12/10/07- Revised FACT SHEET
FOR
DOMINION NUCLEAR CONNECTICUT, INC (DNC)
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

FACILITY NAME: DOMINION NUCLEAR CONNECTICUT, INC (DNC) MILLSTONE POWER STATION (MPS)

LOCATION ADDRESS: ROPE FERRY ROAD
WATERFORD, CONNECTICUT

NPDES PERMIT No. CT0003263

FACILITY ID: 152-003

RECEIVING WATERS: LONG ISLAND SOUND

APPLICATION No. 199701876

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PRELIMINARY NOTE

On August 26, 2006, the Commissioner of Environmental Protection ("Commissioner") issued a notice of tentative determination to reissue a National Pollution Discharge Elimination System ("NPDES") permit to Dominion Nuclear Connecticut, Inc. ("Dominion" or "DNC") for the wastewater discharges from and the cooling water intake structures at its nuclear power facility on Rope Ferry Road in Waterford, Connecticut. In response to receipt of a petition with the necessary signatures, a public hearing was required to be held regarding this original tentative determination. Pre-hearing proceedings commenced on October 19, 2006. Before the public hearing was held, the United States Court of Appeals for the Second Circuit ("Second Circuit") issued its decision in Riverkeeper, Inc., v. EPA, 475 F. 3d 83, (2d Cir. 2007). In June 2007, before the public hearing was held, the Hearing Officer approved a request from the Department of Environmental Protection ("the Department") to suspend the proceedings so that the Department could evaluate the impact the United States Court of Appeals for the Second Circuit decision in Riverkeeper, Inc., v. EPA, 475 F. 3d 83, (2d Cir. 2007) may have on the proposed draft permit. The Hearing Officer's last Order regarding this suspension specified that the hearing process would be suspended until this second notice of a tentative determination is issued and a 30-day comment period is provided. The Department is publishing its second notice of a tentative determination to renew Dominion's NPDES permit and is providing a 30-day comment period. As such, at a future date the Hearing Officer will issue notice of the date for convening a status conference, pre-hearing processes, and establishing a date for a public hearing. Notice of the date for a public hearing will be published in The Day and posted under the Department's website. Further information about public participation, including how persons may participate in the public hearing, is provided in the public notice for this tentative determination. This public notice is published in The Day and is posted on the Department's website.

FACILITY OVERVIEW

Millstone Power Station ("MPS" or "the Station") is a nuclear power plant located on Rope Ferry Road, (CT Route 156), in Waterford, Connecticut. The plant is presently owned and operated by Dominion. MPS is a baseline electrical generating facility consisting of three units. The oldest of these, Unit 1, began operation in 1970, but was taken out of service in November 1995 and is now being decommissioned. Units 2 and 3 are pressurized water reactors that have been in operation since 1975 and 1986, respectively.

MPS is situated on the eastern Connecticut shore of Long Island Sound ("LIS") at the Millstone Point peninsula about 5 miles west-southwest of the City of New London. The property covers an area of about 500 acres at the site of an old rock quarry, and is bounded to the west by Niantic Bay, to the east by Jordan Cove, and to the south by Twotree Island Channel *(see Figures 1 and 2).*

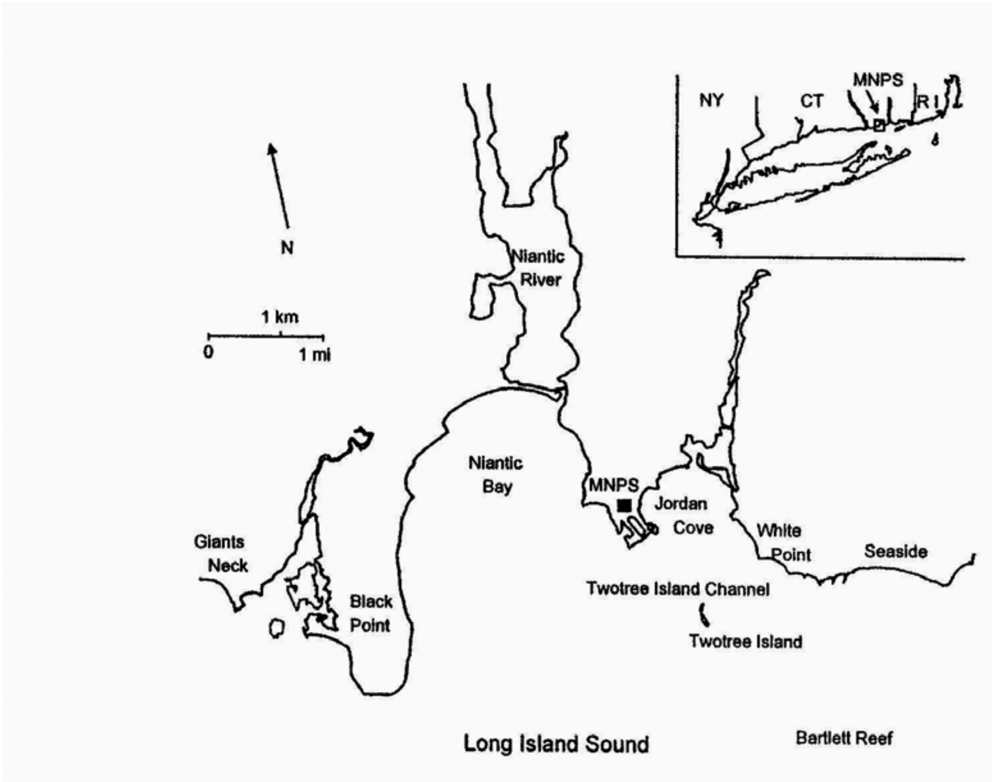

Figure 1. - Location of Millstone Nuclear Power Station and surrounding area. (Figure incorporated from DNC annual ecological report)

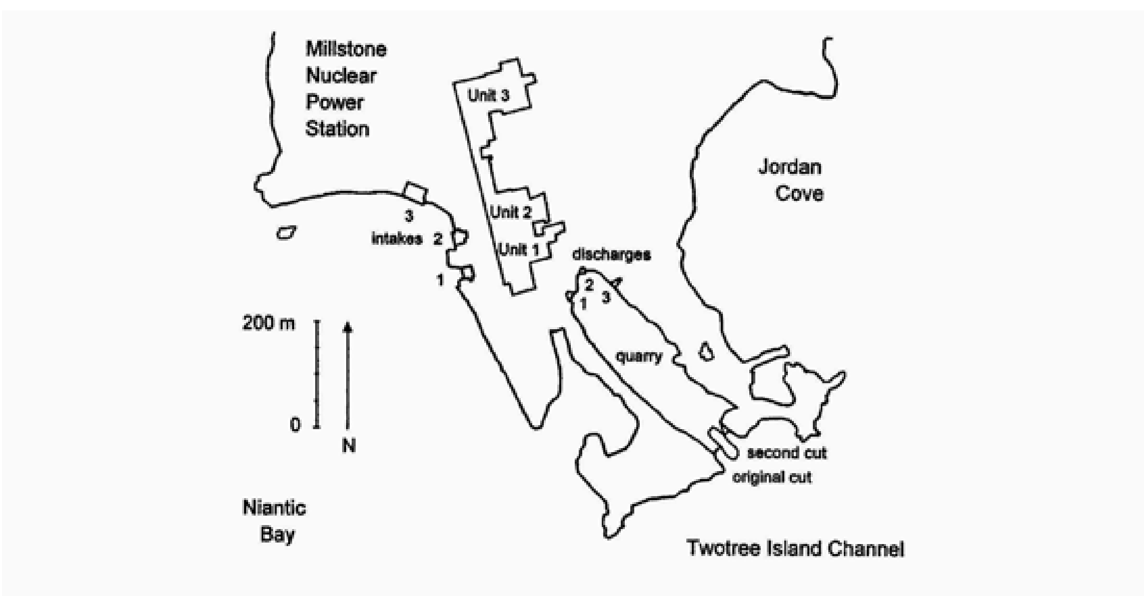

Figure 2. - The Millstone Nuclear Power Station site, showing the Unit generator/reactor buildings, cooling water intake structures, the quarry which receives the Unit discharges, and the two quarry discharge cuts to Long Island Sound. (Figure incorporated from DNC annual ecological report).

The marine environment in the vicinity Millstone Point is highly influenced by strong tidal currents that traverse the channel. Average tidal flow through the channel is approximately 900 thousand gal/sec and at maximum is about 2.2 million gal/sec. These currents provide for quick dispersion of the thermal heat load from the consolidated outfall at the quarry cut to Long Island Sound. *(DNC yearly Annual Report on Monitoring of the Marine Environment of Long Island Sound at Millstone Power Station and the DEP staff review of these reports.)*

The applicant was previously authorized to discharge approximately 2.75 billion gallons per day ("gpd") of once through non-contact condenser cooling water, plant service water, related steam electric process wastewaters and several other significantly smaller and intermittent discharges. The discharges of once through non-contact condenser cooling water, plant service water, and related process wastewaters are consolidated in underground collection tunnels constructed for each electrical generation unit. The draft permit authorizes 2,255,625,000 gallons per day of these waters and wastewaters – the vast majority of which are used for cooling purposes - to be discharged first into an on-site quarry and then through two cuts in the quarry at the southern end of Millstone Point (Latitude 41^{o}-18'-16"; Longitude 72^{o}-9'-57") into Long Island Sound in Waterford, Connecticut. Approximately 844,652,000 gallons of these waters and wastewaters come from Unit 2, while 1,410,933,000 gallons per day come from Unit 3.

The other smaller and intermittent discharges, which in the aggregate total approximately 500,000,000 gallons per day, include Unit 2 and Unit 3 intake structure screen washwaters, pump seal and bearing lubrication water, and related process wastewaters, site stormwater, groundwater, fire suppression system wastewaters and plant operating systems-related drainage. These discharges are directed to the eastern end of Niantic Bay off Millstone Point (Latitude 41^{o}-18'-30"; Longitude 72^{o}-10'-13") in Waterford, Connecticut. The draft permit also authorizes two discharges from MPS Marine Laboratory, one into the quarry before entering Long Island Sound and the second into Jordan Cove.

In addition to limits on discharges, the draft permit also limits, to 2,190,000,000 gallons per day, the amount of waters that can be withdrawn from Long Island Sound and used for cooling purposes. The waters used by the facility for cooling and other purposes are drawn, almost exclusively, from Long Island Sound. A summary of the discharges and intakes regulated under the proposed permit is provided in Table 1 attached to this Fact Sheet.

To help reduce impingement mortality and entrainment during the winter flounder spawning season, Dominion has agreed, and the new draft permit requires the installation of variable frequency drives or pumps (“VFD”) at the intake structures for both Unit 2 and 3. The VFD for unit 2 will be installed in the fall of 2009 and for Unit 3 in the spring of 2010. This technology will enable Dominion to safely reduce the amount of cooling water needed to generate electricity during the critical spring spawning season for winter flounder. This flow reduction technology will be utilized in conjunction with Unit 2 and Unit 3 spring refueling outages, also during the spring spawning season, to reduce entrainment impacts by an average of 40 to 50 percent. The revised draft permit also requires that Dominion evaluate whether the VFDs could be used for a longer duration, beyond the spring spawning season, as a means of reducing cooling water intake flows and thereby also reducing impingement mortality and entrainment .

Also the radiological emissions from MPS, are regulated by the U.S. Nuclear Regulatory Commission ("NRC"). As such, any radiation in or associated with discharges of wastewater from MPS are regulated by the NRC.

REGULATORY BACKGROUND

The last NPDES permit issued for MPS was issued to Northeast Nuclear Energy Company, a division of Northeast Utilities, on December 14, 1992. Even though this 1992 permit had an expiration date of December 14, 1997, since a timely and sufficient renewal application was filed in June 1997, by virtue of Conn. Gen. Stat. § 4-182, this 1992 permit remains in effect until a final determination is made on the pending renewal application.

After submission of its renewal application, DEP became aware of several serious permit compliance issues at MPS, related primarily to unauthorized discharges and improper monitoring. This led to both civil and criminal enforcement proceedings by both state and federal regulatory agencies against Dominion's predecessor, Northeast Utilities. These actions were not fully concluded until early 2000 and resulted in the imposition of significant penalties and other sanctions.

In addition, on November 13, 2000, the Commissioner issued an Emergency Authorization to Northeast Nuclear Energy Company. The discharges covered by this emergency authorization have been incorporated into the new draft permit. Section III of the Emergency Authorization provides that upon the final determination of Dominion's application for reissuance of the new draft permit, the emergency authorization shall expire. As such, upon the Commissioner's final determination of the current renewal application, the November 13, 2000 Emergency Authorization shall expire and no longer be in effect.

On March 29, 2001 the existing NPDES Permit Number CT0003263 and Emergency Authorization Number EA0100176 were transferred from Northeast Utilities Service Company to Dominion, following the sale of the facility to Dominion. Dominion has been operating MPS since March 2001.

THERMAL IMPACTS FROM MILLSTONE'S DISCHARGE

The thermal impacts from the discharges at MPS come almost exclusively from the discharge of once through cooling waters. This wastewater is first discharged into the quarry on-site and then into Long Island Sound. The thermal impacts from this discharge have been monitored for close to thirty (30) years. Data from this monitoring indicate that together, the once through cooling water from Unit 2 and Unit 3 represent about 2.8% of the mean tidal flow through Twotree Island channel, just south of Millstone Point and that the thermal plume produced during operation of MPS is dispersed and assimilated by the strong currents off Millstone Point with little apparent effect on the area's ecology. This location is well suited for heat dissipation and is the primary driver of the thermal plume's dynamic behavior thereby limiting its impacts on aquatic biota. Each year's monitoring results are presented in an Annual Report provided to the Department.

There are no federal technology-based or water-quality based limits for facilities like Millstone regarding the thermal component of its discharge. Connecticut does have certain standards included within the state's Water Quality Standards ("WQS").

Section 10 of Connecticut's WQS allow for the establishment of a zone of influence when permitting discharges to surface waters in order to allocate a portion of the receiving waters for mixing and assimilation of the discharge. Section 10 states that the zone of influence for assimilation of a thermal discharge shall be limited to the maximum extent possible and as a guideline shall not be greater than 25% of the cross sectional area or volume of flow of the receiving water.

Consistent with section 10, the previous permit recognized a zone of influence, extending in a radius not to exceed 8,000 feet from the discharge outlet at the quarry cut. The 8,000-foot limit was established based upon a thermal plume model developed for MPS. (Stoltzenbach and Adams, 1979). The new draft permit retains this approach. In addition, the new draft permit requires that Dominion remap the thermal plume and evaluate changes in the outfall structure that may lead to further minimization of the areal extent of the thermal zone of influence. (See section 10(W) and (X)).

Section 10 also states that the water quality criteria shall apply outside the zone of influence for a discharge. The water quality criteria applicable to a discharge depend upon the classification of the surface water into which a discharge is made. The portion of Long Island Sound into which MPS discharges is Class SA. With respect to the allowable temperature increase, the water quality criteria for Class SA are that "there shall be no changes from natural conditions that would impair any existing or designated uses assigned to this Class, and in no case exceed 83 degrees F, or in any case raise the temperature of the receiving water more than 4 degrees F. During the period including July, August and September, the temperature of the receiving water shall not be raised more than 1.5 degrees F unless it can be shown that spawning and growth of indigenous organisms will not be significantly affected."

The revised draft permit, like the previous permit, contains requirements to implement these requirements. While the revised draft permit imposes a 105 degrees Fahrenheit maximum temperature limit on the discharge from the quarry cuts into Long Island Sound, the revised draft permit also prohibits MPS's discharge from increasing the temperature of the receiving waters more than 83 degrees Fahrenheit, or in any case, raising the temperature of the receiving waters by more than 4 degrees outside the mixing zone. In addition, MPS has demonstrated that during July, August and September, while the increase in the temperature of the receiving water is greater than 1.5 degrees, but less than 4 degrees, that such increase will not significantly affect spawning and growth of indigenous organisms.

The revised draft permit also retains conditions from the previous permit limiting the difference between the temperature of the intake water and the temperature of the water being discharged. This differential is referred to as the "delta-T". For the discharge from the quarry cut into Long Island Sound and the discharge from Unit 2 into the quarry cut, the delta-T cannot exceed 32 degrees Fahrenheit. The delta-T for the discharge from Unit 3 into the quarry is 28 degrees Fahrenheit.[1]

There is one other thermal component of MPS's discharge worth noting. As mentioned above, the new draft permit requires the installation of VFDs at the intake structures of Unit 2 and Unit 3. When the VFDs are used, the amount of intake water will be reduced which should also reduce the level of impingement mortality and entrainment.[2] Since there is less water available to transfer the heat generated by the operation of MPS, the temperature of the water discharged when the VFDs are operating will be higher than the temperature of the water discharged when the VFDs are not operating. While the upper limit temperature established in the previous and in the revised draft permit has not changed, in order to maintain optimal generating capacity at this reduced flow, the revised draft permit established a higher delta-T for the time that the VFDs are operating. For the discharge from Unit 2 into the quarry, this new delta-T is 46 degrees Fahrenheit, or 48 degrees Fahrenheit during pump failure or maintenance (see Table C, remark 2). For the discharge from Unit 3 into the quarry, this new delta-T is 38 degrees Fahrenheit, or 40 degrees Fahrenheit during pump failure or maintenance (see Table O, remark 2). For the discharge from the quarry cuts into Long Island Sound, the new delta-T is 41 degrees Fahrenheit. While the temperature of the discharge into Long Island Sound still cannot exceed 105 degrees Fahrenheit, due to reduced flows, the discharge will exit the quarry at a lower velocity and minimally alter the rocky shore aquatic community (attached algae and relatively sedentary invertebrates) in a small area of shoreline adjacent to where the combined discharge exists to Long Island Sound. Also, the revised delta-Ts to accommodate low flow during the winter flounder spawning season will not effect the requirement to not increase the waters of Long Island Sound outside the zone of influence above 83 degrees Fahrenheit, or increase the temperature of the receiving waters more than 4 degrees. These requirements remain in effect, even when the VFDs are operating.

In support of this proposed increase in delta-T, Dominion provided an analysis of the altered thermal plume characteristics during the period of reduced cooling water usage with higher discharge temperature and has shown that the relatively small

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[1] For both the discharges from the quarry cut into Long Island Sound and the discharges from each unit into the quarry, the permit provides for a brief increase in the delta-T for extenuating circumstances, such as pump failure or maintenance.

[2] From April 4th to May 14th, the intake flow limits are reduced" from 2,190,000,000 to 1,270,200,000 in 2011, from 2,190,000,000 to 1,467,300,000 in 2012, and from 2,190,000,000 to 1,095,000,000 in 2013. After May 14th until June 5th or until the first day after May 14th when the intake water temperature reaches 52 degrees Fahrenheit, whichever is sooner, the intake flow limits are reduced from 2,190,000,000 to 1,467,300,000.

temperature increase for a short duration would have minimal effect on resident flora and fauna. The analysis supports the conclusion that the thermal impacts of Millstone Station's operations are limited to a small geographic area and do not threaten species viability or the ecological integrity of the surrounding waters of Niantic Bay, Jordan Cove or Long Island Sound. While thermal discharge plumes are also capable of impeding fish migration, DEP does not believe this to be the case at MPS because of the open water nature of the discharge location, which provides for rapid dilution to ambient temperatures and the ample opportunity for fish to move around any potential thermal barrier.

These requirements for the most significant thermal component of MPS's discharge are summarized below:

DSN 001, the combined discharge from Units 2 and 3 from the Quarry Cuts into Long Island Sound (see Table A)

Maximum temperature of the discharge is 105 degrees F.

The usual delta-T is 32 degrees Fahrenheit, but can be increased under unusual conditions to 44 degrees Fahrenheit for a period not exceeding 24 hours. The delta-T shall not exceed 41 degrees Fahrenheit from April 4th until May 14th. After May 14th, the delta-T remains at 41 degrees Fahrenheit until June 5th, or the date that the intake water temperature reaches 52 Fahrenheit, whichever is sooner, after which the delta-T shall return back to 32 degrees Fahrenheit.

The temperature of the discharge shall not increase the temperature of the receiving stream above 83 degrees Fahrenheit, or, in any case, raise the temperature of the receiving stream by more than 4 degrees Fahrenheit.

DSN 001 B the combined discharges from Unit 2 into the Quarry (see Table C)

The usual delta-T is 32 degrees Fahrenheit, but can be increased to 44 degrees Fahrenheit for more than 24 hours due to pump failure or maintenance. During reduced flow due to extended (more than 24 hours) pump outage or maintenance, the delta-T shall not exceed 38 degrees Fahrenheit with a corresponding limit of 44 degrees Fahrenheit for 24 hours due to failure or maintenance of an additional pump. The delta-T shall not exceed 46 degrees Fahrenheit from April 4th until the May 14th. After May 14th, the delta-T remains at 46 degrees Fahrenheit until June 5th, or the date that the intake water temperature reaches 52 Fahrenheit, whichever is sooner, after which the delta-T shall return back to 32 degrees Fahrenheit.

DSN 001 C the combined discharges from Unit 3 into the Quarry (see Table O)

The usual delta-T is 28 degrees Fahrenheit, but can be increased to 30 degrees Fahrenheit for more than 24 hours due to pump failure or maintenance. During reduced flow due to extended (more than 24 hours) pump outage or maintenance, the delta-T shall not exceed 30 degrees Fahrenheit with a corresponding limit of 36 degrees Fahrenheit for 24 hours due to failure or maintenance of an additional pump. The delta-T shall not exceed 38 degrees Fahrenheit from April 4^{th} until May $14^{th.}$ After May 14^{th}, the delta-T remains at 38 degrees Fahrenheit until June 5^{th}, or the date that the intake water temperature reaches 52 Fahrenheit, whichever is sooner, after which the delta-T shall return back to 28 degrees Fahrenheit.

The previous draft permit and the new revised draft permit require compliance with the state's water quality standards and all other applicable requirements. The Fact Sheet that accompanied the previous draft permit described the effluent limitations discussed above, regarding the thermal component of Millstone's discharge, in terms of a "variance". This was a misnomer. Except for revisions to accommodate variable frequency drives, which drives are discussed below, the effluent limits for the thermal component of the discharge from Millstone are the same in both the previous and the new revised draft permit. As such, whether framed in terms of a variance or not, the limits in the permit regarding the thermal component of Millstone's discharge remain the same as they were in the previous draft permit. The Department makes clear here that, with respect to the thermal component of Millstone's discharge, no variance from the state's water quality standards or from any other applicable requirement is needed because the thermal component of the discharge is consistent with the state's water quality standards and those standards are sufficient to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the receiving waters.

[The Department's position on the thermal plume effect is based on a review of the following documents: Interoffice Memorandum from David Simpson, DEP-Marine Fisheries Division to James Grier, DEP-Water Permitting & Enforcement Division, dated December 16, 2005-Millstone Thermal Effluent and DNC Correspondence D17272 to CTDEP dated December 6, 2001, Millstone Power Station, Analysis of the 1.5 degree Isotherm in Relation to the Spawning and Growth of Indigenous Organisms Report, Interoffice Memorandum from Dave Simpson, DEP-Marine Fisheries Division to Charles Nezianya, DEP-Water Permitting and Enforcement Division, dated November 14, 2007. DNC Correspondence D17849 dated February 28, 2007 and DNC Correspondence D17878-Millstone Power Station Supplemental Information on Thermal Plume Analysis.]

COOLING WATER INTAKE STRUCTURES AND BEST TECHNOLOGY AVAILABLE

CWA Section 316(b), 33 U.S.C. § 1326(b), states: "[a]ny standard pursuant to section 301 or 306 of the Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available ("BTA") for minimizing adverse environmental impact". Largely because of EPA's earlier (i.e. late 1970's) but unsuccessful efforts to establish regulations to implement this section of the Act, NPDES authorized states such as

Connecticut have made permitting decisions regarding CWA Section 316(b) on a case-by-case basis using best professional judgment. In previous NPDES permits issued for MPS, once-through condenser cooling water systems was BTA, subject to ongoing review of the ecological monitoring program results and data.

Since the current permit was issued in December 1992, ongoing ecological monitoring program and associated annual reports produced by MPS have shown a deterioration in the size and long-term viability of the Niantic River winter flounder stock. This decline, which has been gradually occurring over nearly 20 years, is well documented throughout the entire northeast fishery, from Maine to the mid- Atlantic states, but is more pronounced locally in the Niantic River watershed. Many causative factors have been cited for current conditions, including but not limited to entrainment (i.e., the taking in of fish larvae and other aquatic organisms through a cooling system) at Millstone, fishing mortality, habitat deterioration, predation and higher mean temperatures. However, there is no scientific agreement on the specific role and relative contribution of each factor. In view of this situation, the DEP required a complete re-examination of all possible technology alternatives to reduce entrainment.

The ensuing review process culminated in a proposal by DNC to install the variable frequency drives mentioned above that will, in conjunction with spring refueling outages, reduce cooling water usage by over 40% during the peak period of the annual winter flounder spawning season, i.e., from April 4th until May 14th. After May 14th, flows remain reduced until June 5th or the date when the water temperature at the MPS cooling water intakes structures exceeds 52 degrees Fahrenheit, whichever is sooner. The 52 degree or June 5th criterion for determining the end of the flow/entrainment reduction "window" is specified to insure that entrainment mitigation would continue until the winter flounder spawning season peak is over (delay may occur due to unusually cold ambient temperatures). This interval was selected following analysis of the characteristics of the Niantic River winter flounder population's spawning behavior based on nearly 30 years of monitoring. The degree of flow reduction is also maximized by coinciding the flow reduction with the scheduling of planned spring refueling outages for Unit 2 and Unit 3. The new variable frequency drives will be installed in the fall of 2009 for Unit 2 and the spring of 2010 for Unit 3. In addition to seasonal flow reduction, the revised draft permit requires DNC to evaluate the possibility of extending the use of the variable frequency drives beyond the winter flounder spawning season, undertake a laboratory-scale feasibility study for using fine mesh screen technology at the Unit 2 and/or Unit 3 intake structures, including a possible pilot study, an investigation into sources of excess nitrogen in the Niantic River watershed and mitigation alternatives, refine its use of the winter flounder mass-balance model, update entrainment and impingement monitoring at MPS, and perform a full evaluation of measures that can be taken at the facility to reduce impingement and entrainment. These permit conditions are in section 10 of the revised draft permit.

In addition to adverse impacts from entrainment, adverse impacts from impingement mortality was also reviewed. The unit intake structures house large circulating water pumps for condenser cooling as well as service water pumps that operate continuously for plant safety systems. Presently, each of the Unit 2 and 3 intake structures utilizes 2-inch bar racks and curtain walls to keep out very large objects, which are followed by 3/8-inch mesh traveling screens that are washed to dislodge fish and other aquatic organisms, and then discharged to Long Island Sound via sluiceways. The curtain wall prevents warm surface water, ice, and surface marine organisms from entering the intake. Each intake has lateral fish passageways installed in the intake bay walls upstream of the traveling screens to allow fish to escape the screen faces. Unit 3 has a traveling screen that incorporates both low and high-pressure spray systems which work in sequence to remove impinged aquatic organisms and debris separately in order to optimize survival rates. Unit 2, due to its older intake structure design, relies on a single high-pressure spray to convey both impinged organisms and debris back to Long Island Sound. Despite this difference in configuration, an evaluation of the effectiveness of the Unit 2 design has shown that existing impingement controls provide good protection for all but the most delicate species (e.g. jellyfish), and are comparable in effectiveness to the performance of controls observed at Unit 3. Historical, but limited, impingement mortality studies have shown overall good to high rates of survival at MPS or low impingement mortality rates, again depending on species, seasonal variations, and other factors. The data suggests that survival of winter flounder at various life stages after impingement at both Unit 2 and Unit 3 has been very high, i.e. greater than 90%.

The revised draft permit requires the applicant to update impingement mortality monitoring studies, including a reassessment of the need for a low-pressure spray for the Unit 2 intake. This study will better evaluate the efficacy of the existing impingement controls, including the design of fish return systems, to determine if new, modified or additional equipment or procedures are needed.

In addition, on July 9, 2004, EPA published its final regulations for Cooling Water Intake Structures at Large Power Plants for Existing Facilities. These rules, known as the Phase II rules, were promulgated to address the adverse impacts on all life stages of aquatic organisms, including fish and shellfish associated with the withdrawal of large amounts of cooling water from power plants. Among other things, the rules established performance standards for impingement mortality and entrainment from existing cooling water intake structures, such as Millstone's.

On August 25, 2006, the Commissioner issued the initial notice of a tentative determination to renew MPS's NPDES permit. The previous draft permit required compliance with the EPA's Phase II rules. In addition, the previous draft permit included a BTA decision that was based upon balancing the costs versus the benefits of implementing particular technology for minimizing adverse environmental impacts at MPS.

On January 25, 2007, before a public hearing on the previous draft permit was held, the United States Court of Appeals for the Second Circuit ("Second Circuit") issued its decision in Riverkeeper, Inc., v. EPA, 475 F. 3d 83, (2d Cir. 2007) (Riverkeeper II). Riverkeeper II affected the previous draft permit for MPS in two ways.

First, the Second Circuit upheld challenges to many parts of the Phase II rules remanding the rules back to EPA. On March 20, 2007, in light of the Second Circuit's decision, EPA's Assistant Administrator for Water issued a memorandum announcing EPA's intention to suspend the Phase II rules. On July 9, 2007, EPA published in the federal register, notice of its decision to suspend the Phase II rules. Second, the court determined that cost-benefit analysis cannot be used in making a BTA determination under section 316(b).

Since the Commissioner's BTA determination was contrary to the decision of the court and since the draft permit incorporated a requirement to comply with rules that had been suspended, the Commissioner requested time to evaluate the impact of the Riverkeeper decision on the previous draft permit. This evaluation is now complete.

The revised draft permit does not include a requirement to comply with the now suspended Phase II rules. As mentioned above, the new draft permit does still require that Dominion evaluate the best technology available that can be implemented for the Unit 2 and Unit 3 cooling water intake structures. This includes an evaluation of all technological and operational measures, individually or in combination, for minimizing adverse environmental impacts associated with the Unit 2 and Unit 3 cooling water intake structures.

In addition, the Commissioner's new BTA determination is in section 10 of the revised draft permit. This determination does not rely upon a cost-benefit analysis. Rather, the Commissioner has determined that the current location, design, construction and capacity of the cooling water intake structures at MPS does not represent the best technology available for minimizing adverse environmental impacts. Additionally, the Commissioner has determined that there have been findings that reducing cooling water intake flows through the use of closed cycle recirculation systems reflects the best technology available for minimizing adverse environmental impacts and that the information provided with the Permittee's application identified reducing cooling water intake flows through the use of closed cycle recirculation systems as the most effective technology for minimizing adverse environmental impacts. This identification, however, was based upon technologies that exist and not on an evaluation of whether closed cycle cooling, or any other technology can be implemented at Units 2 and 3 at Millstone. To determine whether and what technologies can be implemented at Units 2 and 3, the new draft permit requires that the Dominion study the potential technological and operational measures, including, but not limited to closed cycle cooling, for minimizing adverse environmental impacts from the cooling water intake structures for Unit 2 and Unit 3. Once this study is completed the Commissioner shall make a subsequent BTA determination for the cooling water intake structures for Units 2 and 3. Any such subsequent determination will be implemented through a permit proceeding, including public notice and an opportunity for pubic hearing.

OPERATIONAL IMPACTS OF MILLSTONE STATION ON FISHERIES RESOURCES

(a) **Niantic River Winter Flounder**

The ecological impacts associated with operation of Millstone Station have been a longstanding matter of concern given the large amounts of water withdrawn from Long Island Sound, primarily for once through condenser cooling water usage. The impact of the Station on the Niantic River winter flounder population in particular has been of paramount concern due to its value to commercial and recreational fishing interests in this area. As a result of this, detailed fisheries monitoring programs have been in place since 1976 to provide a basis for gauging the magnitude of the effects of this usage upon various fish species, as well as information on long-term abundance trends used to measure changes in these local fish populations. These studies have shown that the abundance of adult winter flounder spawners in the Niantic River peaked in the early 1980's and has decreased dramatically since then (from approximately 80,000 to about 4,000). There is much scientific debate among experts and professionals as to the reasons for this decline. Among those cited, in addition to the effects of cooling water usage at MPS, are high fishing mortality rates, rising water temperatures associated with climate change, predation by fish, birds and marine mammals, and adverse habitat changes. There have been several expert analyses (by DNC, DEP, and others) along with estimates of the degree of impact attributable to MPS (as measured by the fraction of larvae entrained at MPS) that have ranged from as low as 12% to as high as 57%, depending on the weight given to these and other causative factors and assumptions. There does not appear to be any resulting consensus as to the relative contribution that MPS has made to the decline of Niantic River winter flounder population. The severe decline in the Niantic River population has coincided with depressed regional (southern New England) winter flounder stocks of around 80%. It has been estimated that, at present, the Niantic River winter flounder stock makes up less than 2% of the exploitable winter flounder population in LIS.

[The Department's position relating to winter flounder is based on a review of the following documents: DNC reports "An Evaluation of Cooling Water system Alternatives, August 2001" and "Yearly Annual Reports on Monitoring of the Marine Environment of Long Island at Millstone Power Station" CTDEP Memorandum/Report dated January 25, 2000, Evaluation of MPS Operations and the Niantic River Winter Flounder Population prepared by Vic Crecco, Penny Howell and David Simpson, Marine Fisheries Division.]

There is agreement among DEP Marine Fisheries Division staff that the present condition of the Niantic River winter flounder stock is such that a natural recovery to a sustainable level is highly unlikely, even if the adverse effects of entrainment by MPS were to completely and immediately cease. It is their opinion that the existing, residual Niantic River stock will require a substantial external stimulus to augment its numbers to reach a critical mass, or self-sustaining population. This catalyst may be provided through the design and trial of an outside winter flounder stock importation/relocation program. Such a program must coincide with a significant reduction in cooling water usage at MPS during the peak winter flounder spawning season as required in the proposed NPDES permit to minimize any new entrainment losses and increase the probability of this population recovering to earlier levels.

(b) <u>Tautog</u>

Another important commercial and sport fish in Long Island Sound that has been studied for MPS entrainment impacts is the tautog or blackfish. The total numbers of tautog larvae measured in annual surveys have been high and are a concern since this species forms local spawning aggregations susceptible to entrainment. The total of entrained tautog eggs is substantial, although recent studies have shown that this species is very fecund, capable of multiple annual spawnings in which females can produce 10 to 20 million eggs per season. Adult equivalent loss calculation estimates of several hundred tautog per year for two Unit operation are viewed as small (compared to a 2002 recreational fishery harvest of 107,000 fish). *[The Department's position on tautog is based on a review of the following documents: DNC Annual Reports on Monitoring of the Marine Environment of Long Island at Millstone Power Station and CTDEP Memorandum dated August 1, 2003 to Charles Nezianya, Water Permitting Enforcement Division from David Simpson, Marine Fisheries Division.]*

(c) <u>Other Species of Fish and Shellfish</u>

Atlantic menhaden larval entrainment at MPS has varied widely over the years reflecting the relative abundance of this coastal spawner over time. Adult equivalent loss estimates are up to 1 million fish. The coastwide unit stock of this fish numbers in the billions. Menhaden larval entrainment at MPS occurs during the summer and fall.

Adult equivalent anchovie losses are also small relative to overall stock size with loss estimates averaging around 50,000 adults. Anchovie entrainment occurs during June through September.

Adult equivalent losses for grubby (around 200,000) are somewhat more difficult to quantify since little is known about the size of this localized population. Grubby spawn during the winter and entrainment occurs during a timeframe of January-May, similar to winter flounder. Some benefit to this species are expected to be derived from the planned Unit 2 and 3 early spring flow reductions required for winter flounder.

The cunner is also likely comprised of localized spawning groups.   Although not a sport fish, it frequently occurs as a bycatch in the recreational fishery. The Sound-wide population trends of this fish closely mimic that of tautog, which is an exploited species. Adult equivalent losses are estimated at around 50,000 per year for this summer (May – July) spawner, which may benefit marginally from the recommended seasonal flow reduction period. There are no local cunner population estimates available.

American sand lance are a late winter and early spring spawner, Adult equivalent losses attributable to MPS are estimated to average around 50,000 annually. The size of this coastal population likely ranges in the hundreds of millions to billions of fish.

The local population of American lobster has been studied at MPS since 1978. Survey data has shown that this local population from 1978 to 1999 was stable or increasing. There was a much lower abundance of lobster observed from 2000 to 2004 that can be attributed to mortality from a shell disease affecting regional populations (eastern Long Island Sound to the Gulf of Maine) and unrelated to MPS operations. Since 2004, this condition has improved and the local population of lobster is recovering, although lobster catches remain depressed in other areas, especially western Long Island Sound. The conclusion of lobster monitoring studies at MPS to date is that the levels of larvae entrainment and juvenile and adult impingement are modest and apparently have not caused a decrease in the local lobster population.

[The Department's position on other species of fish and shellfish is based on a review of the following documents: DNC yearly Annual Reports on Monitoring of the Marine Environment of Long Island at Millstone Power Station and CTDEP Memorandum dated August 1, 2003 to Charles Nezianya, Water Permitting Enforcement Division from David Simpson, Marine Fisheries Division, etc.]

WATER-QUALITY BASED LIMITATIONS

(a) Hydrazine

Hydrazine is a chemical widely used in the electrical power generating industry for corrosion control in steam generation systems and other areas where metalworks must be protected. Hydrazine is a highly effective oxygen scavenger and is also known for its use as a rocket fuel. The potential risk of hydrazine as an animal and human carcinogen and its general toxicology make it a chemical of concern. The chemical itself is highly reactive and degrades readily in environmental media. At Millstone Station, hydrazine is discharged in controlled amounts from several locations. By far the largest sources of hydrazine originate from the Unit 2 and Unit 3 condensate polishing facilities (i.e., discharge serial numbers, or DSNs, 001B-6 and 001C-6), which account for more than 90% of the total amounts discharged.[3]

[3] Hydrazine may also be present in discharges from several other locations at MPS, albeit at low frequencies and/or concentrations. Specifically, hydrazine may be discharged via DSNs 001A (Unit 1 decommissioning wastewaters); 001B-1,Unit 2 steam generator blowdown; 001B-1(a), Unit 2 wet lay-up; 001B-2, Unit 2 waste monitor tank; 001B-2(a), Unit 2 steam generator chemical cleaning wastewaters; 001B-3, Unit 2 coolant waste monitor tank; 001B-5, Unit 2 service water; 001B-8, Unit 2 condenser hotwell discharge; 001B-9, Unit 2 closed cooling water system drainage; 001B-10, Unit 2 miscellaneous discharges; 001C-1, Unit 3 steam generator blowdown, 001C-1(a), Unit 3 wet lay-up; 001C-2, Unit 3 radiation waste test tank; 001C-3, low level radiation waste drain tank; 001C-4, Unit 3 secondary system wet lay-up drainage; 001C-5, Unit 3 service water; 001C-6(a), Unit 3 steam generator chemical cleaning wastewater; 001C-6(b), Unit 3 auxiliary boiler blowdown; 001C-8, Unit 3 condenser hotwell wastewater; 001C-9, Unit 3 closed cooling water system drainage; and DSN 006-1, Unit 2 and 3 floor drains, surface runoff and yard drains, water treatment wastewaters and other miscellaneous wastewaters.

As required by DEP since the issuance of the current NPDES permit in December 1992, much has been done to minimize the use of and significantly reduce the amount of hydrazine discharged, particularly from the Unit condensate polishing facilities ("CPF"). These measures include substitution of alternative, less toxic molybdenum-based chemicals for corrosion control, more precise chemistry quality control to reduce excess hydrazine residuals, reuse of wet lay-up waters during Unit start-up, and improved operational control of oxygen in-leakage which reduces the levels of hydrazine dosage needed for effective scavenging. The most productive new procedure has been the introduction of a hydrazine treatment process in the Unit 2 and Unit 3 condensate polishing facilities. Hydrogen peroxide is used in the CPF neutralization sumps to reduce hydrazine concentrations by 50% or more, depending on available reaction time. As a result of all these improvements, the amount of hydrazine in discharges from MPS have been reduced in total by over 50%, compared to previously authorized levels. There are other corrosion inhibitor compounds listed in the application that can be authorized through a minor permit modification or approval process.

The allowable concentration of hydrazine from the two major internal sources of hydrazine discharged from the Station, i.e. the Unit condensate polishing facilities, has been reduced from 75.0 mg/l (milligrams per liter, or parts per million) to 37.5 mg/l to reflect the degree of treatment that can be reliably and effectively provided. The new, lower limitation provides an even greater margin of safety for protection of aquatic life in the receiving waters (i.e., Long Island Sound). Effluent limitations of 125.0 mg/l have been retained for hydrazine present in DSNs 001B-1(a) and 001C-1(a), i.e. Unit 2 and Unit 3 Steam Generator wet lay-up discharges, which occur very infrequently during plant start up cycles.

For DSN 006, a much more stringent concentration limit was established (i.e. a maximum of 50 ug/l) taking into account that there are no known sources of hydrazine to this outfall other than the potential for extremely minute inputs from authorized floor drainage wastewater generated from the Unit 2 and Unit 3 turbine building steam/condensate systems. In addition, there is a much lower level of dilution from other non-contaminated sources at this location and the assimilative capacity at this location, (i.e., adjacent to the Unit 3 intake structure).

Finally, monitoring for the presence of hydrazine is required at other discharge locations. Limitations have not been specified in these other locations because of the effectiveness of the hydrazine reduction measures taken and/or because of the extremely low probability of its presence in these internal wastestreams.

[The Department's position on hydrazine is based on a review of DNC correspondence D17273 to CTDEP dated December 5, 2001, Millstone Power Station, Final Hydrazine Reduction Report]

(b) Aquatic Toxicity

The revised draft permit contains a requirement to conduct quarterly vertebrate and invertebrate chronic toxicity testing of MPS's discharge at the outlet to Long Island Sound on Millstone Point (i.e., DSN 001-1), Unlike an acute toxicity test, which is a measure of a discharge's potential to pose an immediate threat to aquatic life from the toxic constituents of a discharge, a chronic toxicity test is a more time intensive and sensitive testing methodology that assesses the long-term potential for harm, based upon the toxic constituents in a discharge, to reproductive and growth processes needed to sustain healthy aquatic species. The revised draft permit replaces quarterly acute and chronic toxicity testing for each unit's combined discharge with a chronic toxicity test for the combined discharge that enters Long Island Sound . This change was made in recognition of the approximately 15 years of positive results measured at the Station (i.e., that there has never been a toxicity test result that suggests any measurable potential for short term impairment to the local biological community resulting from toxic constituents in MPS's discharge to Long Island Sound. These past results also confirm that any chemical additives that have been used in very small amounts to control corrosion and biofouling have had no measurable effect on acute toxicity. This monitoring approach is consistent with that specified for other large power generation facilities that have achieved similar results.

The revised draft permit also requires acute toxicity testing for the discharge of combined Unit 2 and Unit 3 wastewater discharges from turbine and control building floor and roof drains, excluding stormwater run-off, emergency diesel jacket cooling water, Units 2 and 3 condensate surge tank drainage, hydrolazing wastewater, de-ionized water and seawater, fire suppression system drainage and flushes, reject wastewaters from reverse osmosis water treatment system, air conditioning and air compressor condensate, and miscellaneous power plant discharges that discharge into Niantic Bay.

[The Department's position is based on a review of historical DNC discharge monitoring reports.]

TECHNOLOGY-BASED LIMITATIONS

(a) Chlorine

Chlorine is commonly used facilities such as MPS for preventing and/or controlling the unwanted growth of organisms (or biofouling) in large cooling water systems. At MPS, chlorine is used for control of biofouling in both the condenser cooling water and service water systems (i.e. DSNs 001C-1, 001B-1, 001B-5, and 001C-5). While limitations for the allowable quantities and concentrations of chlorine in cooling water discharges from electrical power generating facilities, such as MPS, are specified in 40 CFR Part 423, the effluent limits specified in the revised draft permit are more stringent than those specified under the federal regulations, are in the existing (December 1992) NPDES permit issued to Millstone and are based upon the exercise of the Department's best professional judgment. A chlorine limitation of 0.1 mg/l is specified for DSN 001-1, the combined discharge for Unit 2 and Unit 3 to Long Island Sound at the quarry cut. In addition, chlorine limits of 0.25 mg/l are specified for DSNs 001B and 001C, as well as the condition that "[c]hlorine shall not be discharged in the condenser cooling water for more than two hours in any one day. Chlorine shall not be discharged in the condenser cooling water of more than one Unit at any one time". Similarly, chlorine concentration limits of 0.25 mg/l are specified for DSNs 001B-5 and 001C-5, the service water discharges for Units 2 and 3.

(b) <u>Oil and Grease</u>

40 CFR Part 423 establishes limits for oil and grease for facilities such as Millstone. Similar to chlorine, the effluent limits specified in the revised draft permit are more stringent than those specified under the federal regulations and are based upon the exercise of the Department's best professional judgment.

A maximum concentration of 15.0 mg/l total oil & grease is specified for a number of internal waste streams as well as some direct discharges to receiving waters. These discharges include, DSNs 001A, 001B-1, 001B-1(a), 001B-2, 001B-3, 001B-6, 001B-8, 001B-10, 001B-11, 001C-1, 001C-1(a), 001C-2, 001C-3, 001C-4, 001C-6, 001C6(a), 001C-6(b), 001C-8, 006-1, and for various storm drain outfalls.

(c) <u>Total Suspended Solids</u>

40 CFR Part 423 establishes limits for total suspended solids for facilities such as Millstone. The effluent limits specified in the revised draft permit are more stringent than those specified under the federal regulations and are based upon the exercise of the Department's best professional judgment.

A maximum concentration of 30.0 mg/l total suspended solids is specified for a number of internal waste streams as well as some direct discharges to receiving waters. These discharges include, DSNs 001A, 001B-1, 001B-1(a), 001B-2, 001B-2(a), 001B-3, 001B-6, 001B-8, 001B-10, 001B-11, 001C-1, 001C-1(a), 001C-2, 001C-3, 001C-4, 001C-6, 001C-6(a), 001C-6(b), 00C-8, and 006-1.

(d) <u>Heavy Metals – Boron, Cadmium, Chromium, Copper, Iron, Lead, Molybdenum and Zinc</u>

Effluent limits for heavy metals have been established for several discharges at MPS, primarily for internal wastestream operations (i.e., smaller discharges which combine with the much larger condenser cooling water and service water volumes which are discharged to LIS via the quarry cut). All of the limitations for heavy metals in the proposed permit are the same as those in the current permit.

The revised draft permit contains average monthly effluent limits of 1.0 mg/l for total chromium, copper, nickel, and iron and 0.1 mg/l for cadmium and lead respectively, for wastewaters associated with steam generator chemical cleaning and decontamination wastewaters (see DSNs 001B-2(a) and 001C-6(a)). These operations occur very infrequently, usually only for a limited number of days every few years. While 40 CFR Part 423 establishes limits for copper and iron, the effluent limits specified in the revised draft permit are more stringent than those specified under the federal regulations and are based upon the exercise of the Department's best professional judgment. The limits for chromium, cadmium and lead are based upon the exercise of the Department's best professional judgment.

For DSNs 001A the revised draft permit contains an effluent limit of 1.0 mg/l for zinc. Boron continues to be monitored at multiple discharge locations at MPS since boric acid is used in the primary coolant systems of pressurized water reactor plants to control the nuclear reaction. Monitoring for molybdenum is required for those plant systems where this has been substituted for hydrazine in corrosion control.

(e) <u>Other Substances</u>

The following chemicals: enthalomine (a common metals chelating agent), methoxypropylamine (Conquor 3585), dimethylamine (Bulab 8007) and dimethyldithiocarbamate (Bulab 6013) are used at MPS for corrosion control and metallurgy protection in multiple plant systems. Usage of these chemicals is infrequent and they have been pre-screened for their low toxicity characteristics. Monitoring for these chemicals is required when they are used to demonstrate that only trace levels are present in MPS' discharge. See DSNs 001B-1, 001B-1(a), 001B-2, 001B-2(a), 001B-3, 001B-6, 001B-8, 001B-9, 001B-10, 001B-11, 001C-1, 001C(a), 001C-2, 001C-3, 001C-4, 001C-6, 001C-6, 001C-6(a), 001C-6(b), 001C-8, 001C-9, and 006-1.

<u>(f) Internal Waste Streams</u>

The revised permit contains limits for a number of internal waste streams. These limits were based upon best professional judgment and for the most part are carried over from the existing permit for MPS. Limits for internal waste streams were included since many of the internal waste streams require treatment and the limits help ensure that these treatment systems are effective.

REFERENCES

1. NPDES Permit No. CT0003263 issued to Northeast Nuclear Energy Company (NNECO) issued on December 14, 1992 and transferred to Dominion Nuclear Connecticut, Inc. (DNC) on March 30, 2001.
2. Emergency Authorization No. EA0100176 issued to NNECO on October 13, 2000 and transferred to DNC on March 30, 2001.
3. Application No. 199701876 for renewal of NPDES Permit No. CT0003263 for Millstone Nuclear Power Station received June 13, 1997 from NNECO and transferred to DNC on March 30, 2001.
4. Addendums No. 1 through No. 10 to Application No. 199701876 from DNC.
5. Millstone Power Station, "An Evaluation of Cooling Water system Alternatives", August 2001 prepared by DNC.
6. DNC correspondence D17272 to CT DEP dated December 6, 2001 (Millstone Power Station, Analysis of the 1.5 degree Isotherm in Relation to the Spawning and Growth of Indigenous Organisms)
7. Stolzenbach, K.D. and Adams, E.E., 1979, "thermal plume modeling of the Millstone Nuclear Power Station" report presented to the Northeast Utilities Service Company.
8. Connecticut Water Quality Standards, as Revised on December 17, 2002.
9. NNECO correspondence D16199 to CT DEP dated August 30, 2000 - Final Scope of Study.
10. CT DEP correspondence to NNECO dated November 14, 2000 - Scope of Study Approval.
11. CT DEP correspondence to DNC dated May 9, 2002 - CT DEP/ESSA review of August 2001 Study.
12. DNC correspondence D17347 to CT DEP dated October 3, 2002 - DNC response to CT DEP/ESSA 5/9/02 review.
13. DNC correspondence D17304 to CT DEP dated February 5, 2003 - DNC response to ESSA report on review of Mass-Balance Model.
14. CT DEP correspondence to DNC dated February 10, 2003 - CT DEP request for additional information pursuant to review of DNC 10/3/02 response.
15. DNC correspondence D17455 to CT DEP dated April 30, 2003 - DNC response to CT DEP's 2/10/03 review.
16. ESSA Technologies Ltd. (ESSA) 2002a, Report on Review of Scope of Study, January 2002.
17. ESSA Technologies Ltd. (ESSA) 2002b, Report on Review of the Evaluation of Cooling Water System Alternatives to Reduce Entrainment at Millstone Station, May 2002.
18. ESSA Technologies Ltd. (ESSA) 2002c, Report on Review of the Mass-Balance Model Used to Estimate the Number of Niantic River Winter Flounder Larvae Entrained by Millstone Power Station (1984-2001), October 2002.

19. ESSA Technologies Ltd. (ESSA) 2003a, Report on Comments on Dominion Nuclear Connecticut's Response to ESSA Report 2002b, January 2003.
20. ESSA Technologies Ltd. (ESSA) 2003b, Report on Comments on Dominion Nuclear Connecticut's Response to CT DEP's February 10, 2003 Letter, July 2003.
21. Annual Report 2003, Monitoring the Marine Laboratory of Long Island Sound at Millstone Power Station, Waterford, Connecticut, April 2004 prepared by Millstone Environmental Laboratory, Dominion Resources Services, Inc.
22. Toxicological Profile for Hydrazines, U.S. Department of Health & Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, September 1997.
23. DNC correspondence D17273 to CT DEP dated December 5, 2001, Millstone Power Station, Final Hydrazine Reduction Report.
24. DNC correspondence D17281 to CT DEP dated December 21, 2001, Millstone Power Station, Nitrogen Loading and Reduction Study.
25. CT DEP Memorandum dated August 1, 2003 to Charles Nezianya, Water Permitting & Enforcement Division from David Simpson, Marine Fisheries Division.
26. CT DEP Memorandum dated June 18, 2003 to Dave Simpson from Vic Crecco, Marine Fisheries Division.
27. CT DEP Memorandum dated August 28, 2003 to Ozzie Inglese, Water Permitting & Enforcement Division from Vic Crecco, Marine Fisheries Division.
28. CT DEP Memorandum/Report dated January 25, 2000, *Evaluation of Millstone Power Station Operations and the Niantic River Winter Flounder Population* prepared by Vic Crecco, Penny Howell, and Dave Simpson, Marine Fisheries Division.
29. CT DEP Water Discharge Permit Regulations - Sections 22a-430-3 and 22a-430-4, Regulations of Connecticut State Agencies.
30. US EPA, 40 CFR Part 423 – Final Regulations for Steam Electric Power Generating Point Source Category.
31. US EPA, 40 CFR Parts 9, 122, 123, 124, and 125 – Final Regulations to Establish Requirements for Cooling Water Intake Structures at Phase II Existing Facilities, July 9, 2004.
32. DNC correspondence D17666 to CT DEP dated March 7, 2005, Millstone Power Station, NPDES Permit Renewal.
33. DNC correspondence D17673 to CT DEP dated April 5, 2005, Millstone Power Station, Request for Schedule to comply with Phase II 316(b) Rule.
34. Annual Report 2004, Monitoring of the Marine Environment of Long Island Sound at Millstone Power Station, Waterford, Connecticut, Millstone Environmental Laboratory, April 2005.
35. DNC correspondence D17676 to CT DEP dated May 6, 2005, Millstone Power Station, Request for CWA Section 316(a) for renewal of variance for thermal limits at MPS.
36. Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 22 regarding Millstone Power Station, Units 2 and 3, Final Report,

U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, July 2005.

37. DNC correspondence D17725 to CT DEP dated October 17 2005, Millstone Power Station, NPDES Permit Renewal, Response to DEP letter dated August 2, 2005.
38. DNC correspondence D17727 to CT DEP dated November 2005, Millstone Power Station, NPDES Permit Renewal Application-Response to DEP Questions.
39. Interoffice Memorandum, David Simpson (DEP- Marine Fisheries Div.) to James Grier (DEP – Water Permitting & Enforcement Div.), December 16, 2005 – Millstone Thermal Effluent
40. DNC correspondence D17849 to CTDEP dated February 28, 2007, re: Millstone Power Station NPDES Draft Permit
41. DNC correspondence D17878 to CTDEP dated April 2, 2007, re: Millstone Power Station Supplemental Information on Thermal Plume Analysis
42. Interoffice Memorandum, from David Simpson, Marine Fisheries Division, to Charles Nezianya, Water Permitting and Enforcement Division, dated November 14, 2007, on DNC's request for increase in delta T during the winter flounder low flow period from April 4 thru May 14

Table 1 – Summary Description of wastewater discharges and Treatment at Millstone Station

(Note: for a more detailed description of these discharges and treatment requirements, see draft NPDES permit and/or permit application process description)

Discharge Serial No. (DSN)	**Type of Treatment**	**Description**
001	No treatment required	Combined Units 2 & 3 discharge to Long Island Sound via quarry cut Max. daily flow = 2,255,625,000 gal/day (non-seasonal) Max. daily flow at reduced level , April 4 thru May 14 and thereafter, per Section 10(C) Maximum temperature = 105 degrees F Maximum temperature differential = 32 degrees F (non-seasonal) Maximum temperature differential = 46 degrees F (seasonal)
001A	Modular filtration skid system; Intermittent batch discharge	Unit 1 discharge to quarry via circulating water tunnel (condenser cooling and service water discharges are inactive) Unit 1 decommissioning wastewaters from spent fuel pool, make-up and cooling water; reactor building and evaporator system wastewaters; flushings from decontamination of plant components; fire suppression system water; misc. wastewaters from Unit 1 radiological control areas Max. daily flow = 40,000 gal/day
001B	No treatment required	Unit 2 discharge to quarry via circulating water tunnel Max. daily flow = 844,652,000 gal/day (non-seasonal) Max. daily flow at reduced level April 4 thru May 14 and thereafter, per Section 10(C)
001B-1	No treatment required	Unit 2 steam generator blowdown during open cycle operation, start-up/standby and hot stand-by operation, and shutdown Max. daily flow = 1,440,000 gal/day
001B-1(a)	No treatment required, except filtration during sludge lancing	Unit 2 steam generator wet lay-up wastewater, steam generator drainage and sludge lancing Max. daily flow = 280,000 gal/day
001B-2	Demineralizer/filtration/ charcoal/coagulant/pH control; Intermittent batch discharge	Wastewaters from Unit 2 radiological control areas in the reactor and turbine buildings; Unit 1 radiologically controlled wastewaters; Unit 3 auxiliary boiler system drainage and other misc. plant wastewaters Max. daily flow = 15,000 gal/day
001B-2(a)	Vendor provided process	Unit 2 steam generator chemical cleaning and decontamination wastewaters (infrequent) Max. daily flow = 60,000 gal/day
001B-3	Demineralizer/filtration/ charcoal/coagulant/pH control; Intermittent batch discharge	Wastewaters from Unit 2 radiological control areas including auxiliary building; reactor building and reactor coolant sumps; Unit 1 radiologically contaminated wastewaters; Unit 3 auxiliary boiler system leakage; steam generator blowdown and other misc. plant wastewaters Max. daily flow = 90,000 gal/day
001B-5	No treatment required	Service water for Unit 2 plant safety systems, auxiliary heat exchanger, pump lub and seal water, hydrolazing wastewaters

		Max. daily flow = 51,840,000 gal/day
001B-6 001B-6	TSS cartridge filter/pH adjustment/demineralizer/air sparging w/hydrogen peroxide; Batch discharge	Unit 2 condensate polishing facility wastewaters, fire suppression system water, waste evaporator water and service water; Unit 3 auxiliary boiler wastewaters, condensate drainage, carbon filter backwash, steam generator drainage and misc. plant wastewaters Max. daily flow = 75,000 gal/day
001B-8	No treatment required	Unit 2 condenser hotwell wastewater; steam generator, feedwater and condensate system drainage; hydrolazing wastewaters Max. daily flow = 250,000 gal/day
001B-9	No treatment required; Intermittent batch discharge	Unit 2 closed cooling water system drainage; hydrolazing and demineralizing wastewaters; incidental leakage during plant start-up, operation, and maintenance Max. daily flow = 30,000 gal/day
001B-10	No treatment required	Unit 2 standpipe discharge including feedwater system drainage, water box priming pumps, groundwater and circ water leakage; Unit 2 feed and condensate drainage and misc. plant wastewaters Max. daily flow = 150,000 gal/day
001B-11	Filtration of RBCCW heat exchanger wastewater	Unit 2 service water drainage and incidental leakage from the reactor building closed cooling water system; hydrolazing wastewater and misc. plant wastewaters Max. daily flow = 150,000 gal/day
001C	No treatment required	Unit 3 discharge to quarry via circulating water tunnel Max. daily flow = 1,410,933,000 gal/day (non-seasonal) Max. daily flow at reduced level April 4 thru May 14 and thereafter, per section 10(C)
001C-1	No treatment required	Unit 3 steam generator blowdown during open cycle operation, start-up, standby and hot stand-by operation, and shutdown Max. daily flow = 1,440,000 gal/day
001C-1(a)	No treatment required, except filtration during sludge lancing	Unit 3 steam generator wet lay-up drainage; chemical control and sludge lancing wastewaters Max. daily flow = 576,000 gal/day
001C-2	Filtration/demineralizer/charcoal /coagulant/ pH control; Intermittent batch discharge	Wastewaters from Unit 3 radiological controlled areas in the reactor and turbine buildings Max. daily flow = 50,000 gal/day
001C-3	Filter/demineralizer/charcoal/ coagulant/pH control; Intermittent batch discharge	Wastewaters from Unit 3 radiological controlled areas within the reactor building and other locations Max. daily flow = 20,000 gal/day
001C-4	pH adjustment and filtration	Unit 3 secondary system wet lay-up drainage; condenser cleaning wastewater; hydrolazing wastewaters; auxiliary boiler stack drainage Max. daily flow = 80,000 gal/day
001C-5	No treatment required	Service water for Unit 3 plant safety systems Max. daily flow = 86,400,000 gal/day
001C-6	Filtration/pH/TSS demineralizer elemental neutralization/air sparge/hydrogen peroxide; Batch discharge	Unit 3 condensate polishing facility wastewaters, fire suppression system water, waste evaporator water and service water; Unit 3 auxiliary boiler wastewaters, condensate drainage, carbon filter backwash, steam generator drainage and misc. plant wastewaters Max. daily flow = 75,000 gal/day
001C-6(a)	Vendor provided process	Unit 3 steam generator chemical cleaning and decontamination wastewaters (infrequent) Max. daily flow = 60,000 gal/day

001C-6(b)	Oil water separator in auxboiler room prior to sump	Unit 3 auxiliary boiler blowdown; hot water heating system drainage, misc. plant wastewaters Max. daily flow = 72,000 gal/day
001C-8	No treatment required	Unit 3 condenser hotwell wastewater; secondary system plant water and wet lay-up drainage; misc. plant wastewaters Max. daily flow = 250,000 gal/day
001C-9	No treatment required	Unit 3 closed cooling water system drainage; turbine and reactor building closed cooling water drainage; reactor plant and control building chilled water drainage; service water system drainage Max. daily flow = 30,000 gal/day
003-1	No treatment required	Unit 2 traveling screen wash water, hydrolazing wastewaters, pump bearing lubrication water, pump strainer backwash, intake desilting wastewaters, and misc. plant wastewaters Max. daily flow = 3,888,000 gal/day
003a-1	No treatment required	Unit 2 fish return sluiceway to Long Island Sound Max. daily flow = 3,888,000 gal/day
004-1	No treatment required	Unit 3 traveling screen wash water including fish return, hydrolazing wastewaters, pump strainer backwash and misc. plant wastewaters Max. daily flow = 11,520,000 gal/day
006-1	pH Adjustment, Oil/water separators, Filtration	Combined Unit 2 and Unit 3 wastewater discharges from turbine and control building floor and roof drains, emergency diesel jacket cooling water, Units 2 and 3 condensate surge tank drainage, hydrolazing wastewater, de-ionized water and seawater, fire suppression system drainage and flushes, reject wastewaters from reverse osmosis water treatment system, air conditioning and air compressor condensate, and misc. power plant discharges Max. daily flow = 432,000 gal/day exclude stormwater run-off
005,008, 009, 016, 024A, 1B-12	Oil/water separators in line	Stormwater including parking lot and roadway runoff, fire suppression system testing and drainage, clean water washes, condensate and misc. power plant wastewaters
007,011, 012, 014, 015, 019, 021, 022, 024, 027, 028, 032	No treatment required	Stormwater including parking lot and roadway runoff, fire suppression system testing and drainage, clean water washes, condensate and misc. power plant wastewaters
008, 020, 020A	Oil/water separators in line	Parking area and/or roadway stormwater, stormwater management areas
011,013, 014, 018,019 023, 025, 026, 028, 029, SMA-1, SMA-2, SMA-3, SMA-4	No treatment required	Parking area and/or roadway stormwater, stormwater management areas
017-1	No treatment required	Environmental Lab seawater from Jordan Cove into quarry

Monitoring Site No. 001	No treatment required	Unit 1, 2 and 3 intakes
001B, 001B-5, 001C, 001C-5	Biocide/chlorination	Control of macro-fouling
008, 016	Settling in fractionating tank	Firewater system flush
001-1, 001B, 001C, 006, 016	Intake demucking	Settling in lined dumpsters
001B-2, 001B-3, 001B-6, 001C-2, 001C-3, 001C-4, 001C-6	Hydrogen Peroxide	Used to treat hydrazine. Also used in primary water system as forced oxygenation to insure oxygen is present prior to filtration or ion exchange