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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Serial No.	14-187
MPS Lic/GJC	R0
Docket No.	50-423
License No.	NPF-49

DOMINION NUCLEAR CONNECTICUT, INC.
MILLSTONE POWER STATION UNIT 3
2013 ANNUAL ENVIRONMENTAL PROTECTION PLAN OPERATING REPORT

In accordance with Section 5.4.1 of the Environmental Protection Plan (EPP), Appendix B to the Millstone Power Station Unit 3 Operating License, 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, 2013 to December 31, 2013.

Should you have any questions regarding this report, please contact Mr. William Bartron, at (860) 444-4301.

Sincerely,

L. J. Armstrong
Director, Nuclear Station Safety and Licensing

IE25
NRR

Enclosures: 1

Commitments made in this letter: None.

cc: U. S. Nuclear Regulatory Commission
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Serial No. 14-187
Docket No. 50-423
License No. NPF-49

Enclosure 1

MILLSTONE POWER STATION UNIT 3
2013 ANNUAL ENVIRONMENTAL PROTECTION PLAN OPERATING REPORT
JANUARY 1 – DECEMBER 31, 2013

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

2013 Annual Environmental Protection Plan Operating Report (AEPPOR)

1. Introduction:

   This report covers the period January 1, 2013 through December 31, 2013. During 2013, Millstone Power Station Unit 3 (MPS3) completed refueling outage 3R15 (April 13 – May 19). Capacity factor for Cycle 15 was 100.4%, and for Cycle 16 through Dec 31, 2013 was 99.8%. Overall capacity factor for 2013 was 89.2%.

   As required by the MPS3 Environmental Protection Plan (EPP), Appendix B to the MPS3 Operating License, 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).

   Section 10(A) of Millstone Power Station's (MPS) NPDES permit, as issued to Dominion Nuclear Connecticut, Inc. (DNC) by the Connecticut Department of Environmental Protection (now the Department of Energy and Environmental Protection, or DEEP) on September 1, 2010 (the Permit), requires continuation of biological studies of supplying and receiving waters. These studies include analyses of intertidal and subtidal benthic communities, finfish communities, entrained plankton, lobster populations, and winter flounder populations. Section 10(A)(2) of the Permit requires an annual report of these studies to be sent to the DEEP Commissioner on or before July 31 of each year. The latest report that fulfills these requirements, "Annual Report 2012 - Monitoring the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, Connecticut" (Annual Report), dated July 2013, 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:

   Sections 1 and 5 of the Permit require monitoring and recording of various 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. Section 8 of the Permit requires that a monthly report of this monitoring be submitted to the DEEP. The report that fulfills these requirements, the "Monthly Discharge Monitoring Report" (DMR), includes discharge data from all MPS units. Consistent with prior annual AEPPOR submissions, water flow, temperature, pH, and chlorine data pertaining to MPS3 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. During 2013, there were no MPS3 events that were reported as NPDES exceedances. However, one exception was identified; a weekly sample for Total Residual Chlorine was missed at DSN001-1 (quarry cut). The description below is excerpted from the November DMR.

a) MPS Quarry Cut Discharge (Discharge Serial Number (DSN) 001-1)

"For the week beginning Sunday, November 10, 2013 through Saturday, November 16, 2013, the weekly analysis for Total Residual Chlorine (TRC) at the DSN 001-1 discharge was inadvertently missed. The weekly Free Available Chlorine (FAC) sample was obtained with a result of 0.02 mg/L FAC. This issue was entered into the MPS Corrective Actions Program and an investigation into the reasons why the analysis was missed is ongoing. At the conclusion of the investigation, corrective actions identified will be assigned and completed."

The Apparent Cause Evaluation identified Human Performance errors, specifically overconfidence and lack of communication; corrective actions have been implemented.

2.3 NPDES Permit Renewal

As the MPS NPDES permit will expire in 2015, MPS has established a team and has scheduled milestones to ensure that a completed permit application is submitted to the DEEP in accordance with general requirements.

3. Environmental Protection Plan (EPP) Noncompliances:

No EPP noncompliances were identified for MPS3 in 2013.

4. Environmentally Significant Changes to Station Design or Operation:

No MPS3 design change records or system operating procedure changes initiated during 2013 included a determination that a significant unreviewed environmental impact could occur. However, several Environmental Evaluations and Reviews identified activities that could involve environmentally sensitive issues. These are included for information, and listed below:

- Beyond Design Basis construction and equipment, mandated by the FLEX program, involve new fossil fuel storage areas and new air emission sources. However, all required permitting has been or will be acquired, and MPS's Spill Prevention, Control and Countermeasures Plan will be modified accordingly.
- Intake security modifications are currently being installed. Equipment literature review indicates that there are no impacts to wildlife at MPS3 from this equipment. Information from the equipment manufacturer indicates that impacts to marine mammals (which are rarely found near MPS intakes) are extremely minimal in scope.
- DNC is seeking approval from the NRC to change the Technical Specifications to allow operation of MPS3 at Long Island Sound (Ultimate Heat Sink; UHS) intake temperatures up to 80°F (current limit is 75°F). Using a modification of the

analytical thermal plume model that has been used historically at MPS, it was concluded that "there will be insignificant impact on the dynamics and the shape of the far field plume (defined in terms of excess temperature above ambient, ΔT), and that the size of the $\Delta T = 4^{o}F$ isotherm will actually be slightly smaller, though the effective change in size is insignificant". DNC has received NRC approval to operate MPS2 at Long Island Sound (Ultimate Heat Sink; UHS) intake temperatures up to $80^{o}F$ (limit was $75^{o}F$).

- As reported in previous AEPPORs, MPS3 (and MPS2) have installed Variable Frequency Drives (VFDs) on circulating water pumps, which allow reduction in pump output. Cooling water flow reductions occur primarily in the spring, and reduce the entrainment of Winter Flounder larvae (a species of particular interest to the DEEP), but reduction in cooling water flow results in concomitant increase in ΔT. However, as the receiving water temperature is low in the spring, the environmental impact is minimal, and MPS operating procedures ensure that Permit limits on ΔT and absolute discharge temperature are not exceeded.

5. Non-Routine Reports of Environmentally Significant Events:

   No MPS3 events in 2013 involved a situation that could result in a significant environmental impact.

   Nine licensee events occurred at MPS3 that constituted an event or condition that were determined to be reportable to the NRC, however none involved environmental issues, and none were determined to have caused a significant environmental impact.

Table 1. MPS3 NPDES data summary, Jan 1-Dec 31, 2013. Selected water quality parameters for MPS3[1].

2013	Maximum Discharge Flow (10^6 gpd)	Discharge pH Range (SU)		Discharge Temp. Range (°F)		Average Discharge Temp. (°F)	Average Δ Temp. (°F)	Maximum FAC (ppm)	Maximum TRC (ppm)	Maximum SWS FAC (ppm)
		Min	Max	Min	Max					
January	1361.0	7.7	7.9	54.9	72.3	61.7	19.8	0.14	0.02	0.19
February	1361.5	6.5	8.2	55.0	67.8	58.1	19.1	0.12	0.03	0.19
March	1361.6	7.7	8.1	56.2	65.8	58.2	18.3	0.15	0.05	0.23
April	1360.4	6.2	7.9	44.3	77.4	58.8	13.6	0.08	0.02	0.21
May	1361.2	6.3	8.0	49.3	79.5	60.8	8.1	0.10	0.04	0.23
June	1361.0	7.6	7.9	73.3	86.4	78.9	16.6	0.09	0.04	0.17
July	1360.9	7.6	7.9	82.0	89.3	85.4	15.6	0.08	0.04	0.19
August	1361.0	7.6	7.9	68.5	88.9	83.5	14.1	0.09	0.03	0.17
September	1360.9	7.6	8.0	81.6	88.5	84.5	15.4	0.09	0.04	0.20
October	1361.0	7.8	8.0	75.0	89.0	81.4	16.6	0.08	0.03	0.19
November	1360.4	7.8	8.0	63.5	81.9	72.1	17.0	0.12	0.04	0.22
December	1361.6	7.7	8.0	59.9	71.0	65.2	19.3	0.13	0.05	0.21

Notes:

(1) Parameters are measured at MPS3 discharge (DSN 001C), except for TRC (total residual chlorine), which is measured at MPS discharge (quarry cuts; DSN 001-1), and SWS FAC (service water system free available chlorine; DSN 001C-5).

Attachment to the
2013 Annual Environmental Protection Plan Operating Report
January 1 – December 31, 2013

Executive Summary Section of
"Annual Report 2012 - *Monitoring the Marine Environment of Long Island Sound* at Millstone Power Station, Waterford, Connecticut"
dated July 2013

Executive Summary – 2012 Environmental Monitoring Annual Report

Rocky Intertidal Studies

Rocky intertidal monitoring studies during 2012 continued to document ecological changes to the shore community near, and associated with, the Millstone Power Station (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 station discharge to Long Island Sound (LIS).

Seasonal shifts in occurrence of annual algal species were noted at Fox Island-Exposed (FE) during 2012. 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*). 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 was more typical of other sites.

Thermal effects on dominant species abundance and distribution patterns were also evident at FE in 2012 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. *Neosiphonia harveyi* maintained a perennial population at FE in 2012, but occurred mainly as a summer annual at sites unaffected by MPS.

Ascophyllum nodosum growth, represented as the most recent internodal length, continued to demonstrate no clear relationships among monitoring stations, or correlation with station operating conditions, indicating that the thermal plume from MPS has had little effect on local populations. Natural influences of other factors, such as ambient temperature conditions, storms and wave action, nutrients and light, play the dominant role 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 three exotic red algae (*Antithamnion pectinatum* in 1986, *Grateloupia turuturu* in 2004, and *Heterosiphonia japonica* in 2010), decreases in barnacle abundance in recent years, and long-term increases in abundance of the common seaweeds *Fucus vesiculosus* and *Chondrus crispus*.

Eelgrass

Eelgrass (*Zostera marina* L.) populations were monitored at three locations in the vicinity of MPS. Data from 2012 surveys indicated that the two study sites nearest to the MPS thermal plume (Jordan Cove and White Point) supported healthy and expansive eelgrass populations, consistent with results since the study began in 1985. These two populations have exhibited moderate variability in population and subtle declines in some population parameters parameters (e.g., shoot density, shoot length, and standing stock biomass) and distribution over the entire study period, but this variability was not related to MPS operation. Both predicted and measured thermal input to these sites from the cooling water discharge is at most minimal (< 1°C above ambient conditions) and well below levels considered stressful to eelgrass.

By comparison, high eelgrass population variability has been observed in the Niantic River, where complete and often sudden eelgrass bed losses were documented on five separate occasions prior to 2000. Following the widespread eelgrass die-off in the late 1990s, the Niantic River population showed continued signs of improvement in shoot density, biomass, and areal distribution through 2011. However, widespread Niantic River eelgrass mortality was observed again in 2012, and was attributed to unusually high seawater temperatures and possibly the timing of nutrient loading. Because the Niantic River is located well away from any influence of the MPS thermal plume, eelgrass population fluctuations there must be related to these and/or other environmental factors such as disease, increased turbidity, and waterfowl grazing. Results from this monitoring therefore suggest that fluctuations in eelgrass populations observed at sites in the Niantic River are due to changes in local and regional environmental conditions and not to MPS operation.

Lobster Studies

Impacts associated with recent MPS operations on the local lobster population were assessed by comparing results of the 2012 study year to data collected from 1978 through 2011. Emphasis has been placed on assessing long-term trends in the abundance and population characteristics of lobsters collected in the Millstone Point area.

Throughout LIS, the lobster population was stable or increasing from 1978 through 1999. The abundance of lobsters in LIS was lower from 2000 to 2012. In this

study, lobsters in the MPS area showed a similar trend, with abundance indices (total catch and CPUE) in research pots and trawls declining to all-time lows in 2012. Declines in pots and in trawl catches were unrelated to MPS operations and attributed to an increase in mortality associated with ambient seawater temperature rise and temperature mediated stressors that include a shell disease affecting lobster populations from eastern LIS to the Gulf of Maine. Ambient seawater temperatures in the MPS area in 2012 were the highest recorded since the study began. Declines in the abundance of legal-size lobsters were attributed in part to the outbreak of shell disease and to a nearly 5 mm increase in the minimum legal-size since 1978. Recent reductions in landings of legal-size lobsters harvested by commercial lobstermen in eastern LIS coincided with declines observed in this study, and lobster catches remained severely depressed in other areas of LIS since the lobster die-off observed in 1999.

Long-term trends observed in lobster population characteristics over the past three decades (growth, female maturity and egg-bearing lobsters) appear related to warmer ambient seawater temperatures and/or the recent outbreak of shell disease, and not MPS operation. Increased ambient water temperature may be responsible for the increased susceptibility and transmission of diseases affecting lobsters in LIS, which is at the southern boundary of their range of distribution in nearshore waters.

The number of lobster larvae entrained through the MPS cooling water systems was highly variable and low in recent years, due to low adult lobster abundance throughout LIS. 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 use of aquatic organism return systems at Units 2 and 3, which return impinged lobsters to Niantic Bay.

Benthic Infauna

Benthic infaunal monitoring documented long-term trends in sediment characteristics at all the subtidal sites in the vicinity of MPS. At the effluent station (EF), the sedimentary environment remains coarse, with low silt/clay which is related to discharge of cooling water into LIS at the Quarry cuts. Sediments at the intake station (IN) were consistent with sediment characteristics prior to dredging during MPS Unit 3 construction. Sediments at Jordan Cove (JC) continue to show stabilization following an earlier siltation event when increased water flow from the discharge after startup of MPS Unit 3 scoured fine sediments surrounding EF and deposited them at JC. Sedimentary characteristics at the reference site at Giants Neck (GN) were similar to previous years' observations and continued to reflect natural variability unrelated to MPS.

The 2012 infaunal communities at all sampling sites continued to respond to sedimentary environments. Dominant taxa at all sites were reflective of climax communities that have undergone long-term successional development in response to more stable sedimentary environments. Surface deposit-feeding oligochaetes and polychaetes continued to be dominant organisms at all sites in 2012. Burrowing deposit-feeders and suspension feeders showed increased relative abundance in recent years at EF. Multi-dimensional-scaling showed distinct separation of communities affected by construction (IN) and initial operation of Unit 3 (JC and EF). Changes in community structure and functional group dominance at subtidal benthic infaunal stations during the period 1980-2012 reflect not only effects related to construction and initial operation of MPS Unit 3, but other regional and/or local biotic and abiotic factors. Community changes at GN during the period 1980-2012 were attributed solely to these latter factors, and not to operation of MPS.

Winter Flounder Studies

Various life history stages of winter flounder have been monitored since 1976 to determine what effect, if any, MPS may have on the local Niantic River population, particularly through the entrainment of larvae. During the past 31 years, annual Niantic River adult winter flounder abundance represented an estimated 0.2 to 3.3% of the total LIS winter flounder resource (mean = 1.23%). Over the past 18 years, low winter flounder abundance levels have been found throughout LIS by the Connecticut Department of Energy and Environmental Protection (CTDEEP). During the same time period, adult winter flounder abundance in the Niantic River has remained low. A total of 88 adult flounder were captured in the 2012 winter flounder spawning survey, with no recaptures from past years. The spawning survey was extended to Niantic Bay in 2012, however only six adult fish were captured in five weeks of sampling. Reflecting these trends of record low abundances, CPUE in 2012 was 0.5 fish per standardized tow in the Niantic River and 0.06 fish per standardized tow in Niantic Bay.

Niantic River female spawner abundance in 2012 was estimated at 1,826 fish that produced about 1.116 billion eggs. Previous annual standardized catch estimates ranged from approximately 323 females in

2009 to 77 thousand in 1982 and corresponding total egg production estimates were 0.2 to 44.8 billion.

In 2012, larval abundance in Niantic Bay (Stations EN and NB combined) and Niantic River (Stations A, B, and C) was low to moderate and slightly lower than 2011 values. Relative to the Niantic River, larval abundance in Niantic Bay has increased in recent years, suggesting higher production in LIS rather than in estuaries such as the Niantic River. In most years 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 enhanced survival. An analysis suggested that mortality decreases with decreasing egg production (a measure of early larval abundance). Larval mortality is also influenced by prevailing water temperatures, with warmer springs allowing for faster development and lower mortality. As expected from low larval abundance in 2012, initial settled juvenile abundance from the juvenile beam trawl survey was low.

The number of larvae entrained at MPS is a measure of potential impact to winter flounder. Annual estimates of entrainment are related to both larval densities in Niantic Bay and MPS cooling-water volume. Avoided entrainment in 2012 can be attributed to use of the variable frequency drives (VFDs) during the "Interval" (defined in the MPS NPDES permit as the period "from April 4 to May 14 or the first day after May 14 when the intake water temperature reaches 52 °F, whichever is later, but no later than June 5"). The 2012 entrainment estimate of 83.3 million reflected lower Niantic Bay larval densities. 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 use 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 for entrainment, the more larvae 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 an important factor in determining juvenile abundance.

Despite a small adult spawning stock in the river, there have nonetheless been relatively large numbers of larvae in several recent years, probably from population compensatory mechanisms and possibly greater contributions from spawners outside of the Niantic River. However, based on the 2012 Niantic Bay spawning survey, there is not a concentrated spawning population located within the Bay.

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 account for fewer adults. A bottleneck in recruitment may occur during the late juvenile life stage (ages-1 and 2), probably from predation. Environmental effects, including changes to the Niantic River habitat (e.g., widely fluctuating eelgrass abundance), a warming trend in regional seawater temperature, and interactions with other species (e.g., predation), especially during early life history, are also important processes affecting winter flounder population dynamics.

Results from winter flounder studies through 2012 suggest that MPS operations have had minimal effects on winter flounder biomass in the Niantic River. Declines in stock size have been greatly evident on a regional basis, including Long Island Sound, Rhode Island and all other Southern New England waters. Entrainment during the larval life stages of winter flounder occurs, however there has been large variation in the amount of larval mortality and recruitment in recent years, both occurring independently of MPS operations.

Fish Ecology Studies

Results from the Fish Ecology monitoring studies during 2012 indicate that no long-term abundance trends for various life stages of seven selected species could be directly related to MPS operation. No long-term trend was identified for American sand lance larval abundance. The density of anchovy eggs collected in entrainment samples exhibited a significant negative trend; larval anchovy abundance showed no long-term trend. Atlantic menhaden larvae showed a significantly increasing trend in abundance, as did juveniles taken by seine and trawl. No significant long-term trends were detected in populations of juvenile or adult silversides collected by seine or trawl. Grubby larval abundance is increasing and a significant decreasing trend was exhibited for grubby at the Intake and Niantic River trawl stations. No significant trend was found for the abundance of cunner eggs and larvae. Juvenile and adult cunner show a significant decreasing trend in Jordan Cove and an increasing trend in Niantic River trawl catches. Following the removal of the Unit 3 rock cofferdam, no significant trend was detected in cunner abundance at Intake. Significant decreasing

trends in cunner abundance were noted in Intake and Jordan Cove lobster pot catches. No significant trend was found for tautog eggs, but tautog larval abundance has significantly increased over the past 37 years. Juvenile tautog collected by trawl are significantly increasing in abundance at the Niantic River station, but are decreasing at Intake, and adults are increasing in Jordan Cove and Twotree lobster pot catches.

The magnitude of entrainment is dependent upon egg and larval densities and condenser cooling water flows during their periods of occurrence. Cooling-water volume at MPS has been reduced 23% due to the shutdown of Unit 1 in November 1995, resulting in less entrainment and impingement, and a smaller thermal plume. Further reductions in cooling-water flows have been implemented at MPS with the use of VFDs during the peak period of winter flounder annual spawning in accordance with the NPDES permit issued on September 1, 2010. In addition to the Unit 3 fish return, which was in operation at unit start-up in 1986, impingement impacts were further reduced at MPS with the installation of a fish return at Unit 2 in early 2000. The implementation of these mitigation measures serve to minimize entrainment and impingement impacts at MPS.

Annual variations in ichthyoplankton entrainment likely reflected differences in spawning and transport of eggs and larvae within LIS. Other factors, such as extremes in seasonal water temperature, may also affect larval growth and development. A number of temporal and spatial changes were identified in the community of fishes and macroinvertebrates collected in the MPS trawl monitoring program. These changes were unrelated to the operations of MPS, but rather were associated with shifts in the dominance of individual taxa from changes in habitat, range extensions or contractions related to a warming trend in ambient seawater temperature that has occurred over the past three decades, and changes in fishing rates and fishing regulations.