September 30, 1999

Mr. Harold F. Reheis, Director
Georgia Department of Natural Resources
Environmental Protection Division
205 Butler Street, S.E.
Floyd Towers East, Suite 1152
Atlanta, Georgia 30334

Subject: **Comments in Response to EPD's Proposed Total Maximum Daily Loads for Segments of Bear Creek and Beaverdam Creek in the Savannah River Basin**

The Georgia Industry Environmental Coalition (GIEC[1]) has reviewed the Georgia Environmental Protection Division's (EPD's) proposed Total Maximum Daily Loads (TMDLs) for two segments listed on the USEPA's 303(d) list. It is our understanding that these are the first two TMDL's regarding dissolved oxygen (DO) that have been performed by EPD and, as such, are viewed by GIEC as precedent-setting documents. This view is supported by our understanding that EPD presently does not have written procedures nor policies to direct the TMDL effort, nor for the regulated community to evaluate results.

As stated in the TDML documents, a TMDL is required for waters identified on Georgia's 303(d) list. The TMDL is "established at a level necessary to implement applicable water quality standards with seasonal variations and a margin of safety." It should be noted that each of the creek segments was listed because prior modeling efforts identified the segments as potentially water-quality limited. Both creek segments have fishing water use classification with a daily average and minimum acceptable DO standard of 5.0 and 4.0 mg/l, respectively. EPD developed the model to primarily address the "primary constituents responsible for lowering the instream DO concentration", ultimate carbonaceous biochemical oxygen demand ($CBOD_u$) and ultimate nitrogenous oxygen demand ($NBOD_u$). "Other sources of these constituents are nonpoint sources such as background stream concentrations."

Data were collected for each of the creeks to assist EPD in the calibration of the DO kinetics. The parameters developed during the calibration phase were then applied to a critical (extreme flow and meteorological) conditions model to develop the TMDL that will allow the DO standards to be protected. The comments provided below can be categorized as those pertaining to the process EPD used to develop the TMDL and the adequacy of the model to defensibly develop a TMDL.

---

[1] GIEC is a not-for-profit membership organization of environmentally-regulated businesses in Georgia. Its members form a diverse group of industries, representing over 30 companies and 19 SIC codes, with the shared belief that environmental regulations should, and can, be both protective and cost efficient. The mission of GIEC is to serve as a technically-based advocate for Georgia industry by promoting environmental regulations and policies founded on protection of human health and the environment, sound science and cost/benefit principles. It is not GIEC's purpose to engage in political advocacy at either the state or national level.

TMDL Elements - The proposed TMDL regulations (August 23, 1999) will require a minimum of the following ten elements for a TMDL:

1. Waterbody Name and Geographic Location
2. Identify the Pollutant Load
3. Identify the Deviation from the Pollutant Load
4. Source Categories
5. Wasteload Allocation
6. Load Allocation
7. Margin of Safety
8. Seasonal Variations
9. Allowance for Future Loading
10. Implementation Plan

Both of the subject TMDLs have sections/discussions that address each of the elements except the Allowance for Future Loading element. It is not clear if EPD has incorporated a future loading allowance into the Margin of Safety (MOS).

303 (d) Listing Rational – As previously mentioned, no data were used to list the creek segments on Georgia's 303(d) list. The listing was based on model results. It is not known if the "listing" model used data for calibration or verification. The reports did not identify any data that supported the results of the early modeling effort.

Model - EPD used a steady state model to determine the TMDL. The DO standard allows for a time variable instream DO (5.0 daily average, never less than 4.0 mg/l) and the data collected on Beaverdam Creek indicate that the instream DO has a diurnal range of 0.5 to 1.5 mg/l. A more robust time-varying model could have been used to simulate the diurnal temperature and loading effects.

Model Calibration – A review of the DO model calibration results (Figure 3 of Bear Creek and Figure 10 of Beaverdam Creek) indicate that the system kinetics may not be totally understood. As a result, parameters used to calibrate the model may not accurately represent the system and some parameters may account for more than one process. For instance, sediment oxygen demand (SOD) was not included in the DO resource kinetics. SOD has become a recognized DO sink when modeling instream DO kinetics. The SOD can vary greatly depending on such things as the solids discharged from upstream point and nonpoint sources, stream velocities, and stream bed characteristics. SOD and other DO-demanding materials appeared to be lumped into the $CBOD_u$ and $NBOD_u$ deoxygenation rates. The instream $CBOD_u$ deoxygneation rates ranged from 0.25 to 0.5 per day @ 20 deg C and $NBOD_u$ deoxygneation rates were 0.2 and 0.3 per day. The rates used for both studies were based on literature values. Apparently, no data were collected to measure the $COBD_u$ and deoxygenation rates. These high rates allow for a better fit of observed data, but also could mask the effects of other DO demanding sources.

Critical Conditions - The critical conditions for both these TMDLs were 7-day, 10-year low flows, coupled with the highest temperature that the USGS predicts will occur in the stream. The parameters (rates, upstream and tributary concentrations, etc.) used to calibrate the DOSAG model were those used for the critical-conditions model. The only changes to the model were (1) the upstream and tributary flow and temperatures and (2) the point source loading. The point source loads for both of these models were set at BOD_5 = 10 mg/l,

ammonia = 2 mg/l, and DO = 6 mg/l. These limits reflect an advanced level of treatment that is considered achievable for municipal waste streams.

Of note is the critical conditions parameterization does not take into account the character of the waste after implementing the TMDL (advanced wastewater treatment). Typically, advanced wastewater system discharges have less solids and lower constituent concentrations. A characteristic of the lower concentration wastewater is slower DO consumption rates (deoxygenation) and a corresponding higher f-ratio ($CBOD_u$ to BOD_5). In addition, it is recognized that the instream deoxygenation rates downstream from wastewater treatment facilities reflect the level of treatment. That is, streams with highly treated wastewater have lower deoxygenation rates (say 0.05 to 0.1 per day) than those with less treatment (greater than 0.1 per day). This was evidenced in your recent study on the Chattahoochee River. In addition, if the solids load is reduced, the deposition and resulting SOD downstream from the discharge will possibly be reduced. Both the lower deoxygenation rates and the lower SOD will generally result in more available capacity.

Margin of Safety – The MOS as defined by EPA is "unallocated assimilative capacity or conservative analytical assumptions used in establishing the TMDL". The MOS is a safety factor that "ensures attainment and maintenance of water quality standards for the allocated pollutant." EPD used compounding probability (low stream flow, high water temperature and maximum wastewater discharge), conservative modeling assumptions and an assimilative capacity reserve (5.2 versus 5.0 mg/l) to define the MOS. Does this TMDL and MOS imply that the new DO standard for fishing waters is never less than 5.2 mg/l? The following summarizes the conservative assumptions used for the models:

- High deoxygenation rates (to compensate for no SOD and other unknowns?)
- No allowance (lower SOD and deoxygenation rates) for implementing the advanced waste water treatment
- Extreme temperatures and 7Q10 low flows
- Not accounting for diurnal temperature and discharge effects
- Basing the TMDL solely on the daily average criteria and not allowing for excursions below 5.0 mg/l
- Conservative upstream "background" DO loading - 75 % DO saturation, 3.0 mg/l $CBOD_u$ and 0.4 mg/l $NBOD_u$
- Complete (100 %) conversion of ammonia to nitrate-nitrite (NO2-NO3)

Implementation (Resource Allocation) - The proposed implementation plan for both TMDLs is at the expense of the point sources. The implementation plans are to increase the treatment efficiency of the municipal wastewater treatment facilities. Though the creeks have different characteristics, the treatment levels for both facilities are the same (10 mg/l-BOD, 2 mg/l-NH3 and 6 mg/l-DO). Should these limits be considered the new minimum treatment limits for municipal wastewater treatment facilities?

The implementation plan did not evaluate controls for nonpoint source contributions. Can the upstream and tributary loadings (DO, $CBOD_u$ and $NBOD_u$) be reduced?

Of benefit to GIEC would be a discussion and presentation of the DO deficit partition. That is, what is the allocation of each point and nonpoint source to the TMDL. For DO, this would include the background/tributary $CBOD_u$, $NBOD_u$, DO deficit, SOD and where appropriate the

algae and other DO demanding sources. The point source DO allocation would be attributed to $CBOD_u$, $NBOD_u$, DO deficit, and other appropriate DO demanding sources (i.e., immediate oxygen demand). GIEC believes that this allocation would be useful in the analysis and could potentially be used in the future to assist in trading these resources.

We have found it difficult to provide comprehensive comments on these proposed TMDLs because EPD's methodologies and processes for development of TMDLs have not been provided for public review. We strongly recommend EPD document your methodologies and processes and make them available for review and comment. Since these are the first two TMDLs to be established for DO, GIEC views the methodologies and processes under which they were developed to be precedent-setting and should be available for public review and comment prior to setting TMDLs.

We appreciate EPD's consideration of our comments and look forward to your response. Please call either of us if you have any questions regarding these comments or desire additional information.

Sincerely,

GEORGIA INDUSTRY ENVIRONMENTAL COALITION

Michael E. Wilder
Water Resources Workgroup Chair

James R. Baker
Chair

Attachment: List of GIEC Member Companies

cc: A. Hallum, EPD
GIEC General Membership