

APPENDIX D

Comments on revised draft of Meduxnekeag River TMDL, May 1996

Comments on revised draft of Meduxnekeag River TMDL, May 1996 (see Appendix A) from John Clark, General Manager Houlton Water Company dated August 12, 1996. Response (November 12, 1996 memo) follows.

1. A very limited data set was input to the model used to calculate a total phosphorus allocation for HWC's discharge. Within this report the DEP describes significant limitations of the model, including the use of a limited data set, and of the calibration/verification procedures used in this analysis, yet a definitive water-quality limit is set forth to be achieved by HWC.
2. The model used is not directly applicable to the conditions found in the river. The QUAL2E model is designed to predict DO demands on a river system in the presence of algae suspended within the water column. In this case, attached plant growth was assumed to be predominant in the river. To compensate for this limitation, the DEP arbitrarily created Sediment Oxygen Demand (SOD) values which were then input into a model, seriously compromising the reliability and precision of the model run discussed in the TMDL report.
3. No attempt was made to quantify nutrients or Dissolved Oxygen (DO) demands contributed by non-point sources. Yet the report states that reduction in non-point nutrient sources in combination with point source reduction would provide for significant improvements in water quality.
4. The DEP allows for water withdrawal from the river during low flow periods for agricultural purposes, which further impacts the river's ability to assimilate nutrients and other pollutants. In effect, HWC is being required to compensate for a situation created in part by an activity out of HWC's control and not regulated by the DEP. Withdrawal of water occurs during the absolute worst low flow periods.
5. The results of the model provide the sole basis for allocating a Total Phosphorus limit to HWC. Taking into account the model's limitations, assumptions, data manipulation as well as the limited database available; HWC must seriously challenge the DEP's conclusions and proposed limits as set forth in the TMDL report.

November 12, 1996

To: Michael Barden, Director DWRR
From: David Miller, DEA

Subject: Meduxnekeag River TMDL

I have reviewed the comments on the above report by Houlton Water Company dated August 12, 1996 and have the following response, numbered in the same manner as the comments.

(1) Sufficient data was collected for the calibration of the QUAL2 average daily dissolved oxygen (DO) model of the Meduxnekeag. The model development was not limited by data, in fact, rather than the usual two survey data sets that are normally collected for this type of study, a total of three data sets were collected. The third data set was collected under near ideal conditions during a dry summer with river flows near 7Q10. This third data set along with the previous data provided two distinct sets of conditions with which to develop the DO model. The calibrated model accurately predicted DO over the range of flows/conditions represented by the data sets.

The reviewer seems to confuse the QUAL2 DO model with the procedure to estimate a total phosphorous (TP) allocation. The QUAL2 model was used to examine the relative contributions to the DO deficit of various factors. After it was determined that diurnal variation (plant effects) was the major cause of non attainment, the QUAL2 model was used to estimate to what extent the diurnal range must be reduced in order to attain standards. For this purpose the diurnal range from the 1995 data was used. The 1995 data provided a good approximation of 7Q10 river conditions but in terms of diurnal range the results are probably conservative (higher minimum DO) because while water quality standards must be assessed under conditions of full license loading limits, the data were collected under reduced point loading conditions and no attempt was made to estimate the diurnal range that would occur under conditions of 7Q10 river flow and full license loading.

The phosphorous allocation procedure used actual instream data to develop a relationship between diurnal DO range and TP concentration. Curve fitting of this data resulted in a high degree of correlation ($R^2=0.974$). The report points out the limitations of this method and while additional data would improve the analysis, effort would be better spent in actual field trials in reducing phosphorous loading and measuring the results (as recommended in the report).

(2) I disagree that the QUAL2 model is not applicable to the Meduxnekeag River. The use of SOD to represent the net effect of all benthic sources and sinks including attached plants is valid for a steady state, daily average

condition. The model limitation is that the dynamic, diurnal minimum DO cannot be modeled. For estimating minimum DO actual diurnal range data was used, despite the fact that this probably overestimates the minimum DO as noted above.

(3) The sampling and subsequent modeling were performed during and for dry weather periods when runoff is not a factor. In fact the work on the Meduxnekeag was delayed several years due to the need for good low flow conditions. Background phosphorous data (from above the discharges) indicate little contribution from non point sources compared to the significant increase in TP below the Houlton outfall. Contrary to the reviewer's comments, no conclusions were drawn regarding the effect of non point reduction other than to point out that "it may be possible that reduction in non point nutrient sources in combination with a reasonable reduction in TP from the Houlton discharge may result in significant improvements with regard to plant growth . . ."

In general the effect of non point nutrient loading upon free flowing river systems is less understood than that for lake or impoundment systems. The effect of non point loading, which occurs at times when river flow, velocities and flushing are increased, upon water quality during critical summer low flow conditions represented by 7Q10 flow (requirement for allocation studies) may not be significant when compared to the effect of a point source. Whereas non point loading is intermittent and of limited duration, point sources provide the constant supply of nutrients required for the establishment and maintenance of high density plant communities.

(4) Water withdrawal is a critical issue. DEP does not "allow" withdrawals, Currently there is no Maine regulation under which this activity can be controlled, but work is under way to develop minimum flow regulations. Until such a time that a regulation is in place, we must deal with conditions as they are. There have been cases where a licensee has negotiated with water users for a guaranteed minimum flow.

(5) Contrary to the reviewer's conclusion, the QUAL2 model is not the "sole source" of the nutrient allocation. As described above, the bulk of the analyses is based upon actual data. The model is a useful tool but in this case actual data acquired over a number of years and including a good low flow year, provides clear indication of non attainment of standards as well as the role of plant growth, nutrient enrichment and point source contribution.

In general, I stand by the report as written. I will point out that the report recommendations are based chiefly on actual data and that the emphasis of the recommendations is upon reduction of all nutrient loads along with monitoring to achieve attainment of water quality standards at the least cost possible.

cc Nick Archer