December 20, 2000

Ms. Arleen O'Donnell, Assistant Commissioner
Bureau of Resources Protection
Department of Environmental Protection
1 Winter Street
Boston, MA 02108

Ms. Linda Murphy, Director
Office of Ecosystem Protection
U.S. Environmental Protection Agency
Water Technical Unit "SEW"
P.O. Box 8127
Boston, MA 02114

Re: Massachusetts Water Resources Authority, Permit Number MA0103284
Notification Pursuant to Part I.8. Contingency Plan

Dear Ms. O'Donnell and Ms. Murphy:

MWRA's NPDES Permit and Contingency Plan specify that the Total Chlorine Residual (TCR) of the final effluent, based on an average of three daily measurements, be no greater than 0.631 mg/l. On Friday, December 15, 2000, MWRA confirmed that the TCR was 0.9 mg/l on Thursday, December 14, 2000, triggering notification under the Contingency Plan. This exceedance of the total chlorine residual limit for a short period of time posed no adverse environmental impacts.

MWRA believes that a control weakness--lack of automated TCR sensors--led to the occurrence of elevated TCR levels. MWRA did not discover that it lacked the necessary automated TCR sensors until just prior to commencing start-up of the effluent outfall tunnel in September. Once MWRA discovered this deficiency, it took steps to correct this problem. In fact, MWRA had ordered TCR sensors prior to the incident, but had not yet received them. MWRA is now in the process of installing the first of three sensors.

This letter of notification, prepared pursuant to Contingency Plan notification requirements, describes the circumstances on December 14, the corrective actions already underway to minimize TCR violations in the future, and effects on the receiving water.

December 14, 2000:

On December 14, 2000, a rain event increased the plant flow from the daily average flow of 360 million gallons per day (at 10:00 a.m.) to over 800 million gallons per day (at 1:00 p.m.). This rapid change in flow made automated control of the chemical feed systems very difficult. The minimum chlorine residual targets were extremely difficult to maintain, forcing the operators to increase the dosing rates significantly at the peak of the rain event (upwards of 80 gallons per minute from a typical dry weather feed rate of 3-5 gallons per minute). The operators were making adjustments to the chlorine-dosing rate approximately every 15 minutes around the peak of the rain event (1:00 p.m.). As

the flows decreased, the total chlorine residual started increasing rapidly. The dechlorination control system compensated for the decreasing flows but did not always compensate for the rapid increase in chlorine residual resulting in a high chlorine residual of 2.64 mg/l during the 2:20 p.m. sampling event. Two other chlorine residual measurements taken during the day measured at less than the detection limit of 0.03 mg/L, giving an average total chlorine residual for the day of 0.9 mg/l.

Staff made adjustments according to standard operating procedures for the unit's operation. Since adjustments were made every 15 minutes around this period it is estimated that the event lasted no longer than 30 minutes. However, if sensors had been on-line to determine total chlorine residual, automated adjustments would have been even quicker to respond to a rapid increase in chlorine residual.

Corrective Action:

Even before the start-up of the new outfall, staff had recognized the limitations on operational control without automatic sensors. Several different on-line total chlorine residual analyzers had been tested for accuracy, reliability and ease of maintenance. The selected product is now being installed and will be subject to routine testing over the next several weeks.

Meanwhile, staff adjusted their storm event standard operating procedures and will proactively increase sodium bisulfite dosing when they increase sodium hypochlorite dosing (prior to receiving a residual reading.) Final adjustments will be made once the actual chlorine residual samples have been taken. (This approach was successful during the major, high flow storm that subsequently occurred on December 17, 2000 when DITP maintained adequate disinfection, meeting fecal coliform limits, but had no TCR exceedance.)

Effects:

The TCR permit limit of 0.631 mg/l, measured at the treatment plant, is a conservative limit. First, it assumes there is no decrease in chlorine residual in the effluent as it travels the 9.5-mile length of the tunnel. To test for the effect of travel time within the outfall tunnel on the chlorine residual concentration of the effluent, the sample that measured 2.6 mg/l was held in the laboratory for the tunnel travel time of five hours. At the end of the five hours, the sample measured 1.71 mg/l, which would yield an average TCR of 0.59 mg/l at the diffuser. Second, the limit is based on a worst-case dilution assumption of minimum dilution (stratified conditions, as occur in the summer). At this time of year, the water column in Massachusetts Bay is well-mixed, providing much greater dilution (at least 150-fold for the average plant flow on that day) than was assumed for calculation of the chlorine residual limit (50-fold) found in the permit and the Contingency Plan.

Please let me know if any of MWRA's staff can give you additional assistance regarding this notification.

Sincerely,

Michael J. Hornbrook
Chief Operating Officer

See Attachments:
A: Deer Island Treatment Plant's Chlorination/Dechlorination Process
B: Disinfection Process Flow Diagram
C: Deer Island Treatment Plant Process Information--Disinfection

Cc:
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