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Engineering, Environmental & Geologic Consultants

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Comments and Recommendations On

Draft Chapter 583 Nutrient Criteria for Fresh Surface Waters

And

DEPLW - 0970

Protocols for Calculating the Diatom Total Phosphorus Index (DTPI) and Diatom Total Nitrogen Index (DTNI) for Wadeable Streams and Rivers

The following are Acheron's comments on the Maine Department of Environmental Protection's draft of Chapter 583, the Nutrient Criteria for Fresh Surface Water and the associated Protocols for Calculating the Diatom Total Phosphorus Index that is referenced in Ch. 583. The comments will address the following major issues:

- A. Chapter 583 represents such a substantive change and addition to the water quality criteria of Maine that it should be addressed in legislation as an amendment to 38 MRSA 465 by the Legislature. Once the Legislature has considered all of the social, economic and environmental benefits and cost of regulating nutrients, then and only then should the Board and the Department proceed with rule making.
- B. This major change to the water quality standards in Maine is being rushed through the administrative process without adequate opportunity for public comments, peer review, stakeholder input and financial analysis. We recommend that the Board delay action on this rule until a) the Department identifies specifically who will be impacted by the new nutrient standards, b) how the rule will or could be used by the Department or independent third parties to require installation of nutrient removal technology and c) how the increased cost of capital and O&M will be borne by rate payers.

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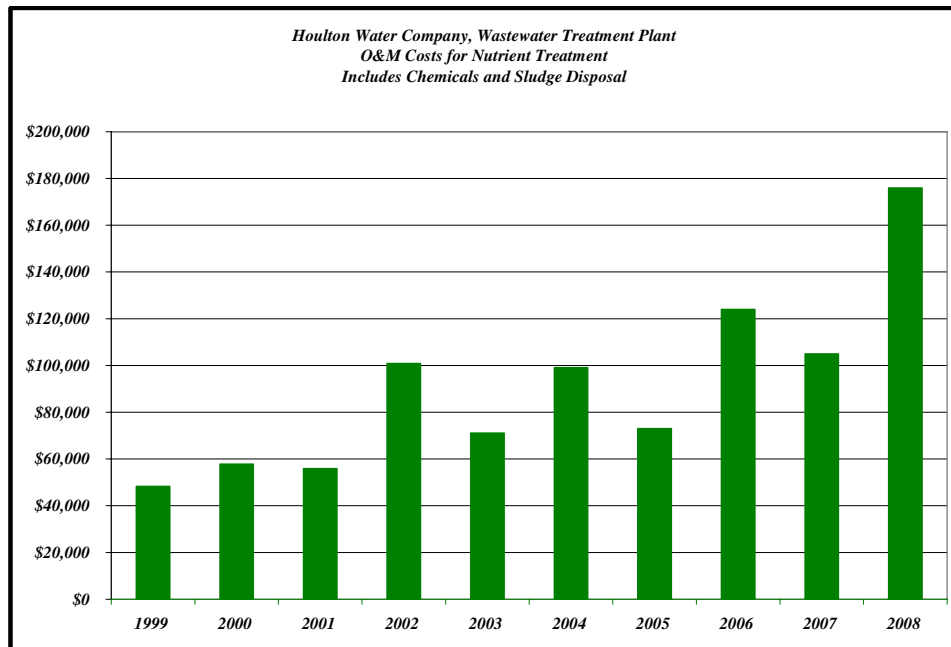
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- C. Chapter 583 could have a substantive economic impact on both point and non-point source dischargers to rivers and streams in Maine. Nowhere does the Department address the potential economic impact of this regulation.
- D. The Department and the Board so far have not identified the critical environmental issues that will be addressed or corrected by the new standards and criteria in 583.
- E. The Department so far has not adequately explained the technical and scientific basis for the standards and criteria proposed in 583.

Before I get into my detailed comments and suggestion, I would like to share with the Board a brief case history of one town, Houlton, Maine, who has already implemented nutrient treatment. In 2005, the Department issued a license/permit to the Houlton Water Company (HWC) with very stringent nutrient limits. The nutrient limits were imposed to address issues of attached algae and other periphyton in the Meduxnekeag River downstream of the HWC discharge. The HWC began trials of nutrient removal technology in 2002 and has been in 100% compliance with the nutrient limits imposed by the new license.

The application of phosphorus treatment technology in Houlton virtually eliminated the periphyton in the river downstream of the discharge. There are still some areas of attached algae **upstream and downstream** of the HWC discharge that is believed to be caused by some level of nutrient enrichment from non-point sources.

The improvements described above in the Meduxnekeag River have however significantly increased sewer bills to the residents of Houlton. The following is a chart that shows graphically how O&M costs have increased since 2002.



The total cost for chemicals and sludge disposal at the HWC wastewater treatment plant has increased from about \$50,000 per year in 2002 to \$175,000 per year in 2008. The increase of about \$125,000 per year is due almost entirely to the increased cost of chemicals and sludge disposal associated with phosphorus treatment. Distributed over the 1,460 residential customers on the Houlton system, the increased cost to operate and maintain the phosphorus treatment system is approximately \$85.00 per year per customer. The average total sewer bill in Houlton is \$354.00 per year per residential customer. Phosphorus treatment now represents approximately 24% of the average residential customer's sewer bill in Houlton, Maine.

The cost of phosphorus treatment in Houlton is probably lower than many communities because the capital cost to install phosphorus treatment in Houlton was very low. Most communities will need to add infrastructure to accomplish phosphorus treatment.

It is the legitimate domain of the Board to understand the cost to the residents of Maine of any new environmental standards. It is further the domain of the Board to weigh the cost and benefits. Based on the data presented above, any community forced to implement phosphorus removal as a result of Chapter 583 can expect sewer rates in their community to be 25% to 35% higher than they would be without phosphorus treatment.

The notice of formal rulemaking published on the Department's website does not address if this new rule will or will not have a fiscal impact on municipalities in Maine. Both of the options are left blank on the public notice. The fiscal notice indicates that this rule will not change the status quo unless the rule leads to the identification of additional water quality impairments. That is exactly the heart of our concern. This new rule has the potential to establish within its definitions and standards, a whole new list of water bodies that are impaired by these new standards. The Board and the municipalities deserve to know if they will be impacted by this change in water quality standards before the standards are adopted. Then and only then can the Board expect to have a realistic assessment of the true fiscal impact of this new rule. So far, Department staff has not provided sufficient time or information to allow for that assessment and evaluation. The Board should not be hasty in its deliberations on this issue and should allow sufficient time for potentially affected parties to understand the full implications of Chapter 583.

The following are our detail comments and suggestions.

- A. Legislative versus Regulatory Process.** Chapter 583 as presented represents a major substantive addition to the water quality standards. This regulation establishes a whole new set of standards for determining if a water body is impaired. A designation of "impaired" carries with it the understanding that something needs to be done to address the cause or causes of the impairment.

Nutrients are added to all rivers and streams from a variety of sources including point source licensed discharges, urban stormwater discharges, agricultural operations, overland runoff from all types of land development and even overland

runoff from undeveloped land. Nutrients, particularly one type of phosphorus, can cause algae development in fresh water streams, rivers, lakes and impoundments. Some amount of algae development is normal and essential for a healthy and productive ecosystem. Excessive algae development in a water body can have negative impact on the ecosystem.

This regulation is the first attempt to define impairment caused by nutrients and establish new thresholds for nutrients that cause or contribute to the impairment. Regulation of nutrients from point source discharges is not new in Maine. There are scores of discharge permits with nutrient limitations. What is new in this regulation is the authority to regulate nutrients from all other sources. Once a water body is classified as impaired under the criteria in 583, the Department will then have the authority to regulate all point and non-point sources of nutrients to correct the impaired condition.

The authority to acquire this magnitude of substantive expansion of regulatory authority has traditionally come from the Legislature, not by the Department granting the authority unto itself. This expansion of authority deserves to be addressed by the Legislature in an open and public process. All of the potentially affected stakeholders, including environmental groups, should have an opportunity to address the issues raised by 583 in a Legislative process, not a rule making procedure by the Department and the Board.

B. Economic Impact. Chapter 583 has the potential to have a substantive economic impact on both point and non-point source dischargers to rivers and streams in Maine. The principal concern with this rule is the standards are so new that there is no way to know which rivers and streams will be or could be classified as impaired under the proposed new standards. The Department has regulated nutrients from point source discharges for years. There is no way to know if the standards that have been applied over the years are stringent enough to achieve compliance with these new standards in 583.

It is clear that Chapter 583 will impact both point and non-point sources. Clearly that is the intent of the regulation. River segments could be “impaired” by discharges and/or runoff from existing point source discharges, urban areas, residential areas, agricultural operations, forest harvesting operations, industrial development, aquaculture operations or some combination of land use. Where combinations of land use occur, assigning responsibility to various types of land use for causing or contributing to the “impaired” condition could be daunting.

In our experience, the causes of nutrient enrichment in Maine rivers is always complex. In most cases, the contributors to nutrient enrichment are a combination of point and non-point sources. One of the economic concerns is that licensed point sources will be forced to undertake expensive studies to try to determine the extent to which the point source is causing or contributing to a designation of

impairment as defined in 583. The draft regulation establishes a framework for defining nutrient impairment but does not address how to assess responsibility for the impairment.

C. Environmental Issues to be Addressed by Ch. 583. The Department and the Board have so far not identified the critical environmental issues that will be addressed or corrected by the new standards and criteria in 583. The Department has not presented adequate justification for the imposition of a whole new category of water quality standards in Maine. Where are the waters of the State that the Department believes are impaired by nutrients and will be captured by this regulation? What is the magnitude of the impairment? Why is it necessary to have an entirely new set of water quality standards? Why are the existing water quality standards considered inadequate to address these issues of concern?

D. The Department has explained the technical and scientific basis for the standards and criteria proposed in 583, but have not subjected the new criteria to public scrutiny. The following is a sample of some of the technical issues raised by 583:

- **Total Phosphorus vs Dissolved Ortho-Phosphorus:** Total phosphorus in water is defined by the results of a laboratory test known as the Total Phosphorus test. Total phosphorus is comprised of the sum of the concentration of organic and inorganic phosphorus in a water sample. Each of these two sub-sets of total phosphorus is further defined by the concentration of the dissolved and non-dissolved fractions. So, total phosphorus is comprised of the sum of four distinctly different forms of phosphorus.

Only one of these fractions is considered bio-available to support plant growth; that is dissolved inorganic phosphorus commonly referred to as dissolved ortho-phosphorus. The water soluble ortho-phosphorus exists in nature as an ion with other elements and is commonly referred to as phosphate ions. Ortho-phosphorus is mined from the ground as an inorganic mineral and processed with a strong acid to create fertilizer or some other inorganic phosphorus product. When water is applied to fertilizer, the ortho-phosphorus is dissolved in the ionic form and is then available to be taken up by plants and used in photosynthesis to help plants grow. All aquatic plants require dissolved ortho-phosphorus to survive and grow.

Once dissolved ortho-phosphorus is absorbed into the tissue of any type of plant, it is no longer available for other plants to use until that plant dies and decomposes. The phosphorus that is taken up into plant tissue is then classified as organic phosphorus that is included in the Total Phosphorus test. In general, the dissolved ortho-phosphorus concentrations in river water are a small fraction of the total phosphorus. When a sample of river water is tested for total phosphorus, the results include all of the non-bio-available forms of phosphorus as well as the bio-available dissolved ortho-phosphorus. Total

phosphorus concentration in streams and rivers vary over a wide range usually in response to major rain events. Runoff from major storm events can flush large quantities of organic material into rivers and streams causing the total phosphorus levels in the water to increase dramatically. All of the phosphorus that is tied up in plant material is counted in the total phosphorus test.

Total phosphorus is important to large lakes and ponds because organic phosphorus can be recycled into ortho-phosphorus in large lakes. That transformation does not take place in streams and rivers. Therefore, dissolved ortho-phosphorus is the form of phosphorus that should be regulated in streams and rivers.

Generally, the concentration of dissolved ortho-phosphorus levels in stormwater runoff does not change in response to major rain events unless the runoff is from areas where some form of fertilizer has been applied. Then and only then will the dissolved (inorganic) ortho-phosphorus levels increase with a rain event.

It makes no logical or scientific sense to regulate nutrients in Class AA, A, B and C water based on total phosphorus. The parameter of concern is the dissolved (inorganic) ortho-phosphorus fraction of total phosphorus.

- **Selection of Threshold Limits:** The Department is proposing to use specific numeric threshold values for Total Phosphorus (TP) in combination with one of the response criteria that include chlorophyll-a, the Diatom Total Phosphorus Index (DTPI) and Percent of Substrate Coverage by Algae Growth to establish if a given water is impaired. In our opinion, it could be very easy for the Department or some third party to find river segments in Maine that trigger the threshold for impairment for brief periods in the summer. There needs to be a lot more information added to this regulation to define how and when sampling is to be done under this regulation. It is very easy to identify periods during and following major storm events when the total phosphorus concentrations exceed the proposed threshold.

With Chapter 583, the Department is establishing what constitutes an impaired river or stream without the benefit of input from stake holders and interested parties outside of the Department. The Department has provided an explanation of how they arrived mathematically at the threshold values in 583. We submit that every one of these values could and should be subject to rigorous scientific and public debate.

There is very little discussion of how the Percent Substrate Coverage threshold levels of 20, 30 and 40 percent were selected for Class A, B and C waters. Every aquatic biologist and fly fisherman appreciates how substrate coverage varies based on temperature, depth and solar exposure. Nutrients are just one of

the variables that affect substrate coverage. In our experience, it will be very easy to “select” sampling sections in Class B streams that either exceed or do not exceed the 30% threshold. This new substrate coverage standard should be subjected to considerable scientific and public debate before it is include in regulation.

The chlorophyll-a standard should also be examined carefully. Studies conducted on Gulf Island Pond indicate periods when chlorophyll-a levels were 9.3 to 9.5 ug/L and Secchi Dish readings were in the range of 1.2 to 2.1 meters. At the time these levels existed in the Pond, there was no visible algae either on the surface or suspended in the water column. There is some empirical evidence to indicate the threshold chlorophyll-a limit for class B and C waters should be considerably higher.

The definition of an algae bloom in Maine is already established in regulation as a Secchi Disk reading of 2 meter or less caused by algae. It has been shown repeatedly that there is no correlation between chlorophyll-a and Secchi Disk reading. Clearly, algae cause Secchi Disk readings to decline. But there are other variables that affect Secchi Disk. It may be helpful from a regulatory perspective to have a better test than Secchi Disk to numerically define a bloom, but 8.0 ug/L is well below what most reasonable observers would consider a bloom. The first challenge in the process should be to establish what an algae bloom is and what is not. The Department staff has their opinion. Others outside of the Department may have a different opinion.

The basis for the Department’s selection of 8.0 ug/L of chlorophyll-a as the definition of potential impairment for Class B and C waters should be the subject of scientific and public debate before any limit is established within the framework of a regulatory proceeding such as Chapter 583. The Department’s data and analysis should be scrutinized and peer reviewed before a threshold concentration is established.

Chapter 583 is the vehicle for the Department to finally expose the Diatom Total Phosphorus Index to public scrutiny. In April, 2009, the Department released the Protocol for Calculating the Diatom Total Phosphorus Index. Briefly, the procedure involves collecting field samples, identification of the type of diatoms present in the samples, submission of the data to the Department for review and then inserting the data into the Department’s secret model to produce an Index number. Apparently the Department has been collecting data for this model for some time. Apparently the Department does not intend to release the model for use by anyone outside of the Department. If Acheron has a client who would like to know the Index for a given section of river, they cannot derive the index independently of the Department. Contrast that with all of the other parameters in 583. Every one of the parameters can be sampled, analyzed and compared to the criteria for impairment in 583 without

releasing the data to the Department. The single except is the Diatom Total Phosphorus Index.

This same procedure was used with the biomonitoring process. Finally, when threatened with a freedom of information act request, the Department released the biomonitoring model, but only in a form that could not be used

The real issue is that no-one outside of the Department has any idea what this new water quality criteria means. It would be helpful if the Department would release the model and the data from the data base. That way, people outside of the Department could have some indication of what this new parameter means and how it might be applied to specific river segments.

E. Timing of the Process. The Department appears to be rushing this major new rule through the administrative process without adequate opportunity for public scrutiny, peer review, stakeholder input, analysis of potential impacts and financial analysis. On April 10, 2009 the protocol for the diatom index was released. On May 7, 2009 the Department posted a draft of Ch. 583 for public review. The public hearing is scheduled for June 18, 2009 and final comments are due July 30, 2009. The entire process of proposing and adopting a major change and additions to the water quality standards in Maine is being condensed into less than three months. In the past few years, the Department has used stakeholder sessions to refine new regulations for a variety of important environmental issues. That process seems to work well to improve the final product. The last major rule making that Acheron was asked to be involved with was the toxics regulations. That process took over two years of stakeholders meetings, hearings, public review and consideration by the Board. Nutrient control is no less important to the regulated community.

F. Recommendations. We recommend that the Board remand this draft regulation back to the Department. A stakeholders group should be established to work with the staff and the Board to refine the draft. In the mean time, the Department should determine which, if any, river segments in Maine will or could be classified as impaired under the standards in Ch 583. Then and only then can the Department and potential affected parties address the concerns of the cost of this new rule.

Following completion of the stakeholder process, the Department should submit the proposed nutrient criteria to the Legislature as an amendment to 38 MRSA 465. The Department should also include a fiscal note with the proposed amendment to 38 MRSA 465 so that the Legislature and the public can balance the cost and benefits of imposing these new water quality standards in Maine.

The goals of the new nutrient criteria may be appropriate for Maine. However, it is the domain of the Legislature to evaluate the benefits versus the costs to society and provide clear direction to the Board and the Department. Once the Legislature

has addressed the issue of nutrient standards, then the Board and the Department can proceed with rule making to implement the standards established by the Legislature. These new standards represent such a major change in water quality standards they should be evaluated by the Legislature before being implemented by the rule making procedures.

I thank you for the opportunity to present my verbal testimony and this written testimony on this important new regulation. I hope the Board will take the opportunity to engage in a stakeholder process for this new regulation.

Sincerely,
Acheron Inc.

William B. Ball, PE
President