G.1

WATER QUALITY: AT WHAT PRICE?

The Bedford Water Advisory Board (BWAB) has over the last several years been very active, indeed at the forefront of generating baseline data on the lakes within its area of responsibility. This information has been assembled primarily by CWRS and testing done by AMEC. Laboratory testing has been traditionally done at accredited labs using acknowledged and standard procedures.

Of concern to BWAB at this time is the trend of the data as well as the final measure of the water quality.

Traditionally in processes like this, models of the measured variable have been generated and verified., the initial conditions ascertained and the predictive capability of the model relied on to develop a final end state. In applying this common engineering procedure to water quality, we run into a couple of difficulties that may invalidate this approach.
First of all, the selected model for predicting phosphorus loading in our case is based on Dillon Rigler model of 1975, and has been modified for Nova Scotia by CWRS. It is apparently being considered for province wide use by NSDEL, according to Brylinski in 2004.
Secondly, the phosphorus loading model is a bulk loading system without a time line. An analysis was made to correlate an assumed load and a resultant measurement and the single data point appeared to be valid.
Thirdly, because of the lack of a time line, or transport rate, the model can only be valid at the end state of the phosphorus load uptake at some future time.

The conclusion that I have drawn from this is that the phosphorus modeling capability and accuracy is highly suspect, and capable of perhaps predicting final values. If the model is in fact wrong, we will have proceeded too far down the development path to recover.

On the other hand, developers have a right to know what is permissible in developing their properties. Annapolis Basin Pulp and Power have been extremely cooperative in trying to determine what they can do on their property in the Bedford West Planning area. They have baselined what the current state is, and assembled some data to show some trends. It is their intention or the intention of the ongoing owners to use the current modeling tools, to size the density and construction techniques for the various parts of the development which will affect the water quality of the area.

What data is available?
I have compiled the documents at Annex A which relate to the water quality of the part of Bedford West under consideration. Specifically, I have reviewed all data that refers to the North end of Kearney Lake, Kearney Run, and the input to Paper Mill Lake.

What does the data show:

Date	Location	TP (ug/L)
1980	Kearney lake	1
1990		9
1994(avg)		4.1
2004-		6.7
2005/6		4.1
Final Future value		15.4
1980	Papermill Lake	6
1990		6
1994(avg)		5.1
2004-		4.2
2005/6		4.2
Final Future value		16.2 – 19.7

As you can see, the current numbers are no where near what the block phosphorus number are predicted to be. This may be due to transport lag, of the block loaded phosphorous into the final equilibrium state.

Annex A
List of Documents:

1. Water Quality Impact Assessment of Water bodies contained in the Bedford West Planning area using a phosphorus loading model approach, CWRS, April 30 2004
2. Field work results, 22 June 2004 – McQuade, Kearney and Papermill lake, CWRS

   Summary – 9.7,10.3 9.0 ug/L respectively
3. Bedford West Planning area Data compilation and Summary of Results, CWRS, May 2005 – April 2006

   Summary – 2 year sampling program results. Baseline data
4. AMEC test report 18 Feb 2004. Upstream WQ sampling of PML water shed.

   Summary - This has the error in the phosphorus readings.

5. AMEC test report Sept 13, 2005. Upstream WQ sampling of PML water shed.

   Summary - High Fecal count in 4 lakes, none in Washmill Lake
6. AMEC test report, 25 April 2006, Upstream WQ sampling of PML water shed.

   Summary – Not particularly useful.
7. Inter-Laboratory Total phosphorus Survey, 22 Sep 2004 with AMEC, and CWRS.
8. Summary of Porter Dillon 1994-95 results and AG Survey 2005. Kearney and Papermill lake

   Summary: referenced in 3.
9. Subwatershed Management Plan Bedford West, May 2004. Jacques Whitford.
10. Birch Cove Lakes Area Environmental Study, Task 2 Report, June 1996

    Summary:: See Appendix A and B. C. Provide historical data from 1980 to 1994

11. Water Quality Analysis for Kearney Lake, .Paper Mill Lake and Jack's lake, 1984-1996. Jacques Whitford et al, Sept 1996

    Summary: Not particularly helpful.
12. Limnological Study of 27 Halifax Metro Lakes, March 1991 by Soil and Water conservation Society of Metro Halifax.

    Summary; See figure 8c, page 67.. A record of the original conditions of the lakes in the Metro area including Kearney and PML.