a separate neutralizing tank for discharge and will have a negligible effect on pH of the collection box effluent.

The circulating water will have its hydrogen ion concentration control-

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases (Cont'd.)

Federally adopted effluent guidelines published in 40 CFR, Part 423. | 1

Bases (Cont'd.)

led within a narrow range to prevent scaling in the condenser and on other heat exchange surfaces. Due to this narrow control range, wide variations of hydrogen ion concentration will not take place, and Monday thru Friday sampling and analysis will be satisfactory to protect the aquatic environment. | 1

2.3.3.A Other Chemicals

Objective

To limit the concentration of sulfate bearing compounds at levels below which detrimental effects have been observed on aquatic life.

Specifications

The concentration of sulfate ion will be limited to 1,000 mg/l as a monthly average. | 1

Bases

A literature search has shown that the minimum 96 hour TLm concentration of listed sulfate sales that are toxic to Lepomis Macrochirus (Bluegill Sunfish) is calcium sulfate at 2,980 mg/l. The specification established is well below this value.

2.3.3.B Other Chemicals | 1

Objective

To ensure compliance with limits of this Environmental Technical Specifications.

Specifications

The concentration of sulfate ion will be determined on a monthly basis from a sample collected at the discharge of the collection box. | 1

Bases

Sulfate compounds are the only chemicals resulting from unit operation that will be discharged to the environment in concentrations significantly different from natural lake water.

Sulfates will predominately be discharged with cooling tower blowdown. They will also result from neutralization of regenerant wastes and operation of the domestic water plant. | 1

Due to the feed of sulfuric acid to the cooling tower circulating water for alkalinity control, calcium sulfate will be formed. Another sulfate present is magnesium sulfate.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

Bases (Cont'd.)

Some discharge of sulfate will occur from the water treatment plant. The spent sulfuric acid and sodium hydroxide regenerants are neutralized in the neutralizing tank. A solution containing calcium sulfate, magnesium sulfate, and sodium sulfate will result.

2.0 ENVIRONMENTAL PROTECTION CONDITIONS

2.4 Radioactive Discharges

Objective

To specify the limits and controls applicable to the release of radioactive liquid effluents to the receiving water and of radioactive particulates and gaseous effluents to the atmosphere, to ensure that these releases are as low as practicable (10 CFR Part 50.34a) and that resulting radiation exposures in unrestricted areas will not exceed a few percent of natural background exposures.

Specification

2.4.1 LIQUID WASTES

2.4.1.1 During normal unit operations, including expected occurrences, operating procedures shall be developed and used in such a manner so that radioactive materials in liquid effluents released to unrestricted areas be as low as practicable.

2.4.1.2 Except for tritium, the radioactivity concentrations in liquid effluents above background from the unit shall not exceed the values specified in 10 CFR Part 20, Appendix B, Table II, Column 2. (July, 1974) 1

2.4.1.3 The calculated annual total quantity of all radioactive material in liquid effluents released to unrestricted areas will not result in an annual dose to the body of an individual from all pathways of exposure in excess of 5 millirems.

2.4.1.4 Prior to release to the station discharge, a sample shall be analysed for gross beta-gamma radioactivity concentrations. A monthly composite sample shall be used to determine the tritium concentration and to carry an isotopic analysis.

2.4.1.5 During normal release of radioactive liquid effluents, at least one of the two radioactive liquids discharge monitors shall be operable. In the event both are inoperable and the waste can be stored no longer, grab samples shall be taken in the discharge line during the release.

2.4.2 GASEOUS WASTES

2.4.2.1 Release Rates

2.4.2.1.1 The release rate of each gaseous radioactive isotope i, except for I-131, shall meet the requirement that $\frac{Qi}{i^{mpci}} \leq 2.1 \times 10^{13}$ where Q_i is the measured rate of release (Ci/yr) of isotope i and mpci is the maximum permissible concentration of radioactive isotope i as shown in 10 CFR, Part 20, Appendix B, Table II, Column 1. (July, 1974)

2.4.2.1.2 The estimated total quantity of noble gases, above background, to be released to unrestricted areas shall not result in an annual average calculated air dose in unrestricted areas in excess of 10 millirads from gamma radiation and 20 millirads from beta radiation.

2.4.2.1.3 The calculated annual total quantity of I-131 above background released to the atmosphere will not result in an annual dose to any organ of any individual in an unrestricted area from all pathways of exposure in excess of 15 millirems.

2.4.2.2 During release of radioactive gaseous wastes from the gaseous waste disposal system to the Unit vent, the gaseous radioactivity monitor, iodine monitor, and particulate monitor in the Unit vent shall be operable. 1

2.4.2.3 Whenever necessary to purge the containment vessel so that the airborne concentration of radionuclides will be less than the occupational limit, the purge shall be through particulate filters, absolute filters, and if iodine levels would result in exceeding specification 2.4.2.1.3 through charcoal filters.

2.4.2.4 Potentially highly radioactive gaseous waste from the gaseous waste disposal system and vent headers of unit components shall be provided a minimum holdup of 30 days (except as noted in 2.4.2.5).

2.4.2.5 Gaseous waste may be discharged from the waste gas surge tank directly to the Unit vent for a period not to exceed seven days if the holdup system equipment is not available and the release rates meet Environmental Technical Specification 2.4.2.1 and 2.4.2.2.

2.4.2.6 During power operation, whenever the condenser air ejector discharge monitor is inoperable, daily grab samples shall be taken from the air ejector discharge and analyzed for gross radioactivity daily.

2.4.3 CONTAINERIZED WASTE

2.4.3.1 Prior to shipping, liquids and slurries containing radionuclides shall be solidified in drums using a chemical grout.

2.4.3.2 Depending on the level of radiation, the drums may be filled while contained inside lead casks which may also be used in shipping the containers.

2.4.3.3 Solid wastes shall be compressed using a bailer and put in drums (except as noted in 2.4.3.4).

2.4.3.4 In cases where a bailer is not applicable, solid wastes shall be either cut to fit in a normal shipping container, or another appropriate container shall be used to ship the material off site.

2.4.3.5 All shipments of radioactive material shall meet the Department of Transportation regulations.

Monitoring Requirement

A. Liquid Wastes

Prior to release of each batch of liquid, a sample shall be taken from that batch and analyzed for gross radioactivity. The sample will be analyzed to determine the concentrations of radioactive isotopes according to the schedule presented in Table 2.4-1. Release concentrations will be calculated to demonstrate compliance with Environmental Technical Specification 2.4.1.2 using the measured concentrations and the unit discharge flow at the time of discharge. 1

Records of the radioactive concentrations and volumes, before dilution, of each batch of liquid released, average unit discharge, flows, and length of time over which each discharge occurred shall be maintained for routine reporting specified in Environmental Technical Specification 5.4.1.

The liquid effluent radiation monitor shall be calibrated at least quarterly using a known radioactive source. Each monitor shall also have an instrument functional test monthly.

B. Gaseous Wastes

The following measurements will be made on the unit vent: (1) the gross radioactivity will be continuously monitored and recorded to provide Ci per unit volume of gas released, (2) the volume flow rate will be continuously monitored and recorded, (3) the radioactivity monitors will be calibrated in terms of Ci per unit volume of gas or equivalent CPM at least annually using a known radioactive source, (4) release rates of gross radioactivity will be determined from the above measurements, and (5) at least one unit vent monitor will be operating during any gaseous releases thru the unit vent.

Samples of gas for gas decay tanks just prior to release and from the containment vessel just prior to purge will be taken and analyzed according to the schedule presented in Table 2.4-2. The release rates will be calculated from the sample concentrations, the waste gas decay tank volumes and pressures, the containment vessel volume, and the dilution air flow rates.

An isokinetic sample from the unit vent will be routed continuously through a series combination of a particulate filter and charcoal trap. This filter and trap will be analyzed for radioisotopes according to the schedule given in Table 2.4-2. The total release rate of I-131 will be calculated from the amounts (Ci) found on the charcoal traps, the sample flow rates, and the gaseous effluent release rates.

Records of the radioactive concentrations and volumes released shall be maintained for routine reporting specified in Environmental Technical Specification 5.4.1.

Bases

A. Liquid Wastes

The specifications which address the "as low as practicable" criterion and compliance with the intent of 10 CFR Part 50.34a are based on the following: (1) Except for tritium, the potential instantaneous exposure rate in unrestricted areas should not exceed 500 mrem/yr., (2) the annual dose commitment to the whole body or any organ of an individual in an unrestricted area shall not exceed 5 mrem as a result of liquid effluents. 1

Liquid wastes from the radioactive waste disposal system are mixed with the unit discharge, which consist primarily of cooling tower blowdown and dilution water, prior to release to the lake. The unit discharge flow during period of liquid radioactive waste release will average 28,125 gpm (20,000 gpm dilution water and 8,125 gpm average cooling tower blowdown). Flow measuring devices are provided in the unit's cooling tower blowdown, service water discharge, dilution pump discharge, and cooling tower make-up pump discharge (when used for dilution). The output from these flow measuring devices will go to the unit's computer where the unit discharge flow will be computed and logged. Radioactive levels in the unit discharge will be calculated from the activity in the processed waste being released, the discharge rate of the processed waste, and the unit discharge flow. There will also be a continuous sampler on the discharge conduit to obtain a composite sample of all liquid discharges leaving the unit.

Due to the use of a cooling tower with the resultant low unit discharge flow, the proposed numerical guide of Appendix I for annual average concentration of tritium prior to dilution in a natural body of water may not be met. However, the annual average discharge concentration of tritium in liquid wastes will be a small fraction of the MPC specified in 10 CFR Part 20 and the average concentration at the intake of the nearest public water supply at Erie Industrial Park, Ohio, would be well below MPC such that compliance with specification 2.4.1.3 can be achieved. Thus, discharge of

liquid wastes at the specified concentrations will not result in significant exposure to members of the public as a result of consumption of drinking water from the lake, even if the effects of potable water treatment systems on reducing radioactive concentration of the water supply is neglected.

The monitoring requirements stipulate that radioactive substances and their concentrations in each release will be determined and concentrations at the discharge point will be calculated from the unit discharge flow. The requirements also stipulate that records of concentrations and volumes discharged will be available and that periodic calibration and performance checks of effluent monitoring equipment will be made.

B. Gaseous Wastes

Radioactive gases result from fission and activation processes. These gases are collected in waste gas decay tanks. Prior to release to the atmosphere, gaseous wastes are introduced into the Unit vent which has a flow rate of 80,000 cfm. Further dilution then occurs in the atmosphere.

The specifications which address the "as low as practicable" criterion and compliance with the intent of 10 CFR Part 50.34a are based on the following: (1) the instantaneous exposure rate due to radioactive noble gas isotopes in unrestricted areas should not exceed 500 mrem/yr.; (2) the release rate of radioactive noble gas isotopes above background averaged over a yearly interval should result in a calculated air exposure dose rate in unrestricted areas of less than 10 mrad per year from gamma radiation and 20 mrad per year from beta radiation; (3) the release rate of I-131 and radioisotopes in the particulate form above background should result in a dose rate in unrestricted areas of less than 15 mrem per year considering all exposure pathways. 1

The formula prescribed in specification 2.4.2.1.1, requires that the concentration of gaseous radioactive isotopes, due to the unit effluents, in any unrestricted area not exceed the maximum permissible concentrations specified in 10 CFR Part 20, ensures that the instantaneous exposure rate will not exceed 500 mrem/yr. Stated mathematically, Q_i (X/Q/3.15 x 10^7 = fmpci and Σ_i fmpci is equal to or less than 1 where Qi is the release rate (Ci/yr) of isotope i, (X/Q) is the applicable maximum annual average atmospheric dispersion factor in unrestricted areas (sec/m^3), 3.15 x 10^7 is the number of seconds in a year and fmpci is the fraction of the maximum permissible concentration of radioactive isotope i in unrestricted areas as defined in 10 CFR Part 20, Appendix B, Table II, Column 1. The values of Q_i will be measured as described in Monitoring Requirements. The applicable value of X/Q is 1.5 x 10^{-6} sec/m^3 according to the Davis-Besse Nuclear Power Station Supplement to Environment Report, Docket No. 50-346, November 1971, Volume I, P. 4-24.

Rearranging and including the numerical value of X/Q yields,

$$\Sigma_i Q_i / \text{fmpci} \leq 2.1 \times 10^{13}.$$

Specification 2.4.2.1.2 ensures that the quantity of noble gases released above background will result in calculated air dose in unrestricted areas of

less than 10 millirads from gamma radiation and 20 millirads from beta radiation.

Specification 2.4.2.1.3 ensures that the quantity of I-131 released will result in an actual exposure of individuals in unrestricted areas of less than 15 mrem from all exposure pathways.

The monitoring requirements ensure that the essential information with which to carry out the Environmental Technical Specification will be available and stipulates that records of concentrations and volumes released will be maintained. 1

C. Containerized Wastes

In order to ensure safe off site shipment of liquids and slurries, each will be solidified in a DOT-approved sealed container. Solids will also be packaged in approved sealed containers. The containers to be shipped can be filled inside a lead cask which can remain with the container in shipment.

Table 2.4-1

Radioactive Liquid Waste Sampling and Analysis Schedule

A. Monitor Tank Contents

Sampling Frequency	Type of Activity Analysis	Detectable Concentration
Each Batch	Gross B-γ	10^{-7} μCi/ml
One Batch/Month	Dissolved fission and activated gases	10^{-5} μCi/ml
Weekly Proportional Composite (1)	Ba/La-140 I-131	10^{-6} μCi/ml
Monthly Proportional Composite (1)	Gamma isotopic analysis	5 x 10^{-7} μCi/ml
	H-3	10^{-5} μCi/ml
	Gross Alpha	10^{-7} μCi/ml
Quarterly Proportional Composite (1)	Sr-89, Sr-90	5 x 10^{-8} μCi/ml

1

NOTES:

(1) A proportional composite sample is composed of increments from each batch collected in the same proportion as the volume of the batch is to the total volume discharged for the time period.

Table 2.4-2

Radioactive Gaseous Waste Sampling and Analysis Schedule

A. Gas Decay Tank Releases

Sample Type	Sampling Frequency	Type of Activity Analysis	Detectable Concentration
Gas from Decay Tank	Each Tank Release	Individual Gamma emitters	10^{-4} μCi/cc (1)

B. Containment Vessel Purge Releases

Sample Type	Sampling Frequency	Type of Activity Analysis	Detectable Concentration
Gas from Containment Vessel	Each Purge	Individual gamma emitters	10^{-4} μCi/cc (1)

C. Unit Vent Releases

Sample Type	Sampling Frequency	Type of Activity Analysis	Detectable Concentration
Particulate Filter	Weekly	Gross B-γ	10^{-11} μCi/cc
		Ba-140, La-140	10^{-11} Ci/cc
	Monthly	Gamma emitters	10^{-10} μCi/cc
	Quarterly	Gross α	10^{-11} μCi/cc
		Sr-89 and Sr-90	10^{-11} μCi/cc
Charcoal Filter	Weekly	I-131	10^{-12} μCi/cc
	Quarterly	I-133 and I-135	10^{-12} μCi/cc

NOTES:

(1) Analysis shall also be made within one month of the initial criticality and following each refueling.

3.0 ENVIRONMENTAL SURVEILLANCE

3.1 Non-Radiological Surveillance

Environmental surveillance programs will be developed to monitor the non-radiological impacts from the Davis-Besse Nuclear Power Station Unit No. 1. This surveillance will generally consist of aquatic and terrestrial environmental monitoring programs described in this Section 3.1. In general these programs will commence at initial criticallity of the unit and will continue as described in the following paragraphs for approximately two years of normal unit operation. The actual length of the programs described below may be shorter or longer than two years depending upon results. Upon review and approval of these results by the Nuclear Regulatory Commission, a less intensive program will be implemented to maintain a check on the unit's non-radiological impact for the life of the unit. The details of this less intensive program will be determined upon analysis of the first two years data. It is anticipated that this program will be similar to the one described below but reduced in frequency and intensity.

3.1.1 Aquatic Environmental Montoring Program

Objective

To conduct special chemical, physical and biological studies in the area of the unit's intake and discharge in Lake Erie. This will permit the determination of any changes in water quality or stress placed on the aquatic ecosystem by unit operation. 1

3.1.1.1 Water Quality Analysis

A. Frequency - Once every 30 days during ice free periods (normally April through November), weather permitting.

B. Location: Sampling location numbers 1, 8 and 14.

C. Parameters measured and methodology:

	Parameter	
1.	pH	ASTM D1293-65 (1973)
2.	D.O.	Std. Methods, 13th Ed., 218B (1971)
3.	Temperature	Std. Methods, 13th Ed., 162 (1971)
4.	Conductivity	ASTM D1135-64 (1973)
5.	Transparency	Secchi disk (Welch, 1948)
6.	Turbidity	Std. Methods, 13th Ed., 163A (1971)
7.	Solar Radiation	G.M. Mfg. and Instr. Corp.
8.	Total Alkalinity	Std. Methods, 13th Ed., 102 (1971)
9.	Suspended Solids	Std. Methods, 13th Ed., 224C (1941)
10.	Dissolved Solids	USEPA, Chem. Analysis, Water (1971)
11.	NO_3	ASTM D992-71 (1973)
12.	SO_4	ASTM D516-68C (1973)
13.	Total P	Std. Methods, 13th Ed., 223F (1971)
14.	SiO_2	ASTM D859-68B (1973)

Water samples will be taken with a 3-liter Kemmerer sampler at the various sampling locations. These samples will be placed in polyethylane containers and taken to the laboratory for analysis.

3.1.1.2 Plankton Studies (phytoplankton and zooplankton)

A. Frequency - Once every 30 days during ice free periods (normally April through November), weather permitting.

B. Location: At sampling location numbers 1, 3, 8, 12, 13, 14 and 18. These sampling locations may be modified during the course of the study if it is determined it will result in the collection of more meaningful data.

C. Analysis to be made: Number and kind of organisms present.

D. Methodology: Duplicate vertical tows, bottom to surface, will be taken at each of the sampling locations with a Wisconsin plankton net (12 cm mouth; no. 25, 0.064 mm mesh). Each sample will be concentrated to 50 ml and preserved in 5% formalin. The volume of each sample will be computed by multiplying the length of the tow by the area of the net mouth.

3.1.1.3 Benthic Studies

A. Frequency - Once every 60 days during ice free periods (normally April through November), weather permitting.

B. Locations: At sampling location numbers 1, 3, 4, 8, 9, 12, 14, 17 and 18. These sampling locations may be modified during the course of the study if it is determined it will result in the collection of more meaningful data. 1

C. Analysis to be made: Population and generic composition.

D. Methodology: Three replicate samples will be taken at each sampling location with a Ponar dredge ($A=0.55m^2$). Samples will be sieved through a U.S. #40 sieve, preserved in 10% formalin and returned to the laboratory. Individuals will be identified as far as possible (usually to genus; to species where possible) and reported as numbers of individuals per square meter.

3.1.1.4 Fisheries Population Studies

A. Frequency - Once every 30 days fish populations will be sampled during ice free periods (normally April through November), weather permitting.

B. Location:

1. Four five minute trawls will be run between the intake crib (station 8) and discharge structure (station 12).

2. Bag seine samples will be taken at sampling locations 23, 24 and 25.

3. Experimental gill nets will be set in the vicinity of the intake crib (station 8) and discharge structure (station 12).

C. Analysis to be made: Fish will be identified by species, weighed, measured and age-length relationship determined.

D. Methodology: Trawls, bag seines and gill nets will be used to collect fish at the various sampling locations. Fish will be identified and released after identification. A scale sample will be taken from selected individuals to determine the age-length relationship.

3.1.1.5 Ichthyoplankton

A. Frequency - Once every 30 days during ice free periods, weather permitting. Except during periods of anticipated high ichthyoplankton concentrations, May through August, when samples will be taken once every ten days.

B. Location: Samples will be collected in the vicinity of the intake crib (station 8) the discharge structure (station 12) and station 4.

C. Analysis to be made: Samples will be identified and counted.

D. Methodology: Samples will be collected by five-minute tows, surface and near bottom, using a 0.75 meter diameter oceanographic plankton net (no. 00, 0.75 mm mesh)

3.1.1.6 Fish Impingement

The traveling water screens, in the intake structure, will be operated on a periodic basis as required to remove any impinged material which would block the flow of water through the screens. This material, removed by backwash sprays, will be sluiced to the screenwash catch basin which will have a screened overflow weir discharge. The screenwash catch basin will be monitored for a 24-hour period two to three days a week for the presence or absence of any fish. This information will be tabulated weekly listing all fish impinged by number and species. If significant numbers of fish are observed, over 1000 per week, plans will be developed to also record length and weight of fish impinged. 1

3.1.2 Terrestrial Environmental Monitoring Program

Objective

1. To monitor the effects of the unit's cooling tower and meteorological tower on migrating birds.

2. To monitor the effect of cooling tower drift on the land surrounding the site.

3.1.2.1 Aerial

Specification

During the spring and early fall (i.e. April, May, late August, September, and October) the areas around the cooling tower and meteorological tower

will be surveyed weekly, weather permitting, to determine the number and type of birds, if any, that have been killed by impacting on either the cooling or meteorological tower. The frequency of these surveys will be increased to daily during periods of maximum predicted hazard, to migrating birds, as related to meteorological conditions (i.e., frontal passage, low ceiling, etc.)

Bases

The greatest potential for bird kills exists during the migratory period - April, May, late August, September, and October. During these periods, bird kills are associated with climatic conditions that force nocturnal migratory birds to fly at low altitudes and limit their visibility.

3.1.2.2 Cooling Tower Drift

Specification

Color infrared aerial photography will be used to detect any effects of cooling tower drift on the terrestrial vegetation of the site and of the area around the site. This photograph will be taken at a scale of one inch equals 500 feet and will cover a land area of approximately 20 square miles. It will be taken during the middle of the growing season for five successive years beginning at initial criticality of the unit. To reduce variability, photographs will be taken between 11 a.m. and 2 p.m., EDT, in clear weather with minimum ground haze. Flight lines, flight altitude, make and model of camera, lens and filter, film make and type, and processing methods and conditions will be the same for all sets of photographs. 1

Interpretation of the infrared photography will include ground reconnaissance of selected areas. Field records obtained during the ground reconnaissance will be provided to the Nuclear Regulatory Commission.

Bases

The operation of the cooling tower is accompanied by the distribution of minimal amounts of chlorides, sulfates, phosphates, etc., by the drift from the cooling tower, over the surrounding land. The amount of material deposited by the cooling tower drift is predicted to be small and the effect on vegetation negligible. The infrared aerial photograph will allow an annual overall gross analysis of the general state of health of the surrounding vegetation and will aid in identifying any significant changes which would warrant further study.

SITE LOCATION

⊕3 AQUATIC SAMPLING LOCATIONS

LEGEND

1. CONTAINMENT BUILDING
2. AUXILIARY BUILDING
3. TURBINE BUILDING
4. INTAKE STRUCTURE
5. SEWAGE TREATMENT PLANT
6. COOLING TOWER
7. SWITCH YARD
8. RELAY HOUSE
9. CIRCULATION WATER SYSTEM PUMP HOUSE
10. WATER TREATMENT BUILDING
11. FOREBAY & INTAKE CANAL
12. 96" INTAKE CONDUIT
13. INTAKE CRIB
14. 72" DISCHARGE CONDUIT
15. DISCHARGE STRUCTURE

DAVIS-BESSE NUCLEAR POWER STATION, UNIT 1

AQUATIC SAMPLING LOCATIONS

FIGURE 3.1-1

3.0 ENVIRONMENTAL SURVEILLANCE

3.2 Environmental Radiation Monitoring

Objective

To establish a sampling schedule for the purpose of detecting, measuring, and evaluating any significant effects of unit operation and waste releases on the environment.

Specification

A. Environmental samples and external radiation levels will be taken from locations and at frequencies listed in Tables 3.2-1 and 3.2-2, and will be analyzed according to the routine listed in Table 3.2-1, using procedures which will provide concentration values with minimum detectable limits which are equal to or less than those listed on Table 3.2-3.

B. Reports shall be sumitted in accordance with the requirements of Section 5.4, unit reporting requirements.

C. For animals producing milk for human consumption, samples of fresh milk will be obtained from these animals at locations and frequencies shown in Table 3.2-1, and analyzed for their radioiodine content, calculated as iodine-131. Analysis will be carried out within eight days (one I-131 half-life) of sampling. Suitable analytical procedures will be used to determine the radioiodine concentration to a sensitivity of 0.5 picocuries per liter of milk at the time of sampling. For activity levels above 0.5 picocuries per liter the overall error (one sigma confidence level) of the analysis will be within ± 25%. Results will be reported, with associated calculated error, as picocuries of I-131 per liter of milk at the time of sampling. 1

D. An annual census of animals producing milk for human consumption shall be conducted at the start of the grazing season to determine their location and number with respect to the site. The census shall be conducted under the following circumstances:

1. Within a 1 mile radius from the plant or the calculated 15 mrem/year isodose line* whichever is larger: A door to door or equivalent counting technique shall be utilized.

2. Within a 5 mile radius for cows and a 15 mile radius for goats: Enumeration by using referenced information from sources such as county agricultural agents or other reliable sources.

A change in sampling locations shall occur if, after census takings, a new milk animal is found to be in a more critical location from the standpoint of dispersion of radioiodine than one of those specified. A suitable substitution shall be made if samples from a location of milk animals are no longer available due to removal of the animals from the location.

*Dose to be calculated using models and assumptions presented in NRC Regulatory Guide 1.42.

Bases

Environmental media which are sampled and analyzed for radioactivity are shown by the two diagrams on Figure 3.2-1. The upper diagram shows the critical pathways; the lower diagram shows the other monitored pathways.

A pre-operational radiological monitoring program was conducted in order to determine the magnitude of the radioactivity in the environment surrounding the site and to study fluctuations in the radioactivity levels prior to operation of the unit. The information will serve as a guide and baseline in evaluating any changes in environmental radioactivity levels that may possibly be attributed to the unit. The pre-operational radiological environmental monitoring program, to establish baseline values, was begun in July 1972 and will continue until initial criticality of the unit.

The operational radiological environmental monitoring program, similar to the pre-operational radiological monitoring program, will also be conducted with the sampling and analysis schedule related to the level of radioactivity found in the unit discharge and in the environmental samples. The operational surveillance program shall consist of: (1) a program of measurements of radioactivity in environmental media which is outlined in Table 3.2-1, (2) reporting all results of this program on a routine basis as described in Section 5.4-1 of these Environmental Technical Specifications, and (3) reporting the results of measurements of radioactivity in critical pathway environmental media samples on the non-routine bases described in Section 5.4-2 of these Environmental Technical Specifications. The critical pathway environmental media are air, drinking water, milk and external radiation. 1

The environmental monitoring program will be conducted in accordance with Chapter 6 of the Davis-Besse Nuclear Power Station Unit No. 1, Environmental Report. Measurement of radiation levels are carried out in such a manner so as to ensure compliance with 10 CFR Part 20 and the intent of 10 CFR Part 50.34a. The survey is designed such that releases of unit origin can be differentiated from natural or other sources of environmental radiation. This is accomplished from samples collected at locations near the site, indicator locations, where concentrations would be expected to be the highest if a release should occur, and comparing to samples collected at locations remote to the site, control locations. Statistical calculations will be carried out to determine whether there is a significant difference between the indicator and control sample locations. Specific radionuclide analyses will be also performed to determine whether they are related to known unit discharges.

If significant increases in radiation levels are detected by the radiological environmental monitoring program, dose estimates to man will be carried out.

TABLE 3.2-1

Radiological Environmental Monitoring Program

Sample	Sampling Location	Type[(a)]	Sampling Frequency	Analysis
Airborne Particulates	1	I	Weekly	Gross beta
	2	I		
	3	I		on quarterly composite
	4	I		of all indicator filters
	7	I		and all control filters:
	8	I		1. Gamma spectral analysis
	9	C		
	11	C		2. Sr-89, 90
	12	C		
	23	C		
	27	C		
Airborne Iodine	1	I	Weekly	Gamma spectral analysis on charcoal canister for I-131
	2	I		
	3	I		
	4	I		
	7	I		
	8	I		
	9	C		
	11	C		
	12	C		
	23	C		
	27	C		
External Radiation Levels	1	I	Monthly	Gamma dose
	2	I	Quarterly	
	3	I	Annually	
	4	I		
	5	I		
	7	I		
	8	I		
	9	C		
	11	C		
	12	C		
	23	C		
	24	C		
	27	C		

TABLE 3.2-1

Radiological Environmental Monitoring Program (Cont'd.)

Sample	Sampling Location	Type	Sampling Frequency	Analysis
Untreated Surface Water	3 11 12 28	I C C I	Weekly Grab[(b)] Composited Monthly	Gross beta in dissolved and suspended fractions Tritium - Quarterly On quarterly composite of all indicator and all control samples: 1. Gamma spectral analysis 2. Sr-89, 90
Treated Surface Water	11 12 28	C C I	Weekly Grab Composited Monthly	Similar to analysis performed on untreated surface waters
Groundwater	7 17 27	I I C	Quarterly[(b)]	Similar to analysis performed on untreated surface waters
Bottom Sediments	27 29 30	C I I	Semi-Annually	Gross beta Sr-89, 90 Gamma spectral analysis
Fish (two species)	Lake Erie vicinity of site Lake Erie ≥ 10 mi from site	I C	Semi-Annually	Flesh-Gross beta Gamma spectral analysis
Soil	1 2 3 4 7 8 9 11 12 23 27	I I I I I I C C C C C	Once Every 3 Years	Gamma spectral analysis

1

TABLE 3.2-1

Radiological Environmental Monitoring Program (Cont'd.)

Sample	Sampling Location	Type	Sampling Frequency	Analysis
Fruit or Vegetables (two varieties)(c)	8 ≥ 10 mi from the 25	I C I	Semi-Annually	Edible Portion Gamma spectral analysis Sr-89, 90
Milk(d)	8 20 24	I I C	Monthly	Sr-89, 90 I-131 Calcium Gamma spectral analysis
Edible Meat	11 22 Onsite wildlife (one species) Vicinity of site, waterfowl, duck or goose	C I I I	Semi-Annually Annually	Gamma spectral analysis
Animal - Wildlife Feed	8(e) 9 Onsite (Smartweed)	I C I	Semi-Annually Annually	Gamma spectral analysis

(a) "C" designates control location
"I" designates indicator location
(b) Except when ice conditions prohibit sampling
(c) Locations for fruit or vegetable samples are subject to change based on availability
(d) Locations for milk samples are subject to change based on availability and milk animal census
(e) cattle feed is collected the 1st quarter, and grass is collected the 3rd quarter

1

Table 3.2-2

Sampling Locations

Davis-Besse Nuclear Power Station

Sampling Point[a]	Location[b]
1	Site boundary, NE of station, near intake canal.
2	Site boundary, E of station.
3	Site boundary, SE of station, near Toussaint River and storm drain.
4	Site boundary, S of station, near Locust Point and Toussaint River.
5	Main entrance of site.
7	Sand Beach, 0.9 miles NNW of site.
8	Earl Moore Farm, 2.7 miles WSW of site.
9	Oak Harbor, 6.8 miles SW of site.
11	Port Clinton, 11.5 miles SE of site.
12	Toledo, 23.5 miles WNW of site.
17	Irv Fick's well onsite, 0.7 miles SW of site.
19	(Deleted)
20	Daup Farm, 5.4 miles SSE of site.
22	Peter Farm, 2.6 miles SW of site.
23	Put-In-Bay Lighthouse, 14.3 miles ENE of site.
24	Sandusky, 24.9 miles SE of site.
25	Winter Farm, 1.3 miles S of site.
27	Magee Marsh, 5.3 miles WNW of site.
28	Unit 1 water supply, onsite.
29	Lake Erie, Intake Area 1.5 mile NE of site.
30	Lake Erie, Discharge Area 0.9 mile ENE of site.

1

(a) There are no sampling points number 6, 10, 13, 14, 15, 16, 18, 21 and 26.

(b) Distance measured from the center of the Unit No. 1 shield building.

Table 3.2-3

Typical Estimated Minimum Detectable Concentrations

Type of Sample	Analysis	Typical Minimum Sensitivity
Water	Gross β	0.2 pCi/l
	Gross α	0.3 pCi/l
	H-3	0.3 pCi/ml
	Co-58	
	Co-60	
	Ba/La-140	
	Sr-89	
	Sr-90	0.6 pCi/l
	Cs-134	
	Cs-137	3.0 pCi/l
	Zn-65	
	Mn-54	
	I-131	
	Cr-51	
Air Particulates	Gross β	0.001 pCi/m^3
	Gross α	0.0004 pCi/m^3
	Sr-89	
	Sr-90	0.001 pCi/m^3
	Cs-134	
	Cs-137	
	Ba/La-140	
Air Gases	I-131	0.01 pCi/m^3
Milk	Sr-89	
	Sr-90	0.6 pCi/l
	Cs-134	
	Cs-137	3.0 pCi/l
	I-131	0.5 pCi/l*
Beef, Wildlife and Fish	Gross β	0.02 pCi/g
	Co-58	
	Co-60	
	Cs-134	
	Cs-137	
	Zn-65	
	Mn-54	
	Sr-89	
	Sr-90	
	I-131	
Vegetables or Fruit	Gross α	0.02 pCi/g
	Gross β	0.2 pCi/g
	Cs-134	
	Cs-137	0.01 pCi/g

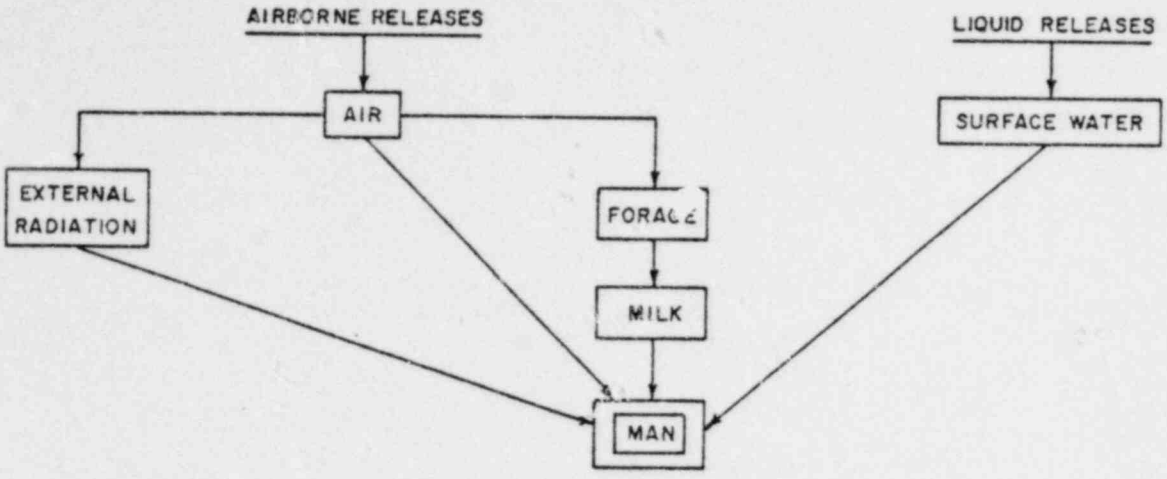
Table 3.2-3

Typical Estimated Minimum Detectable Concentrations (Cont'd.)

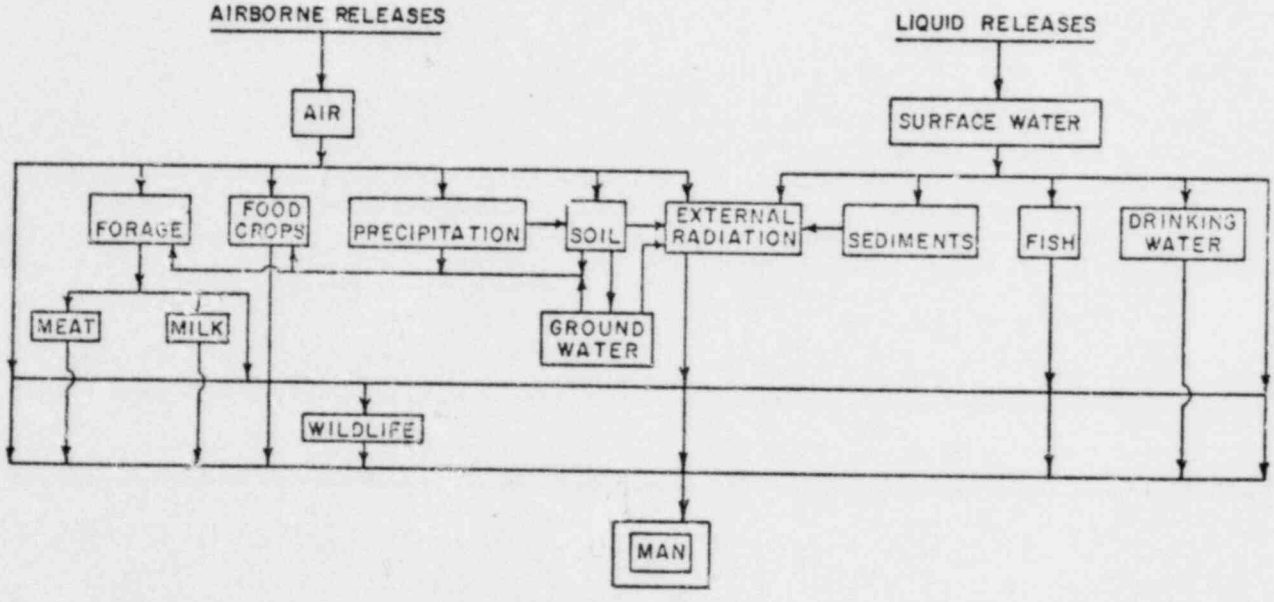
Type of Sample	Analysis	Typical Minimum Sensitivity
Vegetables or Fruit	Sr-89 Sr-90 I-131	0.001 pCi/g
External Radiation	Beta/Gamma	1 mrem
Fodder	Gross α Gross β Sr-90 Cs-137	0.2 pCi/g 1. pCi/g 0.03 pCi/g 0.1 pCi/g
Soil and Sediment	Gross β Sr-90 Cs-137	1.4 pCi/g 0.1 pCi/g 0.5 pCi/g

1

* The I-131 determination in milk will be done by the technique described in USAEC Regulatory Guide 4.3 issued September 1973; hence, the value for minimum detectable limit is expected to be smaller than this value in the future.

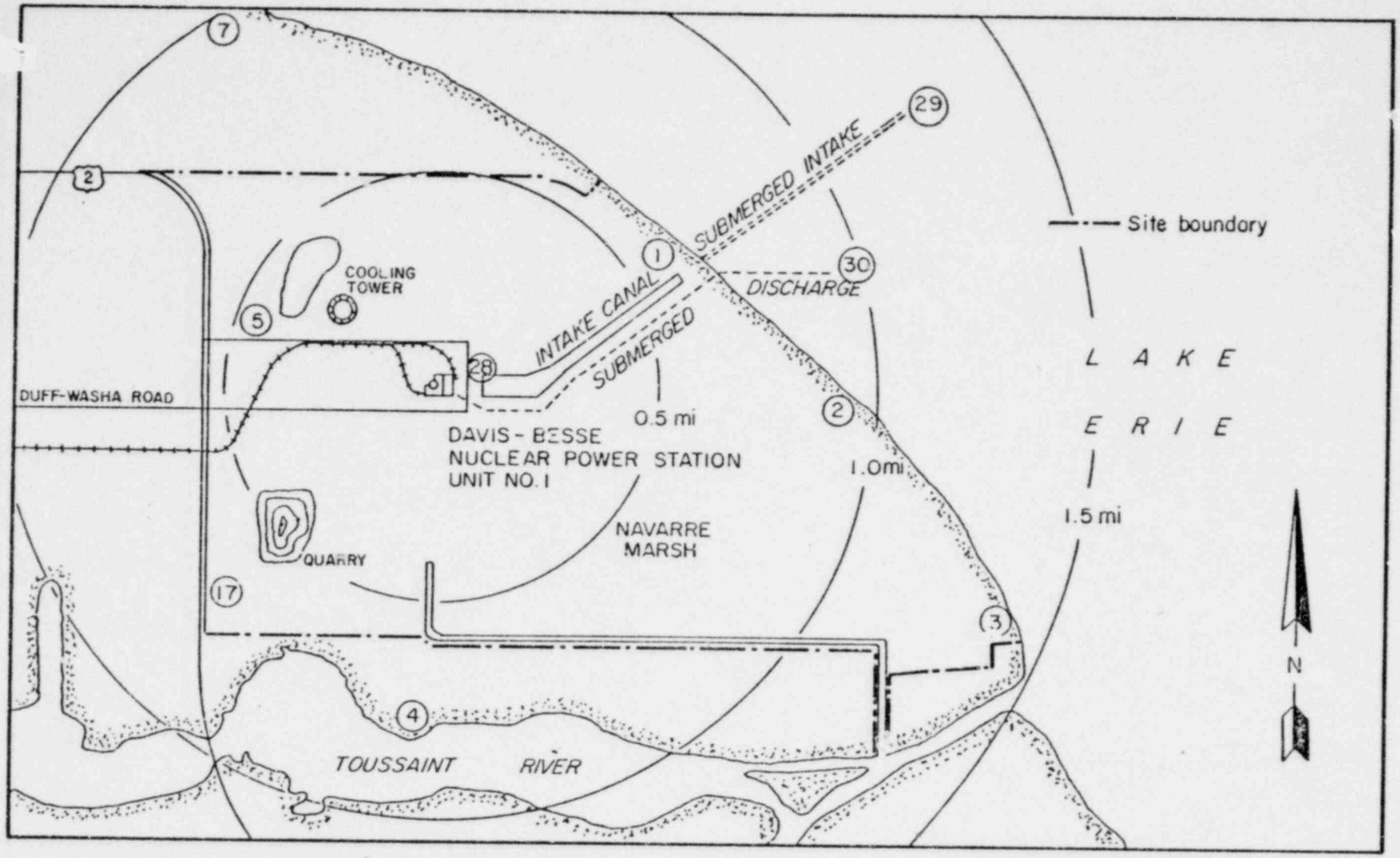


CRITICAL PATHWAYS



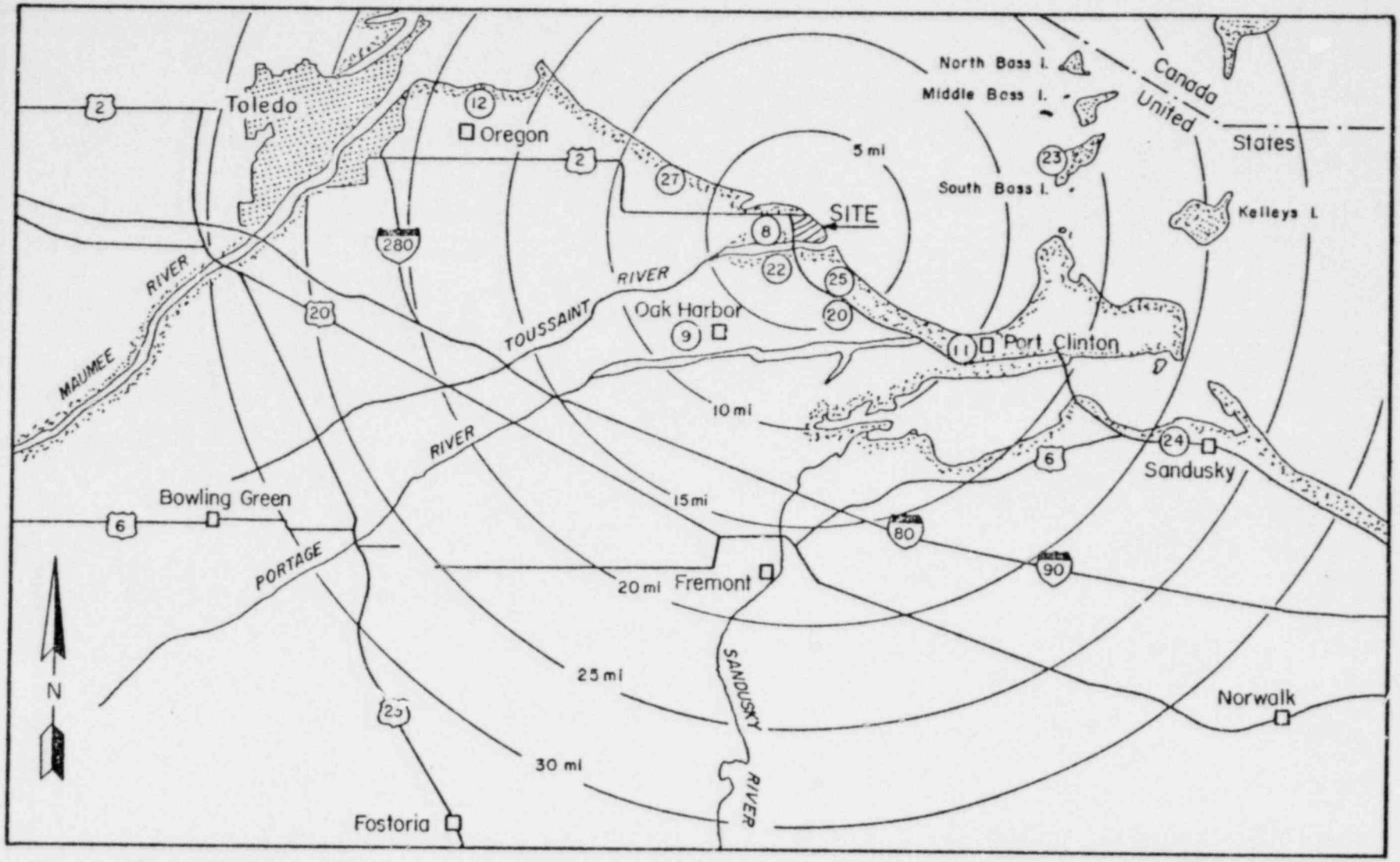
OTHER MONITORED PATHWAYS

DAVIS-BESSE NUCLEAR POWER STATION
ENVIRONMENTAL MEDIA AND EXPOSURE PATHWAYS
FIGURE 3.2-1



(2) SAMPLING LOCATIONS

DAVIS-BESSE NUCLEAR POWER STATION
SAMPLING LOCATIONS ON THE SITE PERIPHERY
FIGURE 3.2-2



(2) SAMPLING LOCATIONS

DAVIS-BESSE NUCLEAR POWER STATION
SAMPLE LOCATIONS (EXCEPTING
THOSE ON THE SITE PERIPHERY)
FIGURE 3.2-3

4.0 SPECIAL SURVEILLANCE, RESEARCH, OR STUDY ACTIVITIES

4.1 Operational Noise Surveillance

Objective

The objective of this program is to conduct a noise survey in the vicinity of the Davis-Besse site during normal unit operation. The results of the survey will be used to assess the noise impact of the operation of Unit No. 1.

Specifications

Methodology

In devising the methodology to be used during the operational noise survey, consideration has been given to ANSI S3W50[1] which establishes a method for the evaluation of noise in an area in which the ambient sound levels result from the superposition of multiple noise sources. The survey periods and the number of sampling points in the survey area will be chosen in order to develop a statistical statement of the noise levels in the vicinity of the site. During the survey, noise sensitive land use and specific noise sources will be identified. Measurements will be obtained near critical locations of noise sensitive land use such as the nearest resident, school, hospital, cemetery, and wildlife refuge which may be affected by noise from unit operation. Measurements will be obtained in the vicinity of the unit during the hours of daytime (0700-1900 hours), evening (1900-2200 hours), and nighttime (2200-0700 hours) over a two day period during representative environmental conditions and while Davis-Besse Unit No. 1 is operating at full load within one year after the unit has achieved operation at rated load. The survey will be conducted during a period when the construction activities associated with the Davis-Besse site will be minimal and do not contribute significantly to the noise levels. 1

The instrumentation which will be used during the operational noise survey will consist of the following:

1. Brüel and Kjaer Type 2209 Precision Sound Level Meter
2. Brüel and Kjaer Type 1613 Octave Filter Set
3. Brüel and Kjaer Type 4145 Condenser Microphone
4. Brüel and Kjaer Type 4220 Pistonphone

This instrumentation meets the requirements of the International Electrotechnical Commission (IEC) for a Type I or precision sound level meter.[2] A 1-inch diameter condenser microphone will be used to assure that accurate low ambient sound level measurements can be made. The meter will be acoustically calibrated using the B&K Pistonphone before and after each measurement period to assure continued accuracy. All measurements will be made using an open-celled polyurethane foam wind screen to attenuate the effect of wind generated noise. Headphones will be used to determine any distortion, improper amplication characteristics, and intermittent electrical connections.

Sound level measurements will be made with the precision sound level meter operated in the A-weighted slow response mode. The field measurements will conform to the recommendations of ANSI S3W50 except for Paragraph 2.2, "Instrument Reading Procedures". This paragraph states that one should observe the A-level reading for five seconds and record the best estimate of the central tendency and the range of the meter deflections, with observations repeated until the number of readings equals or exceeds the spread (in decibels) of all the readings. This method was modified, based on experience at other sites, because large fluctuations of the readings due to local sources such as rustling leaves and creatures of nature will not permit a central tendency to be determined with a five second period. The method to be used involves the observation of the meter once every five seconds regardless of the location of the needle within its swing. These measurements are repeated until a statistically reliable sample is obtained. The number of readings required to achieve this condition is determined by the variability of the ambient sound level, which in most cases consists of at least 100 readings that are recorded at each sampling point during each measurement period. The measurement approach of taking a sample every five seconds results in a statistically independent sample because the interval is considerably greater than the meter averaging time.

Octave band analyses will be obtained to assess the nature of any complex noise source or to identify the presence of any pure tone associated with the operation of Davis-Besse Unit No. 1.

Meteorological conditions during the survey will be documented by obtaining hourly readings of the wind speed, wind direction, temperature, temperature lapse rate (ΔT), and dew point from the onsite meteorological tower. Supplemental data such as barometric pressure will be obtained from nearby airports. 1

The operating conditions of Davis-Besse Unit No. 1 during the survey will be documented by obtaining hourly readings of the steam flow rate, power output (MWe), circulating water flow through the natural draft cooling tower, and supporting operating data.

The data obtained during the noise survey will be analyzed with the NUS computer code DBFRE to obtain the A-weighted L_{10}, L_{50}, L_{90}, L_{eq}, and L_{dn} sound levels along with the cumulative percent distribution and the standard deviation of the data at each sampling point during each measurement period. The L_{50} sound levels (sound levels exceeded 50% of the time) at each sampling point will then be used to construct A-weighted sound level contours on a site map.

Operational Noise Impact Assessment

The results of the noise survey during unit operation will be compared to the pre-operational background noise levels documented in Section 2.9 of the Davis-Besse Unit No. 1 Supplement to the Environmental Report - Operating License Stage and several noise level criteria to assess the final operational noise impact of Davis-Besse Unit No. 1. These results will also provide a check on the predicted noise impact of the operation phase presented in Section 5.7 of the Davis-Besse Unit No. 1 Supplement to the Environmental Report - Operating License Stage.

Consideration will be given to several noise level criteria in evaluating the final noise impact of the operation phase. The HUD Noise Criteria[3] states that sound levels up to 45 dBA are "acceptable" for continuous 24-hour exposure; levels up to 65 dBA are "normally acceptable" provided that 65 dBA is not exceeded more than 8 hours per day; levels exceeding 65 dBA more than 8 hours per day are "normally unacceptable"; and levels which exceed 75 dBA more than 8 hours per day or 80 dBA more than 60 minutes per day are "unacceptable".

The EPA proposed noise level guidelines[4] state that in residential environments, the time weighted day/night outdoor average level, below which no effects on public health and welfare occur due to activity or speech interference, is 55 dBA. Such levels would also protect the majority of the exposed population under most conditions against annoyance. 1

Stevens, Rosenblith, and Bolt[5] suggest another method that compares the background noise levels with the intruding noise. Since its introduction, this method has been shown to be valid by the results of additional studies, and it is an approach commonly used by acousticians. It indicates that up to a 5 dBA increase in the ambient will usually not generate any complaints due to annoyance. Up to a 10 dBA increase may cause a slight amount of annoyance.

REFERENCES

1. American National Standards Institute, "Draft Method for Measurement of Community Noise," ANSI S3W50 (November 11, 1969).

2. International Organization for Standardization, "Specifications for Precision Sound Level Meters," IER-179 (1971).

3. U.S. Department of Housing and Urban Development, "Noise Abatement and Control, Department Policy, Implementation Responsibilities, and Standards," Circular 1390.2 (July 16, 1971). 1

4. Environmental Protection Agency, "Information on the Development of Environmental Noise Requirements to Protect Public Health and Welfare With an Adequate Margin of Safety," EPA 550/9-74-004 (March 1974).

5. Stevens, K.N., W.A. Rosenblith, and R.H. Bolt, "A Community's Reaction to Noise, Can It Be Forecasted?", Noise Control, Vol. 1, No. 1, pp. 63-71 (January 1955).

5.0 ADMINISTRATIVE CONTROLS

5.1 Review and Audit

Review and audit of environmental matters and compliance with these Environmental Technical Specifications in particular shall be provided by the Station Review Board, the Company Nuclear Review Board, and the Quality Assurance Manager. | 1

5.1.1 Station Review Board

A Station Review Board, composed of technically qualified station personnel has been established to perform timely and continuing reviews of unit Operation. The makeup of the Board, specification of quorum, and meeting frequency are set forth in the Unit's Final Safety Analysis Report, Chapter 16, "Technical Specifications." The Board's review responsibility will include all new or revised unit environmental procedures, proposed changes or modifications to unit structures or equipment, reported violations of the unit's Environmental Technical Specifications, proposed changes to the unit's Environmental Technical Specifications, and any occurance of a safety limit being exceeded.

5.1.2 Company Nuclear Review Board

A Company Nuclear Review Board, composed of technically qualified personnel, has been appointed by the Vice President, Facilities Development, to perform independent reviews of unit operation. The makeup of the Board, specification of quorum and meeting frequency are set forth in the unit's Final Safety Analysis Report, Chapter 16, "Technical Specifications." The Boards independent review responsibility will include all new or revised unit environmental procedures, proposed changes or modifications to unit structures or equipment, reported violations of the unit's Environmental Technical Specifications, proposed changes to the unit's Environmental Technical Specifications, station operation, and minutes of the Station Review Board meeting. | 1 | 1

5.1.3 Quality Assurance Manager

The Quality Assurance Manager shall be responsible for verification of compliance with the Environmental Technical Specifications. Periodic reviews and audits will be conducted in accordance with the provisions of the quality assurance program for unit operation described in the unit's Final Safety Analysis Report. The Quality Assurance Manager shall also be responsible for reviewing all nonconformance reports concerning Environmental Technical Specifications including corrective actions taken to prevent any recurrence of the same nonconformance. | 1 | 1

5.0 ADMINISTRATIVE CONTROLS

5.2 Action to be taken in the event of violation of an Environmental Technical Specification.

5.2.1 Follow any remedial action permitted by the unit's Environmental Technical Specification until the specification can be met. | 1

5.2.2 Any Environmental Technical Specification violation will be promptly reported to the Station Superintendent and reviewed. | 1

5.2.3 A report for each occurance shall be prepared as specified in Section 5.4.2.

5.0 ADMINISTRATIVE CONTROLS

5.3 Operating Procedures

5.3.1 Written procedures, including applicable check lists and instructions, shall be prepared and adhered to for all activities, performed by Toledo Edison, involved in carrying out the Environmental Technical Specifications. Procedures will include sampling, instrument calibration, analysis, and actions to be taken when limits are approached or exceeded. Testing frequency of any alarms will be included. These frequencies will be determined from experience with similar instruments in similar environments and from manufacturers' technical manuals. | 1

Procedures shall be prepared for assuring the quality of the programs that are contracted to outside consultants. These procedures shall provide for audits to review procedures and to review and evaluate the program reports and results. | 1

5.3.2 Unit operating procedures which involve actions or operations which could have an impact on the environment shall be identified. These procedures shall include provisions as necessary to ensure that the unit and all its systems and components are operated in compliance with the unit's Environmental Technical Specifications.

5.3.3 All procedures described in Section 5.3.2, and all changes thereto will be reviewed by the unit's Station Review Board. | 1

5.0 ADMINISTRATIVE CONTROLS

5.4 Unit Report Requirements

5.4.1 Routine Reports

A. Annual Environmental Operating Report

A report on the environmental surveillance programs for the previous twelve months operations will be submitted as part of the Annual Operating Report within 90 days after January 1 of each year. The period of the first report will begin with the date of initial criticality. The report will be a summary of the results of the environmental activities for the twelve month period and an assessment of the observed impacts of unit operation on the environment. 1 1

Results from all radiological environmental surveillance samples taken shall be summarized on an annual basis following the format of Table 5.4-1 for inclusion in the Annual Report. Results from all non-radiological environmental surveillance samples will be summarized on an annual basis and reported in an appropriate format. In the event that some results are not available within the 90 day period, the report shall 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. 1 1

Results which have been the subject of non-routine reports in accordance with Section 5.4.2 will be noted and appropriately discussed. Results will be statistically treated as appropriate in order to disclose possible long-term changes in environmental parameters.

B. Radioactive Effluent Release Report

A report on the radioactive discharge released from the unit during the previous six months of operation shall be submitted to the Regional Director, Office of Inspection and Enforcement, Region III (with a copy to the Director of Reactor Licensing) within 60 days after January 1 and July 1 of each year. The report shall include a summary of the quantities of radio active liquid and gaseous effluents and solid waste released from the unit as outlined in NRC Regulatory Guide 1.21, Revision 1, issued June 1974, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," with data summarized on a quarterly basis following the format of the Regulatory Guide. 1

The report shall include a summary of the meteorological conditions concurrent with the release of gaseous effluents during each quarter as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of the Regulatory Guide. Calculated offsite dose to humans resulting from the release of effluents and their subsequent dispersion in the atmosphere shall be reported as recommended in Regulatory Guide 1.21.

5.4.2 Non-Routine Reports

A. Radiological Environmental Monitoring

1. If samples of "critical pathway environmental media samples"* collected over a calendar quarter show total levels of radioactivity that could result in accumulated unit related doses to an individual for that quarter in access of 1/2 the annual design objective, the results shall be reported and a plan submitted to the Regional Director, Office of Inspection and Enforcement, Region III (with a copy to the Director of Reactor Licensing) and implemented within 30 days to limit conditions so that the annual dose to any individual will not exceed the design objective.

2. Anomalous Measurement Report - If a confirmed measured level of radioactivity in any environmental medium exceeds ten times the control station value, a written report shall be submitted to the Regional Director, Office of Inspection and Enforcement, Region III (with a copy to the Director of Reactor Licensing) within ten days after confirmation. 1

3. Milk Pathway Measurements

   (a) If cow or goat milk samples collected over a calendar quarter show average concentrations of 9.6 picocuries per liter or greater a plan shall be submitted within 30 days advising the U.S. Nuclear Regulatory Commission, Office of Inspection and Enforcement of the proposed action to ensure the plant related annual doses will be within the design objective of 15 mrem/yr to the thyroid of any individual.

   (b) When pasture grass is sampled rather than goat milk, if individual pasture grass samples show I-131 concentrations of 0.072 picocuries per gram wet weight or greater, a plan shall be submitted within one week advising the U.S. Nuclear Regulatory Commission, Office of Inspection and Enforcement of the proposed action to ensure that plant related annual doses will be within the design objective of 15 mrem/yr to the thyroid of any individual.

B. Non-radiological Discharges and Environmental Monitoring

1. In the event that a limiting condition for operation is exceeded involving a significant environmental impact occurs, a report will be made within 24 hours by telephone and telegraph to the Regional Director, Office of Inspection and Enforcement, Region III followed by a written report within 10 days. The telephone and telegraph report will quantify the occurence, its causes and, if aspects of the Davis-Besse Unit 1 operation are among the causes, planned remedial action to the extent possible. 1 1

*critical pathway as defined by Paragraph 14 of ICRP Report No. 14.

2. In the event that a limiting condition for operation is exceeded, a report will be made within 30 days to the Regional Director, Office of Inspection and Enforcement, Region III. The report will describe: (1) efforts to confirm or deny the validity of the observation, (2) efforts to determine the causes and whether aspects of the Davis-Besse Unit 1 operation are among the causes and (3) planned action to prevent reoccurrences. | 1

5.4.3 Changes

1. When a change in a unit design feature or operating practice as is planned which, in the judgement of the Applicant, would have a significant adverse effect on the environment or which involves an environmental matter or question not previously reviewed and evaluated by the NRC, a report on the change will be made by the Vice President, Energy Supply, to the Director, Division of Reactor Licensing, Directorate of Licensing, U.S. NRC (cc: to Regional Director, Office of Inspection and Enforcement, Region III) prior to implementation. The report will include a description and evaluation of the change. | 1

2. Changes or additions to permits and certificates required by Federal, State, local or regional authorities for the protection of the environment will be reported. When the required change is submitted to the concerned agency by the Vice President, Energy Supply, it will also be submitted to the Director, Division of Reactor Licensing, Directorate of Licensing, U.S. NRC (cc: to Regional Director, Office of Inspection and Enforcement, Region III) for information. The submittal will include an evaluation of the environmental impact of the change. | 1

3. Request for changes in Environmental Technical Specifications will be submitted by the Vice President, Energy Supply, to the Director, Division of Reactor Licensing, Directorate of Licensing, U.S. NRC (cc: to Regional Director, Office of Inspection and Enforcement, Region III) for prior review and authorization. The request will include a description and an evaluation of the proposed change. | 1

TABLE 5.4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

DOCKET NO. _____ 12 MONTH REPORTING PERIOD _____

Type of Sample	Analysis	All Indicator Locations Mean	All Indicator Locations Range	All Control Locations Mean	All Control Locations Range	Pre-Operational Data Mean	Pre-Operational Data Range	Anomalous Report and Remarks
Airborne Particulates	β							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							
Airborne Iodine	I-131							
External Radiation	Monthly γ							
	Quarterly γ							
	Yearly γ							
Untreated Surface Water	β							
	H-3							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							

TABLE 5.4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

DOCKET NO. _____ 12 MONTH REPORTING PERIOD _____

Type of Sample	Analysis	All Indicator Locations Mean	All Indicator Locations Range	All Control Locations Mean	All Control Locations Range	Pre-Operational Data Mean	Pre-Operational Data Range	Anomalous Report and Remarks
Treated Surface Water	β							
	H-3							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							
Groundwater	β							
	H-3							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							
Bottom Sediments	β							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							

1

TABLE 5.4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

DOCKET NO. _____ 12 MONTH REPORTING PERIOD _____

Type of Sample	Analysis	All Indicator Locations Mean	All Indicator Locations Range	All Control Locations Mean	All Control Locations Range	Pre-Operational Data Mean	Pre-Operational Data Range	Anomalous Report and Remarks
Fish	β							
	γ, _____							
	_____							
	_____							
	_____							
Soil	γ, _____							
	_____							
	_____							
	_____							
	_____							
Fruit or Vegetables	β							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
	_____							

TABLE 5.4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

DAVIS-BESSE NUCLEAR POWER STATION UNIT NO. 1

DOCKET NO. _____ 12 MONTH REPORTING PERIOD _____

Type of Sample	Analysis	All Indicator Locations Mean	All Indicator Locations Range	All Control Locations Mean	All Control Locations Range	Pre-Operational Data Mean	Pre-Operational Data Range	Anomalous Report and Remarks
Milk	I-131							
	Sr-89							
	Sr-90							
	γ, _____							
	_____							
	_____							
Edible Meat	γ, _____							
	_____							
	_____							
	_____							
Animal-Wildlife Feed	γ, _____							
	_____							
	_____							
	_____							

5.0 ADMINISTRATIVE CONTROLS

5.5 Records Retention

5.5.1. Records and logs relative to instrument calibration and chemical analysis shall be retained for five years except as described in Section 5.5.2. | 1

5.5.2 All records and logs relative to the following areas shall be retained for the life of the unit: | 1

5.5.2.1 Records and drawing changes reflecting unit design modifications made to systems and equipment described in the unit's Environmental Report. | 1

5.5.2.2 Records of environmental monitoring surveys. | 1

5.5.2.3 Records of radioactivity in liquid and gaseous effluents released to the environment. | 1

5.5.2.4 Minutes of Station Review Board and Company Nuclear Review Board meetings. | 1

5.5.2.5 Copies of all superseded operating procedures which affect the environment. | 1