



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 1

1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

July 18, 2005

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

SUBJECT: Notification of Approval of Androscoggin River TMDLs

Dear Mr. Fisk:

Thank you for your submittal of the Androscoggin River Total Maximum Daily Loads (TMDLs) for carbonaceous biochemical oxygen demand, total suspended solids, total phosphorus, and ortho-phosphorus in Gulf Island Pond, and total suspended solids in the Livermore Falls impoundment. These two waterbody segments are included on Maine's 2004 303(d) list and were a high priority for TMDL development primarily due to point source pollution.

The U.S. Environmental Protection Agency (EPA) hereby approves Maine's May 13, 2005 Androscoggin River TMDLs received by EPA on May 18, 2005. EPA has determined that these TMDLs meet the requirements of §303(d) of the Clean Water Act (CWA), and of EPA's implementing regulations (40 CFR Part 130). We note that the TMDLs for GIP are 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 MEPDES discharge permits and the §401 water quality certification for Gulf Island Dam. Attached is a copy of our approval documentation.

These TMDLs have been the subject of much public interest, and the implementation phase, including required monitoring to address uncertainties and inform future water quality assessments, will 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,

A handwritten signature in cursive script that reads "Linda M. Murphy".

Linda M. Murphy, Director
Office of Ecosystem Protection

cc: Electronically:
David Courtemanch, ME DEP

EPA NEW ENGLAND'S TMDL REVIEW

TMDL: **Androscoggin River** (2 segments) Androscoggin County
ME HUC ME 0104000208
- **Gulf Island Pond (GIP)**, Lewiston-Auburn, ME.
WBS# 424R Class C (listed 2004 for aquatic life; recreation, fish consumption /DO, transparency, nutrients; target TMDL development 2006).
- **Livermore Falls Impoundment**, Livermore Falls, ME.
WBS# 423R Class C (listed 2004 for aquatic life, fish consumption / aquatic life criteria; target TMDL development 2006).

STATUS: Final

IMPAIRMENT/POLLUTANT: In GIP, impairments of numeric dissolved oxygen criteria, Class C narrative criteria for the support of indigenous fish species, and the designated use of water contact recreation require TMDLs for carbonaceous BOD (CBOD_u), total suspended solids (TSS), total phosphorus (total-P), and ortho-phosphorus (ortho-P). In the Livermore Falls impoundment, impairment of aquatic life criteria requires a TMDL for TSS.

BACKGROUND: the Maine Department of Environmental Protection (ME DEP) submitted to EPA New England, pursuant to §303(d) of the Clean Water Act, the final Androscoggin River TMDLs listed above with a transmittal letter dated May 13, 2005, and received by EPA on May 18, 2005. The TMDL report submittal includes the following supporting documentation:

- *Androscoggin River Total Maximum Daily Load of Gulf Island Pond and Livermore Falls Impoundment*, (Final, ME DEP, May 2005);
- *Public Comment for TMDL (January 30 – February 18, 2005)*;
- *Responses to Comments of the Draft TMDL*, (ME DEP, May 2005);
- *Androscoggin River and Gulf Island Pond Data Report with Responses to Comments* (Final, ME DEP, Jan 2005);
- *Responses to Comments Final Androscoggin River Modeling Report*, (ME DEP, Sept. 2002);
- *Androscoggin River Modeling Report and Alternative Analysis*, (ME DEP, June 2002);
- *Responses to Comments Draft Androscoggin River Modeling Report*, (ME DEP, Nov. 2001).

REVIEWERS: Jennie Bridge (617-918-1685), e-mail: bridge.jennie@epa.gov
Stephen Silva (617-918-1561), e-mail: silva.stephen@epa.gov

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.*

TMDLs are submitted for two segments of the Androscoggin River listed on Maine's 2004 Clean Water Act (CWA) §303(d) list that do not attain water quality standards for class C waters, and the report adequately describes the water body segments and the cause of the impairment as identified in Category 5A of the list. In summary:

- (1) The lower 4 miles of the 14.5 mile impoundment of Gulf Island Pond (GIP) (upstream of Gulf Island dam in Lewiston-Auburn, ME) do not attain class C standards for dissolved oxygen (DO) concentration in the summer at depths of 30 to 80 feet. The major factor is pollutant loading from numerous point source discharges upriver from GIP, including three paper mills in Berlin, NH (Fraser Paper), Rumford, ME (Mead WestVaco), Jay, ME (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. ME DEP also explains that 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 predicted by the water quality model even if point source discharges are eliminated." (page 1 TMDL summary). Algae blooms also interfere with recreational uses of GIP. In order to meet class C water quality standards for dissolved oxygen, as well as attain designated uses for primary contact recreation, summer (June to September) TMDLs are presented for carbonaceous biochemical oxygen demand (CBOD_u), total phosphorus (TP or total-P), and ortho-phosphorus (ortho-P), and an annual TMDL is presented for total suspended solids (TSS).
- (2) Livermore Falls impoundment is located upstream of GIP and does not attain class C aquatic life criteria. A summer TMDL for TSS is presented (as a 60-day average).

The non-attainment segments are ranked as a high priority for TMDL development. The DEP's scheduled completion date of 2003 was delayed to obtain additional data during the 2004 field season in order to improve model predictions under reduced paper mill phosphorus loading (page 1 TMDL summary). Important assumptions made in developing the TMDLs are discussed and

summaries of the water bodies, pollutants of concern, and pollutant sources are provided. Important assumptions include the continued need for an oxygen injection system (currently located 5 miles above Gulf Island dam), and the need for additional amounts of oxygen in other areas of GIP.

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, TSS, total-P, and ortho-P are tied to achieving the targets of Maine's numeric water quality criteria for dissolved oxygen, the narrative criteria for protection of aquatic life, and the narrative criteria protecting designated uses of water contact recreation. Justifications for the various GIP TMDL averaging periods (different from the period of one day) are explained in the text of the report (pages 14 for phosphorus, 30 and 33 for CBODu, and 53 for TSS).

GIP Targets for Dissolved Oxygen

ME DEP uses three numeric water quality targets for dissolved oxygen 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, discussed below),
- (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, discussed below), and
- (3) Maine Class B numeric criterion (instantaneous minimum of 7 ppm DO) is used to test water quality modeling inputs for Fraser Paper 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 DO numeric 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 TMDL is expressed as a weekly average load due to the slow response of the Androscoggin River and GIP to pollutant loading.

Maine's narrative WQSs state that "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.

Since the late 1980's, ME DEP has, in its licensing and § 401 certification decisions, generally protected cold water fisheries using the 6.5 ppm from EPA guidance on DO criteria necessary to support cold water fish. ME DEP has a long standing practice of using maximum ambient water column temperatures in its water quality models for application of this DO criterion. In this TMDL, ME DEP has assumed a colder temperature in its model (22°C) rather than actual ambient temperatures. Several commenters on the draft TMDL objected to this approach because it results in allowing greater levels of monthly average BOD to be discharged compared to the levels that would be allowed if ambient temperatures were used. ME DEP justifies the use of 22°C with the 6.5 ppm criterion, rather than maximum ambient water column temperatures (which are as high as 24°C to 26°C) by explaining that 22°C captures the majority of the temperature range (0°C to 24°C) within which salmonids would be growing (pages 12-13 RTC).

GIP TSS Target

The TMDL target for TSS is linked to the same class C numeric DO and narrative aquatic life criteria described above, and the TSS TMDL for GIP was determined using the same water quality model as for CBODu. Total suspended solids (TSS), discharged by the treatment facilities year-round, tend to settle and accumulate in the deeper areas of GIP. The settled solids create a sediment oxygen demand (SOD) which is shown by modeling to be one of the most significant factors in DO impairment for GIP. The TSS TMDL for GIP is appropriately expressed as an annual average to account for the year-round load accumulating over time. An important purpose of this limit is to assure that annual TSS loadings do not exceed the levels which are the basis for modeling and calculation of the CBODu and phosphorus loads needed to meet the numeric and narrative DO criteria discussed above.

GIP Phosphorus TMDL Target

The phosphorus TMDL has been established to ensure that both numeric DO and narrative aquatic life criteria discussed above are met (using the same water quality model), and to enable GIP to attain the designated use of primary contact recreation. Gulf Island Pond is an impounded section of the Androscoggin River, and excessive amounts of phosphorus in GIP result in blooms of algae whose cycle of oxygen production and respiration creates 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. The blooms themselves create "unsuitable aesthetic conditions for swimming" and other primary contact recreational activities (page 2, TMDL summary).

Maine's WQS do not include numeric criteria for nutrients. ME DEP has chosen chlorophyll-a as a surrogate for eutrophic conditions, because algal blooms are a direct result of eutrophic conditions, and chlorophyll-a is a measure of algal productivity. ME DEP set an algae bloom

prevention threshold of 10 ppb chlorophyll-a, based on the best information it had available at the time. In particular, ME DEP relied on site-specific data (2004 *Androscoggin River Data Report* dated January 2005) showing that the pond-averaged chlorophyll-a was 10 ppb on one occasion when a bloom occurred in a portion of the Pond on August 4, 2004 and 4 out of 6 data sampling locations were in areas of the Pond without a bloom (pages 66-67, RTC; pages 38-50, January 2005 *Androscoggin River Data Report*). Several paper mills commented that they did not believe the chlorophyll-a target of 10 ppb was based on sufficient data, that only the data from areas of the Pond with an active bloom should have been used to set the target, and that the pond-averaged 10 ppb is too low a target (overly protective). However, use of only two data points collected within the bloom area, as suggested by the mills, would not yield a sufficiently protective chlorophyll-a target. The chlorophyll-a levels within the bloom area obviously would exceed the levels associated with non-bloom conditions, and they also do not account for any lag time in the response to phosphorus loading between chlorophyll-a build up and full bloom conditions.

When evaluating other waters subject to algae blooms, DEP has typically used chlorophyll-a levels in the range of 8-12 ppb defining an algae bloom. The 10 ppb target in this TMDL falls in the middle of that range and so is consistent with DEP's past experience (pages 5-7, TMDL). Further, 10 ppb is the same level historically recognized by EPA (1974) as the level of chlorophyll-a above which eutrophication would occur (page 4-12, EPA *Protocol for Developing Nutrient TMDLs* 1999).

In addition, the ME DEP lakes assessment section has been using a chlorophyll-a threshold level of 8 ppb to define blooms in colored lakes (>30 pcu) for more than 20 years (page 6 RTC) based on many lake studies. Gulf Island Pond is classified as a stream, not a lake, because GIP has a much higher flushing rate than a lake. Except for the deepest areas, the Pond appears to be well-flushed during high flows, so the impounded riverine system is expected to have a somewhat higher assimilative capacity for nutrients than Maine lakes. Using this reasoning, combined with the GIP-specific data, and past Maine DEP experience, an initial target of 10 ppb seems reasonable for GIP. The TMDL report acknowledges that the chlorophyll-a target may be adjusted in the future if warranted by new information (page 7 TMDL).

Livermore Falls Impoundment TSS Target

The Livermore Falls TSS TMDL is tied to achieving Maine's water quality criteria for class C aquatic life. Maine's narrative WQS require Class C waters "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]. With the use of macroinvertebrate sampling and a linear discriminant model, Maine DEP has implemented numeric tiered aquatic life standards since 1992 and promulgated them as rule in 2004. The criteria are based on 20 years of data, from more than 600 monitoring stations on approximately 150 rivers and streams. The class C metrics from this model are appropriately used as the numeric target for the Livermore Falls Impoundment TMDL for TSS.

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.

With respect to the GIP DO narrative (monthly average) TMDL target, we recognize that some commenters objected to the State's use of 22° C rather than ambient temperatures, particularly in light of DEP's past practice. However, states have some discretion in interpreting their narrative water quality standards, and in this case Maine explained that 22° C is very close to the upper range of the temperature at which growth occurs, and that using this temperature would be consistent with the narrative water quality standard which allows for some change in aquatic life as long as all indigenous fish are supported and the structure and function of the resident biological community is maintained.¹ EPA expects that the use of a 30 day average DO criterion of 6.5 at 22° C adds additional protection to what is provided by the numeric minimum DO criteria of 5.0 ppm and 60% saturation. We encourage DEP to undertake a model run that would predict the levels of DO that would be attained at the TMDL loadings when the GIP is at 24° C. Given that many of the segments of GIP are predicted to attain DO levels well in excess of 6.5 at 22° C (see Figure 18, page 42 of the TMDL report), it is likely that at actual temperatures of 24° C, many of the segments would still be at or above 6.5.

With respect to the phosphorus TMDL target, EPA believes that ME DEP's establishment of a chlorophyll-a target of 10 ppb was reasonable in light of available information, as explained above. In addition, we note that EPA's 2001 ecoregional nutrient criteria documents, both for rivers and streams, and lakes and impoundments, provide recommended values below 10 ppb. [Ambient Water Quality Criteria Recommendations, EPA 822-B-01-015 for Rivers & Streams in Ecoregion VIII; EPA-822-B-00-010 for Lakes and Reservoirs in Ecoregion VIII]. The EPA recommendations are intended to serve as a starting point for States and Tribes to translate narrative nutrient criteria into a quantified endpoint, or to develop more refined criteria to reflect local conditions, (pages iii- iv, EPA 822-B-01-015). The relevant values (which range from 3.4-7 ppb) illustrate that it would not be prudent to use an initial chlorophyll-a target greater than 10 ppb. Furthermore, as TMDLs are implemented, and water clarity in the Androscoggin River and GIP improves, it is possible that increased light penetration will trigger blooms at increasingly lower levels of phosphorus, necessitating further reductions in phosphorus loads.

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

¹ The commenters also asserted that DEP's change in determining how the 6.5 ppm DO would be implemented constitutes a water quality standards change that requires EPA review and approval before it can be implemented. We agree that in some circumstances, a new interpretation of a water quality standard may constitute a revised standard subject to EPA review and approval. However, we do not believe that the State's action here is such a circumstance.

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

All TMDLs for both GIP and Livermore Falls impoundment are expressed as loads to the entrance of the respective impoundment, and as mass-per-time (lbs/day or ppd) over various averaging periods, as appropriate (see references in section 2 of this review document). ME DEP identified the loading capacities for GIP in terms of seasonally applied (June-Sept.) 30-day and 7-day averaged loadings for C-BODu (55,843 ppd and 61,241 ppd respectively), 30-day averaged loadings for total-P (317 ppd) and ortho-P (50 ppd), and an annually averaged loading for TSS (100,000 ppd), all expressed as loads to the entrance of the pond.

The phosphorus TMDL represents a default combination of total-P and ortho-P. ME DEP points out that there are other combinations of total-P and ortho-P that would enable WQS to be met. Using the water quality model, ME DEP calculated three additional combinations of total-P and ortho-P which allow increasing levels of ortho-P, all of which have total-P levels equal to or less than the default TMDL for total-P (page 20 TMDL report). Options presented by DEP are reasonable because the TP is kept at or below the default level needed to attain WQS, while offering ortho-P levels that are easier for the mills to meet.

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 predicts non-attainment of class C numeric and narrative DO criteria in deeper portions of the pond even if point source discharges are eliminated. Specifically, based on the water quality modeling, the TMDLs establish default oxygen injection loads of 30,000 ppd at Upper Narrows and 150,000 ppd at Lower Narrows. These levels, in conjunction with waste load reductions, will ensure that WQS will be met (see table on page 3, TMDL summary; pages 28, 32 and 34, TMDL report). The TMDL report refers to 40 C.F.R. § 125.3(f) of the federal NPDES permitting regulations, which 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.² The TMDLs for TSS and CBODu 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. The TMDLs were not based on a specific § 125.3 demonstration but the TMDL report noted that the mills would be providing such a demonstration prior to the licensing process.

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

ME DEP describes the rationales for the methods used to establish the cause-and-effect relationships between the various narrative and numeric targets and the identified pollutant sources as follows:

CBODU, TP, and Ortho-P TMDLs

ME DEP uses the Qual2EU water quality model for the upstream portion of the Androscoggin River, and a WASP model for the GIP impoundment portion of the river in order to develop the CBODU, TP, and ortho-P TMDLs. ME DEP recently made upgrades to both WASP and QUAL2EU with EPA support and oversight (pages 74-75 RTC). Detailed descriptions of the models are included in the 2002 Modeling Report.

ME DEP provides supporting documentation for the TMDL analyses, including the basis for assumptions, strengths and weakness in the analytical process, and results from the water quality modeling. ME DEP also explains the historical perspective of changing water quality in the river, and the modeling history of the Androscoggin River (started in the early to mid 1980's from data collected primarily in 1982 and 1984) (pages 2-7, TMDL report). One significant finding of the 2002 updated modeling report 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 (due to poor mixing characteristics of the pond and SOD) (page 3, TMDL report).

ME DEP describes certain changes in both the Qual2EU and WASP 2002 models made following additional monitoring during summer 2004 (pages 7-14, TMDL report). Component analysis of average phosphorus loads discharged in 2004 indicates that paper mills are still the largest source of phosphorus and account for about 70% of the total-P and 80% of the ortho-P entering the pond (page 24, TMDL report).

ME DEP traditionally defines critical conditions for point source TMDLs as:

- Low river flows (when dilution of wastewater inputs is at a minimum);
- 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).

In the final Androscoggin River model, DEP followed the traditional approach to the first two critical conditions, described as follows (page 29, TMDL report):

- Low river flows at 7Q10 (1,550 cfs @ Berlin, NH; 1,704 cfs through GIP) and at 30Q10 (1,630 cfs @ Berlin, NH; 1,780 cfs through GIP). State law requires the use of 7Q10 flow for assessing the assimilative capacity of a river); and
- High water temperatures: 26°C for surface waters, 24°C at depth for the DO minimum standard of 5.0 ppm for GIP; 24°C for a weekly average for the Androscoggin River; 22°C for the application of the 30-day average DO of 6.5 ppm for both GIP and the river. Ambient receiving water temperatures used in modeling (26°C at the surface, 24°C at depth) represent inter-annual averages of the maximum summer temperatures on a 7-day averaging basis over a 10-15 year period (personal communication with Paul Mitnik, ME DEP 4/12/05).

However, with respect to the third critical condition, maximum inputs, ME DEP changed the approach from the draft to the final TMDL. In response to public comments concerning the implicit margin of safety, DEP adjusted the initial point source allocations using “clustering factors,” which eliminated the assumption that all point sources would be discharging their maximum loads simultaneously (a conservative assumption in the implicit margin of safety used in the draft TMDL). The DEP used a probabilistic estimate of combined loading based on past monitoring data and an explicit margin of safety to account for uncertainty associated with pollutant loads, modeling and monitoring. (See WLA and MOS sections below for further discussion of the change in the third critical condition.)

TSS TMDLs

Using the same models mentioned above, ME DEP developed two separate TMDLs for total suspended solids (TSS). Using the WASP model for GIP, an annual average TSS TMDL was established for GIP due to the year-round contribution of TSS to the sediment oxygen demand (SOD) in the deeper areas of the pond. (As mentioned before, TSS settles and accumulates in the deeper areas of the pond and creates an 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 and calculating the CBODu and phosphorus loading capacities. Seasonal oxygen injection requirements are a necessary component of the GIP TMDL for TSS (as well as for CBODu). The June 2002 Androscoggin River Modeling Report is referred to for the TMDL calculation process and details (page 53, TMDL report).

Using the QUAL2EU model for the upstream portion of the Androscoggin River, existing TSS loads to the Livermore Falls impoundment were estimated under conditions when aquatic life criteria are monitored (using macroinvertebrate sampling.) ME DEP established a seasonal TSS TMDL, tied to aquatic life impact for Livermore Falls impoundment by using a TSS settling rate calibrated with actual data (see Androscoggin River Modeling Report, June 2002) (page 55, TMDL report), and then computing levels of TSS loading in the river to assure attainment of aquatic life criteria (page 55 TMDL report). The seasonal TSS loading capacity for Livermore Falls impoundment (of 35,800 ppd 60-day average), is applied June through September (page 4, TMDL summary; page 58 TMDL report). A 60-day averaging period is used because 60 days is the time period ME DEP states is required for the samplers to evaluate aquatic life attainment status.

The TMDL represents a target level of TSS that correlates to attainment of aquatic life criteria, based on the best available data over five years summarized in Table 12 (page 55 TMDL report). Although non-attainment was measured in 2002 at a level of 21,279 ppd (under unusual weather conditions, see page 56 TMDL report), ME DEP explained that, with three other data points all greater than the 2002 level and showing attainment between 24,807 – 30,508 ppd, it chose to rely on the weight of evidence. As a result, ME DEP chose 30,508 ppd (attainment in 2000) and 40,258 ppd (non-attainment in 1995) to bracket the levels at which the TSS threshold for non-attainment might occur. To establish the initial TMDL target of 35,800 ppd, ME DEP roughly split the difference between the two values. Given the relatively small difference in levels involved (between the TMDL of 35,800 ppd versus the 30,508 ppd top-of-the-attainment-range level), and the fact that monitoring will be required in the permits to further evaluate the

situation, ME DEP's choice of TSS target level is reasonable based on the limited information available.

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.

With respect to DO, ME DEP has acknowledged that the various model runs predict some non-attainment in two segments (model segments 12 and 13) directly above the Upper Narrows diffuser, but explained the reasons why it believes that the predictions for low DO in these two segments are not representative of actual conditions (pages 44 & 53 TMDL report, pages 32-33 RTC). We agree with ME DEP that monitoring should continue in this location in the future to confirm actual DO levels during critical conditions.

The loading capacities assume that a certain amount of oxygen will be injected into GIP. This is a reasonable basis for establishing the loading capacities, in light of modeling that predicts non-attainment with DO criteria at actual loads from the mills in conjunction with the existing aerator at full capacity, and even in the absence of any point source discharges (see figure 48, Androscoggin River Modeling Report, May 2002). One commenter noted that in the past, the Region had indicated that it considers oxygen injection to be a temporary solution to the DO problem in GIP. It is true that generally the Region prefers pollution prevention over artificial mechanisms such as aerators. However, in this case modeling shows that 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 a reasonable approach.

With respect to the Livermore Falls TSS target, ME DEP offered some possible explanations for the apparent inconsistency in the data, specifically the non-attainment shown in 2002. These explanations, combined with data that showed attainment at higher loading levels, are a reasonable basis for DEP's decision to exclude the 2002 data from the data that were used to set the TSS target. However, given the uncertainties, we strongly agree with DEP that additional monitoring is important. In particular, more data should be collected at summer low flow conditions to determine whether lack of flushing also contributes to aquatic life non-attainment. Additional monitoring will also help address the issue of DEP's decision to split the difference between the highest loading with showed attainment, and the loading which showed non-attainment in 1995.

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

As shown in summary tables on page 3 of the TMDL summary, load allocations (LAs) for nonpoint sources are specified as a single categorical load or gross allotment for each pollutant of concern. Data for the TMDLs did not allow the separation of natural background from NPS.

ME DEP explains that “a large percentage of the phosphorus of NPS origin is unavailable for algal growth when compared to point source–available phosphorus. Ortho-P, the most available form of phosphorus, is rapidly utilized and is not typically seen in high concentrations except below point source discharges. Most of the NPS ortho-P is assimilated quickly within the tributaries themselves before reaching the Androscoggin River.” (page 53, RTC).

As discussed above, the causes of low dissolved oxygen are predominantly point source, rather than nonpoint source, discharges of phosphorus, CBODu, and TSS. For this reason, the TMDLs for the pollutants of concern do not specify nonpoint source load reductions to meet the DO water quality standards; rather, the LAs are set at existing NPS load levels. (The nonpoint source loads are those realized at the entrance to GIP after point sources are removed from the model.)

The constant background (NPS portion) of sediment oxygen demand (SOD) is accounted for in loading capacity by the water quality model, and is expressed as mass per area per time. This approach is reasonable because monitoring data indicate SOD has been constant in GIP over many years, demonstrating equilibrium at current loads and showing that most of the heavy historical SOD loading has been exerted due to natural attenuation. New SOD caused by the ongoing discharge of TSS by the mills is accounted for in the model.

Livermore Falls Impoundment LAs for TSS

ME DEP established the LAs for TSS in the Livermore Fall Impoundment at actual nonpoint source levels consistent with ambient conditions when aquatic life criteria were attained. The LAs represent the difference between TSS loads (measured instream at the entrance to the impoundment) and the loads from point source dischargers (as predicted at the entrance to the impoundment using the QUAL2EU model).

In the five years of existing data, class C aquatic life criteria were not met in the summers of 1995 and 2002 (although ME DEP does not consider the 2002 data to be representative for purposes of the TMDL targets), the two years of lowest mean flow (page 55, TMDL report). No aquatic life problem was measured in the higher flow years of 2003 and 2004 (Personal communication, Paul Mitnik, 4/6/05). Thus, despite higher TSS loading in high river flow years, impairment is only found in low flow years and is attributed to the point sources (WLA) rather than nonpoint sources (LA). ME DEP explains that “The differences in non-point source TSS loads from year to year are due to differences in river flow. When river and tributary flows are higher, non-point TSS loads are higher.” (page 55, TMDL report).

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 is 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 (pages 53, 71, 81-82 RTC). 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 increased phosphorus loading. (page 53, RTC)

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 in 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 reflect current NPS loadings, the TMDLs imply that there are no additional allocations available for future NPS sources.

Florida Power and Light (FPL), the owner of Gulf Island Dam, commented that DEP is *required* to reduce nonpoint source contributions of the pollutants at issue, and should not be imposing oxygen injection requirements on FPL. We disagree that such a requirement exists. For reasons discussed in section 3 above, it is reasonable for DEP to base the TMDL loading capacities on the assumption that oxygen injection will occur, since under any scenario oxygen injection will be needed to meet DO criteria in the deeper portions of GIP. Once the loading capacity is established, DEP has discretion to determine the balance between waste load allocations for point sources and load allocations for nonpoint sources. EPA interprets the TMDL regulations to require "reasonable assurance" that NPS reductions will occur in the circumstance where WLAs are not as stringent as they otherwise would be based on such expected NPS reductions (reflected in the LAs). The WLAs in this TMDL do not rely on NPS reductions occurring, and therefore it is permissible for the LAs to be established at existing levels. Moreover, it is not apparent that reductions in NPS pollutants would obviate the need to provide oxygen injection. Finally, in order to ensure that the background assumption of oxygen injection is realized, it is the State's prerogative to determine how oxygenation should be required, and from whom, consistent with its permitting and licensing authorities. DEP has stated that it intends to require oxygenation through MEPDES permits issued to the paper mills and through the § 401 certification related to the FERC license for the dam. If FPL objects to DEP's § 401 certification requirements, its recourse would be to challenge the certification, not the TMDL.

Finally, DEP's decision to base the Livermore Falls TSS LAs on actual NPS loadings consistent with ambient conditions when the aquatic criteria were attained was reasonable. The data indicate that the cause of the impairment is the point source discharges during critical low flow conditions, rather than NPS loadings.

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.

Significant findings of the 2002 updated modeling report influencing wasteload allocations (WLAs) include the following (pages 3-4, TMDL report):

- Sediment oxygen demand (SOD) is the largest source of dissolved oxygen depletion in the deeper areas of the pond, primarily from the settling and decay of algae, and to a lesser extent, the continuing discharge of TSS.
- Current point source discharges account for half the SOD; nonpoint source and natural sources account for the other half;
- Current point source discharges and the existence of the large GIP impoundment below the discharges are the primary cause of algae blooms;
- Paper mills account for the majority of phosphorus and biochemical oxygen demand (BOD) inputs to the pond.

All WLAs are based on critical conditions of low flows (7Q10 and 30Q10) and high temperatures. As discussed above, the third usual critical condition of maximum inputs (point sources discharging at licensed limits) was changed in response to public comments (criticizing the implicit margin of safety used in the draft TMDL). The final GIP TMDLs for CBOD_u, total-P, and ortho-P, and the TSS TMDL for Livermore Falls impoundment (page 58) have point source allocations inflated by clustering factors (derived from DMRs). The clustering factor applied to each of these TMDLs accounts for the unlikely occurrence of all point sources discharging their maximum loads simultaneously. This approach of modifying a very conservative loading assumption is reasonable because ME DEP subsequently applies an explicit margin of safety which results in the WLAs being reduced by the application of a 10% margin of safety (see discussion in sec. 6, MOS) in lieu of the conservative assumption (implicit MOS) that all the mills discharge simultaneously at maximum permitted loads. The explicit MOS is being used to account for uncertainty associated with pollutant loads, monitoring, and modeling based on 1-3 years of mill monitoring data, 4 years of modeling data, and DEP ambient river data since the 1960's.

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

Wasteload allocations for all point sources combined are listed for each pollutant in the TMDL summary tables on page 3 (TMDL summary). In response to public comments, DEP established default WLAs for individual dischargers for each of the pollutants of concern, as described in the following tables in the report:

Total-P and Ortho-P for GIP as a 30-day average	Table 6, page 26;
CBODu for GIP as a 7-day average	Table 8, page 32;
CBODu for GIP as a 30-day average	Table 9, page 34;
TSS for GIP as an annual average	Table 10, page 54;
TSS for Livermore Falls Impoundment as a 60-day average	Table 13, page 58.

Since the TMDLs for GIP and Livermore Falls impoundment account for multiple dischargers over many miles of river, the TMDLs are established as loading capacities at the entrance to GIP, for modeling efficiency. WLAs for each discharger are back-calculated to the outfall, and for purposes of the TMDL only, the WLAs are also calculated at the entrance to GIP. Since the municipal dischargers individually represent such a small percent of the impact of pollutant discharges in GIP, the municipal WLAs at the entrance to GIP are presented as a composite number.

Trading Conditions

The TMDLs for phosphorus and TSS explicitly state that the default WLAs for those pollutants may be adjusted, following TMDL approval, by implementing trading among the major dischargers (the 3 paper mills and Livermore Falls WWTP). Trading ratios are provided for ortho-P and organic-P (Table 5, page 23 TMDL report) and TSS (Table 14, page 59 TMDL report). Such trading may occur provided that there are safeguards to ensure that the revised allocations do not cause localized water quality impacts (“hotspots”), the total of the adjusted WLAs does not exceed the total of the default WLAs, and there is an opportunity for public review/comment on the revised allocations (such as during the MEPDES permit process) (page 5 TMDL summary).

Gulf Island Pond Phosphorus WLAs

Seasonal (June to September) GIP WLAs for phosphorus are listed for each MEPDES-permitted dischargers in Table 6. Those WLAs consist of 2004 average summer phosphorus discharges as initial allocations whenever possible. Load assignment priority is inversely proportional to the receiving water impact. For phosphorus, all point sources are given 2004 discharge loads except International Paper (IP), which is the point source with highest impact to GIP and which requires a reduction in ortho-P to meet that TMDL.).

Seasonal (June to September) GIP WLAs for CBODu are listed for each discharger at its outfall in Table 8 (7-day average) and Table 9 (30-day average). Mills are given water quality-based loads, and municipal discharges are given technology-based loads (pages 32 and 34 TMDL report). The WLA for Fraser Paper (located in Berlin, NH) is set at 11,500 ppd as a weekly average at the outfall 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 (see page 3 TMDL summary and

page 30 TMDL report). The WLAs for CBODu at Twin Bridges, the entrance to GIP, are listed for each mill individually along with a subtotal for the municipal dischargers, as explained above.

Year-round GIP WLAs for TSS are listed for each discharger at its outfall in Table 10 (annual average). Mills are given water quality-based loads, and municipal discharges are given technology-based (i.e., secondary treatment-based) loads (page 54 TMDL report). WLAs for TSS at Twin Bridges, the entrance to GIP, are listed for each mill individually along with a subtotal for the municipal dischargers, as explained above.

GIP Instream Aeration System

As with loading capacity, the waste load allocations are predicated on the implementation of instream aeration. This approach is reasonable because modeling indicates that the DO criteria could not be attained in the absence of aeration even if the point source discharges were eliminated.

Livermore Falls Impoundment WLAs

Seasonal (June to September) Livermore Falls WLAs for TSS are listed for each discharger at its outfall in Table 13 (60-day average). Mills are given water quality-based loads, and municipal discharges are given technology-based loads (page 58 TMDL report). WLAs for TSS at Twin Bridges, the entrance to GIP, are listed for each mill individually along with a subtotal for the municipal dischargers, as explained above. A 60-day averaging period for the WLAs is reasonable because 60 days is the time period ME DEP states is required for the samplers to evaluate aquatic life attainment status.

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 and targets will be met (provided that the recommendation discussed below regarding daily maximum BOD₅ is implemented). With continued in-stream injection of DO (at increased levels from past practice), water quality modeling predicts compliance with water quality standards and targets once permit limits are implemented. This TMDL includes an adaptive management approach to implementation (see section 9 below).

The WLAs for BOD₅ are established as a 7 day average. It is EPA's understanding that the 7 day average represents a loading that is intended to meet a daily minimum instream DO of 5.0 ppm on average over seven days (see discussion on page 30 of the final TMDL report). The loadings were adjusted to assure attainment of the instantaneous DO criteria by applying a diurnal adjustment factor to the model output as explained on page 30, footnote 9, of the TMDL report. However, since Maine's DO criterion of 5.0 ppm is expressed as a minimum value, not a seven day average, *the 7 day average loadings should be implemented in licensing as daily maximum loadings/daily maximum permit limits*. In addition, the alternative of increasing the 7 day average loadings by multiples greater than one to obtain daily maximum loadings, as presented under "Licensing Recommendations" in Table 8, is therefore not appropriate and should not be used.

The WLAs for the paper mills were established based on the TMDL modeling efforts and not on the mills' §125.3(f) demonstration, which was submitted to DEP shortly before the TMDL was finalized. In approving the TMDL, EPA is not endorsing the §125.3(f) demonstration. That document was not available at the time of the draft TMDL and neither EPA nor the public had the opportunity to comment on it during the TMDL development process. We believe 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, however, DEP will still need to determine the appropriate level of pollutant controls beyond which oxygen injection becomes the preferred economic and environmental method for attaining WQS in satisfaction of §125.3(f). That might be the level at which the WLAs have been established, or, as some have commented, it might be at levels closer to the actual (lower) pollutant loads that the mills have discharged in recent years.

Default Allocations and Trading

EPA agrees that the default allocations may be adjusted in the manner described in the TMDLs without the need for submission and approval of a revised TMDL, provided that the stated conditions on trading are satisfied. The TMDL report is consistent with EPA's 2003 policy on water quality trading with respect to safeguards against localized "hotspots," the sum of the WLAs being less than or equal to the approved TMDL, modification of facility-specific WLAs with the use of the exchange ratios (identified on page 5 TMDL summary, and in Tables 6 and 14 of the TMDL report), and an opportunity for public review and comment. The TMDLs do not address the potential for trading between WLAs and LAs. Any reallocations from LAs to WLAs (based on assumed reductions in LAs) must be reflected in a revised TMDL to ensure that there is a reasonable assurance that the modified LAs could be achieved.

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 were derived from the same modeling effort as the WLAs for the dischargers located in Maine. The weekly BOD₅ WLA for Fraser Paper in Berlin, NH, was 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. (page 32 Table 8, footnote 3, TMDL report).

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.

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 final TMDLs include an explicit margin of safety of 10% of the total loading capacities, (which is based on the Department's experience, water quality assessment work, water quality modeling, and best professional judgment) in order to account for any lack of knowledge concerning the relationship between pollutant loads and water quality in the Androscoggin River. ME DEP applied an explicit margin of safety, which reduced the WLAs by 10% rather than relying on the implicit MOS approach taken in the draft TMDL, which was based on the conservative assumption that all the mills discharge simultaneously at maximum permitted loads. The explicit MOS being used to account for uncertainty associated with pollutant loads, monitoring, and modeling is based on 1-3 years of mill monitoring data, 4 years of modeling data, and DEP ambient river data since the 1960's.

In addition, DEP has recommended that the dischargers conduct ambient monitoring for a minimum of five years. While this additional monitoring is not part of the MOS, it 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 explicit MOS is adequate. Margins of safety are subjective estimates at best. 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, are seasonal, limited to the months of June to September, since 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 is expressed as an annual average (page 6, TMDL summary).

The Livermore Falls TMDL for TSS is intended to address the aquatic life non-attainment of the Livermore Falls impoundment, which occurs in the summer months. Therefore, the TMDL is seasonal, from June to September. The TMDL establishes a 60 day averaging time for the loads, since the duration of macro-invertebrate sampling time is typically 60 days.

EPA Assessment:

EPA New England concludes that seasonal variations have been adequately accounted for in the TMDLs. The TMDLs for CBOD_u, 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.

EPA concurs that an annual TSS TMDL is 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. However, 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.

A summer TSS TMDL for Livermore Falls impoundment is reasonable because this stretch of the Androscoggin River is much more shallow than GIP, and solids buildup over longer periods of time appears not to be an issue because of wash-out during higher river flows (personal communication with Paul Mitnik, ME DEP 4/12/05). Suspended solids, solids settling, and the impact on aquatic life is an issue in the Livermore Falls impoundment during lower river flows, warmer temperatures, and increased aquatic life activity.

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.

ME DEP recommends that ambient monitoring by dischargers should be undertaken for a minimum of five years during the phased implementation of the TMDLs, including weekly sampling from June to September at five locations for chlorophyll-a, total and ortho-P, DO, temperature, and Secchi depth. (page 7-8, TMDL summary). Summer macro-invertebrate sampling of Livermore Falls Impoundment is recommended as a yearly requirement until more data can be collected during extended low flow conditions (page 58, TMDL report).

ME DEP recommends that continuous monitoring for DO/temperature be done at a depth of 60 feet near the dam (the most difficult location for meeting compliance of DO criteria within the pond). ME DEP also establishes monitoring end points (summers without algae blooms, aquatic

life and DO criteria maintained) and states that “If end points are reached before the final TMDL is realized, a new TMDL will be submitted to EPA for approval.” (page 8, TMDL summary).

EPA Assessment:

EPA believes that monitoring is an important component of TMDL implementation for GIP. We are pleased to see that ME DEP has provided a monitoring plan used successfully in 2004 which will obtain information for updating the TMDL, as needed. The TMDL recommends a minimum of five years of monitoring.

The Region is reserving judgment about whether or when a revised TMDL would be appropriate. EPA expects the TMDLs to result in attainment of water quality standards, meaning that algae blooms no longer occur in GIP; dissolved oxygen levels are met in GIP just above the thermocline from June to September every year during flows at and above 7Q10; and aquatic life criteria are attained and maintained in the Livermore Falls impoundment at and above 7Q10 flows. 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 permitting and a water quality certification for the Gulf Island Dam Hydropower licensing. The default WLAs are provided by ME DEP for CBOD_u, total-P, ortho-P, and TSS; and trading ratios are specified for ortho-P, organic-P and TSS. ME DEP recommends implementation by the point sources in phases of two or three step reductions with required ambient monitoring.

ME DEP intends to include oxygen injection load recommendations in its 401 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, and the TMDL needs to account for this fact.” (page 79, RTC). Modeling also estimates the dam accounts for about 20% of the algae levels in GIP with the TMDL implemented (page 7, TMDL summary).

EPA Assessment:

Addressed, though not required. EPA recognizes that where immediate compliance is not possible, phased implementation is a reasonable approach. Compliance opportunities are presented by improved controls on phosphorus addition (needed and added by the mills to

support the biological treatment processes used by the mills), improved TSS removal, experimentation with the biological treatment system operational mode, and flow reduction.

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."

ME DEP explains that the WLAs in these TMDLs are based on the assumption that "in-stream aeration is required for GIP and results in less stringent WLAs for CBOD_u as a 7 and 30 day average and TSS as an annual average." (page 7, TMDL summary). Reasonable assurance that the in-stream oxygen injection will occur will 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) (see page 8 of this document), 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.

ME DEP hosted a number of stakeholder meetings in 2003 and 2004 on modeling, data collection and stakeholder concerns about development of the Androscoggin River TMDL. Both the 2002 modeling report and the 2004 data report went through public review and comment

periods. Public meetings in Lewiston and Rumford in December 2004 were held to obtain public comment. The public review draft of the TMDL was posted on ME DEP's website on January 3, 2005 with an original deadline of February 3, 2005 for comments; electronic notices of availability were sent to all members of the stakeholders group, and the report was advertised in local newspapers from Berlin, NH to Lewiston, ME. The deadline was extended, upon request, for 15 days, until February 18, 2005. DEP posted all comments on the Department's website, and provided EPA with a complete set of public comments with the final submission. ME DEP provided EPA with a response summary and the Department's response to comments as a separate document along with the final May 18, 2005 TMDL submittal.

ME DEP made a number of revisions to the draft TMDL in response to public comments. A list of significant changes is provided on pages 8-9 of the TMDL summary and includes the following key changes:

- Removal of conservative assumption of all point sources discharging maximum loads simultaneously (with substitution of an explicit margin of safety);
- Use of 10% explicit margin of safety;
- Re-allocations of phosphorus and TSS;
- Establishment of default allocations for phosphorus, TSS, and CBODu, and a default oxygen injection requirement.

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

Data for entry in EPA's National TMDL Tracking System

TMDL/Waterbody Segment Name*	Androscoggin River – Gulf Island Pond
Number of TMDLs*	4
Lead State / Towns*	Maine (ME) / Lewiston, Auburn
TMDL Status	Final
Pollutant ID	515 (total phosphorus) 622 (ortho-phosphorus) 144 (CBODu) 518 (TSS)
TMDL End Point	5.0 ppm Dissolved Oxygen (min. criteria for class C) 6.5 ppm DO (monthly average) 7.0 ppm DO (min. criteria for class B for NH mill) 10 ppb chlorophyll-a to eliminate algae blooms
TMDL Type	Point and Nonpoint Source
Point Sources & Permit #	NH 0100013 - Berlin POTW NH 0100927 - Gorham POTW ME 0101176 - Bethel POTW ME 0101486, ME 0100552 - Rumford-Mexico POTW ME 0100315 - Livermore falls POTW NH 0000655 - Fraser Paper (Berlin) ME 0002054 - Mead Westvaco (Rumford) ME 0001937 - International Paper (Jay)
List ID (from system)	
Impairment ID	Use impairment of aquatic life and recreation due to low DO, low transparency, and excessive nutrients.
Cycle (list date)	2004 (use 1998 until 2002 and 2004 entered)
Establishment Date (approval)*	July 18, 2005
EPA Developed	No

* Data for EPA Region 1 TMDL web page.

Data for entry in EPA's National TMDL Tracking System

TMDL/Waterbody Segment Name*	Androscoggin River – Livermore Falls Impoundment
Number of TMDLs*	1
Lead State / Towns*	Maine (ME) / Livermore Falls
TMDL Status	[Final]
Pollutant ID	518 (TSS)
TMDL End Point	Aquatic life criteria for class C (narr. & numeric – macro)
TMDL Type	Point and Nonpoint Source
Point Sources & Permit #	(See above list for Gulf Island Pond)
List ID (from system)	
Impairment ID	Aquatic Life Impairment
Cycle (list date)	2004 (use 1998 until 2002 and 2004 entered)
Establishment Date (approval)*	July 18, 2005
EPA Developed	No