

# **APPENDIX G**

Summer 2000 Meduxnekeag River Sampling Plan

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### **Background**

Dissolved oxygen criteria are not always being attained in the Meduxnekeag River below the Houlton STP outfall and occasionally above the outfall during the early morning hours at times of relatively low summer flow due to the respiration of attached algae. It is believed that this problem is the result of nutrient enrichment, specifically phosphorous. Houlton STP is performing total phosphorous (TP) treatment from June to September as required in a recently issued permit. AE Staley has TP limits as well as river flow and instream DO thresholds. Summer stream sampling has been performed since 1996 by the DEP, Presque Isle office, and the Houlton Band of Maliseet Indians. It is proposed that monitoring be continued this summer (2000).

This plan is being presented to provide sampling procedures and QA/QC requirements and to include the participation of treatment plant personal. The purpose of the sampling is to monitor the effect of TP treatment of the Houlton discharge upon instream dissolved oxygen (DO) and to generally monitor the river for attainment of DO standards. During the TP treatment period, instream DO/temperature is to be monitored. The treatment plants monitor effluent flow and effluent TP concentration. River flow is normally monitored at the site of a discontinued USGS gage above Houlton outfall by A.E. Staley.

### **Parameters**

Instream dissolved oxygen and temperature, effluent TP concentration, effluent flow and river flow are to be monitored. Instream DO/temperature are to be measured with DO meters. Effluent TP concentration and flow are routinely monitored by Houlton STP (and Staley if applicable). USGS has re-established a rating curve for their Meduxnekeag River site and readings are obtained manually.

### **Procedure/Schedule**

#### **General**

Instream sampling should be made at least weekly for DO/temperature from early June through September. Actual sampling days should be chosen to capture low flow/high temperature conditions.

#### **Effluent Monitoring**

As performed in recent years, the Houlton STP generally monitors TP on a daily basis. The recently issued permit calls for effluent TP concentration of 0.5 mg/l (daily maximum) from June 1 to September 15 and it is anticipated that this monitoring will be continued this coming summer. Houlton should provide information regarding QA/QC procedures and precision of TP analyses. A.E. Staley monitors TP in accordance with their permit, but in general Staley does not discharge during the summer.

#### **Instream DO/Temperature**

DO/temperature is to be measured during early morning (preferably between 5:00AM and 6:00AM, based on past data) and mid afternoon (2:00 to 4:00 PM). The meter is to be air calibrated and periodically checked during each survey and appropriate QA/QC protocols observed (see attached DO meter protocol). A DO saturation table from the 20th edition of Standard Methods is attached.

#### **River Flow**

River flow should be monitored daily at the old USGS gaging station. AE Staley should be contacted to insure that readings will be made. If necessary, arrangements should be made to assist in these gage readings.

### **Stations**

Instream sampling stations should include:

immediately above Staley (station MDX1, above Staley outfall)

immediately above Houlton STP (station MDX11, steep bank, deadend road, Elm St.?)  
below Houlton STP (after mixing) (station MDX12b, above island, moderate walk in from  
Houlton STP, bank site)  
“new” bridge (station MDX15, Lowrey bridge, sample from bridge at center of stream)  
Covered Bridge (station MDX17, covered bridge, sample from highway bridge center of  
stream)

**Equipment**

DO/temperature meter(s). Field sheets.

## Dissolved Oxygen Meter Protocols

The following procedures are recommended when using dissolved oxygen (DO) meters for the purpose of measuring DO and temperature during water quality monitoring/surveys:

- (1) Prior to each survey, the meter should be checked against following:
  - (a) calibrated thermometer and
  - (b) Winkler DO test or another DO meter known to be in calibration (such as a dedicated lab meter) or at least two other meters.
- (2) Each "team" performing the monitoring should carry a backup meter.
- (3) For a survey involving multiple "teams", all meters from all teams should be cross checked. This should be done at least two to three times each day (beginning, middle and end of the day). The check involves all teams gathering, taking a reading on a reference sample (bucket of water) and comparing results. Temperature should agree within 2 degrees C and DO should agree within 0.3 mg/l. Meters not agreeing should be rejected for the day.
- (4) Each team should check meter calibration at intervals during the day. If the meter has drifted, it should be adjusted and the amount of adjustment noted on the field sheet along with the time of adjustment. At any site, if a sampler gets an unusual reading (appears too high/low or erratic), the calibration should be checked and a second reading taken.
- (5) The probe should be checked periodically for air bubbles. If bubbles are found the membrane should be replaced and the probe recalibrated.
- (6) Calibration should be performed using the "air calibration" method. This involves enclosing the DO meter probe in a cap (for example a small plastic bottle which fits firmly over the probe) in which 100% humidity is maintained (by enclosing a wet sponge, being careful not to allow direct water contact with the probe membrane). Atmospheric pressure must be maintained within the cap, i.e. no pressure buildup. This can be done by pulling the cap down far enough to create a small crack through which air pressure can be equalized. A DO reading is then made and compared to the theoretical 100% oxygen saturation for water at the given temperature. A calibrated barometer should be used to determine the correct saturation reading (if not available assume standard pressure of 760 mm, any error is generally small). The reading should be taken from chart of DO saturation values given in the latest edition of Standard Methods. Special care should be taken especially during hot afternoons when, during transport, the probe temperature becomes much higher than the water temperature. In this case it is recommended to dip the capped probed in the water (not allowing water to enter the cap) and taking a DO measurement after the temperature has stabilized. In this situation it is very important to ensure that there is no pressure buildup inside the cap (vent to atmosphere).