UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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June 1, 2010

Andrew Fisk
Maine Department of Environmental Protection
#17 State House Station
Augusta, Maine 04333-0017

SUBJECT: **Notification of Approval of Androscoggin River Gulf Island Pond TMDL Addendum**

Dear Mr. Fisk:

Thank you for Maine's submittal of the *Addendum to the Androscoggin River 2005 Total Maximum Daily Load (TMDL) For Gulf Island Pond, Livermore Falls Impoundment*. This report includes TMDL modifications for carbonaceous biochemical oxygen demand, total phosphorus, and ortho-phosphorous in Gulf Island Pond (GIP); the original TMDLs for total suspended solids in both GIP and Livermore Falls remain unchanged.

Gulf Island Pond is a Class C portion of the Androscoggin River included in Category 4A of Maine's 2008 Integrated Report for impaired waters with TMDLs submitted. EPA had approved Maine's initial TMDL report on July 18, 2005 based on 2004 303(d) listings for dissolved oxygen, nutrients and low transparency. The purpose of the TMDL modifications is to update the TMDLs following the revision and recalibration of the water quality model for Gulf Island Pond.

The U.S. Environmental Protection Agency (EPA) hereby approves Maine's May 27, 2010 Gulf Island Pond TMDL modifications. EPA has determined that this TMDL Addendum report meets the requirements of §303(d) of the Clean Water Act and of EPA's implementing regulations (40 CFR Part 130). We note that the TMDLs for GIP continue to be based on the assumption that additional instream aeration will be required of the three paper mills and the electric company owning the outlet dam via NPDES discharge permits and the §401 water quality certification for Gulf Island Dam. Attached is a copy of our approval documentation.

The implementation phase of these TMDLs, including monitoring to address any uncertainties and inform future water quality assessments, continues to be critically important. My staff and I look forward to continued cooperation with the ME DEP in exercising our shared responsibility of implementing the requirements under Section 303(d) of the CWA.

Sincerely,

/s/
Stephen S. Perkins, Director
Office of Ecosystem Protection

cc (electronic):
David Courtemanch, Brian Kavanah, Dana Murch, ME DEP

06/01/10

EPA NEW ENGLAND'S TMDL REVIEW

TMDL
Modification: Androscoggin River, Androscoggin County
Gulf Island Pond (GIP), Lewiston-Auburn, ME.
ME 0104000208_424R_01, Class C
TMDLs approved 07/18/05 for total-P, ortho-P, CBODu, and TSS.
Listed 2008 in category 4A (TMDL approved) for phosphorus, dissolved oxygen, total suspended solids, biochemical oxygen demand (BOD); also listed in category 4B (enforceable controls in effect) for dioxin limits in 38 MRSA 420; also listed in category 5D (legacy pollutants) for PCB contamination.
GIP is 1 of 2 segments addressed by original 2005 TMDL report; the 2nd segment, Livermore Falls impoundment, was not addressed by this TMDL modification.

STATUS: Final

IMPAIRMENT/POLLUTANT: Low dissolved oxygen, excessive nutrients, and low transparency were the 2004 §303(d) listings for Gulf Island Pond (GIP) that impaired designated uses of aquatic life protection (fish) and water contact recreation. Impairments continue to require TMDLs for carbonaceous BOD (CBODu), total phosphorus (total-P), ortho-phosphorus (ortho-P), and total suspended solids (TSS).

BACKGROUND: The Maine Department of Environmental Protection (ME DEP) has submitted to EPA New England, pursuant to §303(d) of the Clean Water Act, a modification to three of four of the Androscoggin River TMDLs approved by EPA on July 18, 2005. Modifications to the TMDL were necessary for the following reasons: The newly issued 2005 MEPDES permits for dischargers affecting water quality in GIP, and a water quality certification for the continued operation of the Gulf Island-Deer Rips Hydro Project, were appealed to the Maine Board of Environmental Protection. Following public hearings, the Board issued appeal orders on February 7, 2008 establishing additional oxygen injection requirements, water quality monitoring requirements, and final pulp and paper mill effluent limits needed to meet Class C water quality standards in Gulf Island Pond (GIP) based on ME DEP's 2005 approved TMDL report. [BEP Order "L171000-33-O-N (FPL Energy Maine Hydro); #ME0001937 and #W000623-5N-F-R (Verso Paper); #ME0002054 and #W000955-5N-G-R (Rumford Paper Co.)] The Board also directed the Department to revise and re-calibrate its water quality models used for developing the GIP TMDLs.

The 2005-approved TSS TMDLs for GIP and Livermore Falls impoundment are not addressed by the 2010 TMDL modifications for GIP, and the TSS TMDLs remain in effect and unchanged. Furthermore, Livermore Falls impoundment now attains water quality standards for aquatic life use. The one-mile segment of the Androscoggin River was renumbered in 2006 to ME0104000206_423_R01, and was listed in 2008 in category 2 as attaining class B biocriteria; also listed in category 4B for dioxin limits in 38 MRSA 420; also listed in category 5D for legacy PCB contamination.

ME DEP's final *Addendum to the Androscoggin River 2005 Total Maximum Daily Load for Gulf Island Pond, Livermore Falls Impoundment* was submitted with a transmittal letter dated May 13, 2010, and final clarifications were received by EPA electronically on May 27, 2010. The TMDL modification submittal includes and/or refers to the following supporting documentation:

- Appendix A. *Recalibration of the Gulf Island Pond Water Quality Model* (HydroAnalysis Inc., October 31, 2008)
- Appendix B. *Final Model Recalibration Results* (HydroAnalysis Inc., December 18, 2008)
- Appendix C. *Recalibration of the Gulf Island Pond Water Quality Model and Assessment of Oxygen Injection Requirements and Allowable Phosphorus Load* (HydroAnalysis Inc., April 2, 2009)
- Appendix D. *Assessment of Oxygen Injection Requirements Under Licensed Discharge Conditions* (HydroAnalysis Inc., April 13, 2009
- Appendix E. *Analyses of GIPOP Partnership Proposed Alternative Oxygen Injection Rates and Analysis of Reduced Oxygen Injection Rates Without Wausau-Mosinee Wastewater* (HydroAnalysis Inc., September 25, 2009, December 1, 2009, and February 4, 2010)
- Appendix F. *Evaluation of Oxygen Diffuser Replacement at Gulf Island Pond* (Mobley Engineering, May 2008)
- Appendix G. *Oxygen Transfer Efficiency Predictions for Oxygen Diffusers Placed in Gulf Island Pond Lower Narrows* (Mobley Engineering, September 25, 2009)
- Appendix H. *GIP 10% Factor of Safety Calculation* (HydroAnalysis Inc., May 9, 2010)
- Appendix I. *Response to Comments on March 2010 Draft Addendum to Androscoggin River 2005 TMDL* (ME DEP, May 2010)
- *Androscoggin River Total Maximum Daily Load*, Gulf Island Pond, Livermore Falls Impoundment (Mitnik, ME DEP, May 2005; approved by EPA 7/18/05)

http://www.maine.gov/dep/blwq/docmonitoring/impairedwaters/gipfinaltmdl.pdf
http://www.maine.gov/dep/blwq/docmonitoring/impairedwaters/gipfinaltmdlfigstables.pdf
http://www.maine.gov/dep/blwq/docmonitoring/impairedwaters/androscoggin_tmdl_approval_letter.pdf

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REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll-a and phosphorus loadings for excess algae.

ME DEP submitted TMDL modifications for carbonaceous biochemical oxygen demand (CBODu), total phosphorus (TP or total-P), and ortho-phosphorus (ortho-P), and oxygen injection levels for the Gulf Island Pond (GIP) segment of the Androscoggin River. This segment is currently listed in Category 4A of Maine's 2008 Integrated Report (required by Clean Water Act §305(b)/ §303(d)) as not attaining Maine's water quality standards for Class C waters, with a TMDL approved. Summer (June to September) TMDLs continue to be required in order to meet Class C water quality standards for dissolved oxygen (DO), as well as attain designated uses for primary contact recreation.

ME DEP's TMDL "Addendum" report adequately describes the water body segment and the use impairments and sources of pollutants of concern identified in the 2008 303(d) listing category 4A (TMDL approved). In summary: Gulf Island Pond is an impounded section of the Androscoggin River, upstream of Gulf Island dam in Lewiston-Auburn, ME. Excessive amounts of phosphorus in GIP continue to result in blooms of algae whose cycles of oxygen production and respiration create diurnal DO swings, which impact aquatic life. When the algae die, they settle in the impoundment, accumulate in the deeper areas of the impoundment, and exert an oxygen demand contributing to both numeric DO and aquatic life criteria violations in the summer. The blooms themselves create unsuitable aesthetic conditions for swimming and other primary contact recreational activities.

As mentioned above, the 2005-approved TSS TMDL remains in effect due to the year-round contribution of TSS to the sediment oxygen demand (SOD) in the deeper areas of the pond. (TSS settle and accumulate in the deeper areas of the pond and create a SOD, which lowers the amount of DO available in the water column.) An annual GIP TSS loading capacity (100,000 ppd annual average) is needed to assure sediment oxygen demand will not increase significantly and result in higher SOD than those levels considered in modeling when developing the CBODu and phosphorus loading capacities. Seasonal oxygen injection requirements are still a necessary component of the GIP TMDL for TSS-caused SOD (as well as for CBODu).

The major sources of pollutant loading to GIP continue to be numerous point source discharges upriver from the 14.5-mile long impoundment. Dischargers include three paper mills located in

(1) Berlin, NH (Fraser Paper), (2) Rumford, ME (Rumford Paper, formerly Mead WestVaco), (3) Jay, ME (Verso Paper, formerly International Paper), and five municipal point sources in New Hampshire (Berlin and Gorham), and in Maine (Bethel, Rumford-Mexico, and Livermore Falls). Nonpoint source pollutant loads come from land use activities related primarily to residential development, silviculture, and agriculture.

The Gulf Island Dam contributes to non-attainment of DO criteria and the growth of algae blooms by creating an environment of low water movement and low vertical mixing within the water column, to the extent that non-attainment of Class C DO criteria in deeper portions of the pond is still predicted by the water quality model, even if all point source discharges are eliminated. The Gulf Island-Deer Rips Hydro Project located at the dam is owned and operated by FPL Energy Maine Hydro.

Important assumptions made in modifying the TMDLs are discussed, and include the continued need for an oxygen injection system (currently located 5 miles above Gulf Island dam at Upper Falls), improved oxygen injection efficiencies, and the injection of oxygen in an additional, deeper location downstream at Lower Narrows (see map on page 13 Appendix F TMDL Addendum).

EPA Assessment:
ME DEP has adequately identified the waterbody, the pollutants of concern, the magnitude and location of the sources of pollution. The TMDL report also includes an adequate description of important assumptions made in developing the TMDLs.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

GIP TMDLs
The GIP TMDLs for CBODu, total-P, ortho-P, (and TSS) are tied to achieving the targets of Maine's numeric water quality criteria for dissolved oxygen, the narrative criteria for protection of aquatic life (fish), and the narrative criteria protecting designated uses of water contact recreation (transparency/algal blooms).

GIP Targets for Dissolved Oxygen
ME DEP continues to use three numeric water quality targets for dissolved oxygen in modeling to assure that designated uses are attained:
(1) Maine Class C numeric criteria are used to protect against shorter-term impacts (instantaneous minimum of 5 ppm DO and 60% saturation);

(2) Maine Class C narrative criteria for protection of aquatic life are used to protect against longer-term impacts (30-day average 6.5 ppm DO);
(3) Maine Class B numeric criterion (instantaneous minimum of 7 ppm DO) is used to test water quality modeling inputs for Fraser Paper (in the upstream QUAL2EU model) to assure that WQS will be met in the Class B segment from the NH border to the confluence of the Ellis River in Maine.

Maine's Class C numeric DO criteria provide that a water body's DO content may not be less than 5 ppm and 60% saturation (i.e., these criteria must be met at all times). These numeric criteria were used in the water quality modeling for CBODu. The TMDLs continue to be expressed as a weekly average load due to the slow response of the Androscoggin River and GIP to pollutant loading.

Maine's narrative water quality standards for aquatic life protection state, *Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving water and maintain the structure and function of the resident biological community* [MRSA Title 38 Sec. 465, 4C]. ME DEP has interpreted the narrative Class C provision to require an instream 30 day average dissolved oxygen level of 6.5 ppm to support a cold water indigenous fishery.

GIP Phosphorus TMDL Target
The phosphorus TMDL has been established to ensure that criteria for DO and aquatic life protection are met, and to enable GIP to attain the designated use of primary contact recreation. Maine's WQS do not include numeric criteria for nutrients, and ME DEP continues to use an algae bloom-prevention threshold of 10 ppb chlorophyll-a, based on the best information available. The 10 ppb level represents measurement of a pond-wide average applied by the water quality model only to the upper-most modeled segments of GIP (to a depth of 10 feet). ME DEP does have a draft proposed nutrient criterion for Class C impoundments of $\leq$8 ppb (or ug/l) chlorophyll-a, which is measured as an average of the impoundment's epilimnetic waters (roughly the upper 17-20 feet). DEP explains in the responses to public comments that the 10 ppb chlorophyll-a target applied to the upper 10 feet in the GIP model is consistent with the Department's draft proposed nutrient criterion for Class C impoundments ($\leq$8 ppb in the epilimnion). ME DEP calculated concentrations of chlorophyll-a averaged over GIP's epilimnion (upper 20 feet) and found chlorophyll-a average level to be less than 8 ppb. The draft nutrient rule also sets a maximum chlorophyll-a concentration of 10 ug/l for any sample, and GIP modeling results indicate that chlorophyll-a concentrations will not exceed 10 ug/l in any segment of the pond (page 3 Appendix I TMDL Addendum).

EPA Assessment:
EPA concludes that Maine has properly presented its numeric water quality criteria and has made a reasonable interpretation of its narrative water quality standards for the designated uses of the Androscoggin River.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

Loading Capacities for GIP: CBODu, Total-P, Ortho-P, TSS

All TMDLs for GIP impoundment are expressed as mass-per-time loads (lbs/day or ppd) over various averaging periods, as appropriate, in a table entitled *Revised 2010 TMDL for Gulf Island Pond*. ME DEP identified the seasonally applied (June-Sep.) loading capacities for GIP expressed as loads to the entrance of the impoundment (pages 4-5 TMDL Addendum).

In the TMDL modification, the biggest changes were made to the CBODu capacities, in accordance with the Maine Board of Environmental Protection's permit appeal orders to reduce pulp and paper mill effluent limits: the 30-day-averaged loadings for CBODu dropped from 55,843 to 44,917 ppd; 7-day-averaged loadings dropped from 61,241 to 48,096 ppd. The 30-day-averaged loadings for total-P were reduced from 317 to 312 ppd; ortho-P increased from 50 to 56 ppd; organic-P decreased from 267 to 256 ppd in accordance with one of two modeling alternatives provided which will meet the pond-wide average chlorophyll-a concentration of 10 ppb (page 43, Table 10, Appendix C TMDL Addendum). (The annually averaged loading capacity for GIP TSS remains unchanged at 100,000 ppd)

The GIP loading capacities for CBODu and TSS are based on the assumption that oxygen will be added from an in-stream aeration system because the water quality model continues to predict non-attainment of Class C numeric and narrative DO criteria in deeper portions of the pond, even if all point source discharges are eliminated. The TMDL modification presents results of lower paper mill CBODu effluent limits, re-calibrated water quality modeling, additional engineering and modeling studies of oxygen diffuser replacement, improved oxygen transfer efficiencies, alternative oxygen injection rates, and an added oxygen injection margin of safety.

Based on this new information, the oxygen amounts necessary to meet water quality standards in

GIP have been reduced substantially, but include a new MOS (see Section 6 this document). Combined levels of oxygen injection at both Upper and Lower Narrows, in conjunction with waste load reductions, will ensure that WQS are met in GIP.

Comparing oxygen injection requirements from the 2005 TMDL to the 2010 TMDL modification (page 4-5 TMDL Addendum), required oxygen injection is reduced from 30,000 to 23,300 ppd at Upper Narrows, based on an increase in oxygen transfer efficiency from 33% to 54% with an upgraded diffuser system completed in 2009 (page 3, item (1) and Figure 1 Appendix E). Added to this lower oxygen amount is an explicit 4.2% MOS, which results in a total oxygen injection requirement of 24,279 ppd at Upper Narrows (see page 12 MOS discussion in this document).

The oxygen injection requirement at Lower Narrows is reduced from 150,000 (2005 TMDL) to 33,100 ppd, based on an increase in oxygen transfer efficiency from 33% to 75% (page 3, item (1) and Figure 1 Appendix E TMDL Addendum). This new oxygenation system, scheduled for completion in 2010, uses a 2,600-foot long section of oxygen diffusers, and takes advantage of the greater depths (50-55 feet) available to achieve better oxygen transfer than existing lines at upper Narrows (30-35 feet) (pages 1-2 Appendix G TMDL Addendum). Added to this lower oxygen amount is an explicit 4.2% MOS which results in a total oxygen injection requirement of 34,490 ppd at Lower Narrows (see page 6 discussion on MOS in this document).

ME DEP also provides revised TMDLs in the event that wastewater from the Wausau-Mosinee Otis mill is no longer sent to the Verso facility for treatment. Under that scenario, TMDLs for CBODu and TSS would be reduced to account for the reduced loading (see top table page 5 TMDL Addendum).

In the modified TMDL, ME DEP describes the changes made in the analytical methods used to establish the cause-and-effect relationships between the various narrative and numeric targets and the identified pollutant sources as follows:

ME DEP continues to use the Qual2EU water quality model for the upstream portion of the Androscoggin River to establish the boundary conditions for a WASP model which is used for the GIP impoundment portion of the river. These models are used together to develop the CBODU, total-P, and ortho-P TMDLs for this impaired segment of the Androscoggin River. In accordance with the appeal orders issued by the Maine Board of Environmental Protection, ME DEP re-calibrated its WASP water quality model for GIP, incorporating the correction of a dispersive mixing error (which could affect oxygen injection requirements), and a recalculation of the sediment area that affects the sediment phosphorus flux in the pond (which could affect final allowable effluent limits for total-P and/or ortho-P) (page 2 TMDL Addendum).

ME DEP defines critical conditions for the modified point source TMDLs as:

- Low river flows (when dilution of wastewater inputs is at a minimum; 7Q10 is 1,704 cfs (page 33 Appendix C TMDL Addendum);
- High water temperatures (when the saturation of DO is lower and BOD decay and oxygen demand from the sediment are higher);
- Maximum inputs (point sources discharging at maximum allowed loads).

Detailed descriptions of the models, corrections, and recalculations are included in Appendices A through H (TMDL Addendum), which provide supporting documentation for the TMDL modification analyses, including the basis for assumptions, strengths and weakness in the analytical process, and results from the water quality modeling. All simulations were run using a version of the WASP that was found to reproduce the prior results in the original TMDL modeling reports by Mitnik (2002, and 2005), and the model configuration was not changed from its original condition (for GIP WASP model segmentation, see page 2, Fig. 1 Appendix C TMDL Addendum).

As mentioned above, one continued finding of the updated modeling simulations is that non-attainment of DO criteria would still result if there were no oxygen injection, even with the complete removal of point source discharges (page 34, Figure 22 Appendix C TMDL Addendum). The 2005 TMDL report had explained that the resulting non-attainment of water quality standards is due to poor mixing characteristics of the pond and sediment oxygen demand.

EPA Assessment:
EPA New England concludes that ME DEP used a reasonable approach to establish the relationships between pollutant loadings and water quality and that the loading capacities have been appropriately set at levels necessary to attain applicable water quality standards and targets.

The loading capacities assume that a certain amount of oxygen will be injected into GIP. In light of a 2009 model simulation that predicts non-attainment with DO criteria at 7Q10 flow with no upstream point sources and no oxygen injection, pollution controls alone would not be sufficient to enable GIP to attain water quality standards. Therefore, reliance on instream aerators to supplement pollution controls is still a reasonable approach.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

GIP LAs for Total-P, Ortho-P, CBODu, and TSS

The nonpoint source loads to GIP are those realized at the entrance to the impoundment after point sources are removed from the model (i.e., existing NPS load levels), and available data did not allow the separation of natural background from NPS. As shown in summary tables on pages 4-5 of the TMDL Addendum, load allocations (LAs) for nonpoint sources are specified as a single categorical load or gross allotment for each pollutant of concern. Comparing LAs from

the 2005 TMDL to the LAs from the 2010 TMDL modification, the LAs for total-P, ortho-P, CBODu, and TSS have not changed.

EPA Assessment:
EPA New England concludes that DEP has established reasonable load allocations. We agree that, given the existing data, it was not possible to separate natural background from human-induced nonpoint sources of the pollutants of concern. DEP's approach of setting NPS loads at existing levels continues to be reasonable since localized nonpoint source impacts on tributaries throughout the large, mostly forested watershed do not result in significant impacts on the water quality of the main stem of the Androscoggin River. NPS runoff is sporadic, whereas the discharge of point source phosphorus, CBODu, and TSS is essentially continuous. Furthermore, unlike a lake with a long retention time that can hold phosphorus, CBODu, and TSS from large runoff events, NPS loads of these pollutants pass through Gulf Island Pond quickly during large runoff events, and there is not enough retention time for algae blooms to develop from the intermittent nonpoint source phosphorus loading.

ME DEP has a storm water nonpoint source program consisting of both regulatory and voluntary measures to address NPS pollution from the developed and developing areas. Implementation of best management practices, though encouraged throughout the watershed, is most likely to be effective in addressing localized impacts in the tributaries of the Androscoggin River. The huge size of the mostly forested watershed, the sporadic and diffuse occurrence of NPS runoff, and pollutant assimilation prior to reaching the mainstem river, all support ME DEP's conclusion that NPS controls would have an insignificant impact on the mainstem Androscoggin River or GIP, especially compared to the significant impact that can be realized from controls on the more highly concentrated and continuous point source discharges of phosphorus, CBODu, and TSS. We note that since the load allocations in these TMDLs continue to reflect current NPS loadings, the TMDLs imply that there are no additional allocations available for future NPS sources.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

WLAs for Total-P, Ortho-P, CBODu, and TSS

All WLAs for GIP continue to be based on critical conditions of low flows (7Q10 and 30Q10) and high temperatures. The modified WLAs are also based on the critical assumption that all point sources are discharging at maximum allowed loads.

In the 2009 recalibrated modeling, the effluent limits for each of the Maine paper mill dischargers were reduced, in accordance with the February 7, 2008 orders from the Maine BEP to reduce the BOD loads for the mills. The updated model was then used to calculate the oxygen loads necessary to meet water quality standards. As mentioned above, as in the 2005 TMDL, the 2009 recalibrated model indicates that, despite the reductions in CBODu loadings, oxygen injection is still essential to attaining water quality standards in GIP.

Wasteload allocations (WLAs) for all point sources combined are listed for each pollutant in the TMDL summary tables (pages 4-5 TMDL Addendum). Application of the clustering factor for both the phosphorus WLAs uses the same calculation method used in the 2005 TMDL. The WLA for total-P was reduced from 208 to 206 ppd. The ortho-P WLA was increased from 45 to 52 ppd (see explanation for phosphorus loading capacities page 10 TMDL Addendum, and page 43, Table 10 Appendix C). The 30-day and 7-day average WLAs for CBODu were reduced substantially from 39,818 to 34,477 ppd, and from 45,673 to 38,652 ppd, respectively (also see implementation discussion below in Section 9 of this document). The WLAs for TSS were not changed.

Seasonal WLAs for each individual discharger and pollutant are presented in the following tables:

- *Revised Table 6. TMDL Allocation of Phosphorus, Applies June to September* (page 6 TMDL Addendum);
- *Revised Table 8. Gulf Island Pond 7-Day Average TMDL CBODu, PPD June to September* (page 7 TMDL Addendum);
- *Revised Table 9. Gulf Island Pond 30-Day Ave. TMDL CBODu, PPD June to September* (page 8 TMDL Addendum).

These tables provide allocations assigned to each discharger at the outfall (for permitting purposes), the appropriate assimilation factor to account for the discharge distance to GIP, and the allocations to each discharger at the entrance to GIP (Twin Bridges). The summary of the all the allocations at Twin Bridges allow for comparison to the summary WLAs in the TMDL summary table on page 4 TMDL modification. (See also discussion in Section 9 below on implementation of TMDL WLAs in permitting.) Individual annual WLAs for TSS remain unchanged.

Verso continues to be the point source with the highest impact on GIP and requires a reduction in ortho-P to meet that TMDL. Mills continue to be given water quality-based loads (for simulated point-source phosphorus discharge rates, see page 39, Table 8 Appendix C). Municipal discharges are given technology-based loads, and the phosphorus loading rates for municipal discharges were set above their measured values in order to account for future growth (page 38 Appendix C TMDL).

The WLA for Fraser Paper (located in Berlin, NH) is set at 10,298 ppd BOD5 as a weekly

average at the outfall (page 7, Revised Table 8 TMDL Addendum). This revised WLA is less than the 11,500 ppd required in the 2005 TMDL in order to maintain the Class B criterion of 7.0 ppm which applies from the NH border to the confluence of the Ellis River in Maine.

GIP Instream Aeration System

As with loading capacity, the waste load allocations discussed above are predicated on the implementation of instream aeration. This approach continues to be reasonable because updated modeling indicates that the DO criteria cannot be attained in the absence of aeration, even if the point source discharges were eliminated. As discussed in Section 3 above, the changes to the instream aeration system will result in less oxygen being added at each of the two injection locations, at much more efficient oxygen transfer rates.

40 C.F.R. § 125.3(f) of the federal NPDES permitting regulations provides that the use of a nontreatment technique may be considered as a method to achieve water quality standards where technology-based requirements are not sufficient to meet the WQS, and where it is demonstrated that the nontreatment technique is the preferred environmental and economic method to achieving WQS.[1] The TMDLs for CBODu and TSS continue to assume that the nontreatment technique of instream aeration would be acceptable in light of the fact that oxygen injection would be required to meet DO criteria even if all point sources were eliminated (see Figure 22 page 34 Appendix C TMDL Addendum and discussion in Section 3 above). Because of the lower CBODu limits and improved oxygen injection system placement and efficiency, the amount of oxygen needed to be injected to attain water quality standards (including the new MOS) is a total of 24,279 ppd at Upper Narrows and a total of 34,490 ppd at Lower Narrows, compared to 30,000 ppd and 150,000 ppd, respectively, in the original 2005 TMDL (pages 4-5 TMDL Addendum).

EPA Assessment:

EPA New England concludes that the WLAs for the TMDLs are adequate. The TMDL report identifies the paper mills as the dominant sources of pollutant loading to the river. The WLAs and LAs set pollutant loads so that water quality standards will be met. With continued in-stream injection of DO at higher efficiencies, and at the additional injection site at Lower Narrows, water quality modeling predicts compliance with water quality standards once permit limits are implemented. As discussed in Section 6 below on the margin of safety, reliance on oxygen injection affords flexibility to add additional oxygen as needed to address quickly the actual receiving water needs.

EPA believes that the MEPDES licensing process for the mills is the appropriate forum for addressing the merits of the §125.3(f) demonstration, including whether sufficient alternatives were evaluated and what the appropriate level of pollutant discharge should be consistent with §125.3(f). For purposes of this TMDL approval, we agree that oxygen injection will be needed under any scenario, and we also believe it was reasonable for DEP to determine that the point source discharges would not be eliminated and that the dam would not be removed. Under those circumstances, DEP struck a reasonable balance between the general use of oxygen injection and WLAs. In the licensing process, DEP will need to determine the appropriate level of pollutant controls beyond which oxygen injection becomes the preferred economic and environmental

[1] The applicable provision under state law is found in DEP's rules at Chapter 524(2)(II)(f).

method for attaining WQS in satisfaction of §125.3(f).

Out-of-State WLAs

EPA believes that states have some flexibility to make assumptions about improvements in water quality beyond their jurisdictions. If they base a TMDL on such assumptions, states must clearly explain why the assumptions are reasonable. In this case, the WLAs for point sources located in New Hampshire which discharge to the Androscoggin River upstream of Livermore Falls Impoundment and Gulf Island Pond in Maine continue to be derived from the same modeling effort as the WLAs for the dischargers located in Maine. The weekly BOD_5 WLA for Fraser Paper in Berlin, NH, is established to ensure that Maine's minimum Class B DO criterion in the Androscoggin River is met at the state line, and throughout the Class B segment to the confluence with the Ellis River.

EPA is not approving the out-of state loads as formal allocations, since Maine does not have the authority to impose an allocation on an out-of-state source. On the other hand, EPA believes that these estimates of pollutant loads make sense and therefore is approving them as reasonable assumptions on which the in-state loads are based. Moreover, EPA is prepared to use its authorities when issuing NPDES permits to dischargers in New Hampshire, to establish facility-specific effluent limits for CBODu, total-P, ortho-P, and TSS that are consistent with the WLAs in the TMDLs. EPA issued permits whose effluent limits are consistent with these WLAs to Fraser Paper (NH0000655) on September 30, 2008; Berlin, NH POTW (NH0100013) on September 29, 2002; Gorham, NH POTW (NHG580927) on December 22, 2005.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

The modified TMDL continues to provide explicit MOS for both total-P and ortho-P, which are somewhat lower due to a different calculation method. (The MOS for TSS remains the same at an explicit 10%.)

For CBODu, the 10% explicit MOS using a "clustering factor" in 2005 no longer applies to the 30-day and 7-day TMDLs. Instead, an implicit MOS used is relied upon, based on the use of an improved model that is expected to provide a more confident estimate of water quality response to projected wasteloads and oxygen injection. The new implicit MOS is also based on the following conservative assumptions: all the mills could be discharging at maximum permitted loads, simultaneously, under critical low flow and temperature conditions (page 10 TMDL Addendum).

A new MOS is added for the modified oxygen injection component of the TMDL. An explicit factor of 4.2% of the model-predicted supplemental oxygen requirement is added at both Upper

Narrows and Lower Narrows. ME DEP explains that this additional oxygen is calculated to replace the amount of oxygen that would be required if the total CBODu load to the impoundment were increased by 10%. This MOS represents a theoretical 23% increase in BOD loading accepted by the pond while staying above 5mg/l DO (see pages 10-11 and Appendix H TMDL Addendum).

In addition, DEP continues to recommend ambient monitoring by the dischargers (page 11 TMDL Addendum, and Section 8 of this document). While this additional monitoring is not part of the MOS, results could further bolster confidence in the relationship between the loads and water quality or, conversely, provide accurate, site specific information that would support adjustment of the TMDLs.

EPA Assessment:
EPA New England has evaluated the margin of safety and believes that the various implicit and explicit MOSs are adequate to assure attainment of water quality standards. Given ME DEP's extensive study of this system and commitment to future monitoring, adaptive management, and a willingness to adjust the TMDL, as necessary, (based on measurement of actual physical, chemical and biological responses of the river to future pollutant loading), EPA believes the MOS is adequate.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1).

The GIP TMDLs for CBODu and phosphorus continue to be seasonal, limited to the months of June to September, because DO non-attainment and algae blooms are limited to the summer period. (The GIP TSS TMDL is established to control the accumulation of solids and their resulting sediment oxygen demand. Because accumulation occurs over a long period of time, the TMDL continues to be expressed as an annual average.)

EPA Assessment:
EPA New England concludes that seasonal variations continue to be adequately accounted for in the TMDLs. The TMDLs for CBODu, total-P, and ortho-P are only necessary in summer and are not needed to ensure compliance with water quality standards in the non-summer months when temperatures are lower (directly affecting dissolved oxygen), when light intensity is reduced, and algal growth is significantly reduced. Seasonal phosphorus limits make sense because algae blooms are only an issue during the summer and early fall, when warmer temperatures and higher levels of light intensity are available to support algae growth.

(EPA concurs that an annual TSS TMDL continues to be needed in GIP to prevent the accumulation of solids (which are discharged year-round) in the deeper areas of the impoundment and subsequent high levels of SOD lowering DO levels in the deeper waters. Phosphorus is also important for controlling SOD because when algae die and settle to the bottom, their remains create SOD).

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

Although this is not a phased TMDL, ME DEP continues to recommend ambient monitoring by dischargers for the term of the permits or until attainment of water quality standards has been demonstrated to the satisfaction of the Department (page 11 TMDL Addendum). Since 2006, ME DEP has required and approved an annual monitoring plan from the Gulf Island Pond Oxygenation Project (GIPOP) partnership.[2] The plan includes both water quality sampling and continuous monitoring of temperature and dissolved oxygen at several stations. For 2009, data from these assessments are combined into a summary report along with the results of ME DEP's aerial flight observations of the presence/absence of widespread algal blooms, and water quality sampling at the Lower Narrows station during those aerial flights by DEP. [3]

EPA Assessment:

EPA continues to believe that monitoring is an important component of TMDL implementation for GIP. EPA expects the modified TMDLs to result in attainment of water quality standards, meaning that algae blooms no longer occur in GIP and that dissolved oxygen levels are met in GIP just above the thermocline from June to September every year during flows at and above 7Q10. If monitoring indicates WQS are not attained, the TMDLs would have to be made more stringent.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

The TMDLs and oxygen injection requirements will be implemented through MEPDES

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[2] Acheron 2010. *Androscoggin River and Gulf Island Pond Ambient Water Quality Monitoring Plan 2010.*

[3] MEDEP 2010. *2009 Gulf Island Pond Monitoring Program Report*, DEPLW-1109, February 2010.

permitting and a water quality certification for the Gulf Island Dam Hydropower licensing. ME DEP intends to include oxygen injection load recommendations in its Clean Water Act §401 re-certification for the Gulf Island Dam Hydropower license to ensure that the dam complies with Class C DO criteria because the presence of the dam clearly affects the assimilative capacity available in GIP, as evidenced by the model's prediction of non-attainment of DO criteria in some of the pond areas at zero discharge of point sources.

In footnotes of the TMDL summary table on page 4, ME DEP explains two minor implementation-related differences in the CBODu WLAs due to new information or past errors in individual discharge allocations. First, Gorham NH's discharge limits were not available at the time modeling was conducted. When Gorham's licensed limits of 281 ppd are included in the calculation (page 4 Appendix D Table 1 TMDL Addendum), the total WLA is increased at a difference that amounts to less than 0.7% of the 7-day CBODu used for modeling and would have a negligible effect on model results. The second difference relates to an error in the license limit for Bethel WWTP, which was corrected from 75 ppd (reported in the 2005 TMDL) to 85 ppd (used in the 2009 modeling). This correction amounts to less than 0.03% of the 30-day CBODu TMDL reported in the revised TMDL summary table (page 4 TMDL Addendum).

EPA Assessment:
Addressed, though not required.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

Although 2009 monitoring results from GIPOP partnership and MEDEP show improved water quality of Gulf Island Pond since 2004 due to reduced discharges from the mills, and since 2007 due to higher river flows, continued results of non-attainment of Maine's water quality standards supports the need for continued instream aeration (page 2 MEDEP 2010, footnote 1 above). Therefore, WLAs in these TMDLs continue to be based on the assumption that in-stream aeration is required for GIP and results in less stringent WLAs for CBODu as a 7 and 30-day average and TSS as an annual average. Reasonable assurance that the in-stream oxygen injection will occur will continue to be provided through legally enforceable waste discharge permits and the §401-water quality certificate for Gulf Island dam.

EPA Assessment: EPA concurs that it is reasonable to rely on instream aeration to assist in

meeting water quality standards because water quality modeling predicts nonattainment of WQS even at zero discharge, and because instream aeration will improve DO levels immediately above the thermocline (an area which provides essential habitat during critical conditions), whereas even elimination in mill BOD discharge levels would not provide the required increase in DO just above the thermocline. EPA also believes that the issuance of discharge permits for the mills and a §401 certification for the dam will provide reasonable assurance that the instream aeration will occur.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

The public review draft of the modified TMDL was sent to interested parties on March 23, 2010, with a comment deadline of April 22, 2010, and was posted on ME DEP's website. ME DEP provided EPA with a complete set of public comments, a response summary, and the Department's response to comments as Appendix I in the final submittal. ME DEP made a number of revisions to the draft TMDL in response to public comments.

EPA Assessment: EPA New England concludes that ME DEP involved the public during the modification of the TMDL for Gulf Island Pond segment of the Androscoggin River, has provided adequate opportunities for the public to comment on the TMDL Addendum, and has provided reasonable responses to the public comments.

12. Transmittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

ME DEP included a letter dated May 13, 2010, forwarding the final revised TMDL Addendum.

Assessment: ME DEP's letter states that the TMDL is being formally submitted for EPA approval.

Data for Entry in EPA's National TMDL Tracking System and Regional Web Page							
TMDL Water Body Name *	**Androscoggin River, Gulf Island Pond**						
Number of TMDLs*	3						
Type of Pollutant(s) *	Nutients						
Number of listed causes (from 303(d) list)	3						
Any Information/prevention TMDLs (Y/N)	N						
Lead State	Maine (ME)						
TMDL Status	Final						
Individual TMDLs listed below (one line per segment-pollutant combination)							
TMDL Segment name	TMDL Segment ID #	TMDL Pollutant ID# & name	TMDL Impairment Cause(s)	Pollutant Endpoints	Unlisted?	MEPDES Point Source & ID#	Segment still listed for something else? (Y/N)
Androscoggin River, Gulf Island Pond	ME 0104000208_424R_01	515 (Total Phosphorus)	225Dissolv Oxygen 28Nutrients 532Transparency	5.0 ppm DO (min. Class C criteria) 6.5 ppm DO (mo. Ave.) 7.0 ppm DO (class B for NH mill) 10 ppb chlor-a (blooms)		NH0100013 - Berlin POTW NHG580927 - Gorham POTW ME0101176 - Bethel POTW ME0101486; ME 0100552 - Rumford-Mexico POTW ME0100315 - Livermore falls POTW NH0000655 - Fraser Paper (Berlin) ME0002054 - Mead Westvaco (Rumford) ME0001937 - International Paper (Jay)	Y:4B dioxin; 5D PCBs (legacy)
Androscoggin River, Gulf Island Pond	ME 0104000208_424R_01	662 (Ortho-phosphorus)	225Dissolv Oxygen 28Nutrients 532Transparency				
Androscoggin River, Gulf Island Pond	ME 0104000208_424R_01	144 (CBODu)	225Dissolv Oxygen 28Nutrients 532Transparency				
TMDL Water Pollution Type	Point Source						
Cycle (list date)	2008						
Establishment Date (approval)*	June 1, 2010						
EPA Developed	No						
Towns affected*	Lewiston-Auburn, ME						

(Note: Original TMDL **#11594** for TSS *not* changed by these TMDL modifications)