

THREE MILE ISLAND NUCLEAR STATION  
UNIT 2  
ENVIRONMENTAL TECHNICAL SPECIFICATIONS  
(NON-RADIOLOGICAL)

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NOTE

There are no pages numbered 30 or 31.

There is a page number 46 and a page number 46.a.

There are pages numbered 86, 86.a, 86.b, and 86.c.

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## 1.0 Definitions

Accuracy: normally refers to the difference (error or bias) between the mean,  $\bar{X}$ , of the set of results and the value  $\hat{X}$ , which is accepted as the true or correct value for the quantity measured. It is also used as the difference between an individual value  $X_i$  and  $\hat{X}$ . The absolute accuracy of the mean is given by  $\bar{X} - \hat{X}$  and of an individual value by  $X_i - \hat{X}$ . The relative accuracy of the mean is given by  $(\bar{X} - \hat{X})/\hat{X}$ , and the percentage accuracy by  $100 (\bar{X} - \hat{X})/\hat{X}$ .

Aerial Remote Sensing: The measurement or acquisition from aircraft or spacecraft of information on some property of an object or phenomenon by a recording device that is not in physical or intimate contact with the object or phenomenon under study. The technique employs such devices as the camera, radio frequency receivers, and radar systems.

Annually: Annually is once per calendar year at intervals of twelve calendar months, plus or minus seven days.

Batch Release: A batch release is the discharge of fluid wastes of a discrete volume.

Calibration: An instrument or device calibration shall be the adjustment, as necessary, of the output such that it responds with the necessary range and accuracy to known values of the parameter(s) which the instrument sensor or device monitors. The calibration shall encompass the entire circuit including the sensor, indicatory control feature, alarm and/or trip function(s), and shall include the functional test. The calibration may be performed by any series of sequential, overlapping or total circuit steps such that the entire circuit is calibrated as specified. The methodology

and measurement of instrument accuracy and precision of calibration shall be recorded in the plant records.

Closed Cycle Cooling: The circulating water, after passing through cooling towers and recirculated back to the condenser intake with the exception of the blowdown which is discharged to the receiving water body.

Combined Available Chlorine: chlorine existing in water in chemical combination with ammonia or organic nitrogen compounds.

Composite Sample: A combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to the flow rates over the time period used to produce the composite.

Continuous Release: A continuous release is the discharge of fluid waste of a non-discrete volume, e.g., from a volume or system that has an input flow during the continuous release.

Daily Average Concentration: Daily average concentration means the arithmetic average of all daily determinations of concentration made during a calendar month. Daily determinations of concentration using a composite sample shall be the concentration of the composite sample. When grab samples are used, the daily determination of concentration shall be the arithmetic average of all the samples collected during that calendar day.

Daily Maximum Concentration: Daily maximum concentration means the maximum concentration recorded for any calendar day.

Free Available Chlorine: Chlorine existing in water as hypochlorous acid and hypochlorite ions.

Functional Check: A functional check shall be the injection of a simulated signal into a circuit at the primary sensor to verify circuit behavior during observation. Instrument checks shall permit observation of an established value other than a value observed when the instrument is de-energized. Sensor checks shall permit observation of an established value while disconnected from its normal circuit function and subjecting the sensor to the parameter(s) normally monitored. Functional checks shall include alarm and/or trip functions but may be blocked from performing the ultimate specified function.

Functional Test: A functional test shall be verification of operability by performing all specified functions using the parameter(s) which the instrument sensor or device monitors.

Grab Sample: A grab sample is an individual sample collected in less than fifteen minutes.

Ground Truth or Ground Data Surveys: Supporting data collected on the ground and information derived therefrom, as an aid to the interpretation of remotely-recorded survey, such as aerial imagery, etc. Generally, this should be performed concurrently with the airborne surveys.

Herbicides: Chemicals that kill plants or inhibit their normal growth.

Infrared, photographic: Pertaining to or designating the portion of the electromagnetic spectrum with wavelengths just beyond the red end of the visible spectrum; generally defined as from 0.7 to about 1.0  $\mu\text{m}$ , or the useful limits of film sensitivities.

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Lake Frederic: Formerly York Haven Reservoir.

Manner of Herbicide Application: Herbicides may be applied to target plants by any of the following methods:

- a. Basal injection in which selected individual trees receive herbicide injections beneath the bark;
- b. Basal application in which individual plants are treated with pellets or sprays applied to soil at the base of the plant;
- c. Selective foliar spray (spot treatments or directed spray) in which individual plants are sprayed with ground-based equipment;
- d. Broadcast application in which herbicide is distributed either as pellets or spray uniformly over the entire predetermined area of land;
- e. Aerial application in which entire segments of the corridor are treated primarily by broadcast applications employing various types of aircraft.

Monthly: Monthly is once during every calendar month at intervals of 30 days plus or minus three days.

Multispectral or Multiband Photographs: A color picture produced by assigning a color to a particular spectral band.

Normal Operation: Operation of the station at greater than 2% of rated thermal power in other than a safety emergency situation.

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NPDES Permit: NPDES Permit is the National Pollutant Discharge Elimination System Permit No. PA0009920 issued by the Environmental Protection Agency to Metropolitan Edison Company. This permit authorizes Metropolitan Edison Company to discharge from TMINS, controlled waste water into the waters of the Commonwealth of Pennsylvania.

Precision: relates to the reproducibility of measurements within a set, that is, to the scatter or dispersion of a set about its central value.

Quarterly: Quarterly is once during each successive three month period of the calendar year, counting from January 1, at intervals of 13 weeks ± 3 days.

Restricted Areas: Ecological areas designated by the staff to received special mitigative actions such as selected vegetative communities bordering rivers or streams which are not to receive herbicidal applications, etc.

Scale: The ratio of a distance on a photograph or map to its corresponding distance on the ground.

Semi-Monthly: Semi-monthly is twice during each calendar month at intervals of 15 days plus or minus 3 days.

Spectral Band: A width, generally expressed in wavelength or frequency of a particular portion of the electromagnetic spectrum. A given sensor (e.g., radiometer detector or camera film) is designed to measure or be sensitive to energy received from that part of the spectrum.

Station and Unit: Station refers to TMI Units 1 and 2. Unit refers only to TMI-1 or TMI-2, as defined by its usage. Reference to specific instrumentation will be indicated by placing each unit's instrument number in parentheses, Unit 1 proceeding Unit 2. Only the individual unit's instrument is applicable to specifications appl' to that unit.

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Total Residual Chlorine: (residual chlorine) chlorine existing in water as either hypochlorous acid, hypochlorite ions or in chemical combination with ammonia or organic nitrogen compounds.

Unusual or Important Events: As specified in Section 5.6.2.a, unusual or important events that cause a significant environmental impact, that affect potential environmental impact from plant(s) operation, or that have public or potential public interest concerning environmental impact from plant(s) operation may include the following: unusual or important bird impact events on cooling tower structures or meteorological towers; on-site plant or animal disease outbreaks; on-site forest or grass land fires; unusual mortality of any species protected by the Endangered Species Act of 1973; and fish kills near or downstream of the site.

Weekly: Weekly is once during each calendar week at intervals of 7 days plus or minus 2 days.

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2.0 Limiting Conditions for Operation

2.1 Thermal

2.1.1 Maximum  $\Delta T$  Across the Condenser

Limiting Condition for Operation

The maximum temperature rise across the condenser from the intake to the point of discharge shall not exceed  $3.0^{\circ}\text{C}$  (about  $5^{\circ}\text{F}$ ) for a period of more than 72 hours during normal operation.

The total length of time during any one month that the station operates with a temperature rise across the condensers greater than  $3.0^{\circ}\text{C}$  (about  $5^{\circ}\text{F}$ ) shall not exceed ten percent of the total time that the station is in normal operation.

Applicability

This limiting condition for operation shall apply during normal operation of the Three Mile Island Nuclear Station, Unit 2.

Action

If the rise in temperature across the condensers shall exceed any of the limiting conditions for operation specified above, the licensee shall:

- a. implement corrective action,
- b. make an investigation to identify the causes for such excessive temperature rise, and evaluate its environmental impact.

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- c. report these actions to the NRC within 30 days from the initiation of each event during which the excessive temperatures occurred, in accordance with Section 5.6.2.a.(2), The Environmental impact assessment results shall be incorporated into the annual report.

#### Surveillance Requirement

During normal operation, intake and discharge temperatures of the condenser cooling water and the number of pumps operating shall be logged hourly. Intake temperature sensors shall be located in the condenser intake waterbox and the outlet temperature sensors shall be located in the discharge piping. The temperature sensing and recording system shall be accurate to 1/2 degree C (1°F) and calibrated at least weekly. In the event of sensing or recording equipment failure or maintenance interruption, temperature readings shall be taken manually at four hour intervals during the first seven days of malfunction and hourly thereafter. Data shall be summarized in the annual operating report as per Section 5.6.1.a.

#### Bases

The FES-OL for the Three Mile Island Nuclear Station, Unit 2, provides an analysis of the potential thermal effects of the condenser cooling system discharge on the water quality and aquatic biota of the adjacent portions of the Susquehanna River. Based on the volumes of cooling water discharged and the minimum river flow condition, the analysis of thermal effects indicates that the mixed mean receiving water temperature would be increased less than 0.14°C (0.28°F). Further the thermal plume would be limited to a relatively small area.

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The analyses performed in the FES-OL (1972 and 1976) concluded that limiting the temperature rise across the condensers during station operation as specified above will not induce califaction of an excessive portion of the Susquehanna River nor will it result in excessive, irreversible, or irretrievable damage to the biota or water quality of the receiving waters. Anticipated occasional, brief duration, temporary temperature excursions of up to 10.5°C (19°F) are not expected to exert significant biological effects on Susquehanna River populations.

Section 5.3.3 of the Draft Supplement to the FES for Three Mile Island Nuclear Station, Unit 2, endorses the NPDES issued by the State of Pennsylvania under FWPCA Sections 302 and 402 which stipulates a maximum  $\Delta T$  of 2.8°C (5°F). This endorsement indicates NRC agreement that plant operation within the limits indicated above will assure no excessive, irretrievable, or irreversible damage to the aquatic environment or to its biotic inhabitants.

The above surveillance program will provide the information needed to assure compliance with the LCC and will, in addition, provide input to the surveillance program described in Sections 3.1.1 and 3.1.2 which are portions of the continuing study of the effects of thermal discharges from the Three Mile Island Nuclear Station on the water quality and aquatic life in the Susquehanna River. The Special Thermal Plume Mapping study required under Section 4.2 of this ETS will also use this information as a basic data input.

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### 2.1.2 Maximum Discharge Temperature

#### Limiting Condition for Operation

The temperature of the condenser cooling water discharged from the Three Mile Island Nuclear Station Unit 2 shall not exceed 30.5°C (87°F) for a period of more than 8 hours during any 24 hour period, nor shall the average condenser discharge temperature as calculated on a monthly basis, exceed 30.5°C (87°F).

#### Applicability

This limiting condition for operation shall apply during normal operation of the Three Mile Island Nuclear Station Unit 2.

#### Action

If the temperature of the discharged cooling water shall exceed any of the limiting conditions for operation specified above, the licensee shall:

- a. implement corrective action,
- b. make an investigation to identify the causes for such excessive discharge temperature, and evaluate its environmental impact.
- c. report these actions to the NRC within 30 days from the initiation of each event during which the excessive temperatures occurred, in accordance with Section 5.6.2.c.(2). The environmental impact assessment results shall be incorporated into the annual report.

Surveillance Requirement

During normal operation, intake and discharge temperatures of the condenser cooling water and the number of pumps operating shall be logged hourly. Intake temperature sensors shall be located in the condenser intake waterbox and the outlet temperature sensors shall be located in the discharge piping. The temperature sensing and recording system shall be accurate to 1/2 degree C (1°F) and calibrated at least weekly. In the event of sensing or recording equipment failure or maintenance interruption, temperature readings shall be taken manually at four hour intervals during the first seven days of malfunction and hourly thereafter. Data shall be summarized in the annual operating report as per Section 5.6.1.a.

Bases

The FES-OL for the Three Mile Island Nuclear Station, Unit 2, provides an analysis of the potential thermal effects of the condenser cooling system discharge on the water quality and aquatic biota of Lake Norman.

The analyses performed in the FES-OL (1972 and 1976) concluded that a discharge temperature less than 30.5°C (87°F) during station operation as specified above will not induce califaction of an excessive portion of the Susquehanna nor will it result in excessive, irreversible, or

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irretrievable damage to the biota or water quality of the Susquehanna River. Occasional, brief duration, temporary temperature excursions would not be expected to exert significant biological effects on Susquehanna River populations.

Modeling studies have indicated that the discharge temperature limitation of 30.5°C (87°F) will result in a Susquehanna River temperature regime that is compatible with the Commonwealth of Pennsylvania water quality requirements and an NPDES permit that has been issued to the licensee providing for this effluent limitation.

In Section 5.3.3 of the Draft Supplement to the FES the staff accepted the determinations of the Commonwealth of Pennsylvania and EPA that plant operation within the limits indicated will not result in unacceptable impact on the aquatic environment or its biotic inhabitants.

The above surveillance program will provide the information needed to assure compliance with the LCO and will, in addition, provide input to the surveillance program described in Sections 3.1.1 and 3.1.2 which are portions of the continuing study of the effects of thermal discharges from the Three Mile Island Station on the water quality and aquatic life in the Susquehanna River. The Special Thermal Plume Mapping study required under Section 4.2 of this ETS will also use this information as a basic data input.

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### 2.1.3 Rate of Change of Discharge Temperature

#### Limiting Condition for Operation

The temperature of the condenser cooling water discharge shall not be changed at a rate greater than 1°C (2°F) per hour during normal operation of the Three Mile Island Nuclear Station.

#### Applicability

This limiting condition for operation shall apply during normal operation of the Three Mile Island Nuclear Station, Unit 2.

#### Action

If the rate of change of discharge temperature shall exceed the limiting conditions for operation specified above, the licensee shall:

- a. implement corrective action,
- b. make an investigation to identify the causes of such excessive rate of temperature change, and evaluate its environmental impact.
- c. report these actions to the NRC within 30 days from the initiation of each event during which the excessive rate of temperature change occurred, in accordance with Section 5.6.2.a.(2). The environmental impact assessment results shall be incorporated into the annual report.

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Surveillance Requirement

During normal operation, intake and discharge temperatures of the condenser cooling water and the number of pumps operating shall be logged hourly.

Intake temperature sensors shall be located in the condenser intake waterbox and the outlet temperature sensors shall be located in the discharge piping. The temperature sensing and recording system shall be accurate to 1/2 degree C (1°F) and calibrated at least weekly. In the event of sensing or recording equipment failure or maintenance interruption, temperature readings shall be taken manually at four hour intervals during the first seven days of malfunction and hourly thereafter. Data shall be summarized in the annual operating report as per Section 5.6.1.a.

Bases

A rate of temperature change equal to or less than 1°C (2°F) per hour is not expected to have excessive detrimental impacts on the biota of the Susquehanna River.

This rate of change limitation is stipulated by the State of Pennsylvania in its NPDES to TMINS and accepted by the staff in the 1976 draft supplement to the FES-OL.

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#### 2.1.4 Operation of Cooling Towers

##### Limiting Condition for Operation

The condenser cooling system shall not operate in other than closed cycle cooling mode for a period of more than 72 hours during normal operations.

The total length of time during any one month that the station shall operate in other than closed cycle cooling mode shall not exceed ten percent of the total time that the station is in normal operation.

##### Applicability

This limiting condition for operation shall apply during normal operation of the Three Mile Island Nuclear Station, Unit 2.

##### Action

If the condenser cooling system mode of operation shall exceed any of the limiting conditions for operation specified above, the licensee shall:

- a. implement corrective action,
- b. make an investigation to identify the causes for such excessive operation in other than closed cycle cooling mode, and evaluate the resulting environmental impact.
- c. report these actions to the NRC within 30 days from the initiation of each event during which the excessive durations

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of operation in other than closed cycle cooling mode occurred, in accordance with Section 5.6.2. The environmental impact assessment results shall be incorporated into the annual report.

#### Surveillance Requirement

During normal operation, the condenser cooling system mode and the number of pumps operating shall be logged hourly, and related to reactor power level. Data shall be summarized in the annual operating report as per Section 5.6.1.a.

#### Bases

The FES-OL for the Three Mile Island Nuclear Station, Unit 2, provides an analysis of the potential thermal effects of the condenser cooling system discharge while operating in closed cycle mode on the water quality and biota of the Susquehanna River. These analyses indicate that the magnitude of added heat resulting from this method of condenser cooling will not cause a significant rise in mixed mean temperature of the Susquehanna River receiving waters, nor will it create a thermal plume sufficiently large to exert significant detrimental effects on the natural, indigenous aquatic populations of the area.

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2.2      Chemical

2.2.1    pH

Limiting Conditions for Operation

The pH of the discharges from the holding tanks for the demineralizer and condensate polisher regeneration solutions shall be maintained in the range of 6.0 to 9.0, inclusive.

Applicability

This Limiting Condition for Operation shall be applicable under all conditions of station operation.

Action

Discharges from the holding tanks shall not be initiated if the sampled regeneration solutions in the tanks have a pH outside of the allowed range.

The results of the Surveillance for the LCO shall be reported in accordance with Section 5.6.1. The licensee shall report the date of each sample, the pH of the holding tanks, and the method of analysis used. Results of the surveillance which indicate a violation of the LCO shall also be reported in accordance with Section 5.6.2.b.

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Surveillance Requirement

The contents of the regeneration solution holding tanks shall be grab sampled and the pH measured in accordance with the Procedures prepared by the licensee in accordance with Section 5.5. Sampling and measurement shall be conducted prior to each release of the contents of the tanks.

Bases

The Limiting Condition for Operation will control the PH of the discharged demineralizer and condensate polisher regeneration solutions within the range necessary for the protection of aquatic biota. The commonwealth of Pennsylvania and the U. S. EPA Region III evaluated the collection, treatment and discharge systems for the demineralizer and condensate polishing regeneration solutions with respect to the Susquehanna River water quality standards and the FWPCA Steam Electric Generating Point Source Category Effluent Guidelines and Standards, respectively. The Commonwealth and EPA have determined, through issuance of the licensee of a water quality certification and NPDES permit PA-0009920 (pursuant to FWPCA Sections 401 and 402, respectively), that these requirements will be met under proposed operation. In the FES, Section 5.3.3, the staff accepted the determinations of the Commonwealth of Pennsylvania and EPA that the maintenance of regeneration tank discharge pH within the ranges of 6.0 to 9.0 will not result in unacceptable impact on the receiving water.

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Each regeneration of the two stage feed water demineralizers and the condensate polishing demineralizers will produce acidic and caustic solutions of differing characteristics, which will be neutralized on a batch-by-batch basis. Therefore, monitoring the pH of each batch after neutralization but prior to release is necessary to assure compliance with the specified limits.

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### 7.2.2 Biocide

#### Limiting Condition for Operation

When chlorination is being practiced at the station, the concentration of free available chlorine in the plant discharge shall not exceed a monthly average value of 0.2 mg/l nor an instantaneous maximum value of 0.5 mg/l.

#### Applicability

This Limiting Condition for Operation shall be applicable under all conditions of station operation.

#### Action

If sampling indicates that these limits are being exceeded, the addition of chlorine shall be terminated immediately. The biocide application program shall be reviewed by plant personnel and modified as necessary to comply with the above limits prior to the resumption of chlorination of the system involved.

The results of the surveillance conducted for this LCO shall be reported in accordance with Section 5.6.1. For each sample, the licensee shall report the date of the sample, the free available chlorine concentration measured and the analysis procedure used. The monthly average free available chlorine concentration shall also be reported for each month. Results of the surveillance which indicate a violation of the LCO shall also be reported in accordance with Section 5.6.2.b.

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### Surveillance Requirement

The plant discharge line shall be grab sampled and analyzed for free available chlorine utilizing the amperometric titration technique in accordance with the Procedures prepared by the licensee in accordance with Section 5.5. Sampling shall be performed weekly during chlorination at a time when the maximum free available chlorine residual is expected at the plant discharge.

All weekly values determined during a calendar month shall be arithmetically averaged to determine compliance with the specified monthly average limit.

### Bases

This Limiting Condition of Operation will limit the concentration of free available chlorine in the plant discharge to a level consistent with that of the NPDES Permit.

The U. S. Environmental Protection Agency Region III has issued the licensee NPDES Permit No. PA-0009920 as a result of an evaluation of the operation of the plant against the promulgated EPA Steam Electric Generating Point Source Category Effluent Guidelines and Standards dated October 8, 1974.

This evaluation resulted in the adoption of the aforementioned Guideline level for a residual chlorine limit in the plant discharge to the Susquehanna River.

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Based on the provisions of the Second Memorandum of Understanding, the NRC will not impose more stringent limitations on a licensee as a provision of any license than those limitations established pursuant to authority under

the Federal Water Pollution Control Act Amendments of 1972. Therefore, the staff has incorporated the NPDES concentration limits and monitoring frequency as part of these ETS.

The discharge of free available chlorine at the levels permitted by the Limiting Condition of Operation have been assessed by the staff (FES Supplement, Section 5.3.3). It was found that in the vicinity of the discharge, toxic conditions may occur, but that significant adverse impact on the local fishery resource is not expected.

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- 3.0            Environmental Monitoring
- 3.1            Nonradiological Monitoring
- 3.1.1        Abiotic
- 3.1.1.a      Aquatic
- 3.1.1.a.(1) Plant Chemical Releases

Environmental Monitoring Requirement

When chlorination is being practiced at the station, the station discharge shall be grab sampled at the outfall on a weekly basis corresponding to the sampling conducted under ETS 2.3.2 and analyzed for total residual chlorine utilizing the amperometric titration technique in accordance with the Procedures prepared by the licensee in accordance with Section 5.5.

This Environmental Monitoring Requirement shall be applicable under all conditions of station operation. This surveillance program shall commence with the initial application and discharge of residual chlorine from Unit 2 cooling systems and continue until approval for termination or modification is obtained from NRC as per Section 5.6.3.

Action

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1. For each measurement, the date of analysis, total residual chlorine concentration, and method of analysis used shall be recorded.

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A non-routine report as specified in Section 5.6.2.b. shall be made for any measurement of total residual chlorine in excess of 0.2 mg/l.

Bases

POOR ORIGINAL

Chlorination of plant cooling water systems is permitted with controls only on the free available chlorine residual fraction of the discharge. Toxicity to aquatic biota occurs from both the free and combined available residual chlorine fractions. Therefore, a measure of the potential toxicity of the plant discharge is the measure of total residual chlorine. This surveillance program will provide information on the magnitude of the total residual chlorine concentration in the plant discharge during plant chlorination to determine if concentrations harmful to other water users are present. An effluent limit for protection of warm water fish species to intermittent chlorine exposure of 0.2 mg/l total residual chlorine has been suggested by Brungs (1973), EPA (Tebo, 1975) and Basch and Truchan (1974).

In the environmental statement, Section 5.3.3, it was recognized that chlorination of plant systems at the level permitted by the NPDES Permit could lead to discharge of total residual chlorine values up to 3 times the measured values for free available chlorine. Past experience was also cited, stating that total residual chlorine values did not often exceed 0.2 mg/l.

Monitoring total residual chlorine in the plant effluent at the same time as free available chlorine measurements for ETS 2.3.2 will provide necessary information on the relationship among the residual chlorine fractions. This will allow a comparison with the previous operating history at the site and a confirmation of the predictions of FES Section 5.5.3.

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The establishment of the specified report level will also alert the staff to toxic conditions in the vicinity of the plant outfall and to unanticipated operating conditions at the plant.

SELECTED REFERENCES

1. Brungs, W. A. "Effects of Residual Chlorine on Aquatic Life", WPCF, Vol. 45, No. 10, October 1973.
2. L. B. Tebo, Jr., "Effluent Limits for Chlorine - Power Plants", letter to H. Zeller EPA Region IV May 14, 1975.
3. Basch, R. E. and J. G. Truchan, Calculated Residual Chlorine Concentrations Safe for Fish Michigan Water Resources Commission Bureau of Water Management Water Quality Appraisal Section, September 1974.

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3.1.1.a.(2) Water Quality Analysis

Environmental Monitoring Requirement

Information on the physical and chemical characteristics of the Susquehanna River at the times and sampling locations for the General Ecological Survey of ETS Section 3.1.2.a.(1) shall be collected in the vicinity of the TMI station.

The following physical and chemical characteristics of the Susquehanna River shall be measured:

Temperature  
Turbidity  
pH  
Alkalinity  
Dissolved Oxygen  
Total Dissolved Solids  
Copper (total and dissolved)  
Zinc (total and dissolved)  
Sulfate

All samples shall be collected and all analyses shall be performed in accordance with the Procedures prepared by the licensee in accordance with Section 5.5.

The sampling of these parameters shall be conducted monthly (conditions permitting). The collection of samples shall coincide to the extent practicable with biological sampling (under Section 3.1.2.a) at the same location. This surveillance program shall commence at initial criticality of Unit 2 and shall continue until approval for termination or modification of the program is obtained from NRC as per Section 5.6.3.

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Action

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1. The licensee shall indicate for each parameter the date of sampling, the sampling location, the concentration measured, depth of sample, and method of analysis used.

Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2) determined that impacts to aquatic biota of the Lake Frederick area of the Susquehanna River may result from the operation of Three Mile Island Nuclear Station. Examination of the water quality, at the times and locations used for the aquatic biological investigations during plant operation will yield data required for the evaluation of trends and unusual occurrences that may be identified in the biological observations.

1564 036

3.1.1.a.(3) Chemical Release Inventory

Environmental Monitoring Requirement

The licensee shall document the types, amounts, duration and timing of chemical discharges from the station to the receiving waters. From station inventory and operating records, the licensee shall tabulate the usage of chemicals released through station systems to the aquatic environment, excluding chemicals used in station laboratories. The tabulation shall indicate the chemical name as used or as released, the system from which the chemical is released, the amount of each chemical used or released, and the number, dates, and average duration of each release for each chemical during the reporting period. Chemical release data shall be summarized over the smallest discrete usage interval practical. Yearly averages shall only be presented for those discharges which were steady and continuous.

This surveillance program shall commence at initial criticality of Unit 2 and shall continue until approval for termination or modification of the program is obtained from NRC as per Section 5.6.3.

Action

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1.

Bases

1564 037

Documentation of the chemical releases from the station will enable the NRC to determine that the facility is being operated, with respect to chemical use and discharge, in the manner evaluated in the Environmental

Statement. This program is required by the NRC for evaluation of unusual occurrences revealed by other programs conducted under these ETS.

1564 038

- 3.1.2            Biotic
- 3.1.2.a        Aquatic
- 3.1.2.a.(1)    General Ecological Survey
- 3.1.2.a.(1)(a) Benthic Macroinvertebrates

Environmental Monitoring Requirement

The benthic macroinvertebrates shall be sampled to detect and assess the significance of changes in species composition, standing crop biomass, distribution, and abundance as related to power station operation.

All samples shall be collected and all analyses shall be performed in accordance with the Procedures prepared by the licensee as per Section 5.5.

This surveillance program shall commence at initial criticality of Unit 2 and continue until approval for modification is obtained from NRC in accordance with Section 5.6.3.

Action

Description of the program, results, and interpretative analyses of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1. Results reported shall contain (as per Table 5.6 -10), but not be limited to: sampling date; station number; depth of the sample in meters; gear type used; substrate type (expressed in general terms); sample size (areal size sampled in  $m^2$ ); species or taxon; the estimated or actual number of each taxon in the sample; biomass expressed as grams by weight  $m^2$  for each indicated taxon in the sample; the relative abundance of each taxon.



Bases

The environmental assessment made in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2.3) determined that impacts to the benthos of Lake Frederic area of the Susquehanna River may result from the operation of Three Mile Island Nuclear Station. Impacts may occur as a result of thermal additions. Species diversity, composition, and biomass in the immediate site vicinity are most susceptible to thermal alterations, and to changes in sedimentation, turbidity, and dissolved oxygen levels. Suspended solids may also interfere with respiratory processes and decrease light penetration so that the food sources of the benthos may be reduced. Past studies have shown that increased sedimentation may result in increased numbers of some dominant organisms, especially the annelid worm Limnodrilus hoffmeisteri.

Since benthic organisms are sedentary and cannot "avoid" adverse conditions, they are useful indicators of water quality.

1564 040

3.1.2.a.(1)(b) Ichthyoplankton

Environmental Monitoring Requirement

The ichthyoplankton shall be sampled during the months of March through July to detect and assess the significance of changes in species composition, relative abundance, density, and seasonal and spatial distribution as related to power station operation.

All samples shall be collected and all analyses shall be performed in accordance with the Procedures prepared by the licensee as per Section 5.5.

This surveillance program shall commence at initial criticality of Unit 2 and continue until approval for modification is obtained from NRC in accordance with Section 5.6.3.

Action

Description of the program, results, and interpretative analyses of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1.E.

Results reported shall contain (as per Table 5.6 -11), but not be limited to: sampling date; station number; depth of the sample in meters; species or taxon; life stage (model life stage of the specimens); and No./100 m<sup>3</sup> (the estimated number of organisms per 100 cubic meters of water filtered or pumped).

Bases

1564 041

The environmental assessments made in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.5.2.2) determined that impacts to the ichthyoplankton of Lake Frederic may result from the operation

of Three Mile Island Nuclear Station. Impacts may occur due to the entrainment of fish eggs and larvae as a result of mechanical, thermal and biocidal effects. Operation entrainment studies of Unit 1 have indicated low numbers of larval fishes at the intake. Those which have been taken, however, have been represented by several important forage (shiners and darters) and recreational (catfishes, sunfishes, perch) species. The densities of larvae were higher at the intake than at the discharge and always higher at night than during the day for both far-field and entrainment samples. Fish larvae have been taken during far-field sampling undertaken at night from March to July, the period which encompasses the peak spawning season of the Lake Frederic fishes. The majority of fish larvae have been taken during May and June.

In local areas where there is a prolonged temperature shift due to thermal discharges, even if only a few degrees, there may be a shift in comparative abundance of species, with some species disappearing if they approach the limit of their temperature preferendum.

1564 042

3.1.2.a.(1)(c) Fish

Environmental Monitoring Requirement

The ichthyofauna shall be sampled to detect and assess the significance of changes in species composition, relative abundance, seasonal and spatial distribution, condition, and diversity of species as related to power station operation.

All samples shall be collected and all analyses shall be performed in accordance with the Procedures prepared by the licensee as per Section 5.5.

When large numbers of fish are captured which may be in excess of those required for proper analysis, a subsample shall be taken which is representative of the sample as a whole (by species, size classes, sex, etc.). The excess shall be returned.

This surveillance program shall commence at initial criticality of Unit 2 and continue until approval for modification is obtained from NRC in accordance with Section 5.6.3.

1564 043

### Action

Description of the program, results, and interpretative analyses of environmental impacts shall be reported as per the routine report schedule of Section 5.6.1.B.

Results reported shall contain (as per Table 5.6-12) but not be limited to: sampling date; station number; depth of the sample in meters; sampling gear type used; duration of sampling (minutes); species or taxon; the actual or estimated number of each taxon collected in the sample; maximum and minimum length in mm (the longest and shortest fish by species in the sample); model length(s) in mm by species; model weight(s) in grams by species.

### Bases

The environmental assessments made in the FES-OL of 1972 (Section V.C.2) and the Supplement to the FES-OL of 1976 (Section 5.2.2.1) determined that impacts to the fish populations of Lake Frederic may result from the operation of Three Mile Island Nuclear Station. Impacts may result due to impingement of adult and juvenile fishes and the entrainment of fish eggs and larvae. In order to assess the relative significance of these phenomena on the fish populations, this lake-wide sampling program will be performed. Additionally, several species support an active recreational fishery in Lake Frederic and might be subject to potential impaction - sunfish and catfish (several species each), rock bass, smallmouth bass, walleye, and possibly crappie and carp. Operational impingement studies

1564 044

of Unit 1 have shown that the most frequently captured fish species were tassellated darter, channel catfish, spottail shiner, and spotfin shiner. The catfish is an important recreational species, while the darter, spottail shiner and catfish form important food items in the diets of several other recreational species (i.e., rock bass, smallmouth bass, walleye).

Some fish species may be attracted to the warm thermal discharge, particularly during the cooler seasons. A concentration of fishes could result in increased or altered predation, disease, or change in physical condition. In local areas where there is a prolonged temperature shift, even if only a few degrees, there may be a shift in comparative abundance of species, with some species disappearing if they approach the limit of their temperature preferendum.

1564 045

3.1.2.a.(2) Impingement of Organisms

Environmental Monitoring Requirement

Organisms shall be collected from the traveling screens and identified to species or lowest possible taxon. Mesh size of collection devices shall approximate that of the traveling screens. Organisms impinged for a continuous twenty-four hour period shall be sampled in accordance with the Procedures prepared by the licensee as per Section 5.5.

The actual or estimated number and weight removed by impingement for each taxon shall be determined as per Section 5.5.8.

Applicability

This surveillance program shall commence with the date of initial criticality for Unit 2 operation and continue until approval for modification or termination has been obtained from the NRC in accordance with Section 5.6.3.

Action

Results of this study shall be submitted in accordance with Section 5.6.1.a. The reports shall contain the following information: date of the sample, the taxa collected, the actual or estimated number and weight of each taxon impinged for each sample period, the time averaged volumetric flow rate of plant cooling water and the average intake inlet water temperature.

1564 046

A comparison between the impingement experience at Unit 1 versus Unit 2 shall be provided.

Organisms collected from the traveling screens shall be disposed of in a manner consistent with requirements of appropriate Federal, State and local regulatory agencies and described in the procedures document required by Section 5.5.

Bases

The magnitude of loss and the potential impact to the aquatic ecosystem in the vicinity of the power plant resulting from impingement of aquatic organisms on the traveling screens is not precisely known or determinable on a theoretical basis alone. Sampling of organisms collected on the traveling screens will ensure that a reasonable estimate of the organisms impinged on the intake structure will be identified and enumerated. This information when combined with the results of the far field biological surveillance program in the intake/receiving waters will provide the empirical basis on which to judge the impact of plant operation.

Impingement monitoring has been conducted by the applicant during the operation of Unit 1. Results to date indicate that impingement losses due to operation of Unit 1 are minimal. Unit 2 utilizes both a separate intake structure and intake canal. Monitoring of impingement losses due to the combined operation of Units 1 and 2 will establish the relative efficiencies and total losses associated with the operation of Units 1 and 2.

1564 047



3.1.2.a.(3) Entrainment of Ichthyoplankton

Environmental Monitoring Requirement

Ichthyoplankton (fish eggs and larvae) shall be collected during the months of March through May at the intake structures to identify taxa and to estimate numbers lost by cooling system entrainment. Gear used in the collection of entrained ichthyoplankton shall be comparable to that used in the General Ecological Survey for far-field monitoring of ichthyoplankton.

Collections shall be made in accordance with the Procedures prepared by the licensee as per Section 5.5. On each sampling day, collections shall be made so as to identify diurnal variations in concentration of organisms. Specimens shall be identified to the lowest practical taxon.

Applicability

This surveillance program shall commence with the date of initial criticality for Unit 2 operation and continue until approval for modification or termination is obtained from the NRC in accordance with Section 5.6.3.

Action

Results of this program shall be reported in accordance with Section 5.6.1.a. The reports shall include the following information: sampling date, time of day, species or taxon, life stage, number collected and concentration (number per 100 cubic meters).

1564 048

Bases

Adverse effects on local planktonic populations due to entrainment were not anticipated (FES, Units 1 and 2, December, 1972) and none have been detected during Unit 1 operation (FES Supplement, Unit 2, July, 1976). Continuation of phytoplankton and zooplankton monitoring during Unit 2 operation has been judged unnecessary (ibid, page 6-2).

The effects on local fish populations due to entrainment of ichthyoplankton are of higher concern, although no adverse impacts are expected. Predominant species in the fishery deposit eggs on sheltered bottom areas. Larvae and early juveniles emigrating from such areas adjacent to the intake may be subjected to entrainment for the period of time that they remain in the lower water strata. All ichthyoplankton passed through the closed-cycle cooling system are presumably killed by the combined mechanical, chemical and thermal stresses.

Monitoring will provide data for assessing the level of ichthyoplankton entrainment relative to the ichthyoplankton populations in the river.

1564 049

3.1.2.b Terrestrial

3.1.2.b.(1) Aerial Remote Sensing

Environmental Monitoring Requirement

Vegetation communities of the site and vicinity shall be aerially photographed annually to detect and assess the significance of damage, or lack thereof, as related to cooling tower drift dispersions. Photography shall be done by aerial overflight. Aerial photography shall be conducted once per year during late summer or early fall. Timing of aerial photography and ground truthing should be selected to coincide with periods of maximum predicted drift deposition damage, preferably from August 15 to September 15, meteorological conditions permitting.

One of the following aerial photographic techniques shall be utilized:

- Color and/or black and white infrared photography.
- Multispectral or multiband photography.

Selection of either or both of the above techniques shall include the following parameters:

1564 050

- study area around cooling towers shall be relatively small (about 25 square kilometers);
- the scale for full coverage shall be adequate to enable identification of vegetative damage over relatively small areas of terrain. Some circumstances may warrant inspection of photographs illustrating individual trees. Such scale should be in the interval between 1:1000 and 1:10,000 as appropriate to resolve impacted features.

Photographic interpretations shall correlate data from ground truthing and ground inspection surveys and drift modeling with areas of stress and non-stress, as seen on the photographs for purposes of verification of results and interpretation. Ground truthing surveys shall cover, but not be limited to, the first year of the aerial photographic monitoring program.

This surveillance program shall commence at initial criticality of Unit 2 and shall be reviewed by NRC after a period of five years for possible modification or deletion as per Section 5.6.3.

#### Action

Description of the program, results, and interpretive analyses of environmental impacts shall be reported in accordance with Section 5.6.1. Results reported shall contain (as per Table 5.6-16) but not be limited to: sampling date; time of day; film type(s); spectral band(s); and scale.

#### Bases

The environmental assessments, as defined in the FES-OL of 1972 (Section V.C.1.a) and the Supplement to the FES-OL of 1976 (Section 5.5.1 and 6.5) determined that impacts to surrounding vegetative communities may result from the operation of Three Mile Island Nuclear Station cooling towers. Impacts may occur due to cooling tower drift deposition causing vegetative stress. Reconnaissance and aerial photographic inspection of biota in the drift field is the means recommended for detection of possible adverse effects of drift.

1564 051

Such adverse effects may most often be associated with either episodic high level dosages of chlorine or chronic low level chlorine dosages. Aerial photorgraphy will monitor and record the presence or absence of vegetative effects due to cooling tower drift deposition.

1564 052

#### 4.0 Special Surveillance and Study Activities

##### 4.1 Residual Chlorine Surveillance Program

###### Environmental Monitoring Requirement

The licensee shall sample the station discharge plume in the Susquehanna River to determine the spatial distribution of the total residual chlorine when the licensee initiates a discharge of free available chlorine at the maximum level allowed by the NPDES Permit (i.e., 0.2 mg/l average free residual chlorine or 0.5 mg/l maximum free residual chlorine).

The licensee shall analyze the waters of the plant discharge plume for total residual chlorine and shall determine the location of the 0.2 mg/l, 0.1 mg/l and 0.05 mg/l total residual chlorine isopleths in the Susquehanna River. The surface area and volume of water within each isopleth shall also be determined. All analyses shall be conducted in accordance with the Procedures prepared by the licensee in accordance with Section 5.5.

###### Applicability

This special surveillance program shall commence with the initiation of plant chlorine discharge at the maximum level allowed by the NPDES Permit. This special surveillance program shall terminate when the specified isopleths, areas and volumes have been determined for the operating conditions under which the maximum chlorination program is conducted.

1564 053

Action

The results of the surveillance conducted under this program shall be reported in accordance with Section 5.6.1. The results shall include the locations of the isopleths, the surface areas defined by each, the estimated volume of water within each isopleth, the method of analysis, the date of analysis, and the plant and river discharge flow rates.

Bases

In the Supplement to the Environmental Statement, Section 5.3.3, it was recognized that chlorination of plant systems at the level permitted by the NPDES Permit could lead to discharge of total residual chlorine values up to 3 times the measured values for free available chlorine. These levels would exceed a recognized criterion for exposure of aquatic biota to residual chlorine. The staff FES analysis indicated that the residual chlorine levels in the discharge plume would be reduced to levels below the criterion within a short distance of the outfall. This program will provide the necessary information to quantify the portions of the Susquehanna River which will experience residual chlorine concentrations in excess of recommended levels.

1564 054

#### 4.2 Thermal Plume Mapping

##### Specification

Surveys shall be made to characterize the waters of the Susquehanna River with respect to temperature.

##### Surveillance Requirements

The surveys shall be conducted as per Section 5.5 at least three times per year, during periods when the following conditions are expected to occur:

- a. maximum condenser cooling water discharge temperature,
- b. maximum area of thermal discharge plume.

Data shall be collected at locations and depths following a pattern designed to survey and support definition of the thermal structure of the portion of the Susquehanna River effected by operation of the TMINS.

During each survey, synoptic measurements of atmospheric parameters necessary to compute exchange rates for heat will be taken.

This special surveillance program shall commence with the initiation of cooling system discharges and shall continue until completion of one year of full power commercial operation of Unit 2.

##### Reporting Requirement

The results of the surveillance conducted under this program shall be analyzed, interpreted and reported in accordance with Section 5.6.1.a.

The results shall include the locations of the isotherms, the surface



areas defined by each, the estimated volume of water within each isotherm, the methods, locations and dates of measurement, the rationale for the analysis and interpretation of the results, the plant and river discharge flow rates, and all other hydrological and meteorological data used in the analysis of significance.

Base3

Section 5.5.2.3 of the Draft Supplement (6/76) determined that the thermal discharge mapping study of Unit 1 demonstrated that relatively little thermal effect on the Susquehanna River results from operation of that Unit. The thermal plume resulting from operation of Unit 2 in addition to Unit 1 should be mapped to verify the FES assessment that operation of the Three Mile Island Nuclear Station will cause only slight temperature increase over an insignificantly small area of the Susquehanna River.

1564 056

#### 4.3 Hydraulic Effects

##### Specification

The licensee shall monitor the portion of the Susquehanna River in the vicinity of river water intake structures and cooling tower discharge structures out to the middle channel to determine the extent of scouring or sedimentation of the river bed that is occurring as a result of operating the Three Mile Island Nuclear Station.

##### Surveillance Requirement

The licensee shall make depth soundings as per the procedures document required by Section 5.5. This study shall continue until completion of two years of full power operation of Unit 2.

##### Reporting Requirement

An interpretive analysis of the results of the surveillance conducted under this program shall be reported as per Section 5.6.1. The results shall include identification of the sounding locations, dates and times of soundings, the plant and river discharge flow rates and estimations of intake and discharge velocities.

##### Bases

Hydrographic surveys are required to insure that the intake channel is deep enough to maintain minimum submergence on the nuclear service pumps. In addition, Section III.D.1 of the FES (12/72) identifies discharge velocities

1564 057

of about 2.7 ft/sec with a possible maximum of 5.2 ft/sec. These velocities are capable of scouring portions of the Susquehanna River bed. The occurrence of this scouring should be verified and the significance of its extent assessed.

1564 058

5.0 Administrative Controls

5.1 Responsibility

Comment: The applicant's proposed discussion should be more detailed as per Reg. Guide 4.8 in showing independence between the reviewer and the performer of a specific activity.

1564 059

## 5.2 Organization

Comment: Improve the present chart or add supplemental charts which show only those persons, groups, or levels which are involved in performing, reviewing, modifying, or auditing environmental monitoring or surveillance activities; show by flow diagram the steps followed in satisfying Sections 5.1 and 5.3.

1564 060

### 5.3 Review and Audit

The following wording is acceptable for this section:

Independent review functions for environmental matters will be performed under the direction of the Manager - Generation Engineering.\* This review will be conducted by the Radiation Safety & Environmental Engineering Section,\* reporting to the Manager - Generation Engineering. This review shall encompass:

- A. Coordination of Environmental Technical Specifications development with the Safety Technical Specifications to avoid conflicts and maintain consistency.
- B. Proposed changes to the Environmental Technical Specifications and the evaluated impact of the change.
- C. Proposed written procedures, as described in Section 5.5, and proposed changes thereto which affect the environmental impact of the station.
- D. Proposed changes or modifications to station equipment or systems to determine the environmental impact of the changes.
- E. Results of the Environmental Monitoring Programs prior to their submittal in each Environmental Monitoring Report (described in 5.6.1).
- F. Investigations of all reported instances of violation of Environmental Technical Specifications, associated corrective action, and formulation of recommendations to recurrence.

\*Assuming retention of existing proposed independent review and audit authority

1564 061

In addition, auditing of environmental activities shall be conducted under the direction and control of the Manager - Operational Quality Assurance in accordance with the Operational Quality Assurance Plan.

1564 062

5.4 Action to be Taken if a Limiting Condition for Operation is Exceeded

The following wording is acceptable for this section:

- 5.4.1 Remedial action in accordance with the provisions of the Environmental Technical Specifications shall be taken until the condition can be met.
- 5.4.2 Exceeding a limiting condition for operation shall be investigated by the Plant Operation Review Committee under directions of the manager - Generation Engineering.
- 5.4.3 A report for each occurrence shall be prepared and submitted as specified in Section 5.6.2.

1564 063



## 5.5 Procedures

This section provides for and applies to the preparation of a procedures document by the applicant that describes the details of the programs that are required by these ETS. This detailed program shall be approved by the NRC staff prior to finalization and approval of the ETS.

### 5.5.1 Methodology

Detailed written procedures, including applicable check lists and instructions, shall be prepared and followed for all activities involved in carrying out these Environmental Technical Specifications. Procedures for the environmental surveillance and special study programs described in Sections 3, 4, and 6 shall be prepared and followed by personnel responsible for the particular monitoring program. Procedures shall include but not be limited to fully detailed descriptions of sampling equipment, locations and frequency; sample analyses, treatment and storage; data recording, analysis and storage; instrument calibration; tests and experiments; all measurements and analyses; and laboratory and controlled field studies. 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 manual.

1564 064

#### 5.5.2 Quality Assurance of Program Results

Procedures shall be prepared for ensuring the quality of program results, including analytical measurements, and which: document the program in policy directives, designate a responsible organization or individuals, include purchased services (e.g., contractual lab or other contract services), include audits by licensee personnel, and include procedures for revising programs, systems to identify and correct deficiencies, investigate anomalous or suspect results, and review and evaluate program results and reports.

#### 5.5.3 Compliance with Procedures

In addition to the procedures specified in 5.5.1, the station standard operating procedures shall include provisions to ensure each unit and all its systems and components are operated in compliance with the limiting conditions for operation established in these Environmental Technical Specifications

1564 065

#### 5.5.4 Changes in Procedures

"Changes to procedures described in accordance with Section 5.5.1 that do not change the intent of the original procedures may be made, provided such changes are approved by the Manager - Generation Engineering (Review and Audit responsibility as per Section 5.3) and the Manager - Operational Quality Assurance.

- A. The licensee may (1) make changes in the procedures as described in the document developed in accordance with Section 5.5.1 and (2) conduct tests or experiments not described in the document developed in accordance with Section 5.5.1, without prior Commission approval, unless the proposed change, test, or experiment involves a change in the intent or objectives of ETS incorporated in the license, an unreviewed environmental question, or affects the requirements of Section 5.5.6 of these ETS.
- B. The licensee shall maintain records of changes in procedures made pursuant to this section, to the extent that such changes constitute changes in procedures as described in the document developed in accordance with Section 5.5.1. The licensee shall also maintain records of tests and experiments carried out pursuant to paragraph "A" of this section. These records shall include a written evaluation which provides the bases for the determination that the change, test, or experiment does not involve an unreviewed environmental question or constitute a change in these ETS. The licensee shall furnish to the Commission, annually or at such shorter intervals as may be specified in the license, a report containing descriptions, analyses, interpretations, and evaluations of such changes, tests and experiments.

1564 066

C. The licensee shall not (1) make changes in the procedures as described in the document developed in accordance with Section 5.5.1 or (2) conduct tests or experiments not described in the document developed in accordance with Section 5.5.1, which involve an unreviewed environmental question or which will affect the requirements of Section 5.5.6 of these ETS without prior approval from the Director, Division of Operating Reactors. Such approval would be granted in the form of a letter which would not become an explicit part of the facility license or ETS but would become part of the procedures document developed in accordance with Section 5.5.1.

#### 5.5.5 Initiation of Surveillance Programs

"The aquatic environmental surveillance program described in Section 3.7 shall commence at initial criticality of Unit 1 and continue for the operating life of the station. Modifications of the ETS or programs may be proposed at any time with appropriate justification."

#### 5.5.6 Consistency with Preoperational Programs

"The program and methodology required by these ETS shall be similar to those utilized during the preoperational programs (as detailed in the Licensee's Environmental Report - Operating License Stage, April 1974 and in the FES-CP of 1972) so as to assure comparability of results. Consistency between the preoperational and operational programs is necessary to permit comparative analyses of the station's effects on the environment. Any modifications to the approved sampling program must be justified and supported by an adequate comparative sampling or studies to permit adjustments so that direct comparisons of data are technically justified."

1564 067

#### 5.5.7 Delays in Sample Collection

"If sample collection cannot be undertaken on the scheduled date due to adverse weather conditions or for other justifiable reasons, the factual basis shall be recorded and collections shall commence on the first practical date following the scheduled date."

#### 5.5.8 Impingement of Organisms

"The impingement of organisms at the circulating water intake shall be determined by the following procedure:

- (1) If the 24-hour collection is 50 kg or less, all specimens of each taxon shall be enumerated and their individual weights determined.
- (2) If the 24-hour collection is greater than 50 kg, the following subsampling scheme may be used in lieu of complete treatment of the total collections:
  - (a) Determine the total weight of the 24-hour collection ( $W_T$ ). Determine the total weight of the required subsamples ( $W_s$ ) using the following table:

1564 068

Weight of collection ( $W_T$ .) in kg	Number of 50 kg subsamples		$W_s$ (kg)
	Primary	Secondary	
$50 < W_T \leq 100$	1	0	50
$100 < W_T \leq 200$	1	1	100
$200 < W_T \leq 300$	1	2	150
$300 < W_T \leq 500$	1	3	200
$500 < W_T$	1	4	250 (max)

- (b) Withdraw primary subsample of 50 kg from the 24-hour collection and examined for dominant taxa (i.e., taxa represented by 30 or more specimens) and for non-dominant taxa (i.e., taxa represented by less than 30 specimens).
- (c) Determine the number ( $N_{D_j}$ ) and weight ( $W_{D_j}$ ) of each (jth) dominant taxon in the primary subsample only, when secondary subsampling is performed.
- (d) Determine the number ( $N_{N_i}$ ) and weight ( $W_{N_i}$ ) of the (ith) non-dominant taxon found in both the primary subsample and secondary subsamples. Determine the number ( $N_{N_i}$ ) and the weight ( $W_{N_i}$ ) of each (ith) non-dominant taxon from the primary subsample if a secondary subsample is not required.

1564 069

(e) When subsampling, each subsample should be composed of specimens taken throughout the 24-hour sampling period. If available approximately one-fourth of each subsample by weight shall be obtained from each of the following four approximate time periods: (1) six hours before sunset, (2) six hours after sunset, (3) six hours before sunrise, and (4) six hours after sunrise.

(3) Using the recorded data from step (2) subsampling scheme, the following estimates shall be made:

- (a) Estimated weight of non-dominant taxon<sub>i</sub> 
$$= \bar{W}_{Ni} = \frac{W_{Ni}}{W_s} \cdot W_T$$
- (b) Estimated number of non-dominant taxon<sub>i</sub> 
$$= \bar{N}_{Ni} = \frac{N_{Ni}}{W_{Ni}} \cdot \bar{W}_{Ni}$$
- (c) Estimated weight of all dominant taxa 
$$= \bar{W}_D = W_T - \sum_{i=1}^n \bar{W}_{Ni}$$
- (d) Estimated weight of dominant taxon<sub>j</sub> 
$$= \bar{W}_{Dj} = \frac{W_{Dj}}{\sum_{j=1}^m W_{Dj}} \cdot \bar{W}_D$$

1564 070

(e) Estimated number of dominant taxon<sub>j</sub> =  $\bar{N}_{Dj} = \frac{N_{Dj}}{W_{Dj}} \cdot \bar{W}_{Dj}$

(f) Estimated number of total 24-hour collection =  $\bar{N}_T = \sum_{i=1}^n \bar{N}_{Ni} + \sum_{j=1}^m \bar{N}_{Dj}$

(4) For each 24-hour collection period, the following physical data shall be required:

(a) Plant Flow Rate: The time-averaged volumetric flow rate, in m<sup>3</sup>/sec, of plant cooling water withdrawn from the source water.

(b) Intake Temperature: The average intake temperature, in degrees Celsius. Intake temperatures shall be recorded at least once hourly.

1564 071



## 5.6 Station Reporting Requirements

### 5.6.1 Routine Reports

The following wording is acceptable for this Section:

#### a. Annual Environmental Operating Report

A report on the environmental surveillance programs for the previous calendar year shall be submitted to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation) as a separate document by May 1 of each year. The period of the first report shall begin with the date of initial criticality. The report shall include summaries, interpretations, and statistical evaluation of the results of the nonradiological environmental surveillance activities (Section 3) and the environmental monitoring programs required by limiting conditions for operation (Section 2) for the report period, including a comparison with preoperational studies operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the station operation on the environment. If harmful effects or evidence of irreversible damage are suggested by the monitoring programs, the licensee shall provide an analysis of the data and a proposed course of action to alleviate the problem.

#### b. Data Reporting Formats

Results of analysis of all nonradiological environmental samples taken shall be summarized and tabulated on an annual basis. The

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standard formats given in Tables 5.6-1 through 5.6-17 should be used. In the event that some results are not available by May 1, the report shall be submitted noting and explaining the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

#### 5.6.2 Non Routine Reports

The following wording is acceptable for this section:

"A report shall be submitted in the event that (a) a limiting condition for operation is exceeded (as specified in Section 2, "Limiting Conditions for Operation"), (b) a report level is reached (as specified in Section 3, "Environmental Surveillance"), or (c) an unusual or important event occurs that causes a significant environmental impact, that affects potential environmental impact from station operation, or that has high public or potential public interest concerning environmental impact from station operation. Reports shall be submitted under one of the report schedules described below:

5.6.2.a Prompt Report. Those events specified as prompt reports shall be reported within 24 hours by telephone, telegraph, or facsimile transmission to the Director of the NRC Regional Office and within two weeks by a written report to the Director of the Regional NRC Office (with a copy to the Director, Office of Nuclear Reactor Regulation

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5.6.2.b Thirty Day Report. Those events not requiring prompt reports shall be reported within 30 days by a written report to the Director of the NRC Regional Office (with a copy to the Director, Office of Nuclear Reactor Regulation).

Written two-week and 30-day reports and, to the extent possible, the preliminary telephone, telegraph, or facsimile reports 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.

If harmful effects or evidence of irreversible damage are detected by the monitoring programs, the licensee will provide an analysis of the problem and will develop a course of action to be taken to alleviate the problem. If the ecology of the river significantly changes at a future date as, for example, by major changes in water chemistry or reintroduction of shad, the licensee will provide an analysis of expected impacts and a course of action to minimize the impacts.

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5.6.3 Changes in Environmental Technical Specifications

The following is acceptable wording for this section:

Request for changes in environmental technical specifications shall be submitted to the Director, Division of Operating Reactors, for review and authorization. The request shall include a

evaluation of the environmental impact of the proposed change and a supporting cost-benefit analysis. Implementation of such requested changes in ETS shall not be implemented prior to approval by the NRC.

Requests for changes in procedures established under Section 5.5 shall be submitted to the Director, Division of Operating Reactors for review and authorization. The request shall include a description of the change, reasons why such a change is desired, and an evaluation of the impact of the proposed change. Requested changes shall not be implemented prior to approval by the NRC."

#### 5.6.4 Changes in Station Design or Operation

The following wording is acceptable for this section:

"A report shall be made to the NRC prior to implementation of a change in station design or in station operation if the change has the potential for adverse environmental impact or involves an environmental matter or question not previously reviewed and evaluated by the NRC and shall be accompanied by any proposed revision to the Environmental Technical Specifications needed as a result of this change. The report shall include a description of the effects of the change, an evaluation of its environmental effects, and a supporting cost-benefit analysis."

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5.6.5 Changes in Permits and Certificates

The following is acceptable wording for this section:

Changes or additions to permits and certificates required by federal, state, local, and regional authorities for the protection of the environment will be reported. When the required changes are submitted to the concerned agency for approval, copies will also be submitted to the Director, Division of Operating Reactors, USNRC. The submittal will include an evaluation of the environmental impact of the change.

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## 5.7 Records Retention

The following is acceptable wording for this section:

### "5.7.1 Life of Plant Retention

Records and logs relative to the following areas shall be made and retained for the life of the station.

- (a) Records and drawing changes detailing station and unit design changes made to systems and equipment as described in Section 5.6.3.
- (b) Records of all data from environmental monitoring, surveillance and study activities required by these environmental technical specifications.

### 5.7.2 Five Year Retention

All other records and logs relating to the Environmental Technical Specifications shall be retained for five years."

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TABLE 5.6-1

MAXIMUM  $\Delta T$  ACROSS THE CONDENSER

Date

Time

Intake Temperature

Discharge Temperature

Number of Pumps Operating

1564 078

TABLE 5.6-2

MAXIMUM DISCHARGE TEMPERATURE

Date

Time

Discharge Temperature

Number of Pumps Operating

1564 079



TABLE 5.6-3

RATE OF CHANGE OF DISCHARGE TEMPERATURE

Date

Time

Discharge Temperature

Temperature Change During Preceding Hour

1564 080

TABLE 5.6-4  
OPERATION OF COOLING TOWERS

Date

Time

Cooling System Mode

Number of Pumps Operating

Reactor Power Level

1564 081

TABLE 5.6-5

pH

Date

Time

pH of the Final Holdup Pond

Method of Analysis Used

1564 082

TABLE 5.6-6

BIOCIDE

Date

Time

Free Residual Chlorine in Discharge

Monthly Average

Method of Analysis

Units

1564 083

TABLE 5,6-7  
PLANT CHEMICAL RELEASES

Date

Time

Total Residual Chlorine in Discharge

Method of Analysis

Units

1564 084

TABLE 5.6-8  
WATER QUALITY SURVEILLANCE

Date

Time

Chemical or Parameter Measured

Station Designation

Sample Type

Sample Depth, in meters

Units

Measured Value

Method of Analysis

1564 085

TABLE 5.6-9  
CHEMICAL RELEASE INVENTORY

Date

Time Period of Usage

Chemical Name of Released Substance

Percent Grade

Total Amount

Units

Number of Releases During Period

Average Duration of Releases (in minutes)

Source of Discharge

1564 086

TABLE 5.6-10

BENTHIC MACROINVERTEBRATES - FAR FIELD

Sampling Date  
Station Identification  
Gear Type  
Substrate Type (in descriptive terms)  
Sampling Depth (in meters)  
Sample Size (area in square meters)  
Species or Taxon  
Abundance of Each Taxon (number per square meter)  
Biomass of Each Taxon (grams per square meter)

1564 087



TABLE 5.6-11

ICHTHYOPLANKTON - FAR FIELD

Sampling Date  
Station Identification  
Sampling Depth (in meters)  
Species or Taxon  
Life Stage  
Abundance of Each Life Stage (number per 100 cubic meters)

1564 088

TABLE 5.6-12

FISH - FAR FIELD

Sampling Date  
Station Identification  
Gear Type  
Sampling Depth (in meters)  
Sample Duration (in minutes)  
Species or Taxon  
Abundance of Each Taxon  
Modal Length and Length Range (in millimeters)  
Modal Weight and Weight Range (in grams)

1564 089

TABLE 5.6-13  
FISH IMPINGEMENT

Sampling Date  
Species or Taxon  
Number Impinged by Taxon  
Weight Impinged by Taxon  
Plant Flow Rate (cubic meters per second)  
Intake Water Temperature ( °C)

1564 090

TABLE 5.6-14

ICHTHYOPLANKTON ENTRAINMENT

Sampling Date  
Species or Taxon  
Life Stage  
Abundance of Each Life Stage (number per 100 cubic meters)

1564 091

TABLE 5.6-15

EROSION CONTROL INSPECTION

Surveillance Date

Estimated Extent of Erosion  
Problem Area(s)

Type of Stabilization Program Employed

Date of Effective Stabilization

1564 092

TABLE 5.6-16  
AERIAL REMOTE SENSING

Date

Time

Film Type(s)

Spectral Band(s)

Scale

1564 093

TABLE 5.6-17

SURVEILLANCE OF HERBICIDE APPLICATIONS

Date of Application

Type(s)

Volume(s)

Concentration(s)

Method of Application

Frequency of Application

Location of Application

General Wind Conditions at  
Time of Application (MPH)

1564 094

TABLE 5.6-15  
EROSION CONTROL INSPECTION

Surveillance Date

Estimated Extent of Erosion  
Problem Area(s)

Type of Stabilization Program Employed

Date of Effective Stabilization

1564 095



TABLE 5.6-16  
AERIAL REMOTE SENSING

Date

Time

Film Type(s)

Spectral Band(s)

Scale

1564 096

TABLE 5.6-17

SURVEILLANCE OF HERBICIDE APPLICATIONS

Date of Application

Type(s)

Volume(s)

Concentration(s)

Method of Application

Frequency of Application

Location of Application

General Wind Conditions at  
Time of Application (MPH)

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## 6.0 Special Requirements

### 6.1 Erosion Control Inspection

#### Environmental Monitoring Requirements

Routine transmission line surveillance shall include examination for evidence of erosion. All areas within the specified corridor right of way showing evidences of abnormal erosion conditions related to transmission activities shall be identified and recorded. Upon identification of specific erosion damaged areas, initiation of corrective actions shall be undertaken and a record in the form of a field log shall be kept indicating the type of action employed and estimation of effective stabilization.

This Special Requirement shall be applicable during normal transmission line surveillance and shall be conducted no less than once each year in accordance with the Procedures prepared as per Section 5.5.

This surveillance program shall commence at initial criticality of Unit 2 upon initiation of normal transmission line surveillance procedures and continue for the life of the station.

#### Action

A summary of the field inspection programs and corrective actions taken to control abnormal erosion conditions associated with transmission line maintenance activities shall be reported in accordance with the routine report schedule of Section 5.6.1. Field logs indicating locations of erosion damage and type of actions taken to rectify erosion problem areas

1564 098

and estimation of effective stabilization should be kept and be available on the site for a period of two years. Results reported shall contain (as per Table 5.6-15) but not be limited to: surveillance date; estimated size of erosion problem area; type of stabilization program; date of effective stabilization.

#### Bases

Periodic maintenance activities or severe weather may cause instances along the transmission line corridors where soil or slope stabilization will be necessary. In the Supplement to the FES-OL of 1976 (Section 6.5) it was recommended that during normal transmission line inspections, notations be made of any areas requiring reseeding and confirmation of action to remedy erosion in these areas.

Routine corridor surveillance techniques will identify erosion problem areas and coupled with appropriate erosion control steps will insure that such areas become stabilized.

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## 6.2 Surveillance of Herbicide Applications

### Environmental Monitoring Requirements

The use of herbicides to control undesirable vegetation within the corridor rights of way associated with the station shall conform to the approved use of selected herbicides as registered by the Environmental Protection Agency and approved by state authorities and applied as directed by said authorities. Surveillance shall be conducted only during the period of herbicide applications along the corridor right of way associated with the station. Inspections shall be conducted in accordance with the procedures prepared by the licensee as per Section 5.5 and should confirm that restricted areas have not been sprayed, and that accidents such as spills have been documented and cleaned up to the extent practicable.

### Applicability

This Special Requirement shall be applicable only during applications of herbicides along transmission corridors associated with the station.

This surveillance program shall commence at initial criticality of Unit 2 upon initiation of any herbicidal application program and continue for the life of the station.

### Action

The annual report in accordance with Section 5.6.1 includes a statement as to whether herbicides were used. Results shall contain (as per Table 5.6-17) but not be limited to: type(s); concentration(s) of active material; rates

of application; method and frequency of application; location; wind conditions (estimated in miles per hour); and date of application.

Bases

In the Supplement to the FES-OL of 1976 (Section 5.6) it was stated that herbicide usage along rights of way will conform to approved uses as registered by the USEPA and authorized by state authorities. The objective of this monitoring program is to determine the type, volume, manner and method of herbicide applications to ensure environmental quality and provide safe reliable electrical service.

This information will provide surveillance information to the staff to ensure that herbicide applications conform to current Federal and state regulations and thereby, minimize environmental impact due to right of way maintenance procedures.

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