

Annual Environmental Protection Plan Operating Report  
January 1 - December 31, 1988

Millstone Unit 3 Environmental Protection Plan

prepared by  
Northeast Utilities Service Company  
P.O. Box 270  
Hartford, Connecticut 06141-0270

April 1989

8905040216 890501  
PDR ADOCK 05000423  
R PDC

## Annual Environmental Protection Plan Operating Report - 1988

### 1. Introduction

This report covers the period January 1 - December 31, 1988. During 1988, Unit 3 completed a 15 week refueling outage in mid-February; it also shut down for about 3 weeks in April to repair Reactor Coolant System valves, for 1 week in October in response to a reactor trip during a Main Steam Isolation Valve test, and for about 3 weeks in October-November for MSIV repair. For most of the remainder of 1988, Unit 3 was at nominal full power of about 1150 MWe, operating at an annual capacity factor of 75.7% (overall second-cycle capacity factor through 1988 was 85.4%).

As required by Millstone Unit 3 EPP, this Annual Environmental Protection Plan Operating Report (AEPPOR) includes:

- 1) summaries and analyses of the results of environmental protection activities,
- 2) a list of EPP noncompliances,
- 3) a list of all changes in station design or operation which involved a potentially significant unreviewed environmental question, and
- 4) a list of non-routine reports, describing events that could result in significant environmental impact.

### 2. Environmental Protection Activities

#### 2.1 Annual NPDES Report of Ecological Monitoring (EPP Section 4.2)

Paragraph 5 of the referenced NPDES permit requires continuation of biological studies of MNPS supplying and receiving waters, entrainment studies, and intake impingement monitoring. These studies include analyses of intertidal and subtidal benthic communities, finfish communities, entrained plankton, lobster populations, and winter flounder populations. Paragraph 13 of the permit requires an annual report of these studies to the Commissioner of Environmental Protection. The report that fulfills these requirements for 1988, Monitoring the Marine Environment of Long Island Sound at Millstone Nuclear Power Station, Waterford, Connecticut - Annual Report, 1988, presents results from studies performed during 3-unit operation, and compares them to those from 2-unit operation. The added cooling water flow for Unit 3 affects impingement and entrainment, causes sediment scouring near the MNPS discharges, and alters the characteristics of the thermal effluent plume. The biological effects of these changes are discussed in the above-named report (Attachment 1).

## 2.2 Effluent Water Quality Monitoring

Paragraph 6 of the referenced NPDES permit requires monitoring and recording of many water quality parameters at MNPS intakes and at 37 discharge points within the plant, including outfalls of each unit to the effluent quarry, and outfall of the quarry to Long Island Sound. Paragraph 11 of the permit requires a monthly report of this monitoring to the Commissioner of Environmental Protection. The report that fulfills these requirements, Monthly Discharge Monitoring Report, includes data from all three Millstone units. Those data that pertain to Unit 3 are summarized in Table 1a.

During 1988, 10 NPDES exceptions were reported from discharges associated with Unit 3 (Table 1b). The two violations for metals involved excessive iron in discharges from Unit 3 Condenser Hotwell in January. Average concentration did not exceed permit limits (3.0 mg/l), but two of the daily grab samples, on the 18th and 25th, were 6.5 and 10.0 mg/l (above the maximum concentration limit of 5.0 mg/l).

Two other NPDES violations occurred in January; on the 23rd, a sample from the discharge of Units 2 and 3 non-contaminated floor drains was analyzed to have a pH value of 9.62 (NPDES limit 9.0). Investigation did not reveal a cause; no process in the drain collection area that could potentially raise the pH was identified. The problem did not recur in 1988. There was also a hydrazine violation on January 30; this is discussed in a following section.

The Total Residual Chlorine (TRC) sample taken from the quarry cut on April 27 was analyzed at 0.15 mg/l (NPDES limit 0.10 mg/l); this was reported as an exception, although it is possible that the value represents analytical error. Each unit has procedures in place to ensure that chlorination of circulating water (to control microfouling) will not exceed permit limits, and Units 1 and 3 had not chlorinated for several days prior to the 27th. Unit 2 did chlorinate on the day of the violation, but had completed the operation by 0945. The sample in question was collected at 1300, more than five hours later; however, the residence time of the quarry is calculated to be 30-45 minutes.

A violation of Free Available Chlorine (FAC) concentration occurred at the Service Water discharge on November 5; the reported value (0.35 mg/l) exceeded the maximum permitted value (0.25 mg/l). The cause was determined to be a temporary reduction in Service Water flow, without a corresponding decrease in hypochlorite injection rate. Corrective measures have been taken to prevent a recurrence.



The final four reported NPDES violations, i.e., excessive quantities of boric acid discharged from Units 2 and 3 non-contaminated floor drains in April and May, were later attributed to interferences in the analytical procedure. Subsequent testing indicated that the potentiometric titration method used could yield erroneously high values for boron, if interfering substances (e.g., calcium and magnesium salts) were present (see Attachment 2); a possible source of such substances might be leaching from recently poured concrete.

Sampling for hydrazine ( $N_2H_4$ ), biological oxygen demand (BOD), and chemical oxygen demand (COD) is required only when discharging wastewater containing hydrazine. The major hydrazine discharges at Unit 3 are releases following wet lay-up of steam generators; during 1988, these occurred only in January, after the 15 week refueling outage. Hydrazine concentrations, determined while draining the four steam generators, ranged from 46.6-137.3 mg/l (avg. 83.7). One discharge, on January 26, exceeded the administrative target of 125 ppm, but all were below the NPDES permit level of 200 mg/l. During the same discharges, BOD ranged from 11.7-13.5 mg/l (avg. 12.9) and COD ranged from 41-114 mg/l (avg. 71).

Smaller volumes of hydrazine are released from auxiliary boiler blowdown; during 1988, this occurred only in January. On January 30, one sample had a hydrazine concentration of 87.0 mg/l, above the NPDES permit limit for this discharge point (75.0 mg/l). However, the average for the month (four samples) was 58.9 mg/l, and the maximum hydrazine concentration, diluted in the circulating water flow, was 0.005 mg/l (NPDES limit 0.1 mg/l).

### 3. Environmental Protection Plan Noncompliances

During 1988, no EPP noncompliances were identified for Unit 3.

### 4. Environmentally Significant Changes to Station Design or Operation

During 1988, no Unit 3 Plant Design Change Records (PDCRs) met the acceptance criteria for inclusion in this report, i.e., required an environmental review and received Plant Operation Review Committee (PORC) approval for implementation in 1988. Of the 15 PDCRs initiated during 1988, 7 received PORC approval; none of these involved unreviewed environmental issues. An additional 9 PDCRs, that had been initiated in past years, received PORC approval in 1988; none of these involved unreviewed environmental issues, either.

Unit 3 has 126 System Operating Procedures; of these, 58 were added or revised during 1988. In addition, many procedures were modified to reflect small changes, of insufficient magnitude to require the issuance of a new revision. However, each of these changes, as part of the review/approval process, included an environmental evaluation; none were determined to involve an unreviewed environmental impact.

#### 5. Non-Routine Reports of Environmentally Significant Events

During 1988, no events occurred at Unit 3 that met the acceptance criteria for inclusion in this report, i.e., required submittal of a Licensee Event Report (LER) from Unit 3, and involved a situation that could result in a significant environmental impact. Of the 28 events that constituted reportable occurrences in 1988, none were determined to cause a significant environmental impact.

Table 1. Millstone Unit 3 NPDES Data Summary, Jan. 1 - Dec. 31, 1988<sup>1</sup>.

a).

	discharge flow range (10 <sup>3</sup> gpm)	discharge pH range	discharge temp. range (°F)	discharge temp. (avg) (°F)	avg ΔT (°F)	max FAC (ppm)	max TRC (ppm)	settle. solids (mg/l)	SWS FAC (ppm)
Jan.	182-486	7.6-8.4	32.5-41.2	36.7	0.4	< 0.05	0.05	< 0.05	0.23
Feb.	334-942	7.9-8.5	36.0-59.4	47.8	11.2	0.10	0.07	< 0.05	0.20
Mar.	790-942	8.0-8.5	53.1-65.8	58.7	19.1	0.08	0.07	< 0.05	0.20
Apr.	182-942	7.6-8.6	43.9-67.5	54.0	9.6	0.09	0.15	< 0.05	0.20
May	298-573	7.9-8.2	46.0-86.7	62.0	10.7	< 0.05	< 0.05	< 0.05	0.12
June	790-942	7.8-8.3	70.5-81.0	75.4	17.9	< 0.05	< 0.05	< 0.05	0.15
July	942-942	7.4-8.5	75.7-85.8	81.1	17.2	< 0.05	< 0.05	< 0.05	0.15
Aug.	942-948	7.7-8.1	81.9-89.8	85.3	17.6	0.05	0.05	< 0.05	0.20
Sep.	790-942	7.8-8.2	79.9-86.4	83.3	17.8	< 0.05	< 0.05	< 0.05	0.10
Oct.	623-942	7.9-8.2	52.9-82.6	69.1	10.2	0.12	< 0.05	< 0.05	0.15
Nov.	486-796	8.0-8.2	50.9-77.5	68.9	16.4	< 0.05	< 0.05	< 0.05	0.35
Dec.	334-790	8.0-8.3	42.3-74.8	63.0	17.7	< 0.05	< 0.05	< 0.05	0.20

b).

	pH	temp.	FAC	TRC	Set. Sol.	Susp. Sol.	BOD <sup>2</sup>	COD <sup>2</sup>	hydrazine <sup>2</sup>	boric acid	conduct.	lithium	oil & grease	metals
No. of exceptions in year <sup>3</sup>	1	0	1	1	0	0	0	0	1	4	0	0	0	2

<sup>1</sup> Parameters are measured at Unit 3 discharge (001C), except for TRC and settleable solids, which are measured at MNPS discharge (quarry cuts; 001) and SWS FAC (service water system; 001C-5).

<sup>2</sup> Sampling for BOD, COD, and hydrazine required only when discharging wastewater containing hydrazine; data for these events are presented in the text.

<sup>3</sup> Some parameters are measured at more than one point within Unit 3 or only under certain operating conditions. Values represent number of NPDES exceptions for all discharge points.



**NORTHEAST UTILITIES**

THE CONNECTICUT LIGHT AND POWER COMPANY  
WESTERN MASSACHUSETTS ELECTRIC COMPANY  
HOLYOKE WATER POWER COMPANY  
NORTHEAST UTILITIES SERVICE COMPANY  
NORTHEAST NUCLEAR ENERGY COMPANY

MNPS Unit 3 AEPPOR - 1988  
Attachment 2

M  
E  
M  
O

July 28, 1988  
MP-S-CH-88-733

TO: J. Richard Robertson  
Senior Chemist - Millstone

FROM: Gregory L. D'Auria <sup>GO</sup>  
Analytical Chemist - Millstone  
(Millstone Ext. 4575)

SUBJECT: Analysis of Samples from Yard Drainage System for Boron Content

As per your request, four (4) samples from the yard drainage system were analyzed for boron content by Inductively Coupled Plasma (ICP). A two point calibration curve (10ppm, 1ppm) with a control standard check (5ppm) was used for the calibration. The correlation coefficient for the calibration curve was 1.0000. The results of the analysis are listed below. Note that Boron content is expressed in terms of ppm Boric Acid.

<u>Sample ID</u>	<u>Boric Acid (ppm)</u>
A	0.17 ± 0.013
B	0.11 ± 0.165
C	0.572 ± 0.057
D	Not Detected

The same samples were also analyzed for boron content by potentiometric titration. The objective of the second analysis was to determine if the samples contained an interfering substance that would cause the potentiometric analysis to produce erroneous results. The possibility for matrix effects on the ICP analysis is considered to be minimal. Listed below are the results of the potentiometric titration.

<u>Sample ID</u>	<u>Boric Acid (ppm)</u>
A	<0.572
B	0.744
C	<0.572
D	99.02

Note: The samples were not treated to remove interfering substances as noted in ASTM (i.e., the samples were not boiled and EDTA was not added).

Conclusion

The result of 99.02ppm for sample D (Potentiometric Titration) seems to indicate that an interfering substance is present and that treatment for removing the interference is necessary. It should be noted that earlier NPDES samples, done by potentiometric titration, are most likely in error, as these samples were not treated for removal of the interference. Future NPDES Boron samples should be done by I.C.P. or possibly by a modified potentiometric method, i.e., EDTA is added to the samples and the samples are boiled.

GLD:mo

cc: J. J. Waters  
T. F. Burns  
D. Brown (NUSCo)