Northeast Nuclear Energy

Rope Ferry Rd. (Route 156), Waterford, CT 06385

Millstone Nuclear Power Station
Northeast Nuclear Energy Company
P.O. Box 128
Waterford, CT 06385-0128
(860) 447-1791
Fax (860) 444-4277

The Northeast Utilities System

APR 27 2000

Docket No. 50-423
B18070

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Millstone Nuclear Power Station, Unit No. 3
1999 Annual Environmental Protection Plan Operating Report

Section 5.4.1 of the Environmental Protection Plan (EPP) requires that Northeast Nuclear Energy Company submit an Annual Environmental Protection Plan Operating Report to the NRC, describing implementation of the EPP for the previous year. The attached report fulfills this requirement for 1999.

There are no regulatory commitments contained within this letter.

Should you have any questions or require further information, please call Mr. Paul Jacobson, Environmental Services - Nuclear, at (860) 447-1791 ext. 2335.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

Stephen E. Scace - Director
Nuclear Oversight and Regulatory Affairs

Enclosure w/ attachments

IE48

cc: See next page

cc: w/ enc. w/o att. H. J. Miller, Region I Administrator
V. Nerses, NRC Senior Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

A. Rocque, Commissioner
State of Connecticut
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Annual Environmental Protection Plan Operating Report
January 1 - December 31, 1999

Millstone Unit 3 Environmental Protection Plan

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

April 2000

Annual Environmental Protection Plan Operating Report
January 1 - December 31, 1999

Millstone Unit 3 Environmental Protection Plan

Prepared by: Jim Foertch

Reviewed by: Milan Keser

Annual Environmental Protection Plan Operating Report - 1999

1. Introduction

This report covers the period January 1 - December 31, 1999. During 1999, Unit 3 completed its sixth fuel cycle (late April) and conducted its sixth refueling outage (May - June). Since restart, Unit 3 operated near full power for the remainder of 1999; capacity factor for 1999 was 82%.

As required by the Millstone Unit 3 Environmental Protection Plan, 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 National Pollutant Discharge Elimination System (NPDES) Report of Ecological Monitoring (EPP Section 4.2)

Paragraph 5 of the Station's NPDES permit requires continuation of biological studies of Millstone Nuclear Power Station (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 7 of the permit requires an annual report of these studies to the Commissioner of Environmental Protection. The report that fulfills these requirements for 1999, Monitoring the Marine Environment of Long Island Sound at Millstone Nuclear Power Station, Waterford, Connecticut - Annual Report, 1999 (Annual Report), presents results from studies performed during construction and operation of MNPS, emphasizing those of the latest sampling year. Past reports have indicated that the added cooling water flow for Unit 3 affects impingement and entrainment, causes sediment scouring near the MNPS discharges, and alters the characteristics of thermal effluent plume. The extended shutdown of MNPS from 1996-1998 has also caused some changes to the physical environment in the vicinity of the station discharge, and additional changes were documented since restart of Unit 3 in July 1998 (and of Unit 2 in May 1999). Unit 1 will not restart; it is scheduled for decommissioning. The biological effects of these changes are summarized in the Executive Summary section of the Annual Report (Attachment 1) and further discussed in the Annual Report itself (submitted under separate cover).

2.2 Effluent Water Quality Monitoring

Paragraph 3 of the referenced NPDES permit requires monitoring and recording of many water quality parameters at MNPS intakes and at multiple monitoring 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 the Connecticut Department of Environmental Protection (DEP). The report that fulfills these requirements, Monthly Discharge Monitoring Report (DMR), includes data from all three Millstone units. Those items that pertain to Unit 3 are summarized in Table 1. The only NPDES permit exceedance that occurred at a Unit 3 discharge in 1999 was a pH value below 6.0 standard units at DSN 001C for a period of approximately two minutes on May 28. A review of Unit 3 discharges for that day showed that no tanks or sumps were discharged via DSN 001C and therefore, the cause of the drop in pH is not known.

During 1999, in support of Unit 2 restart activities and renewal of the Millstone Station NPDES Permit, the Station submitted much correspondence to the DEP (e.g., requests for Temporary and Emergency Authorization, additional information pertaining to the NPDES Permit renewal application). In compliance with the EPP (Section 3.2) and Station procedures, the NRC was sent concurrent copies of this correspondence. Descriptions of events that pertain to Unit 3 discharges, or the Station as a whole, were summarized from the monthly DMRs, and included in Attachment 2. These events include any NPDES permit exceedances (i.e., events where the value of a parameter was beyond the permitted limit) or exceptions (i.e., events where a permit condition was not met) that were reported for discharges associated with Unit 3, as well as other environmentally-related events related to Unit 3 which did not necessarily involve NPDES permit exceedances or exceptions, but had been reported in Millstone DMRs for informational purposes. Submittals and letters are identified by unique "D-numbers" (e.g., D13909) to allow document and commitment tracking.

3. Environmental Protection Plan Noncompliances

During 1999, no EPP noncompliances were identified for Unit 3.

4. Environmentally Significant Changes to Station Design or Operation

As of December 31, 1999, Unit 3 has 195 System Operating Procedures; of these, 50 were added or revised during 1999. 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 was determined to have involved an unreviewed environmental impact.

During 1999, no Unit 3 Design Change Records (DCRs) met the acceptance criteria for inclusion in this report, i.e., a) were initiated during the report year, and b) included a determination that an unreviewed environmental impact could occur.

5. Non-Routine Reports of Environmentally Significant Events

During 1999, 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 8 events that constituted reportable occurrences at Unit 3 in 1999, none were determined to cause a significant environmental impact.

Although judged not to require submittal of an LER, a description of one event that occurred at Millstone Station in 1999 is included for your information (and discussed more fully in Attachment 2). In May, a number of dead fish (23 gizzard shad, 1 striped bass) were found in the Millstone Quarry. It is believed that the fish entered the Quarry in late April, while the fish barriers were being cleaned, and experienced thermal stress. As these species are seasonally very abundant, no impact to the region's fisheries occurred.

Table 1. Millstone Unit 3 NPDES Data Summary, Jan. 1 - Dec. 31, 1999. Selected water quality parameters for Unit 3[1] (any exceptions or exceedances are in **bold** type, and further described in Section 2.1 of the report).

	discharge flow range (10^3 gpm)	discharge pH range	discharge temp. range (°F)	discharge temp. (avg) (°F)	avg ΔT (°F)	max FAC (ppm)	max TRC (ppm)	max SWS FAC (ppm)
Jan.	638-954	7.9-8.2	45.0-65.0	57.9	17.2	0.14	<0.03	0.18
Feb.	790-954	7.9-8.1	54.1-62.2	56.9	17.3	0.16	0.04	0.17
Mar.	790-954	8.0-8.2	49.2-65.4	58.1	17.4	0.13	<0.03	0.17
Apr.	790-942	6.3-8.2	52.7-69.6	62.4	16.8	0.13	0.04	0.19
May	15-790	**5.2**-8.3	46.1-61.8	53.0	0.0	0.12	0.04	0.24
June	15-942	7.8-8.2	59.2-74.6	63.0	0.1	0.08	0.05	0.22
July	790-954	7.8-8.1	73.7-90.8	82.9	14.2	0.08	0.06	0.18
Aug.	790-942	7.7-8.1	85.2-92.6	86.2	15.1	0.09	0.05	0.22
Sep.	790-948	7.8-8.1	85.0-96.0	86.2	16.1	0.10	0.04	0.22
Oct.	790-948	7.7-8.2	75.7-85.3	79.6	16.2	0.08	0.04	0.19
Nov.	790-948	7.3-8.4	65.6-83.9	72.7	17.1	0.11	<0.03	0.24
Dec.	790-948	8.1-8.4	64.2-76.7	65.7	17.6	0.10	0.03	0.22

Notes:

[1] Parameters are measured at Unit 3 discharge (DSN 001C), except for TRC, which is measured at MNPS discharge (quarry cuts; DSN 001) and SWS FAC (service water system; DSN 001C-5).

ATTACHMENT 1 to the

Millstone Unit 3 Environmental Protection Plan

Annual Environmental Protection Plan Operating Report
January 1 - December 31, 1999

Executive Summary

Winter Flounder Studies

The local Niantic River population of winter flounder (*Pseudopleuronectes americanus*) is potentially affected by the operation of MNPS, particularly by entrainment of larvae through the cooling-water systems of the operating units. As a result, extensive studies of the life history and population dynamics of this important sport and commercial species have been undertaken since 1976.

During the 1999 adult winter flounder spawning season, the D-mean trawl catch-per-unit-effort (CPUE) of fish larger than 15 cm in the Niantic River was 2.7, an increase from the value of 2.1 in 1998, and similar to abundance in 1995 and 1997. Since 1976, CPUE peaked in 1981 and 1982. The Jolly stochastic model was applied to mark and recapture data to estimate the absolute abundance of the Niantic River adult spawning population. The abundance estimate for 1998 was 5,715 winter flounder larger than 20 cm. This was considerably less than estimated population sizes during 1984-91, which ranged between 33 and 80 thousand, but was similar to estimates made since 1995, which have been about 8 thousand or less. Female spawner abundance estimates ranged from about 2 to 68 thousand, with corresponding annual total egg production estimates of about 2 (1996, 1999) to 40 billion.

The low abundance of newly-hatched (Stage 1) larvae in Niantic Bay compared to the Niantic River suggested that nearly all local spawning occurred within the river. Also, through 1994, the abundance of Stage 1 larvae in the river was significantly correlated with independent estimates of female spawner egg production. However, from 1995 through 1999, when egg production estimates have been at their lowest, Stage 1 abundance has been greater than expected. This was attributed to higher egg survival, which may have been as much as four times greater than in earlier years and representing a potentially important compensatory mechanism. Abundance indices of all four larval stages in the Niantic River during 1999 were less than the average for each in the 17-year time-series. Smaller, younger size-classes of larvae were dominant in the river and larger, older size-classes were more prevalent in the bay. Since 1976, annual larval abundances in Niantic Bay have reflected region-wide trends, as they were positively correlated with abundance indices for Mount Hope Bay, MA and RI, indicating likely common processes affecting larval dynamics.

Larval growth and development were positively correlated with water temperature, but other factors, including density and prey abundance, also likely affected growth. Growth of larvae in 1999 was the fastest found in 17 years, which was probably related to the record warm spring water temperatures. Throughout 1999, nearly all monthly mean seawater temperatures recorded at the MNPS intakes either set new records or were well above average for this 24-year time-series. Estimated mortality of larvae from hatching to 7 mm in the Niantic River for 1984-99 ranged between 82 to 98%, with the value for 1999 ranking second lowest. Density-dependence was examined by comparing mortality and egg production estimates (a measure of yolk-sac larval stage abundance) at various monthly and seasonal water temperatures. Results of this analysis suggested that larval mortality decreased with declining egg production and increasing April water temperatures.

The summer 1999 median beam trawl CPUE of metamorphosed age-0 winter flounder was above the average for this data series since 1984. The 1998-99 D-mean CPUE calculated for young winter flounder taken during late fall and early winter at the trawl monitoring program stations was the median value of the 23-year time-series, but represented a large increase over the previous year. These two age-0 abundance indices were significantly correlated and their relative values suggested that the 1988, 1992, and 1994 year-classes of winter flounder were relatively strong, whereas the 1993 and 1997 year-classes were weak. Regardless of these indices, however, few age-1 juveniles, have been taken in recent years during the adult spawning population surveys within the Niantic River. Further, young-of-the-year abundance indices were either not significantly correlated or were negatively correlated with the abundance of female adult spawners 3 to 5 years later. However, the form of the significant relationships was unclear and they may be statistical artifacts. None of the early life stages was considered to be a highly reliable predictor of potential future year-class strength.

Estimating the number of larvae entrained through the condenser cooling-water system at MNPS is the most direct measure of potential impact on winter flounder. Annual estimates of entrainment were related to both larval densities in Niantic Bay and plant operation. The entrainment estimate in 1999 was about 146 million larvae, near the median of all estimates made since 1976. As in previous years, Stage 3 larvae were the most abundant in entrainment collections. The impact of larval entrainment on the Niantic River stock depends upon the fraction of the annual winter flounder production entrained each year. Empirical mass-balance calculations for 1984-99 have shown that a large number of entrained larvae come from areas of Long Island Sound other than the Niantic River, with fractions of entrained larvae originating from the river estimated to range between 12 and 59%. The percentage of the total river production (calculated as equivalent eggs) entrained annually have ranged between about 4 and 44%, with a geometric mean of 12.6%. The value of 32.8% in 1999 was the second largest in 16 years. However, based on the apparent increase in egg survival noted in recent years, estimates since 1995 may have been conservatively high, perhaps resulting in an overestimation of production losses by a factor of four or more, which was not incorporated into the population modeling.

A stochastic computer simulation model (SPDM) was used for long-term assessments of MNPS impact over a 100-year period (1960-2060). The winter flounder stock simulated was female spawner biomass (lbs) and conditional mortality rates corresponding to larval entrainment from mass-balance calculations and juvenile and adult impingement at MNPS were applied according to historical information and projections. Natural and fishing mortality rates (F) were provided by CT DEP. Future model projections to 2000 and beyond were made using a constant F of 0.8.

In SPDM simulations, three stochastic time-series are generated, including a theoretical unfished stock, the size of which depends only upon the dynamics of winter flounder reproduction and environmental variability; a baseline stock affected by rates of fishing in addition to the above; and an impacted stock, which further adds the effects of MNPS to those of fishing and natural variation. An initial stock size of 116,053 lbs was used to represent the theoretical Niantic River female spawning stock at equilibrium, which is the maximum spawning potential (MSP). After fishing was added, the baseline time-series declined to 45,357 lbs by 1970 and to its lowest point of 11,300 lbs in 1995, which was only about 10% of MSP. Similarly, the impacted stock size was reduced to 8,762 lbs in 1996, but increased to 10,376 lbs in 1999. Absolute differences between the baseline and impacted stocks were initially small, but increased to about 3,000 lbs in 1989, 3 years after Unit 3 start-up. However, stock sizes began to be affected by the Unit 1 shutdown and decreased fishing rates beginning in the late 1990s and increased accordingly. Historically, greater reductions in stock biomass resulted from fishing than from larval entrainment, because fishing quickly reduces biomass by the selection of larger individuals throughout the lifetime of a year-class, whereas entrainment only occurs once, and then very early during larval life history. The simulated impacted spawning stock began to return to baseline levels as operation of Units 2 and 3 ceased, and, ultimately, became virtually identical to the baseline.

The probabilities that the Niantic River female spawning stock biomass would fall below selected reference sizes (25, 30, and 40% of MSP) were determined to help assess the long-term effects of MNPS operation. A stock smaller than 25% of MSP is considered overfished, whereas one that is at 40% of MSP can maximize yield to the fisheries while remaining stable. At the lowest point of both the baseline and MNPS-impacted simulations in the mid-1990s, stock sizes were quite likely less than 25% of MSP. Again, simulated reductions in fishing allowed for a rapid increase in spawner biomass, but both the baseline and impacted stocks likely ($p > 0.90$) would remain less than 25% of MSP through 2030. The effect of $F = 0.8$ was to keep the Niantic River stock moderately depressed relative to levels seen prior to 1990.

To date, despite efforts of regulatory agencies to control fishing mortality, the Niantic River winter flounder stock has not shown evidence of any large increases in abundance. Even so, the remaining small adult spawning stock continues to produce relatively large numbers of larvae and young fish, which likely resulted from population compensatory mechanisms. The effective retirement of Unit 1 in late 1995 was followed by an immediate reduction of about one-quarter of the MNPS cooling-water flow and has permanently lessened plant impact. However, despite the relatively good abundance of post-entrainment immature fish, significant recruitment to the adult spawning population has not occurred in recent years, due to as yet unknown factors removing these fish from the population. Only continued efforts in reducing fishing mortality would ensure a quicker recovery of the Niantic River winter flounder population, as drastically reduced plant operations during recent years have not resulted in stronger year-classes and subsequent enhanced recruitment to the spawning stock.

Fish Ecology Studies

The objective of the fish ecology monitoring program at Millstone Nuclear Power Station (MNPS) is to determine whether operation of the electrical generating units has adversely affected the occurrence, distribution, and abundance of local fishes. Potential MNPS impacts include entrainment of fish eggs and larvae through the condenser cooling-water system; impingement of juvenile and adult fish on intake screens, which has been mitigated by the installation of fish return sluiceways; and changes in distribution or abundance attributable to the thermal discharge. Trawl, seine, and ichthyoplankton monitoring programs were established in 1976 to provide the basis for identifying taxa potentially affected, as well as information on long-term abundance trends used to measure changes in the local populations.

This report summarizes data collected in the monitoring programs from June 1998 through May 1999 (report year 1998-99). This period includes the start-up of Unit 3 (July 1998) and Unit 2 (May 1999), after more than two years of station shutdown. Power production remained limited during this period with Unit 1 not generating, Unit 2 only operating 3 weeks during the report period, and Unit 3 operating for 40 of the 52 weeks.

The potential effects of MNPS were assessed by conducting detailed analyses on seven taxa most susceptible to MNPS operational impact from entrainment or thermal effects. Analyses of selected species generally focused on comparing temporal trends over the past two decades. Atlantic menhaden larvae had a significantly increasing trend in abundance during this time period. An increase in Atlantic silverside taken by seine in JC occurred this year. Although grubby larvae are entrained, the adult abundance has not declined over the 23-year monitoring period. This unexploited species has been among the most stable of the fishes residing near MNPS. Declining abundance trends of larval American sand lance, anchovy eggs and larvae, and juvenile and adult tautog and cunner were probably related to regional declines, likely resulting from increased predation of sand lance and overfishing in the case of tautog. The large numbers of tautog and cunner eggs entrained at MNPS did not appear to have affected the future spawning stocks of these two fishes because the proportion of juvenile recruits relative to adults has not declined.

The potential effects of MNPS, during and after the period of reduced cooling-water flow were assessed for the seven selected fish taxa. Outage effects, if any, were expected to be evident for the short-lived species, sand lance, anchovies and silversides, or the species that mature in one year, grubby and cunner. Changes would not yet be readily discernible for the longer-lived species maturing at older ages, Atlantic menhaden and tautog. Both Atlantic silversides taken by seine in Jordan Cove and juvenile cunner caught by trawl in Jordan Cove and Niantic River increased in abundance during this outage period. However, juvenile cunner did not increase in Niantic Bay. It is difficult to relate the juvenile cunner abundance increase to the MNPS outage, as the station had been shutdown since late 1995, and this was the first year abundance increases were noted; also the increase did not occur in all areas near MNPS. The increase in silversides also appeared to be unrelated to the outage as silverside entrainment is very low and with only a 0.8°C water temperature increase occurring at the Jordan Cove seine site as a result of the MNPS discharge, thermal effects were also unlikely.

Lobster Studies

The objective of the lobster monitoring program is to determine if operation of MNPS has caused changes in local lobster abundance and population characteristics beyond those expected from changes in the fishery and natural variability. Several aspects of MNPS operation could potentially impact the local population of American lobster (*Homarus americanus*). Upon hatching in early summer, lobster larvae begin the 6- to 8-week planktonic phase of their life cycle and are susceptible to entrainment through cooling water systems. Since 1984, entrainment studies have been conducted during the hatching season, to estimate the number of lobster larvae drawn through the cooling water system. During 1999, an estimated 595,200 larvae were entrained through the MNPS cooling water system (1984-1998 range = 9,600-659,400). The potential effect of larval entrainment on subsequent juvenile and adult lobster abundance is difficult to assess due to uncertainty concerning the source of entrained larvae, their survival rate, and the relatively long period of time between larval settlement and recruitment to the fishery (6-8 years). However, the increasing trend in total catch-per-unit-effort of lobsters in traps since the study began in 1978 suggests that entrainment of lobster larvae at MNPS has not adversely affected the local lobster population.

Juvenile and adult lobsters can be trapped, or impinged, on the intake travelling screens through which cooling water is drawn into the plants. However, Unit 3 is equipped with a sluiceway, which returns lobsters back to Niantic Bay after they are impinged on the screens. A sluiceway is also being constructed at Unit 2, which will minimize the impacts of impingement on local lobsters.

As a result of intense and increasing fishing effort on the species, lobster landings made in the LIS commercial fishery increased markedly. Results from our studies over the past 22 years indicate an increasing trend in total catch-per-unit-effort, which is comprised mostly of recruit and pre-recruit-sized lobsters (one and two molts below legal size). Total lobster catch during 1999 was the second highest observed and catch-per-unit-effort of 2.560 lobsters/ pot eclipsed all previous values (range 0.904-2.457). Nevertheless, our studies also indicated that nearly all lobsters larger than the minimum legal size are removed by fishing each year, and the trend in legal lobster catch-per-unit-effort has significantly declined since 1978. Although this decline is due in part to the increases in minimum legal size in 1989 and 1990, saturation caused by a tenfold increase in the number of traps used in the LIS fishery since the 1970s may be the most important factor.

The most notable changes in the population characteristics of local lobsters were observed in the proportion of egg-bearing females and their size structure, which may be related to changes in lobster growth and the size at which females become sexually mature. More than 90% of the egg-bearing females were sublegal-sized. Spawning of sublegal egg-bearing females may provide a significant buffer against recruitment failure, which could explain why the LIS lobster fishery is resilient to high levels of fishing.

However, the long-term sustainability of the Connecticut lobster fishery may now be threatened by the catastrophic die-off of lobsters observed in western LIS and the outbreak of shell disease in our area during 1999. Comprehensive examinations of water quality parameters and bottom sediments have failed to identify environmental conditions or toxins that could explain the lobster deaths. Pathologists have identified a parasitic amoeboid protozoan in lobsters collected from western LIS, which could be the causative agent for the die-off. The outbreak of shell disease in our area and the lobster die-offs in western LIS may also be caused by natural environmental factors, such as warmer water temperature, or natural population control mechanisms, such as increased transmission of diseases due to crowding resulting from sharply higher abundance of lobsters and density of lobster traps in recent years. The effects on the local lobster population of mass mortality in western LIS and the recent outbreak of shell disease should be immediately observable when our monitoring program resumes in May 2000.

Rocky Intertidal Studies

Several important operational events during more than 20 years of rocky intertidal monitoring have resulted in identifiable ecological changes to the shore community near the MNPS discharge. While measurable, these changes are not widespread, but remain restricted to approximately 150 m of shoreline on the east side of the power plant discharge to Long Island Sound. Thermal impacts to the shore community at Fox Island-Exposed (FE) were first observed in 1983, after the opening of the second quarry cut. Thermal addition to this site was modified when Unit 3 began commercial operation in 1986, and 3-unit operating conditions over the next eleven years allowed for long-term successional community development under a relatively consistent thermal regime. This community exhibited some changes during the extended shutdown of all three reactors from March 1996 through June 1998. Results of 1999 studies showed that the thermally adapted community at FE was highly resilient because as units returned to service, the characteristic components of this community quickly recovered.

Seasonal shifts in annual species at FE during 3-unit operation, and following Unit 3 restart in 1998 were documented by qualitative algal sampling. These shifts included abbreviated season for cold-water species (*e.g., Monostroma grevillei, Spongomorpha arcta* and *Dumontia contorta*) and extended season for warm-water species (*e.g., Grinnellia americana, Dasya baillouviana,* and *Bryopsis hypnoides*). Seasonality of these species at FE during the recent shutdown period was more typical of other sites. Initial establishment of perennial populations of *Graciliaria tikvahiae* and *Sargassum filipendula* at FE was also detected through qualitative studies during early 3-unit years. These populations were not observed during many collections at FE during the shutdown period, but returned after Unit 3 restart in 1998.

Dominant species abundance and distribution patterns at FE, established during 3-unit operation, were more resilient to the return of ambient conditions. Thermal impacts had been most notable in the low intertidal during 3-unit operation, due to tidal currents in the discharge area. The low intertidal *Chondrus* population and associated seasonal epiphytes at FE were replaced by a population of the opportunistic green alga *Codium fragile* supporting a perennial *Polysiphonia* spp.

population and periodically heavy sets of the blue mussel *Mytilus edulis*. Winter declines in *Polysiphonia* abundance typical of other sites was observed at FE during the shutdown period, but otherwise, little change in low intertidal community composition was observed, relative to recent years when MNPS was operating. Many characteristics of the impacted low intertidal community at FE (sparse, fluctuating populations of barnacles and *Chondrus*, heavy mussel sets) were probably related to the dominance of the *Codium* population, which persisted through the shutdown period, rather than direct thermal effects. This would explain the quick reversal of minor shutdown-related changes following unit restarts.

Ascophyllum growth enhancement at Fox Island, thought to be related to elevated temperatures from the 3-unit MNPS discharge, was observed during the two recent growing seasons (1996-97 and 1997-98) while all three units were shutdown, but was not evident in the latest season (1998-99), following Unit 3 restart. Natural temperature increases related to tidal flushing of water from nearby shallow flats susceptible to solar warming or other natural influences appear to play a more important role in determining *Ascophyllum* growing conditions at FN than does any thermal plume incursion from the MNPS discharge.

Eelgrass

Eelgrass is an ecologically important component of shallow water habitats. Eelgrass population monitoring has been part of marine environmental studies in the vicinity of MNPS since 1985. Eelgrass populations at three locations were monitored during 1999; Jordan Cove (JC), White Point (WP) and Niantic River (NR). The JC and WP sites have been consistently sampled since 1985 while the NR station has been changed several times since 1985 because of declines in the overall abundance of eelgrass in the Niantic River.

Eelgrass shoot density and standing stock biomass estimates have been most variable during the study period in the Niantic River, where reference stations have been monitored. During 1999, the eelgrass population parameters declined dramatically during the summer, and the entire eelgrass bed surrounding the monitoring station (NR#4) died off by August. There was a large increase in sediment silt/clay content at NR#4 in 1999 that may have contributed to the rapid demise of this population. This was the fifth time during the 15-year study that we have documented loss of an eelgrass bed in the Niantic River. Because the Niantic River is located well away from any influence of the MNPS thermal plume, declines at NR sites have been, and continue to be, related to other environmental factors such as water quality, disease or waterfowl grazing.

Eelgrass beds at the two monitoring sites nearest MNPS (JC and WP) have exhibited periodic fluctuations in shoot density and standing stock biomass, but have generally supported healthy populations throughout the 15-year study period, including 1999. These two populations are considered potentially impacted by the MNPS thermal plume, but temperature monitoring has shown only slight increases that may be attributed to a power plant influence. Rather, variability in water temperatures is more indicative of natural solar warming and hydrodynamic conditions in Jordan Cove. These natural factors are particularly influential at JC, which is the most shallow of the study sites, and is immediately adjacent to extensive shallow sand flats vulnerable to solar warming. We have not observed any relationship between WP and JC population fluctuations and power plant discharge flow and heat output. This suggests there has been little or no impact on these eelgrass beds. With Unit 1 permanently retired, the likelihood of thermal plume incursion at JC and WP in the future has been reduced.

Benthic Infauna

Monitoring studies of sedimentary environments and associated benthic infaunal communities in the vicinity of MNPS have been ongoing for more than 20 years. At three of four study sites, community composition has been modified by construction and operation activities at MNPS. The effects of continuous disturbance from the MNPS discharge were observed at one site (EF) throughout the 3-unit operating period. Discharge effects were interrupted after station shutdown in March 1996, and returned with Unit 3 restart in July 1998. Short-term disturbance events at two sites occurred more than 12 years ago (dredging activities at IN and siltation from discharge scouring after Unit 3 start-up at JC). Evidence of increased sediment stability and community recovery has been noted in recent years; however, some impact-related community changes were still observed during the 1999 study. Data from sampling at the control site, IN, continued to provide a baseline for natural variability in local infaunal communities.

Highest community stability over the study period was observed at GN, which is not influenced by MNPS. Sediment mean grain size was most variable at this site, but silt/clay content was least variable and no long term trends were apparent for either parameter. Silt/clay content at GN in June 1999 was the highest yet, and may have contributed to the high abundance of *Tharyx* spp observed on that sampling date. However, *Tharyx* abundance has been increasing at GN over the entire study period. The only other long-term trend observed at GN was a decline in *Aricidea catherinae* abundance. Otherwise, no major changes beyond regional trends in community composition have been observed over the study period, as the suite of dominant taxa has been similar from year to year, with abundance levels that have exhibited the least variability when compared to those at the other three stations.

Impacts related to past MNPS construction and operation events were noted earliest at IN, and were associated with dredging and coffer dam removal during Unit 3 construction from 1983-85. Since then, sediments (primarily silt/clay content levels) have stabilized and become more similar to sediments of pre-impact years. Ongoing community recovery is evident. In particular, numbers of individuals and species richness at IN have increased over the study period as have abundances of organisms typically more common in early study years or at other sites, such as *Aricidea catherinae* and *Tharyx* spp. These trends, along with concomitant decreases in abundance of *Nucula annulata* and other opportunistic species (*e.g.*, the amphipods *Leptocheirus pinguis* and *Ampelisca* spp.), indicate some degree of recovery at IN. Recovery at IN is not complete, however, as other organisms which have established post-impact community dominance, such as oligochaetes and *Protodorvillea gaspeensis*, maintained or increased their degree of dominance in recent years and may persist indefinitely.

Silt deposition at JC resulting from sediment scouring in the MNPS discharge area following Unit 3 start-up resulted in increased sediment silt/clay content and rapid infaunal community change. Abundances of the previously dominant oligochaetes and the polychaetes, *Aricidea catherinae, Tharyx* spp. and *Polycirrus eximius* decreased initially at JC. The long-term effects of this acute disturbance have evidently lessened since 1986. For example, *A. catherinae* and *Tharyx* spp. abundances both rebounded to levels observed during 2-unit years within a few years of Unit 3 start-up, and were near record highs in 1996. However, continued trends toward recovery noted in previous years (e.g., reduced silt/clay content during 1994 and 1995, and rebounding abundances of oligochaetes and *P. eximius* through 1993; NUSCO 1994, 1995) turned out to be short-term community changes not reflected in recent. Additionally, the opportunistic mollusc *Nucula annulata* has maintained a population at JC through 1999 with abundance well above pre-Unit 3 levels. Elevated silt/clay levels in sediments at JC continued to be observed through the shutdown period and following the restart of Unit 3 (1998) and Unit 2 (1999). The persistence of these fine sediments likely explains the limited degree of community recovery noted at JC.

Sediment scour from the MNPS discharge directly impacted both the sediments and the infaunal community at EF, particularly after Unit 3 startup in 1986. Relatively coarse sediment with low silt/clay levels were characteristic of 3-unit benthic habitat at EF. While sediment characteristics remain different from those observed prior to 1986, the altered sedimentary environment at EF, and the infaunal community it supports, stabilized under the new environmental conditions created by the 3-unit discharge. Oligochaete and *Protodorvillea gaspeensis* abundances in recent years have generally decreased to levels observed during the 2-unit period. The relative stabilization of the sediments at EF has also allowed for rebounds of *Tharyx* spp. and *Aricidea catherinae*, taxa common during 2-unit operation.

During the recent extended shutdown from March 1996 to July 1998, there were some shifts in the infaunal community at EF toward the 2-unit community state documented from 1980-1985. These shifts included a decline in oligochaete abundance and population pulses observed regionally (*e.g., Mediomastus ambiseta, Pygospio elegans* and *Tharyx* spp.). During 3-unit operation, because natural regional factors were overridden by plant discharge effects, region-wide pulses in the above taxa had not been observed at EF. Some evidence of the return of discharge effects were noted by September 1999, as sediment mean grain size increased and silt/clay content decreased, and oligochaete abundance increased relative to low abundance levels observed in 1998. These findings are not surprising since both Units 2 and 3 operated through the entire summer of 1999.

ATTACHMENT 2 to the

Millstone Unit 3 Environmental Protection Plan

Annual Environmental Protection Plan Operating Report
January 1 - December 31, 1999

NPDES Monthly Report - January 1999 (D13909)

Unit 3 Waste Test Tank Discharge

The Connecticut Department of Environmental Protection (DEP) was verbally informed on January 5, 1999 of a discharge from the Unit 3 Waste Test tank (WTT) to the yard drains system which discharges via DSN 006. Additional information was provided in a letter dated January 7, 1999 (D13781).

By way of background, the WTT is an above ground tank located outside the Unit 3 containment building which is authorized to be discharged to Long Island Sound via the Millstone quarry, DSN 001C, by way of DSN 001C-2. WTT wastewater typically contains boric acid and low levels of radioactive isotopes.

On January 3, 1999, WTT recirculation was initiated in preparation for sampling and discharge. On January 4, 1999, a decrease in tank level was observed and an operator was sent to inspect the tank. The operator discovered a leak of approximately 1 - 2 gallon per minute from the tank heater loop. The heater loop prevents the tank's contents from freezing during cold weather. The heater loop was immediately isolated stopping the leak. Radiological surveys conducted at 2:20 a.m. on January 4, of the asphalt area in the vicinity of the tanks did not indicate the presence of radiological contamination. A temporary berm had been previously set up to prevent any tank leakage from entering nearby storm drains. Apparently, due to freezing and thawing, the integrity of the berm was breached and some or all leakage from the WTT entered a nearby yard drain.

At approximately 6:30 a.m. on January 4, 1999, Unit 3 began sampling and analysis for radioactivity of the "A" WTT water contained in the wet well of successive yard drains downstream of the leak in an attempt to determine the extent to which waste water from the WTT may have migrated. Each yard drain containing radioactivity was pumped free of water and accumulated silt. At approximately 7:30 a.m., the last sample location prior to discharge, DSN 006, was sampled for radioactivity. Due to difficulties with analysis caused by sample matrix interference, the tritium analysis was not completed until approximately 8:00 p.m. on January 4. Radioactive tritium (a beta particle emitting isotope of hydrogen) was found in this sample at a concentration of 8.38×10^{-6} microcuries per milliliter (mci/ml). This concentration is orders of magnitude below the Nuclear Regulatory Commission Maximum Permissible Concentration of 3.0×10^{-3} mci/ml. A sample taken at 9:30 a.m. on January 5, 1999 for tritium was less than the minimum detectable activity (1.91×10^{-6} mci/ml). Gamma emitting isotopes were found to be less than the minimum detectable activity. Boron was found to be at a concentration of 6.8 ppm boron.

NNECo estimates that up to 1050 gallons (5% of tank capacity) may have entered the bermed area. Of this amount in the bermed area, approximately 200 gallons was recovered from the yard drains.

The WTT was removed from service until repairs to the loop were completed. Additionally, the temporary berm was sealed with a rubberized sealant. The yard drains near the WTTs were covered to prevent liquid from entering them while berm repair was made.

Circulating Water, Service Water and Screenwash Pump Lubricating Water

As discussed in previous correspondence and meetings with the DEP, both chlorinated and non-chlorinated water is used for lubrication and seal water for certain intake pumps. Procedural steps have been initiated at all three Units to limit such discharges. The Department issued an Emergency Authorization (EA0100128) for discharges resulting from the Unit 3 circulating water pumps, service water pumps and screenwash pumps on January 12, 1998 and granted NNECo's extension request on January 8, 1999. Additionally, the DEP issued Emergency Authorizations for Unit 1 (EA0100142) on October 23, 1998 and Unit 2 (EA0100143) on October 16, 1998. Pursuant to the terms of the Emergency Authorizations, monitoring results were reported to the DEP separately.

NPDES Monthly Report - February 1999 (D14064)

Discharge From the Ecolochem Charcoal Filter

NNECo informed the DEP on February 22, 1999 of the discharge of approximately 15 - 40 gallons of secondary plant make up water from a leaking Ecolochem charcoal filter vessel. A written report fully addressing the discharge was submitted on February 26, 1999 (D14000).

As set fourth in our written correspondence to the DEP, it is estimated that approximately 25 - 50 gallons of water leaked from the charcoal filter and out of the mobile unit. Approximately 10 gallons of water puddled outside the trailer on the pavement and was contained. NNECo estimates that 15 - 40 gallons of water flowed to a storm drain, mixed with other sources of waste water flowing to DSN 006 and ultimately was discharged via DSN 006. At approximately 8:30 a.m., the water leaking from the trailer, prior to discharge into the storm drain and mixing with other waste water, was sampled and analyzed for hydrazine. The result of this analysis was 9.7 ppm hydrazine. At 9:00 a.m., a sample was taken at DSN 006 and analyzed for hydrazine. The result of this analysis was 8.7 parts per billion (ppb), well below the permitted limit of 300 ppb daily maximum.

Discharge of Glycerin From Unit 3

The DEP was verbally notified on February 5, 1999 and in writing on February 10, 1999 (D13951) of the discharge of glycerin from the Unit 3 Ecolochem ultra-filters.

By way of background, New London city water is purified for use as pure make-up water to provide make-up water at Unit 3. Purification is accomplished by reverse osmosis (RO) unit, filters and ion exchangers located within the Ecolochem enclosure at Unit 3. Located just upstream of the Ecolochem unit are a bank of membrane (ultra) filters. These filters serve to remove suspended matter from domestic water to prevent fouling of the RO unit. Unit 3 is authorized by its NPDES permit to discharge, via DSN 001C-4, make-up demineralizer backwash wastewater. Discharges from the ultra-filters are part of this process.

New ultra-filter membranes are packed in 100% glycerin as a preservative and must periodically be replaced. As discussed in correspondence with the DEP on December 12, 1996 (D10559), glycerin is commonly used in the food industry and is neither an Appendix B or D substance. The new membranes are flushed free of glycerin prior to placing them in service. This is normally accomplished by flushing the ultra-filters to the Make-up Waste Neutralization Sump (MWNS) and discharged via DSN 001C-4.

On February 3, 1999, 51 ultra-filter membranes were replaced. The new membranes were inadvertently placed in service prior to being pre-rinsed and the glycerin was flushed into the Unit 3 make-up water system. The Condensate Storage Tank (CST) is the collection point for make-up water prior to use in the plant.

As discussed with the DEP on February 5, 1999, NNECo sampled the CST and transferred the contents to the MWNS for discharge via DSN 001C-4. In addition, the MWNS, DSN 006 and the drain line of the Ecolochem unit were sampled for glycerin. These samples were analyzed by the Travelers laboratory in Windsor, CT and glycerin was found to be less than the limit of detection (< 470 mg/l). However, as explained in our letter of February 10, 1999, because this water is used throughout the plant, there is the potential that make-up water containing glycerin may have been discharged via DSNs 001C-1, 001C-2, 001C-3, 001C-4, 001C-6 and 006.

NPDES Monthly Report - March 1999 (D14198)

DSN 001C-1

By way of background, Units 2 and 3 use resins to remove impurities from the condensate system to minimize corrosion of secondary plant components. As resin performance is depleted by this process, it must be periodically regenerated and backwashed.

On March 15, 1999, NNECo verbally informed the DEP that during sampling at the Unit 3 discharge on March 10, 1999, Millstone personnel discovered resin beads. During this period, Unit 3 was discharging one of the Condensate Polishing Facility (CPF) waste neutralization sumps (TK-10 and TK-11) via DSN 001C-6.

On March 11 and 12, 1999, Millstone personnel further sampled the Unit 3 discharge while TK-10 and TK-11 were being discharged. Sampling was performed exclusively for resin detection. No resin was detected in the Unit discharge from these samples.

An inspection of the filters at the discharge of TK-10 and TK-11 found the presence of resin beads. The individual filter cartridges were properly installed and displayed no abnormalities. It is suspected there may be resin in Tk-10 and TK-11 which may be the source of resin found in the Unit discharge sample. This matter was discussed with the DEP in correspondence dated March 19, 1999 (D14126).

Vendor Discharge

The DEP was verbally informed on March 15, 1999 and in writing on March 17, 1999 (D14106) about a spill of gasoline, motor oil and hydraulic oil which occurred as a result of a fire in the engine compartment of a contractor's snow removal vehicle.

Approximately 25 to 30 gallons of a fuel/oil mixture spilled to the ground and mixed with melting snow. The Waterford Fire Department extinguished the fire. Millstone Station personnel immediately initiated spill containment procedures and contained most of the fuel/oil mixture.

An oil sheen, and the odor of gasoline, was detected in a yard drain located approximately 300 feet downhill of the vehicle fire. Station personnel estimated that approximately one gallon may have entered a storm drain. No sheen was observed in the yard drains located further down stream. On-site Environmental Services personnel observed no visible oil sheen within the marsh.

NPDES Monthly Report - April 1999 (D14320)

No items pertaining to Unit 3 were included in this month's Discharge Monitoring Report.

NPDES Monthly Report - May 1999 (D14478)

Unit 3 Turbine Building Sump Discharge

The DEP was verbally advised on May 5, 1999 that, consistent with Millstone's NPDES permit, the Unit 3 turbine building sump had been directed to the radioactive waste system for processing.

By way of background, the normal discharge pathway for the turbine building sump is via DSN 006. Millstone's NPDES permit authorizes the discharge of wastewaters provided, among other conditions, that monitoring and reporting of radioactive liquid releases are performed in accordance with 10 CFR 20 "Standards for Protection Against Radiation". As part of Federal Nuclear Regulatory Commission (NRC) requirements, a radiation monitor is located at the turbine building sump discharge to monitor radioactivity levels prior to discharge. The discharge of the sump may be directed to the radioactive waste system (DSNs 001C-2 and 001C-3) if radioactivity is detected. On May 5, 1999, routine grab sampling and analysis of the turbine building sump detected trace amounts of cobalt 58 (a gamma emitting radioactive isotope) and tritium. Subsequently, the sump was directed to the radioactive waste system. Since that date, no further gamma emitting isotopes have been detected in the turbine building sump. The turbine building sump discharge continues to be directed to the radioactive waste system due the presence of tritium just above the limit of detection. These levels are well below NRC reporting criteria which are governed in 10 CFR Part 50.36a.

NNECo and the DEP have mutually agreed that the discharge of radioactivity is governed by 10 CFR Part 20 and the Unit 2 and 3 Safety Technical Specifications which allows the discharge of radioactivity via DSN 006. NNECo informed the DEP in writing on June 4, 1999 (D14460) that sampling protocols will be upgraded to further assure that all required data is recorded. Subsequently, consistent with the protocols discussed in the June 4, 1999 letter to the DEP, NNECo verbally notified the DEP that it had aligned the turbine building sump back to DSN 006. Radioactivity detected above the turbine building sump radiation monitor limits will be directed to the radioactive waste system consistent with permit conditions as discussed above.

Unit 3 Waste Test Tank Freon Sampling

On May 10, 1999, a portion of the Unit 3 Reactor Building Closed Cooling Water (RBCCW) system was drained to the containment sump to facilitate maintenance. The sump was pumped to the High Level Waste Drain Tank (HLWDT). The HLWDT was processed through ion exchangers and filters then directed to the Waste Test Tank (WTT) for discharge via DSN 001C-2. Since the RBCCW has the potential to contain freon, a sample from the WTT was sent to an off-site laboratory for freon analysis. The results indicated that freon was below the level of detection.

Millstone Quarry

The DEP was verbally informed on May 3, 1999 and in writing on May 8, 1999 (D14357) regarding the discovery of dead fish in the Millstone quarry (the "Quarry") on May 1, 1999. Eight (8) Gizzard Shad and one (1) Striped Bass were found in various stages of decay and were able to be removed from the fish barrier screens. Four (4) additional gizzard shad were observed on the barrier but could not be removed due to their depth. On May 6, 1999 eleven additional dead gizzard shad in an advanced state of decay were observed in the Quarry.

The exact cause of the fish mortality is not known. However, on Wednesday April 28, the Station cleaned the eastern-most fish barriers located at the quarry cut. Eleven barriers, each approximately 4 feet wide by 15 feet deep, were removed and cleaned one-at-a-time and then replaced. NNECo believes that the fish may have entered the Quarry during the cleaning process and experienced thermal stress while in the Quarry.

Unit 3 Discharge (DSN 001C) pH Below 6.0 Standard Units

For a period of approximately two minutes on May 28, 1999, the pH of the Unit 3 discharge dropped below 6.0 standard units. A review of Unit 3 discharges for this day has shown that no tanks or sumps were discharged via DSN 001C and therefor, the cause of this drop in pH is not known.

NPDES Monthly Report - June 1999 (D14677)

Unit 3 Steam Generator Blowdown Sampling (DSN 001C-1)

While reviewing data for the June 1999 DMR, it was discovered that daily sampling for ETA of the Unit 3 steam generator blowdown (DSN 001C-1) was inadvertently performed during periods with no blowdown flow on June 26 and 29, 1999. Millstone's NPDES permit requires daily sampling for ETA when a discharge occurs from a steam generator. NNECo had previously informed the Department that it is Millstone's practice to sample the steam generator blowdown (DSNs 001B-1 and 001C-1) while a discharge is occurring for the purposes of DMR reporting.

On June 26 and 29, 1999, steam generator sampling was performed prior to establishing blowdown flow. Results from these samples indicate that the ETA was less than the permit limit of 15 ppm. All other weekly samples were obtained during period of blowdown flow.

DSN 006

During performance of DSN 006 weekly 24 hour composite sampling in the month of June 1999 the time interval between samples was greater than one hour on two occasions. Millstone's NPDES permit requires composite sampling of DSN 006 over a twenty four hour period. On June 22, 1999 and June 30, 1999, the time difference between the collection of one of the hourly composite samples was greater than one hour by 20 minutes and 35 minutes respectively. All other composite samples for the month were taken appropriately.

Separately, on June 18, 1999, NNECo informed the DEP of elevated Total Suspended Solids (TSS) at DSN 006. By way of background, Millstone Station maintains a fire water protection system that is supplied by New London city water. The recent installation on an eighty foot section of piping was required to be flushed in accordance with National Fire Protection Association standards. Clean water drains, such as wastewater from the fire protection system, are authorized to be discharged via DSN 006.

On June 18, 1999, Millstone personnel performed a flush on the fire water protection system prior to placing the new piping in service. Anticipating the potential of particulate matter (e.g. rust, foreign material) and chlorine, the flush water was directed through a burlap bag onto pavement that flows to a swale which drains to trap rock and grass. Visual observations of the flush water flowing to the swale found it to be free of rust and foreign material. During the flush, some of the water flowed from the swale into a storm drain which ultimately discharges via DSN 006.

A sample was taken at DSN 006 approximately ten minutes after the piping flush was completed. Chemistry personnel observed that the wastewater at the discharge appeared discolored and obtained an additional sample for TSS which was found to be 71.5 ppm. The NPDES permit maximum instantaneous limit for this discharge is 30 ppm. A sample of DSN 006 taken approximately 2 hours later found that the TSS was 9.4 ppm.

NNECo believes that sand within the catch basin caused the high TSS concentration at DSN 006 rather than the flush water itself. Information on this matter was submitted to the DEP in writing on June 23, 19899 (D14552).

Hotwell Sampling (DSN 001C-8)

The Unit 3 hotwell (DSN 001C-8) was discharged on June 24, 25, 26, 27 and 28, 1999. Millstone's NPDES permit requires daily samples for total iron when the hotwell discharged. NNECo has previously discussed with the DEP that Millstone does not have an EPA approved method for total iron and that Millstone's practice is to ship these samples off-site for analysis. These samples are primarily sent to Northeast Utilities West Springfield Laboratory. However, routine screening prior to shipment detected the presence of tritium in the June 24, 25, 26 and 27, 1999 samples. Subsequently, these samples were sent to the Binax Laboratory in Maine which is licensed to receive radioactive samples.

Fish Barrier

NNECo has previously discussed with the DEP the need to maintain the Quarry discharge fish barrier at Millstone Station. NNECo informed the DEP that the fish barrier was in need of repaired and issued a Certificate of Permission (COP-98-101-KZ). On June 7, 1999 (D14488), NNECo informed the DEP that repairs to Quarry fish barrier were completed on June 4, 1999.

Lithium and TSS Methodology

NNECo verbally informed the DEP on July 20, 1999 of its discovery that Chemistry Department methodologies for total lithium and Total Suspended Solids (TSS) in use at Millstone Station were not consistent with EPA/DEP regulations.

For TSS, steps in the Millstone procedure relative to the drying process are not consistent with EPA procedures. The EPA approved methodology for TSS requires, in part, that the sample filter drying process be repeated until "weight loss is less than 4% of previous weight or 0.5 mg, whichever is less." The Millstone Station procedure states that the sample filter be dried once prior to weighing. Chemistry personnel are in the process of modifying the TSS procedure to reflect the practices of the EPA approved methodology.

Millstone Station's NPDES permit requires monitoring for total lithium at only one location: the Unit 3 Radiation Waste Test Tank discharge (DSN 001C-2). The chemistry procedure used at Millstone Station analyzes for dissolved lithium. Upon review, an EPA approved methodology for total lithium does not exist. Information on this matter was submitted to the DEP in writing on August 13, 1999 (D14791).

NPDES Monthly Report - July 1999 (D14777)

Ecolochem

The DEP was verbally informed of the discharge of dilute sulfuric acid solution via DSN 006 on July 15, 1999 and in writing on July 19, 1999 (D14687).

By way of background, Millstone Units 2 and 3 are supplied with plant make up water by two (one for each Millstone unit) vendor operated water purification units. These units, fully operated by an outside vendor (Ecolochem, Inc.), purify New London City water by a series of reverse osmosis (RO), filtration and ion exchange vessels. Prior to flowing through the RO unit, pH of the water may be adjusted (lowered) to optimize the purification process by injecting dilute sulfuric acid solution. The dilute acid solution is prepared in an acid 'day tank' by adding concentrated sulfuric acid (approximately 95% by weight) and diluting the concentrated acid with water to a concentration of approximately 2% by weight.

On the evening of July 15, 1999, a representative of Ecolochem prepared a new batch of dilute sulfuric acid solution. During the dilution process, the water supply valve was inadvertently left open. This occurred near the close of the operator's shift. At the beginning of the next shift, approximately 7:10 P.M., the on-shift operator did not observe any unusual activity.

The open water supply valve resulted in overflow from the day tank to a secondary containment. The secondary containment then overflowed to the pavement, and then to a nearby yard drain and was ultimately discharged via DSN 006. At approximately 8:20 p.m., the secondary containment was observed overflowing at a rate of approximately one gallon per minute. NNECo estimates that approximately 70 gallons of dilute 2% sulfuric acid solution flowed to DSN 006 where it mixed with permitted sources of wastewater prior to entering Niantic Bay.

Upon discovery of this condition, the water supply valve was immediately closed. A sample taken from DSN 006 at 8:30 p.m. indicated that the pH was 5.83. The NPDES permit limit for pH for this discharge is 6.00 - 9.00. A follow-up sample taken at 8:55 p.m. found the pH to be 6.96.

Unit 3 Condensate Discharge

NNECo verbally informed the DEP on July 6, 1999 of a bypass of the Unit 3 Condensate Polishing Facility (CPF) resulting in a discharge of condensate waste water via discharge serial number (DSN) 006. Further information was provided in writing on July 12, 1999 (D14624).

By way of background, Millstone Unit 3 maintains a CPF which utilizes ion exchangers and filters to remove impurities from the feed water and condensate systems. The ion exchangers periodically require regeneration to maintain functionality. Wastewater which results from the regeneration process as authorized by NNECo's NDPES permit is directed to tanks (TK-10 and TK-11) for discharge. The tanks are neutralized to a pH of 6.00 to 9.00 and discharged via DSN 001C-6.

At approximately 9:30 p.m. on July 5, 1999, Millstone personnel observed water on the Unit 3 turbine building floor flowing into the turbine building floor drains which flow to the turbine building sump (TBS). The TBS discharges via DSN 006. An immediate investigation indicated that an ion exchanger vent valve was open allowing water from the condensate system to flow into TK-10. The open vent caused the condensate waste water to overfill TK-10 and flow to the turbine building floor drains. The ion exchanger vent valve was immediately closed when it was discovered that this was the cause of the event.

NNECo estimates that approximately 3,200 gallons of waste water flowed from TK-10 to the TBS and, ultimately, to DSN 006 over a four and one half hour period. This wastewater would have mixed with approximately 100 gallons per minute of reverse osmosis wastewater from the Millstone Ecolochem units, as authorized by the Millstone NPDES permit, prior to discharge via DSN 006.

Millstone is allowed to discharge incidental concentrations of ethanolamine (ETA) and hydrazine resulting from previously authorized additions of ETA and hydrazine to secondary systems at Units 2 and 3 via DSN 006 in Emergency Authorization (the Authorization) EA0100143 issued October 16, 1998. The hydrazine limits described in the Authorization for DSN 006 are: 1) a monthly average of 50 parts per billion (ppb) and 2) 300 ppb daily maximum. The Authorization does not specify any ETA limit. While a 'bypass' is not covered in the Authorization, it does not appear that the DSN 006 hydrazine limits were exceeded.

Unit 3 Sodium Hypochlorite Injection System

On July 6, 1999, Millstone Station personnel discovered a leaking isolation valve in the Unit 3 service water sodium hypochlorite injection system. Unit 3 continuously injects dilute sodium hypochlorite solution to the discharge of service water pumps during operation. The leaking isolation valve directed some sodium hypochlorite solution to the 'D' service water pump which was not in operation. The sodium hypochlorite solution most likely drained from the discharge of the non-operating service water pump to the circulating water tunnel and was ultimately discharged via DSN 001C by the operating circulating water pumps.

Unit 3 Steam Generator Blowdown Sampling (DSN 001C-1)

While reviewing data for the July 1999 DMR, it was discovered that there was one day (July 10, 1999) when daily sampling for ETA of the Unit 3 steam generator blowdown discharge (DSN 001C-1) was inadvertently performed during a period with no discharge flow and two days (July 11 and 30, 1999) when ETA samples were inadvertently not taken when a steam generator discharge occurred. Millstone's NPDES permit requires daily sampling for ETA when a discharge occurs from a steam generator. NNECo had previously informed the Department that it is Millstone's practice to sample the steam generator blowdown (DSNs 001B-1 and 001C-1) while a discharge is occurring for the purposes of DMR reporting.

On July 10, 1999, steam generator sampling was performed prior to establishing discharge flow. Results from these samples indicate that the ETA was less than the permit limit of 15 ppm. All other weekly samples were obtained during period of discharge flow.

NPDES Monthly Report - August 1999 (D14868)

Chlorine Methodology

NNECo verbally notified the DEP on August 24, 1999 of the chlorine analysis methods currently in use at the Millstone Nuclear Power Station. Specifically, that the analytical methods for total residual chlorine (TRC) and free available chlorine (FAC), spectrophotometric N,N-diethyl-p-pheylenediamine or DPD, currently in use at Millstone may not be consistent with the requirements of 40 Code of Federal Regulations (CFR) Part 423, Steam Electric Power Generating Point Source Category. All service water and circulating water FAC and TRC results recorded on this month's DMR forms are the result of the DPD methodology. NNECo informed the DEP in writing on September 24, 1999 (D14968) that amperometric titrators have been purchased and that analytical procedure development is underway.

NPDES Monthly Report - September 1999 (D15031)

DSN 006 Composite Sampling

Millstone's NPDES permit requires the performance of a weekly 24 hour flow proportioned composite sample on DSN 006. To accomplish this, Chemistry department personnel obtain hourly flow readings and a sample for pH and composite formation. Samples are also taken at four hour intervals each week for Total Residual Chlorine (TRC) and monthly for oil & grease to perform a grab sample average. Additionally, Emergency Authorization EA0100143R requires that hydrazine and ETA grab samples be obtained at four hour intervals once per month.

During weekly sampling initiated on September 9, 1999, one of the six TRC samples was not recorded. The technician responsible recalls performing the TRC analysis. His recollection is that the result was above the limit of detection (0.03 ppm) but less than maximum instantaneous limit (0.24 ppm). As a result, the grab sample average calculation for the second week was performed with five samples instead of six.

Unit 3 Condensate Spill

On September 16, 1999, NNECo verbally informed the DEP of a discharge of demineralizer water via Millstone DSN 006. Additional information on this matter was provided in a letter dated September 17, 1999 (D14941).

By way of background, Millstone Unit 3 directs its steam condensate to the condensate polishing facility (CPF). The CPF consists of eight demineralization beds which remove impurities from the condensate water, including corrosion products, prior to discharge via DSN 001C-6.

At approximately 7:30 a.m. on September 16, 1999, an employee working in the area of one of the demineralization beds, inadvertently slipped and broke an electrical solenoid that operates a valve on a waste water line. This valve, by design, opened upon failure of the solenoid. As a result, condensate water potentially containing resin, hydrazine, ETA and trace levels of radioactivity (below NRC permissible concentrations) flowed to several sumps that ultimately discharge to DSN 006.

Corrective actions were promptly taken; the leak was isolated and the turbine building sump (TBS) pumps were secured. Follow-up actions included sampling of the TBS and DSN 006 for ETA and hydrazine. ETA was less than detection (<100 ppb) at both locations. Hydrazine was 7 ppb in the TBS and less than detection (<5 ppb) in DSN 006. As part of spill cleanup, wastewater collected in the various sumps were pumped to portable containers for proper disposal.

Unit 3 Steam Generator Blowdown (DSN 001C-1)

Unit 3 initiated a steam generator blowdown discharge on September 25, 1999 at about 0:30 a.m. At approximately 2:10 a.m. Chemistry personnel obtained samples and discovered that the flow indicators were not operating properly. The control room was immediately notified and the discharge was stopped at about 2:35 a.m. The flow indication was repaired and the discharge resumed at approximately 10:56 a.m. Based on the initial steam generator blowdown alignment, NNECo conservatively estimates the flow rate from each steam generator to be 40 gallons per minute. This value was used in determining the total volume discharged for this time period from DSN 001C-1.

Unit 3 Turbine Building Sump Diversion to Radioactive Waste System

NNECo verbally informed the DEP on September 30, 1999, that the Unit 3 turbine building sump (TBS) had been diverted from DSN 006 to the radioactive waste system (DSNs 001C-2 and 001C-3) due to the presence of tritium. Previous discussions and written correspondence with the DEP, including a letter dated June 4, 1999 (14460), confirmed that the discharge of radioactivity via DSN 006 is governed by 10 CFR Part 20 and the Millstone Units 2 and 3 Safety Technical Specifications. As a result, NNECo conservatively established a tritium activity limit of 1.0×10^{-5} μci/ml (the radiological effluent discharge limit of detection). The TBS would be diverted to radioactive waste system whenever the tritium activity exceeds this limit.

On September 29, 1999, routine grab sampling and analysis indicated that the tritium activity was 1.2×10^{-5} μci/ml. The TBS was diverted to the radioactive waste system for discharge via DSNs 001C-2 and 001C-3.

Unit 3 Test Tank Containment Berm

NNECo has twice verbally discussed with the DEP protocols for water contained within the berm surrounding the Unit 3 Waste Test Tanks and Boron Test Tanks. NNECo's practice is to sample the water in the berm for radioactivity, ETA and hydrazine. If any of these parameters are detected, the wastewater is collected for proper disposal. If none are detected, the wastewater is pumped to the storm drain system and discharged via DSN 006. Appropriate radiological effluent release criteria are under review and will be resolved with the Nuclear Regulatory Commission.

As discussed with the DEP, trace levels of toluene have been detected in some previous wastewater samples taken from the berm. However, recent sampling (taken prior to DMR submittal) did not find toluene about detectable limits (<1 ppb).

Turbidity, specific conductivity, dissolved oxygen and pH analytical methodologies

On September 30, 1999, NNECo advised the DEP that its analytical methods for dissolved oxygen, turbidity, specific conductivity and pH were not identical to EPA approved methods. While no significant variations were noted, these differences were discussed with the DEP in writing on November 1, 1999 (D15015).

NPDES Monthly Report - October 1999 (D15140)

DSN 006 Composite Sampling

Millstone's NPDES permit requires the performance of a weekly 24 hour flow proportioned composite sample on DSN 006. To accomplish this, Chemistry department personnel obtain hourly flow readings and a sample for pH and composite formation. Samples are also taken at four hour intervals each week for Total Residual Chlorine (TRC) and monthly for oil & grease to perform a grab sample average.

During weekly sampling initiated on October 12, 1999, one of the six TRC samples was inadvertently not recorded. As a result, the grab sample average calculation for the second week was performed with five samples instead of six. However, the technician responsible recalls performing the TRC analysis and that the result was above the limit of detection (0.03 ppm) but less than maximum instantaneous limit (0.24 ppm).

Unit 3 Turbine Building Sump Diversion to Radioactive Waste System

Previous discussions and written correspondence with the DEP confirmed that the discharge of radioactivity via DSN 006 is governed by 10 CFR Part 20 and the Millstone Units 2 and 3 Safety Technical Specifications. As a result, NNECo would divert the TBS to the radioactive waste system during periods of elevated tritium activity. NNECo informed the DEP in the September DMR that on the September 29, 1999 the Unit 3 TBS had been diverted from DSN 006 to the radioactive waste system (DSNs 001C-2 and 001C-3). During the month of October 1999, the TBS remained diverted to the radioactive waste system.

Unit 3 Waste Test Tank (DSN 001C-2) Sampling

Millstone's NPDES permit requires weekly sampling of the Waste Test Tank (WTT) for total lithium. On October 7, 1999, a WTT discharge occurred and a lithium sample was obtained for analysis at a later date . However, the sample was inadvertently disposed of without the lithium analysis being performed.

Unit 3 Condensate Polishing Facility (DSN 001C-6) Sampling

Millstone's NPDES permit, as modified on December 9, 1993, requires daily sampling for ETA of the Condensate Polishing Facility (CPF) regeneration wastewater discharge (DSN 001C-6). As part of the DMR for the month of October, the DEP was informed that the ETA analysis for a CPF discharge on October 9 was inadvertently not performed. However, the DEP was subsequently informed (in the November DMR) that a review of the instrument log located the sample result for this discharge, which was within permit limits.

NPDES Monthly Report - November 1999 (D15236)

Unit 3 Turbine Building Sump Diversion to Radioactive Waste System

As discussed in detail in the September and October 1999 DMRs, due to elevated tritium activity, the Unit 3 turbine building sump (TBS) was diverted from DSN 006 to the radioactive waste system (DSNs 001C-2 and 001C-3). During the month of November 1999, consistent with protocols established with the DEP, the TBS was diverted to the radioactive waste system except for the period between November 22, 1999 to November 30, 1999 when tritium levels were less than detection.

NPDES Monthly Report - December 1999 (D15393)

Unit 3 Turbine Building Sump Diversion to Radioactive Waste System

As discussed in detail in the September, October and November 1999 DMRs, due to the presence of low levels of tritium activity, the Unit 3 turbine building sump (TBS) was diverted from DSN 006 to the radioactive waste system (DSNs 001C-2 and 001C-3). During the month of December 1999, consistent with protocols established with the DEP, the TBS was diverted to the radioactive waste system.

Water Treatment System

NNECo submitted a request for determination to the DEP on December 20, 1999 (D14466) regarding proposed changes to the Station's pure water treatment system. NNECo had previously contracted with a vendor, Ecolochem, Inc., to provide pure make-up water at Millstone. Ecolochem operated two systems, one located near Unit 2 that supplies make up water to Units 1 and 2 and another located near Unit 3 that supplies make up water to Unit 3.

In its continuing efforts to minimize Millstone's environmental impact, NNECo has investigated alternative methods and selected a pure water system to be operated by Ionics, Inc. This new system will ultimately eliminate hydrazine as a de-oxygenation chemical in the pure water make-up process, reduce wastewater generation by an estimated 30 percent and eliminate the need for feed water chemical pH adjustment. NNECo's proposal for replacement of both Ecolochem systems with a single Ionics system was authorized by the DEP on December 23, 1999, (C09746) under the terms and conditions of Millstone's current NPDES permit.