Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385

Dominion

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

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DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
2006 ANNUAL ENVIRONMENTAL PROTECTION PLAN OPERATING REPORT

In accordance with Section 5.4.1 of the Environmental Protection Plan (EPP), Dominion Nuclear Connecticut, Inc. hereby submits the Annual Environmental Protection Plan Operating Report (AEPPOR), describing implementation of the EPP for the previous year. Enclosure 1 transmits information for the period of January 1, 2006 to December 31, 2006.

Should you have any questions regarding this report, please contact Mr. Gary Johnson, Environmental Services, at (860) 447-1791, extension 0757.

Very truly yours,

J. Alan Price
Site Vice President - Millstone

IE25

Enclosures: 1

Commitments made in this letter: None.

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Serial No. 07-0278
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Enclosure 1

MILLSTONE POWER STATION UNIT 3
2006 ANNUAL ENVIRONMENTAL PROTECTION PLAN OPERATING REPORT

MILLSTONE POWER STATION UNIT 3
DOMINION NUCLEAR CONNECTICUT, INC. (DNC)

Annual Environmental Protection Plan Operating Report
January 1 - December 31, 2006

Millstone Unit 3 Environmental Protection Plan

Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, Connecticut 06385

April 2007

2006 Annual Environmental Protection Plan Operating Report (AEPPOR)

1. Introduction

This report covers the period January 1, 2006 through December 31, 2006. During 2006, Millstone Power Station Unit 3 (MPS 3) reported a capacity factor of 100.3%; the current cycle 11 (10/27/05 through 04/07/07) capacity factor was 98.4%. MPS 3 refueling outage 3R11 began on April 7, 2007.

As required by the MPS 3 Environmental Protection Plan (EPP), this AEPPOR includes:

- summaries and analyses of the results of environmental protection activities,
- a list of EPP noncompliances,
- a list of all changes in station design or operation which involved a potentially significant unreviewed environmental question, and
- a list of non-routine reports, describing events that could have resulted 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 Millstone Power Station (MPS) NPDES permit requires continuation of biological studies of supplying and receiving waters, entrainment, 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 the Connecticut Department of Environmental Protection (DEP). The report that fulfills these requirements for 2006, Annual Report 2006 - Monitoring the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, Connecticut (Annual Report), presents results from studies performed during construction and operation of MPS, emphasizing those of the latest sampling year. Changes to the biological communities noted in these studies are summarized in the Executive Summary section of the Annual Report, which is attached as part of this report.

2.2 Effluent Water Quality Monitoring

Paragraph 3 of the MPS NPDES permit requires monitoring and recording of many water quality parameters at MPS 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 DEP. The report that fulfills these requirements, the Monthly Discharge Monitoring Report (DMR), includes data from all Millstone units. Consistent with prior annual AEPPOR submissions, water flow, temperature, pH, and chlorine data pertaining to MPS 3 are summarized in Table 1.

Each monthly DMR identifies NPDES permit exceedances (i.e., events where a parameter value was beyond permitted limits) or exceptions (i.e., events where permit conditions were not met) for the month. There were no NPDES exceedances or exceptions for MPS 3 circulating or service water discharges reported in 2006.

Other events dealing with NPDES discharges are also included in the DMRs to provide the DEP with additional information. Information pertaining to events that occurred in 2006 and were reported to the DEP in the monthly DMRs, while unrelated to MPS 3's cooling water discharge but containing wastewater inputs from MPS 3, are extracted from the February and September 2006 DMRs as follows:

a) DSN 001C-6 (MPS 3 Condensate Polisher Regeneration Wastewater Neutralization Tank Discharge

- On February 3, 2006 at 0955, during the first 10 minutes of a DSN 001C-6 discharge, the associated inline pH meter alarmed. As a result, the condensate polisher facility (CPF) operator secured the discharge. Approximately 1,380 gallons were discharged. Under DNC's NPDES Permit, pH, at both DSN 001C and DSN 001C-6, is to be within a range of 6.0 to 9.0 standard units (su). During the time of the discharge, the recorded pH measurements at the Millstone Unit 3 discharge (DSN 001C) were within normal range. However, a grab sample of the contents of the tank for pH, taken after the tank was secured, indicated a pH of 9.4. Subsequently, the tank was again neutralized to the range 6.0 – 9.0 su and discharged. Grab samples obtained during the discharge were all between 6.0 and 9.0 su for pH.

  Upon investigation, the apparent cause for this event was sodium hydroxide remnants adhering to the top of the sump that were diluted back into wastewater during the discharge. Sodium hydroxide is used for neutralization of the sump. The sump is normally discharged when approximately 90% full, but this tank level was 98%.

Table 1

MPS 3 NPDES Data Summary, Jan. 1 - Dec. 31, 2006. Selected water quality parameters for MPS 3[1].

	Discharge Flow (max) (10^6 gpd)	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.	1357.5	7.8-7.9	56.5-69.3	61.2	17.8	0.17	0.04	0.19
Feb.	1357.1	7.8-7.9	53.8-66.3	59.0	17.3	0.18	0.04	0.17
Mar.	1357.2	7.8-8.2	53.9-63.1	58.1	16.5	0.17	<0.03	0.19
Apr.	1356.5	7.9-8.2	60.1-73.2	63.8	16.6	0.12	<0.03	0.22
May	1357.1	7.9-8.1	64.9-76.3	69.4	15.8	0.14	<0.03	0.20
June	1357.2	7.5-8.1	70.4-82.7	75.7	15.4	0.14	0.03	0.19
July	1356.5	7.8-8.2	78.6-89.6	83.4	15.7	0.09	0.03	0.23
Aug.	1358.3	7.8-8.2	82.9-92.9	86.1	15.9	0.11	0.06	0.22
Sep.	1357.3	7.8-8.2	81.4-89.6	83.9	15.3	0.12	0.05	0.20
Oct.	1357.3	8.0-8.2	66.6-84.1	78.4	15.0	0.09	0.03	0.24
Nov.	1356.6	7.9-8.1	69.4-80.0	72.3	15.5	0.14	<0.03	0.19
Dec.	1357.3	7.9-8.0	62.2-77.6	66.9	16.8	0.11	0.04	0.19

Notes:

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

Abbreviations Used:

Temp. = Water Temperature
ΔT = Delta-T (difference between discharge and intake water temperature)
FAC = Free Available Chlorine
TRC = Total Residual Chlorine
SWS = Service Water System

Attachment to the
2006 Annual Environmental Protection Plan Operating Report
January 1 – December 31, 2006

Executive Summary Section of
"Annual Report 2006 - Monitoring the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, Connecticut"
dated April 2007

Executive Summary

Winter Flounder Studies

The local Niantic River winter flounder population is potentially affected by the operation of Millstone Power Station (MPS) primarily through entrainment of larvae in the condenser cooling-water systems. To assess possible effects, the abundance of adult spawners is measured within the Niantic River and larvae are sampled at the plant discharges and in the Niantic River and Bay during late winter and early spring. Settled age-0 juveniles are collected in the river in summer.

The relative abundance of adult spawners in 2006 was 1.1 fish per trawl tow (catch-per-unit-effort; CPUE), the lowest value since 1976, when this study began. Over the past decade, abundance of winter flounder spawners has remained at a relatively low level, with CPUE fluctuating around 1-2 fish per tow. Absolute abundance of the spawning population present in 2005 (the latest year for which an estimate could be made) was nearly 7 thousand fish, the largest estimate since 2002. Using another methodology, female spawner abundance estimates ranged from approximately 1.6 thousand (2006) to 75 thousand (1982) and corresponding total egg production estimates were 1.1 to 44.8 billion. The population decline occurring after the early 1980s was also seen in other Southern New England populations. During the past 2 decades, Niantic River winter flounder abundance represented an estimated 0.4 to 3.4% of the entire winter flounder resource in Long Island Sound (LIS).

In 2006, Stage 1 (newly hatched) larvae were initially abundant in the Niantic River, but suffered high mortality. Reduced mortality in later developmental stages, however, resulted in relatively abundant Stage 4 (pre-metamorphosis) larvae in the Niantic River and Bay. Since 1995, more Stage 1 larvae were found than expected from low adult spawner abundance, suggesting a density-dependent compensatory mechanism during the egg stage that is attributed to reduced predation on eggs by sevenspine bay shrimp. Thus, when egg densities are low, there is higher egg survival producing more Stage 1 larvae. Density-dependent mortality is also present during the larval period of life, as an analysis suggested that mortality decreased with decreasing egg production (a measure of early larval abundance), which was further moderated by warmer spring water temperatures that allowed for faster larval development.

Following larval metamorphosis and settlement, densities of age-0 young in the Niantic River were relatively high this year. However, their mortality rate was at an all-time high and few fish were left at the end of summer and into fall and winter. Relatively high juvenile mortality rates in a few other years also reduced abundance of potentially larger year-classes. Abundance indices of age-0 fish were either not significantly correlated or were negatively correlated with the abundance of female adult spawners 3 to 5 years later. Conversely, positive correlations were found between age-1 abundance indices and these older fish. However, there was much scatter in these relationships and none of the early life stages were considered to be reliable predictors of potential future year-class strength.

The number of larvae entrained is a measure of potential impact to winter flounder. In most years, Stage 3 larvae predominated in entrainment collections. Annual estimates of entrainment are related to both larval densities in Niantic Bay and MPS operation. The 2006 entrainment estimate of about 276 million reflected relatively high larval densities and sustained operation of Units 2 and 3, with no associated spring outages. The retirement of Unit 1 reduced potential MPS entrainment by about 23%, which is equivalent to an estimated 93 million larvae this year.

Annual entrainment density (abundance index divided by total seawater volume) has varied without trend since 1976, indicating that larval production and availability in Niantic Bay remained relatively stable despite increased water use during the 1986-95 period of three-unit operation and reduced cooling-water demand in 1995-97. Correlations between entrainment estimates and abundance indices of post-entrainment age-0 juveniles were positive. This implies no entrainment effect as the more larvae that were available to be entrained, the more larvae that metamorphosed and settled in Niantic River and Bay. This was also demonstrated by a comparison of annual entrainment and juvenile year-class abundance, which suggested that entrainment estimates were simply a measure of emerging year-class strength. Thus, entrainment is not the most important factor in determining juvenile abundance.

The potential impact of larval entrainment on the Niantic River stock depends upon the fraction of the annual winter flounder reproduction entrained each year (termed production loss in this report), which was calculated as equivalent eggs removed by entrainment. Empirical mass-balance model calculations showed that a large number of entrained larvae came from a number of sources in LIS besides the Niantic River. Based on the increase in egg survival noted in recent years, a factor that was not originally incorporated into the mass-balance model, most production loss estimates from 1995 through 2005 are probably conservatively high. Correcting the estimates made since 1995 by using a higher egg survival rate resulted in lower production loss estimates (revised long-term mean = 11.4%).

The small adult spawning stock in the river continues to produce relatively large numbers of larvae and young fish, which are a likely result of population compensatory mechanisms. Despite relatively good abundance of age-0 winter flounder (a life stage not entrained) in many recent years, significant recruitment to the adult spawning population has not occurred. Processes that are unrelated to MPS operation and which occur after juvenile winter flounder leave shallow nursery waters during the fall of their first year of life seem to be operating to produce fewer adults. A bottleneck, probably from predation, appears to be occurring during the late juvenile life stage (ages-1 and 2). Environmental effects, including changes to the Niantic River habitat, a warming water temperature trend, and interactions with other species (e.g., predation), especially during early life history, are also important processes affecting winter flounder population dynamics.

Fish Ecology Studies

Monitoring during 2006 indicated that no long-term abundance trends in various life stages of seven selected taxa could be directly related to the operation of MPS. No significant long-term trends were detected for juvenile or adult silversides collected by trawl or seine. Similarly, no long-term trends were identified in American sand lance larvae and grubby larvae, juveniles, and adults. Atlantic menhaden larvae showed a significantly increasing trend in abundance, as did juveniles taken by seine and trawl. Densities of both anchovy eggs and larvae during 2006 continued to show significant negative trends. The bay anchovy has experienced a regional decline in abundance. This species is important forage for predatory fishes and birds. In particular, the striped bass has recently increased in abundance along the Atlantic coast and may have contributed to reduced numbers of bay anchovy.

Data collected during 2006 continued to show no long-term abundance trends in the numbers of entrained cunner and tautog eggs and larvae. Juvenile and adult cunner and tautog have significantly decreased at the Intake trawl station, but the decline was attributed to the 1983 removal of the Unit 3 intake cofferdam, a preferred habitat for these species. Since that time, no significant abundance trend was found from 1984 through 2006. Cunner abundance significantly increased at the Niantic River trawl station and continued to fluctuate without trend at Jordan Cove. The combined catches of juvenile and adult tautog collected at the three trawl stations increased, probably as a result of more restrictive fishing regulations. Significant increases in tautog abundance were found in Niantic River trawl catches and in both Jordan Cove trawl and lobster pot catches.

Changes in the overall species composition and temporal and spatial abundance of fishes and shellfishes collected by trawl over the past 30 years appeared to be unrelated to MPS operation. Shifts in the dominance of individual taxa were attributed to changes in habitat, range extensions or contractions, and warmer ambient seawater temperatures occurring over the past 3 decades.

Cooling-water use at MPS was reduced 23% from the shutdown of Unit 1, resulting in less entrainment and impingement. Fish return systems at Units 2 (2000) and 3 (1986) further reduce impingement mortality at MPS. Based on the lack of decreasing trends for all taxa except anchovies, MPS has had minimal effect on local fish and shellfish assemblages.

Lobster Studies

Impacts associated with recent MPS operations on the local lobster population were assessed by comparing results of the 2006 study to data collected from 1978 to 2005. Emphasis has been placed on assessing long-term trends in the abundance and population characteristics of lobsters collected in the Millstone Point area.

No significant long-term trends were identified in the annual CPUE of lobsters (combined over all sizes and stations) collected either in pots or by trawl. At each of the three monitoring stations, the total pot-CPUE of lobsters has varied without trend since 1978. However, the CPUE of legal-size lobsters has exhibited a significant declining trend at the Jordan Cove and Twotree stations, but not at the Intake station located nearby MPS. Of note, the abundance of legal-size lobsters harvested by commercial fishers in our area increased over the past few years. During 2006, lobster landings in our area were 50% higher than the landings reported during 2003.

Although the local lobster population was stable through 1999, the lower abundance of lobsters observed in pots and in trawl catches from 2000 to 2006 was attributed to an increase in natural mortality associated with a shell disease affecting lobster populations from eastern LIS to the Gulf of Maine. This mortality was unrelated to MPS operation. The recent declines in the CPUE of legal-size lobsters were attributed, in part, to this outbreak of shell disease and also to a 3 mm increase in the minimum legal-size since 1978. Increased ambient water temperature may be responsible for the increased susceptibility and transmission of diseases affecting lobsters in LIS, which are near their southern range of distribution in nearshore waters.

The number of lobster larvae entrained through the MPS cooling water systems has not resulted in a decrease in local lobster abundance. Impacts associated with entrainment and impingement of lobsters at MPS have been greatly reduced by the shutdown of Unit 1, which eliminated 23% of the cooling water used, and the installation of aquatic organism return systems at Units 2 and 3, which return impinged lobsters to Niantic Bay with high survival.

Rocky Intertidal Studies

Rocky intertidal monitoring studies during 2006 continued to document ecological changes to the shore community near to, and associated with, the MPS thermal discharge. These changes are not widespread, and remain restricted to approximately 150 m of shore-line on the east side of the power plant discharge to LIS.

Seasonal shifts in occurrence of annual algal species were noted at the Fox Island-Exposed (FE) monitoring site during 2006. These shifts included an abbreviated season for cold-water species (*e.g.*, *Monostroma grevillei, Spongomorpha arcta,* and *Dumontia contorta*) and an extended season for warm-water species (*e.g.*, *Grinnellia americana, Dasya baillouviana,* and *Bryopsis hypnoides*). Similar shifts have been observed in most years since Unit 3 began operation (1986), with the exception of the extended shutdown of all MPS units from March 1996 to June 1998, when seasonality of these species at FE during the recent shutdown period was more typical of other sites.

Thermal effects on dominant species abundance and distribution patterns were also evident at FE in 2006 and most apparent in the low intertidal zone. Seasonally high abundance of *Hypnea musciformis*, a species observed for the first time in 2001, and expanded populations of *Sargassum filipendula, Corallina officinalis*, and *Gelidium pusillum* now characterize the lower shore community at FE. *Polysiphonia* spp. maintained a perennial population at FE in 2006, but occurred mainly as a summer annual at sites unaffected by MPS.

Ascophyllum nodosum growth during 2005-06 continued to exhibit no clear relationships among our monitoring stations nor correlation with plant operating conditions, indicating that the thermal plume from MPS had little effect on local populations. Natural influences of other factors, such as ambient temperature conditions, nutrients and light, play important roles in determining *Ascophyllum* growing conditions in the Millstone area.

The rocky intertidal monitoring program has also documented regional patterns and modifications to shore communities unrelated to MPS operation. These include the introduction to the region of two exotic red algae, *Antithamnion pectinatum* in 1986 and *Grateloupia turuturu* in 2004, decreases in barnacle abundance in recent years, and a long-term increase in abundance of the common brown rockweed, *Fucus vesiculosus*.

Eelgrass

Eelgrass (*Zostera marina* L.) population dynamics were monitored during summer from 1985 to 2006 at three locations near MPS. Monitoring results from 2006 indicate some population improvement at all sites, continuing short-term trends observed over the last 2 to 6 years. However, long-term declines in one or more eelgrass population parameters (e.g., shoot density, shoot length, and standing stock biomass) were observed at all three areas monitored over the entire 22-year study period. Eelgrass populations at two monitoring sites to the east of MPS and near the fringes of the thermal plume (<1.5 km from the MPS discharge to LIS) exhibited gradual declines since 1985. These declines were not associated with MPS operation, as thermal input from the cooling water discharge to these sites is minimal (<1°C above ambient conditions).

By comparison, heavy, often sudden, eelgrass losses were documented on five separate occasions prior to 2000 in the Niantic River. This estuary is located well beyond (>2 km) waters influenced by the MPS thermal discharge. Since 2001, eelgrass distribution in the Niantic River has expanded, and gradual, steady increases in shoot density and biomass were observed through 2006. In previous years, three short-term declines in eelgrass abundance have been directly associated with fouling and overgrowth of eelgrass; one by blue mussels (*Mytilus edulis*) at the Niantic River in 1992, and two by blooms of green algae (*Cladophora* spp.) at White Point in 1991 and 2004. Recent research suggests nutrient loading from land-based sources as the cause of eelgrass disappearance in LIS to the west and elsewhere. Excess nutrients, coupled with increases in regional water temperature and waterfowl grazing, may factor strongly in declines of populations near MPS. Eelgrass distribution once extended over the entire Connecticut coastline, but has constricted from west to east such that populations around Millstone Point now represent the western range limit of eelgrass in LIS.

Benthic Infauna

Benthic monitoring studies during 2006 documented several changes to sediment composition and infaunal communities at stations in the vicinity of MPS (Effluent, Intake, Jordan Cove) and at our reference station (Giants Neck). In general, sediments were coarser (larger mean grain size) and the silt/clay fraction was smaller, particularly at Effluent, Intake and Giants Neck. Mean grain size and silt/clay estimates at Jordan Cove have remained stable since the changes observed in 1986, which were attributed to the start-up of Unit 3. Community abundance and numbers of species at Effluent and Giants Neck in 2006 exhibited decreasing trends over the study period since 1980. A single specimen of the 'Nodose' box crab *Calappa tortugae* was taken in the Giants Neck September samples, which is the first record of this species north of North Carolina. At Intake, community abundance and number of species in 2006 were also low. Community abundance and numbers of species at Jordan Cove in 2006 were within historical ranges. Surface deposit-feeding oligochaetes and polychaetes were the dominant organisms at all stations in 2006. Multivariate analyses showed shifts in community similarity from early years to recent years at the stations in the vicinity of MPS as well as at the Giants Neck reference station that is beyond the influence of the power station. Further changes to benthic communities in the vicinity of MPS may be affected by a combination of plant operation, ambient seawater temperature increase, and levels of nutrient input from point and non-point sources in eastern LIS.