MASSACHUSETTS WATER RESOURCES AUTHORITY

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Frederick A. Laskey
Executive Director

October 20, 2005

Ms. Linda Murphy, Director
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Water Technical Unit "SEW"
P.O. BOX 8127
Boston, MA 02114

Mr. Glenn Haas, Director
Division of Watershed Management
Department of Environmental Protection
1 Winter Street
Boston, MA 02108

RE: Massachusetts Water Resources Authority
NPDES Permit Number MA 0103284
Wet Weather and Deer Island Treatment Plant Power Failure and Bypasses, October 15, 2005

Dear Ms. Murphy and Mr. Haas:

In accordance with Part II.D.1.e. of Massachusetts Water Resources Authority's ("MWRA") NPDES Permit Number MA 0103284, MWRA is submitting this written notification, which is a follow-up to its verbal notification made on October 15, 2005 regarding wet weather bypasses due to a large and sustained rainstorm and an electrical power failure during the rainstorm. The power failure resulted in the loss of pumping and secondary treatment at MWRA's Deer Island Treatment Plant ("DITP") and a bypass discharge to Quincy Bay. These bypasses were unavoidable, there were no feasible alternatives to the bypasses, and MWRA provided verbal notification within 24 hours in accordance with Part II.B.4.d. of its NPDES permit.

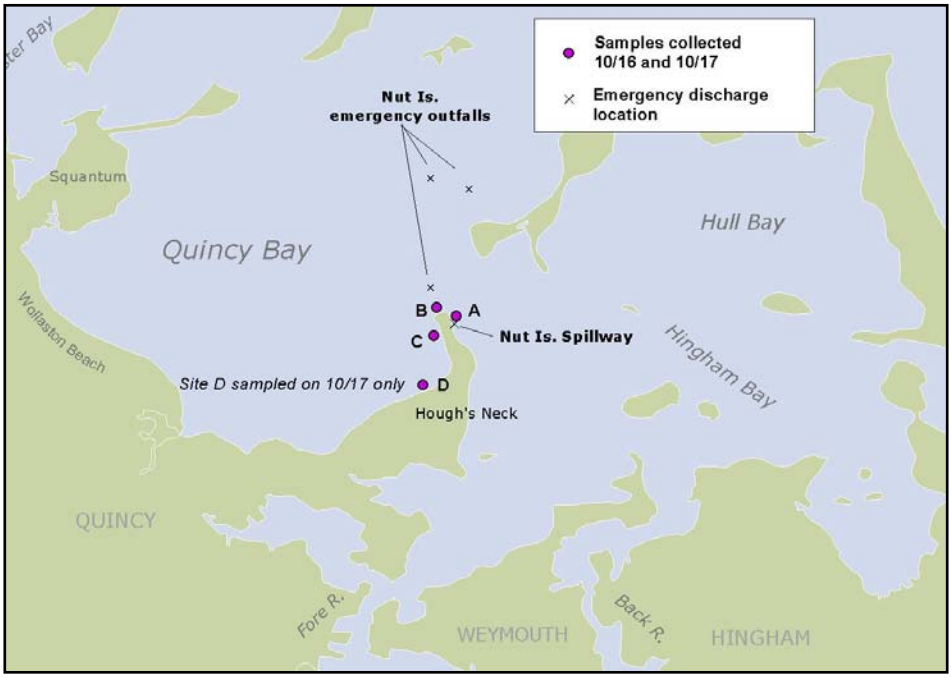
On October 14 and 15 a major storm occurred in the greater Boston area causing widespread flooding, overflows, and sewer surcharges. This storm followed a week of wet weather, which had already saturated the ground. Rainfall in the South System was very heavy (more than 6.5 inches of precipitation were recorded at the Blue Hills Observatory between mid-day Friday October 14 and Saturday afternoon October 15, with more than 4.5 inches on October 15). On October 15, at 4:53 pm NStar power to Deer Island was lost as a result of an accident at NStar's K Street substation, apparently during routine maintenance on an adjacent transformer.

Prior to the loss of power, DITP was pumping at the rate of 1,208 MGD, with flow from the South System at approximately 390 MGD (45 MGD from the Braintree-Weymouth Intermediate Pump Station and 345 MGD from Nut Island).

South System

Nut Island: Because of the extended period of heavy rain, flows from the South System exceeded the capacity of Nut Island Headworks and at 3:07pm on Saturday, October 15 it became necessary to open a gate to the emergency outfalls to prevent backups of sewage into streets, homes and businesses. Approximately 2 MG were discharged to Quincy Bay. The gate was closed at 4:00pm. After DITP lost power, staff isolated the headworks and opened all three emergency outfalls and the emergency spillway discharging approximately 23 MG to Quincy/Hingham Bays. After DITP power was restored, staff commenced closing the spillway gates at 6:27pm, and completed closing of all the Nut Island gates by 7:40pm.

MWRA staff sampled the shoreline of Nut Island for bacteria on October 16 and 17. Sampling locations and bacteria data are shown below. Bacteria counts were slightly elevated the day after the discharge, and within water quality standards by Monday.



Results of Nut Island monitoring, October 16 – 17, 2005.
"Single-sample" water quality criteria are 104 col/100mL for *Enterococcus* and 235 col/100 mL for *E. coli*.

Site	Date/Time collected	Colonies/100 ml	
		Enterococcus	***E. coli***
A	10/16/2005 13:20	155	195
B	10/16/2005 13:26	55	70
C	10/16/2005 13:38	300	275
A	10/17/2005 9:58	5	25
B	10/17/2005 10:04	10	35
C	10/17/2005 10:13	10	50
D	10/17/2005 11:41	25	85

South System continued

Roslindale--Archdale: The Archdale diversion structure was opened beginning at 8:15am on Saturday to provide needed relief at Archdale and downstream, and completely closed on Sunday morning at 9:50am.

Weymouth--Smelt Brook: Section 126 started to overflow at 6:00 am on Saturday and stopped Sunday at 3:30am.

Braintree--Pearl Street: Section 128 started to overflow at 6:00am Saturday and stopped at 4:00am Sunday.

North System

Alewife Area: The relief sites (Section C and 107) for the North Metropolitan sewer system at the Alewife area activated at about 7:30am on Saturday. They remained active until 10:30pm. An overflow also occurred at the Alewife Pump Station property on Saturday from about 4:30pm to 10:30pm.

Medford--Section 91B: The downstream head house near Lakeview Avenue in Medford overflowed on Saturday from 2:00pm until 11:22pm.

Chelsea--Section 15: On-street flooding occurred on Second Street in Chelsea as a result of the power outage from Saturday at 5:30pm until 8:15pm.

Malden--Section 40: Malden behind NE Coffee/Charles Street overflowed on Saturday at 9:00pm until 1:00am Sunday.

Commercial Point CSO Facility: (All of MWRA's CSO facilities activated; those reports will be part of MWRA's October monthly CSO Discharge Monitoring Reports.) At the Commercial Point CSO Facility, the bypass weir overflow was overtopped for several hours due to tidal impacts.

Headworks:

Columbus Park: Due to high flows, choking began on Saturday 10/15 at 12:15am. After the power failure, the headworks was isolated at 4:53pm to protect the facility. Flow was reintroduced at 6:32pm. Free flow to DITP resumed at 10:00pm.

Ward Street: Due to high flows, choking began on Saturday 10/15 at 12:05am. After the power failure, the headworks was isolated at 4:53pm to protect the facility. Flow was reintroduced at 6:48pm. Free flow to DITP resumed at 8:45pm.

Chelsea Creek: Due to high flows, intermittant choking began on Saturday 10/15 at 2:00am. After the power failure, the headworks was isolated at 4:53pm on 10/15. Flow was reintroduced at 6:45pm. Free flow to DITP resumed at 5:00am on Sunday 10/16.

Power loss at DITP

On Saturday, October 15, at 4:53pm, Deer Island experienced a complete power loss from NStar. The power loss originated at the NStar K Street substation in South Boston as a direct result of an accident involving an NStar contract maintenance crew. The crew, while performing insulator cleaning, suffered near-fatal injuries. NStar, presumably in the interest of safety, cut off our power supply at 4:53pm. This decision was made without any advance notification to MWRA. At the time of the power disruption, DITP was pumping at its maximum flow rate of 1,208 MGD and had been pumping in excess of 1,000 MGD for almost 18 hours. For comparison, the average daily dry weather flow DITP treats is 330 MGD.

Background: Electricity is normally supplied via a cross-harbor submarine cable originating at the NStar facility located on K Street, South Boston and terminating in the NStar Substation 132 located on Deer Island. Voltage is supplied at 115,000 volts through the NStar facilities and reduced to 13,800 volts on Deer Island. Station 132 is owned and operated by NStar. Deer Island's electrical distribution system originates at the Main Switchgear Building (MSB) and is distributed through 43 substations. Voltage is supplied at 13,800 volts to the substations and is reduced to 4,160 volts and/or 480 volts.

For backup power, Deer Island relies upon two 26-MW combustion turbine generators ("CTG") located in the Thermal Power Plant (TPP). The CTG units are designed to fully restore power back to the MSB in the event of loss of power from NStar. The power then has to be distributed to each of the 43 unit substations.

DITP Response**:** As soon as the power disruption occurred, plant staff immediately took steps to start the backup power source, the CTGs. The first CTG was activated within 8 minutes at 5:01pm. The MSB was recorded as automatically reset within the next 2 minutes at 5:03pm. The first pump was powered within 71 minutes, or 6:14pm. Pumps came back on-line in rapid succession, about every 10 minutes. Pumping operations reached 1,000 MGD by 7:30pm and 1,200 MGD by 8:00pm. The re-establishment of power to the unit substations is described below.

The unit substations and their associated equipment are designed with various protective devices, such as relays or breakers, that trip during power outages. These devices protect the main equipment, such as motors and Variable Frequency Drives ("VFD"), that control that speed of the pumps, from permanent damage. The design does allow some equipment to "ride out" minor interruptions in power or power surges. However, events beyond a certain duration or magnitude do create trips.

In some cases, these protective devices are designed to automatically re-set. In other cases, either due to safety concerns or simply because it is the way it was designed, manual resetting is required. In this instance, manual resetting was required.

Pumping at the South System Pump Station was initiated at 6:14pm. Pumping at the Winthrop Terminal Headworks was initiated at 6:29pm and brought to maximum flow by 7:02 pm. Pumping at the North Main Pump Station via the Boston Main Drainage Tunnel was initiated at 6:32 pm and via the North Metropolitan Relief Tunnel at 6:43 pm. There were no disruptions in disinfection operation. Prior to the power outage, a portion of the flow was already bypassing secondary treatment with the secondary process limit set to

540 MGD. Due to the power outage, blending levels increased while secondary unit operations were recovered. Secondary returned to full 540 MGD capacity by 10:30 pm.

DITP Effluent Quality: Despite the power failure, effluent quality at DITP was well within the daily permit limit of 14,000 colonies/100 mL geometric mean for the day for fecal coliform bacteria. Additional samples were collected during the power failure and after restoration. Total suspended solids were higher than usual on 10/15, but dropped back to normal on 10/16.

Date/Time Sample Collected	Note	Fecal coliform (colonies/100mL)	Total chlorine residual in disinfection basin before dechlorination (mg/L)
10/15/2005 7:02	Before power failure	125	0.84
10/15/2005 9:37		60	0.92
10/15/2005 12:08		40	0.93
10/15/2005 18:50	After power failure	133,000	< 0.04
10/15/2005 21:57	After power restored	265	0.09
10/15/2005	Daily Geometric Mean	403	

Total suspended solids (mg/L)	
10/15/2005	32
10/16/2005	13

As discussed above, the loss of power occurred while DITP and Nut Island Headworks were operating at peak capacity. At that time, the sewer system was already exceeding capacity and overflowing in several areas. In order to prevent injury to personnel working at the headworks facilities and prevent severe property damage to the facilities, MWRA had to close the influent gates to the headworks facilities. Staff also had to use some additional relief points to prevent damage to residential property and prevent injury to residents. Because of these conditions, there was no available in-system storage and there were no feasible alternatives to bypass. During this event, MWRA complied with the provisions of Part II. B.4.d. of its NPDES permit, which define certain circumstances were the Regional Administrator may not take enforcement action against a permittee for bypass.

MWRA staff will continue to review operating procedures in an effort to speed up the process of resetting the electrical system and starting-up the pumps.

If you have questions about this notification, please do not hesitate to call me at (617) 788-4359.

Sincerely,

Michael J. Hornbrook
Chief Operating Officer

cc: T. Borci, EPA
B. Pitt, EPA
M. Griffin, EOEA
J. Kennedy, DMF
K. Brander, DEP
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