DEQ Nutrient Work Group
10th Meeting Summary
June 17, 2010

Introductions
A list of the members of the Nutrient Work Group (NWG) and others in attendance is attached below as Appendix 1.

Agenda
- Review of the May 20, 2010 Meeting Summary
- Draft EQC Report
- Nutrient Trading Policy
- BACT Approach to the Private Sector Temporary Affordability Criteria
- Disinfection and Nutrient Level Issue
- DEQ's Proposed Revision to the Base Numeric Nutrient Criteria
- NWG Work Plan
- Public Comment
- Next Meeting

Review of the May 20, 2010 Meeting Summary
Don Quander pointed out that he represents the Montana Petroleum Association rather than the Missoula Petroleum Association as stated in the meeting summary. There were no other comments.

Draft EQC Report
George Mathieus reviewed and asked for comments on the draft of the DEQ report to the Montana Environmental Quality Council entitled "Report to the Environmental Quality Council (EQC) on Progress toward Numeric Nutrient Standards for Montana's Surface Waters." This report had been posted on the NWG web page at the following address.

http://www.deq.mt.gov/wqinfo/nutrientworkgroup/agendasminutes/2010/june17/eqc_summary_d8.pdf

Highlights of the comments on the draft report follow.

General Comments
- DEQ should note that it will report later to the EQC on methods for complying with the numeric nutrient standards by reducing rather than treating nutrient discharges to streams. Examples of ways to reduce discharges might include composting toilets, use of gray water, etc.
- The draft report does not discuss the NWG's agreement on temporary criteria for public systems.

Executive Summary
- Municipalities should be added to the list of interests represented on the NWG.
- The executive summary contains too much background information such as the standards developed for the Clark Fork River.
- The executive summary should list the priority NWG member concerns.

1.0 Introduction

- The work on nutrients in the Clark Fork began as voluntary nutrient standard adopted in 2002.
- The report should state in this or a later section that Smurfit-Stone would not have been able to meet the new numeric nutrient standards without a large expenditure, $53 million plus operating costs.
- The Missoula Smurfit-Stone plant did not discharge into a wadeable stream and therefore would not have been subject to the standards the NWG has been considering.
- The nutrient trading issue remains to be discussed.
- A simple chronology of the standard permitting process including the alternative analysis should be provided to the EQC as a handout.
- The background information should include a statement of the current narrative nutrient standards and the proposed numeric nutrient standards.
- The report should indicate that the categorical best available control technology path for the private sector temporary nutrient criteria may require legislation.

2.0 Nutrient Work Group

- The legal topic list may imply their resolution by the NWG. Some such as the permit shield have been resolved, while others including the role of economic considerations, standard compliance, and nutrient trading have not.
- Some aspects of the permit shield such as how long it would last and how far behind the state may be in issuing permits have not been resolved.
- In addition to legal and scientific topics, this section should include a discussion of the temporary criteria for the public sector.
- This section mentions that the NWG will next be working with the Department on the details of non-degradation. We have not discussed this.
- The more detail provided to legislative committees, the better.
- More detail should be provided about the work remaining to be done.

3.0 Cost-Benefit Analysis of Numeric Nutrient Standards

- The Montana Department of Revenue property tax appraisal has not dropped water front property values.
- Property values are set by the market; the relationship in the Dobbs study between property value and water quality is not applicable in Montana.
- The value of Clark Fork River frontage property are increasing as a result of the cleanup.
- I agree in general improved water quality will increase property value, but I am skeptical about the incremental value resulting from adoption of the numeric nutrient standard we are discussing.
- Including the cost cap in the economic analysis downplays the cost of complying with the numeric nutrient standards. EPA has not agreed to the 1% median household income cap. Industry assumes that it will have to spend what ever is required to comply. The cost of complying fully with the standards should be assessed and included in the report.
- Is the $39.8 million figure given on page 7 of the report a present value number? Answer - It is in 2010 dollars.

- The last paragraph on page 7 states: "Quantifiable monetary costs of meeting nutrient standards are greater than monetary benefits, although the net costs per person appear reasonable." The NWG has not agreed to specific quantified monetary costs.
- The monetary costs in the table on page 6 are based on cost caps and the affordability and technology variances. The total cost of complying with the standards may not be reasonable.
- This table does not include the cost absorbed by non-point public and private sources.
- DEQ should be prepared to answer a question from an EQC member about why the department may be unable to quantify the cost of standard compliance to industry.
- This section might include the cost reported by Smurfit-Stone for complying with the numeric nutrient standards. This cost would not necessarily be representative of industry's cost of complying, but it may be indicative of the significant costs to industry.
- A list of non-quantifiable costs and benefits should be provided to the EQC.

<u>4.0 Key Issues and Concerns Raised by the Nutrient Work Group</u>

- Industry does not agree that the inability of the vast majority of discharges to meet the numeric nutrient standards would be typical of circumstances with other water quality standards.
- The petroleum industry does not accept that it should not worry about standard non-compliance because variances might be received. We do not know how variances will be translated into discharge permits.
- Comments on the draft provided by NWG members should be appended to the report.
- A list of member concerns should be included as bullet points in the report.
- I suggest that member point-DEQ counterpoint be avoided in the report.
- We would like to be confident that DEQ will have the resources to implement the standards in a timely manner.
- Permitting people see their role differently than we have discussed.
- How adequately do the numeric standard levels incorporate the variability of natural processes?
- Nutrient trading and offsets are more practical for the larger communities.
- A commercially available technology for the nitrogen numeric nutrient standards does exist for municipal or industrial dischargers, so we will have to rely on a whole basin approach to compliance.

NWG Action - Those members of the NWG present at this meeting agreed to the following list of priority issues and specific points related to them for inclusion in the report.

Issue 1- Compliance/non-compliance issues

- ***The NWG needs to work through the "soup to nut" process beginning with the standards and ending with permits.***
- ***The vulnerability of discharges to relying on variances because they cannot meet the standards for an extended period.***

Issue 2 - Entire standard package

- ***Include a flow chart of the entire process.***
- ***Discuss the BACT approach to the private sector temporary criteria.***

Issue 3 - Basin-wide nutrient reductions
- ***Basin specific solutions involving discharge and total maximum daily load permitting.***
- ***Nutrient trading and offsets.***
- ***Specify the meaning of the basin scale (i.e. related waters).***

Issue 4 - Economic analysis
- ***Real, long-term cost of numeric nutrient standard compliance if the variance process (temporary nutrient criteria) was not available.***
- ***Consider both high and low technology compliance alternatives.***

Issue 5 - Affordability/Limits of Technology
- ***Status of the 1% median household income cap.***
- ***BACT approach for private sector discharges.***

DEQ will revise the EQC report in light of these comments and post it on the NWG web page for member review as soon as possible.

Nutrient Trading Policy

Todd Teagarden provided an update on the status of the DEQ nutrient trading policy. The original draft of the policy was provided to a consultant in January of this year. He submitted comments on the draft to DEQ in the middle of May. The policy has been redrafted reflecting the comments and is under review by DEQ Chief Legal Counsel John North and Department Director Richard Opper. DEQ has a meeting to discuss the revised draft with the consultant on July 12 and expects to release the policy for comment by the NWG and the public in mid-July. John North will decide if a rulemaking is necessary to implement the policy.

Question - What are the major differences you expect between the revised and original drafts?
Answer - The format of the policy is changed and the point-non-point mechanism is changed.

Question - Will the revision continue to discuss trading ratios?
Answer - Yes.
Question - Do you expect the policy to affect permits?
Answer - John North is considering whether the future municipal discharge permits will include a trading option.

Question - Who will submit the trading proposal?
Answer - The discharge permit applicant will submit the proposal. It will be evaluated by a DEQ work group.

Question - Will brokers for nutrient trades have to be licensed?
Answer - No.

Question - Will trades be limited to the growing season?
Answer - Not necessarily; the period will depend on the seasons in which the trades would occur.

Question - How would enforcement or oversight occur?
Answer - They would occur through a groundwater or Montana Pollutant Discharge Elimination System (MPDES) permit.

Question - In the first draft of the policy, DEQ proposed considering actions only after the trading policy is adopted. If Lewis and Clark County adopts a septic inspection program prior to adoption of the policy, could offsets be considered for the City of Helena's discharge permit?
Answer - I don't know.

Question - Would trades be allowed only after a certain level of treatment?
Answer - No; trades will likely be driven by the watershed TMDL.

BACT Approach to the Private Sector Temporary Affordability Criteria

Dr. Mike Suplee reported that not a lot has changed regarding the BACT approach since the last NWG meeting in May. DEQ has a meeting with EPA Headquarters next week to discuss this topic. DEQ staff is pulling together technical information on specific industry practices.

Disinfection and Nutrient Level Issue

At the May NWG meeting, the relationship of numeric nutrient standards to disinfection by products (DBP) in drinking water was raised. Shelley Nolan, DEQ Public Water System Program Manager, and John Jose, DEQ Disinfection Rule Manager, discussed this issue using the handouts copied in Appendix 2 below.

Drinking water treatment must balance the amount of chlorine used to disinfect the water supply with the amount and type of DBP produced. DPB are carcinogens and can cause spontaneous abortions. Too little chlorine and the required disinfection will not occur. Too much chlorine and to many DBP will be produced. New federal regulations, referred to as Stage 2, will make sampling for DBP more stringent. Sampling will be required when the chlorine reaction time is longest at the site where DPB concentrations are likely to be the highest.

Nutrient standards benefit water treatment through the following mechanism. Increased nutrient loading increases total organic carbon (TOC) concentrations via increased phytoplankton and benthic algae (which eventually die and contribute to TOC). When TOC concentrations increase, pH varies more across the day, reducing the effectiveness of disinfection and the need to increase drinking water treatment by increasing the amount of chlorine and/or increasing TOC removal by increasingly expensive filtration techniques. The City of Bozeman is installing a $21 million nano-filtration plant to treat 15 millions of gallons of water per day. Numeric nutrient standards will help reduce TOC production and the risk of increased DPB concentrations and/or increased TOC removal costs.

Question - You said that Montana has 78 surface drinking water sources. How many are on wadeable streams, on large rivers and on lakes?
Answer - I don't have the specific numbers. The most common surface water sources are large rivers and streams. The Yellowstone, Missouri, Marias, Milk and Big Hole River are surface

water sources as are Cutbank Creek, Ten-Mile Creek, and Flower Creeks. Fred Burr Lake, Seeley Lake, Flathead Lake, and Whitefish Lake are also drinking water sources.

Comment - The majority of Montana's drinking water systems have low DBP concentrations because TOC concentrations are low.
Response - Most small drinking water systems have low retention times which inhibit DBP formation. The City of Great Falls does not have a DBP problem, but Malstrom Airforce base does. The City of Havre has DBP problems. Currently, most small systems are not required to sample for DBP.

Question - When cities such as Bozeman are required to install nano-filtration plants, they must use increased energy to run their treatment plants. Are the increased energy costs included in Dr. Blend's cost-benefit analysis?
Answer - No; these costs/benefits would be in the non-quantifiable category.

Question - Does DEQ measure TOC?
Answer by Dr. Suplee - TOC concentrations were not measured in reference streams. We can back out TOC concentrations from the Yellowstone River modeling. Treatment plants measure TOC in raw and finished water.

Question - Do you have optimization analyses that show the benefits of TOC reduction?
Answer by Dr. Suplee - No; additional research would be required.

Comment - Calculating the benefits of reduced TOC and DBP would be helpful.

Question - Have you looked at TOC and DBP in setting the numeric nutrient standards?
Answer by Dr. Suplee - No.

Comment - We need to understand whether the increment of improvement in nutrient concentrations resulting from the proposed nutrient standards would have an impact on public health and the attendant costs and benefits.
Response - This would be good to look at. For some plants, the water quality of the receiving water is too bad to be impacted. In some cases, with borderline TOC concentrations of 3 or 4 mg/L, the nutrient standards may preclude the need for nano-filtration plants. The lower Yellowstone currently hovers in the 3 or 4 mg/L range. The City of Billings is looking at installing membrane filtration to remove TOC.

Comment by Dr. Suplee - Water quality standards are supposed to protect the most sensitive beneficial water use. Drinking water may be the most sensitive use on the Yellowstone so the relationship between nutrient standards and TOC may be an important issue. We will look at TOC modeling implications for the Yellowstone.

Question - Are there alternative technologies to chlorination for water disinfection such as ultraviolet light (UV)?
Answer - UV25 depends on the clarity of the water and would not work when clarity is low; ozone or carbon adsorption beds may work.

Comment - Other countries use a combination of UV and filters.
Response - The US has higher standards.

Question - Are there alternatives for smaller systems?
Answer - Smaller systems are trying to hook onto larger water supply systems, but the connection distances are costly. They can be on the order of $200 per household.
Comment - The Safe Drinking Water Act will be the driver rather than nutrient standards, if human health impacts are relevant.

Summary
- Any nutrient reduction will benefit drinking water treatment.
- We do not know if the base numeric nutrient standards will affect TOC and DBP and levels of disinfectant application.
- We need to examine cost shifting, i.e., if waste water treatment plants spend money on nutrient treatment, will drinking water treatment systems benefit by expending less on DBP removal.

DEQ's Proposed Revision to the Base Numeric Nutrient Criteria

Dr. Mike Suplee summarized the 2008 and 2010 approaches to deriving seasonal nutrient criteria using a handout contained in Appendix 3 below.

Question - EPA's Science Review Board has critiqued EPA's approach to nutrient standards. Would anything in the critique affect Montana's proposed standards?
Answer - No.

Question - What is the schedule for releasing the revision to the base numeric nutrient criteria?
Answer - I hope that it can be released in the early fall, perhaps by the NWG's September meeting.

Question - What water uses may be affected by the criteria in each eco-region?
Answer - The affected uses are set out in the water quality standards.

NWG Work Plan

Gerald Mueller stated that outstanding work plan topics include: EPA's response to the 1% median household income cap for the public entity affordability variance; a private entity affordability variance; the nutrient trading policy; options for reducing rather than treating nutrient discharges to wadeable streams; and case studies to illustrate how numeric nutrient standards would translate into specific permits.

Public Comment

Question - Have there been developments regarding the issuance of numeric nutrient standards in Florida?
Answer by Tina Laidlaw - EPA is reviewing state comments. I am not sure when the rule adoption for lakes, reservoirs and streams will take place. The document for stress-response may be issued on September 30. A Notice of Intent (NOI) has been issued regarding the State of

Kansas' failure to adopt numeric nutrient criteria has been issued that triggers a 60-day comment period.

Question - Have any NOI been issued regarding nutrients in Region 8?
Answer by Tina Laidlaw - No.

Next Meeting

The next scheduled NWG meeting is on August 12, 2010 in the DEQ Director's Conference Room in the Metcalf Building in Helena. The agenda may include:

- EPA's view of the 1% MHI affordability cap;
- Implications of total organic carbon levels for numeric nutrient standards based on modeling of the Yellowstone River; and
- The DEQ nutrient trading policy.

Appendix 1
NWG Attendance List
June 17, 2010

Members

Scott Murphy	Morrison-Maierly, Inc.
Jim Jensen	Montana Environmental Information Center
Don Allen	Western Environmental Trade Association (WETA) Jim EdgcombMontana Department of Commerce
Michael Perrodin	BNSF Railway
Brian Sugden	Plum Creek
Jay Bodner	Montana Stock Growers Association/Agriculture
Ryan Swinney	Bruce Swinney & Associates
Jim Edgcomb	Montana Department of Commerce Donald QuanderMontana Petroleum Association/Petroleum
Jeff Tiberi	Conservation Districts
Dick Hoehne	Town of Philipsburg/Montana League of Cities and Towns
John Rundquist	City of Helena
Chris Brick	Clark Fork Coalition
Debbie Shea	Montana Mining Association

Alternate Members

Doug Parker	Hydrometrics (alternate for Debbie Shea)

Non-Voting Members

Dr. Mike Suplee	DEQ, Water Quality Standards Section, Water Quality Specialist
Dr. Jeff Bland	DEQ Economist

Other Meeting Participants

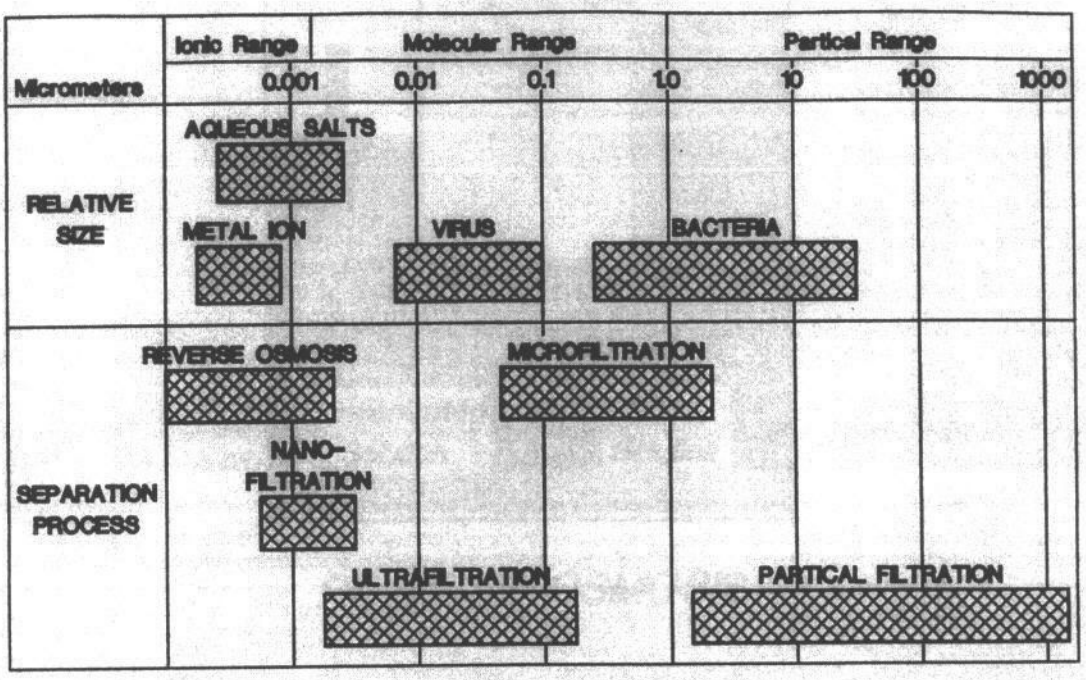
Mike Jacobson	City of Great Falls
Mark Simonich	Helena Association of Realtors
Jessie Luther	Browning, Kaleczyc, Berry, and Hoven
Todd Teegarden	DEQ Technical and Financial Assistance Bureau Chief
Claudia Massman	DEQ Attorney
Tina Laidlaw	EPA
Amanda McInnis	HDR
George Mathieus	DEQ Planning, Prevention and Assistance Division
Bob Bukantis	DEQ, Water Quality Planning, Water Quality Standards Section Supervisor
Alan Tolerton	City of Billings (vial telephone)
Shelley Nolan	DEQ Public Water System Program Manager
John Jose	DEQ Disinfection Rule Manager

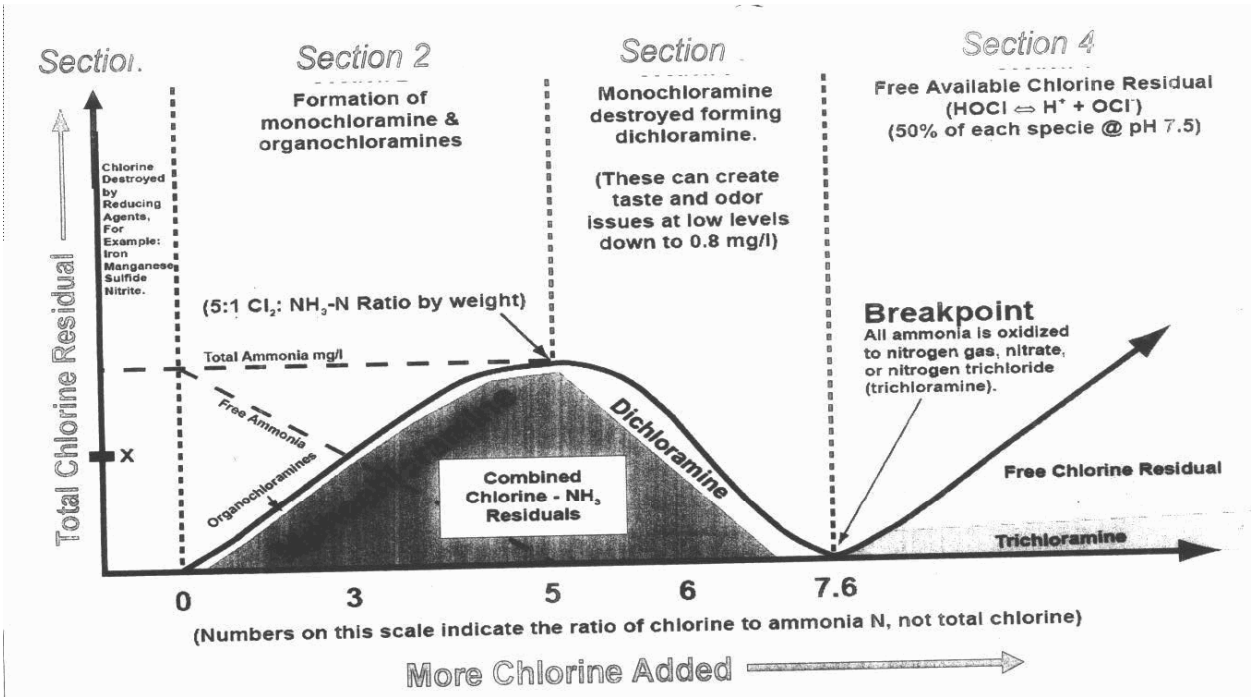
NWG Facilitator

Gerald Mueller	Consensus Associates

Appendix 2

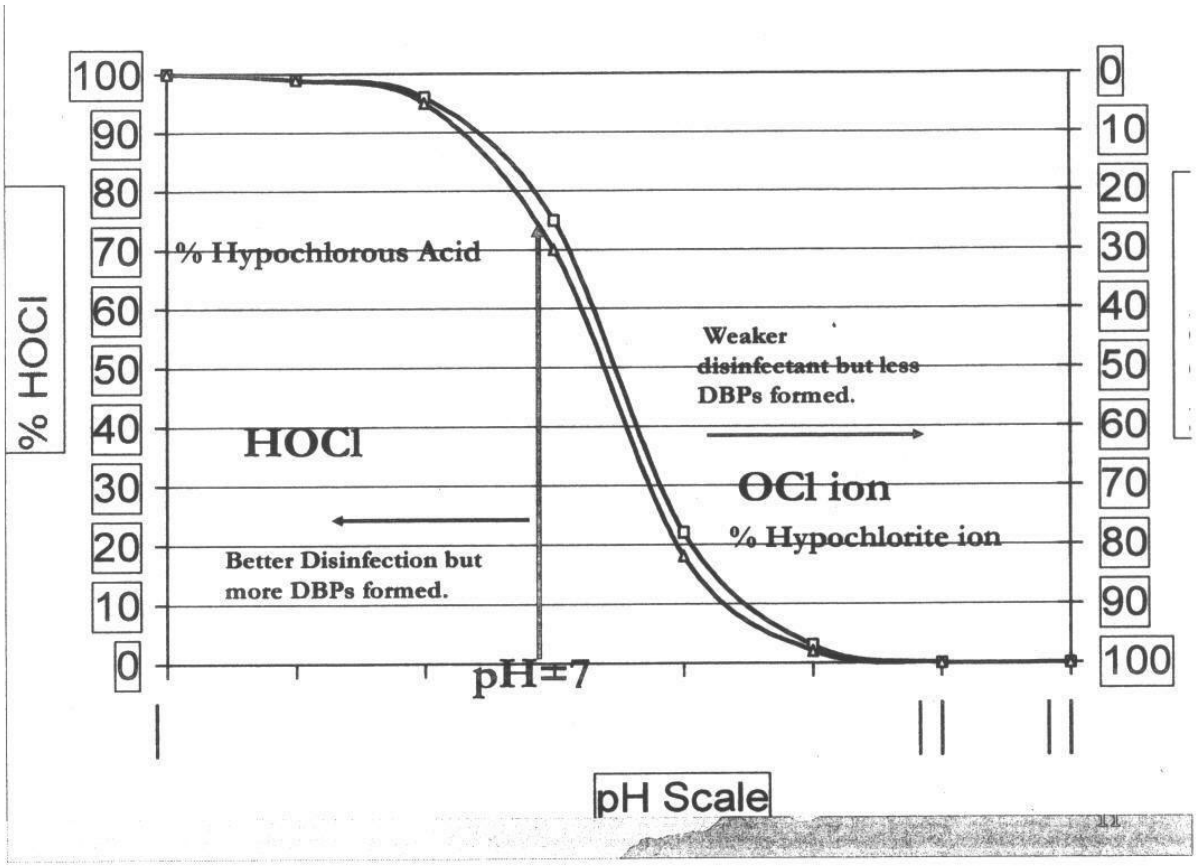
SIZE RANGES OF DIFFERENT PROCESSES





At "X" amount of Total Chlorine Residual:

(1) If the free chlorine is equal to the total chlorine, then Section 4 applies.
(2) If the free chlorine is less than the total chlorine and there is free ammonia, then Section 2 applies (mostly monochloramine, no odor).
*(3) If the free chlorine is less than the total chlorine, and **there is no** free ammonia, then Section 3 applies (some monochloramine and dichloramine).*


% HOCl
100
90
80
70
60
50
40
30
20
10
0
% Hypochlorous Acid
HOCl
Better Disinfection but more DBPs formed.
pH=7
Weaker disinfectant but less DBPs formed.
OCl ion
% Hypochlorite ion
0
10
20
30
40
50
60
70
80
90
100
pH Scale

Formation of DBPs

Precursor in Water

Organic Material

+

Disinfectant

Chlorine or

Natural Bromine

DBP

=

TTHMs & HAA5s

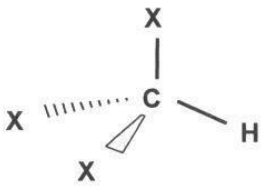
Bromates

15

Disinfection Byproducts (DBPs)

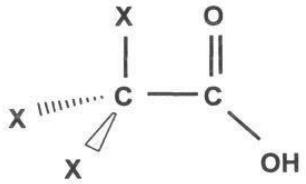
Chlorine & Bromine + Organic matter → DBPs

Trihalomethanes (4-TTHMs)



X = Cl, Br

Haloacetic Acids (5-HAA5s)



X = Cl, Br

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Regulated DBPs

Major Trihalomethanes TTHM's-One Carbon

- Cl_3 **C**H — Chloroform
- Cl_2Br**C**H — Bromodichloromethane
- Br_3**C**H — Bromoform
- $ClBr_2$**C**H — Chlorodibromomethane

Major Haloacetic Acids HAA5's-Two Carbons

- **C**H_2Cl**C**OOH — Chloroactetic acid
- **C**HCl_2**C**OOH — Dichloroacetic acid
- **C**Cl_3**C**OOH — Trichloroacetic acid
- **C**H_2Br**C**OOH — Bromoacetic acid
- **C**HBr_2**C**OOH — Dibromoacetic acid

Ozone has the potential of producing BROMATES

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Appendix 3

Outline of 2008 approach to derive seasonal nutrient criteria

1. Nutrient Zones IDed.
Analyses show that level III and level IV ecoregions are a practical and meaningful way to create nutrient concentration zones across Montana landscape.

2. Wadeable Stream Reference Dataset.

Dataset was made more uniform (i.e., each site contributes equitably to the whole) via a targeted data collection effort in 2007. Per-ecoregion evenness target of 80% was achieved.

3. Determine Overall Stressor Response-to-Reference Relationship.
Four applicable, regional case studies identified. Based on harm to two major uses (recreation, aquatic life).

2008 analysis: Harm-to-use corresponds to 87th percentile of reference (mean, or 91st, median).

4. Draft criteria recommended, by level III ecoregion.

In western MT ecoregions, criteria were set at the 90th percentile of the reference distribution, in all cases.

In plains ecoregions, criteria were set at the 75th percentile of the reference distribution. (There was only one stress-response case study, which suggested a percentile lower than the 90th should be used.)

Nitrate criteria were also recommended.

Problems Identified with Approach:

- Some question as to whether or not the nutrient datasets were even enough to be used in the comparison process (box 3).
- Adherence to only 1 or 2 reference percentiles led to criteria that, based on other information, were too stringent in some regions, and too lenient in others.
- Appropriate nitrate criterion difficult to identify (i.e., they are soluble and so transient under ambient conditions)

2010 approach to deriving seasonal nutrient criteria

1. Nutrient Zones IDed.
Analyses show that level III and level IV ecoregions are a practical and meaningful way to create nutrient concentration zones across Montana landscape.

2. Wadeable stream reference dataset.

Dataset was made more uniform via a targeted data collection effort in 2007. Evenness target of 80% was achieved.

Datasets were evened to ≥ 90% by systematically reducing the influence of over-contributing sites.

3. Determine Overall Stressor Response-to-Reference Relationship.
Seven applicable, regional case studies identified. Based on harm to two major uses (recreation, aquatic life).

2010 analysis: harm-to-use corresponds to 87th percentile of reference (mean: 90th, median)

4. For each ecoregion, consider:

- **which use(s) are affected,**
- **(b) the reference-to stressor response relationship(s) *specific to* that ecoregion,**
- **(c) the overall statewide reference-to stressor response relationship, and**
- **(d) other scientific literature pertinent to the region or which has general application (e.g., Redfield Ratio).**

Detailed considerations for each ecoregion will be clearly documented in an addendum to 2008 report. Literature considered, choices made, and logic path will be clearly laid out.

Due to ecoregion-specific considerations, the reference percentile a criterion is associated with will vary from zone to zone. Some level-IV ecoregion criteria will likely be recommended as well.

If a nitrate criterion is suggested, it will only pertain to Western Montana (prairie stream nitrate study ongoing). A single, not-to-exceed ambient value will likely be considered for all western ecoregions.