Mary S. Booth, PhD
[redacted]

August 16, 2009

Sharon DeMeo
U.S. EPA, Office of Ecosystem Protection, Industrial Permits Branch
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Re: MA0040371, Russell Biomass NPDES permit

Dear Ms. DeMeo,

Thank you for the considerable effort and thoughtfulness that you have put into the drafting of the Russell Biomass NPDES permit - the explanations in the permit factsheet are detailed and cogent. Nonetheless, there are a few remaining issues that I would like to discuss in this submission. I am submitting these comments as a private citizen who has followed this process for over a year, and not on behalf of any other entity. My comments will focus on four main issues: the mixing zone, phosphorus, aluminum, and temperature.

Mixing zone

The Massachusetts implementation policy for mixing zones (1993) states that the mixing zone should be as small as is feasible, and that "Mixing zone size and shape will vary with hydrologic conditions. Mixing zone criteria apply at critical or worst case hydrologic conditions". Failing this, fish and other aquatic organisms moving upstream or simply unlucky enough to be in the discharge zone are treated to an inescapable warm and toxic soup. This plant will discharge the same amount or perhaps even more cooling tower blowdown during low-flow/high temperature periods as it does when river flows and assimilative capacity are higher. However, having viewed photos of the river near the discharge zone taken during low-flow periods, I am not confident that the mixing zone will move with sufficient velocity and turbulence to dissipate heat and pollutants during worst case/low flow conditions. The following photo was taken by Henry Worchol on October 9, 2007 when summed flow at the three upstream gages was 35.1 cfs, still higher more than the 7Q10 value. These photos show a very stagnant situation where mixing can not be assured.

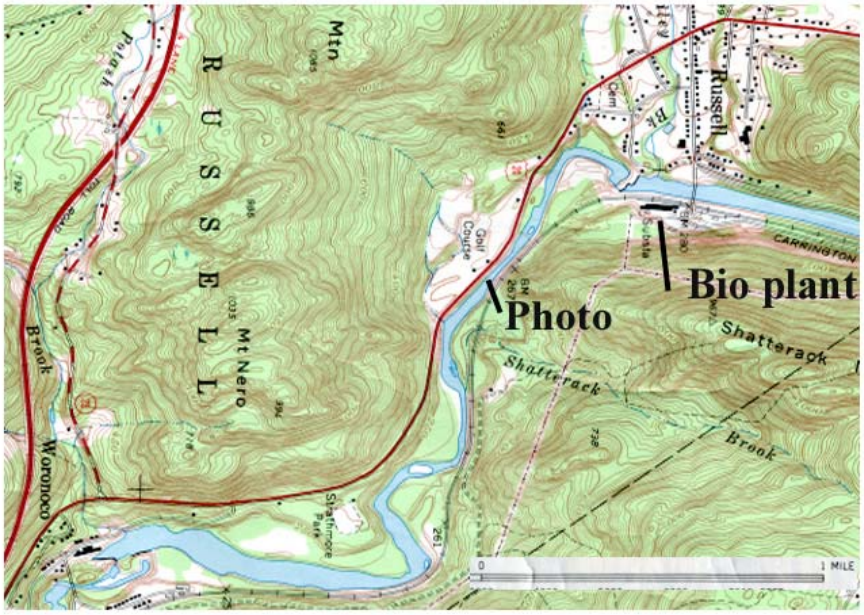

Photo looking upstream Oct. 8 - 2007

Further, I have little confidence in the modeling behind the mixing zone. The applicant used "FlowMaster", a modeling tool intended primarily for pipes and artificial ditches with regular dimension. Quoting from the manual, it states

"Uniform Flow: The equations used in Bentley FlowMaster deal primarily with uniform flow. Uniform flow refers to a hydraulic condition in which the flow depth, channel discharge, and flow area do not change over a channel reach having constant section characteristics such as shape and material. These conditions are met only when the channel bottom slope and the friction slope are equal. When water is flowing under uniform flow conditions, the depth of flow is frequently called normal depth.

The river is not a uniform pipe or ditch, and to the extent that the mixing model is based on such oversimplified assumptions, it may misrepresent mixing zone dynamics.

The outflow location for wastewater will be on the bank of the river, and potentially even above the level of the water during low-flow periods. Mixing zone regulations state that effluent flows along the banks of a river should be avoided if at all possible. How will such trailing flows be avoided, given the configuration of the outflows?

Further, the model relating flow rate to stream depth at the discharge point was calibrated with just one measurement on June 17th, 2005, when summed flow at the three upstream gages was 537 cfs. There were multiple days later in the year when flow was less than 50 cfs, but no data were collected to relate stream flow and depth.

There are many assumptions inherent in this mixing zone model, and much depends on getting the modeling right. After the plant is built is not the time to be trying to fix problems with dissipation of the waste stream. Why can not the applicant perform some tests at the proposed outflow location where water is pumped from immediately above the location, then labeled with a dye and re-discharged, so that the mixing zone dynamics can be directly observed? Given the magnitude of the project, this seems like a relatively inexpensive approach to avoiding costly problems later.

Phosphorus

As the permit factsheet acknowledges, the Westfield River is clearly impaired in its downstream reach, probably because of excess nutrients. Further, phosphorus from the plant's discharge will represent a significant increase over measured in-stream concentrations, which already exceed EPA's benchmark for Ecoregion VII of 0.01 mg/L.

The extent to which the plant's wastewater will contribute to phosphorus loading in the river is still unknown, to a large extent because phosphorus concentrations in the Westfield River are very poorly characterized. At this point the acceptable data for evaluating phosphorus concentrations appears to consist of a very few samples collected in 2001, eight years ago. None of the samples have been collected at conditions approximating the 7Q10 flow. Since phosphorus tends to be derived from point sources, it is reasonable to assume that its concentration will increase as flows decrease. The lack of representative data is therefore troubling. How hard would it have been for additional water quality and temperature data to have been collected over the last several years that this plant has been in the works? Why has DEP not required that the proponent collect such data?

By only regulating phosphorus discharges resulting from direct additions of P to boiler water, and not the phosphorus already present in river water that is concentrated in the cooling process, the permit itself unfortunately appears to ignore potential phosphorus loading by the plant. In a permit that exhibits such concern for details of the plant's operation, I respectfully submit that it is disappointing that the permit grants "intake credits" for such phosphorus, as is stated in the factsheet. Almost all the phosphorus that is removed with river water and concentrated in the cooling process is no less a "new addition" of nutrients than phosphorus that has been deliberately added, since the river's dilution capacity has been reduced by 85% concomitant with the net removal of cooling water in the first place. Documents submitted by the applicant have indicated that the actual concentration of phosphorus in wastewater will be 1.0 – 1.5 mg/L, and the permitting documents should reflect this fact.

Aluminum

It is good news that the permit prohibits the use of aluminum-containing compounds for water treatment at the plant. However, the same argument pertains for aluminum that pertains for phosphorus – that the concentration of aluminum as cooling water, and the re-discharge of remaining cooling water back to the river, constitutes nearly as much of an addition of a "novel" pollutant as if the aluminum had been added directly.

Further, the impacts are probably greater than even the modeling would indicate. Data on aluminum concentrations in the river was collected upstream of the Texon plant, which has a NPDES permit that allows it to discharge up to 1.3 mgd of effluent containing up to 2.4 mg/L aluminum. This translates to about 26 lb of aluminum per day that can be added to the river by the Texon plant. If calculations of the amount of aluminum taken in by the Russell plant and then re-discharged to the river were based on water quality data collected below the Texon plant, the calculated loadings could well be higher. Discharging aluminum-containing waters into a mixing zone of dubious efficacy may present a real threat to indigenous and stocked fish, including juvenile Atlantic salmon, which are known to be particularly sensitive to aluminum.

Temperature

As is the case for aluminum, the temperature data used by the applicant was collected upstream of the Texon plant. This is problematic partly because water temperatures on two of the three river branches may be influenced by dams, and so may not be representative of water temperatures further downstream after water has traveled and been held in impoundments. Further, the Texon plant's NPDES permit allows thermal discharges that can alter water temperature by up to 5 degrees Fahrenheit, a provision the plant has violated in the past. In sum, actual water temperatures may be greater at the Russell site than are suggested by the upstream data, and additional, detrimental thermal loading by the plant's discharges is a possibility. Again, it does not seem excessively onerous to require that the applicant conduct some site-specific monitoring. Why has this not been required?

In conclusion, while EPA has clearly carefully considered many issues when issuing this permit, there are still outstanding questions. Many of these could be answered prior to the plant's construction with a small amount of water quality and flow monitoring.

It is also unclear whether the permit's conditions will be sufficiently protective under the increasing frequency and intensity of low-flow periods that is already being observed on the Westfield River, presumably due to climate change. For this analysis, I attach the letter I submitted previously on water withdrawals by the plant. This analysis of low-flow events has also be conducted and affirmed by Dr. Piotr Parasiewicz, using more sophisticated modeling techniques. I hope that EPA is considering that this plant, if built, will likely withdraw water and discharge pollutants every day for many years (or at least until the wood supply runs out or becomes prohibitively expensive). Over this time frame, increased effects of climate change are likely to be felt, including higher air and water temperatures, and, as hard as it is to believe this summer, increased frequency of drought.

Thank you for the opportunity to comment.

Sincerely,

Mary S. Booth

cc: Paul Hogan, DEP