

Missouri
Department of
Natural Resources

DRAFT MCDANIEL LAKE TMDL
PUBLIC COMMENTS

Public Notice
Nov. 7 – Dec. 7, 2003

McDaniel Lake
WBID #7236

Greene County, Mo.

Missouri Department of Natural Resources
Water Protection Program
PO Box 176
Jefferson City, MO 65102-0176
800-361-4827 / 573-751-1300



Scott Goodin

11/19/2002 01:48 PM

To: Sharon Clifford/WPCP/DEQ/MODNR@MODNR, Anne Peery/WPCP/DEQ/MODNR@MODNR

cc:

Subject: F&M Lakes

I cut this out of a draft I never sent for some reason. The secret to solving any problem lies not in the solution, but the questions. I figured you two could make the most use of this. It's pointless talking with anyone else involved with it.

1) Common factors leading to a summer bloom of cyanobacteria (bluegreen algae) include the following:

- Several consecutive days of clear, sunny skies;
- Surface water temperatures in excess of 18 centigrade
- Several consecutive days of calm weather
- Persistent high air temperatures
- Adequate nutrient ratios or >mesoeutrophic conditions
- Imbalanced trophic cascade (food chain)
- Fluctuating water levels

2) Management challenges contributing to causative factors outlined in section 1:

- Land clearing
- Enriched runoff
- Human and animal waste disposal
- Fishery management
- Hydraulic manipulation

a) You mention that most of your problems (with algae blooms) began after the intake from Stockton went online. Your hypothesis that it is something in Stockton water contributing to the blooms may be correct. However, the opposite could also be true, that it is something lacking from Stockton water (namely nutrients) that may be a primary contributor. It seems that if the nitrate to phosphorus ratio drops below 10:1 by weight, it will change the lake's phyto-dynamic from a phosphorus limited system to a nitrate limited system. Some species of cyanobacteria are able to 'fix' their own nitrogen from the atmosphere. Thus, having a ready supply of their own nitrogen, the cyanobacteria are able to more readily draw available phosphorus from the water column and out-compete other aquatic flora.

*We need to know the ambient nutrient levels and volume of water drawn from Stockton, and water present in the receiving lake in order to determine if it is the presence or absence of nutrients that may be contributing to your problem.

b) If the lakes are managed as "Trophy" fisheries, there may be too few piscivores to keep zooplanktivorous minnows (and other smaller fishes) in check resulting in a lower population density of grazing zooplankton. Grazing zooplankton are what keeps suspended algae (and cyanobacteria) in check. In one study, simply increasing the number of piscivores in a lake eliminated the dominance of cyanobacteria in a very short time.

*What is the condition of the fisheries on lakes that experience algae blooms?

*What is the relative abundance of piscivores to forage fishes?

*Could the fishery be manipulated to produce conditions that favored water quality management over fishery management?

*Does the food-web structure inhibit dominance by grazing zooplankton?

c) Cyanobacteria are well adapted to eutrophic waters characterized by periods of stratification. Cyanobacteria do not thrive in moving water. However, mixing hypolimnetic water with the epilimnion will release bound phosphorus into a form usable by phytoplankton (including cyanobacteria). Aeration has similar effects. This also includes rapid changes in lake levels such that preclude the establishment of shoreline vegetation. Cyanobacteria depend very strongly on the total phosphorus concentration in the water column.

Based upon what I've been able to glean thus far, I think entirely too much effort is being poured into modeling difficulties and not enough into the problem itself.

-----Thanks!-----

Scott W. Goodin

Department of Natural Resources

Water Pollution Control Program

Tel: (573)-526-1503 Fax:(573)-526-5797

nrgoods@dnr.state.mo.us

~~~~~

"We need to teach people how to think, not what to think."

>> Ellen McCallie, MO Botanical Garden

**Scott Goodin**

11/24/2003 02:32 PM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR

cc:

Subject: MDL TMDL

<http://www.dnr.mo.gov/wpscd/wpcp/tmdl/wpc-tmdl-pn-mcdaniel-lk.htm>

Bear with me here. I'm going to be as gentle as I can. I've got some concerns with this one due to my educational background and previous involvement.

I feel this TMDL is premature. It does not adequately address the problem, and the problem cannot be adequately assessed from available data, only the symptoms (taste & odor).

- The Nitrogen:Phosphorus ratio has been documented as a key factor in objectionable algae blooms consisting of cyanobacteria spp. This is not discussed nor is it included except to be dismissed in favor of a chl-a target. How was the decision reached to not consider the N:P ratio as a possibility?
- Data presented in the appendices and used in drafting the models do not even allow for assessment of the possibility of a nutrient ratio trigger. Are we comfortable proceeding with the proposed target knowing that we haven't considered alternative probabilities?
- Many cyanobacteria are nitrogen fixing. At lower concentrations of nitrate, cyanobacteria out compete green algae for available phosphorus. This is not discussed, yet who put whom's house where in 1805 is?
- Zooplankton population density is touched on in brief. It has been documented repeatedly in a number of journal publications that a lentic trophic structure (food web) which inhibits zooplankton dominance sets the stage for a nuisance bloom of cyanobacteria, yet this is not discussed. Why?
- MIB and geosmin production are symptoms of the problem. The problem may be the nutrient ratios, not the actual levels. The problem may be the trophic structure. The problem may be a combination of both. The problem is not chl-a densities. Chl-a densities are a biological reaction to chemical, biological, and climatological factors, not a measure of possible causative agents. Have all of these potential problems been examined to the same degree before determining the phosphorus target?
- The TMDL does not adequately diagnose the problem (see "symptom" above) and may cause affected parties to engage in costly monitoring and corrective measures that could ultimately fail to address or check the symptoms because of lack of consideration for other factors by the Department. The TMDL endpoints need to be reconsidered to address the problem, not they symptom.
- Available data utilized (as shown in the appendices) do not characterize nutrient levels in the lake beyond phosphorus levels. Without knowing Nitrogen levels, how it be said for certain that phosphorus is the correct parameter to target for reduction?
- How far off the discussion table has the DNR gotten with respect to the possibility that this may be a fisheries management issue and not a water chemistry issue? Is it still being discussed?
- The recommended monitoring parameters are comprehensive and well thought out. However, zooplankton monitoring needs to continue. Efforts should also be undertaken to more accurately assess the condition of the fishery through creel studies by MDC. Please consider these suggestions.

Alrighty, thats the lot of them. I hope it wasn't too much. I just don't want us to spend 5 years spinning our wheels on a problem we haven't even adequately characterized yet. I worry that from what's presented, we may end up doing just that. Set me straight where you can too. There's a lot thats kind of fuzzy, the statistical explanations in the Endpoint discussion.

Thanks!

~~~~~

Scott W. Goodin,
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nrgoods@dnr.state.mo.us

~~~~~



John Hoke

12/03/2003 02:48 PM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR, Stacia  
Bax/WPCP/DEQ/MODNR@MODNR  
cc: John Hoke/WPCP/DEQ/MODNR@MODNR  
Subject: MDL Comments (draft)

Here's what I've come up with so far. Let me know what you think. Once we get this where we want it, Anne can send it on to Mr. Goodin. He raises a lot of good points that we may see again once comments start arriving.

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I agree that the available data are insufficient to establish a statistically significant correlation between nutrients and taste and odor problems in McDaniel Lake. However, the proposed monitoring plan should give us a more robust, contemporaneous dataset with which to establish a refined chlorophyll-a target and watershed TP loading in Phase II.

- The Nitrogen:Phosphorus ratio has been documented as a key factor in objectionable algae blooms consisting of cyanobacteria spp. This is not discussed nor is it included except to be dismissed in favor of a chl-a target. How was the decision reached to not consider the N:P ratio as a possibility?

Due to the complex relationships between taste and odor events, nutrients, and limnetic environments, knowledgeable staff from MDNR, EPA-R7, Springfield CU, and UMC met last November to discuss possible endpoints for McDaniel Lake. Chlorophyll-a was chosen as the preferred endpoint based on research conducted by Downing et al. (2001). TN:TP ratios were not chosen because the predominant trend in McDaniel Lake, based on available data and methods developed by Forsberg and Ryding (1980), has been that nitrogen and phosphorus are co-limiting. For the subset of TN:TP ratios that were not co-limiting, TP was found to be the most common limiting factor.

- Data presented in the appendices and used in drafting the models do not even allow for assessment of the possibility of a nutrient ratio trigger. Are we comfortable proceeding with the proposed target knowing that we haven't considered alternative probabilities?

Analysis of nutrient ratios was considered as an option, but attendees of the McDaniel Lake meeting felt the research conducted by Downing et al was more appropriate. This research found that suspended chlorophyll-a predicts the risk of cyanobacteria dominance better than nutrient ratios, phytoplankton biomass, or concentrations of nitrogen and phosphorus. Please see the "Endpoint Options" portion of the document for more details and let me know if you'd like a copy of the Downing et al research.

- Many cyanobacteria are nitrogen fixing. At lower concentrations of nitrate, cyanobacteria out compete green algae for available phosphorus. This is not discussed, yet who put whom's house where in 1805 is?

At the time the technical portion of the document was being written, a comprehensive list of the algal species found in McDaniel Lake and their abundance was not available. Research is currently being done in this area, but I'm not certain when the results will be available. Because TN:TP ratios indicated TP was the most limiting factor in cases where the nutrients were not co-limiting, nitrogen was considered to be abundant in the McDaniel Lake system. Which is why we didn't consider the source of the nitrogen within the system (water vs. watershed). But it would be easy to quantify if you know the algal species present, their respective rates of nitrogen fixation from the atmosphere, nitrogen loading from the watershed, and have a little money to spend on nitrogen isotope analysis.

As for the historical perspective found in the document, Anne and Gail do a really good job putting the watershed and major players into perspective. What gets entered into that section is their domain and its not our place to tell them what should or should not be included.

- Zooplankton population density is touched on in brief. It has been documented repeatedly in a number of journal publications that a lentic trophic structure (food web) which inhibits zooplankton dominance sets the stage for a nuisance bloom of cyanobacteria, yet this is not discussed. Why?

An in-depth discussion of zooplankton dominance as it relates to control of cyanobacteria populations was not included due to the approach that was chosen. As stated in the "Additional Recommendations" section, zooplankton density may in fact explain more variation in taste and odor events than nutrient or biomass estimates. The lack of available zooplankton species and abundance data, however, made a detailed discussion of McDaniel Lake zooplankton somewhat difficult. Such a discussion may be possible, however, after additional zooplankton data are collected via the proposed monitoring plan.

- MIB and geosmin production are symptoms of the problem. The problem may be the nutrient ratios, not the actual levels. The problem may be the trophic structure. The problem may be a combination of both. The problem is not chl-a densities. Chl-a densities are a biological reaction to chemical, biological, and climatological factors, not a measure of possible causative agents. Have all of these potential problems been examined to the same degree before determining the phosphorus target?

MIB and geosmin are indeed symptoms of the problem and, as detailed in the document, they were not chosen as the endpoint. Please refer to the comments above relating to nutrient ratios and trophic structure. I do agree, however, that a combination of chemical, biological, and physical variables may collectively be causing the problem. As the document states, the matter often becomes a discussion of risk and those factors that contribute to the potential for harmful blooms and metabolite build-up. Managing taste and odor problems is rarely a pro rata reduction in any one causal variable, but rather a process of minimizing risks. The available data and approach used lend themselves to reducing the risk of cyanobacteria proliferation through reductions of total phosphorus. Additional tools and BMPs for risk reduction can be investigated in the next phase when additional water quality, algal, and zooplankton data become available.

- The TMDL does not adequately diagnose the problem (see "symptom" above) and may cause affected parties to engage in costly monitoring and corrective measures that could ultimately fail to address or check the symptoms because of lack of consideration for other factors by the Department. The TMDL endpoints need to be reconsidered to address the problem, not they symptom.

Given the available data and endpoint options, the TMDL does do a good job of addressing the taste and odor problem and the complex chemical, biological, and physical relationships involved. It establishes a reasonable approach and endpoint based on research and opinions of those knowledgeable in the field. It also makes recommendations for reductions and additional monitoring that will enable us to add facets to the approach and implementation plan in the next phase.

- Available data utilized (as shown in the appendices) do not characterize nutrient levels in the lake beyond phosphorus levels. Without knowing Nitrogen levels, how it be said for certain that phosphorus is the correct parameter to target for reduction?

The data presented in the appendices were those used in the Chl-a/TP analysis and are a subset of the available data for McDaniel Lake. Inclusion of the entire dataset in the appendices would have made the document extremely long and difficult to reproduce, so only the data utilized in the analysis were included. The complete dataset is available upon request if you're interested. As stated earlier, TN:TP ratios did not indicate that nitrogen was a limiting nutrient in McDaniel Lake.

- How far off the discussion table has the DNR gotten with respect to the possibility that this may be a fisheries management issue and not a water chemistry issue? Is it still being discussed?

At the time the modeling was conducted, limited algae, zooplankton, and fish population data were available. As such, only a cursory discussion was included in the document. However, monitoring to determine algal and zooplankton speciation and abundance are recommended for the first phase of the TMDL. The results of these monitoring efforts will enable us to get a handle on the lower trophic structure in McDaniel Lake and determine its impact on the system. If its determined that the zooplankton population is too low, we'll most likely start looking higher up the food chain to see how the other species are doing (or aren't doing if that's the case). Until then, to my knowledge no discussions are taking place.

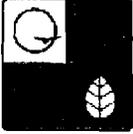
- The recommended monitoring parameters are comprehensive and well thought out. However, zooplankton monitoring needs to continue. Efforts should also be undertaken to more accurately assess the condition of the fishery through creel studies by MDC. Please consider these suggestions.

I agree. I'll talk with Anne and Stacia to see if we can't work this in somehow, but with funding an issue on our end it may have to be completed using other sources. These data may already be available and could be something we can work on while the other data are being collected.

As always, your comments and suggestions are welcome and appreciated. Feel free to let me know if you have further questions or would like additional information. Thanks!

John Hoke  
Environmental Specialist III  
GIS/Modeling Unit -- Water Quality Section -- WPCP  
Missouri Department of Natural Resources





**Scott Goodin**

12/04/2003 03:11 PM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR  
cc: John Hoke/WPCP/DEQ/MODNR@MODNR, Stacia  
Bax/WPCP/DEQ/MODNR@MODNR  
Subject: Re: MDL TMDL 

Thanks for the reply and thoughtful responses. Something is still burning though and I can't quite find a way to get my head wrapped around it well enough to articulate it properly. No more time to ponder.

Regardless of what my cerebellum is currently mulling over, I recommend pushing hard for Creel studies. Creel studies are cheap & easy, consisting of little more than a survey or questionnaire with some 9th-grade number crunching at the end. From everything I've looked at so far, this looks like a text-book fishery management problem. Given that professional observation, we shouldn't neglect to explore this avenue with the comparative low cost of assessing the condition & structure of the fishery. I realize this may be a bit far outside the box for conventional TMDLs, being that it's not dealing with a chemical analyte or land use patterns, but with what little is known about the conditions surrounding the blooms at McDaniel, it merits looking into.

Thank you,

~~~~~  
Scott W. Goodin,
Department of Natural Resources
Water Pollution Control Program
Tel: (573)-526-1503 Fax:(573)-526-5797
e-mail: scott.goodin@dnr.mo.gov
~~~~~





Anne Peery

12/09/2003 03:57 PM

To: Stacia Bax/WPCP/DEQ/MODNR@MODNR, John Hoke/WPCP/DEQ/MODNR@MODNR  
cc:  
Subject: MDL-TMDL (Final comments) from Scott G.

FYI...

Anne

----- Forwarded by Anne Peery/WPCP/DEQ/MODNR on 12/09/2003 03:57 PM -----



Scott Goodin

12/08/2003 12:20 PM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR  
cc:  
Subject: MDL-TMDL (Final comments)

Read that research by Downing ET.AL. Not convincing enough for me personally to base the entire TMDL endpoints off of it. Here's why (quotes in "" are directly from the study):

#1 These guys didn't look at the trophic structure. We'd better look at the trophic structure or we'll still be scratching our heads in 2008.

#2 "As total P increases, cyanobacteria represent an increasing percentage of the biomass...." observed nitrogen levels not discussed in this factor but indicate that a ratio change is also occurring at the same time.

#3 "Although N:P impacts on cyanobacterial dominance are well founded..." --self explanatory

#4 Instead of talking up their findings they instead say "we should be testing alternative explanations" and then citing a number of factors that need looking into. Not exactly supportive of their conclusion, is it?

#5 The conclusion lacks further confidence " Although it is likely that stoichiometry influences the structure of phytoplankton communities, our analysis of temperate zone lake data shows that the key mechanisms leading to cyanobacter dominance may be most closely related to the physical and biological constraints accompanying a simple increase in nutrient supply". ---this is weak, weak, weak, & a back-handed compliment to boot.

#6 The data used don't run over as many consecutive seasons as with the N:P ratio studies. Maybe good, maybe not so good?

#7 "Fig. 1 shows that the relative contribution of cyanobacter to total phytoplankton biomass follows nonlinear relationships to phytoplankton biomass, N:P ratio, and nutrient concentrations." Yes, as the ratio of N:P increases you will have less cyanobacter. This is indeed nonlinear.

I think you're basing the endpoints off of a Doctoral "hip-shot": Impressive, but not very accurate. Again though, it's obvious that the direction of the TMDL is carved in stone unless something really weird happens. I can tell when a position is being defended rather than alternatives examined. Its okay, I do it too.

This is food for thought. As long as we're collecting lots of good, unbiased data, things should progress nicely. We can always revise the endpoints as we learn more. TP is probably a good idea though. I'm still leery of the Chl-a because it looks more of an "after the fact" than a prediction criterion.

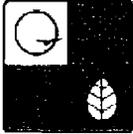
**Closing Hint:** When ever a study (like the one by Downing Etal) leads in with "A controversial precept" or "Controversy surrounds", you should add liberal salt to what you choose to digest.

Thank you,

~~~~~  
Scott W. Goodin,
Department of Natural Resources
Water Pollution Control Program
Tel: (573)-526-1503 Fax:(573)-526-5797
e-mail: scott.goodin@dnr.mo.gov
~~~~~

Richard Laux comments  
WLA

» Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03 - Stacia Bax/WPCP/DEQ/MODNR



**Anne Peery**

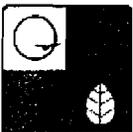
11/25/2003 09:15 AM

To: Richard Laux/WPCP/DEQ/MODNR@MODNR  
cc: Phil Schroeder/WPCP/DEQ/MODNR@MODNR, John  
Hoke/WPCP/DEQ/MODNR@MODNR, Mohsen  
Dkhili/WPCP/DEQ/MODNR@MODNR, Stacia  
Bax/WPCP/DEQ/MODNR@MODNR  
Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03

Richard,  
Here are some first thoughts of the matter. When we decide on a course of action, we'll run it by you.  
Thanks,

Anne Peery  
TMDL Developer  
DNR/ Water Pollution Control Program  
573-526-1426  
nrpeera@mail.dnr.state.mo.us

----- Forwarded by Anne Peery/WPCP/DEQ/MODNR on 11/25/2003 09:10 AM -----



**John Hoke**

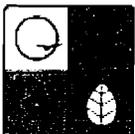
11/25/2003 09:01 AM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR  
cc: Mohsen Dkhili/WPCP/DEQ/MODNR@MODNR, Stacia  
Bax/WPCP/DEQ/MODNR@MODNR  
Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03

Thanks Anne. What Richard says is correct and we'll need to address the issue either through additional wording as he suggests or through an actual allocation of TP for these facilities. We could take the percentage of flow from these facilities (very small) when compared to the total flow from the watershed and assign a load. Then the WLA loading could be partitioned among the individual facilities based on their size. Granted all of these numbers would be small, but they'll be numbers we can lean on instead of a general statement.

Or, we can add a monitoring only requirement into each of these permits and handle the allocation in Phase II. I think the MOS gives us the flexibility to pursue this option. What we don't want is to cause small facilities to incur costs for TP removal if none exists in their effluent. The reasonable potential does exist, but we also need to be reasonable with respect to the realities of the situation.

John Hoke  
Environmental Specialist III  
GIS/Modeling Unit -- Water Quality Section -- WPCP  
Missouri Department of Natural Resources  
Anne Peery



**Anne Peery**

11/25/2003 08:39 AM

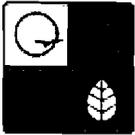
To: Mohsen Dkhili/WPCP/DEQ/MODNR@MODNR, Stacia  
Bax/WPCP/DEQ/MODNR@MODNR, John  
Hoke/WPCP/DEQ/MODNR@MODNR  
cc:  
Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03

FYI. There is no rush on this. It's a 30-day public notice, though I would like to address this before the end of it.

Thanks!

Anne Peery  
TMDL Developer  
DNR/ Water Pollution Control Program  
573-526-1426  
nrpeera@mail.dnr.state.mo.us

----- Forwarded by Anne Peery/WPCP/DEQ/MODNR on 11/25/2003 08:37 AM -----



**Richard Laux**

11/25/2003 08:28 AM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR, Sharon Clifford/WPCP/DEQ/MODNR@MODNR  
cc: Phil Schroeder/WPCP/DEQ/MODNR@MODNR, Becky Shannon/WPCP/DEQ/MODNR@MODNR

Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03



Thanks, I have some concern about the point sources being allotted "0" pounds of phosphorus.

Also the statements (on page 13) about the small "size" of the existing point source facilities negating nutrient requirements in permits appear unsupported by existing law or regulation. This appears to be the continuing misunderstanding WQ section staff have about WQ based permit limits (by regulation and law WQ based limits apply where there is "reasonable potential", regardless of the size of the facility). If there is a need to make statements about the effluent regulations, I'd recommend having such text reviewed and approved by permit section staff before such misstatements are taken as factual by other readers.

If all point sources in the basin receive "0" allotment, how can we legally renew any permit in the basin for domestic sewage or issue any new permits for stormwater from construction (contains nutrients)? I'm sure the Sierra Club will ask the same questions, only they'll wait until we try to issue permits and may not raise the issue to WQ section staff during the TMDL PN.

*Why haven't they monitored nutrients before then?*

Perhaps a better way would be to state the combined contribution (appears to be only two with domestic and perhaps two constructing/disturbing sediments) would be very small and not impact the methods chosen to address the problem. Allotting them "0", appears somewhat unreasonable and very problematic to normal permitting activities.

Anne Peery



**Anne Peery**

11/24/2003 02:43 PM

To: Richard Laux/WPCP/DEQ/MODNR@MODNR  
cc:

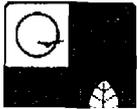
Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03

Sorry to take so long to get back to you. I've been working in Word answering comment letters. From the WPCP web page, click on "Impaired Waters and TMDLs" in the side bar and then Draft TMDLs. Choose Draft McDaniel Lake TMDL and the PN announcement comes up. Click on Draft McDaniel Lake TMDL again (this time it is spelled correctly) and you should be in.

If that doesn't work, let me know.

Thanks,

Anne Peery  
TMDL Developer  
DNR/ Water Pollution Control Program  
573-526-1426  
nrpeera@mail.dnr.state.mo.us  
Richard Laux



**Richard Laux**

11/24/2003 08:25 AM

To: Anne Peery/WPCP/DEQ/MODNR@MODNR

cc:

Subject: Re: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03 

I can't seem to actually find the TMDL itself?

Anne Peery



**Anne Peery**

11/21/2003 03:40 PM

To: Bruce Martin/SWRO/DEQ/MODNR@MODNR, martil@mdc.state.mo.us,  
Phil Schroeder/WPCP/DEQ/MODNR@MODNR, Richard  
Laux/WPCP/DEQ/MODNR@MODNR, banekt@mdc.state.mo.us, Steve  
Bauguess/WPCP/DEQ/MODNR@MODNR

cc:

Subject: McDaniel Lake TMDL on Public Notice 11/21 - 12/21/03

Here is the PN announcement for the McDaniel Lake TMDL. It gives you information how to access the TMDL, the Information Sheets and the Fact Sheet.



PublicNoticeofMcDanielLakeTMDL-e-version.c

Anne Peery  
TMDL Developer  
DNR/ Water Pollution Control Program  
573-526-1426  
nrpeera@mail.dnr.state.mo.us

Comments on McDaniel Lake from EPA - Stacia Bax/WPCP/DEQ/MODNR



Anne Peery

12/09/2003 03:56 PM

To: John Hoke/WPCP/DEQ/MODNR@MODNR, Stacia Bax/WPCP/DEQ/MODNR@MODNR, Mohsen Dkhili/WPCP/DEQ/MODNR@MODNR

cc:

Subject: Comments on McDaniel Lake from EPA

These are easy...I can handle the first three.

Anne Peery

TMDL Developer

Missouri Department of Natural Resources

Water Pollution Control Program

573-526-1426

anne.peery@dnr.mo.gov

----- Forwarded by Anne Peery/WPCP/DEQ/MODNR on 12/09/2003 03:55 PM -----



Lavaty.Ann@epamail.epa.gov

12/09/2003 03:09 PM

To: nrpeera@mail.dnr.state.mo.us, nrclifs@mail.dnr.state.mo.us

cc: Generaux.Jack@epamail.epa.gov

Subject: Comments on McDaniel Lake

Anne and Sharon,

Below are the comments, please let me know if you have any questions. Unless you have any questions or comments, we'll assume these comments will be incorporated into the TMDL.

Thank you,

Ann Lavaty

Environmental Scientist

TMDL Team

USEPA Region 7

901 N. 5th St.

Kansas City, KS 66101

(913) 551-7370

Comments on the draft McDaniel Lake TMDL:

1. Pg 10, Section 3; Last sentence just before Modeling Objective - "Filling in the formula..." May be too early in the document to provide this since further discussion on the variables are included later on, including the derivation.

2. Pg 12; the LA was calculated to be 2.06 #/day, however, the next paragraph is contradictory since it indicates a target load of 1.94 #/day. The 2.06#/day appears to be the correct value.

3. Pg 13, Table 2; instead of providing "Letter of Approval" for the two facilities listed under facility name, please state these are facilities covered under a MO General permit (define in asterisk area and include the type of facility(s) they represent).

4. Pg 14, MOS; It is necessary to describe what the conservative assumptions are and to provide an explanation of the nature affect of assumptions. As written, EPA cannot approve this MOS.

12/10/03 - statewide reference lake data - took out 3<sup>rd</sup> &  
- lower 95%tile CI for target TP  
- year round compliance - not just summer



# MISSOURI DEPARTMENT OF CONSERVATION

## Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180  
Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JERRY M. CONLEY, Director

**REPLY TO:** Columbia Research Center  
1110 S. College Ave.  
Columbia, MO 65201  
Telephone: 573/882-9880  
FAX: 573/882-4517

DEC 19 2003  
MTC

December 16, 2003

Mrs. Becky Shannon  
Water Pollution Control Program  
Missouri Department of Natural Resources  
PO Box 176  
Jefferson City, MO 65102-0176

Dear Mrs. Shannon:

RE: McDaniel Lake and Barker Creek TMDLs

The following are the comments of the Missouri Department of Conservation concerning the draft TMDL for McDaniel Lake and Barker Creek (tributary to).

### McDaniel Lake

1. Page 1. The pollutant for McDaniel Lake is identified as "algae". Increased algae production is the result of excessive nitrogen and phosphorus enrichment which should be the listed causes of impairment.
2. Page 3, Paragraph 1. We concur with the intent to remove Fellows Lake from the TMDL list.
3. Page 4. The definition of eutrophication listed in the document incorrectly suggests that lake and reservoir eutrophication is exclusively a human-induced process. Reservoirs and lakes naturally age through the eutrophication process and rate of aging or succession can be increased by human disturbance. A better definition follows with its source:

Eutrophication (1) Natural process of maturing (aging) in a body of water. (2) Natural and human-influenced process of enrichment with nutrients, especially nitrogen (total nitrogen greater than 600 mg/m<sup>3</sup>) and phosphorus (total phosphorus greater than 25 mg/m<sup>3</sup>) leading to an increased production of organic matter.

COMMISSION

STEPHEN C. BRADFORD  
Cape Girardeau

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CYNTHIA METCALFE  
St. Louis

HOWARD L. WOOD  
Bonne Terre

Armantrout, N. B., compiler. 1998. Glossary of aquatic habitat inventory terminology. American Fisheries Society, Bethesda, Maryland

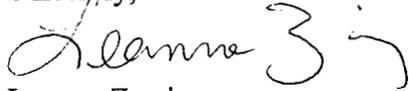
4. Page 5, Paragraph 1. "Liver shad" should be corrected to "gizzard shad". The relationship between shad and zooplankton populations is speculative and assumes that shad are present in exceedingly large numbers and have been successful in depressing what might otherwise be more dense populations of zooplankton. While this is a possibility, data are not presented to adequately support a conclusive determination.
5. Page 5, Footnote 5. The last sentence should be changed to read: "If this layer of the food chain is reduced, algae *may* increase."
6. Page 8. Add the word "excessive" for "As mentioned in the introduction, the presence of *excessive* cyanobacteria has been definitively linked..."
7. Page 12, Paragraph 4. Should the target load (LA from the preceding formula) be 2.06 lbs/day, rather than 1.94 lbs/day as stated here?
8. Page 12. Waste Load Allocation. The seven point sources present in the watershed were presumed in the draft to contribute no significant nitrogen or phosphorus to the McDaniel Lake watershed. This assumption is not supported by any data, nor was any data provided from these discharging facilities. Since nitrogen or phosphorus is a known concern in this watershed, as permits for these facilities are renewed, nutrient monitoring and limits should be added to the discharge permits to determine and limit their contribution. Until such time as the nitrogen and phosphorus contribution of these seven facilities can be quantified it is premature to assume that their WLA is zero pounds per day.
9. In the document the descriptor "Cyanobacteria" and the obsolete "blue-green algae" are used interchangeably. Although they both refer to the same organism, one should be chosen for consistency (preferably the taxonomically accurate "Cyanobacteria").
10. Bibliography. Taxa in Latin should be in italics.

#### Barker Creek

Page 6. The use of surrogate Tebo Creek data to determine the alkalinity vs. pH regression model was reasonable considering the paucity of available data for Barker Creek. The relation for Barker Creek should be verified in the future with planned additional monitoring data collected from Barker Creek. Also, further discussion in the text, figures and charts should specify that surrogate Tebo Creek data was used in the regression.

The Department supports efforts by Department of Natural Resources to improve Missouri's aquatic resources and appreciates the opportunity to comment on these TMDLs.

Sincerely,

A handwritten signature in black ink that reads "Leanna Zweig". The signature is written in a cursive style with a large, stylized "Z" and a long horizontal stroke at the end.

Leanna Zweig  
Environmental Services Biologist

STATE OF MISSOURI      Bob Holden, Governor • Stephen M. Mahfood, Director  
**DEPARTMENT OF NATURAL RESOURCES**

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www.dnr.state.mo.us

January 6, 2004

Ms. Leanna Zweig  
Columbia Research Center  
1110 South College Avenue  
Columbia, MO 65201

RE:    McDaniel Lake TMDL Comments

Dear Ms. Zweig:

Thank you for your comments on behalf of Missouri Department of Conservation (MDC). The numbers in our response correspond to the numbering in your comment letter relating to McDaniel Lake.

1. Page 1. On the recently released 2002 303(d) list the impairment is listed as “nutrients.”
2. Page 3, Paragraph 1. Thank you for your support. It is appreciated.
3. Page 4. You offered a good definition and we incorporated it into the TMDL.
4. Page 5, Paragraph 1. Liver shad has been corrected to gizzard shad. While the relationship between gizzard shad and zooplankton may be speculative, City Utilities of Springfield has on several occasions stated the water was silver with shad. The TMDL document also makes clear they are speculating by offering various scenarios for the phenomenon.
5. Page 5, Footnote 5. The word “may” has been included, per your suggestion.
6. Page 8. The word “excessive” has been included.
7. Page 12, Paragraph 4. The correction has been made.
8. Page 12, WLA. First, we have learned there are only five facilities involved since the two Letters of Approval have been discontinued. Second, total phosphorus monitoring will be added to the permits as appropriate (e.g., those that are oil and water separators or construction permits would not require this monitoring) and this language has been included in the TMDL. Third, the combined contribution of these discharges across the entire watershed is 0.0135 ft<sup>3</sup>/s, or less than one-tenth of one percent of the total watershed flow. This flow equates to 8,721 gallons per day. It is therefore not expected to impact the methods chosen to address the problem and the WLA will stay at zero. However, this is a phased TMDL and if the monitoring reveals a problem, adjustments will be made in Phase II.
9. While in some instances we followed your suggestion and replaced “blue-green algae” with “cyanobacteria,” instances referring to filament counts were left unchanged.
10. The Latin was placed in italics.

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Ms. Leanna Zweig  
Page 2

Again, thank you for commenting. MDC's participation in the TMDL process and concern for the health of Missouri's water resources is appreciated. If you have other questions or wish to discuss this further, please contact Anne Peery of the Water Quality Section at (573) 526-1426 or at Missouri Department of Natural Resources, Water Pollution Control Program, P. O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

WATER POLLUTION CONTROL PROGRAM

A handwritten signature in black ink, appearing to read "Becky L. Shannon", written over the typed name below.

Becky L. Shannon, Chief  
Water Quality Section

BLS:apd



RECEIVED

DEC 23 2003

WPCP

December 19, 2003

Planning Section  
Missouri Department of Natural Resources  
Water Pollution Control Program  
P.O. Box 176  
Jefferson City, MO 65102-0176

Dear Sir or Madam:

**Subject: Comments Regarding McDaniel Lake Draft TMDL**

City Utilities of Springfield (CU) Water Treatment and Supply management has carefully reviewed the draft documents of the proposal for a TMDL assignment for McDaniel Lake (MDL). We would like to submit comments on the document as follows:

Page 1: no comment

Page 2: no comment

Page 3: First paragraph:

Fellows Lake: CU has experienced more than one taste and odor "event" associated with this reservoir. This observation hinges on the definition of an "event" and even internally we have difficulty agreeing on a consistent definition, whether discussing Fellows Lake or McDaniel Lake. From a customer standpoint, an "event" occurs when we are receiving more taste and odor calls than normal and we have customers whose olfactory senses are offended. From a treatment plant standpoint, an "event" may be an occurrence which causes us to make extra chemical additions, adjust intake depth, use an alternate source, or blend with less offensive water. From a source water standpoint, an "event" may be an occurrence in which a significant level of Geosmin or 2-methylisoborneol (MIB) is measured or when the problematic species of algae are rising rapidly or at a level to cause alarm. Since "event" is referred to several times in the TMDL draft, we feel it is important for everyone to understand that the word can have different connotations in use. We would suggest that, from a water quality perspective, an "event" is one which, consistent with 10 CSR 20-7.031(4)(F), is not amenable to ordinary treatment processes, i.e., requires extraordinary measures on the part of plant operators. When successful, these should not result in excessive complaints. Accordingly, we would suggest that a tally of customer complaints is an inadequate metric to describe the extent of taste and odor concerns in both reservoirs. The last paragraph implies that 1982 marked the first taste and odor event associated with MDL. Actually, CU experienced taste and odor complaints prior to 1982, but that singular occurrence was extensive enough to cause management to address the problem through a long-term concerted program.

Page 4:

First paragraph, last sentence: The CU Laboratories use Gas Chromatography/Mass Spectroscopy (GC/MS) to monitor MIB and Geosmin, the Cyanobacteria metabolites that impair drinking water supplies during blooms.

Second paragraph: This paragraph merely describes the dynamics of a typical drinking water reservoir.

Third paragraph, last sentence: We suggest “All are the result of inadequate watershed management, drought, and continued increased demand for water.”

Page 5:

First paragraph: There is an abrupt change to first person voice in the middle of this paragraph.

First bullet point: We suggest changing “strategic” to “selected”.

Second bullet point: We suggest changing “using” with “encouraging”.

Third bullet point: We suggest changing “State Operating Permit” to “Letter of Agreement”.

Fourth bullet point, last sentence: We suggest changing “logistical problems” to “logistical considerations”, as the refinements deal more with timing than procedural changes.

Fifth bullet point, penultimate sentence: We suggest revised wording to read; “They found however, that HLW seemed to make the lake unstable during the late summer months and that downstream discharge required additional monitoring.”

Page 6: No comment.

Page 7:

Third paragraph: Mr. Parker’s email did not refer to 10 CSR 20-7.031(4)(F) directly, and therefore may be construed out of context. The addition of powdered activated carbon (PAC) to water at the intake occurs in the pipe at the pumps and should fall under 10 CSR 60 if a reference is desired. If, however, the Water Quality Rule reference is intended to address the degree of impairment, we would agree that this is a proper reference, but the connection should be explained more clearly.

Fourth paragraph: This paragraph is somewhat misleading. Downing et al (2001) did not improve our understanding of the taste and odor problem. Chlorophyll-a is a poor predictor of Cyanobacteria dominance. CU management feels that the TMDL should be expressed as a nutrient level and not as a secondary or tertiary result of that nutrient level.

Fifth paragraph: TMDL endpoint Options: We suggest revision to read, “Variance cannot be overstated considering the dynamic nature of the McDaniel Lake system”. This is in accordance with our telephone conversation with Ms. Becky Shannon in which we agreed that the word “perturbed” should not be used due to its negative connotation.

Page 8:

First paragraph: This is a good statement but it should be added that sediment based nutrients are not considered in the computer model.

Third paragraph: It must be cautioned that 25,000/mL was a ballpark figure and was considered to be a total algae count, greens as well as blue greens. We have learned that potentially problematic species should be enumerated semiweekly. Those numbers were substantially lower than 25,000/ml. Furthermore, Mr. Parker’s email did not state “would” result in T&O events but only said, “we are in danger of”, which should be stated as “could”. Since further calculations seem to be based on the 25,000 number, it should be pointed out that Mr. Parker’s email in response to your direct questions was prefaced with the statement: “But first, I

must caution you about taking any of this information out of context or interpreting it to be more factual than intended. Taste and odor control treatment continues to be an evolving art in our organization and each event tends to have individual characteristics. We consider the process to be multiple barrier including the watershed, in-lake, and plant, as points of control.”

Page 9:

Last paragraph: McDaniel Lake Endpoint: We agree that controlling total phosphorus loading is a good answer. However, we question using chlorophyll-a near the dam as an indicator since it is dependent upon biomass (phytoplankton including cyanobacteria) development which may be controlled by other lake management techniques.

Page 10:

Last paragraph: We suggest revision to read, “McDaniel Lake receives water from its own watershed and indirectly from Stockton Lake. Water from Stockton Lake is pumped to Fellows Lake to augment its water level. If additional water is desired in McDaniel Lake, some or all of Stockton Lake pumpage is shunted via the Little Sac River directly into McDaniel Lake.”

Page 11:

Continued from page 10. “Fellows Lake itself also has a bypass function allowing water to be discharged from the lake into the Little Sac River, which eventually flows downstream to McDaniel Lake.”

Second paragraph: Somehow, the fact that chlorophyll-a measurements include both green (good) and blue-green (bad) algae seems to have escaped the mathematical approach espoused in these discussions. Chlorophyll-a does not discern the difference. In short, the 25,000 taken out of context is given more importance than it may deserve.

Page 12: No comment.

Page 13:

First paragraph: Critical Comment: The proposed Waste Load Allocation (WLA) of zero pounds per day for each permit is not practicable for the City Utilities’ Nuccitelli Pipeline Alternate Discharge Permit. This pipeline is intended to transfer public water supply from Stockton Lake, which contains some levels of these nutrients. The allocation for the pipeline discharge should account for permitted flows and nutrient level contained in the Stockton Lake water.

Page 14: No comment.

Page 15: No comment.

Page 16: Table 6. The last three entries on the table refer to Fellows Lake and should probably be removed if Fellows Lake is going to not be included.

Page 17:

Table 7: Geosmin and MIB sampling and analyses will document approximately 20 sampling events instead of 50.

Page 18: No comment.

Page 19:

Third paragraph: “Additional Thoughts”: This may be the most salient statement in the entire document. It would be presumptuous for DNR (or CU, for that matter) to provide assurances to the contrary. Since sediment analyses is not considered, the TMDL process is focusing on a single water column nutrient (phosphorus) only. The dynamic nature of the system is not being considered.

Page 20:

Third paragraph, first arrow: Wetland Practices: The CU 2004 lake management goals do not include plans to “Install wetland practices and aquatic plants on CU property at every opportunity”. At present, this is an unfunded overall goal, which we are encouraging the Watershed Committee to pursue.

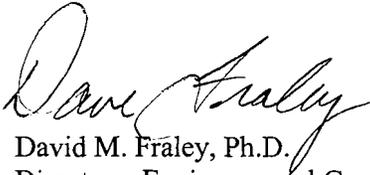
City Utilities appreciates the opportunity to submit these comments. If you require additional information or clarification regarding any of the items or issues addressed herein, please feel free to contact John Parker, 417.831.8880 or David Ballou at 417.831.8822.

Respectfully,



John J. Parker, P.E.

Manager – Water Treatment and Supply



David M. Fraley, Ph.D.

Director – Environmental Compliance

cc: Dennis Gold, P.E. – Senior Manager – Natural Gas and Water  
David Ballou – Director - Laboratories

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**DEPARTMENT OF NATURAL RESOURCES**

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January 6, 2004

Mr. John J. Parker, P.E.  
Mr. David M. Fraley, Ph.D.  
City Utilities of Springfield  
P.O. Box 551  
Springfield, MO 65801-0551

Dear Sirs:

Thank you for your comments on behalf of City Utilities of Springfield (CU) regarding the McDaniel Lake Total Maximum Daily Load (TMDL) document. The numbers in our response correspond to the numbering in your comment letter.

Page 3, First paragraph: As you suggested, event was defined from a water quality prospective. A footnote was included to explain this. Other wording was included in the TMDL to address your comment about the 1982 event.

Page 4:

First paragraph, last sentence: We used the sentence you provided regarding CU Laboratories to replace the one in the draft TMDL document.

Second paragraph: We included verbiage to clarify this point.

Third paragraph: The sentence construction was corrected as suggested.

Page 5:

First Paragraph: The first person voice was corrected to the third person.

First, second, fourth and fifth bullets: Words were replaced per your suggestions.

Third bullet: According to the department's Southwest Regional Office (SWRO), there is no formal Letter of Agreement. Since CU discussed the issue of applying CUTRINE<sup>®</sup>-PLUS with SWRO, the TMDL document was revised to read, "State usage guidelines affecting the downstream..."

Page 7:

Third paragraph: The document was revised to remove the reference you noted.

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Fourth paragraph: I appreciate your comment on this issue. Analysis of nutrient levels was considered as an option, but after discussions with CU staff, other researchers, EPA and stakeholders, my office made the determination that the research conducted by Downing, et al, was more appropriate. This research found that suspended chlorophyll-a predicts the risk of cyanobacteria dominance better than nutrient ratios, phytoplankton biomass, or nutrient concentrations. Given the other endpoint options and the available data, the current approach was adopted. The proposed monitoring plan is expected to result in a more robust, contemporaneous data set with which to establish a refined target and watershed loading in Phase II of the TMDL.

Fifth paragraph: "Dynamic" was substituted for "perturbed."

Page 8:

First paragraph: While the HSPF model does have the ability to simulate soil/sediment runoff processes and sediment-chemical interactions as part of its watershed hydrology and water quality simulation, sediment based nutrients are included in the current approach as part of the total phosphorus load from the watershed. No differentiation was made between dissolved and suspended phosphorus in the total phosphorus loading.

Third paragraph: Thank you for the clarification of the e-mail communication from Mr. John Parker. As you suggested, we have changed the word "would" to "could" in discussing the risk of a taste and odor (T&O) event. My staff used the value of 25,000/mL along with available water quality data to determine the period of time when the risk of T&O events in McDaniel Lake would be the greatest. We acknowledge and agree that CU now considers this value too high and that the potential for T&O events exists when *total* algae counts are greater than 25,000/mL. Regardless, I believe we are both in agreement that the potential for cyanobacteria dominance of the algal population is greatest from July until September and it is reasonable to use this period of time to define the critical period for potential T&O events in McDaniel Lake.

Page 9, McDaniel Lake Endpoint: The requirement that the TMDL endpoint be met at the dam was established to provide an assessment point for the TMDL and compare water quality trends with the largest available set of historical data. However, we now know that CU has already started monitoring at the sites suggested in the recommended monitoring plan (Table 6). In the future we would like to use a weighted average of all three McDaniel Lake monitoring sites for assessment purposes and re-evaluate the "end-point determination site" as data become available.

Page 10 and 11: The wording was altered as per this comment.

Page 11, second paragraph: Department staff agree that the chlorophyll-a method does not distinguish between green and blue-green algae sources of chlorophyll-a in the water column. As you mentioned, the 25,000/mL value was based on John Parker's e-mail and used to determine the period of time when the risk of T&O events in McDaniel Lake would be the greatest. Critical period (July through September) chlorophyll-a and total phosphorus were extracted from the larger data set and used in the regression analysis. Given that the potential for cyanobacteria dominance is greatest during this period of time, we believe it is reasonable to use this subset of data in the analysis.

Page 13, first paragraph: Department staff agrees with the fact that the water transported in the pipeline contains some levels of nutrients, along with other parameters, however, the permit you reference is for dredge and fill activities and also addresses pipeline cleaning, not raw water delivery. The raw water transported from Stockton Lake, therefore, was not considered as a point source contribution in the model. I agree that this is a potential factor and is yet another complexity in this already challenging analysis. Nonetheless, work by my staff as well as other scientists and managers have led to the conclusions contained in the TMDL. As for the permitted point sources, the combined design flow for three of the five facilities (two do not have a design flow noted, including Nuccitelli) is  $0.0135 \text{ ft}^3/\text{s}$ , or less than one-tenth of one percent of the total watershed flow. Since the combined contribution of these discharges across the entire watershed is so small, it is not expected to impact the methods chosen to address the problem. These facilities will initiate a total phosphorus monitoring program as appropriate. The WLA for this TMDL will remain zero pounds per day. In the future as more data is gathered, a revised WLA may be calculated.

Page 16, Table 6: The McDaniel Lake TMDL recommended monitoring plan was developed to acquire a comprehensive knowledge of the watershed. Although not directly addressed in this TMDL, Fellows Lake is located in the McDaniel Lake watershed and, as such, water quality there can be considered indicative of watershed impacts and should be considered when looking for a solution to the problem. However, please note that the monitoring plan is a recommendation. In the event that limited resources prohibit such monitoring, we would expect that the McDaniel Lake monitoring would be a higher priority than Fellows Lake monitoring.

Page 17, Table 7: The wording in the asterisked "footnote" to the table was amended to reflect this number.

Page 19, third paragraph: We agree that the available data do not consider the dynamic nature of the system. As stated in the Load Allocation section, the lake is treated as a "black box." However, lacking more explicit data, tools and resources with which to better quantify and qualify the dynamics, we consider the approach used to be the most appropriate. The proposed monitoring plan is expected to give us a more robust, contemporaneous data set with which to establish a refined target and watershed loading in Phase II.

Page 20, third paragraph, first arrow: The wording was changed to, "Coordinate with WCO to install wetland practices and aquatic plants on CU property."

Again, thank you for commenting, and also for your continued hard work to find and implement solutions to the taste and odor occurrences in your drinking water reservoirs. City Utilities' participation in the TMDL process and concern for the health of Missouri's water resources is truly appreciated. If you have other questions or wish to discuss this further, please contact Anne Peery of the Water Quality Section at (573) 526-1426 or at Missouri Department of Natural Resources, Water Pollution Control Program, P. O. Box 176, Jefferson City, MO 65102-0176.

Sincerely,

WATER POLLUTION CONTROL PROGRAM

A handwritten signature in black ink, appearing to read "Becky L. Shannon", with a long horizontal flourish extending to the right.

Becky L. Shannon, Chief  
Water Quality Section

BLS:apd