Montana
Board of Environmental Review
P. O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • Website: www.deq.state.mt.us

AGENDA

FRIDAY, MAY 18, 2012
METCALF BUILDING, ROOM 111
1520 EAST SIXTH AVENUE, HELENA, MONTANA
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NOTE: *Individual agenda items are not assigned specific times. For public notice purposes, the meeting will begin no earlier than the time specified; however, the Board might not address the specific agenda items in the order they are scheduled. The Board will make reasonable accommodations for persons with disabilities who wish to participate in this meeting. Please contact the Board Secretary by telephone at (406) 444-6701 or by e-mail at jwittenberg@mt.gov no later than 24 hours prior to the meeting to advise her of the nature of the accommodation you need.*

9:00 A.M.

I. ADMINISTRATIVE ITEMS

A. REVIEW AND APPROVE MINUTES

1. March 23, 2012, Board meeting minutes.

II. BRIEFING ITEMS

A. CONTESTED CASE UPDATE

1. Enforcement cases assigned to the Hearing Examiner

a. **In the matter of violations of the Montana Septage Disposal and Licensure Laws by James Vaughn, d/b/a Any Time Septic & Porta-Potty, Lake County, BER 2011-06 SDL.** On February 9, 2012, the Board received *Department's Motion to Vacate Contested Case Hearing and to Set Status Conference*. The Board received *Answer to Motion to Vacate and Set Hearing Status* from the attorney for the appellant, on February 15, 2012. A *Second Order Vacating Hearings and Imposing Stay of Proceedings* was issued on April 17, 2012.

b. **In the matter of violations of the Public Water Supply Laws by Olson's Lolo Hot Springs, Inc. at Lolo Hot Springs, PWSID #MT0000805, Missoula County, BER 2011-09 PWS.** On December 14, 2011, attorney for DEQ filed *Request to Stay Proceedings*, and the hearing examiner issued *Order Granting Request to Stay Proceedings* on December 15, 2011. A *Status Report* was filed on March 19, 2012.

c. **In the matter of violations of the Opencut Mining Act by Ell Dirt Works, LLC, at the Gene Foss Pit 1, Richland County, BER 2011-11 OC.** The hearing examiner issued *Order Joining Additional Parties* on March 13, 2012, in response to the appellant's *Motion to Join Additional Parties*, filed on January 30, 2012. A hearing is scheduled for July 11, 2012.

d. **In the matter of violations of the Water Quality Act by SK Construction, Inc. on US Highway 2 near Bainville, Roosevelt County, BER 2011-20 WQ.** On April 11, 2012, the hearing examiner issued *Order Granting Extension of Stay*, giving the parties through May 4, 2012, to reach settlement or submit a joint agreed revised hearing schedule.

e. **In the matter of violations of the Opencut Mining Act by the City of Ronan at Ronan, Lake County, BER 2011-23 OC.** A hearing is scheduled for August 17, 2012.

f. **In the matter of violations of the Montana Strip and Underground Mine Reclamation Act by Westmoreland Resources, Inc., at the Absaloka Mine, Big Horn County, BER 2012-02 SM.** The parties filed *Agreed Proposed Schedule* on March 23, 2012, and the hearing examiner issued *First Scheduling Order* on April 12, 2012.

2. Other cases assigned to the Hearing Examiner

   a. **In the matter of CR Kendall Corporation's request for a hearing to appeal DEQ's decision to deny a minor permit amendment under the Metal Mine Reclamation Act, BER 2002-09 MM.** An *Order Requesting Status Report* was issued on January 13, 2012. DEQ counsel filed *Status Report* on January 26, 2012.

   b. **In the matter of the appeal and request for hearing by Roseburg Forest Products Co. of DEQ's Notice of Final Decision regarding Montana Ground Water Pollution Control System Permit No. MTX000099, BER 2010-09 WQ**. On April 12, 2012, the Board received *Joint Motion to Stay Appeal*. On April 20, 2012, an *Order Vacating Hearing Dates and Setting Telephonic Status Conference Date* was issued.

   c. **In the matter of the appeal and request for hearing by the City of Helena regarding the DEQ's Notice of Final Decision for Montana Pollutant Discharge Elimination System (MPDES) Permit No. MT0022641, BER 2011-08 WQ.** On March 9, 2012, the hearing examiner issued *Seconded Amended Scheduling Order,* setting a hearing date of July 10, 2012.

3. Contested Cases not assigned to a Hearing Examiner

   a. **In the matter of violations of the Opencut Mining Act by Brad Blakeman at the Camas Prairie Gravel Pit, Sanders County, BER 2012-01 OC.** Interim Hearing Examiner Katherine Orr issued *First Scheduling Order* setting a hearing before the Board on September 28, 2012.

4. Other Contested Case Briefings

   a. **In the matter of violations of the Montana Underground Storage Tank Act by Jeanny Hlavka, individually and d/b/a J.R. Enterprise, LLC, at the Fort Peck Station, Valley County, BER 2010-08 UST.** The Board signed an order granting the DEQ's *Motion for Summary Judgment* on September 28, 2011. On October 26, 2011, Hlavka filed a petition in state district court in Valley County for judicial review of the Board's decision. On November 30, 2011, the Board transmitted a certified copy of the record to the district court. On March 9, 2012, the District Court remanded the case back to the Board.

III. ACTION ITEMS

A. INITIATION OF RULEMAKING

DEQ will propose that the Board initiate rulemaking to:

1. Amend ARM 17.30.617 to designate the mainstem Gallatin River from the Yellowstone National Park boundary to the confluence of Spanish Creek as an Outstanding Resource Water (ORW) and to amend ARM 17.30.638 to add a new subsection clarifying that discharges to ground water with a direct hydrologic connection to an ORW are within the statutory mandate prohibiting any permanent change in the water quality of an ORW resulting from point source discharges. DEQ will request that the Board issue a notice of supplemental rulemaking to extend the comment period.

2. Amend ARM 17.8.801 and 17.8.818 for major source permitting regarding the emissions of NO_x as a precursor to Ozone and other minor amendments.

3. Revise Circular DEQ-2, design standards for municipal wastewater collection and treatment. Included in the revisions to DEQ-2 are treatment standards, classifications, and allowable uses for reclaimed wastewater. Associated with these reuse standards are proposed rule changes under the Water Quality Act and the Public Water Supply Act.

4. Establish new and revised water quality standards in Circular DEQ-7. The revisions to Circular DEQ-7 will be incorporated by reference by amending rules in ARM Title 17, Chapter 30, Subchapters 5, 6, 7, and 10, pertaining to mixing zones, surface water quality standards, nondegradation requirements, and ground water rules. DEQ also proposes incorporating the new and revised water quality standards in Circular DEQ-7 by amending ARM Title 17, Chapter 24, Subchapter 6, pertaining to reclamation; ARM Title 17, Chapter 36, Subchapter 3, pertaining to subdivisions; ARM Title 17, Chapter 55, Subchapter 1, pertaining to CECRA; and ARM Title 17, Chapter 56, Subchapters 5 and 6, pertaining to underground storage tanks. The proposed rulemaking is primarily intended to update certain water quality standards and required reporting values in DEQ-7 and to incorporate DEQ-7 into the above rules. DEQ recommends initiating rulemaking for the proposed changes.

B. REPEAL, AMENDMENT, OR ADOPTION OF FINAL RULES

1. DEQ proposes to adopt the amendments to Title 17, Chapter 38, Sub-Chapter 3, Cross Connections in Drinking Water Supplies, to update the adoption by reference to the newest addition, to update the current language to use industry standard language, and for clarification. In addition, DEQ proposes to adopt the amendments to 17.38.208 to remove duplicative language, to 17.38.225 to clarify the disinfectant residual monitoring requirements, and to 17.38.234 to clarify Water Hauler record keeping requirements.

C. FINAL ACTION ON CONTESTED CASES

1. **In the matter of violations of the Public Water Supply Laws by Jore Corporation at Jore Corporation, Lake County, BER 2011-05 PWS.** On March 12, 2012, the parties filed *Stipulation for Dismissal*. An order to dismiss the case will be presented for signature.

2. **In the matter of the request for hearing by Nancy Scott, Dale Whitton, Kimberly Mole, Jess Hodge, Katherine G. Potter, Sharon B. Johnson, Clinton C. Johnson, James, D. Ward, and Korrie L. Ward, Marshall Warrington, Jr., Patricia Warrington, John Hutton, regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-15 OC, BER 2011-12 OC, BER 2011-13 OC, and BER 2011-17 OC.** On March 31, 2012, the hearing examiner issued *Proposed Order Granting Motion for Summary Judgment*. An *Order Supplementing Proposed Order Granting Motion for Summary Judgment* was issued on April 17, 2012. An *Order of the Board* will be provided.

3. **In the matter of the request for hearing by Steven K. Endicott, Ruth Ann Endicott, and Robert W. Gambill regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-14 OC and BER 2011-18 OC.** On April 2, 2012, the hearing examiner issued *Proposed Order Granting Motion for Summary Judgment*. An *Order of the Board* will be provided.

4. **In the matter of the request for hearing by Glenn Miller, Rick Sant, Ralph & Edna Neils, Berneice A. Zucker, Patricia Anderson, Tina K. Moore, Marc Zahner, Donald E. White, Jacki Bruemmer, Betty Longo, Tracy Nicely, Michael Dunn, Dennis Thayer, James Hopkins, Debbie Zahner, James P. Tomlin, Howard C.A. Hunter, George**

Stachecki, Marie Mabee, Harold Mabee, Patricia Warrington, Lily S. Parker, Linda S. Fisher, Steven E. Fisher, Connie Karns, John Ritchie, Grant Denton, Karen & Ben Pelzel, Richard L. Johnson, N.E.W. Boss, Jane O. Drayton, Leonard H. Drayton, Warren Robbe, Katherine G. Potter, Robert B. Potter, Bonnie Gannon, Kim F. Taylor, Linda Cochran, Helen R. Lockard, Marshall Warrington, Jr., Bruce Kinney, Devan Kinney, Jon Kinney, Joel Kinney, Karen Legue, Angeline R. Allen, Gary Allen, Bonnie Sonnenberg, Bud Biddle, Eunice Boeve, Ron Boeve, Kathleen Burbridge, Harold Lewis, Ken Mole, and Lois M. Mole, regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-16 OC. On April 2, 2012, the hearing examiner issued *Proposed Order Granting Motion for Summary Judgment*. An *Order of the Board* will be provided.

5. **In the matter of violation of the Metal Mine Reclamation Act by Noble Excavating, Inc. at Nickleback Rock Quarry, Lincoln County, BER 2011-24 MM.** On March 6, 2012, the hearing examiner issued *Order Granting Extension of Time* giving the parties through April 3, 2012, to reach settlement or file a proposed hearing schedule. On May 1, 2012, the parties filed a *Stipulation to Dismiss and Request for Dismissal*. An order to dismiss the matter will be presented for the Board's signature.

D. NEW CONTESTED CASES

1. **In the matter of violations of the Montana Strip and Underground Mine Reclamation Act by Westmoreland Resources, Inc., at the Absaloka Mine, Big Horn County, BER 2012-03 SM.** The Board received the appeal on March 14, 2012. Interim Hearings Examiner Katherine Orr issued *First Prehearing Order* on April 11, 2012. The Board may appoint a permanent hearings examiner or decide to hear the matter.

IV. GENERAL PUBLIC COMMENT

Under this item, members of the public may comment on any public matter within the jurisdiction of the Board that is not otherwise on the agenda of the meeting. Individual contested case proceedings are not public matters on which the public may comment.

V. ADJOURNMENT

Montana
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TELECONFERENCE MINUTES
MARCH 23, 2012

Call to Order

The Board of Environmental Review's regularly scheduled meeting was called to order by Chairman Russell at 9:03 a.m., on Friday, March 23, 2012, in Room 111 of the Metcalf Building, 1520 East Sixth Avenue, Helena, Montana.

Attendance

Board Members Present: Chairman Joseph Russell, Marvin Miller, Heidi Kaiser, Larry Mires, and Joe Whalen

Board Members Present via Telephone: Larry Anderson

Board Members Absent: Robin Shropshire

Board Attorney Present: Katherine Orr, Agency Legal Services Bureau

Board Secretary Present: Joyce Wittenberg

Court Reporter Present: Laurie Crutcher, Crutcher Court Reporting

Department Personnel Present: Tom Livers (Deputy Director); John North, Jane Amdahl, Jim Madden, Dana David, Claudia Massman – Legal; Judy Hanson – Permitting & Compliance Division; Jon Dilliard, Steve Kilbreath – Public Water Supply & Subdivisions Bureau; Dave Aguirre, David Klemp – Air Resources Management Bureau; Ed Coleman, Chris Yde, Eric Urban, Bob Smith – Industrial & Energy Minerals Bureau; Jenny Chambers – Water Protection Bureau; John Arrigo, Frank Gessaman – Enforcement Division; George Mathieus – Planning, Prevention & Assistance Division; Amy Steinmetz, Michael Suplee, Rod McNeil, Bob Bukantis – Water Quality Planning Bureau; Terry Campbell, Mike Abrahamson, Paul LaVigne, Todd Teegarden – Technical & Financial Assistance Bureau

Interested Persons Present: Stephen Brown – North Star Aviation; Kim Wilson, Darrel James, Harley Harris – Montana-Alberta Tie Ltd.; Tina Laidlaw – Environmental Protection Agency

I.A.1 Review and approve January 27, 2012, Board meeting minutes.

Mr. Mires MOVED for the Board to approve the January 27, 2012, meeting minutes. Ms. Kaiser SECONDED the motion. The motion CARRIED with a unanimous vote.

Mr. Livers explained to the Board that DEQ4 was not on the agenda for this meeting, as he had indicated it would be at the January meeting. He said it will be at least a couple of months before staff can carve out another window to work on it.

Mr. Whalen requested a roll call on Board members present, and Chairman Russell noted that Mr. Anderson was present vie telephone, Ms. Shropshire was absent, and the rest of the Board members were present in the room.

II.A.1.a In the matter of violations of the Public Water Supply Laws by Jore Corporation at Jore Corporation, Lake County, BER 2011-05 PWS.

II.A.1.c In the matter of violations of the Public Water Supply Laws by Olson's Lolo Hot Springs, Inc. at Lolo Hot Springs, PWSID #MT0000805, Missoula County, BER 2011-09 PWS.

II.A.1.d In the matter of violations of the Opencut Mining Act by Ell Dirt Works, LLC, at the Gene Foss Pit 1, Richland County, BER 2011-11 OC.

II.A.1.e In the matter of violations of the Water Quality Act by SK Construction, Inc. on US Highway 2 near Bainville, Roosevelt County, BER 2011-20 WQ.

II.A.1.f In the matter of violations of the Opencut Mining Act by the City of Ronan at Ronan, Lake County, BER 2011-23 OC.

II.A.1.g In the matter of violation of the Metal Mine Reclamation Act by Noble Excavating, Inc. at Nickleback Rock Quarry, Lincoln County, BER 2011-24 MM.

Ms. Orr said AOCs are expected in the above matters II.A.1.a, c, d, e, f, and g. She said dismissals would be forthcoming.

II.A.1.b In the matter of violations of the Montana Septage Disposal and Licensure Laws by James Vaughn, d/b/a Any Time Septic & Porta-Potty, Lake County, BER 2011-06 SDL.

Ms. Orr said a ruling was forthcoming on the pending motion.

II.A.2.a In the matter of CR Kendall Corporation's request for a hearing to appeal DEQ's decision to deny a minor permit amendment under the Metal Mine Reclamation Act, BER 2002-09 MM.

Ms. Orr said the information provided in the agenda in regard to this item is current.

II.A.2.b In the matter of the appeal and request for hearing by Roseburg Forest Products Co. of DEQ's Notice of Final Decision regarding Montana Ground Water Pollution Control System Permit No. MTX000099, BER 2010-09 WQ.

Ms. Orr said oral argument on the motion for summary judgment is scheduled for April.

II.A.2.c In the matter of the appeal and request for hearing by the City of Helena regarding the DEQ's Notice of Final Decision for Montana Pollutant Discharge Elimination System (MPDES) Permit No. MT0022641, BER 2011-08 WQ.

Ms. Orr said a second amended scheduling order was issued on March 9.

II.A.2.d In the matter of the request for hearing by Nancy Scott, Dale Whitton, Kimberly Mole, Jess Hodge, Katherine G. Potter, Sharon B. Johnson, Clinton C. Johnson, James, D. Ward, and Korrie L. Ward, Marshall Warrington, Jr., Patricia Warrington, and John Hutton regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-15 OC, BER 2011-12 OC, BER 2011-13 OC, and BER 2011-17 OC.

II.A.2.e In the matter of the request for hearing by Steven K. Endicott, Ruth Ann Endicott, and Robert W. Gambill regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-14 OC and BER 2011-18 OC.

II.A.2.f In the matter of the request for hearing by Glenn Miller, Rick Sant, Ralph & Edna Neils, Berneiee A. Zucker, Patricia Anderson, Tina K. Moore, Marc Zahner, Donald E. White, Jacki Bruemmer, Betty Longo, Tracy Nicely, Michael Dunn, Dennis Thayer, James Hopkins, Debbie Zahner, James P. Tomlin, Howard C.A. Hunter, George Stachecki, Marie Mabee, Harold Mabee, Patricia Warrington, Lily S. Parker, Linda S. Fisher, Steven E. Fisher, Connie Karns, John Ritchie, Grant Denton, Karen & Ben Pelzel, Richard L. Johnson, N.E.W. Boss, Jane O. Drayton, Leonard H. Drayton, Warren Robbe, Katherine G. Potter, Robert B. Potter, Bonnie Gannon, Kim F. Taylor, Linda Cochran, Helen R. Lockard, Marshall Warrington, Jr., Bruce Kinney, Devan Kinney, Jon Kinney, Joel Kinney, Karen Legue, Angeline R. Allen, Gary Allen, Bonnie Sonnenberg, Bud Biddle, Eunice Boeve, Ron Boeve, Kathleen Burbridge, Harold Lewis, Ken Mole, and Lois M. Mole, regarding Opencut Permit No. 487, issued to Plum Creek Timberlands, LP, for the Dorr Skeels site in Lincoln County, BER 2011-16 OC.

Ms. Orr said she expects to issue rulings in the above matters II.A.2.d, e, and f.

II.A.3.a In the matter of violations of the Opencut Mining Act by Brad Blakeman at the Camas Prairie Gravel Pit, Sanders County, BER 2012-01 OC.

Ms. Orr said she had issued a first scheduling order on March 1 setting a hearing for September 28.

II.A.4.a In the matter of violations of the Montana Underground Storage Tank Act by Jeanny Hlavka, individually and d/b/a J.R. Enterprise, LLC, at the Fort Peck Station, Valley County, BER 2010-08 UST.

Ms. Orr said she had issued a summary judgment in this matter. It was then appealed to District Court. The court analyzed whether a summary judgment was appropriate and decided it was not appropriate under the exchange of the burden of proof regarding motions for summary judgment and remanded the case back to the Board. Ms. Orr said there is talk of settling the case.

II.B.1 DEQ's Role in Oil and Gas Development Briefing

Mr. Livers said DEQ staff would give a high-level overview of the department's authority in oil patch regulation. He said the department is not the primary regulating agency on production, but that DEQ does touch several areas on both production and impacts from production.

Ms. Hanson provided a summary of the areas where DEQ does not have authority and provided some websites where the Board could find more information. She talked about department laws that are triggered by oil production itself, and the laws that are triggered as a result of the increase in people. Ms. Hanson said DEQ has sent staff to eastern Montana for public meetings with citizens and legislators, and has a staffer from the Billings Office going to Glendive and Sidney on a monthly basis to provide assistance with permitting processes.

Mr. Kilbreath responded to questions from the Board. He said DEQ is actively pursuing compliance on recreational camping vehicle parks, mobile home parks, and work camps.

Mr. Mires requested Ms. Hanson provide a paper list of the items she identified that the BER has oversight on, or that they need to be concerned about. Ms. Hanson agreed to do so.

Further discussion included: the Major Facility Siting Act and when it is triggered; the new Montana Oil Pipeline Safety Review Council; the roles of the Department of Transportation and the Board of Oil and Gas; municipalities and their ability to accommodate additional water requirements and wastewater treatment; and the Silvertip pipeline oil spill.

II.B.2 Nutrient Reduction Strategy Briefing

Mr. Mathieus said the reason for this briefing is the complexity of some of the rulemakings and also to show how they are all interrelated. He provided an overview of recent legislative history on regulation of nutrients in water, stakeholder involvement, and nonpoint source pollution issues.

Dr. Supplee discussed numeric nutrient criteria development and offered an overview of the scientific analysis used to establish these criteria, including: the need for numeric standards versus narrative; phosphorus and nitrogen; and authority and criteria for granting a variance from standards. Dr. Suplee said that the Board would review a new DEQ 12 when the rulemaking is presented to them. He said DEQ expects to request initiation at the July 2012 meeting. Dr. Suplee responded to questions from the Board.

Mr. Lavigne talked about the Water Pollution Control State Revolving Fund. He explained some of the design circulars and discussed circular DEQ2 in detail, saying it is based on the Ten States Standards document. He said the upcoming proposal will include a lot of cleanup and significant modifications to the land application guidelines, as well as adding in the reuse standards. Mr. Lavigne said DEQ expects to request rulemaking at the May 2012 Board meeting, and he responded to questions.

Mr. Teegarden talked about DEQ's draft nutrient trading policy and how it will enhance TMDL development. He said DEQ presented the draft policy to the Water Pollution Control Advisory Council in February and is hoping to request initiation of rulemaking at the May 2012 Board meeting. Mr. Teegarden, Ms. Chambers, Ms. Massman, and Mr. Mathieus responded to questions.

[Upon the Board's return from the lunch break, Mr. Anderson did not rejoin the meeting.]

III.A.1 In the matter of the DEQ's proposal to initiate rulemaking to amend ARM Title 17, Chapter 14, Subchapter 9, to regulate underground mining using in situ coal gasification.

Mr. Smith said DEQ is requesting initiation of rulemaking to amend rules that implement the Montana Strip and Underground Mine Reclamation Act, specifically, ARM Title 17, Chapter 24, Subchapter 9. He said the rulemaking is required by Senate Bill 292, which passed in the 2011 legislative session and requires adoption of the rules by October 1, 2012. He provided a brief description of the proposal and said there were no significant changes.

Ms Kaiser recused herself from this matter.

Chairman Russell called for a motion to initiate the rulemaking. Mr. Whalen so MOVED. Mr. Miller SECONDED the motion. Chairman Russell called for public comment on the rulemaking request; there was no response. The motion CARRIED with a 4-0 vote.

III.B.1 In the matter of final adoption of amendments to ARM Title 17, Chapter 24, Subchapters 3, 4, 5, 6, 7, 9, 10, 11, and 12 implementing the Montana Strip and Underground Mine Reclamation Act.

Mr. Urban said DEQ is requesting final adoption of rulemaking to amend rules that implement the Montana Strip and Underground Mine Reclamation Act. He said the rulemaking includes modifications to nine subchapters within ARM Title 17, Chapter 24. Mr. Urban said DEQ held a public hearing and comments were received. He said the comments have been addressed and that DEQ recommends the Board adopt the amended rules with the revisions.

Ms. Kaiser recused herself from this matter.

Chairman Russell called for public comment on the rulemaking; there was no response. He called for a motion to adopt the amendments, the 311 Analysis, DEQ's responses to comments, and the revisions to the amendments. Mr. Mires so MOVED. Mr. Whalen SECONDED the motion. The motion CARRIED 4-0.

III.C.1 In the matter of the notice violations of the Montana Water Quality Act by North Star Aviation, Inc., at Ravalli County Airport, Ravalli County, BER 2009-10 WQ.

Ms. Orr said the Board would decide whether to accept, reject, or modify her proposed findings of fact and conclusions of law. She said the appellants are objecting to two of the findings of fact and one conclusion of law, and that the Board is required to review the complete record if it chooses to modify a finding of fact. Ms. Orr provided information about the parties' exceptions.

Ms. Brown described the situation that brought about the violation notice, and described North Star's response to the situation. He said DEQ imposed a fine of $8,500, which is what North Star is appealing. Mr. Brown outlined the two findings of fact and the conclusion of law that North Star is challenging.

Mr. Madden responded to Mr. Brown's comments and said that the two findings of fact in questions are supported by substantial evidence and that the conclusion of law in question is legally sound.

Mr. Brown, Mr. Madden, and Ms. Orr responded to questions from the Board.

Ms. Orr said she had reduced the fine by $1,000 based on North Star's intention to install something that would prevent the event from recurring.

Mr. Whalen MOVED to uphold the findings of fact and conclusions of law. Mr. Miller SECONDED the motion. The motion CARRIED 5-0.

III.C.2 In the matter of the appeal and request for hearing by Maurer Farms, Inc.; Somerfeld & Sons Land & Livestock, LLC; Jerry McRae; and Katrina Martin regarding the DEQ's final decision to amend the MATL's certificate of compliance, BER 2010-16 MFS.

Ms. Orr said there were no exceptions filed in this matter.

Chairman Russelll called for a motion to authorize him to sign the order adopting the proposed findings of fact and conclusions of law. Ms. Kaiser so MOVED. Mr. Mires SECONDED the motion. The motion CARRIED 5-0.

III.C.3 In the matter of violations of the Opencut Mining Act by Deer Lodge Asphalt, Inc., at the Olsen Pit, Powell County, Montana, BER 2011-02 OC.

Ms. Orr said there no exceptions were filed by the appellant, but that DEQ had filed a clarification and exception requesting that Finding of Fact No. 11 be altered. She said another of the findings of fact addresses the issue brought by DEQ.

Mr. North said DEQ withdraws its objection and request for clarification.

Chairman Russell called for a motion to authorize him to sign the new order. Mr. Mires so MOVED. Mr. Miller SECONDED the motion. The motion CARRIED 5-0.

III.C.4 In the matter of the request for hearing by Frank Gruber, Broadwater Estates, regarding the DEQ's denial of permit modifications to Groundwater Permit No. MTX000157, BER 2011-22 WQ.

Ms. Orr said the parties have reached settlement and are requesting the Board dismiss the matter.

Chairman Russell called for a motion to authorize him to sign the order. Mr. Miller so MOVED. Ms. Kaiser SECONDED the motion. The motion CARRIED 5-0.

III.C.5 In the matter of violations of the Opencut Mining Act by Emerald Hills Development Company at the Emerald Hills Pit, Yellowstone County, BER 2011-25 OC.

Ms. Orr said a stipulation and order to dismiss under Rule 41(a) is included in the packet.

Chairman Russell called for a motion to authorize him to sign the dismissal order. Mr. Mires so MOVED. Ms. Kaiser SECONDED the motion. The motion CARRIED 5-0.

III.D.1 In the matter of violations of the Montana Strip and Underground Mine Reclamation Act by Westmoreland Resources, Inc., at the Absaloka Mine, Big Horn County, BER 2012-02 SM.

Ms. Orr described the appeal.

Ms. Kaiser recused herself from taking action on this matter.

Chairman Russell called for a motion to appoint Ms. Orr as the permanent hearing examiner for this matter. Mr. Whalen so MOVED. Mr. Miller SECONDED the motion. The motion CARRIED unanimously.

IV. General Public Comment

Mr. Livers reminded that the next meeting is scheduled for May 18 and would most likely be in person.

Chairman Russell called for other comments. No one responded.

V. Adjournment

Chairman Russell called for a motion to adjourn. Mr. Miller so MOVED. Mr. Whalen SECONDED the motion. The motion CARRIED with a unanimous vote.

The meeting adjourned at 2:03 p.m.

Board of Environmental Review March 23, 2012, minutes approved:

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JOSEPH W. RUSSELL, M.P.H.
CHAIRMAN
BOARD OF ENVIRONMENTAL REVIEW

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DATE

BOARD OF ENVIRONMENTAL REVIEW
AGENDA ITEM
EXECUTIVE SUMMARY FOR
WATER QUALITY STANDARDS AMENDMENTS

AGENDA ITEM # **III.A.1.**

AGENDA ITEM SUMMARY: The proposed rulemaking would amend rules to designate a portion of the Gallatin River as an Outstanding Resource Water (ORW).

LIST OF AFFECTED RULES: ARM 17.30.617 and 17.30.638.

AFFECTED PARTIES SUMMARY: The proposed designation of the Gallatin River from the Yellowstone National Park boundary to Spanish Creek as an ORW would prohibit new or increased point source discharges that would cause a permanent change of water quality. This includes individual and community waste water treatment systems or industrial sources that desire to discharge to the proposed ORW section of the Gallatin River or are determined to have a direct hydrologic connection to the Gallatin River.

SCOPE OF PROPOSED PROCEEDING: Issuance of a notice of supplemental rulemaking extending the comment period.

BACKGROUND: The Board received a petition from American Wildlands in December 2001 requesting the Board to initiate rulemaking to designate the mainstem Gallatin River from the Yellowstone National Park boundary to the confluence of Spanish Creek as an Outstanding Resource Water (ORW).

At the March, 2002, meeting the Board received comment on the petition and directed the Department to prepare an environmental impact statement (EIS) addressing the petition. The draft EIS was released for public comment in September, 2006. The comment period on the draft EIS closed on October 27, 2006. The final EIS was issued on January 9, 2007.

Notice of proposed rulemaking appeared in the October 5, 2006, Montana Administrative Register. The comment period on the proposed rulemaking closed on November 2, 2006. The Board received a number of comments objecting to the ORW designation on grounds that it would render a number of properties in the Big Sky area undevelopable. In response, the petitioners and several members of the development community commenced discussions regarding local and other actions that could eliminate the potential that an ORW designation would render properties undevelopable. They requested the Board to delay action on the rulemaking while they explored the feasibility of these options. The Board granted this request and has extended the comment period at approximately six-month intervals since then to allow those efforts to continue. The last extension expired on April 24, 2012. During that comment period, the Board received a comment from the Department requesting a further extension of the comment period.

HEARING INFORMATION: The Board held a hearing on October 25, 2006.

BOARD OPTIONS:

The Board may:

1. Publish a supplemental notice extending the comment period;
2. Adopt the rule amendments as proposed or with modifications; or
3. Determine that it will not adopt the rule amendments, either affirmatively or by inaction.

DEQ RECOMMENDATION: Since the original publication of the notice, various interested parties have formed a collaborative called the "Wastewater Solutions Forum." The Forum hired an engineering firm and that firm completed a feasibility study for engineering option that would protect the Gallatin River without the need for an

ORW. Comments received indicated that extension of the Big Sky Water and Sewer District service area along the Gallatin would provide more effective water quality protection than the ORW designation. The Forum was exploring funding options when the economic downturn began. That downturn resulted in an interruption of those efforts. However, those efforts have now resumed. The Forum has funding for and is currently conducting a pilot test to determine the feasibility of disposing of waste water from the Big Sky and Yellowstone Mountain Club wastewater treatment facilities using snow making at a confined site at the Yellowstone Mountain Club. If successful, this will provide a method for disposal of wastewater without affecting the Gallatin River. This may allow for expansion of the sewer system and protection of the Gallatin. The snow making portion of the pilot project to determining the feasibility of disposal of wastewater from the Big Sky wastewater treatment plant using snow making is complete. Monitoring of the quality of the runoff is ongoing, and that the results should be available this summer. The Department therefore recommends that, rather than making a decision to adopt or not adopt the rule, the Board extend the comment period until November 2, 2012.

ENCLOSURES:

1. Public Comment
2. Notice of Extension of Comment Period on Proposed Amendment

Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor
Richard H. Opper, Director

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.mt.gov

April 24, 2012

Filed with the
MONTANA BOARD OF
ENVIRONMENTAL REVIEW
This 24th day of April, 2012
at 11:17 o'clock A.m.
By: [signature]

Montana Board of Environmental Review
1520 E Sixth Avenue
PO Box 200901
Helena MT 59620-0901

Dear Members of the Board of Environmental Review:

On behalf of the Department of Environmental Quality (DEQ), I am writing to request that the Board of Environmental Review grant an extension of the comment period in ARM 17.30.617 and 17.30.630 pertaining to the Outstanding Resource Water (ORW) designation for the Gallatin River for 6 months.

The Wastewater Solutions Forum – a collaboration of conservation groups, Big Sky area developers, the three local ski areas, and the Big Sky Water & Sewer District have joined together to study ways to maintain high water quality in the Gallatin River while enhancing the local economy. Last year, the Forum began collaborating with the DEQ on a pilot project to determine whether snowmaking can be used to dispose of treated wastewater. The pilot project began last fall and will be completed early this summer when spring runoff is complete. A summary report will follow later this summer. When we know the outcome and details of the pilot project DEQ and the Wastewater Solutions Forum group will be in a better position to recommend how to proceed on the ORW designation.

Sincerely,

Todd Teegarden

Todd Teegarden, P.E.
TFA Bureau Chief
Department of Environmental Quality

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.30.617 and 17.30.638 pertaining to outstanding resource water designation for the Gallatin River	)))))	NOTICE OF EXTENSION OF COMMENT PERIOD ON PROPOSED AMENDMENT (WATER QUALITY)

TO: All Concerned Persons

1. On October 5, 2006, the Board of Environmental Review published MAR Notice No. 17-254 regarding a notice of public hearing on the proposed amendment of the above-stated rules at page 2294, 2006 Montana Administrative Register, issue number 19. On March 22, 2007, the board published MAR Notice No. 17-257 regarding a notice of extension of comment period on the proposed amendment of the above-stated rules at page 328, 2007 Montana Administrative Register, issue number 6. On September 20, 2007, the board published MAR Notice No. 17-263 regarding a notice of extension of comment period on the proposed amendment of the above-stated rules at page 1398, 2007 Montana Administrative Register, issue number 18. On March 13, 2008, the board published MAR Notice No. 17-268 extending the comment period on the proposed amendment of the above-stated rules at page 438, 2008 Montana Administrative Register, issue number 5. On September 11, 2008, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 1953, 2008 Montana Administrative Register, issue number 17. On February 26, 2009, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 162, 2009 Montana Administrative Register, issue number 4. On August 13, 2009, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 1324, 2009 Montana Administrative Register, issue number 15. On February 11, 2010, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 264, 2010 Montana Administrative Register, issue number 3. On July 29, 2010, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 1648, 2010 Montana Administrative Register, issue number 14. On January 27, 2011, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 89, 2011 Montana Administrative Register, issue number 2. On July 14, 2011, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 1244, 2011 Montana Administrative Register, issue number 13. On January 12, 2012, the board published MAR Notice No. 17-276 extending the comment period on the proposed amendment of the above-stated rules at page 5, 2012 Montana Administrative Register, issue number 1.

2. During the initial comment period and extensions of the original comment period, the board was advised that members of the Big Sky community, which would be affected by this rulemaking, had formed a collaborative, called the "Wastewater Solutions Forum," and had hired an engineering firm, which completed a feasibility study on extending the coverage of the Big Sky Water and Sewer district service area. The board received comments indicating that this would protect water quality in the Gallatin River as well as or better than adoption of the proposed rule. The Forum was exploring funding options when the economic downturn began. That downturn resulted in an interruption of those efforts. However, those efforts have now resumed. The board received comments indicating that the Forum has funding for and is conducting a pilot test to determine the feasibility of disposing of wastewater from the Big Sky and Yellowstone Mountain Club wastewater treatment facilities using snow making at a confined site at the Yellowstone Mountain Club. If successful, this will provide a method for disposal of wastewater without affecting the Gallatin River, which may allow for expansion of the sewer system and protection of the Gallatin. During the most recent comment period, the board received a comment stating that that the snow making is complete and that monitoring of runoff water quality is ongoing. Results of the pilot test are expecting to be complete during the summer. The board has determined that it will further extend the comment period in order to allow submission of the results of the pilot test and comments and information on the feasibility of this option.

3. Written data, views, or arguments may be submitted to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana, 59620-0901; faxed to (406) 444-4386; or e-mailed to ejohnson@mt.gov, no later than November 2, 2012. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

4. The board will make reasonable accommodations for persons with disabilities who wish to participate in this rulemaking action or need an alternative accessible format of this notice. If you require an accommodation, contact the board no later than 5:00 p.m., July 23, 2012, to advise us of the nature of the accommodation that you need. Please contact the board secretary at P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2544; fax (406) 444-4386; or e-mail ber@mt.gov.

Reviewed by:	BOARD OF ENVIRONMENTAL REVIEW
	BY:
JOHN F. NORTH Rule Reviewer	JOSEPH W. RUSSELL, M.P.H. Chairman

Certified to the Secretary of State, July 2, 2012.

BOARD OF ENVIRONMENTAL REVIEW
AGENDA ITEM

EXECUTIVE SUMMARY FOR ACTION ON RULE INITIATION

Agenda # III.A.2.

Agenda Item Summary: The Department requests that the Board initiate rulemaking to amend air quality rule provisions in Administrative Rules of Montana (ARM) Title 17, Chapter 8, subchapter 8 to update major source permitting requirements for precursor emissions leading to the formation of ozone and to make certain changes to an incorrect reference to nitrogen dioxide pertaining to recent PM2.5 rule amendments.

List of Affected Rules: This rulemaking would amend ARM 17.8.801 and 17.8.818.

Affected Parties Summary: The proposed rule amendments would affect owners and operators of major sources.

Scope of Proposed Proceeding: The Department requests that the Board initiate rulemaking and conduct a public hearing to consider the proposed amendments.

Background: In this rulemaking, the Board would be considering revisions to Montana's PSD regulations to conform to the federal rulemaking for PSD permitting implementation promulgated in 2005, 70 FR 71612. The proposal is not intended to reflect a more stringent or extensive set of requirements for sources subject to PSD than requirements under federal rules applicable nationwide.

This rulemaking action is intended to update Montana's rules to incorporate requirements for major source permitting regarding the airborne emissions of nitrogen oxides as a precursor to ambient ozone concentrations. The federal Clean Air Act, 42 USC §§7401, *et seq*., requires each state to assure air quality in that state meets minimum standards applicable across the nation. The Environmental Protection Agency (EPA) is directed to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that meet certain criteria regarding effects on public health and welfare. In order for Montana to retain its authority to regulate major sources of air pollution in the state, Montana is required to adopt the minimum standards applicable to emissions of a NAAQS pollutant whenever a NAAQS is established or revised. These rules reflect changes to major source permitting requirements as a result of a revision to the NAAQS for ozone.

Ozone is a criteria pollutant formed as the result of combining volatile organic compounds (VOC) with nitrogen oxides (NO_X) in the presence of strong sunlight. EPA established a NAAQS to limit the concentrations of ozone in the ambient air. Ozone is a particular problem in urban areas where NO_X, emitted primarily from vehicles, combines with VOCs from various sources, including fueling activities and vehicles, usually during summer months. Ozone is not a problem pollutant in Montana and Montana is currently classified as attainment/unclassifiable with respect to the 1997 ozone NAAQS.

EPA revised the ozone NAAQS in 1997 from 0.12 parts per million of ozone, averaged over one hour, to 0.08 parts per million of ozone, averaged over eight hours. On November 29, 2005, EPA published rules regarding the implementation of the 1997 ozone NAAQS. Those rules directed states to revise their programs for major source permitting pursuant to the New Source Review/Prevention of Significant Deterioration (PSD) program. EPA notified Montana on July 22, 2011, that Montana's SIP meets requirements for the 1997 ozone standard for all elements of the Clean Air Act except provisions for major source permitting under PSD (76 FR 43918). In a May 19, 2011, promulgation (76 FR 28934), EPA found Montana's PSD regulations for ozone inadequate.

These rule amendments would make Montana's rules consistent with the minimum federal requirements for PSD permitting with respect to the 1997 ozone NAAQS. Montana's rules require a source to demonstrate that emissions from the proposed construction and operation will not cause or contribute to air pollution in excess of any maximum allowable increase or maximum allowable concentration for any NAAQS pollutant. Generally, the revisions to the rules add NO_X as a precursor pollutant for purposes of determining applicability of preconstruction monitoring, impact analysis, and permitting provisions. The amendments also would establish a significant emissions rate to determine whether an emissions increase from a proposed source or modification may be excluded from PSD review because the proposed source or modification is considered to be minor. These amendments would require that various demonstrations and resulting emission control requirements include NO_X for purposes of calculating effects on the ozone NAAQS.

The revisions also would include correcting a reference to nitrogen dioxide (NO_2). The rule currently references NO_2 as a source emission when it is a pollutant formed in the ambient air. The reference is revised to state "NO_x," a pollutant emitted from a source.

Hearing Information: The Department recommends that the Board appoint a presiding officer and conduct a public hearing to take comment on the proposed amendments.

Board Options: The Board may:

1. Initiate rulemaking and issue the attached Notice of Public Hearing on Proposed Amendment;
2. Modify the Notice and initiate rulemaking; or
3. Determine that amendment of the rules is not appropriate and deny the request to initiate rulemaking.

DEQ Recommendation: The Department recommends that the Board initiate rulemaking and appoint a presiding officer to conduct a public hearing, as described in the enclosed proposed Montana Administrative Register notice.

Enclosures:

1. Draft Notice of Public Hearing on Proposed Amendment

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.8.801 and 17.8.818, pertaining to definitions and review of major stationary sources and major modifications--source applicability and exemptions)	NOTICE OF PUBLIC HEARING ON PROPOSED AMENDMENT (AIR QUALITY)

TO: All Concerned Persons

1. On _________________, 2012, at __:__ __.m., the Board of Environmental Review will hold a public hearing [in/at address], Montana, to consider the proposed amendment of the above-stated rules.

2. The board will make reasonable accommodations for persons with disabilities who wish to participate in this public hearing or need an alternative accessible format of this notice. If you require an accommodation, contact Elois Johnson, Paralegal, no later than 5:00 p.m., _________________, 2012, to advise us of the nature of the accommodation that you need. Please contact Elois Johnson at Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2630; fax (406) 444-4386; or e-mail ejohnson@mt.gov.

3. The rules proposed to be amended provide as follows, stricken matter interlined, new matter underlined:

17.8.801 DEFINITIONS In this subchapter, the following definitions apply:

(1) through (19) remain the same.

(20) "Major modification" means any physical change in, or change in the method of operation of, a major stationary source that would result in a significant net emissions increase of any pollutant subject to regulation under the FCAA, excluding hazardous air pollutants, except to the extent that such hazardous air pollutants are regulated as constituents of more general pollutants listed in section 108(a)(1) of the FCAA.

(a) Any net emissions increase that is significant for volatile organic compounds or NO_x will be considered significant for ozone.

(b) through (21)(d) remain the same.

(22) The following apply to the definition of the term "major stationary source":

(a) through (a)(iii) remain the same.

(b) A major source that is major for volatile organic compounds or NO_x will be considered major for ozone.

(c) through (24)(g) remain the same.

(25) "Nitrogen Oxides" or "NO_x" means the sum of nitric oxide and nitrogen dioxide in the flue gas or emission point.

(25) and (26) remain the same, but are renumbered (26) and (27).

~~(27)~~ (28) The following apply to the definition of the term "significant":

(a) "significant" means, in reference to a net emissions increase or the potential of a source to emit any of the following pollutants, a rate of emissions that would equal or exceed any of the following rates:

Pollutant and Emissions Rate

Carbon monoxide: 100 tons per year (tpy)
Nitrogen oxides <u>(NO_X)</u>: 40 tpy
Sulfur dioxide (SO_2): 40 tpy
Particulate matter: 25 tpy of particulate matter emissions
15 tpy of PM-10 emissions
PM-2.5: 10 tpy of direct PM-2.5 emissions, 40 tpy of sulfur dioxide ~~(SO_2)~~ emissions, or 40 tpy of ~~nitrogen dioxide (NO_2)~~ <u>nitrogen oxides (NO_X)</u> emissions unless demonstrated not to be a PM-2.5 precursor
Ozone: 40 tpy of volatile organic compounds <u>or nitrogen oxides</u>
Lead: 0.6 tpy
Fluorides: 3 tpy
Sulfuric acid mist: 7 tpy
Hydrogen sulfide (H_2S): 10 tpy
Total reduced sulfur (including H_2S): 10 tpy
Reduced sulfur compounds (including H_2S): 10 tpy
Municipal waste combustor organics (measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans): $3.2 * 10^{-6}$ megagrams per year ($3.5 * 10^{-6}$ tpy)
Municipal waste combustor metals (measured as particulate matter): 14 megagrams per year (15 tpy)
Municipal waste combustor acid gases (measured as sulfur dioxide ~~(SO_2)~~ and hydrogen chloride): 36 megagrams per year (40 tpy)

(b) "significant" means, in reference to a net emissions increase or the potential of a source to emit a pollutant subject to regulation under the FCAA, that ~~(27)~~ <u>(28)</u>(a) does not list any emissions rate. This does not include hazardous air pollutants, except to the extent that such hazardous air pollutants are regulated as constituents of more general pollutants listed in section 108(a)(1) of the FCAA.

(c) Notwithstanding ~~(27)~~ <u>(28)</u>(a), "significant" means any emissions rate or any net emissions increase associated with a major stationary source or major modification, which would construct within 10 kilometers of a Class I area, and have an impact on such area equal to or greater than one $\mu g/m^3$ (24-hour average).

(28) and (29) remain the same, but are renumbered (29) and (30).

AUTH: 75-2-111, 75-2-203, MCA
IMP: 75-2-202, 75-2-203, 75-2-204, MCA

<u>17.8.818 REVIEW OF MAJOR STATIONARY SOURCES AND MAJOR MODIFICATIONS--SOURCE APPLICABILITY AND EXEMPTIONS</u> (1) through (6) remain the same.

(7) The department may exempt a proposed major stationary source or major modification from the requirements of ARM 17.8.822, with respect to monitoring for a particular pollutant, if:

(a) the emissions increase of the pollutant from a new stationary source or the net emissions increase of the pollutant from a modification would cause, in any area, air quality impacts less than the following amounts:

(i) through (v) remain the same.

(vi) ozone: no de minimus air quality level is provided for ozone. However, any net increase of 100 tons per year or more of volatile organic compounds <u>or nitrogen oxides</u> subject to this subchapter requires an ambient impact analysis, including the gathering of ambient air quality data;

(vii) through (c) remain the same.

AUTH: 75-2-111, 75-2-203, MCA
IMP: 75-2-202, 75-2-203, 75-2-204, MCA

<u>REASON:</u> The board is proposing amendments to Montana's prevention of significant deterioration (PSD) rules to conform the rules to amendments to federal regulations by the federal Environmental Protection Agency (EPA) in 2005. The federal Clean Air Act, 42 USC 7401 through 7671q (CAA), directs each state to assure that air quality in that state meets minimum standards applicable across the nation. The CAA directs the EPA to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that meet certain criteria regarding effects on public health and welfare. Pursuant to the CAA, EPA has authorized the state of Montana to regulate major sources in the state. For Montana to retain this authority, the board is required to adopt the minimum standards applicable to major source emissions of a NAAQS pollutant whenever a NAAQS is established or revised 40 USC 7410(C).

On November 29, 2005, EPA published regulations regarding the implementation of the 1997 ozone NAAQS (70 CFR 71612). Those regulations required revisions to state programs for major source permitting. One of the requirements in the EPA regulations was to address ozone formation by regulating precursor pollutants. "Precursor pollutants" are pollutants that combine to form another pollutant. The federal regulations include nitrogen oxides (NO_x) that react with volatile organic compounds to form ozone. In a decision published on May 19, 2011, in the Federal Register at 76 FR 28934, EPA found Montana's PSD rules for ozone inadequate because the rules do not address NO_x as a precursor pollutant for ozone. The proposed amendments in this notice would address EPA's concerns and make Montana's rules for PSD permits adequate to implementing the 1997 8-hour ozone NAAQS.

Generally, the proposed amendments to the rules would add NO_x as a precursor pollutant that contributes to the formation of ozone. The department and applicants for permits to construct or modify major sources would be required to analyze the applicability of PSD requirements based on NO_x as a precursor to ozone. The following are brief descriptions of the proposed amendments:

ARM 17.8.801(20)(a) would be amended by modifying the definition of "major modification," adding NO_x as a precursor pollutant for ozone when NO_x emissions exceed a significance threshold.

ARM 17.8.801(22)(b) would be amended to add NO_x as a precursor to ozone, triggering consideration of a source as "major" for ozone when the source emits or has the potential to emit 100 tons per year of NO_x.

ARM 17.8.801(25) would be amended by adding a definition of the term nitrogen oxides or NO_x, defining it as the sum of nitric oxide and nitrogen dioxide in the flue gas or emission point.

ARM 17.8.801(27)(a) would be amended to add a significance level of 40 tons or more per year of NO_x because NO_x is a precursor pollutant that, in combination with VOCs, creates ozone. Ozone is not a source emission, but an increase in NO_x emissions, which is a source emission, is a good surrogate for the formation of ozone. A significant increase in ozone will be assumed based on a 40 tpy or more net increase in the potential to emit of NO_x.

ARM 17.8.818(7)(a)(vi) would be amended to add that a net increase of 100 tons or more per year of NO_x, as a precursor to ozone formation, triggers an ambient impact analysis.

The board is also proposing the following amendment concerning particulate matter smaller than 2.5 microns, referred to as PM-2.5:

ARM 17.8.801(27)(a), would be amended by substituting "nitrogen oxides" for "nitrogen dioxide (NO_2)"as a precursor to PM-2.5 formation. In that subsection, a net emissions increase or potential to emit of 40 tons per year of NO_x would cause a source to be considered major for PM-2.5 for the purpose of triggering PSD review. The use of "nitrogen dioxide (NO_2)" was a mistake when the rule was adopted in September, 2011. The board intended to use "nitrogen oxides," which includes the sum of nitric oxide and nitrogen dioxide in the flue gas or emission point because they are precursors to the formation of PM-2.5, and the board is proposing to correct that mistake.

The board is also proposing to amend portions of rules listed above for consistency of language when referring to sulfur dioxide (SO_2) and nitrogen oxides (NO_x). The proposed amendments would match the comparable language provided in the Code of Federal Regulations (CFR). These proposed amendments are not intended to change the substance of these rules.

4. Concerned persons may submit their data, views, or arguments, either orally or in writing, at the hearing. Written data, views, or arguments may also be submitted to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana 59620-0901; faxed to (406) 444-4386; or e-mailed to ejohnson@mt.gov, no later than 5:00 p.m., ____________ 2012. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

5. Katherine Orr, attorney for the board, or another attorney for the Agency Legal Services Bureau, has been designated to preside over and conduct the hearing.

6. The board maintains a list of interested persons who wish to receive

notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding: air quality; hazardous waste/waste oil; asbestos control; water/wastewater treatment plant operator certification; solid waste; junk vehicles; infectious waste; public water supply; public sewage systems regulation; hard rock (metal) mine reclamation; major facility siting; opencut mine reclamation; strip mine reclamation; subdivisions; renewable energy grants/loans; wastewater treatment or safe drinking water revolving grants and loans; water quality; CECRA; underground/above ground storage tanks; MEPA; or general procedural rules other than MEPA. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be mailed or delivered to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Ave., P.O. Box 200901, Helena, Montana 59620-0901, faxed to the office at (406) 444-4386, e-mailed to Elois Johnson at ejohnson@mt.gov, or may be made by completing a request form at any rules hearing held by the board.

7. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

Reviewed by:	BOARD OF ENVIRONMENTAL REVIEW
______________________________	BY: ____________________________________
DAVID RUSOFF Rule Reviewer	JOSEPH W. RUSSELL, M.P.H., Chairman

Certified to the Secretary of State, ______________, 2012.

BOARD OF ENVIRONMENTAL REVIEW
AGENDA ITEM
EXECUTIVE SUMMARY FOR
REQUEST TO INITIATE RULEMAKING

AGENDA # III.A.3.

AGENDA ITEM SUMMARY: The Department requests that the Board initiate rulemaking to amend rules governing the Department's review of plans and specifications for public sewage systems in ARM 17.38.101, 17.38.102, 17.38.103, 17.38.106, and to adopt changes to Department Circular DEQ-2, which is incorporated by reference in ARM 17.30.1001and 17.38.101. The Department also requests that the Board amend ARM 17.30.1022 to clarify the scope of an existing ground water permit exemption and add an exemption for public sewage systems that use "unrestricted reclaimed wastewater."

LIST OF AFFECTED BOARD RULES: ARM 17.30.1001, 17.30.1022, 17.38.101, 17.38.102, 17.38.103, and 17.38.106.

LIST OF AFFECTED DEPARTMENT RULES: ARM 17.36.345, 17.36.914, 17.50.811, 17.50.815, and 17.50.819 (all changes are incorporation by reference or correcting the title of DEQ-2).

AFFECTED PARTIES SUMMARY: The proposed rule amendments could potentially affect public wastewater facilities and anyone submitting plans and specifications to the Department under the public water and sewer laws.

SCOPE OF PROPOSED PROCEEDING: The Department requests that the Board initiate rulemaking and schedule a public hearing to take comment on the proposed rule amendments and the revisions to Department Circular DEQ-2.

BACKGROUND: The changes to Department Circular DEQ-2 (DEQ-2) include new information and recommendations from the 2004 edition of a document entitled, "Recommended Standards for Wastewater Facilities," also known as the "Ten State Standards," published by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. This document is a compilation of common engineering standards used by states in the design and preparation of plans and specifications for wastewater treatment facilities. Since its inception, DEQ-2 has been based primarily on the information contained within this document. In this rulemaking, new information from the 2004 edition of the document is being proposed for incorporation into DEQ-2 in order to provide: (1) design standards that reflect recent technological advances in the wastewater industry; (2) additional and important design considerations to ensure compliance with water quality standards; and (3) better clarity for design engineers through the expansion of text or a restructuring of its content.

In addition, DEQ-2 has been revised to include a new Appendix B that establishes design standards and other considerations for public sewage systems that propose to use reclaimed wastewater for other purposes. The new Appendix B would establish requirements for using reclaimed wastewater for a variety of uses that go beyond its current use for irrigation at agronomic rates. If adopted, this proposal will expand the allowable reuse alternatives available to public sewage systems in a manner that is consistent with the U.S. Environmental Protection Agency (EPA) guidance and national design standards. The proposal to adopt Appendix B, in combination with the irrigation reuse standards in Chapter 120, Section 121, is in response to the recent enactment of House Bill 52 (2011), authorizing the board to adopt rules identifying allowable uses of reclaimed wastewater and classifications for those uses. The newly-enacted state law also requires the adoption of treatment, monitoring, and reporting standards tailored to each classification to protect the uses of the reclaimed wastewater and any receiving water. The classification, standards, and allowable uses proposed for adoption in Appendix B are based on EPA guidance and standards established in many other western states. The levels of treatment for each of the proposed classifications have been extensively evaluated by public health agencies, primarily in California, Washington, Florida, and Texas, and have been determined in each of those states to be protective of public health and the environment.

Finally, ARM 17.30.1022 is proposed for amendment to clarify that only public sewage systems that apply reclaimed wastewater at agronomic rates qualify for a ground water permit exemption and to add a new ground water permit exemption for public sewage systems that treat reclaimed wastewater to the highest standards proposed for adoption in DEQ-2.

HEARING INFORMATION: The Department recommends that the Board appoint a hearing officer and conduct a public hearing to take comment on the proposed amendments.

BOARD OPTIONS:

The Board may:

1. Initiate rulemaking and issue the attached Notice of Public Hearing on Proposed Amendment;
2. Modify the Notice and initiate rulemaking; or
3. Determine that amendment of the rules is not appropriate and deny the Department's request to initiate rulemaking.

DEQ RECOMMENDATION:

The Department recommends that the Board initiate rulemaking and appoint a hearing officer.

ENCLOSURES:

1. Draft Notice of Public Hearing on Proposed Amendment
2. Draft Proposed Department Circular DEQ 2

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
AND THE DEPARTMENT OF ENVIRONMENTAL QUALITY
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.30.1001, 17.30.1022, 17.36.345, 17.36.914, 17.38.101, 17.38.102, 17.38.103, 17.38.106, 17.50.811, 17.50.815, and 17.50.819 pertaining to definitions, exclusions from permit requirements, subdivisions, wastewater treatment systems, plans for public water supply or wastewater system, fees, operation and maintenance requirements for land application or incorporation of septage, grease trap wastes, and incorporation by reference	)	NOTICE OF PUBLIC HEARING ON PROPOSED AMENDMENT (WATER QUALITY) (SUBDIVISIONS/ON-SITE SUBSURFACE WASTEWATER TREATMENT) (PUBLIC WATER AND SEWAGE SYSTEM REQUIREMENTS) (SOLID WASTE MANAGEMENT)

TO: All Concerned Persons

1. On _______________, 2012, at __:__ __.m., the Board of Environmental Review and the Department of Environmental Quality will hold a public hearing [in/at address], Montana, to consider the proposed amendment of the above-stated rules.

2. The board and department will make reasonable accommodations for persons with disabilities who wish to participate in this public hearing or need an alternative accessible format of this notice. If you require an accommodation, contact Elois Johnson, Paralegal, no later than 5:00 p.m., _______________, 2012, to advise us of the nature of the accommodation that you need. Please contact Elois Johnson at Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2630; fax (406) 444-4386; or e-mail ejohnson@mt.gov.

3. The rules proposed to be amended provide as follows, stricken matter interlined, new matter underlined:

17.30.1001 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, apply throughout this subchapter:

(1) through (13) remain the same.

(14) "Reclaimed wastewater" is defined in 75-6-102, MCA.

(14) and (15) remain the same, but are numbered (15) and (16).

(17) "Unrestricted reclaimed wastewater" means wastewater that is treated to the standards for Class A-1 or Class B-1 reclaimed wastewater, as set forth in Appendix B of Department Circular DEQ-2, entitled "Montana Department of Environmental Quality Design Standards for Public Sewage Systems" (May 2012 edition).

(a) The board adopts and incorporates by reference Department Circular

DEQ-2, entitled "Department of Environmental Quality Design Standards for Public Sewage Systems" (May 2012 edition). Copies are available from the Department of Environmental Quality, Technical and Financial Assistance Bureau, P.O. Box 200901, Helena, MT 59620-0901.

AUTH: 75-5-201, 75-5-401, MCA
IMP: 75-5-301, 75-5-401, MCA

17.30.1022 EXCLUSIONS FROM PERMIT REQUIREMENTS (1) In addition to the permit exclusions identified in 75-5-401, MCA, the following activities or operations are not subject to the permit requirements of ARM 17.30.1023, 17.30.1024, 17.30.1030 through 17.30.1033, 17.30.1040, and 17.30.1041:

(a) through (e) remain the same.

(f) multi-family sewage disposal systems reviewed and approved by the Department of Public Health and Human Services under Title 50, chapters 50, 51, and 52, MCA, and multi-family sewage disposal systems reviewed and approved by local boards of health under Title 50, chapter 2, MCA, after May 1, 1998. However, this exclusion does not apply to aerobic package plant systems, mechanical treatment plants, and nutrient removal systems, which require a high degree of operation and maintenance, or systems which require monitoring pursuant to ARM 17.30.517(1)(d)(ix); ~~and~~

(g) public sewage systems that ~~use~~ apply reclaimed wastewater at agronomic rates to land ~~application~~ as a method of disposal and that have been reviewed and approved by the department under Title 75, chapter 6, MCA, and ARM 17.38.101~~.~~;

(h) public sewage systems that discharge unrestricted reclaimed wastewater and that have been reviewed and approved under Title 75, chapter 6, MCA, and ARM 17.38.101. Discharges of unrestricted reclaimed wastewater excluded under this rule remain subject to the monitoring and reporting requirements imposed as a condition of approval under ARM 17.38.101(8)(c).

(2) remains the same.

AUTH: 75-5-401, MCA
IMP: 75-5-401, 75-5-602, MCA

17.36.345 ADOPTION BY REFERENCE (1) For purposes of this chapter, the department adopts and incorporates by reference the following documents. All references to these documents in this chapter refer to the edition set out below:

(a) remains the same.

(b) Department Circular DEQ-2, "Design Standards for ~~Wastewater Facilities~~ Public Sewage Systems," ~~1999~~ 2012 edition;

(c) through (2) remain the same.

AUTH: 76-4-104, MCA
IMP: 76-4-104, MCA

17.36.914 WASTEWATER TREATMENT SYSTEMS - TECHNICAL

REQUIREMENTS (1) remains the same.

(2) Department Circular DEQ-4, 2009 edition, which sets forth standards for subsurface sewage treatment systems, and Department Circular DEQ-2, ~~1999~~ 2012 edition, which sets forth design standards for ~~wastewater facilities~~ public sewage systems, are adopted and incorporated by reference for purposes of this subchapter. All references to these documents in this subchapter refer to the editions set out above. Copies are available from the Department of Environmental Quality, P.O. Box 200901, Helena, MT 59620-0901.

(3) through (7) remain the same.

AUTH: 75-5-201, MCA
IMP: 75-5-305, MCA

17.38.101 PLANS FOR PUBLIC WATER SUPPLY OR ~~WASTEWATER~~ PUBLIC SEWAGE SYSTEM (1) For purposes of this rule, "delegated division of local government" means a local government that has been delegated authority pursuant to ARM 17.38.102 and 75-6-121, MCA, to review and approve plans and specifications for public water supply or ~~wastewater~~ public sewage systems, as designated in the written delegation.

(2) The purpose of this rule is to assure the protection of public health and the quality of state waters by requiring review and approval, by either the department or a delegated division of local government, of plans and specifications for siting, construction, and modification of public water supply and ~~wastewater~~ public sewage systems prior to the beginning of construction.

(3) As used in this rule, the following definitions apply in addition to those in 75-6-102, MCA:

(a) through (e)(ii) remain the same.

(f) "Reclaimed wastewater" is defined in 75-6-102, MCA.

(f) through (m)(ii) remain the same, but are renumbered (g) through (n)(ii).

(4) A person may not commence or continue the construction, alteration, extension, or operation of a public water supply system or ~~wastewater~~ public sewage system until the applicant has submitted a design report along with the necessary plans and specifications for the system to the department or a delegated division of local government for its review and has received written approval. Three sets of plans and specifications are needed for final approval. Approval by the department or a delegated division of local government is contingent upon construction and operation of the public water supply or ~~wastewater~~ public sewage system consistent with the approved design report, plans, and specifications. Failure to construct or operate the system according to the approved plans and specifications or the department's conditions of approval is an alteration for purposes of this rule. Design reports, plans, and specifications must meet the following criteria:

(a) and (b) remain the same.

(c) the design report, plans, and specifications for all ~~wastewater~~ public sewage systems, except public subsurface sewage treatment systems, must be prepared and designed by a professional engineer in accordance with the format and criteria set forth in ~~d~~Department Circular DEQ-2, "Montana Department of Environmental Quality Design Standards for ~~Wastewater Facilities~~ Public Sewage

Systems." The design report, plans, and specifications for a ~~wastewater~~ public sewage system must also be designed to protect public health and ensure compliance with the Montana Water Quality Act, Title 75, chapter 5, MCA, and rules adopted under the Act, including ARM Title 17, chapter 30, subchapter 7;

(d) through (j) remain the same.

(5) through (7) remain the same.

(8) The department or a delegated division of local government shall issue a written approval for a public water supply system or ~~wastewater~~ public sewage system if it determines that the design report, plans, and specifications are complete and the applicant has complied with all provisions of this rule. The approval may be conditional as follows:

(a) the department's approval of a public water supply system may set forth conditions of approval which may include, but shall not be limited to, those specifying limits on quantities available for irrigation and fire flows, limited storage, standby power sources, and peak flows; ~~or~~

(b) the department's approval of a ~~wastewater~~ public sewage system may set forth conditions of approval which may include, but shall not be limited to, expected performance characteristics and performance limitations such as operations, staffing, financing, wastewater loads, standby power, and access~~.~~ ; or

(c) the department's approval of the use of reclaimed wastewater by a public sewage system must require compliance with the treatment standards, monitoring, recordkeeping, and reporting requirements required for each classification, as described in Department Circular DEQ-2.

(9) Except as provided in (10)(b), unless the applicant has completed the construction, alteration, or extension of a public water supply or ~~wastewater~~ public sewage system within three years after the department or a delegated unit of local government has issued its written approval, the approval is void and a design report, plans, and specifications must be resubmitted as required by (4) with the appropriate fees specified in this subchapter. The department may grant a completion deadline extension if the applicant requests an extension in writing and demonstrates adequate justification to the department.

(10) through (11) remain the same.

(12) A person may not commence or continue the operation of a public water supply or ~~wastewater~~ public sewage system, or any portion of such system, prior to certifying by letter to the department or a delegated division of local government that the system, or portion of the system constructed, altered, or extended to that date, was completed in accordance with plans and specifications approved by the department. For a system or any portion of a system designed by a professional engineer, the engineer shall sign and submit the certification letter to the department or a delegated division of local government.

(13) Within 90 days after the completion of construction, alteration, or extension of a public water supply or ~~wastewater~~ public sewage system, or any portion of such system, a complete set of certified "as-built" drawings must be signed and submitted to the department or a delegated division of local government. The department may require that the "as-built" submittal be accompanied by an operation and maintenance manual. For a system or any portion of a system designed by a professional engineer, the engineer shall sign and submit the certified

"as-built" drawings to the department or a delegated division of local government.

(14) remains the same.

(15) The department or a delegated division of local government may require that chemical analyses, microbiological examinations, flow tests, pressure tests, treatment plant performance records, or other measures of performance for a public water supply or ~~wastewater~~ public sewage system be conducted by the applicant to substantiate that the system complies with the criteria set forth in the design report, plans, and specifications.

(16) remains the same.

(17) When design reports, plans, and specifications submitted pursuant to this rule include a proposal to use reclaimed wastewater, the department or delegated division of local government may not approve the proposal until the applicant has obtained any necessary approvals required under Title 85, MCA, from the Department of Natural Resources and Conservation.

(18) An owner or operator of a public sewage system may not:

(a) use reclaimed wastewater for a use that has not been approved by the department or by a delegated division of local government, according to the use classification system in department Circular DEQ-2, "Montana Department of Environmental Quality Design Standards for Public Sewage Systems "; or

(b) use reclaimed wastewater that has not been treated to the applicable standards for the use set forth in department Circular DEQ-2, "Montana Department of Environmental Quality Design Standards for Public Sewage Systems."

~~(17)~~ (19) For purposes of this chapter, the ~~department~~ board adopts and incorporates by reference the following documents. All references to these documents in this chapter refer to the edition set out below:

(a) remains the same.

(b) Department of Environmental Quality Circular DEQ-2, ~~1999~~ 2012 edition, which sets forth the requirements for the design and preparation of plans and specifications for sewage works;

(c) through (i) remain the same.

~~(18)~~ (20) A copy of any of the documents adopted under ~~(16)~~ (19) may be obtained from the Department of Environmental Quality, P.O. Box 200901, Helena, MT 59620-0901.

AUTH: 75-6-103, MCA
IMP: 75-6-103, 75-6-112, 75-6-121, MCA

17.38.102 DELEGATION OF REVIEW OF SMALL PUBLIC WATER AND ~~SEWER~~ SEWAGE SYSTEM PLANS AND SPECIFICATIONS (1) The department may delegate to divisions of local government the review of plans and specifications for:

(a) small public water supply systems and small public ~~sewer~~ sewage systems; and

(b) extensions or alterations of existing public water and public ~~sewer~~ sewage systems that involve 50 or fewer connections.

(2) Delegation may occur only if:

(a) a division of local government submits a written application to the department that includes the following:

(i) and (ii) remain the same.

(iii) a request that the department provide training for public water and ~~sewer~~ sewage system review.

(b) remains the same.

AUTH: 75-6-103, 75-6-121, MCA
IMP: 75-6-121, MCA

17.38.103 PUBLIC WATER AND ~~SEWER~~ SEWAGE PROJECTS ELIGIBLE FOR CATEGORICAL EXCLUSION FROM MEPA REVIEW (1) Except as provided in (2), a department action under this subchapter and under either Title 75, chapter 6, part 1 or Title 75, chapter 6, part 2, MCA, is excluded from the requirement to prepare an environmental assessment or an environmental impact statement if the application for department review is for any of the following projects:

(a) projects relating to existing infrastructure systems such as ~~sewer~~ sewage systems, drinking water supply systems, and stormwater systems, including combined sewer overflow systems that involve:

(i) through (4)(d) remain the same.

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

17.38.106 FEES (1) remains the same.

(2) Department review will not be initiated until fees calculated under (2)(a) through (e) and (5) have been received by the department. If applicable, the final approval will not be issued until the calculated fees under (3) and (4) have been paid in full. The total fee for the review of a set of plans and specifications is the sum of the fees for the applicable parts or subparts listed in these citations.

(a) remains the same.

(b) The fee schedule for designs requiring review for compliance with Department Circular DEQ-2 is set forth in Schedule II, as follows:

SCHEDULE II

Chapter 10 Engineering reports and facility plans	
engineering reports (minor)	$ 280
comprehensive facility plan (major)	$ 1,400
Chapter 30 Design of sewers	
per lot fee	$ 70
non-standard specifications	$ 420
collection system (per lineal foot)	$ 0.25
Chapter 40 Sewage pumping station	
force mains (per lineal foot)	$ 0.25
1000 gpm or less	$ 700
greater than 1000 gpm	$ 1,400
Chapter 60 Screening grit removal	
screening devices and comminutors	$ 420

grit removal ....$ 420
flow equalization..$ 700
Chapter 70 Settling ....$ 1,120
Chapter 80 Sludge handling ....$ 2,240
Chapter 90 Biological treatment...$ 3,360
nonaerated treatment ponds ....$ 1,120
aerated treatment ponds ....$ 1,960
Chapter 100 Disinfection..$ 900
Chapter 120 Irrigation and Rapid Infiltration Systems.......................... $ 980
Appendices A~~, B,~~ and C~~, & D~~ (per design)...$ 980
(c) through (7) remain the same.

AUTH: 75-6-108, MCA
IMP: 75-6-108, MCA

17.50.811 OPERATION AND MAINTENANCE REQUIREMENTS FOR LAND APPLICATION OR INCORPORATION OF SEPTAGE (1) through (6) remain the same.

(7) Septage may be placed in an active sewage sludge management unit at a permitted wastewater treatment facility only if the facility is designed and operated to handle septage in a manner protective of human health and the environment and in conformance with Department Circular DEQ-2, Design Standards for ~~Wastewater Facilities~~ Public Sewage Systems.

(8) through (11) remain the same.

AUTH: 75-10-204, 75-10-1202, MCA
IMP: 75-10-204, 75-10-1202, MCA

17.50.815 GREASE TRAP WASTES (1) and (2) remain the same.

(3) Grease trap waste may be dewatered at a permitted wastewater treatment works designed in conformance with Department Circular DEQ-2, Design Standards for ~~Wastewater Facilities~~ Public Sewage Systems, a solid waste management system licensed in conformance with Title 75, chapter 10, part 2, MCA, or at a land application site approved in conformance with this subchapter.

(4) through (8) remain the same.

AUTH: 75-10-1202, MCA
IMP: 75-10-1202, MCA

17.50.819 INCORPORATION BY REFERENCE AND AVAILABILITY OF REFERENCED DOCUMENTS (1) The department hereby adopts and incorporates by reference:

(a) Department Circular DEQ-2, Design Standards for ~~Wastewater Facilities~~ Public Sewage Systems (~~1999 ed.~~ 2012 edition), which sets forth design standards for ~~wastewater facilities~~ public sewage systems;

(b) through (3) remain the same.

AUTH: 75-10-1202, MCA
IMP: 75-10-1202, MCA

REASON: The board is proposing to amend Montana's rules regulating the design and construction of public sewage systems in ARM 17.38.101, 17.38.102, and 17.38.103 in order to clarify existing language, add requirements related to the department's approval of proposals to use reclaimed wastewater, and incorporate revisions to Department Circular DEQ-2, currently entitled "Department of Environmental Quality Design Standards for Wastewater Facilities" (1999 edition) (hereafter "DEQ-2"). In general, the proposed revisions to DEQ-2 consist of updates to the existing design standards, the addition of new design standards for relatively new technology, and the addition of treatment standards and associated classifications for reclaimed wastewater that will be reused for other purposes. The board is also proposing to change the title of DEQ-2 to be consistent with the changes in terms proposed in ARM 17.38.101. The draft Department Circular DEQ-2 can be viewed at http://deq.mt.gov/wqinfo/pws/PlanReviewEngineer.mcpx.

In addition, the board is proposing amendments to ARM 17.30.1022 to provide a ground water permit exemption for certain classes of reclaimed wastewater and to add definitions into ARM 17.30.1001 to limit the new exemption to specific classes of reclaimed wastewater.

The board's specific reasons for amending the rules and revising DEQ-2 are as follows:

Rule Amendments

ARM 17.30.1001(14) and (17)

The board is proposing to amend ARM 17.30.1001 in order to incorporate the statutory definition of "reclaimed wastewater" in (14) and add a new definition of "unrestricted reclaimed wastewater" in (17) to supplement the existing definitions in Montana's ground water rules. The proposed adoption of these definitions will ensure that only reclaimed wastewater that is treated to the highest standards in DEQ-2 will qualify for an exemption from the ground water permit requirements, because the wastewater must comply with the standards specified in the definition of "unrestricted reclaimed wastewater." The board is further proposing to incorporate by reference DEQ-2 into ARM 17.30.1001(17), because the definition of "unrestricted reclaimed wastewater" requires compliance with Class A-1 or B-1 treatment standards, which are proposed for adoption in the revised DEQ-2.

ARM 17.30.1022(1)(g)

The board is proposing to amend ARM 17.30.1022(1)(g) to clarify that only public sewage systems that apply reclaimed wastewater at agronomic rates qualify for a ground water permit exemption. As currently written, the rule provides an exemption for any public sewage system that land applies its wastewater regardless of method or volume. By specifying that the wastewater must be applied at agronomic rates (i.e., the controlled application of wastewater in a manner that ensures that all of the effluent is used by vegetation and no impacts to ground water will occur), the amendment clarifies that the exemption only applies to land application methods that do not result in impacts to ground water.

ARM 17.30.1022(1)(h)

The board is proposing to add a new exemption from the ground water permitting requirements in ARM 17.30.1022(1)(h), which will exempt discharges from public sewage systems that meet the definition of "unrestricted reclaimed wastewater." Under that definition, a discharge must be treated to the highest standards proposed for adoption in DEQ-2 prior to being used for other purposes. The proposed exemption would allow a public sewage system that meets Class A-1 or B-1 standards to discharge the treated water without first obtaining a ground water permit from the department.

The board is proposing this exemption for two reasons: (1) treating wastewater to the standards for Class A-1 or B-1 prior to reusing it poses minimal risk to public health and the environment; and (2) providing a ground water permit exemption may provide an incentive for public sewage systems to provide a higher level of treatment than required by current regulations governing ground water permits. In order to ensure that any exempt reclaimed wastewater continues to meet Class A-1or B-1treatment standards during the life of a reuse project, the board is proposing language in ARM 17.30.1022(1)(h) specifying that the reclaimed wastewater remains subject to the monitoring and reporting requirements imposed by the department during its approval of a reuse project.

ARM 17.36.345, 17.36.914, and 17.50.819

The board and department are amending these rules to update the incorporation by reference of DEQ-2, 2012 edition, to make the department's review under subdivisions and solid waste programs consistent with the department's review of public sewage systems under ARM 17.38.101.

ARM 17.38.101, 17.38.102, 17.38.102

The board is proposing to amend ARM 17.38.101, 17.38.102, and 17.38.103 to replace the terms "wastewater system" and "sewer," as used throughout the rules, with the term "public sewage system." The board is proposing this amendment to clarify that the rules only apply to "public sewage systems" that, by definition, are systems for the collection and disposal of sewage that serve 15 or more families or 25 or more persons daily for 60 or more days. In contrast, the term "wastewater system" is broadly defined in ARM 17.38.101 to mean "a public sewage system or other system that collects, transports, treats, or disposes of industrial wastes." Since the board's authority under 75-6-103, MCA, is expressly limited to adopting rules governing public sewage systems, the board is proposing this amendment to be consistent with its statutory authority.

ARM 17.38.101(8)(c)

The board is also proposing to add new requirements to ARM 17.38.101 in response to recent amendments to state laws governing the department's review and approval of public sewage systems (House Bill 52, 2011). Specifically, 75-6-103, MCA, has been amended to require the board to adopt rules establishing allowable uses and associated classifications of reclaimed wastewater and also adopt monitoring, reporting, and recordkeeping requirements tailored to each classification. In response to these directives, ARM 17.38.101(8) is being amended to add (c) specifying that the department's approval of a reclaimed wastewater project must require compliance with the treatment standards and reporting requirements currently being proposed for adoption in DEQ-2. The adoption of new (8)(c) is necessary to ensure that the department's approval of a reclaimed wastewater project imposes a clear legal obligation on the owner or operator to adhere to the treatment and reporting standards proposed for adoption in DEQ-2.

ARM 17.38.101(17)

The amendments to 75-6-103, MCA, further require the adoption of rules requiring applicants requesting the department's approval of a proposal to use reclaimed wastewater to first obtain from the Department of Natural Resources and Conservation "any necessary approvals required under Title 85, MCA." In response to this directive, the board is proposing to add a new (17) to ARM 17.38.101, which prohibits the department or a delegated division of local government from approving a reclaimed wastewater project until the applicant has obtained any necessary approvals under Title 85, MCA. Since a delegated division of local government may also approve a reclaimed wastewater project, the prohibition against approving a project without first obtaining any necessary approvals from the Department of Natural Resources and Conservation applies to those entities as well.

ARM 17.38.101(18)

Finally, the amendments to 75-6-103, MCA, require the adoption of a rule prohibiting the use of reclaimed wastewater, unless the particular use is allowed under the board's rules. The amendments also require a rule prohibiting the use of reclaimed wastewater, unless it has been treated to meet the standards adopted by the board for the particular use. In response to these directives, the board is proposing to add a new (18) to ARM 17.38.101. Under (18), an owner or operator of a public sewage system may not use reclaimed wastewater for a use that has not been adopted by the board in DEQ-2. The new section also prohibits an owner or operator from using reclaimed wastewater that has not been treated to the standards for that particular use specified in DEQ-2.

ARM 17.38.101(19)

The board is proposing to amend ARM 17.38.101(19) in order to incorporate the board's proposed revisions to DEQ-2 into rules regulating the design and construction of public sewage systems. This amendment is necessary to provide the department with authority to require compliance with the new requirements proposed for adoption in DEQ-2, including requirements for reclaimed wastewater.

ARM 17.38.106

As a result of the proposed revisions to Circular DEQ-2, an adjustment to the fees in ARM 17.38.106 (2)(b), Schedule II, is necessary to account for the removal of the design standards currently in Appendix B and D and the consolidation of those design standards into new Chapter 120. In order to maintain the existing fee amount for the review of projects under Appendix B and D, the board is proposing to apply the fee amount currently provided for the department's review under both appendixes to the department's review of the same projects under new Chapter 120. The board is further proposing to eliminate Appendix B and D from Schedule II, since all projects currently reviewed under those appendixes will be reviewed under new Chapter 120.

The proposed amendments to the fee rule are necessary to ensure that the fees now assessed for review of projects under Appendix B and D will apply to the same projects that will now be reviewed under Chapter 120. Specifically, 75-6-108, MCA, requires the board to adopt rules to recover the department's costs for its review of plans and specifications submitted by persons for the alteration, construction, or extension of public sewage systems. Since no change to the existing fee for projects currently reviewed under Appendix B and D is being proposed, the board finds the adoption of the proposed fee for Chapter 120 is reasonable and necessary.

ARM 17.50.811 and 17.50.815

These rules are being amended to change the Title of Department Circular DEQ-2 to be consistent with the other changes in the rule notice.

Circular DEQ-2 Revisions

DEQ-2, General Revisions

Many of the proposed revisions throughout DEQ-2 are based on new information and recommendations from the "parent document." All references to the parent document, as used in the board's reasons for revising DEQ-2, refer to the 2004 edition of a document entitled, "Recommended Standards for Wastewater Facilities," also known as the "Ten State Standards," published by the Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. This document is a compilation of common standards used by states in the design and preparation of plans and specifications for wastewater treatment facilities. Since its inception, DEQ-2 has been based primarily on the information contained within the parent document. New information from the 2004 edition of the parent document is being proposed for incorporation into DEQ-2 in order to provide: (1) design standards that reflect recent technological advances in the wastewater industry; (2) additional and important design considerations; and (3) better clarity for design engineers through the expansion of text or a restructuring of its content. When a revision to DEQ-2 is being proposed based on a recommendation or requirement of the parent document, the reason for the revision indicates that fact.

In addition to the specific revisions explained below, the board is proposing to generally revise the text of DEQ-2 to replace the terms "DEQ," "reviewing agency," "regulatory agency," and "reviewing authority" with the single term "Department." The board is proposing this change to provide consistency and clarity throughout the document. The board is also proposing to add applicable titles next to the numerical internal references used throughout DEQ-2, which refer the reader to other sections of the document. This change is being made to assist the reader in identifying the content of the numerical references to other sections in DEQ-2.

DEQ-2, Section 10.1

This section addresses the planning document requirements for wastewater improvement projects. The board is proposing to amend the section by specifying the number of copies of engineering reports or facility planning documents that must be submitted to the department. The board is also deleting information that pertains to plans and specification submittals. The deleted information will be relocated in Chapter 20 which addresses plan and specification requirements.

DEQ-2, Section 11

This section addresses the informational requirements for engineering reports and facility plans. The board is proposing to amend this section by requiring the planning document to discuss the benefits and purpose of the proposed project. This amendment is necessary to provide the treatment works' owner with adequate information for decision making.

DEQ-2, Section 11.12

This section addresses the informational requirements for engineering reports. The board is proposing to amend this section to require more detail in the planning document. This information is necessary to provide a better basis for design and is also a requirement in the parent document.

DEQ-2, Section 11.14 and Section 11.15

The board is proposing to delete the site drawing information from Section 11.14 and add a new Section 11.15 to clarify that site drawings are mandatory rather than a recommendation, as currently stated in Section 11.14. This amendment is necessary to make site drawings a mandatory requirement and is consistent with the recommendation in the parent document.

DEQ-2, Section 11.18

The board is proposing to add this new section to recommend that the planning document include the reasons for selection of the proposed alternative. This amendment is necessary to provide the owner with adequate information for decision making. This amendment is also a recommendation in the parent document.

DEQ-2, Section 11.19

This section addresses the environmental impacts of the proposed project. The board is proposing to amend the section by requiring that the discussion of environmental impacts be expanded to include cumulative and secondary impacts, as well as how adverse impacts will be minimized and mitigated. This amendment is necessary in order to provide information to the funding and reviewing agencies that will assist the agencies in completing an environmental assessment or environmental impact statement for the project. This amendment is also a recommendation in the parent document.

DEQ-2, Section 11.23

This section addresses the informational requirements for facility plans. The board is proposing to amend the section by recommending that the wastewater improvements with a design life in excess of 20 years be designed for the extended period. This amendment is necessary to provide the owner with adequate information for decision-making purposes. This amendment is also a recommendation in the parent document.

DEQ-2, Section 11.24 d

This section provides definitions for key design parameters. The board is proposing to amend the section to provide a more precise definition of the "design peak instantaneous flow." This amendment is necessary because the amended definition is a design parameter used for the design of wastewater treatment facilities.

DEQ-2, Section 11.24 e

This section provides definitions for key design parameters. The board is proposing to add this section to provide a definition for "design maximum month flow." This addition is necessary because the design maximum month flow is a design parameter used for the design of wastewater treatment facilities.

DEQ-2, Section 11.242

This section addresses hydraulic capacity for facilities served by existing collection systems. The board is proposing to amend the section by recommending that the wastewater flows should be more thoroughly evaluated prior to initiation of design and that actual flow data for wet weather flow conditions should be included in the facility plan. This amendment is necessary to encourage the collection of information that may result in better treatment and is also a recommendation in the parent document.

DEQ-2, Section 11.243

This section addresses hydraulic capacity for facilities served by new collection systems. The board is proposing to amend the section by deleting Figure 1 (depicting the ratio of peak hourly flow to design average flow) and replace it with the peaking factor equation, which was used to develop the peaking factor curve in Figure 1. This revision is necessary to ensure that the peaking factors used in the design are as accurate as possible, and eliminates the redundancy of information and guesswork associated with the use of Figure 1.

DEQ-2, Section 11.251 b 1 and 2

This section provides organic load definitions for wastewater facilities. The board is proposing to amend the section by adding a definition for "design total nitrogen." This amendment is necessary because total nitrogen is a key design parameter for many wastewater facilities that are subject to new Montana Pollutant Discharge Elimination System (MPDES) permits and Montana Ground Water Pollution Control System (MGWPCS) permits with requirements related to total maximum daily loads (TMDLs) for nitrogen and nondegradation analysis for nitrogen.

DEQ-2, Section 11.251 c 1

This section provides organic load definitions for wastewater facilities. The board is proposing to amend the section by adding a definition for "design total phosphorus." This amendment is necessary because total phosphorus is a key design parameter for many wastewater facilities that are subject to new MPDES permits with requirements related to total maximum daily loads (TMDLs) for nutrients.

DEQ-2, Section 11.252

This section addresses organic loads for facilities served by existing collection systems. The board is proposing to amend the section by adding language from the parent document that clarifies the informational requirements that are currently in DEQ-2, which address higher organic loads from industrial sources and from septage haulers.

DEQ-2, Section 11.253 a

This section addresses organic loads for facilities served by new collection systems. The board is proposing to amend the section by adding a requirement that specific values must be used for determining influent per capita loads for total nitrogen and total phosphorus during the design of wastewater systems when actual influent loads for these parameters are not available. The values reported were obtained from Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, 4th edition. This amendment is necessary to more accurately assess organic loads when no actual data on organic loads is available during the design phase.

DEQ-2, Section 11.253 d

This section addresses organic loads for facilities served by new collection systems. The board is proposing to amend the section by adding recommended language from the parent document that allows, in some circumstances, organic loading data from a similar municipality to be used for design purposes. This amendment is necessary to provide an alternative method of determining organic loads when no actual data is available.

DEQ-2, Section 11.27

This section requires the facility plan to address effluent permit limits and how the proposed facility will meet the limits. The board is proposing to amend the section by requiring the facility plan to address compliance with permit limits based on TMDLs, numeric water quality standards, and nondegradation requirements.

DEQ-2, Section 11.29 b

This section requires that the facility plan provide a detailed evaluation of each alternative considered. The board is proposing to add this section to require the facility plan to address the transport and treatment of wet weather flows. This amendment is a recommendation in the parent document.

DEQ-2, Section 11.29 c 1

This section requires that the facility plan provide a detailed site evaluation for each alternative considered. The board is proposing to amend this section by adding recommended language from the parent document that recommends consideration be given to facility location and future development as well as the use of non-aerated treatment technologies and the potential for odor generation for wastewater with high sulfate concentrations.

DEQ-2, Section 11.29 c 7

This section requires that the facility plan provide a detailed site evaluation for each alternative considered. The board is proposing to amend this section by adding recommended language from the parent document that prevents the construction of lagoons in karst areas unless geologic and construction details are acceptable.

DEQ-2, Section 11.29 c 12 to c 18

This section requires that the facility plan provide a detailed site evaluation for each alternative considered. The board is proposing to amend this section by requiring more detail in the planning document to address environmental impacts that may result from construction of the proposed alternatives. This amendment is necessary to provide a better basis for design and will provide the owner with adequate information for decision making. Adding these criteria to the site evaluation will enable the department to better assess and understand early in the project what sensitive or critical environmental resources may be impacted by the project and what mitigation or permitting requirements may be needed. This information is also required by the public funding agencies.

DEQ-2, Section 11.29 g

This section allows for the usage of technologies not included in the standards. The board is proposing to amend this section by reorganizing its content to provide better clarity.

DEQ-2, Section 11.29 i

This section addresses the method and level of treatment to be achieved during construction. The board is proposing to amend this section by adding language that requires that the department's permitting program be notified when a unit bypass is needed during construction. This addition is necessary to ensure that this step is not overlooked (a requirement in the facility's discharge permit), and to make sure adequate planning occurs to maintain overall treatment at the highest level possible during construction.

DEQ-2, Section 11.29 j

The board is proposing to add this new section to require the development of a plan of operation for wastewater treatment systems undergoing significant upgrades. The plan of operation will provide the community with an outline of key tasks that need to be completed prior to system start-up for the successful operation of the new facility. The plan of operation will address the development and implementation of an operating budget, administrative procedures, staffing and training plans, routine and emergency operational procedures, and an operation and maintenance manual. This new section is necessary to provide key information during the planning process.

DEQ-2, Section 11.29 l

This section requires cost estimates for the alternatives considered. The board is proposing to amend this section by requiring that engineering, administration, and contingency costs be added to the overall cost estimate. This information will provide the town or owner with adequate information for decision making and will provide interested parties with a more comprehensive understanding of the financial impacts of the project.

DEQ-2, Section 11.29 m

This section addresses staffing and operational requirements for the alternatives considered. The board is proposing to add this section to ensure that the proper operator certification and the associated costs to hire the operator(s) is considered in the development of the alternatives analysis. The system classifications were taken from ARM 17.40.202(1)(c).

DEQ-2, Section 11.29 n

This section addresses the environmental impacts of the proposed project. The board is proposing to amend this section by requiring that the discussion of environmental impacts be expanded to include cumulative and secondary impacts and that the impacts to the environment and human population, as outlined under the Montana Environmental Policy Act, must be addressed as well. This information is necessary for the funding and reviewing agencies to complete a thorough environmental assessment or environmental impact statement for the project.

DEQ-2, Section 20

This section addresses the submittal of plans and specifications for the proposed project. The board is proposing to amend this section by relocating information from Section 10.1 that pertains to the plan and specification review, project certification, and as-built submittals. Additional language has been added to provide guidance and clarity regarding plan and specifications submittal requirements.

DEQ-2, Section 20.14

This section addresses project design criteria. The board is proposing to amend this section by adding recommended language from the parent document, which requires that downstream facilities be evaluated to ensure that sufficient capacity exists for the proposed project.

DEQ-2, Section 20.15

This section addresses the development of procedures for operation of the existing facilities during construction. The board is proposing to amend this section by adding a recommendation that facility personnel, essential to implementation of the operating procedures, be listed in the project documents.

DEQ-2, Section 21

This section addresses the project specifications. The board is proposing to amend this section by adding recommended language from the parent document to provide clarity.

DEQ-2, Section 21.1

This section addresses the submittal of an operation and maintenance manual for the project. The board is proposing to delete this section and relocate the information to a new operation and maintenance section that provides more details regarding operation and maintenance manual content.

DEQ-2, Section 23

This section addresses the submittal of additional information to the department. The board is proposing to amend this section by adding pump curves and buoyancy calculations to the list of information that may need to be submitted for a project. This additional information is necessary to provide clarity to the design engineer on the type of information the department may request to determine the adequacy of a project design.

DEQ-2, Section 24

This section addresses the submittal of deviation requests by the owner or operator for the project. The board is proposing to amend this section by reorganizing its content to provide better clarity.

DEQ-2, Section 24.1

This section addresses the procedure for the submittal of deviation requests for the project. The board is proposing to amend this section by requiring a professional engineer to submit all deviation requests on a newly developed form from the department. Additional information has been added to this section to provide clarity to the deviation process.

DEQ-2, Section 25

The board is proposing to add this new section which addresses the submittal requirements of an operation and maintenance manual for the project. In addition it requires that the system have an operation and maintenance manual prior to system start-up and provides the design engineer with guidance on the type of information that must be included in the document. These changes will ensure that the system owner has the information needed to successfully operate the facility and will provide conformity of operation and maintenance manuals.

DEQ-2, Section 33.1

This section addresses the minimum pipe diameter for gravity sewer mains. The board is proposing to amend this section by reorganizing its content to provide clarity.

DEQ-2, Section 33.2

This section addresses the minimum bury depth to prevent sewer pipes from freezing. The board is proposing to amend this section by establishing a minimum bury depth of four feet and requiring a review of local building codes for determination of maximum frost depths to ensure that four feet is adequate.

DEQ-2, Section 33.41

This section addresses the minimum slopes for gravity sewer mains. The board is proposing to amend this section by adding recommended language from the parent document that requires sewer mains to be designed with minimum self-cleansing flow velocities.

DEQ-2, Section 33.42

This section addresses minimum flow depths in gravity sewer mains. The board is proposing to amend this section by adding language that clarifies the need to obtain a deviation from the department when minimum pipe slopes are not met.

DEQ-2, Section 33.5

This section addresses curvilinear sewer mains. The board is proposing to amend this section by adding recommended language from the parent document, which requires that curvilinear sewers must provide a minimum flow velocity of two feet per second.

DEQ-2, Section 33.83 a through d

This section addresses pipe bedding material and placement for sewer main installation. The board is proposing to amend this section by deleting existing language and replacing it with the pipe bedding requirements located in the Montana Public Works Standard Specifications (MPWSS) 6th edition. Engineering consultants typically do not reference the bedding classes included in the current section, but instead reference the MPWSS for pipe bedding material requirements. Including the bedding requirements in DEQ-2 will simplify the review process by eliminating the need to cross check against the MPWSS.

DEQ-2, Section 33.84

This section addresses trench backfill requirements for sewer main installation. The board is proposing to amend this section by adding language from the MPWSS that includes backfill compaction requirements depending on surface restoration needs. Engineering consultants commonly reference the MPWSS for trench backfill requirements. Including these requirements in DEQ-2 will simplify the review process by eliminating the need to cross check against the MPWSS.

DEQ-2, Section 33.92

This section addresses the testing of sewer mains for leakage. The board is proposing to amend this section by allowing video inspections on sewer mains with active service connections. This amendment is necessary because it is not possible to conduct water or low air pressure testing on sewer mains with active service connections.

DEQ-2, Section 33.10

The board is proposing to add this new section which addresses the use of casing pipes on sewer mains. This information will clarify and provide consistency in the department's review of casing pipe installations.

DEQ-2, Section 34.1

This section addresses manhole spacing on sewer mains. The board is proposing to amend this section by requiring the town or owner, under certain circumstances, to submit documentation stating that adequate cleaning equipment is available for the proposed manhole spacing.

DEQ-2, Section 34.2

This section addresses drop type manholes. The board is proposing to amend this section by making the "recommended" use of a drop pipe, when sewers enter manholes at an elevation 24 inches or more above the manhole invert, a "requirement." The use of a drop pipe is a requirement in the parent document.

DEQ-2, Section 34.4

This section addresses the flow channel height through manholes. The board is proposing to amend this section by making the "recommendation," that the flow channel for pipes greater than eight inches in diameter be formed to the full height of the outer sewer pipe, a "requirement." Larger diameter pipe is utilized with higher flows. Deeper channels will contain the flow better and prevent the deposition of solids within the manhole structure.

DEQ-2, Section 34.6

This section addresses the water-tightness of manholes. The board is proposing to amend this section by adding recommended language from the parent document that requires manhole lift holes and grade adjustment rings to be properly sealed to prevent the infiltration of water.

DEQ-2, Section 34.7

This section addresses the testing requirements for the confirmation of manhole water-tightness. The board is proposing to amend this section by adding vacuum and water testing procedures. This amendment will provide the design engineer with better guidance on testing requirements and will indicate under which conditions testing must take place. The vacuum testing procedure is recommended in the parent document and the water testing procedure is similar to the septic tank testing in both Circular DEQ-4 and the "San Antonio Water System Standard Specification for Construction".

DEQ-2, Section 35

This section addresses the use of inverted siphons in sewer collection systems. The board is proposing to amend this section by making the "recommended" use of at least two barrels for inverted siphons a "requirement." Use of at least two barrels for inverted siphons is a requirement in the parent document.

DEQ-2, Section 36.11

This section addresses cover depths for sewers entering or crossing streams. The board is proposing to amend this section by requiring the engineer to conduct a scour analysis to justify the proposed burial depth.

DEQ-2, Section 36.21

This section addresses piping material for sewers entering or crossing streams. The board is proposing to amend this section by recommending that a casing pipe be used when crossing streams and providing additional requirements when material other than ductile iron pipe is used for stream crossings. This amendment will provide the design engineer with better guidance and clarity of construction requirements for stream crossings and requires the use of mechanical joints or encasement in concrete to maintain alignment and improve structural integrity.

DEQ-2, Section 36.22

This section addresses construction methods and practices for sewers entering or crossing streams. The board is proposing to amend this section by listing the specific permits that may be required for work done in and around streams. Adding this information will provide the design engineer with better guidance and clarity regarding which permits are needed and which regulatory agencies should be contacted.

DEQ-2, Section 37

This section addresses aerial crossings of sewer collection systems. The board is proposing to amend this section by making the "recommendation," that the bottom of the sewer pipe be located above the 50-year flood plain, a "requirement." In addition adequate justification must be submitted for the use of pier structures to support sewer mains and, if sewers are to be attached to bridges, the town or owner must obtain written permission from the bridge owner. These amendments will provide the design engineer with better guidance and clarity regarding the design requirements of aerial crossings.

DEQ-2, Section 38

This section addresses the protection of water supplies from sewer collection systems. The board is proposing to amend this section by making the "recommendation," that the factors listed in Circular DEQ-1 be considered in the establishment of acceptable isolation distances between water and sewer mains, a "requirement."

DEQ-2, Section 38.2

This section addresses the setback distances of sewer mains from water works structures. In addition to the 100-foot separation from public water supply wells, the board is proposing to amend this section by requiring a 50-foot separation between sewer mains and all other wells. This amendment is necessary to provide consistency with ARM 17.36.323 regarding horizontal setback distances. In addition, language has been added requiring documentation from the operating authority of the collection system stating that all waterworks units, within 100 feet of the proposed sewer main alignment, have been identified and are shown on the plans. The way the standard is currently written, it is hard to know if there are no waterworks units in the area or if the engineer simply overlooked it. Adding this language will ensure that these setback distances are not overlooked on any project.

DEQ-2, Section 38.31

This section addresses the horizontal separation of water and sewer mains. The board is proposing to amend this section by deleting parts (a) and (b) of the existing language and replacing it with the recommended language from the parent document requiring that sewers be constructed in compliance with public water supply standards and pressure tested to 150 psi to assure water-tightness.

DEQ-2, Section 38.32

This section addresses the vertical separation of water and sewer mains. The board is proposing to amend this section by deleting parts (b) and (d) of the existing language and replacing it with the recommended language from the parent document requiring that sewers be constructed in compliance with public water supply standards and pressure tested to 150 psi to assure water-tightness. The amendment also allows a minimum separation of six inches provided that flowable fill, or a water tight carrier pipe, that extends ten feet on both sides of the pipe crossing is used. This amendment eliminates the need for submittal of a deviation when the 18-inch separation could not be met, which will save time during the review process.

DEQ-2, Section 39

This section requires the conformance of service connections with local and state plumbing codes. The board is proposing to amend this section by updating the ARM reference number that incorporates by reference the uniform plumbing code.

DEQ-2, Section 42.22

This section addresses equipment removal from pumping stations. The board is proposing to amend this section by adding recommended language from the parent document that requires the pumping station to remain operational when an individual pump is removed for maintenance.

DEQ-2, Section 42.231

This section addresses access by personnel into pumping stations. The board is proposing to amend this section by reorganizing its content to provide better clarity.

DEQ-2, Section 42.24

This section addresses the buoyancy of pumping stations due to ground water. The board is proposing to amend this section by requiring the submittal of buoyancy calculations to the department when the potential for high ground water exists. This amendment will ensure proper design to protect the structure from potential floatation.

DEQ-2, Section 42.321

This section addresses bar racks for pumping stations. The board is proposing to amend this section by adding recommended language from the parent document that references other sections that must be considered in the design of bar racks in pumping stations.

DEQ-2, Section 42.33

This section addresses pump opening sizes. The board is proposing to amend this section by adding language that allows smaller pump openings and allows the passing of smaller spheres for grinder pumps. The current standard does not take into consideration smaller piping diameters permissible with grinder pumps.

This amendment will allow the use of grinder pumps without the need to obtain a deviation from the department regarding pump openings, which will simplify the review process.

DEQ-2, Section 42.36

This section addresses pump intakes. The board is proposing to amend this section by making the "recommendation," that each pump have its own intake, a "requirement." Each pump having its own intake is a requirement in the parent document.

DEQ-2, Section 42.4

This section addresses pump controls for pumping stations. The board is proposing to amend this section by adding recommended language from the parent document requiring dual air compressors for bubbler control systems and the alternation of pumps daily, instead of each cycle, for suction lift stations.

DEQ-2, Section 42.52

This section addresses check valve placement requirements for pumps. The board is proposing to amend this section by adding language that allows swing and flexible disk check valves to be located on a vertical run of pipe. Allowing these check valves to be installed in the vertical run will prevent the need for the submittal of a commonly-approved deviation and simplify the review process.

DEQ-2, Section 42.62

This section addresses sizing of wet wells for pumping stations. The board is proposing to amend this section by adding language that recommends wet wells be designed with the flexibility to accommodate phased growth. In addition, an equation has been added to calculate the wet wells "active" volume. These amendments will ensure that the value added by the improvements is optimized and will provide the design and review engineers with information to confirm wet well sizing. The wet well volume equation is recommended in the State of Washington Department of Ecology document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 42.73

This section addresses electrical controls for pumping stations. The board is proposing to amend this section by adding recommended language from the parent document that recommends an automatic increase in ventilation rates whenever hazardous concentrations of gases or vapors are detected.

DEQ-2, Section 42.74

This section addresses pumping station electrical equipment. The board is proposing to amend this section by adding recommended language from the parent document, which requires that all electrical equipment in the lift station be installed in accordance with the National Electrical Code for Class 1, Division 1, Group D locations.

DEQ-2, Section 42.75

This section addresses ventilation requirements in pumping station wet wells. The board is proposing to amend this section by adding recommended language from the parent document, which requires that the air used for ventilation be 100 percent fresh.

DEQ-2, Section 42.76

This section addresses ventilation requirements in pumping station dry wells. The board is proposing to amend this section by adding recommended language from the parent document, which requires that the air used for ventilation be 100 percent fresh.

DEQ-2, Section 43

This section addresses suction lift pumping stations. The board is proposing to amend this section by adding language from Section 43.1 for clarity.

DEQ-2, Section 43.2

This section addresses pumping equipment compartment location and wet well access for suction lift pumping stations. The board is proposing to relocate information from existing Section 43.1 and to create a new section for clarity.

DEQ-2, Section 44.32

This section addresses electrical controls for submersible lift stations. The board is proposing to amend this section by adding recommended language from the parent document, which requires that electrical controls located outside be housed in a weatherproof structure.

DEQ-2, Section 44.4

This section addresses the location of valves for submersible lift stations. The board is proposing to amend this section by adding recommended language from the parent document, which requires that provisions be made to drain or remove accumulated water in the valve chamber.

DEQ-2, Section 45 through 45.3

These sections address the minimum design requirements for screw pump stations. The board is proposing to add information that addresses covers, the isolation of pump wells, and bearing lubrication using recommended language from the parent document.

DEQ-2, Section 46

This section addresses alarm systems for lift stations. The board is proposing to amend this section by adding recommended language from the parent document, which requires a back-up power supply for the alarm system and identification of the alarm condition. In addition, a requirement was added requiring thermal and moisture sensors on submersible pumps. This requirement was added for compliance with Section 44.1, which requires an effective method to detect seal failure.

DEQ-2, Section 47.2

This section addresses emergency pumping capability for lift stations. The board is proposing to amend this section by making the "recommendation," that a riser be provided on the force main to hook up a portable pump, a "requirement." Having a riser on the force main to hook up a portable pump is a requirement in the parent document. In addition, language has been added requiring that a separate portable pump or generator is to be provided for each lift station within the community to ensure that the community's entire collection system remains functional during extended power outages.

DEQ-2, Section 47.3

This section addresses emergency storage requirements for lift stations. The board is proposing to amend this section by adding language that recommends one hour of emergency storage be provided for lift stations, but also provides the department with the flexibility to alter the storage requirements based on site specific conditions. This amendment is necessary to provide the design engineer with sizing guidance.

DEQ-2, Section 47.44

This section addresses utility substations for emergency power to pumping stations. The board is proposing to add this new section that requires each independent substation to be capable of operating the pump station at its rated capacity. This amendment is a requirement in the parent document.

DEQ-2, Section 49.1

This section addresses force main diameters and velocities. The board is proposing to amend this section by adding language that requires force mains that serve grinder pumps to be designed with a minimum velocity of two feet per second and a minimum diameter of 1.5 inches. In addition, language was added to limit the force main velocity to less than eight feet per second. This amendment is necessary to provide the design engineer with force main sizing guidance. Limiting force main velocities is a requirement in the State of Washington Department of Ecology document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 49.3

This section addresses the termination of force mains in a manhole. The board is proposing to amend this section by adding recommended language from the parent document that requires corrosion protection of the manhole.

DEQ-2, Section 49.4

This section addresses pressure changes in force mains. The board is proposing to amend this section by specifying that the use of surge protection devices must be evaluated to protect the force main. This amendment is a requirement in the parent document.

DEQ-2, Section 49.71

This section addresses friction coefficients used in the Hazen-Williams equation to calculate pump flows. The board is proposing to amend this section by requiring the design engineer to consider both new pipe and old pipe flow conditions and to consider how the higher discharge rates with the new piping will impact the pumps and downstream facilities.

DEQ-2, Section 49.10

This section addresses maintenance considerations for force mains. The board is proposing to amend this section by requiring isolation valves where force mains connect to a common force main and recommending the installation of cleanout ports for pig launching and catching. These amendments are based on recommendations in the parent document.

DEQ-2, Section 51.1

This section addresses general considerations for the siting of wastewater treatment facilities. The board is proposing to amend this section by requiring, in addition to considering nondegradation requirements, that consideration be given to future requirements from the development of TMDLs or compliance with water quality standards when selecting a site, to ensure that adequate space exists for future facilities that may be required to provide increased levels of treatment. This amendment is necessary to ensure that a comprehensive evaluation is made of future compliance issues.

DEQ-2, Section 52

This section addresses the need for wastewater facilities to provide the necessary degree of treatment to meet water quality standards established by the state. The board is proposing to add language encouraging the design engineer to consider future permit requirements that are related specifically to the implementation of TMDLs, new water quality standards, and the state's nondegradation policy.

DEQ-2, Section 53.8

This section addresses the evaluation of pumps at wastewater treatment facilities. The board is proposing to add this section to ensure that a thorough evaluation of major pumps or key unit processes has been made by the design engineer.

DEQ-2, Section 54.1

This section addresses the installation of mechanical equipment at wastewater treatment facilities. The board is proposing to amend this section by making the "recommendation," that the installation and initial operation of major items of mechanical equipment be inspected and approved by a representative of the manufacturer, a "requirement." This amendment is necessary to ensure that new equipment is installed and operating correctly.

DEQ-2, Section 54.21

This section addresses bypass structures and piping at wastewater treatment facilities. The board is proposing to amend this section by adding language that requires the capability to manually operate all bypasses and recommending that a fixed high water level bypass overflow be provided. These amendments are recommended in the parent document.

DEQ-2, Section 54.5

This section addresses the hydraulic testing of water bearing units. The board is proposing to add this section to require that all water bearing structures be hydraulically tested and to establish leakage standards. The leakage standards are based on recommendations developed by the American Concrete Institute Committee 350 and the American Water Works Association Committee 400, as presented in the joint subcommittee report entitled "Testing Reinforced Concrete Structures for Watertightness." This amendment is necessary to establish standardized criteria for testing the watertightness of concrete structures.

DEQ-2, Section 54.6

This section addresses the use of paint to color-code piping in wastewater treatment facilities to facilitate identification. The board is proposing to amend this section by making the "recommendation," that the use of mercury or lead in paint be avoided, a "requirement" due to health concerns associated with mercury and lead. In addition, the existing language was altered making color-coding of pipelines a requirement for all plants, not just a recommendation for large facilities. The operation of all facilities is enhanced by having piping that is readily identifiable. Three colors and their associated piping contents were added based on recommendations from the parent document.

<u>DEQ-2, Section 54.8</u>

This section addresses erosion control at wastewater treatment facilities during construction. The board is proposing to amend this section by adding clarifying language that specifically states that a dewatering or storm water permit may be required.

<u>DEQ-2, Section 56.22</u>

This section addresses the direct connections of potable water piping and sewer connected wastes. The board is proposing to amend this section by adding language that requires a backflow prevention assembly be used on any potable water line that serves a wastewater treatment facility and adding language that directly references cross-connection requirements, as provided in state rules governing cross-connections and the Uniform Plumbing Code. These amendments will ensure that the potable water supply is adequately protected.

<u>DEQ-2, Section 56.23</u>

This section addresses the indirect connections of potable water piping and sewer connected wastes. The board is proposing to amend this section by adding clarifying language for the usage of backflow devices and includes requirements where air gaps are used. The air gap requirements are based on the Technical Brief entitled "Cross Connection and Backflow Prevention" published by the National Drinking Water Clearinghouse (2004 edition).

<u>DEQ-2, Section 56.24</u>

This section addresses the use of an individual well to provide potable water to a wastewater treatment facility. The board is proposing to amend this section by making the "recommendation," that the well be constructed in accordance with Circular DEQ-3 and the Montana Board of Water Well Contractor's rules, a "requirement."

<u>DEQ-2, Section 56.7</u>

This section addresses composite sampling equipment for influent and effluent flows. The board is proposing to amend this section by requiring the sampling point to be located prior to any process return flows. This amendment is based on a recommendation in the parent document.

DEQ-2, Section 57.1

This section addresses safety equipment for wastewater facilities. The board is proposing to amend this section by recommending that OSHA and the Montana Department of Labor and Industry Safety Bureau be contacted for any additional safety considerations that may be implemented for the protection of visitors and workers to the treatment facility. In addition, language has been added requiring suitable lighting be provided for all access and work areas. These amendments will promote operator and visitor safety and assist with maintenance activities. Lastly, vector control was added to the list of safety provisions. This amendment is recommended in the parent document.

DEQ-2, Section 57.27

This section addresses protective clothing and equipment for wastewater system personnel. The board is proposing to amend this section by requiring that UV light safety goggles and rubber gloves be provided to operations personnel for facilities that use UV disinfection systems and that masks be provided in areas where exposure to aerosols and sprays may occur. These amendments are necessary to provide further protection to operations personnel.

DEQ-2, Section 57.30

This section addresses eyewash devices and safety showers. The board is proposing to add this new section to clarify where the safety devices must be located within the facility. In addition, the new section specifies the discharge pressure, capacities, and water temperature that must be provided to the eyewash devices and safety showers. These amendments are required in the parent document.

DEQ-2, Section 58.341

This section addresses fume hood design considerations for Category II laboratories. The board is proposing to amend this section by recommending that the air intake for the laboratory be balanced against all exhaust ventilation, including the fume hood, so that an overall positive pressure is maintained in the laboratory. This amendment is recommended in the parent document.

DEQ-2, Section 58.38

This section addresses safety equipment and considerations for Category II laboratories. The board is proposing to amend this section by deleting information that covers eyewash devices and safety showers, as this information is already covered in Section 57.30.

DEQ-2, Section 58.41

This section addresses siting, space requirements, and the layout for Category III laboratories. The board is proposing to amend this section by recommending that analytical and storage areas are isolated from sources of contamination. In addition, language has been added requiring adequate security for storage areas and that provisions are made for the storage and disposal of chemical wastes. These amendments are based on recommendations and requirements in the parent document.

DEQ-2, Section 58.44

This section addresses the location, design, materials, fixtures, and exhaust considerations for fume hoods and canopy hoods in Category III laboratories. The board is proposing to amend this section by making many of the "recommendations" in the current text "requirements." A category III laboratory is typically used at more complex systems when a high level of sampling is required. These amendments will result in an improved working environment and will promote laboratory technician safety.

DEQ-2, Section 58.49

This section addresses safety equipment and considerations for Category III laboratories. The board is proposing to amend this section by deleting information that covers eyewash devices and safety showers, as this information is already covered in Section 57.30.

DEQ-2, Section 61.129

This section addresses the removal and cleaning of screening material. The board is proposing to amend this section by adding clarifying language that requires washing of the screening material for devices with an opening of 0.5 inch or less. This amendment is necessary as these screens tend to also screen out a significant amount of organic material, which can result in the generation of odors. Washing the screening material will return much of the organic material back to the influent flow stream for treatment in the facility and reduce odors in the headworks building.

DEQ-2, Section 61.130

This section addresses the construction material for bar racks. The board is proposing to add this new section to specify what materials are acceptable for use in the construction of bar racks due to the corrosive environment.

DEQ-2, Section 61.16

This section addresses the cleaning needs for facilities that use coarse screens. The board is proposing to add this new section to require that hosing equipment be provided for cleaning. The parent document has the same requirement for fine screen facilities.

DEQ-2, Section 61.21

This section addresses the use of fine screens in wastewater treatment facilities. The board is proposing to amend this section by adding clarifying language that lists the various types of screens that can be used and by requiring automated washing of screening material for all fine screens. This amendment is necessary because fine screens tend to also screen out a significant amount of organic material, which can result in the generation of odors. Washing the screening material will return much of the organic material back to the influent flow stream for treatment in the facility and reduce odors in the headworks building.

DEQ-2, Section 61.22

This section addresses the design and installation of fine screens. The board is proposing to amend this section by adding language that allows the manufacturer of the fine screen to determine if a coarse screen should precede the fine screen. The cleaning strategies and mechanism of present-day fine screens does not necessitate the need for coarse screens.

DEQ-2, Section 61.25

This section addresses the use of hoods on fine screens. The board is proposing to add this new section requiring that fine screens be equipped with hoods to contain any aerosols and spray from the backwash system. This amendment is necessary for operator safety and to prevent the floor from becoming wet and slippery.

DEQ-2, Section 62.2

This section addresses considerations for the use of comminuters and grinders in wastewater treatment. The board is proposing to amend this section by adding clarifying language indicating that accumulation of stringy material, from use of these devices, may require special design considerations to protect equipment in downstream unit processes, as well as result in additional operation and maintenance activities for operations.

DEQ-2, Section 63.3

This section addresses design parameters for grit removal facilities. The board is proposing to amend this section by adding clarifying language that defines what flow designates a small treatment system and providing recommended design parameters for aerated grit chambers and horizontal grit chambers. The values reported were obtained from a document entitled, "Wastewater Engineering Treatment and Reuse," by Metcalf & Eddy (4th edition).

DEQ-2, Section 65.2

This section addresses the location of flow equalization basins. The board is proposing to amend this section by making the current "recommendation," that equalization basins be located downstream of pretreatment facilities, a "requirement." Flow equalization is typically used for mechanical treatment facilities that are also equipped with screening devices. Requiring this layout will prevent the excessive accumulation of solids in the equalization basin, making maintenance of the system easier for the operator.

DEQ-2, Section 65.51

This section addresses mixing and draw-off piping in flow equalization basins. The board is proposing to amend this section by making the current "recommendation," that corner fillets and hopper bottoms be used in equalization basins, a "requirement." A hopper bottom provides the most efficient means for the removal of any solids that settle out and will simplify maintenance activities associated with the equalization basin.

DEQ-2, Section 71.2

This section addresses flow distribution and control for clarifiers. The board is proposing to add language that prevents the use of valves for flow proportioning. This amendment is necessary because valves are more susceptible to plugging. In addition, since they are submerged, a visual confirmation to assess if flows are being evenly split between multiple units cannot be made. This can lead to flow imbalances resulting in overloading to individual tanks.

DEQ-2, Section 72.1

This section addresses clarifier dimensions. The board is proposing to amend this section by increasing the minimum side water depth for primary clarifiers from seven to ten feet. This amendment is recommended in the parent document. In addition, clarifying language has been added recommending that a minimum side wall depth of 16 feet be used to meet stringent phosphorous or total suspended solid limits (TSS). The increased depth will provide increased settling and improve the removal of particles. The 16 foot side water depth is based on values reported in a document entitled "Wastewater Engineering Treatment and Reuse," by Metcalf & Eddy (4th edition).

DEQ-2, Section 72.21

This section addresses surface overflow rates for primary and intermediate settling tanks. The board is proposing to amend this section by recommending a maximum detention time of 2.5 hours in the primary settling tank. This value was obtained from a document entitled "Wastewater Engineering Treatment and Reuse," by Metcalf & Eddy (4th edition). The board is also proposing to amend this section by adding recommended language from the parent document that addresses surface overflow rates for intermediate settling tanks.

DEQ-2, Section 72.8

This section addresses the use of baffles in settling basins. The board is proposing to add this new section recommending that baffles be utilized in settling basins for systems that must meet stringent phosphorous or TSS limits. The baffles prevent short-circuiting caused by density currents resulting in improved treatment.

DEQ-2, Section 73.2

This section addresses sludge collection and removal from clarifiers. The board is proposing to amend this section by adding language from the parent document that recommends suction withdrawal from clarifiers over 60 feet in diameter and for activated sludge facilities that nitrify.

DEQ-2, Section 72.23

This section addresses sludge removal piping diameters. The board is proposing to amend this section by allowing sequencing batch reactors and membrane bioreactor plants to have sludge removal piping that is four inches in diameter. This amendment is consistent with the manufacturer's recommendations for these types of facilities. In addition, language was added requiring that provisions be made that allow for the return sludge to be sampled, which will enhance operability of the plant.

DEQ-2, Section 73.24

This section addresses sludge removal from clarifiers. The board is proposing to amend this section by discouraging the use of air-lift pumps for secondary sludge removal where stringent TSS or phosphorous limits are required. Air-lift pumps lack the capability of providing a wide range of flow control limiting the operability of the clarifier and the operator's ability to optimize unit process performance.

DEQ-2, Section 74.4

This section addresses the use of covers on final settling basins to prevent them from freezing. The board is proposing to amend this section by adding language that recommends nitrogen removal facilities consider covering their final settling basins, which have been shown to be prone to freezing in some parts of the state.

DEQ-2, Section 81

This section addresses facilities for sludge processing at mechanical treatment plants. The board is proposing to amend this section by adding recommended language from the parent document requiring that the department be contacted if any sludge processing system is being considered that is not covered by these standards, to ensure that state and federal sludge disposal requirements can be met.

DEQ-2, Section 82

This section provides key considerations in the selection of sludge handling processes. The board is proposing to amend this section by adding clarifying language that discusses the importance of time and temperature to meet pathogen and vector attraction reduction in accordance with regulations for sludge stabilization provided in 40 CFR Part 503. This amendment is recommended in the parent document.

DEQ-2, Section 84.132

This section addresses the installation of access manholes on the top of anaerobic digesters. The board is proposing to amend this section by adding clarifying language from the parent document that recommends the access manholes have a 30-inch diameter.

DEQ-2, Section 84.31

This section addresses the design of the anaerobic digester tank capacity. The board is proposing to amend this section by adding clarifying language from the parent document that requires consideration of the solids retention time at peak loadings in the determination of tank capacity. The board is also proposing to amend this section by making the "recommendation," that tank sizing design calculations be submitted to the department, a "requirement."

DEQ-2, Section 84.45

This section addresses the installation of electrical equipment associated with anaerobic digester appurtenances. The board is proposing to amend this section by changing the electrical requirement from Class I, Division 2 to Class I, Division 1. This amendment is required in the parent document.

DEQ-2, Section 84.47

This section addresses ventilation requirements for areas that contain anaerobic digester appurtenances and digester gas piping. The board is proposing to amend this section by adding recommended language from the parent document that requires at least 12 complete air changes per hour, on a continuous basis, for areas designated Class I, Division 2.

DEQ-2, Section 84.531

This section addresses heating requirements for anaerobic digesters. The board is proposing to amend this section by adding clarifying language from the parent document that recommends an operating temperature range of 85° to 100 °F for the optimization of mesophilic digestion.

DEQ-2, Section 84.542

This section addresses the use of boilers to heat sludge in anaerobic digesters. The board is proposing to amend this section by making the "recommendation," that boiler controls be automatic, a "requirement." Automatic controls will enhance operator safety and optimize system performance.

DEQ-2, Section 84.7

This section addresses anaerobic digestion sludge production. The board is proposing to add this new section by removing information from existing DEQ-2, Section 88.11, which covered anaerobic solids production values based on the treatment process and population equivalents, and inserting that information into new Section 84.7.

DEQ-2, Section 85.4

This section addresses mixing equipment in aerobic digesters. The board is proposing to amend this section by including a minimum mixing energy requirement of 0.75 Hp/1000 ft^3 of digester capacity for mechanical mixing equipment. This value was obtained from a document entitled "Wastewater Engineering Treatment and Reuse" by Metcalf & Eddy (4th edition).

DEQ-2, Section 85.8

This section addresses aerobic digestion sludge production. The board is proposing to add this new section by removing information from existing DEQ-2, Section 88.12, which covered aerobic solids production values based on the treatment process and population equivalents, and inserting that information into new Section 85.8.

DEQ-2, Section 86.3

This section addresses odor control from sludge storage tanks. The board is proposing to amend the section by deleting the sentence that states: "The reviewing authority should be contacted for design and air pollution control objectives to be met for various types of air scrubber units." The department does not have design standards for air scrubber units.

DEQ-2, Section 87.23

This section addresses piping supports located in digestion tanks. The board is proposing to amend this section by stressing the importance of designing the piping support system to withstand the corrosive environment of the digestion tank.

DEQ-2, Section 88.1

This section addresses sludge dewatering. The board is proposing to amend the section by deleting information that pertains to aerobic and anaerobic solids production values. The deleted information is being relocated to sections 84.7 and 85.8.

DEQ-2, Section 88.3

This section addresses the use of ponds as sludge dewatering units. The board is proposing to amend the section by deleting the information related to sludge dewatering and relocating it to Section 89.2, which addresses sludge storage ponds. This revision is recommended in the parent document.

DEQ-2, Section 88.32

This section addresses protection of the water supply in mechanical dewatering facilities. The board is proposing to add this new section by adding recommended language from the parent document that requires the water system to be designed in accordance with Section 56.23 (Indirect Connections) of DEQ-2. This amendment will ensure that the water supply remains adequately protected from contamination.

DEQ-2, Section 89.22

This section addresses the location of ponds for sludge storage. The board is proposing to add language that requires a minimum separation of 500 feet between water wells and sludge storage ponds. This separation distance is required by a provision in state water quality laws at 75-5-605, MCA.

DEQ-2, Section 89.23

This section addresses the seal of ponds used for sludge storage. The board is proposing to add language that requires the test results from the leakage test be submitted to the department for approval. This will ensure that the leakage meets department standards.

DEQ-2, Section 89.25

This section addresses the use of ponds for sludge storage. The board is proposing to add this new section by adding recommended language from the parent document that requires that the pond be equipped with a method of decanting and for supernatant to be returned to the treatment process.

DEQ-2, Section 89.31

This section addresses the disposal of sludge. The board is proposing to add this new section by adding recommended language from the parent document that requires drainage facilities at sludge vehicle transfer stations to collect and return any spillage or washdown material to the treatment plant or sludge storage facility.

DEQ-2, Section 89.32

This section addresses the disposal of sludge via sanitary landfilling. The board is proposing to amend this section by adding language that explains that sludges typically must pass a Toxicity Characteristic Leaching Procedure (TCLP) test for disposal in a landfill. In addition, language has been added requiring documentation from the operating authority of the landfill stating that they are licensed and willing to accept sewage sludge.

DEQ-2, Section 89.33

This section addresses the disposal of sludge via land application. The board is proposing to amend this section by adding recommended language from the parent document that lists several design considerations for the proper disposal of sludge at a land application site. Clarifying language was also added stating that a sludge disposal permit from the U.S. Environmental Protection Agency (EPA), along with department approval, is required for the land application of sludge.

DEQ-2, Section 91.211

This section addresses the wastewater distribution system in trickling filters. The board is proposing to amend this section by adding recommended language from the parent document that adds design considerations for rotary distributors and motor driven distributor arms.

DEQ-2, Section 92.12

This section addresses the use of activated sludge for wastewater treatment. The board is proposing to amend the section by deleting information that pertains to sequencing batch reactors. Design considerations for sequencing batch reactors are addressed in Section 96.

DEQ-2, Section 92.2

This section addresses the pretreatment of wastewater for activated sludge facilities. The board is proposing to amend this section by adding recommended language from the parent document that requires screening devices, with a clear opening of 1/4-inch or less, to be provided prior to the activated sludge process.

DEQ-2, Section 92.31

This section addresses capacities and permissible loadings in activated sludge facilities. The board is proposing to amend this section by adding clarifying language that references Section 95.31 for the design of systems that incorporate nitrification into the treatment process.

DEQ-2, Section 92.32 b

This section addresses short-circuiting trough small aeration tanks at activated sludge plants. The board is proposing to amend this section by requiring that tanks be designed with a means of positive control. This requirement prevents short-circuiting through the tank.

DEQ-2, Section 92.331

This section addresses the general requirements associated with the oxygen demand at activated sludge plants. The board is proposing to amend this section by adding clarifying language that requires, in addition to the maximum diurnal organic loading, that the diurnal peak TKN loading be taken into account for nitrogen removal plants. Furthermore a reference is included directing the design engineer to Section 95.31 for additional nitrification design considerations.

DEQ-2, Section 92.41

This section addresses return sludge rates for activated sludge facilities. The board is proposing to amend this section by adding recommended language from the parent document that includes minimum and maximum return sludge rates for step aeration, complete mix, and single stage nitrification processes, and requiring design flexibility that enables operation in various process modes. In addition, return sludge rates for Biological Nutrient Removal treatment processes have been added. The range of 70% to 120% is supported by information from the Water Environment Federation (WEF) in a document entitled "Design of Municipal Wastewater Treatment Plants" (4th edition) and from a seminar entitled "Basics of Biological Nutrient Removal" presented to department staff by Dr. Bill Oldham in February 2009.

DEQ-2, Section 92.5

This section addresses flow measuring devices for various unit processes. The board is proposing to amend this section by making the "recommendation," that flow rate measuring devices be installed for various unit processes, a "requirement." This amendment will ensure that the design is not limiting the operator's ability to optimize unit process performance.

DEQ-2, Section 93.26

This section addresses the separation distance between water wells and wastewater treatment ponds. The board is proposing to add this new section that requires a minimum separation of 500 feet between water wells and wastewater treatment ponds. This separation distance is required by a provision in state water quality laws at 75-5-605, MCA. Language is also included that directs the design engineer to Section B.6 for the separation requirements for storage ponds.

DEQ-2, Section 93.34

This section addresses the number of treatment cells and piping requirements for treatment ponds. The board is proposing to amend this section by making the "recommendation," that piping flexibility be incorporated into the design to allow for isolation of a treatment cell or splitting the flow to two or more cells, a "requirement". Piping flexibility is essential for providing adequate treatment under different operational scenarios.

DEQ-2, Section 93.341

This section addresses controlled discharge facultative treatment lagoon system design considerations. The board is proposing to delete this section as this information is included in Table 93-1, entitled "Facultative Pond Design Criteria."

DEQ-2, Section 93.342

This section addresses flow through facultative treatment lagoon system design considerations. The board is proposing to delete this section as this information is included in Table 93-1, entitled "Facultative Pond Design Criteria."

DEQ-2, Section 93.36

This section addresses design criteria for facultative ponds. The board is proposing to amend this section by changing the minimum operating depth of storage cells from two feet to one foot for land application and total retention systems. This amendment is necessary so the minimum operating level in Table 93-1 is in agreement with Note 2 of the Table, which states the detention time for storage lagoons can be based on the volume between one foot and the maximum operating depth. In addition, the board is proposing to amend the minimum operating depth of the primary cell for total retention systems from two feet to four feet. Since total retention systems are typically utilized in smaller communities with lower flows, this amendment will ensure that the primary cell is not oversized and is able to maintain an adequate depth of water, especially during system start-up, to keep the sludge covered, minimize odors, and provide better treatment.

DEQ-2, Section 93.411

This section addresses pond embankment or dike construction. The board is proposing to amend this section by deleting the reference to the Standard Proctor Density and instead referencing AASHTO T99 and ASTM D698 for compaction requirements. Referencing AASHTO T99 and ASTM D698 is consistent with the compaction methods cited in the revised Section 33.83 of DEQ-2,which relies on the standards and methods in the document entitled "Montana Public Works Standard Specifications (MPWSS)" (6th edition).

DEQ-2, Section 93.415

This section addresses freeboard depths for wastewater treatment pond systems. The board is proposing to amend this section by adding clarifying language that defines a small treatment system as being 25,000 gallons per day or less.

DEQ-2, Section 93.416 b

This section addresses the use of riprap on the interior slopes of pond embankments for erosion control. The board is proposing to amend this section by deleting the sentence that allows for riprap to be limited only to interior dikes receiving prevailing winds. Previous projects have shown that, where limited riprap has been allowed, erosion still occurs on the interior slopes at the water line and from rain and snowmelt around the entire pond, regardless of wind direction.

DEQ-2, Section 93.421

This section addresses pond bottom construction. The board is proposing to amend this section by deleting the reference to the Standard Proctor Density and instead referencing AASHTO T99 and ASTM D698 for compaction requirements. Referencing AASHTO T99 and ASTM D698 is consistent with the compaction methods cited in the revised Sections 93.411 and 33.83 of DEQ-2, which rely on the standards and methods in the document entitled "Montana Public Works Standard Specifications (MPWSS)" (6th edition).

DEQ-2, Section 93.422

This section addresses pond seal leakage requirements. The board is proposing to amend this section by adding language that clarifies the leakage allowances, testing duration, and testing protocol for pond liners. This amendment is necessary to ensure that the leakage test is included in the specifications for review and approval by the department. In addition, language from the parent document was added that clarified the testing of soil and bentonite liners.

DEQ-2, Section 93.434

This section addresses the placement of influent lines in treatment ponds. The board is proposing to amend this section by adding clarifying language that the influent line must be located above the required sludge storage depth. This will ensure that flow into the treatment pond does not become obstructed.

DEQ-2, Section 93.442 a 3

This section addresses drawdown structure design for irrigation storage ponds. The board is proposing to add this new section that allows the bottom pipe for land application systems to be located one foot above the pond bottom. Adding this design standard will provide consistency with the allowable operating range proposed in Table 93-1for land application systems.

DEQ-2, Section 93.442 a 4

This section addresses piping requirements for cell bypass. The board is proposing to amend this section by deleting the language associated with cell bypass requirements as this information is already included in Section 93.34.

DEQ-2, Section 95

A provision in this section allows department approval for other biological processes not covered in DEQ-2. The board is proposing to relocate this information from existing Section 95 to new Section 98.

DEQ-2, Section 95

The information in this section addresses design standards for Biological Nutrient Removal (BNR) wastewater treatment systems. The board is proposing to add new information in Section 95 to ensure that key design components and requirements for the biological removal of phosphorus and nitrogen are addressed in the design of BNR facilities to optimize treatment and operability. The board finds that the inclusion of this new information in DEQ-2 is necessary so that owners and operators of public sewage systems have the necessary design standards for installing BNR treatment as a means to meet future permit limits for phosphorus and nitrogen.

The design standards proposed for inclusion in this section are supported by information from the following documents and seminars: (1) Water Environment Federation's (WEF) "Design of Municipal Wastewater Treatment Plants" (4th edition); (2) WEF's Manual of Practice No.34 entitled "Nutrient Removal"; (3) "Biological Nutrient Removal in Advanced Wastewater Treatment Plants: Design and Operational Considerations," a seminar presented to department staff by Glen Daigger (May 2011); (4) "Phosphorus Removal - Tips for Operators, Trainers, and Design Engineers," a WEF Webcast (June 2011); (5) "Biological Nutrient Removal," a seminar presented to department staff by Ron Schuyler (June 2011); (6) "Basics of

Biological Nutrient Removal," a seminar presented to department staff by Dr. Bill Oldham (February 2009); (7) "Improving Performance of Biological Wastewater Treatment Systems," an METC sponsored course (August 2008); (8) "2009 Nutrient Removal Conference," a WEF sponsored course; and (9) "2007 Nutrient Removal Conference," a WEF sponsored course.

DEQ-2, Section 96

This section addresses design standards for Sequencing Batch Reactor (SBR) wastewater treatment systems. The board is proposing to add this new section to DEQ-2 to ensure that key design components and requirements are addressed in the design of SBR facilities to optimize treatment and operability. The board finds that the inclusion of this new information in DEQ-2 is necessary so that owners and operators of public sewage systems have the necessary design standards for installing SBR treatment as a means to meet future permit limits for nitrogen and phosphorus.

The design standards proposed for inclusion in this section are supported by information from: (1) the parent document; (2) WEF's document entitled "Design of Municipal Wastewater Treatment Plants" (4th edition); (3) Texas Commission on Environmental Quality's "Chapter 217 - Design Criteria for Domestic Wastewater Systems"; (4) "Aqua SBR Design Manual"; and (5) State of Washington Department of Ecology's "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 97

This section addresses design standards for Membrane Bioreactors (MBR) wastewater treatment systems. The board is proposing to add this new section to ensure that key design components and requirements are addressed in the design of MBR facilities to optimize treatment and operability. The board finds that the inclusion of this new information in DEQ-2 is necessary so that owners and operators of public sewage systems have the necessary design standards for installing MBR treatment as a means to meet future permit limits for nitrogen and phosphorus.

The design standards proposed for inclusion in this section are supported by information from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition) and the "2008 Membrane Technology," which is a WEF sponsored course.

DEQ-2, Section 98

This section addresses approval for other biological processes not covered in DEQ-2. This new section refers the reader to Section 53.2, which contains the requirements for approval and use of innovative technologies not covered in DEQ-2.

DEQ-2, Section 102.2

This section addresses chlorine dosages. The board is proposing to amend this section by adding dosage requirements for lagoon facilities and changing trickling films to fixed films, which is a more general term and includes rotating biological contactor systems as well.

DEQ-2, Section 102.31

This section addresses the storage of chlorine gas cylinders. The board is proposing to amend this section by making the "recommendation," that chlorine gas cylinders be stored upright, a "requirement." Proper storage will enhance operator safety.

DEQ-2, Section 102.32

This section addresses the storage of chlorine gas in one-ton containers. The board is proposing to amend this section by adding language that states a means for securing the containers must be provided. Proper storage will enhance operator safety.

DEQ-2, Section 102.45

This section addresses piping requirements for chlorine disinfection systems. The board is proposing to amend this section by adding recommended language from the parent document, which requires that a chlorine piping system be color coded to ensure that interconnection between the chlorine and sodium hydroxide systems cannot occur. These amendments will promote operator safety.

DEQ-2, Section 102.511

This section addresses the use of locker-type chlorine enclosures for small systems. The board is proposing to amend this section by adding language from Section 5.4.2 of Circular DEQ-1, entitled "Standards for Water Works" (2006 edition). This amendment will provide cost savings to small systems.

DEQ-2, Section 102.53

This section addresses heating requirements for chlorination rooms. The board is proposing to amend this section by adding recommended language from the parent document, which allows liquid hypochlorite to be stored in unheated areas.

DEQ-2, Section 102.6

This section addresses sampling and testing associated with chlorine disinfection. The board is proposing to amend this section by adding clarifying language that states sampling must be done in accordance with permit requirements.

DEQ-2, Section 103.2

This section addresses dechlorination chemical dosages. The board is proposing to amend this section by adding recommended language from the parent document, which includes dosage requirements for sodium thiosulfate and sodium sulfite.

DEQ-2, Section 103.42

This section addresses mixing requirements for dechlorination systems. The board is proposing to amend this section by adding language from the parent document, which recommends that the chemicals be introduced at a point of adequate hydraulic turbulence or requires that mechanical mixing be provided.

DEQ-2, Section 103.51

This section addresses the storage of dechlorination chemicals. The board is proposing to amend this section by making the "recommendation," that sulfur dioxide housing guidelines follow those used for chlorine gas, a "requirement." This amendment will promote operator safety.

DEQ-2, Section 104

This section addresses ultraviolet (UV) radiation disinfection systems. The board is proposing to amend this section by expanding its content to include both open channel and closed vessel UV units and providing additional requirements that relate to the characterization of the wastewater, system hydraulics, installation and maintenance considerations, system sizing, electrical provisions, and spare parts needs. Due to safety concerns with chlorine disinfection, and as UV technology has evolved, the use of UV to meet disinfection needs has been on the rise. Expansion of the UV disinfection system section will ensure improved system design and reliability.

DEQ-2, Chapter 110

This chapter addresses supplemental treatment processes with a specific emphasis on phosphorus removal by chemical treatment. The board is proposing to amend this chapter to expand the process design requirements for coagulation, chemical mixing, flocculation, and filtration. This amendment will change the current focus from phosphorus removal to only clarification in general.

DEQ-2, Section 111.123

This section addresses feed water characteristics and conditions that must be considered in the clarification process. The board is proposing to add this new section to ensure that water and solid characteristics, over the range of conditions expected, are defined for the proposed clarification process. The language for this section was obtained from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 111.21

This section addresses dosage considerations for the coagulation process. The board is proposing to amend this section by adding design considerations and requirements for coagulation processes that use charge neutralization or sweep coagulation. This amendment will ensure that key design parameters are addressed when these processes are proposed. The language for this section was obtained from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 111.22

This section addresses chemical selection for phosphorus removal. The board is proposing to amend this section by adding language from the parent document, which recommends that additional considerations in the chemical selection process. This amendment will ensure a more thorough evaluation regarding chemical selection.

DEQ-2, Section 111.24

This section addresses chemical mixing for the coagulation process. The board is proposing to amend this section by adding design considerations and requirements for mechanical mixers and in-line static mixers. This amendment will ensure that key design parameters are addressed when these devices are used. The language for this section was obtained from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 111.25

This section addresses flocculation for the clarification process. The board is proposing to amend this section by adding design considerations and requirements for flocculation basins. This amendment will ensure that key design parameters are addressed in the design of flocculation basins. The language for this section was obtained from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition).

DEQ-2, Section 111.26

This section addresses settling for the clarification process. The board is proposing to amend this section by referencing additional settling processes that are located in Circular DEQ- 1. This amendment will give the designer more options for solids separation in the clarification process, as well as provide basic design requirements.

DEQ-2, Section 111.27

This section addresses filtration for the clarification process. The board is proposing to amend this section by establishing filtration design requirements based on treatment objectives and effluent uses. Given the potential for human contact when the use of reclaimed wastewater is approved by the department, the board is proposing to require filtration for reclaimed wastewater that is equivalent to the filtration required in the drinking water industry. Due to the variety of filters available and accompanying design requirements, the board is proposing language that requires compliance with Circular DEQ-1, Section 4.2 (Filtration), rather than repeat those requirements in DEQ-2. This amendment will ensure that adequate filtration units are used for the proposed uses.

DEQ-2, Section 111.33

This section addresses dry chemical feed systems for phosphorus removal. The board is proposing to amend this section by adding some additional design requirements from Circular DEQ-1, "Standards for Water Works," for dry chemical feed systems including the use of gravimetric or volumetric feeders and mixing requirements for dissolved solutions. These amendments will improve the delivery of dry chemicals to the treatment process.

DEQ-2, Chapter 120

This chapter addresses design standards and other considerations for irrigation and rapid infiltration systems. The board is proposing to replace and incorporate the existing design standards from DEQ-2 (1999 edition) in Appendix B, "Standards for the Spray Irrigation of Wastewater," and Appendix D, "Standards for Rapid Infiltration Basins," into a new Chapter 120. As proposed, the new chapter 120 will not only include the information from both Appendix B and D, but also expand and clarify the content of the information in the current Appendix B. The new information relating to the irrigation with wastewater is necessary to provide design considerations, including tables and equations, from a document entitled "Process Design Manual for Land Treatment of Municipal Wastewater Effluents," published by the U.S. EPA.

DEQ-2, Section 121

Section 121, formerly Appendix B, provides design standards for the irrigation of wastewater at or below agronomic rates. Notable additions to Section 121 include the development of treatment standards and an associated classification system for reclaimed wastewater used for irrigation and the inclusion of key design components from a document entitled "Process Design Manual for Land Treatment of Municipal Wastewater Effluents," published by the U.S. EPA.

In the current version of DEQ-2, EPA's design manual for land treatment is merely incorporated by reference. In this rulemaking, the board is proposing to insert key portions of the text, tables, and equations from EPA's manual into Section

121, which will simplify the review process by eliminating the need to cross reference against the EPA document. The board is also proposing to enhance the requirements and content of the Operations and Maintenance (O&M) Manual for irrigation with wastewater by requiring a discussion of critical operation tasks and the establishment of a recordkeeping database to track irrigation practices. A comprehensive O&M Manual is necessary to ensure that the irrigation with reclaimed wastewater occurs in accordance with the department's approval.

Other provisions of EPA's manual proposed for inclusion in Section 121 are requirements for buffer zones, access control of the irrigation site, effluent monitoring, and soil testing. These provisions will ensure that public health and any potential receiving waters are protected during land treatment of domestic wastes.

In addition, the board is proposing to include classifications and associated treatment standards for reclaimed wastewater that is applied to land at or below agronomic rates. The new classes and standards that are required for irrigation uses at agronomic rates are identified in Section 121.3. That section establishes four classifications of reclaimed wastewater that differ by the degree of additional treatment required for each class following secondary treatment, as specified in 40 CFR Part 133. The four classifications of reclaimed wastewater that are identified in Section 121.3 require less treatment than classes that meet the definition of "unrestricted reclaimed wastewater" that are included in revised Appendix B. A more detailed explanation of the derivation of the four classes and associated treatment standards is provided in the board's reasons for revising Appendix B. The board is proposing to adopt these four classifications and associated treatment standards for land treatment of effluent, because the additional treatment requirements specified in Section 121.3, along with the monitoring, reporting, and design requirements proposed for adoption in Section 121, will ensure that public health and the beneficial uses of any potential receiving water will be protected.

<u>DEQ-2, Section 122</u>

Section 122, formerly Appendix D, provides design standards for rapid infiltration systems. The board is proposing to revise Section 122 by including tables and text from EPA's document entitled "Process Design Manual for Land Treatment of Municipal Wastewater Effluents" (2006 edition), relating to the design of rapid infiltration systems. These additions from EPA's manual include hydraulic loading rates, infiltration/percolation basin loading requirements, and minimum number of cells. In addition, the board is proposing to include design guidance for the use of subsurface absorption cells, also known as ground water infiltrators, for the disposal of treated effluents in Section 12.24, as an addition to traditional "open basin" design requirements. The board is proposing these revisions to provide clarity to the design requirements for rapid infiltration systems.

<u>DEQ-2, Appendix A, Section A.11</u>

This section addresses the handling of septage at wastewater treatment facilities. The board is proposing to amend this section by adding language from the parent document, which recommends that grease not be hauled to wastewater treatment plants for disposal.

DEQ-2, Appendix A, Section A.12

This section addresses the characterization of septage. The board is proposing to amend this section by adding language from the parent document, which recommends that the septage source be sampled and analyzed with consideration of those results in the design of septage receiving and treatment systems.

DEQ-2, Appendix A, Section A.25

This section addresses the point of introduction of septage into the waste water treatment process. The board is proposing to amend this section by recommending that septage enter the treatment process upstream, or within the headworks of the facility, and clarifying that other points of introduction require adequate justification.

DEQ-2, Appendix A, Section A.36

This section addresses the location of septage-receiving facilities at wastewater treatment plants. The board is proposing to amend this section by adding language that recommends that the septage-receiving facility be located and designed to allow for the slow release of septage into the treatment system during the non-peak periods. This addition is necessary to prevent "shock loads" from upsetting the treatment process that can lead to permit violations.

DEQ-2, Appendix A, Section A.50

This section addresses recording devices at septage-receiving facilities. The board is proposing to amend this section by recommending that a key pad, card reader, or similar recording device be installed at septage receiving facilities. This amendment will help track the source and volume of septage received at the facility.

DEQ-2, Appendix B

This new Appendix B establishes design standards and other considerations for public sewage systems that propose to use reclaimed wastewater for other purposes. In Appendix B, the board is proposing to establish requirements for using reclaimed wastewater for a variety of uses that go beyond its use for irrigation at agronomic rates. If adopted, this proposal will expand the allowable reuse alternatives available to public sewage systems in a manner that is consistent with EPA guidance and national design standards. The board's proposal to adopt new Appendix B, in combination with the irrigation reuse standards in Chapter 120, Section 121, is in response to the recent enactment of House Bill 52 (2011), authorizing the board to adopt rules identifying allowable uses of reclaimed wastewater and classifications for those uses. The newly-enacted state law also requires the adoption of treatment, monitoring, and reporting standards tailored to each classification to protect the uses of the reclaimed wastewater and any receiving water. The classification, standards, and allowable uses proposed for adoption in Appendix B are based on EPA guidance and standards established in many other western states. The levels of treatment for each of the proposed classifications have been extensively evaluated by public health agencies, primarily in California, Washington, Florida, and Texas, and have been determined in each of those states to be protective of public health and the environment.

DEQ-2, Appendix B, Section B-2

This section includes definitions that are used throughout Appendix B. These definitions are necessary to describe and define the allowable uses, treatment standards, and other requirements for the use of reclaimed wastewater.

DEQ-2, Appendix B, Section B.3

This section identifies, in tabular form, all of the allowable uses of reclaimed wastewater proposed for adoption by the board and the class of reclaimed wastewater required for each use. The allowable uses identified in this section will provide alternatives for using reclaimed wastewater, in lieu of potable water, for such things as landscape impoundments, fire fighting, construction dust control and compaction, industrial use, and aquifer recharge and injection.

DEQ-2, Appendix B, Section B.4

This section establishes treatment standards to achieve the quality of reclaimed water that would be required for each of the various uses identified in B.3, Table B-1. Table B-2 in Section B.4 establishes six classifications of reclaimed wastewater that are differentiated by the degree of additional treatment provided following secondary treatment, which is applicable to each class. The highest degree of treatment within the classification system is required for Class A-1 and B-1 reclaimed waters. These waters not only meet the various treatment standards used or recommended by other states and EPA, but must also meet Montana's nondegradation requirements prior to reuse.

DEQ-2, Appendix B, Section B.5

This section establishes requirements for the conveyance of reclaimed wastewater. The board is proposing to require compliance with the standards adopted by the board for the conveyance of drinking water, set forth in Circular DEQ-1. The board is proposing this approach because reclaimed wastewater is typically delivered to the place of reuse in the same manner as drinking water. Therefore, Section B.5 requires compliance with the standards in Circular DEQ-1 for drinking water pumping facilities (DEQ-1, Chapter 6), storage tanks and basins (DEQ-1, Chapter 7), and delivery piping, trenching, and bedding (DEQ-1, Chapter 8). In addition, Section B.5 requires the use of purple piping or marking to identify reclaimed wastewater conveyance systems. This last requirement is based upon EPA guidelines for water reuse.

DEQ-2, Appendix B, Section B.7

This section establishes requirements for fencing and advisory signs as a means of notifying the public and protecting public health when appropriate to do so. The board is proposing to adopt provisions that allow the department to determine when fencing or signs are needed on a case-by-case basis.

DEQ-2, Appendix B, Section B.8

This section requires a written agreement or lease arrangement that secures the land where reclaimed wastewater will be used for a period of 20 years or more. The board is proposing this requirement to avoid situations where the owner of the reclaimed wastewater has no place to send the reclaimed wastewater in the event that a landowner refuses to accept it.

DEQ-2, Appendix B, Section B.9

This section establishes requirements for measuring the flow of reclaimed wastewater on a daily basis and also requires sampling the reclaimed wastewater prior to reuse. The board is proposing to adopt these provisions to ensure that the quality and amount of reclaimed wastewater complies with the department's approval of the reuse project.

DEQ-2, Appendix B, Section B.10

This section establishes specific requirements for an O&M Manual for various uses of reclaimed wastewater. The requirements in this section are tailored to each use so that, when prepared, the manual establishes clear requirements for the operation, treatment, monitoring, and recordkeeping of reclaimed wastewater. This section also authorizes the department to establish and require project-specific operations and monitoring when justified by the project. The board is proposing these requirements to ensure that the reclaimed wastewater system is operated and maintained, according to the department's approval, so that public health and the environment are protected.

DEQ-2, Appendix C

This appendix addresses design standards and considerations for alternative sewer collection systems. The board is proposing to amend Appendix C by expanding its content to include information on small diameter gravity systems, septic tank effluent pump systems, grinder pump systems, and their associated requirements with regard to system hydraulics, material considerations, and connection to conventional sewer systems. The proposed expansion of the appendix requires these systems to have an O&M Manual prior to system start-up and provides guidance on the type of information that must be included in the manual. The standards developed in Appendix C are supported by information from the State of Washington Department of Ecology's document entitled "Criteria for Sewage Works Design" (2008 edition); EPA's document entitled "Alternative Wastewater Collection Systems" (October 1991); and EPA's document entitled "Decentralized Systems Technology Fact Sheet Small Diameter Gravity Sewers" (September 2000).

DEQ-2, Appendix D

This appendix establishes guidelines for sewer rehabilitation. The board is proposing a new Appendix D to provide general information and guidance regarding rehabilitation techniques for sewer mains, sewer service connections, and manholes, which do not require extensive trench excavation and pipe replacement. Rehabilitation methods covered in the appendix include sliplining, cured-in-place pipe, and pipe bursting. The guidelines developed in the new Appendix D are supported by information from EPA's document entitled "Collection Systems O&M Fact Sheet Trenchless Sewer Rehabilitation" (September 1999).

DEQ-2, Appendix E

This appendix addresses required information on capacity development for wastewater systems. The board is proposing a new Appendix E in order to provide the department with the information necessary for its review and evaluation of a proposed new system. The information required in Appendix E includes management, operation, maintenance, and financing of the system. By requiring the submission of this information to the department, the department will be able to evaluate a new system for proper system maintenance, operation, and financial planning that will provide long-term stability of a new system. The language proposed for inclusion in Appendix E is based on language taken from Appendix A of Circular DEQ-1, entitled "Standards for Water Works" (2006 edition). This proposed addition of the information in new Appendix E is necessary to meet the requirements of 75-6-103(2)(f), MCA, which requires the board to adopt rules concerning the technical, managerial, and financial capacity of a proposed public sewage system to ensure that the system is capable of meeting the applicable requirements in DEQ-2.

4. Concerned persons may submit their data, views, or arguments, either orally or in writing, at the hearing. Written data, views, or arguments may also be submitted to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana 59620-0901; faxed to (406) 444-4386; or e-mailed to ejohnson@mt.gov, no later than 5:00 p.m., ____________, 2012. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

5. Katherine Orr, attorney for the board, or another attorney for the Agency Legal Services Bureau, has been designated to preside over and conduct the hearing.

6. The board and department maintain a list of interested persons who wish to receive notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding: air quality; hazardous waste/waste oil; asbestos control; water/wastewater treatment plant operator certification; solid waste; junk vehicles; infectious waste; public water supply; public sewage systems regulation; hard rock (metal) mine reclamation; major facility siting; opencut mine reclamation; strip mine reclamation; subdivisions; renewable energy grants/loans; wastewater treatment or safe drinking water revolving grants and loans; water quality; CECRA; underground/above ground storage tanks; MEPA; or general procedural rules other than MEPA. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be mailed or delivered to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Ave., P.O. Box 200901, Helena, Montana 59620-0901, faxed to the office at (406) 444-4386, e-mailed to Elois Johnson at ejohnson@mt.gov, or may be made by completing a request form at any rules hearing held by the board.

7. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

Reviewed by: BOARD OF ENVIRONMENTAL REVIEW

____________________________ BY: __________________________________

JAMES M. MADDEN
Rule Reviewer

JOSEPH W. RUSSELL, M.P.H.,
Chairman

DEPARTMENT OF ENVIRONMENTAL QUALITY

BY: __________________________________
RICHARD H. OPPER, Director

Certified to the Secretary of State, __________________, 2012.

Montana Department of
ENVIRONMENTAL QUALITY

CIRCULAR DEQ-2

DESIGN STANDARDS FOR ~~WASTEWATER FACILITIES~~ PUBLIC SEWAGE SYSTEMS

DRAFT 3/15/12

2012 Edition

CIRCULAR DEQ-2
(formerly Circular WQB-2)

Adopted 03/24/95
Initially Effective 04/28/95
Revised 8/30/99

Montana Department of Environmental Quality
(Established 07/01/95; formerly Montana Department of Health and Environmental Sciences)

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FOREWORD

The Board of Environmental Review of the State of Montana, as authorized by 75-6-103(2)(f), MCA, has adopted the following standards for wastewater works. The terms "Department", ~~"reviewing authority" and "reviewing agency"~~ as used in these standards refer to the Montana Department of Environmental Quality (DEQ) or its authorized agents.

These standards are intended to establish planning and design criteria for Public Sewage Systems as defined in 17-6-102(13) MCA ~~These standards are intended for wastewater facilities~~ insofar as the criteria are applicable to normal situations for an individual project. The design criteria in these standards are intended for the more conventional municipal wastewater collection and treatment systems where any industrial component of the wastewater is relatively small. When a significant industrial component exists or is planned within a collection system, an effective pretreatment program must be enacted to ensure toxic substances will not disrupt the biological treatment process. ~~Innovative approaches to collection and treatment, particularly for the very small municipal systems, are not included. The DEQ Department should be contacted for design guidance and criteria where such systems are being considered.~~

Lack of description or criteria for a unit process does not suggest it should not be used, ~~but~~ only that consideration by the ~~appropriate reviewing agency~~ Department will be on the basis of information submitted with the design. Engineering data that may be required by the ~~reviewing agency~~ Department, for new process and application evaluation is included in Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives) ~~of these standards~~.

These standards are intended to define limiting values for items upon which an evaluation of such plans and specifications will be made by the ~~reviewing authority~~ Department; and to establish, as far as practicable, uniformity of practice. Users should also be cognizant of applicable federal requirements.

Where sampling procedures or monitoring are required within this document, the procedures and methods used to analyze each sample must follow the Standard Methods for the Examination of Water & Wastewater, 21st edition or its updates.

Deviations from the criteria are allowed on a case-by-case basis. The design engineer must submit a request, with appropriate technical justification, for a deviation from a specific section of the standards indicating how the criteria will be changed.

The terms "shall", "must" and "required" are used where practice is sufficiently standardized to permit specific delineation of requirements or where safeguarding of the public health or protection of water quality justifies such definite action. Other terms, such as "should," "may," "recommended," and "preferred," indicate desirable procedures or methods.

Definition of terms and their use in these standards is intended to be in accordance with GLOSSARY-WATER AND WASTEWATER CONTROL ENGINEERING, jointly prepared by APHA, ASCE, AWWA and WEF (formerly WPCF). The units of expression used are in accordance with those recommended in WEF (formerly WPCF) MANUAL OF PRACTICE NUMBER 6, UNITS OF EXPRESSION FOR WASTEWATER TREATMENT.

These standards are based on Circular ~~WQB-2~~ DEQ-2, Montana Department of Environmental Quality, Design Standards for Wastewater Facilities, ~~1995~~ 1999 Edition, that were based on "The Recommended

Standards for Wastewater Facilities", ~~1990~~ 1997 Edition, prepared by the Great Lakes - Upper Mississippi River Board of State ~~Sanitary Engineers~~ and Provincial Public Health and Environmental Managers. Some modifications were prompted by the "Recommended Standards for Wastewater Facilities", ~~1997~~ 2004 Edition, prepared by the Great Lakes - Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers. The Board of Environmental Review expresses its appreciation to the Great Lakes Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers for its contribution to public health and water quality protection.

CHAPTER 10

ENGINEERING REPORTS AND FACILITY PLANS

10. GENERAL

10.1 Project Submittals

The engineering report or ~~facilities~~ facility plan, including project design criteria, must be submitted prior to submission of project plans and specifications. One draft copy of the engineering report or facility plan should be submitted for solicitation of comments from the Department. Two copies of the final engineering report or facility plan must be submitted. Upon approval, one copy will be stamped "approved," dated, signed by a Department representative and returned to the applicant.

~~Final plans and specifications must be submitted at least 60 days prior to the date on which action by the reviewing authority is desired. Two copies of the final plans must be submitted. Upon approval, one set of the approved plans and specifications must be stamped "approved", dated, signed by a DEQ representative and returned to the applicant.~~

~~No approval for construction can be issued until final, detailed plans and specifications have been submitted and approved by the reviewing agency. Within 90 days following completion of project construction, a professional engineer registered in Montana must certify that the project was built in accordance with the approved plans and specifications.~~

~~A set of "as built" drawings must accompany the certification.~~

11. ENGINEERING REPORT OR FACILITY PLAN

For federal or state financed grant or loan projects, additional requirements may apply.

The Engineering Report or Facility Plan: identifies and evaluates wastewater related problems; assembles basic information; presents criteria and assumptions; examines alternate projects with preliminary layouts and cost estimates; describes financing methods, sets forth anticipated charges for users; reviews organizational and staffing requirements; offers a conclusion with a proposed project for client consideration and outlines official actions and procedures to implement the project. The planning document must clearly describe the benefits and purpose of the proposed project and must include sufficient detail to demonstrate that the proposed project meets applicable criteria.

The concept (including process description and sizing), factual data and controlling assumptions, and considerations for the functional planning of wastewater facilities are presented for each process unit and for the whole system. These data form the continuing technical basis for the detailed design and preparation of construction plans and specifications. Architectural, structural, mechanical, and electrical designs are usually excluded. Sketches may be desirable to aid in presentation of a project. Outline specifications of process units, special equipment, etc., are occasionally included.

Engineering Reports must be completed for minor collection system, pump station, and interceptor projects. Comprehensive Facility Plans must be completed or have been completed for projects involving new, expanded, upgraded, or rehabilitated wastewater treatment facilities and major collection, interceptor sewer, and pump station projects. The determination of classification as major or minor collection interceptor sewer and pump station projects will be made by the ~~regulatory agency~~ Department.

11.1 Engineering Reports

Engineering reports for minor sewer extensions, lift stations, and interceptors must contain the following and other pertinent information as required by the ~~reviewing agency~~ Department.

11.11 Problem Defined

Description of the existing system should include an evaluation of the conditions and problems needing correction.

11.12 Design Conditions

The anticipated average and peak flows and waste load for existing and ultimate conditions must be established. The basis of the projection of initial and future flows and waste loads must be included and must reflect the existing or initial service area and the anticipated future service area. Hydraulic and organic load information and data needed for new facilities are included in Sections 11.24 (Hydraulic Capacity) and 11.25 (Organic Capacity).

11.13 Impact on Existing Wastewater Facilities

The impact of the proposed project on all existing wastewater facilities~~,~~ including gravity sewers, lift stations, and treatment facilities must be evaluated.

11.14 Project Description

A written description of the project is required ~~and site drawings attached where necessary for clarity~~.

11.15 Drawings

Preliminary drawings identifying the site of the project, including the location and alignment of proposed facilities are required.

~~11.15~~ 11.16 Design Criteria

Engineering design criteria to be used in design of the project must be included.

~~11.16~~ 11.17 Site Information

Project site information should include topography, soils, geologic conditions, depth to bedrock, groundwater level, floodway or floodplain considerations, and other pertinent site information.

11.18 Alternative Selection/Analysis

The reasons for selection of the proposed alternative: including any lift station sites, feasibility and how the project fits into a long term plan, should be discussed.

~~11.17~~ 11.19 Environmental Impacts

Adverse environmental impacts, including cumulative and secondary impacts, resulting from the project ~~should~~ must be addressed ~~including~~ along with mitigation efforts. Consideration should be given to minimizing any potential adverse environmental impacts of the proposed project. If appropriate, compliance with planning requirements of federal, state and local regulatory agencies must be documented.

11.2 Facility Plans

Facility Plans must be completed for wastewater treatment facilities, major collection systems, and ~~those~~ interceptor sewers~~,~~ and pump stations serving major areas. Facility Plans must contain the following and other pertinent information as required by the ~~reviewing agency~~ Department.

11.21 Problem Evaluation and Existing Facility Review

a. Descriptions of existing system including condition and evaluation of problems needing correction.

b. Summary of existing and previous local and regional wastewater facility and related planning documents.

11.22 Planning and Service Area

The planning area and existing and potential future service area should be described on a drawing.

11.23 Population Projection and Planning Period

Present and predicted population must be based on a 20 year planning period. Phased construction of wastewater facilities should be considered in rapid growth areas. Sewers and other facilities with a design life in excess of 20 years should be designed for the extended period.

11.24 Hydraulic Capacity

11.241 Flow Definitions and Identification

The following flows for the design year must be identified and used as a basis for design for sewers, lift stations, wastewater treatment plants, treatment units, and other wastewater handling facilities. Where any of the terms defined in this section are used in these design standards, the definition contained in this section applies.

a. Design Average Flow

The design average flow is the average of the daily volumes to be received for a continuous 12-month period expressed as a volume per unit time. However, the design average flow for facilities having critical seasonal high hydraulic loading periods must be based on the daily average flow during the seasonal period.

b. Design Maximum Day Flow

The design maximum day flow is the largest volume of flow to be received during a continuous 24-hour period expressed as a volume per unit time.

c. Design Peak Hourly Flow

The design peak hourly flow is the largest volume of flow to be received during a one-hour period expressed as a volume per unit time.

d. Design Peak Instantaneous Flow

The design peak instantaneous flow is the ~~instantaneous maximum flow rate to be received~~ highest recorded flow rate occurring for a period consistent with the recording equipment.

e. Design Maximum Month Flow

The design maximum month flow is the average daily flow received during the maximum calendar month, or 30 consecutive days, (whichever is greater) expressed as a volume per unit time

11.242 Hydraulic Capacity for Wastewater Facilities to Serve Existing Collection Systems

a. Projections must be made from actual flow data to the greatest extent possible, including the influence of infiltration and inflow. Seasonal variations in flow must be considered.

b. The probable degree of accuracy of data and projections must be evaluated. This reliability estimation should include an evaluation of the accuracy of existing data, as well as an evaluation of the reliability of estimates of flow reduction anticipated due to infiltration/inflow (I/I) reduction or flow increases due to elimination of sewer bypasses and backups.

c. Critical data and methodology used must be included. It is recommended that graphical displays of critical peak wet weather flow data (refer to 11.241 (b) (c) (d) and (e)) be included for a sustained wet weather flow period of significance to the project.

11.243 Hydraulic Capacity for Wastewater Facilities to Serve New Collection Systems

a. The sizing of wastewater facilities receiving flows from new wastewater collection systems must be based on an average daily flow of 100 gallons ($0.38m^3$) per capita plus wastewater flow from industrial plants and major institutional and commercial facilities unless water use data or other justification upon which to better estimate flow is provided.

b. The 100 gpcd figure must be used which, in conjunction with a peaking factor from ~~Figure 1~~ equation (10-1), is intended to cover normal infiltration for systems built with modern construction techniques (refer to Section 31 Separation of Clear Water). An additional allowance should be made where conditions are unfavorable.

$$\frac{\text{Design Peak Hourly Flow}}{\text{Design Average Flow}} = \frac{\left(18 + \sqrt{P}\right)}{\left(4 + \sqrt{P}\right)} \qquad (10\text{-}1)$$

P = population in thousands

Source: Fair, G.M. and Geyer, J.C. "Water Supply and Waste-water Disposal" 1st Ed. John Wiley & Sons, Inc. New York, (1954), P. 136

c. If the new collection system is to serve existing development the likelihood of I/I contributions from existing service lines must be evaluated and wastewater facilities designed accordingly.

11.244 Combined Sewer Interceptors

In addition to the above requirements, interceptors for combined sewers must have capacity to receive sufficient quantity of combined wastewater for transport to treatment facilities to ensure attainment of the appropriate state and federal water quality standards.

11.25 Organic/Nutrient Capacity

11.251 Organic Load Definitions and Identification

Where applicable, the following organic loads for the design year must be identified and used as a basis for design of wastewater treatment facilities. Where any of the terms defined in this section are used in these design standards, the definition contained in this section applies.

a. Biochemical Oxygen Demand

The 5-day Biochemical Oxygen Demand (BOD_5) is defined as the amount of oxygen required to stabilize biodegradable organic matter under aerobic conditions within a five day period in accordance with "Standard Methods for the Examination of Water and Wastewater", latest edition. Total 5-day Biochemical Oxygen Demand ($TBOD_5$) is equivalent to BOD_5 and is sometimes used in order to differentiate carbonaceous plus nitrogenous oxygen demand from strictly carbonaceous oxygen demand.

The carbonaceous 5-day Biochemical Oxygen Demand ($CBOD_5$) is defined as BOD_5 less the nitrogenous oxygen demand of the wastewater. See "Standard Methods for the Examination of Water and Wastewater", latest edition.

~~b.~~ 1. Design Average BOD_5

The design average BOD_5 is generally the average of the organic load received for a continuous 12-month period for the design year expressed as weight per day. However, the design average BOD_5 for facilities having critical seasonal high loading periods must be based on the daily average BOD_5 during the seasonal period.

~~c.~~ 2. Design Maximum Day BOD_5

The design maximum day BOD_5 is the largest amount of organic load to be received during a continuous 24-hour period expressed as weight per day.

~~d.~~ 3. Design Peak Hourly BOD_5

The design peak hourly BOD_5 is the largest amount of organic load to be received during a one-hour period expressed as weight per day.

b. Total Nitrogen

Total nitrogen is the sum of organic nitrogen, ammonia, nitrite and nitrate (all expressed as N). Analytically, organic nitrogen and ammonia are typically reported as Total Kjeldahl Nitrogen (TKN). See "Standard Methods for the Examination of Water and Wastewater", latest edition.

1. Design Average Total Nitrogen

The design average total nitrogen loading is generally the average of the nitrogen load received for a continuous 12-month period for the design year expressed as weight per day. However, the design total nitrogen value for facilities having critical seasonal high loading periods must be based on the daily average total nitrogen load during the seasonal period.

2. Design Diurnal Peak TKN

The design diurnal peak TKN is the largest amount of TKN load to be received during a continuous 24-hour period expressed as weight per day. Where data are not available on TKN variation, a diurnal peak TKN load (lbs/day) of 2.0 times the average load must be assumed.

c. Total Phosphorus

Total phosphorus includes all orthophosphates and condensed phosphates, dissolved and particulate, organic and inorganic. See "Standard Methods for the Examination of Water and Wastewater", latest edition.

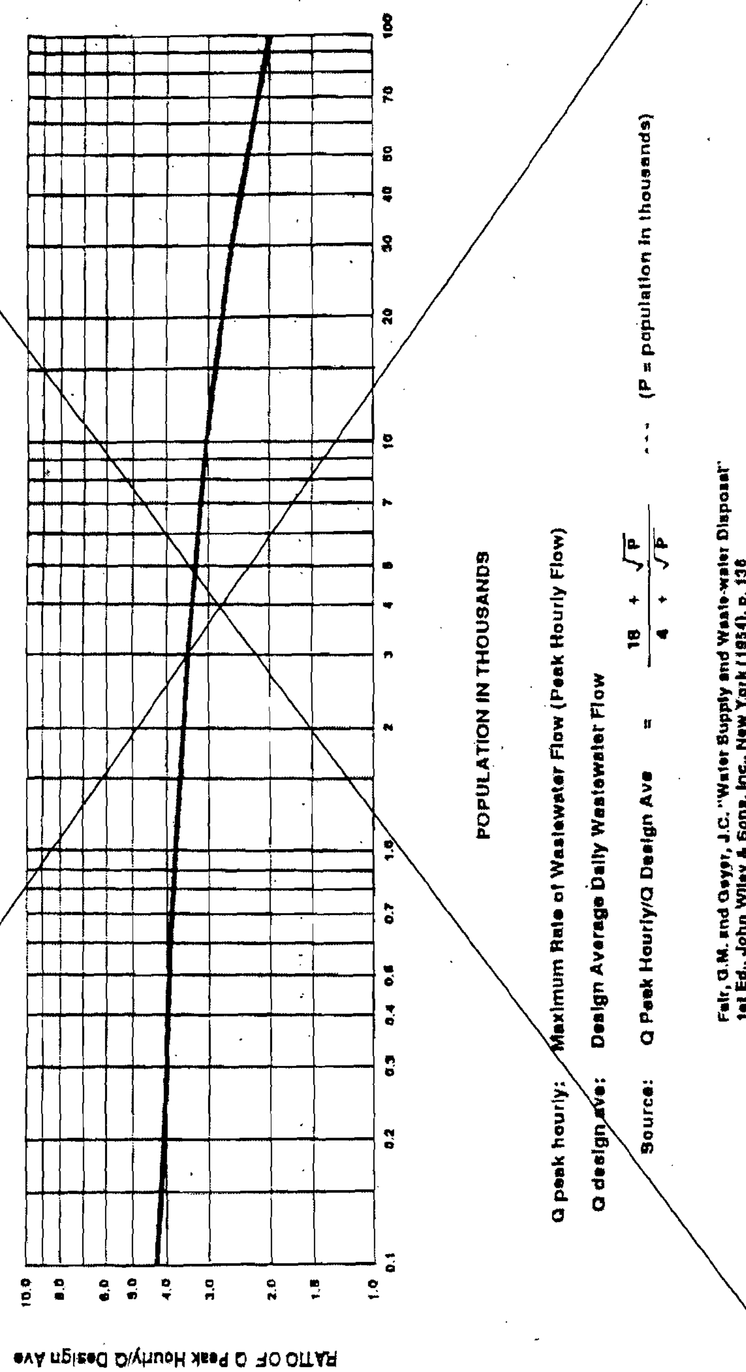
1. Design Average Total Phosphorus

The design average total phosphorus loading is generally the average of the phosphorus load received for a continuous 12-month period for the design year expressed as weight per day. However, the design total phosphorus value for facilities having critical seasonal high loading periods must be based on the daily average total phosphorus load during the seasonal period.

Chapter 10

Engineering Reports and Facility Plans

FIGURE 1
Ratio of Peak Hourly Flow to Design Average Flow



11.252 Design of Organic Capacity of Wastewater Treatment Facilities to Serve Existing Collection Systems.

a. Projections must be made from actual waste load data to the fullest extent possible.

b. Projections must be compared to Section 11.253 and an accounting made for significant variations from those values.

c. Impact of industrial sources must be documented. For projects with significant industrial contributions, evidence of adequate pretreatment strategies must be included, along with documentation that industries are aware of the pretreatment limitations and user costs associated with the project. Documentation of the individual industrial participation in the project plan including user charges must be provided.

d. Septage and leachate may contribute significant organic load and other materials which can cause operational problems and non-compliance with discharge permit limitations. The discharge of septage must be considered in evaluating the organic loading to the proposed treatment facility. See Appendix A:~~,~~ Handling and Treatment of Septage at a Wastewater Treatment Plant.

11.253 Organic Capacity of Wastewater Treatment Facilities to Serve New Collection Systems.

a. ~~Domestic waste~~ Public sewage treatment design must be on the basis of at least 0.20 pounds (0.09 kg) of BOD_5 per capita per day and 0.22 pounds (0.10 kg) of suspended solids per capita per day, unless information is submitted to justify alternate designs. Nutrient loading must be on the basis of at least 0.033 pounds (0.015 kg) of Total Nitrogen per capita per day and 0.009 pounds (0.004 kg) of Total Phosphorus per capita per day, unless information is submitted to justify alternate designs.

b. Industrial contributions. Refer to Section 11.252(c).

c. Septage and leachate. Refer to Section 11.252(d).

d. Data from similar communities (i.e. municipalities, districts, etc.) with generally equivalent conditions may be utilized in the case of new systems. However, a thorough investigation that is adequately documented must be provided to the Department to establish the reliability and applicability of such data.

11.26 Wastewater Treatment Facility Design Capacity

The wastewater treatment facility design capacity is the design average flow at the design average BOD_5 for the most restrictive unit process. Refer to Sections 11.24 (Hydraulic Capacity) and 11.25 (Organic Capacity) for peaking factors that will be required.

11.27 State and Federal Treatment Standards

The ~~facilities~~ facility plan ~~should~~ must identify current and anticipated effluent requirements and describe how the proposed facility will comply with the standards. The effect of the State Nondegradation Policy ~~should~~, approved TMDL, and water quality standards must also be addressed.

11.28 Initial Alternative Development

The process of selection of wastewater treatment alternatives for detailed evaluation must be discussed in the facility plan. All wastewater management alternatives considered, including no action, and the basis for the engineering judgment for selection of the alternatives chosen for detailed evaluation, must be included.

11.29 Detailed Alternative Evaluation

The following must be included for the alternatives to be evaluated in detail.

a. Sewer System Revisions

The proposed revisions to the existing sewer system, including adequacy of portions not being changed by the project, must be discussed in the facility plan.

b. Wet Weather Flows

Facilities to transport and treat wet weather flows in a manner that complies with state and local regulations must be provided.

~~b.~~ **c. Site Evaluation**

When a site must be used which is critical with respect to ~~these~~ the following items, appropriate measures must be taken to minimize adverse impacts.

1. Compatibility of the treatment process with the present and planned future land use, including noise, potential odors, air quality, and anticipated sludge processing and disposal techniques, must be considered.

   Non-aerated treatment ponds should not be used if excessive sulfate is present in the wastewater.

   Wastewater treatment facilities should be separate from human habitation or any area likely to be built up within a reasonable future period and must be separated in accordance with state and local requirements. Refer to Section 93.21 (Distance from Habitation).

2. Zoning and other land use restrictions must be identified.
3. An evaluation of the accessibility and topography of the site must be submitted.
4. Area for future plant expansion must be identified.
5. Direction of prevailing wind must be identified. Other climatological data may be required.
6. Flood considerations, including the 25 and 100 year flood levels, impact on floodplain and floodway, and compliance with applicable regulations regarding construction in flood prone areas, must be evaluated. Refer to Section 51.2 (Flood Protection) for ~~contains~~ requirements ~~for protection from flooding~~.
7. Geologic information, depth to bedrock, karst features, or other geologic considerations of significance to the project must be included. Lagoons must not be located in karst areas unless the specific geologic and construction details are acceptable.
8. Protection of groundwater including public and private wells is of utmost importance. Demonstration that protection will be provided must be included.

The ~~regulatory agency~~ Department must be contacted for required separation.

9. Soil type and suitability for construction and depth to normal and seasonal high groundwater must be identified.
10. The location, depth, and discharge point of any field tile in the immediate area of the proposed site must be identified.
11. A preliminary assessment of site availability must be included.
12. Present and known future effluent quality requirements determined by the Department must be included.
13. Access to the receiving stream for the outfall line must be discussed and displayed.
14. Historical, archeological, or paleontological resources in the immediate area of the proposed project boundary must be identified.
15. Any wetlands within the proposed project boundary must be identified.
16. Federal Aviation Administration (FAA) site determination criteria must be evaluated.
17. Unique, endangered, fragile, or limited environmental resources, including federally listed threatened or endangered species must be identified
18. Where spray irrigation is proposed for effluent disposal, a summary of all applicable site characteristics (i.e. soil permeability, soil water holding capacity, soil salinity and sodium adsorption ratio, soil pH, nitrogen concentrations in existing soils, topography, geologic factors, etc.) must be included.

~~c.~~ d. Unit Sizing

Unit operation and unit process sizing and basis must be provided.

~~d.~~ e. Flow Diagram

Flow diagram of treatment facilities including all recycle flows must be provided.

~~e.~~ f. Emergency Operation

Emergency operation requirements as outlined in Section ~~46~~ 47 (Emergency Operation) and 56.1 (Emergency Power Facilities) must be provided. State or local regulatory agencies may have more stringent requirements.

~~f.~~ g. Technology Not Included in These Standards

~~Section 53.2 outlines procedures for introducing and obtaining approval to use technology not included in these standards.~~ Proposals to use technology and procedures for introducing and obtaining approval to use technology not included in these standards must address the requirements of Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives).

~~g.~~ h. Sludge

The solids disposal options considered and method selected must be included. This is critical to completion of a successful project. Compliance with requirements of Chapter 80~~,~~ (Sludge Processing, Storage, and Disposal), must be assured.

~~h.~~ i. Treatment During Construction

A plan for the method and level of treatment to be achieved during construction must be developed and included in the facility plan ~~that must be submitted to the reviewing agency~~ for review and approval by the Department. This approved treatment plan must be implemented by inclusion in the plans and specifications to be bid for the project. Refer to Section 20.15 (Operation During Construction) and Section 21 (Specifications).

For facilities with a discharge permit, appropriate personnel in the Department's Permitting program must be notified of a planned unit bypass as required in the discharge permit.

j. Plan of Operation / Start-Up Protocol

A Plan of Operation for the start-up the new facility may be required by the Department. The hiring and/or training of wastewater treatment operator(s), required operation and maintenance practices, and projected costs of operation and maintenance may be required.

~~i.~~ k. Operation and Maintenance

Portions of the project which involve complex operation or maintenance requirements must be identified including laboratory requirements for operation, industrial sampling, and self-monitoring. In all cases, an operation and maintenance manual will be required unless waived by the ~~reviewing agency~~ Department.

~~j.~~ l. Cost Estimates

Cost estimates for capital, operation and maintenance (including basis), engineering services (i.e. design, construction, inspection, etc.), administration, and contingencies must be included. ~~and an~~ An economic analysis (i.e., a present worth analysis) of these costs must also be included.

m. Staffing Requirements

Consideration must be given to operator requirements and their related impacts to the operation and maintenance budget for the alternatives proposed. Wastewater treatment system classifications and corresponding certifications are as follows:

Class 1 wastewater operator certification is required for the operation of conventional activated sludge plants, biological nutrient removal plants, ammonia conversion processes or other tertiary processes such as effluent filtration and membrane bioreactor systems;

Class 2 wastewater operator certification is required for the operation of extended aeration activated sludge plants such as oxidation ditches and package plants, fixed-growth trickling filter and bio-disc plants, or sequencing batch reactors;

Class 3 wastewater operator certification is required for the operation of mechanically aerated pond systems; and

Class 4 wastewater operator certification is required for the operation of ponds that do not utilize mechanical aeration.

The highly automated nature of class 1 (and some class 2) systems will require increased operator attention and skill level (computer and circuitry knowledge), and increased process control testing for proper operation. For class 1 and class 2 systems, two or more full-time operators, with formal training specific to system operations (e.g., membrane bioreactors, biological nutrient removal, sequencing batch reactors, etc.) are strongly recommended. A back-up operator is recommended for all systems.

n. Environmental Review

Environmental impacts, including cumulative and secondary impacts, of ~~effects of~~ each alternative ~~should~~ must be evaluated. Impacts on the physical environment and human population, as outlined under the Montana Environmental Policy Act (MEPA), must be considered. Consideration must be given to minimizing any potential adverse environmental ~~effects~~ impacts of the proposed project. Compliance with planning requirements of federal, state, and local regulatory agencies must be documented. Environmental information provided on the proposed project will be used by the ~~DEQ~~ Department in complying with review procedures required under the ~~Montana Environmental Policy Act~~ MEPA and related administrative rules.

11.30 Final Project Selection

The project selected from the alternatives considered under Section 11.29 (Detailed Alternative Evaluation) must be set forth in the final facility plan document to be forwarded to the ~~regulatory agency~~ Department for review and approval, including the financing considerations and recommendations for implementation of the plan. Evidence that the owner agrees (e.g., council resolution) with the recommendations of the plan should be provided.

CHAPTER 20

ENGINEERING PLANS AND SPECIFICATIONS

20. PLANS AND SUPPORT DOCUMENTS

Submissions to the ~~reviewing agency~~ Department, prepared by a professional engineer licensed in Montana, must include sealed plans, specifications, design report criteria~~, the appropriate construction permit applications, review forms~~, capacity development information required in Appendix E (Capacity Development for Wastewater Systems), and ~~permit~~ plan review fee, if required.

Complete final plans must be submitted at least 60 days prior to the date on which action by the Department is desired. No approval for construction can be issued until final, detailed plans and specifications have been submitted and approved by the Department. Three copies of the final plans must be submitted. Documentation must be provided that indicates the owner will provide as-built drawings of the project, prepared by a registered professional engineer, and a certification letter as required in ARM 17.38.101 .

Upon approval, one set of the approved plans and specifications will be stamped "approved", dated, signed by a Department representative, and returned to the applicant. Construction of the project must be completed within three years of the Department approval date or the approval is void. If more than three years elapse before completing construction, plans, specifications, and appropriate review fees must be resubmitted for review and approval by the Department before construction can begin.

Within 90 days following completion of project construction, a professional engineer registered in Montana must certify that the project was built in accordance with the approved plans and specifications and a complete set of certified "as-built" drawings must be submitted to the Department. The project (or portion of the project to be activated) may not be placed into service until the project engineer certifies by letter to the Department that the project (or activated portion of the project) was constructed in accordance with the plans and specifications approved by the Department.

20.1 General

20.11 Plan Title

All plans for wastewater facilities must bear a suitable title showing the name of the municipality, sewer district, or institution. They must show the scale in feet or metric measure, a graphical scale, the north point, date, and the name of the engineer, with his or her certificate number and imprint of the registration seal. A space should be provided for signature and/or approval stamp of the ~~appropriate reviewing agencies~~ Department.

20.12 Plan Format

The plans must be clear and legible (suitable for microfilming). They must be drawn to a scale which will permit all necessary information to be plainly shown. Generally, the size of the plans should not be larger than ~~30~~ 22 inches x ~~42~~ 34 inches (~~762~~ 559 mm x ~~1070~~ 864 mm). Datum used should be indicated. Locations and logs of test borings, when required, must be shown on the plans.

20.13 Plan Contents

Detail plans must consist of: plan views, elevations, sections, and supplementary views which, together with the specifications and general layouts, provide the working information for the contract and construction of the facilities. They must also include: dimensions and relative elevations of structures, the location and outline form of equipment, location and size of piping, water levels, and ground elevations.

20.14 Design Criteria

Design criteria must be included on all plans ~~and specifications~~ and a hydraulic profile must be included for all wastewater treatment facilities. For sewer and lift station projects, information must be submitted to verify adequate downstream sewer, pump station, and treatment plant capacity.

20.15 Operation During Construction

Project ~~construction~~ documents must specify the procedure for operation during construction that complies with the plan required by Section 11.29(~~h~~) (i), (Treatment During Construction). This procedure must explain the roles and responsibilities of all persons or parties involved in the project.

20.2 Plans of Sewers

20.21 General Plan

A comprehensive plan of existing and proposed sewers must be submitted for projects involving new sewer systems and substantial additions to existing systems. This plan must show the following:

20.211 Geographical Features

a. Topography and elevations - Existing or proposed streets and all streams or water surfaces must be clearly shown. Contour lines at suitable intervals should be included.

b. Streams - The direction of flow in all streams, and high and low water elevations of all water surfaces at sewer outlets and overflows must be shown.

c. Boundaries - The boundary lines of the municipality or the sewer district, and the area to be sewered, must be shown.

20.212 Sewers

The plan must show the location, size, and direction of flow of ~~all~~ relevant existing and proposed sanitary and combined sewers draining to the treatment facility concerned.

20.22 Detail Plans

Detail plans must be submitted. Profiles should have a horizontal scale of not more than 100 feet to the inch (1200:1) and a vertical scale of not more than 10 feet to the inch (120:1). Plan views ~~should~~ must be drawn to a corresponding horizontal scale and must be shown on the same sheet. Plans and profiles must show:

a. Location of streets and sewers;

b. Line of ground surface; size, material, and type of pipe; length between manholes; invert and surface elevation at each manhole; and grade of sewer between each ~~two~~ adjacent manholes (all manholes must be numbered on the profile);

Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor must be plotted on the profile of the sewer which is to serve the house in question. The engineer shall state that all sewers are sufficiently deep to serve adjacent basements except where otherwise noted on the plans;

c. Locations of all special features such as inverted siphons, concrete encasements, elevated sewers, etc.;

d. All known existing structures and utilities, both above and below ground, which might interfere with the proposed construction or require ~~isolation~~ a setback, particularly water mains and water supply structures (i.e., wells, clear wells, basins, etc.), gas mains, storm drains, and telephone and power conduits; and

e. ~~Special d~~ Detail drawings, made to a scale to clearly show the nature of the design, must be furnished to show the following particulars:

All stream crossings and sewer outlets, with elevations of the stream bed and normal and extreme high and low water levels;

Details of all special sewer joints and cross sections; and

Details of all sewer appurtenances such as manholes, lampholes, inspection chambers, inverted siphons, regulators, tide gates, and elevated sewers.

20.3 Plans of Sewage Pumping Stations

20.31 Location Plan

A plan must be submitted for projects involving construction or revision of pumping stations. This plan must show the following:

a. The location and extent of the tributary area;

b. Any municipal boundaries within the tributary area; and

c. The location of the pumping station and force main, and pertinent elevations.

20.32 Detail Plans

Detail plans must be submitted showing the following, where applicable:

a. Topography of the site;

b. Existing pumping station;

c. Proposed pumping station, including provisions for installation of future pumps or ejectors;

d. Elevation of high water at the site, and maximum elevation of wastewater in the collection system upon occasion of power failure;

e. Maximum hydraulic gradient in force main (including surge) and downstream gravity sewers when all installed pumps are in operation; and

f. Test borings and groundwater elevations.

20.4 Plans of Wastewater Treatment Plants

20.41 Location Plan

A plan must be submitted showing the wastewater treatment plant in relation to the remainder of the system.

Sufficient topographic features must be included to indicate the plant's location with relation to streams and the point of discharge of treated effluent.

20.42 General Layout

Layouts of the proposed wastewater treatment plant must be submitted, showing:

a. Topography of the site;

b. Size and location of plant structures;

c. Schematic flow diagram(s) showing the flow through various plant units, and showing utility systems serving the plant processes;

d. Piping, including any arrangements for bypassing individual units (materials handled and direction of flow through pipes must be shown);

e. Hydraulic profiles showing the flow of wastewater, supernatant liquor, and sludge; and

f. Test borings and groundwater elevations.

20.43 Detail Plans

Detail plans must show the following, where applicable:

a. Location, dimensions, capacities, volumes, and elevations of all existing and proposed plant facilities;

b. Elevations of high and low water level of the body of water to which the plant effluent is to be discharged;

c. Type, size, pertinent features and operating capacity of all pumps, blowers, motors, and other mechanical devices;

d. Minimum, design average, and peak hourly hydraulic flow in profile; and

e. Adequate description of any features not otherwise covered by specifications or engineering report.

21. SPECIFICATIONS

Complete <u>signed and sealed</u> detailed technical specifications must be submitted for the ~~proposed project~~ <u>construction of sewers, wastewater pumping stations, wastewater treatment facilities, and all other appurtenances</u>, and must accompany the plans.

The specifications accompanying construction drawings plans must include, but are not ~~be~~ limited to, specifications for the approved procedures for operation during construction in accordance with Sections ~~11.28(h)~~ <u>11.29(i) (Treatment During Construction)</u> and 20.15 <u>(Operation During Construction),</u> all construction information not shown on the ~~drawings~~ <u>plans</u> which is necessary to inform the builder in detail of the design requirements for the quality of materials, workmanship, and fabrication of the project.

The specifications must also include: the type, size, strength, operating characteristics, and rating of equipment; allowable infiltration; the complete requirements for all mechanical and electrical equipment, including machinery, valves, piping and jointing of pipe; electrical apparatus, wiring, instrumentation, and meters; laboratory fixtures and equipment; operating tools, construction materials; special filter materials, such as, stone, sand, gravel, or slag; miscellaneous appurtenances; chemicals when used; instructions for testing materials and equipment as necessary to meet design standards; and performance tests for the completed works and component units. It is suggested that these performance tests be conducted at design load conditions wherever practical.

~~21.1 O&M MANUAL~~

~~An Operation and Maintenance Manual is required for when expanding, modifying, or constructing new wastewater treatment and sewage lift stations.~~

22. REVISIONS TO APPROVED PLANS

~~Any~~ Changes to the approved plans or specifications affecting public safety, capacity, flow, operation of units, or point of discharge must be approved~~,~~ in writing, before such changes are made. Plans or specifications so revised should be submitted well in advance of any construction work which will be affected by such changes ~~to permit~~ allow sufficient time for review and approval. Structural revision or other minor changes not affecting capacities, flows or operation will be permitted during construction without approval.

"As built" plans clearly showing such alterations must be submitted to the ~~reviewing agency~~ Department at the completion of the work.

23. ADDITIONAL INFORMATION REQUIRED

The ~~reviewing authority~~ Department may require additional information which is not part of the ~~construction drawings~~ plans, such as head loss calculations, pump curves, buoyancy calculations, proprietary technical data, copies of deeds, copies of contracts, etc.

24. DEVIATIONS FROM STANDARDS

The DEQ Deviation Review Committee, on a case-by-case basis for specific projects, may grant deviations from the mandatory requirements of these standards. ~~Deviations from the mandatory requirements of these standards may be granted by the DEQ Deviation Review Committee. Deviations are granted on a case-by-case basis and are applicable only to specific projects.~~

24.1 Procedure

~~24.11~~ A ~~person~~ professional engineer desiring a deviation shall make a request in writing on the Department of Environmental Quality *Public Water and Sewage System Deviation Request for Deviations Submitted by a Professional Engineer* form. The deviation request must identify the specific ~~section of the~~ standards to be considered and the proposed change to that standard. Adequate justification for the deviation must be provided. "Engineering judgment" or "professional opinion" without supporting data is not considered adequate justification. Multiple deviations must be completed on separate deviation forms.

~~24.12~~ A panel of three persons from the ~~DEQ shall~~ Department will review the request and ~~reach a decision by majority vote~~ make a final determination on whether or not a deviation may be granted. ~~The panel will make the final determinations on limited deviations.~~ A file of all deviations will be maintained by the Department.

~~24.13 A file of all deviations must be maintained by the DEQ.~~

25. OPERATION & MAINTENANCE MANUAL

A complete and comprehensive Operation and Maintenance Manual (O&M Manual) is required when expanding, modifying, or constructing new wastewater treatment and disposal facilities and sewage lift stations. Two copies of the O&M Manual are required and must be submitted to DEQ for review and approval prior to start-up of the new facility. Once approved by DEQ, a copy of the O&M Manual will be marked approved and provided to the owner for the treatment facility. If requested by the Owner and acceptable to the Department, the O&M manual may be submitted electronically for review and approval.

The O&M Manual must include the following minimum information: facility description, process description, start-up procedures, routine operation and maintenance responsibilities/requirements (including manufacturer's service and maintenance recommendations and operational protocols should the PLC unit fail), MBR cleaning strategies (if applicable), trouble-shooting, equipment and component contact information, monitoring and sampling plan for operational purposes and permit requirements, solids handling plan, record keeping, operator safety (including emergency contact numbers), an emergency operating response plan for the facility, and warranty information.

The design engineer must be retained by the system owner to provide technical assistance during system start-up and to modify the manual as needed during the first year of operation.

Section E.4 of Appendix E (Capacity Development for Wastewater Systems) includes additional financial O&M information that may be required by DEQ prior to approval of the project.

CHAPTER 30

DESIGN OF SEWERS

31. SEPARATION OF CLEAR WATER

Sewers must be designed for municipal wastewater only. Rain water from roofs, streets, and other areas, and groundwater from foundation drains must not be permitted in municipal wastewater sewers.

32. DESIGN CAPACITY AND DESIGN FLOW

In general, sewer capacities should be designed for the estimated ultimate tributary population, except in considering parts of the systems that can be readily increased in capacity. Similarly, consideration should be given to the maximum anticipated capacity of institutions, industrial parks, etc. ~~Where future relief sewers are planned, economic analysis of alternatives should accompany initial permit applications.~~ See Sections 11.24 (Hydraulic Capacity) and 20.2 (Plans of Sewers).

33. DETAILS OF DESIGN AND CONSTRUCTION

33.1 Minimum Size

~~A gravity sewer conveying raw wastewater must be at least 8 inches (203 mm) in diameter. Gravity sewer mains within private property; i.e., trailer courts, condominiums, apartments, etc., may be less than 8 inches in diameter provided that a small diameter line can be shown to be hydraulically feasible, that no future expansion is anticipated, and that maintenance would not be increased. Generally, sewers size would will be restricted to a minimum of 6 inches in diameter.~~

A gravity sewer main conveying raw wastewater must be at least 8 inches (203 mm) in diameter, except gravity sewer mains within private property. Trailer courts, condominiums, apartments, etc. are allowed mains no smaller than 6 inches in diameter, provided that the 6 inch diameter main can be shown to be hydraulically feasible, that no future expansion is anticipated, and that maintenance will not be increased due to the smaller diameter.

33.2 Depth

In general, sewers should be sufficiently deep to receive wastewater from basements and to prevent freezing. The minimum depth of bury must not be less than 4 feet (to the top of pipe) without justification by the design engineer. The prevailing local building code must be used in determining the maximum frost depth; however, the designer must consider increasing that depth if the site is located where local information suggests greater frost penetration. Insulation must be provided for sewers that cannot be placed at a depth sufficient to prevent freezing. Insulation used for this purpose must be specifically designed to withstand compaction and for use in subsurface locations. It must retain the insulating value for the design life of the sewer.

33.3 Buoyancy

Buoyancy of sewers and manholes must be considered and flotation of the ~~pipe~~ component must be prevented with appropriate construction where high groundwater conditions are anticipated.

33.4 Slope

33.41 Recommended Minimum Slopes

All sewers must be designed ~~and constructed to provide the pipe-full velocities~~ to give mean velocities, when flowing full, of not less than 2.0 feet per second (0.6 m/s) using Manning's formula with an "n" value of 0.013 ~~and the minimum slopes listed in the following table~~. ~~These values are based on Manning's formula using an "n" value of 0.013.~~ The following are the minimum slopes that must be provided; however, slopes greater than these are desirable:

Sewer Size	Minimum Slope in Feet Per 100 Feet (m/100m)
6 inch (152 mm)	0.60
8 inch (203 mm)	0.40
10 inch (254 mm)	0.28
12 inch (305 mm)	0.22
14 inch (356 mm)	0.17
15 inch (381 mm)	0.15
16 inch (406 mm)	0.14
18 inch (457 mm)	0.12
21 inch (533 mm)	0.10
24 inch (610 mm)	0.08
27 inch (686 mm)	0.067
30 inch (762 mm)	0.058
33 inch (838 mm)	0.052
36 inch (914 mm)	0.046
39 inch (991 mm)	0.041
42 inch (1067 mm)	0.037

Sewers 48 inches (1200 mm) or larger should be designed to give mean velocities, when flowing full, of not less than 3.0 feet per second (0.9 m/s), based on Manning's Formula using an "n" value of 0.013.

33.42 Minimum Flow Depth

Pipe slopes slightly less than those required may be permitted, only under extenuating circumstances through an approved deviation. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. The operating authority of the sewer system will give written assurance to the ~~appropriate reviewing agency~~ Department that any additional sewer maintenance required by reduced slopes ~~will~~ can be provided.

33.43 Minimize Solids Deposition

The pipe diameter and slope must be selected to obtain the greatest practical velocities to minimize settling problems. Oversize sewers will not be approved to justify using flatter slopes. If the proposed slope is less than the minimum slope of the smallest pipe which can accommodate the design peak hourly flow, the actual depths and velocities at minimum, average, and design maximum day and peak hourly flow for each design section of the sewer must be calculated by the design engineer and be included within the ~~plans~~ design report.

33.44 Slope Between Manholes

Sewers must be laid with uniform slope between manholes.

33.45 High Velocity Protection

Where velocities greater than 15 feet per second (4.6 m/s) are attained, special provision must be made to protect against displacement by erosion and impact.

33.46 Steep Slope Protection

Sewers on 20 percent slopes or greater must be anchored securely with concrete, or equal, with anchors spaced as follows (as a minimum):

a. Not over 36 feet (11 m) center to center on grades 20 percent and up to 35 percent;

b. Not over 24 feet (7.3 m) center to center on grades 35 percent and up to 50 percent; and

c. Not over 16 feet (4.9 m) center to center on grades 50 percent and over.

33.5 Alignment

Sewers 24 inches (610 mm) or less in diameter must be laid with straight alignment between manholes. Straight alignment must be checked by either using a laser beam or lamping.

Curvilinear alignment of sewers larger than 24 inches (610 mm) may be considered on a case-by-case basis providing compression joints are specified and ASTM or specific pipe manufacturers' maximum allowable pipe joint deflection limits are not exceeded. Curvilinear sewers must be limited to simple curves which start and end at manholes. When curvilinear sewers are proposed, the required minimum slopes indicated in 33.41 (Recommended Minimum Slopes) must be increased accordingly to provide a minimum velocity of 2.0 feet per second (0.6 m/s) when flowing full.

33.6 Changes in Pipe Size

When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

Sewer extensions should be designed for projected flows even when the diameter of the receiving sewer is less than the diameter of the proposed extension. Special consideration should be given to minimizing turbulence when designing a flow channel within a manhole where there is a change in pipe size. The ~~appropriate reviewing agency~~ Department may require a schedule for construction of future downstream sewer relief.

33.7 Materials

Any generally accepted material for sewers will be given consideration, but the material selected should be adapted to local conditions, such as: character of industrial wastes, possibility of septicity, soil characteristics, exceptionally heavy external loadings, abrasion, corrosion, and similar problems.

Suitable couplings complying with ASTM specifications must be used for joining dissimilar materials. The leakage limitations on these joints must be in accordance with Sections ~~33.93 or 33.94~~ 33.92 (Leakage Tests).

All sewers must be designed to prevent damage from superimposed live, dead, and frost induced loads. Proper allowance must be made for loads on the sewer because of soil and potential groundwater conditions, as well as the width and depth of the trench. Where necessary, special bedding, haunching and initial backfill, concrete cradle, or other special construction must be used to withstand anticipated potential superimposed loading or loss of trench wall stability. See ASTM D 2321 or ASTM C 12 when appropriate.

For new pipe materials for which ASTM standards have not been established, the design engineer shall provide complete pipe specifications and installation specifications developed on the basis of criteria adequately documented and certified in writing by the pipe manufacturer to be satisfactory for the specific ~~detailed plans~~ application.

33.8 Installation

33.81 Standards

Installation specifications must contain appropriate requirements based on the criteria, standards, and requirements established by industry in technical publications. Requirements must be set forth in the project specifications for the pipe and methods of bedding and backfilling the pipe so as not to damage the pipe or its joints, impede cleaning operations and future tapping, or create excessive side fill pressures and ovalation of the pipe, or ~~seriously~~ impair flow capacity.

33.82 Trenching

a. The width of the trench must be ample to allow the pipe to be laid and jointed properly and to allow the bedding and haunching to be placed and compacted to adequately support the pipe. The trench sides must be kept as nearly vertical as possible. When wider trenches are specified, appropriate bedding class and pipe strength must be used.

All trenches must be constructed according to current Montana Department of Labor and Industry or O.S.H.A. standards, as appropriate. In unsupported, unstable soil, the size and stiffness of the pipe, stiffness of the embedment and *in-situ* soil and depth of cover must be considered in determining the minimum trench width necessary to adequately support the pipe.

b. Ledge rock, boulders and large stones must be removed to provide a minimum clearance of 4 inches (102 mm) below and on each side of all pipe(s).

33.83 ~~Bedding, Haunching,~~ Pipe Bedding Materials and Placement ~~and Initial Backfill~~

~~a. Bedding classes A, B, C, or crushed stone as described in ASTM C 12 must be used and carefully compacted for all rigid pipe provided the proper strength pipe is used with the specified bedding to support the anticipated load, based on the type soil encountered and potential groundwater conditions.~~

~~b. Embedment materials for bedding, haunching and initial backfill Classes I, II or III, as described in ASTM D 2321, must be used. Backfill must be carefully compacted for all flexible pipe and the proper strength pipe, must be used with the specified bedding to support the anticipated load based on the type of soil encountered, and potential groundwater conditions.~~

a. Type 1 Pipe Bedding includes the material placed from 4 inches (100mm) below the bottom of the pipe, around the pipe, and up to the springline of the pipe.

Provide Type 1 Bedding consisting of sand, sandy gravel, or gravel having a maximum 3/4 inch size (19mm), and a maximum plasticity index of 6, determined by AASHTO T89 and T90 or by ASTM D4318.

Where trench excavation encounters wet or unstable material, Type 1 Pipe Bedding must be free draining and non-plastic.

Refer to Standard Drawing 02221-1 and Special Provisions for other requirements.

b. Select Type 1 Bedding includes the material placed from the springline of the pipe to 6 inches (15cm) over the pipe.

Select Type I Bedding shall consist of soil, sand or fine gravel, free from clods, lumps of frozen material, or rock exceeding 1-1/2 inches (38mm) in its greatest dimension.

Excavated trench material may be screened or sorted for use as backfill subject to approval of the Engineer.

Where trench excavation encounters wet or unstable material, Select Type 1 Bedding must be free draining and non-plastic.

c. Type 2 Pipe Bedding is used as directed by the Engineer to replace unsuitable material encountered in the trench bottom.

Place Type 2 Pipe Bedding from the bottom of the Type 1 Bedding material to the depth required to adequately support the pipe.

Type 2 Bedding shall consist of granular material meeting the following gradation:

Sieve Opening	% Passing
3 Inch -	100
No. 4 0 -	25
No. 8 0 –	10

d. Place in maximum 6" lifts and compacted to 95% of Maximum Dry Density as determined using AASHTO T-99 or ASTM D698.

e **e.** All water entering the excavations or other parts of the work must be removed until all the work has been completed. No sanitary sewer may be used for the disposal of trench water ~~unless specifically approved by the engineer, and then only if the trench water does not ultimately arrive at existing pumping or wastewater treatment facilities~~. A construction Dewatering Discharge Permit, issued by ~~DEQ~~ the Department, is required if water from construction is discharged to state waters. The ~~DEQ~~ Department must be contacted immediately if either contaminated soil or contaminated groundwater is encountered. If contamination is anticipated, an acceptable plan for handling and disposal must be submitted to ~~DEQ~~ the Department for approval.

33.84 ~~Final~~ Trench Backfill

a. Final trench backfill must be of a suitable material removed from the excavation except where other material is specified. Debris, frozen material, clods or stones larger than 8 inches, organic matter, or other unstable materials may not be used for final backfill within 1 foot of the top of the pipe.

Type A trench backfill used in streets and paved areas must be placed in 8 inch lifts within 3 percent of optimum moisture content and compacted to at least 95 percent of maximum dry density determined by AASHTO T99 or by ASTM D698 or as recommended by a geotechnical engineer.

Type B trench backfill used for unpaved alleys, cultivated areas, borrow pits, unimproved streets, or other unsurfaced areas must be placed in 8 inch lifts within 3 percent of optimum moisture content and compacted to at least 90 percent of maximum dry density determined by AASHTO T99 or by ASTM D698 or as recommended by a geotechnical engineer.

Type C trench backfill used in open and unimproved areas outside of the public right-of-way must be placed in 12 inch lifts at densities equal to or greater than the densities of adjoining undisturbed soils.

b. Final backfill must be placed in such a manner as not to disturb the alignment of the pipe.

33.85 Deflection Test

a. The Engineer has the option of requiring deflection testing of a portion, or all, of flexible pipe installations to assure the quality of construction. Flexible pipe is considered a conduit that will deflect at least 2 percent without any sign of structural distress.

Deflection tests, when performed on PVC pipe, must be conducted in accordance with ASTM D3034 and must satisfy either of the following deflection limitations:

Minimum Period Between Trench Backfilling & Testing	Minimum Mandrel Diameter as a Percent of Inside Pipe Diameter
7 days	95.0
30 days	92.5

b. If deflection exceeds the specified limits, replacement or correction must be accomplished in accordance with requirements in the approved specifications.

c. The rigid ball or mandrel used for the deflection test must have a diameter of at least 95 percent or 92.5 percent (depending on the time of test) of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured. The pipe must be measured in compliance with ASTM D 2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. Mandrels must have at least nine arms. The test must be performed without mechanical pulling devices.

d. Deflection testing requirements for flexible pipe, other than PVC, must be determined by the design engineer.

33.9 Joints and Infiltration

33.91 Joints

The installation of joints and the materials used must be included in the specifications. Sewer joints must be designed to minimize infiltration and to prevent the entrance of roots throughout the life of the system.

33.92 Leakage Tests

Leakage tests must be specified. This may include appropriate water or low pressure air testing. The testing methods selected should take into consideration the range in groundwater elevations during the test and anticipated during the design life of the sewer.

Sewers with active service connections may be leak tested via video inspection.

~~33.93~~ **a. Water (Hydrostatic) Test**

The leakage exfiltration or infiltration may not exceed 200 gallons per inch of pipe diameter per mile per day (0.019 m^3/mm of pipe dia/km/day) for any section of the system. An exfiltration or infiltration test must be performed with a minimum positive head of 2 feet (610 mm).

~~33.94~~ **b. Air Test**

The air test must, at a minimum, conform to the test procedure described in ASTM C-828-86 for clay pipe, ASTM C 924 for concrete pipe, UNI-B-690 low pressure test for PVC pipe. For other materials, test procedures must be approved by ~~DEQ~~ the Department.

~~33.95~~ 33.93 Service Connections

Service connections to the sewer main must be water tight and may not protrude into the sewer. If a saddle type connection is used, it must be a pre-manufactured device ~~intended~~ that is designed to join ~~with~~ the types of pipe that are to be connected. All materials used to make service connections must be compatible with each other and with the pipe materials to be joined. All materials must be corrosion ~~proof~~ resistant.

33.10 Casing Piping

Where casing pipe is used to carry sewers at horizontal borings, stream crossings, water line crossings and other locations, the pipe must conform to the slope requirements of Section 33.4 (Slope), if necessary, and must be rated for the structural and environmental conditions to which it will be exposed. The engineer must provide supporting manufacture's documentation and calculations as necessary to justify the type and size of casing pipe proposed.

34. MANHOLES

34.1 Location

Manholes must be installed: at the end of each sewer line; at all changes in grade, size, or alignment; at all intersections; and at distances not greater than 400 feet (122 m) for sewers 15 inches (381 mm) or less in diameter; and 500 feet (152 m) for sewers 18 inches (457 mm) to 30 inches (762 mm). Greater spacing may be permitted in larger sewers at the discretion of the Department.

~~except that~~ Distances up to 600 feet (183 m) may be approved where ~~adequate modern~~ cleaning equipment for the stated spacing is provided. Documentation must be provided that such cleaning equipment is readily available and has the cleaning capability stated. ~~Greater spacing may be permitted in larger sewers.~~ Cleanouts may be used only for special conditions and may not be substituted for manholes or installed at the end of laterals greater than 150 feet (46 m) in length.

34.2 Drop Type

A drop pipe ~~should~~ must be provided for a sewer entering a manhole at an elevation of 24 inches (610 mm) or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches (610 mm), the invert should be filleted to prevent solids deposition.

Drop manholes should be constructed with an outside drop connection. Inside drop connections (when necessary) must be secured to the interior wall of the manhole and provide access for cleaning.

Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection must be encased in concrete.

34.3 Diameter

The minimum inside diameter for manholes is 48 inches (1.22 m); larger diameters are preferable for large diameter sewers. A minimum access diameter of 22 inches (559 mm) must be provided.

34.4 Flow Channel

The flow channel straight through a manhole should be made to conform as closely as possible in shape and slope to that of the connecting sewers. For pipes greater than 8 inches in diameter, the channel walls ~~should~~ must be formed or shaped to the full height of the crown of the outlet sewer in such a manner as to not obstruct maintenance, inspection or flow in the sewers. For pipes 8 inches or less in diameter, the channel must be formed at least to the spring line of the pipe.

When curved flow channels are specified in manholes, including branch inlets, or when entrance or exit losses are significant, minimum slopes indicated in Section 33.41 (Recommended Minimum Slopes), must be increased to maintain acceptable velocities.

34.5 Bench

A bench must be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench should be sloped no less than 1/2 inch (13 mm) per foot (305 mm) (4 percent). A lateral sewer, service connection, or drop manhole pipe may not discharge onto the surface of the bench.

34.6 Watertightness

Manholes must be of the pre-cast concrete or poured-in-place concrete type. Manholes must be waterproofed on the exterior. Pre-cast concrete manhole sections manufactured in accordance with ASTM C 478M-93 (with Section 16 rejection requirements made mandatory) are exempt from the exterior waterproofing requirement. Manhole lift holes and grade adjustment rings must be sealed with non-shrinking mortar or other material approved by the Department.

Inlet and outlet pipes must be joined to the manhole with a gasketed flexible watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place.

Watertight manhole covers ~~are to~~ must be used wherever the manhole tops may be flooded by street runoff or high water. Locked manhole covers may be desirable in isolated easement locations or where vandalism may be a problem.

34.7 Inspection and Testing

The specifications must include a requirement for inspection and testing for watertightness or damage prior to placing into service.

Vacuum testing, if specified for concrete sewer manholes, must conform to the test procedures described in ASTM C 1244.

Water testing will only be allowed where groundwater is below the bottom of the manhole during testing. Hydrostatic testing shall be conducted by sealing all pipe penetrations to the manhole and filling the manhole to the top of the manhole cone with water. Water may be added over a 24 hour period to compensate for losses due to evaporation and absorption. Following the 24 hour saturation period any loss of water within a 30 minute period shall be a failed test and the manhole must be rejected.

34.8 Corrosion Protection for Manholes

Where corrosive conditions, due to septicity or other causes, are anticipated, consideration must be given to providing corrosion protection on the interior of the manholes.

34.9 Electrical

Electrical equipment installed or used in manholes must conform to Section 42.35 (Electrical Equipment).

35. INVERTED SIPHONS

Inverted siphons ~~should~~ must not have less than two barrels, with a minimum pipe size of 6 inches (152 mm). They must be provided with necessary appurtenances for maintenance, convenient flushing, and cleaning equipment. The inlet and discharge structures must have adequate clearances for cleaning equipment, inspection, and flushing. Design must provide sufficient head and appropriate pipe sizes to secure velocities of at least 3.0 feet per second (0.92 m/s) for design average flows. The inlet and outlet details must be arranged so that the design average flow is diverted to one barrel, and so that either barrel may be ~~out~~ taken out of service for cleaning. The vertical alignment should permit cleaning and maintenance.

36. SEWERS IN RELATION TO STREAMS

36.1 Location of Sewers in Streams

36.11 Cover Depth

The top of all sewers entering or crossing streams must be at a sufficient depth below the natural bottom of the stream bed to protect the sewer. In general, the following cover requirements must be met:

a. One foot (~~305 m~~ 0.3 m) of cover where the sewer is located in rock;

b. Three feet (~~914 m~~ 0.9 m) of cover in other material. In ~~major streams,~~ streams with high seasonal flows or streams with an alluvial foundation, more than three feet (~~914 m~~ 0.9 m) of cover may be required. The engineer must provide scour analysis to justify the bury depth in these cases; and

c. In paved stream channels, the top of the sewer ~~line~~ should be placed below the bottom of the channel pavement.

Less cover will be approved only if the proposed sewer crossing will not interfere with ~~the~~ future improvements or reasonably anticipated natural changes to the stream channel. Reasons for requesting less cover must be provided in the project proposal.

36.12 Horizontal Location

Sewers located along streams must be located outside of the stream bed and sufficiently removed from the stream bed to provide for future possible stream widening and to prevent pollution by siltation during construction.

36.13 Structures

The sewer outfalls, headwalls, manholes, gate boxes, or other structures must be located so they do not interfere with the free discharge of flood flows of the stream.

36.14 Alignment

Sewers crossing streams should be designed to cross the stream as nearly perpendicular to the stream flow as possible and must be free from change in grade. Sewer systems must be designed to minimize the number of stream crossings. Trenchless construction technologies should be considered for stream crossings to avoid the impacts of open cut construction.

36.2 Construction

36.21 Materials

Sewers entering or crossing streams ~~may either be constructed of ductile iron pipe with restrained mechanical joints; or~~ must be constructed so they will remain watertight and free from changes in alignment or grade. The use of a casing pipe to carry the sewer is recommended. Crossings constructed of ductile iron or PVC pipe must have restrained mechanical joints when not encased in concrete. When a casing pipe is not utilized for PVC or HDPE pipe, encasement in concrete is required. Material used to backfill the trench must be stone, coarse aggregate, washed gravel, or other materials that will not readily erode, cause siltation, damage pipe during placement, or corrode the pipe.

36.22 Siltation and Erosion

Construction methods that will minimize siltation and erosion must be used. The design engineer shall include in the project specifications the method(s) to be employed in the ~~construction~~ installation of sewers in or near streams. Best management practices (BMP's) must be utilized during construction. Such methods must provide adequate control of siltation and erosion by limiting unnecessary excavation, disturbing or uprooting of trees and vegetation, dumping of soil or debris, or pumping of silt-laden water into the stream. Specifications must require that cleanup, grading, seeding and planting or restoration of all work areas begin immediately after the construction has been completed. Exposed areas may not remain unprotected for more than seven days.

Any work proposed in or near streams, wetlands, floodplains, and other water bodies will require permits from the appropriate regulatory authorities. One or more of the following permits may be required: a 124 permit, issued by the Montana Department of Fish, Wildlife and Parks; ~~and a 3A Permit~~ 318 Authorization issued by DEQ ~~must be obtained if turbidity in the stream is expected to be higher than 5 NTUs.~~ ; a 310 Permit issued by the Local Conservation District; a 404 Permit issued by the Corps of Engineers; a Navigable Rivers Land Use License issued by the DNRC; a Floodplain Permit issued by the DNRC or Local Floodplain Administrator. Other permits not listed here may be required.

37. AERIAL CROSSINGS

Sewers supported by piers across ravines or streams will be allowed only when it can be demonstrated that no other practical alternative exists. Such sewers on piers must be constructed in accordance with the requirements in Section 36.21 (Materials). Support must be provided for all joints in pipes utilized for aerial crossings. The supports must be designed to prevent frost heave, overturning, and settlement.

Precautions against freezing, such as insulation and increased slope, must be provided. Expansion jointing must be provided between above ground and below ground sewers. Where buried sewers change to aerial sewers, special construction techniques must be used to minimize frost heaving.

For aerial stream crossings, the impact of flood waters and debris must be considered. The bottom of the pipe and carrying structure ~~should~~ must not be ~~placed no~~ lower than the elevation of the ~~50~~ 100 year flood. Ductile iron pipe with mechanical joints is recommended.

Where sewers crossing streams are to be attached to bridge structures, the bridge owner must provide written approval that this approach will not structurally impair the bridge or interfere with routine maintenance, and is acceptable to the owner. The sewer must be attached to the bridge in a manner that protects it from vandalism and provides support as defined above for pier crossing systems. This documentation must be provided with the design submittal.

38. PROTECTION OF WATER SUPPLIES

When wastewater sewers are proposed in the vicinity of any water supply facilities, requirements of Circular DEQ 1 ~~should~~ must be used to confirm acceptable isolation distances in addition to the following requirements.

38.1 Cross Connections Prohibited

There may not be any physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply. A water pipe may not pass through or come in contact with any part of a sewer manhole.

38.2 Relation to Water Works Structures

Sewer mains may not be located within 100 feet of a public water supply well or within 50 feet of all other wells.

All existing waterworks units, such as basins, wells, or other treatment units, within 100 feet ~~(61~~ 31 m) of the proposed sewer must be shown on the engineering plans. Documentation must be submitted to the Department from the operating authority of the collection system stating that all waterworks units within 100 feet of the proposed sewer main alignment(s) have been identified and are shown on the project plans.

38.3 Relation to Water Mains

38.31 Horizontal Separation

Sewers must be laid at least 10 feet (3m) horizontally from any existing or proposed water main. The distance must be measured edge to edge.

If the proper horizontal separation as described above cannot be obtained, the design engineer shall submit a request for a deviation along with a description of the problem and justifying circumstances. If the deviation is granted, the sewer must be designed and constructed with the following minimum conditions:

a. ~~Sewer pipe must be PVC with nominal 20-foot lengths.~~ Sewers must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards (DEQ 1) and be pressure tested to minimum 150 psi to assure watertightness.

~~b.~~ ~~The sewer must pass low pressure air testing in accordance with UniBell Recommended Practice UNI-B-6-90.~~

~~c~~ **b.** Sewer services utilizing in-line fittings and extending to at least property lines must be installed and tested in the area of the encroachment. Saddles are not acceptable.

38.32 Crossings

Sewers crossing water mains must be laid with a minimum vertical distance of 18 inches (457 mm) between the outside of the water main and the outside of the sewer. This must be the case where the water main is either above or below the sewer. The crossing must be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support must be provided for the sewer to maintain line and grade and to prevent damage to the water main.

If the proper vertical separation as described above cannot be obtained, the design engineer ~~shall submit a request for a deviation along with a description of the problem and justifying circumstances. If the deviation is granted, the sewer must be designed and constructed~~ may design the crossing with the following minimum conditions:

a. Vertical separation at crossings between water and sewer mains must be at least 6 (six) inches.

b. ~~Sewer pipe must be PVC with nominal 20-foot lengths.~~ Sewers must be constructed of slip-on or mechanical joint pipe complying with public water supply design standards (DEQ 1) and be pressure tested to minimum 150 psi to assure watertightness.

c. At crossings, one standard length of new pipe must be centered at approximately a 90 degree angle in respect to the existing pipe.

~~d.~~ ~~The sewer must pass low pressure air testing in accordance with UniBell Recommended Practice UNI-B-6-90.~~

~~e~~ d. Sewer services utilizing in-line fittings and extending to at least property lines must be installed and tested within 10 feet of the crossing. Saddles are not acceptable.

e. Either the water or sewer main must be encased in a watertight carrier pipe which extends 10 feet (3m) on both sides of the crossing or the mains must be encased in a minimum of 6 inches of flowable fill for a minimum of 10 feet each side of the crossing pipes.

f. If the minimum 6 (six) inch separation is not viable, the water line must be relocated, and vertical separation at crossings between water and sewer mains must be at least 18 (eighteen) inches.

39. SEWER SERVICES AND PLUMBING

~~**39.1 Plumbing**~~

Sewer services and plumbing must conform to relevant local and state plumbing codes, or to the Uniform Plumbing Code as amended by ARM ~~8.70.302~~ 24.301.301, or other applicable codes.

The Department discourages the use of shared service lines.

CHAPTER 40

WASTEWATER PUMPING STATIONS

41. GENERAL

41.1 Flooding

Sewage pumping station structures and electrical and mechanical equipment must be protected from physical damage by the 100 year flood. Wastewater pumping stations should remain fully operational and accessible during the 25 year flood. Regulations of state and federal agencies regarding flood plain obstructions must be followed.

41.2 Accessibility and Security

The pumping station must be readily accessible by maintenance vehicles during all weather conditions. The facility should be located off the traffic way of streets and alleys. It is recommended that security fencing and access hatches with locks be provided to prevent unauthorized intrusion.

41.3 Grit

Where it is necessary to pump wastewater prior to grit removal, the design of the wet well and pump station piping must receive special consideration to avoid operational problems from the accumulation of grit.

41.4 Safety

Adequate provisions must be made to effectively protect maintenance personnel from hazards. Equipment for confined space entry in accordance with OSHA, the State of Montana Department of Labor and Industry, and regulatory agency requirements must be provided for all wastewater pumping stations. Also refer to Section 57 (Safety).

42. DESIGN

42.1 Type

Wastewater pumping stations in general use fall into four types: wet well/dry well, submersible, suction lift, and screw pump.

42.2 Structures

42.21 Separation

Dry wells, including their superstructure, must be separated from the wet well. Common walls must be gas tight.

42.22 Equipment Removal

Provisions must be made to facilitate removing pumps, motors, and other mechanical and electrical equipment. Individual pump and motor removal must not interfere with the continued operation of remaining pumps.

42.23 Access and Safety Landings

42.231 Access

Suitable and safe means of access for persons wearing self-contained breathing apparatus must be provided to dry wells, and to wet wells ~~for persons wearing self contained breathing apparatus~~. Access to wet wells containing either bar screens or mechanical equipment requiring inspection or maintenance must conform to Section 61.13 (Access and Ventilation). Also refer to Section 57 (Safety).

42.232 Safety Landings

For built-in-place pump stations, a stairway or ladder to the dry well must be provided with rest landings at vertical intervals not to exceed 12 feet (3.7 m). For factory-built pump stations over 15 feet (4.6 m) deep, rigidly fixed landings must be provided at vertical intervals not to exceed 10 feet (3 m). Where a landing is used, a suitable and rigidly fixed barrier must be provided to prevent an individual from falling past the intermediate landing to a lower level. A manlift or elevator may be used in lieu of landings in a factory-built station, provided emergency access is included in the design. Where ladders are used, adherence to federal safety standards is mandatory.

42.24 Buoyancy

Where high groundwater conditions are anticipated, buoyancy ~~of~~ calculations for the wastewater pumping station structures must be ~~considered~~ submitted and, if necessary, adequate provisions must be made for protection.

42.25 Construction Materials

Wastewater pumping stations must be constructed with materials that are capable of withstanding prolonged exposure to hydrogen sulfide and other corrosive gases, greases, oils, and other constituents frequently present in wastewater. This is particularly important in the selection of metals and paints. Contact between dissimilar metals should be avoided. If dissimilar metals are used, construction methods must minimize galvanic action through other means.

42.3 Pumps and Pneumatic Ejectors

42.31 Multiple Units

Multiple pumps or ejector units must be provided. Where only two units are provided, they must be of the same size. Units must have capacity such that, with any unit out of service, the remaining units will have capacity to handle the design peak hourly flow.

42.32 Protection Against Clogging

42.321 Combined Wastewater

Pumps handling combined wastewater must be preceded by readily accessible bar racks to protect the pumps from clogging or damage. Bar racks should have clear openings as provided in Section 61.121 (Bar Spacing). Where a bar rack is provided, a mechanical hoist must also be provided. Where the size of the installation warrants, mechanically cleaned and/or duplicate bar racks must be provided. Refer to Sections 42.22 (Equipment Removal), 42.23 (Access and Safety Landings), and 61.13 (Access and Ventilation).

42.322 Separate Sanitary Wastewater

Pumps handling separate sanitary wastewater from 30 inch (762 mm) or larger diameter sewers must be protected by bar racks meeting the above requirements. Appropriate protection from clogging must also be considered for small pumping stations. Refer to Sections 42.23~~1~~ (Access and Safety Landings) and 61.13 (Access and Ventilation).

42.33 Pump Openings

Pumps handling raw wastewater must be capable of passing spheres of at least 3 inches (76 mm) in diameter, except for grinder pumps, which must be capable of passing spheres of at least 1 inch (25.4 mm) in diameter. Pump suction and discharge openings must be at least 4 inches (102 mm) in diameter, except for grinder pumps, openings must meet the pump manufacturers requirements for the expected wastewater.

42.34 Priming

The pump must be placed so that under normal operating conditions it will operate under a positive suction head, except as specified in Section 43 (Suction Lift Pump Stations).

42.35 Electrical Equipment

Electrical systems and components (e.g., motors, lights, cables, conduits, switch boxes, control circuits, etc.) in raw wastewater wet wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present, must comply with the National Electrical Code requirements for Class I, Division 1, Group D, ~~Division 1~~ locations. In addition, equipment located in the wet well must be suitable for use under corrosive conditions. Each flexible cable must be provided with watertight seal and separate strain relief. A fused disconnect switch located above ground must be provided for the main power feed for all pumping stations. When such equipment will be exposed to weather, it must meet the requirements for weatherproof equipment in NEMA 3R or 4. A 110 volt power receptacle to facilitate maintenance must be provided inside the control panel for lift stations that have control panels outdoors. Ground fault interruption protection must be provided for all outdoor outlets.

42.36 Intake

Each pump ~~should~~ must have an individual intake. Wet well and intake design must avoid turbulence near the intake and prevent vortex formation.

42.37 Dry Well Dewatering

A sump pump equipped with dual check valves must be provided in the dry well to remove leakage or drainage, with discharge above the maximum high water level of the wet well ~~or as necessary to prevent flooding of the dry well~~. Water ejectors connected to a potable water supply will not be approved. All floor and walkway surfaces should have an adequate slope to a point of drainage. Pump seal leakage must be piped or channeled directly to the sump. The sump pump must be sized to remove the maximum pump seal water discharge that would occur from a pump seal failure. Refer to Section ~~45~~ 46 (Alarm Systems).

42.38 Pumping Rates

The pumps and controls of main pumping stations, ~~and~~ especially pumping stations operated as part of the treatment ~~works~~ facility, should be selected to operate at varying delivery rates. Insofar as is practicable, such stations should be designed to deliver as uniform a flow as practicable in order to minimize hydraulic surges. The station design peak hourly flow capacity must be determined in accordance with Section 11.24 (Hydraulic Capacity) and should be adequate to maintain a minimum velocity of 2 feet per second (0.61 m/s) in the force main. Refer to Section ~~48.1~~ 49.1 (Velocity and Diameter).

42.4 Controls

Control float tubes, bubbler lines, or other controls should be ~~so~~ located so as not to be unduly effected by turbulent flows entering the well or by the turbulent suction of the pumps. Bubbler type level monitoring systems must include dual air compressors. Provision must be made to automatically alternate the pumps in use. Suction lift stations must be designed to alternate pumps daily instead of each pump cycle to extend the life of the priming equipment.

42.5 Valves

42.51 Suction Line

Shutoff valves must be placed on the suction line of dry pit pumps.

42.52 Discharge Line

With the two exceptions of screw pumps and short discharge lines (10 feet or less), shutoff and check valves must be placed on the discharge line of each pump ~~(except on screw pumps)~~. The check valve must be located between the shutoff valve and the pump. Check valves must be suitable for the material being handled and must be placed on the horizontal portion of discharge piping, except for ball checks, flapper swing check valves, or flexible disk check valves (body seat constructed at an angle of 45 degrees to the flow line), which may be placed in the vertical run. Valves must be capable of withstanding normal pressure and water hammer.

All shutoff and check valves must be operable from the floor level and accessible for maintenance. Outside levers are recommended on swing check valves.

42.6 Wet Wells

42.61 Divided Wells

Where continuity of pumping station operation is critical, consideration should be given to dividing the wet well into two sections, properly interconnected, to facilitate repairs and cleaning.

42.62 Size

Pump stations must be designed to operate under the full range of projected system hydraulic conditions, and should have the flexibility to accommodate project phasing if proposed.

The design fill time and minimum pump cycle time must be considered in sizing the wet well. The effective volume of the wet well must be based on design average flow and a filling time not to exceed 30 minutes unless the facility is designed to provide flow equalization. The pump manufacturer's duty cycle recommendations must be utilized in selecting the minimum cycle time. When the anticipated initial flow tributary to the pumping station is less than the design average flow, provisions should be made so ~~that~~ the fill time indicated is not exceeded for initial flows. When the wet well is designed for flow equalization as part of a treatment ~~plant~~ facility, provisions should be made to prevent septicity.

For constant speed pumps, the minimum volume between pump on and pump off levels can be calculated using Equation (4-1):

$$t = \frac{4V}{Q} \qquad (4\text{-}1)$$

t = minimum time between pump starts (minutes)

V = wet well volume (gallons)

Q = pump capacity (gallons per minute)

42.63 Floor Slope

The wet well floor must have a slope of at least 1 to 1 to the hopper bottom. The horizontal area of the hopper bottom may not be greater than necessary for proper installation and function of the inlet.

42.64 Air Displacement

Covered wet wells must have provisions for air displacement such as an inverted "j" tube or other means which vents to the outside.

42.7 Safety Ventilation

42.71 General

Adequate ventilation must be provided for all pump stations. Where the dry well is below the ground surface, permanent mechanical ventilation is required. If screens or mechanical equipment requiring maintenance or inspection are located in the wet well, permanently installed ventilation is required. There may not be any interconnection between the wet well and dry well ventilation systems.

42.72 Air Inlets and Outlets

In dry wells over 15 feet (4.6 m) deep, multiple inlets and outlets are desirable. Dampers should not be used on exhaust or fresh air ducts and fine screen or other obstructions in air ducts should be avoided to prevent clogging.

42.73 Electrical Controls

Switches for operation of ventilation equipment should be marked and located conveniently. All intermittently operated ventilation equipment must be interconnected with the respective pit lighting system. Consideration should be given also to automatic controls where intermittent operation is used. The manual lighting/ventilation switch must override the automatic controls. For a two-speed ventilation system with automatic switch-over and gas detection equipment, consideration should be given to increasing the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors.

42.74 Fans, Heating, and Dehumidification

The fan wheel should be fabricated from non-sparking material. Automatic heating and dehumidification equipment must be provided in all dry wells. The electrical equipment and components must meet the requirements in Section 42.35 (Electrical Equipment).

42.75 Wet Wells

Wet well ventilation may be either continuous or intermittent. Ventilation, if continuous, must provide at least 12 complete air changes per hour; if intermittent, at least 30 complete air changes per hour must be provided. Air must be forced into the wet well by mechanical means rather than exhausted from the wet well. The air change requirements must be based on 100 percent fresh air. Portable ventilation equipment must be provided for use at submersible pump stations and wet wells with no permanently installed ventilation equipment.

42.76 Dry Wells

Dry well ventilation may be either continuous or intermittent. Ventilation, if continuous, must provide at least 6 complete air changes per hour; if intermittent, at least 30 complete air changes per hour must be provided.

A system of two-speed ventilation with an initial ventilation rate of 30 changes per hour for 10 minutes and an automatic switch over to 6 changes per hour may be used to conserve heat. The air change requirements must be based on 100 percent fresh air.

42.8 Flow Measurement and Instrumentation

Suitable devices for measuring wastewater flow should be considered at all pumping stations. Indicating, totalizing and recording flow measurements, and voltage/ampere meters must be provided at pumping stations with a 1200 gpm (76 L/s) or greater design peak flow. Elapsed time meters must be provided for all pumps. Flow meters must be installed ~~in straight sections of pipe when~~ as recommended by the manufacturer. A pressure gauge should be provided.

42.9 Water Supply

There may not be any physical connection between any potable water supply and a wastewater pumping station that under any conditions might cause contamination of the potable water supply. If a potable water supply is brought to the station, it must conform to Section 56.23 (Indirect Connections).

43. SUCTION LIFT PUMP STATIONS

Suction lift pumps must be of the self-priming or vacuum-priming type and must meet the applicable requirements of Section 42 (Design).

43.1 Pump Priming and Lift Requirements

~~Suction lift pumps must be of the self-priming or vacuum-priming type and must meet the applicable requirements of Section 42~~. Suction-lift pump stations using dynamic suction lifts exceeding the limits outlined in the following sections may be approved upon submission of factory certification of pump performance and detailed calculations indicating satisfactory performance under the proposed operating conditions. Such detailed calculations must include static suction-lift as measured from "lead pump off" elevation to center line of pump suction, friction, and other hydraulic losses of the suction piping, vapor pressure of the liquid, altitude correction, required net positive suction head, and a safety factor of at least 6 feet (1.8 m).

~~The pump equipment compartment must be above grade or offset and must be effectively isolated from the wet well to prevent the humid and corrosive sewer atmosphere from entering the equipment compartment. Wet well access may not be through the equipment compartment and must be at least 24 inches (610 mm) in diameter. Gasketed replacement plates must be provided to cover the opening to the wet well for pump units removed for servicing. Valving may not be located in the wet well.~~

43.11 Self-Priming Pumps

Self-priming pumps must be capable of rapid priming and repriming at the "lead pump on" elevation. Such self-priming and repriming must be accomplished automatically under design operating conditions. Suction piping should not exceed the size of the pump suction and may not exceed 25 feet (7.6 m) in total length. Priming lift at the "lead pump on" elevation must include a safety factor of at least 4 feet (1.2 m) from the maximum allowable priming lift for the specific equipment at design operating conditions. The combined total of dynamic suction lift at the "pump off" elevation and required net positive suction head at design operating conditions may not exceed 22 feet (6.7 m).

43.12 Vacuum~~ing~~-Priming Pumps

Vacuum-priming pump stations must be equipped with dual vacuum pumps capable of automatically and completely removing air from the suction-lift pump. The vacuum pumps must be adequately protected from damage due to wastewater. The combined total of dynamic suction-lift at the "pump off" elevation and required net positive suction head at design operating conditions may not exceed 22 feet (6.7 m).

43.2 Equipment, Wet Well Access, and Valve Location

The pump equipment compartment must be above grade or offset and must be effectively isolated from the wet well to prevent the humid and corrosive sewer atmosphere from entering the equipment compartment. Wet well access may not be through the equipment compartment and must be at least 24 inches (610 mm) in diameter. Gasketed replacement plates must be provided to cover the opening to the wet well for pump units removed for servicing. Valves may not be located in the wet well.

44. SUBMERSIBLE PUMP STATIONS - SPECIAL CONSIDERATIONS

Submersible pump stations must meet the applicable requirements under Section 42 (Design), except as modified in this Section.

44.1 Construction

Submersible pumps and motors must be designed specifically for raw wastewater use, including totally submerged operation during a portion of each pumping cycle, and must meet the requirements of the National Electrical Code for such units. An effective method to detect shaft seal failure or potential seal failure must be provided.

44.2 Pump Removal

Submersible pumps must be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well.

44.3 Electrical Equipment

44.31 Power Supply and Control Circuitry

Electrical supply, control, and alarm circuits must be designed to provide strain relief and to allow disconnection from outside the wet well. Terminals and connectors must be protected from corrosion by location outside the wet well or through use of watertight seals. If located outside, weatherproof equipment must be used.

44.32 Controls

The motor control center must be located outside the wet well, be readily accessible, and be protected by a conduit seal or other appropriate measures meeting the requirements of the National Electrical Code, to prevent the atmosphere of the wet well from gaining access to the control center. The seal must be located so that the motor may be removed and electrically disconnected without disturbing the seal. When such equipment is exposed to weather, it must meet the requirements of weatherproof equipment NEMA 3R or 4.

44.33 Power Cord

Pump motor power cords must be designed for flexibility and serviceability under conditions of extra hard usage and must meet the requirements of the National Electrical Code standards for flexible cords in wastewater pump stations. Ground fault interruption protection must be used to de-energize the circuit in the event of any failure in the electrical integrity of the cable. Power cord terminal fittings must be corrosion-resistant and constructed in a manner to prevent the entry of moisture into the cable, must be provided with strain relief appurtenances, and must be designed to facilitate field connecting.

44.4 Valves

Valves required under Section 42.5 (Valves) must be located in a separate valve ~~pit~~ chamber. Provisions must be made to remove or drain accumulated water from the valve chamber. Valve pits may be dewatered to a wet well through a ~~valved~~ drain line with a gas and water tight valve. Check valves that are integral to the pump need not be located in a separate valve ~~pit~~ chamber provided that the valve can be removed from the wet well in accordance with Section 44.2 (Pump Removal). Access must be provided in accordance with Section 42.231 (Access).

45. SCREW PUMP STATIONS – SPECIAL CONSIDERATIONS

Screw pumps must meet the applicable requirements of Section 42 (Design).

45.1 Covers

Covers should be provided.

45.2 Pump Wells

A positive means of isolating individual screw pump wells must be provided.

45.3 Bearings

Submerged bearings must be lubricated by an automated system without pump well dewatering.

~~45~~ 46. ALARM SYSTEMS

Alarm systems with a backup power source must be provided for pumping stations. The alarm must be activated upon power failure, sump pump failure, high and low wet well level, pump failure, unauthorized entry, or any cause of pump station malfunction. Shaft seal failure, moisture and thermal sensors shall be provided on submersible pump motors. Redundant low-level alarms~~,~~ ~~or thermal sensors on pump motors,~~ should be considered in high hazard ~~situations~~ environments. ~~to prevent explosive situations~~. Pumping station alarms, including identification of the alarm condition, must be ~~telemetered~~ transmitted (via telemetry) to a municipal facility that is ~~manned~~ staffed 24 hours a day. If such a facility is not available and a 24-hour holding capacity is not provided, the alarm must be ~~telemetered~~ transmitted to ~~city~~ municipal offices during normal working hours and to the home of the responsible person(s) in charge of the lift station during off-duty hours. Audio-visual alarm systems with a self-contained power supply may be acceptable in some cases in lieu of ~~the telemetering~~ a transmitting system outlined above, depending upon location, station holding capacity and inspection frequency.

~~46~~ 47. EMERGENCY OPERATION

~~46~~ 47.1 Objective

The objective of any emergency operation is to prevent the discharge of raw or partially treated wastewater to any waters and to protect public health by preventing back-up of wastewater and subsequent discharge to basements, streets, and other public and private property.

~~46~~ 47.2 Emergency Pumping Capability

Emergency pumping capability is required unless on-system overflow prevention is provided by adequate storage capacity. Emergency pumping capability may be accomplished by connection of the station to at least two independent utility substations, or by ~~provision~~ use of portable or ~~in-place~~ permanent internal combustion engine equipment which will generate electrical or mechanical energy, or by ~~the provision~~ use of portable pumping equipment. Such emergency standby systems must have sufficient capacity to start up and maintain the total rated running capacity of the station. Regardless of the type of emergency standby system provided, a riser from the force main with rapid connection capabilities and appropriate valving ~~should~~ must be provided for all lift stations to hook up portable pumps. Where portable emergency operating equipment is utilized, a separate pump or generator must be provided for each lift station unless adequate justification is provided by the community stating why this is not necessary.

~~46~~ 47.3 Emergency High Level Overflows

For use during possible periods of extensive power outages, mandatory power reductions, or ~~uncontrollable~~ emergency conditions, consideration should be given to providing a controlled, high-level wet well overflow, to supplement alarm systems and emergency power generation, in order to prevent backup of wastewater into basements, or other discharges which may cause severe adverse impacts on public interests, including public health and property damage. Where a high level overflow is utilized, it will be necessary to install a storage/detention tank, or basin, which must be made to drain to the station wet well. It is recommended that a minimum of one hour of storage be provided for peak flow conditions. The Department may require different storage requirements based on site specific conditions.

~~46~~ 47.4 Equipment Requirements

~~46~~ 47.41 General

The following general requirements apply to all internal combustion engines used to drive auxiliary pumps, service pumps through special drives, or electrical generating equipment:

~~46~~ 47.411 Engine Protection

The engine must be protected from operating conditions that would result in damage to equipment. Unless continuous manual supervision is planned, protective equipment must be capable of shutting down the engine and activating an alarm on site and as provided in Section ~~45~~ 46 (Alarm Systems). Protective equipment must monitor for conditions of low oil pressure and overheating, except that oil pressure monitoring is not required for engines with splash lubrication.

~~46~~ 47.412 Size

The engine must have adequate rated power to start and continuously operate under all connected loads.

~~46~~ 47.413 Fuel Type

Reliability and ease of starting, especially during cold weather conditions, should be considered in the selection of the type of fuel.

~~46~~ 47.414 ~~Design and Installation of~~ Fuel Storage Tanks

Design and installation of fuel storage tanks and piping must comply with all state and federal standards.

~~46~~ 47.415 Engine Ventilation

The engine must be located above grade with adequate ventilation of fuel vapors and exhaust gases.

~~46~~ 47.416 Routine Start-up

All emergency equipment must be provided with instructions indicating the need for regular starting and running of such units at full loads.

~~46~~ 47.417 Protection of Equipment

Emergency equipment must be protected from damage at the restoration of regular electrical power.

~~46~~ 47.42 Engine-Driven Pumping Equipment

Where permanently installed or portable engine-driven pumps are used, the following requirements, in addition to general requirements, apply:

~~46~~ 47.421 Pumping Capacity

Engine-driven pump(s) must meet the design pumping requirements unless storage capacity is available for flows in excess of pump capacity. Pumps must be designed for anticipated peak hour operating conditions, including suction lift, if applicable.

~~46~~ 47.422 Operation

The engine and pump must be equipped to provide automatic startup and operation of pumping equipment unless manual start-up and operation is justified. Provisions must also be made for manual start-up. Where manual start-up and operation is justified, the storage capacity and alarm system must meet the requirements of Section ~~46~~ 47.423 (Portable Pumping Equipment).

~~46~~ 47.423 Portable Pumping Equipment

Where part or all of the engine-driven pumping equipment is portable, sufficient storage capacity and an alarm system must be provided to allow time for detection of pump station failure and transportation and hookup of the portable equipment.

~~46~~ 47.43 Engine-Driven Generating Equipment

Where permanently installed or portable engine-driven generating equipment is used, the following requirements apply in addition to the general requirements of Section ~~46~~ 47.41 (General):

~~46~~ 47.431 Generating Capacity

a. Generating unit size must be adequate to provide power for pump motor starting current and for lighting, ventilation, and other auxiliary equipment necessary for safety and proper operation of the lift station.

b. The operation of only one pump during periods of auxiliary power supply must be justified. Such justification may be made on the basis of the design peak hourly flows relative to single-pump capacity, anticipated length of power outage, and storage capacity.

c. Special sequencing controls must be provided to start pump motors unless the generating equipment has capacity to start all pumps simultaneously with auxiliary equipment operating.

~~46~~ 47.432 Operation

Provisions must be made for automatic and manual start-up and load transfer unless only manual start-up and operation is justified. The generator must be protected from operating conditions that would result in damage to equipment. Provisions should be considered to allow the engine to start and stabilize at operating speed before assuming the load. Where manual start-up and transfer is justified, storage capacity and alarm system must meet the requirements of Section ~~46~~ 47.433 (Portable Generating Equipment).

~~46~~ 47.433 Portable Generating Equipment

Where portable generating equipment or manual transfer is provided, sufficient storage capacity and an alarm system must be provided to allow time for detection of pump station failure and transportation and connection of generating equipment. The use of special electrical connections and double throw switches is recommended for connecting portable generating equipment.

47.44 Independent Utility Substations

Where independent substations are used for emergency power, each separate substation and its associated transmission lines must be capable of starting and operating the pump stations at its rated capacity.

~~47~~ 48. INSTRUCTIONS AND EQUIPMENT

Wastewater pumping stations and portable equipment must be supplied with a complete set of operational instructions, including emergency procedures, maintenance schedules, tools and such spare parts as may be necessary.

~~48~~ 49. FORCE MAINS

~~48~~ 49.1 Velocity and Diameter

At design pumping rates, a cleaning velocity of at least 2 feet per second (0.61 m/s) must be maintained. The minimum force main diameter for raw wastewater is 4 inches (102 mm). It is desirable to have cleaning velocities of at least 3 feet per second. The maximum velocity shall not exceed 8 feet per second for the design pump rate.

Force mains in small grinder and effluent pump installations must be based on a minimum design flow velocity of 2 feet per second and a minimum pipe diameter of 1.5 inches.

~~48~~ 49.2 Air and Vacuum Relief Valve

An air relief valve must be placed at high points in the force main to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on force mains. The force main configuration and head conditions should be evaluated as to the need for and placement of vacuum relief valves.

~~48~~ 49.3 Termination

Force mains should enter the gravity sewer system at a point not more than ~~2~~ 1 foot (~~610 mm~~ 0.3 m) above the flow line of the receiving manhole. Corrosion protection for the receiving manhole must be provided in accordance with Section 34.8 (Corrosion Protection for Manholes).

~~48~~ 49.4 Pipe and Design Pressure

Pipe and joints must be equal to water main strength materials suitable for design conditions. The force main, reaction blocking, and station piping must be designed to withstand water hammer pressures and associated cyclic reversal of stresses that are expected with the cycling of wastewater lift stations. Surge protection ~~chambers~~ devices ~~should~~ must be evaluated to protect the force main.

~~48~~ 49.5 Special Construction

Force main construction near streams or water works structures and at water main crossings must meet applicable provisions of Sections 36 (Sewers in Relation to Streams), 37 (Aerial Crossings), and 38 (Protection of Water Supplies).

~~48~~ 49.6 Freeze Prevention

Force mains must be constructed to prevent freezing and must be buried a minimum of 6 feet. Depths greater than 6 feet may be required where local conditions dictate. If it is impossible to achieve sufficient burial depth, insulation may be used to help prevent freezing. However, when proper depth cannot be obtained, the engineer ~~shall~~ must submit justification for the lesser depth and heat flow calculations showing that the pipe will not freeze.

~~48~~ 49.7 Design Friction Losses

~~48~~ 49.71 Friction Coefficient

Friction losses through force mains must be based on the Hazen -Williams formula or other acceptable methods. When the Hazen - Williams formula is used, the value for "C" must be 100 for unlined iron or steel pipe for design. For other smooth pipe materials such as PVC, polyethylene, lined ductile iron, etc., a higher "C" value, not to exceed 120, may be allowed for design.

Both new and old pipe conditions must be evaluated, along with the various combinations of operating pumps and minimum and maximum flows, to determine the highest head and lowest head pumping conditions. The effects of higher discharge rates on selected pumps and downstream facilities must be considered.

~~48~~ 49.72 Maximum Power Requirements

When initially installed, force mains will have a significantly higher "C" factor. The effect of the higher "C" factor should be considered in calculating maximum power requirements and duty cycle time to prevent damage to the motor.

48 49.8 Identification

Where force mains are constructed of material that might cause the force main to be confused with potable water mains, the force main must be appropriately identified.

48 49.9 Leakage Testing

Leakage tests must be specified including testing methods and leakage limits.

49.10 Maintenance Considerations

Isolation valves must be used where force mains connect into a common force main. Cleanouts at low points and chambers for pig launching and catching should be considered for any force main to facilitate maintenance.

CHAPTER 50

WASTEWATER TREATMENT ~~WORKS~~ <u>FACILITIES</u>

51. PLANT LOCATION

51.1 General

Items to be considered when selecting a plant site are listed in Chapter 10 (<u>Engineering Reports and Facility Plans</u>). The layout and siting of wastewater treatment facilities must consider the long-range implications of the <u>State of Montana</u> Nondegradation <u>Rules (ARM 17.30.701), Total Daily Maximum Load (TMDL), and Water Quality Standards necessary to protect public health and to maintain a high level of water quality.</u> Area should be set aside for future facilities that may be required to provide increased levels of treatment.

51.2 Flood Protection

The treatment works structures, and electrical and mechanical equipment must be protected from physical damage by the 100 year flood. Treatment works should remain fully operational and accessible during the twenty-five (25) year flood. This requirement applies to new construction and to existing facilities undergoing major modification. Flood plain regulations of <u>local,</u> state and federal agencies must be followed.

52. QUALITY OF EFFLUENT

The required degree of wastewater treatment must be based on the effluent requirements and water quality standards established by the ~~DEQ~~ <u>Department</u> and/or appropriate federal regulations, including discharge permit requirements. <u>Consideration should be given to future TMDLs and water quality standards as well as the State's Nondegradation Policy.</u>

53. DESIGN

53.1 Type of Treatment

Items that must be considered in the selection of the appropriate type of treatment are presented in Chapter 10 (<u>Engineering Reports and Facility Plans</u>).

The plant design must provide the necessary flexibility to perform satisfactorily within the expected range of waste characteristics and volumes.

53.2 ~~Required~~ Engineering <u>and Performance</u> <u>Requirements</u> ~~Data~~ for <u>Innovative Wastewater Treatment Alternatives</u> ~~New Process and Application Evaluation~~

The policy of the ~~reviewing authority~~ <u>Department</u> is to encourage rather than ~~obstruct the~~ <u>discourage</u> development of ~~any~~ methods or equipment for treatment <u>or reuse</u> of wastewaters. The lack of inclusion in these standards of some types of wastewater treatment processes or equipment should not be construed as precluding their use. The ~~reviewing authority~~ <u>Department</u> may approve other types of wastewater treatment processes and equipment if the operational reliability and effectiveness of the process or device has been demonstrated with a suitably-sized prototype unit operating at its design load conditions, to the extent required.

To determine that such new processes and equipment or applications have a reasonable and substantial chance of success, the ~~reviewing authority~~ <u>Department</u> may require the following:

a. Monitoring observations, including test results and engineering evaluations, demonstrating the efficiency of such processes;

b. Detailed description of the test methods;

c. Testing, including appropriately-composited samples, under various ranges of strength and flow rates (including diurnal variations) and waste temperatures over a sufficient length of time to demonstrate performance under climatic and other conditions which may be encountered in the area of the proposed installations;

d. Other appropriate information.

The ~~reviewing authority~~ Department may require that appropriate testing be conducted and evaluations be made under the supervision of a competent process engineer other than those employed by the manufacturer or developer.

53.3 Design Period

The design period must be clearly identified in the engineering report or facilities plan as required in Chapter 10 (Engineering Reports and Facility Plans).

53.4 Design Loads

53.41 Hydraulic Design

53.411 Critical Flow Conditions

Flow conditions critical to the design of the treatment plant are described in Chapter 10 (Engineering Reports and Facility Plans).

Initial low flow conditions must be evaluated in the design to minimize operational problems with freezing, septicity, flow measurements and solids dropout. The design peak hourly flows must be considered in evaluating unit processes, pumping, piping, etc.

53.412 Treatment Plant Design Capacity

The treatment plant design capacity must be as described in Chapter 10 (Engineering Reports and Facility Plans). The plant design flow selected must meet the appropriate effluent and water quality standards that are set forth in the discharge permit. The design of treatment units that are not subject to peak hourly flow requirements must be based on the design average flow. For plants subject to high wet weather flows or overflow detention pumpback flows, the design maximum day flows that the plant is to treat on a sustained basis should be specified.

53.413 Flow Equalization

Facilities for the equalization of flows and organic shock load must be considered at all plants that are critically affected by surge loadings. The sizing of the flow equalization facilities should be based on data obtained herein and from Chapter 10 (Engineering Reports and Facility Plans).

53.42 Organic Design

Organic loadings for waste treatment plant design must be based on the information given in Chapter 10 (Engineering Reports and Facility Plans). The effects of accepting septage ~~flow that may be accepted~~ at the plant must be given consideration and appropriate facilities must be included in the design. Refer to Appendix A – Handling and Treatment of Septage at a Wastewater Treatment Plant.

53.43 Shock Effects

The shock effects of high concentrations and diurnal peaks for short periods of time on the treatment process, particularly for small treatment plants, must be considered.

53.5 ~~Conduits~~ Piping and Channels

All piping and channels should be designed to carry the maximum expected flows. The incoming sewer should be designed for unrestricted flow. Bottom corners of the channels must be filleted. ~~Conduits~~ Piping and channels must be designed to avoid creation of pockets and corners where solids can accumulate.

Suitable gates or valves should be placed in channels to seal off unused sections, which might accumulate solids. The use of shear gates, stop plates or stop planks is permitted where they can be used in place of gate valves or sluice gates. Non-corrodible materials must be used for these control gates.

53.6 Arrangement of Units

Component parts of the plant should be arranged for greatest operating and maintenance convenience, flexibility, economy, continuity of maximum effluent quality, and ease of installation of future units.

53.7 Flow Division Control

Flow division control facilities must be provided as necessary to insure organic and hydraulic loading control to plant process units and must be designed for easy operator access, change, observation and maintenance. The use of ~~head up~~ flow division boxes equipped with adjustable sharp-crested weirs or similar devices is recommended. The use of valves for flow splitting is not ~~recommended~~ acceptable. Appropriate flow measurement facilities must be incorporated in the flow division control design.

53.8 General Plant Pumping

The Department may require that a rational basis of pump design, pump head calculations, and pump curves be submitted for major pumps and pumps integral to key unit processes. Pump designers should consider the use of variable frequency drives (VFD) or variable speed drives (VSD), and must incorporate spare or redundant pumps where necessary, to maintain treatment capabilities.

54. PLANT DETAILS

54.1 Installation of Mechanical Equipment

The specifications ~~should be so written~~ must include the requirement that ~~the~~ installation and initial operation of major items of mechanical equipment will be inspected and approved by a representative of the manufacturer.

54.2 Unit Bypasses

54.21 Removal from Service

Properly located and arranged bypass structures and piping must be provided so that each unit of the plant can be removed from service independently. The bypass design must facilitate ~~plant~~ facility operation during unit maintenance and emergency repair to minimize deterioration of effluent quality and insure rapid process recovery upon return to normal operational mode. The bypass provisions must meet the discharge permit requirements, or other effluent quality requirements of the Department.

Bypassing may be accomplished through the use of duplicate or multiple treatment units in any stage if the design peak instantaneous flow can be handled hydraulically with the largest unit out of service.

The actuation of all bypasses must require manual action by operating personnel. All power-actuated bypasses must be designed to permit manual operation in the event of power failure and be designed so the valve will fail as is, upon failure of the power-actuator.

A fixed high water level bypass overflow should be provided in addition to a manually or power-actuated bypass.

54.22 Unit Bypass During Construction

Unit bypassing during construction must conform to the requirements in Sections 11.29 (~~h~~ i) (Treatment During Construction), 20.15 (Operation During Construction), and Section 21 (Specifications). For facilities with a discharge permit, appropriate personnel in the Department's Permits program should be notified of a planned unit bypass as required in the discharge permit.

54.3 Unit Dewatering, Flotation Protection, and Plugging

Means such as drains or sumps must be provided to completely dewater each unit to an appropriate point in the process. ~~Due~~ Consideration must be given to the possible need for hydrostatic pressure relief devices to prevent flotation of structures. Pipes subject to plugging must be provided with means for mechanical cleaning or flushing.

54.4 Construction Materials

Due consideration must be given to the selection of materials that are to be used in wastewater treatment ~~works~~ facilities because of the possible presence of hydrogen sulfide and other corrosive gases, greases, oils, and similar constituents frequently contained in wastewater. This is particularly important in the selection of metals and paints. Contact between dissimilar metals should be avoided to minimize galvanic action.

54.5 Unit Testing

All water bearing units must be hydraulically tested. The allowable leakage rate for concrete water containment structures, with a side water depth of 25 ft or less, must not exceed 0.1% of the water volume in a 24 hour period (following absorption and stabilization) and must not show any visible leakage or dampness on the exterior walls. Test procedures and results must be submitted to the Department for approval.

54.~~5~~6 Painting

The use of paints containing lead or mercury ~~should~~ must be avoided ~~in order to~~. To facilitate identification of piping~~, particularly in the large plants, it is suggested that the~~ different lines must be color-coded. The following color scheme is recommended for purposes of standardization.

- Raw sludge line – brown with black bands
- Sludge recirculation suction line – brown with yellow bands
- Sludge draw off line – brown with orange bands
- Sludge recirculation discharge line – brown

- Sludge gas line – orange (or red)
- Natural gas line – orange (or red) with black bands
- Nonpotable water line – blue with black bands
- Potable water line – blue
- Chlorine line – yellow
- Sulfur Dioxide – yellow with red bands
- Sewage (wastewater) line – gray
- Compressed air line – green
- Water lines for heating digesters or buildings – blue with a 6-inch (152 mm) red band spaced 30 inches (762 mm) apart.
- Fuel oil/diesel – red
- Plumbing drains and vents – black
- Polymers – purple

The contents and direction of flow must be stenciled on the piping in a contrasting color.

54.~~6~~7 Operating Equipment

A complete outfit of tools, accessories and spare parts necessary for the plant operator's use must be provided. Readily accessible storage space and workbench facilities must be provided, and consideration must be given to provision of a garage for large equipment storage, maintenance, and repair.

54.~~7~~8 Erosion Control Construction

Effective site erosion control must be provided during construction. Permits may be required from the Department for dewatering and storm water control at a construction site.

54.~~8~~9 Grading and Landscaping

Upon completion of the plant, the ground must be graded and sodded or seeded. All-weather walkways should be provided for access to all units. Where possible, steep slopes should be avoided to prevent erosion. Surface water may not be permitted to drain into any unit. Particular care must be taken to protect trickling filter beds, sludge beds, and intermittent sand filters from stormwater runoff. Provision should be made for landscaping, particularly when a plant must be located near residential areas.

55. PLANT OUTFALLS

55.1 Discharge Impact Control

The outfall sewer must be designed to discharge to the receiving stream in a manner acceptable to the ~~reviewing authority~~ Department. Consideration should be given in each case to the following:

a. Preference for free fall or submerged discharge at the site selected;

b. Utilization of cascade aeration of effluent discharge to increase dissolved oxygen; and

c. Limited or complete across-stream dispersion as needed to protect aquatic life movement and growth in the immediate reaches of the receiving stream.

55.2 Protection and Maintenance

The outfall sewer must be ~~so~~ constructed and protected against the effects of floodwater, tide, ice, or other hazards as to reasonably insure its structural stability and freedom from stoppage. A manhole should be provided at the shore end of all gravity sewers extended into the receiving waters. Hazards to navigation must be considered in designing outfall sewers.

55.3 Sampling Provisions

All outfalls must be designed so that a sample of the effluent can be safely obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters.

56. ESSENTIAL FACILITIES

56.1 Emergency Power Facilities

56.11 General

All plants must be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures, except as noted below. Methods of providing alternate sources include:

a. The connection of at least two independent power sources such as substations. A power line from each substation is recommended, and will be required unless documentation is received and approved by ~~the reviewing authority~~ Department verifying that a duplicate line is not necessary;

b. Portable or in-place internal combustion engine equipment which will generate electrical or mechanical energy; and

c. Portable pumping equipment when only emergency pumping is required.

56.12 Power for Aeration

Standby generating capacity normally is not required for aeration equipment used in the activated sludge process. In cases where a history of long-term (4 hours or more) power outages have occurred, auxiliary power for minimum aeration of the activated sludge will be required. Full power generating capacity may be required by the ~~reviewing authority~~ Department for ~~waste~~ discharges to ~~certain~~ critical ~~stream segments~~ water bodies such as upstream of ~~bathing~~ beaches, public water supply intake or other similar situations.

56.13 Power for Disinfection

Continuous disinfection, where required, must be provided during all power outages. Continuous dechlorination is required for those systems that dechlorinate.

56.2 Water Supply

56.21 General

An adequate supply of potable water under pressure should be provided for use in the laboratory and for general cleanliness around the plant. Piping or other connections may not exist in any part of the treatment works, which, under any conditions, might cause the contamination of a potable water supply. The chemical quality should be checked for suitability for its intended uses such as in heat exchangers, chlorinators, etc.

56.22 Direct Connections

Direct connections between potable water piping and sewer-connected wastes must not exist under any condition in the treatment facility in accordance with Title 17, Chapter 38, Sub-Chapter 3, ARM and the Uniform Plumbing Code as adopted by the State of Montana, particularly Section 603.3.5. An approved backflow prevention assembly must be installed on the service connection (potable water supply line) to any wastewater treatment facility. Potable water from a municipal or separate supply may be used directly at points above grade for the following hot and cold supplies:

a. Lavatory;

b. Water closet;

c. Laboratory sink (with vacuum breaker);

d. Shower;

e. Drinking fountain;

f. Eye wash fountain; and

g. Safety shower.

Hot water for any of the above units may not be taken directly from a boiler used for supplying hot water to a sludge heat exchanger or digester heating unit.

56.23 Indirect Connections

Where a potable water supply is to be used for any purpose in a plant other than those listed in Section 56.22 (Direct Connections), backflow due to either back-pressure or back-siphonage must be identified and adequate protection must be provided. ~~either a~~ An air gap (combination of a break tank, pressure pump, and pressure tank), vacuum breaker, ~~must be used~~ or a backflow preventer assembly ~~valve~~ must be installed. Air gaps and backflow ~~preventer valves~~ prevention assemblies must be constructed in accordance with ARM Title 17, Chapter 38, Sub-Chapter 3 and with the Uniform Plumbing Code. If backflow ~~preventer valves~~ prevention assemblies are used, the plant must have ~~a backflow prevention program~~ Cross-Connection Control Program approved by the ~~DEQ~~ Department. Also, the requirements of ~~this Circular,~~ Sections 38.1 (Cross Connections Prohibited), and 38.2 (Relation to Water Works Structures) apply.

In break tank systems, water must be discharged to the break tank through an air gap at least 6 inches (15.2 cm) above the flood line or the spill line of the tank, whichever is higher. Where potable water is discharged to the drainage system and backflow due to back-siphonage may occur, the connection must use an approved air gap. The air gap must be a minimum of two pipe diameters of the supply inlet, but in no case will the air gap be less than one inch.

A sign must be permanently posted at every hose bib, faucet, hydrant or sill cock located on the water system beyond the break tank, or approved backflow prevention assembly to indicate that the water is not safe for drinking.

56.24 Separate Potable Water Supply

Where it is not possible to provide potable water from a public water supply, a separate well may be provided. Location and construction of the well ~~should~~ must be in compliance with ~~DEQ~~ Circular DEQ 3 and ~~or~~ the Montana Board of Water Well Contractors' rules~~, depending upon the population to be served~~. Requirements governing the use of ~~the supply are those contained in Sections 56.22 and 56.23~~ potable water within a wastewater treatment facility are those contained in this Chapter and within the Uniform Plumbing Code.

56.25 Separate Non-Potable Water Supply

Where a separate non-potable water supply is to be provided, a break tank or an approved backflow prevention assembly will not be necessary, but all system outlets must be posted with a permanent sign indicating the water is not safe for drinking.

56.3 Sanitary Facilities

Toilet, shower, lavatory, and locker facilities should be provided in sufficient numbers and convenient locations to serve the expected plant personnel.

56.4 Floor Slope

Floor surfaces must be sloped adequately to a point of drainage.

56.5 Stairways

Stairways, rather than ladders, must be installed for access to units requiring routine inspection and maintenance, such as digesters, trickling filters, aeration tanks, clarifiers, tertiary filters, etc. Spiral or winding stairs are permitted only for secondary access where dual means of egress are provided.

Stairways must have slopes between 30° and 40° from the horizontal to facilitate carrying samples, tools, etc. Each tread and riser must be of uniform dimension in each flight. Minimum tread run is 9 inches (229 mm). The sum of the tread run and riser may not be less than 17 (432 mm) nor more than 18 inches (457 mm). A flight of stairs may consist of no more than a 12-foot (3.7 m) continuous rise without a platform.

56.6 Flow Measurement

56.61 Location

Flow measurement facilities must be provided to measure the following flows:

a. Plant influent and effluent flow;

b. Excess flow treatment facility discharges;

c. Other flows required to be monitored under the provisions of the discharge permit; and

d. Other flows, such as return activated sludge, waste activated sludge, recirculation, and recycle required for plant operational control.

56.62 Facilities

Indicating, totalizing and recording flow measurement devices must be provided for all mechanical plants. Flow measurement facilities for lagoon systems must be at least equivalent to elapsed time meters used in conjunction with pumping rate tests or calibrated weirs or flumes. All flow measurement equipment must be sized to function effectively over the full range of flows expected, must be protected against freezing and must be readily accessible.

56.63 Hydraulic Conditions

Flow measurement equipment including entrance and discharge conduit configuration and critical control elevations must be designed to ensure that the required hydraulic conditions necessary for accurate measurement are provided. Conditions that must be avoided include turbulence, eddy currents, air entrainment, etc., that upset the normal hydraulic conditions ~~that are~~ necessary for accurate flow measurement.

56.7 Sampling Equipment

Effluent composite sampling equipment must be provided at facilities where necessary to meet discharge permit monitoring requirements. Composite sampling equipment must also be provided as needed for influent sampling and for monitoring plant operations. The influent sampling point must be located prior to any preliminary treatment units and process return flows.

57. SAFETY

57.1 General

Adequate provision must be made to effectively protect ~~the operator~~ plant personnel and visitors from hazards. ~~The following must be provided:~~ It is recommended that OSHA and the Montana Department of Labor and Industry Safety and Health Bureau be contacted for safety requirements. At a minimum, and as appropriate, the following must be provided at each facility:

- **a.** Enclosure of the plant with a fence and signs designed to discourage the entrance of unauthorized persons and animals;
- **b.** Hand rails and guards around tanks, trenches, pits, stairwells, and other hazardous structures with the tops of walls less than 42 inches (1070 mm) above the surrounding ground level;
- **c.** Gratings over appropriate areas of treatment units where access for maintenance is required;
- **d.** First aid equipment;
- **e.** "No Smoking" signs in hazardous areas;
- **f.** Protective clothing and equipment, such as self-contained breathing apparatus, gas detection equipment, goggles, gloves, hard hats, safety harnesses, etc.
- **g.** Portable blower and sufficient hose;
- **h.** Portable lighting equipment complying with the National Electrical Code requirements. Suitable lighting must be provided in all work and access areas. Electrical fixtures in areas where hazardous gases may accumulate must meet the requirements of the National Electrical Code for Class I, Division 1, Group D locations;
- **i.** Gas detectors certified for use in Class I, Division 1, Group D, locations;
- **j.** Appropriately-placed floatation devices, warning signs for slippery areas, non-potable water fixtures, low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, etc.;
- **k.** Adequate ventilation in pump station areas in accordance with Section 42.7 (Safety Ventilation);
- **l.** Provisions for local lockout on stop motor controls, main power source; ~~and~~
- **m.** Provisions for confined space entry in accordance with OSHA, Montana Department of Labor and Industry Safety and Health Bureau, and ~~regulatory agency~~ Department requirements; and
- **n.** Adequate vector control which considers customary insects, mammals, rodents and other pests.

57.2 Hazardous Chemical Handling

Follow OSHA Hazard Communication Standard, found in Title 29 Code of Federal Regulations (CFR) Part 1910.1200, or Worker Right to Know Law. In addition, see Uniform Fire Code Article 80.

57.21 Containment Materials

The materials utilized for storage, piping, valves, pumping, metering, splash guards, etc., must be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical.

57.22 Underground Storage

Underground storage and piping facilities for fuels, or ~~for~~ chemicals such as alum or ferric chloride, must be constructed in accordance with applicable state and federal regulations on underground storage tanks for both fuels and hazardous materials.

57.23 Secondary Containment

Chemical storage areas must be enclosed in dikes or curbs that will contain the stored volume until it can be safely transferred to alternate storage or released to the wastewater at controlled rates that will not damage facilities, inhibit the treatment process, or contribute to stream pollution. Liquid polymer should be similarly contained to reduce areas with slippery floors, especially to protect travelways. Non-slip floor surfaces are desirable in polymer-handling areas.

57.24 Liquefied Gas Chemicals

Properly designed isolated areas must be provided for storage and handling of chlorine and sulfur dioxide and other hazardous gases. Gas detection kits, alarms, controls, safety devices, and emergency repair kits must also be provided.

57.25 Splash Guards

All pumps or feeders for hazardous or corrosive chemicals must have guards that will effectively prevent spray of chemicals into space occupied by personnel. The splash guards are in addition to guards to prevent injury from moving or rotating machinery parts.

57.26 Piping, Labeling, Coupling Guards, Location

All piping containing or transporting corrosive or hazardous chemicals must be identified with labels every ten feet and with at least two labels in each room, closet, or pipe chase. Color-coding may also be used, but is not an adequate substitute for labeling.

All connections (flanged or other type), except those adjacent to storage or feeder areas, must have guards that will direct any leakage away from space occupied by personnel. Pipes containing hazardous or corrosive chemicals should not be located above shoulder level except where continuous drip collection trays and coupling guards will eliminate chemical spray or dripping onto personnel.

57.27 Protective Clothing and Equipment

The following items of protective clothing or equipment must be provided and utilized for all operations or procedures when their use will minimize injury hazard to personnel:

a. Self-contained breathing apparatus recommended for protection against chlorine;

b. Chemical worker's goggles, ultraviolet light safety goggles, or other suitable goggles (safety glasses are insufficient);

c. Face masks or shields for use over goggles;

d. ~~Dust~~ Masks to protect the lungs in dry chemical areas or in areas exposed to aerosols or sprays;

e. Rubber gloves (mandatory for ultraviolet light systems);

f. Rubber aprons with leg straps;

g. Rubber boots (leather and wool clothing should be avoided near caustics); and

h. Safety harness and line.

57.28 Warning System and Signs

Facilities must be provided for automatic shutdown of pumps and sounding of alarms when failure occurs in a pressurized chemical discharge line.

Warning signs requiring use of goggles must be located near chemical unloading stations, pumps, and other points of frequent hazard.

57.29 Dust Collection

Dust collection equipment must be provided to protect personnel from dusts injurious to the lungs or skin and to prevent polymer dust from settling on walkways which become slick when wet.

57.30 Eyewash Devices and Safety Showers

Eyewash devices and safety showers must utilize potable water and be fully operable during all weather conditions. Eyewash devices and safety showers are to be as close as practical, and no more than 25 feet (7.6 m) to points of chemical exposure. Eyewash devices and safety showers must be provided in category II (refer to Section 58.3) and category III (refer to Section 58.4) laboratories, and on each floor level or work location involving hazardous or corrosive chemical storage, mixing (or shaking), pumping, metering, or transportation unloading.

The eyewash devices must be supplied with water of moderate temperature, 50° to 90° F (10° to 32° C), suitable to provide 15 minutes to 30 minutes of continuous irrigation of the eyes. The safety showers must be capable of discharging 30 gpm to 50 gpm (1.9 L/s to 3.2 L/s) of water at moderate temperature and at pressures of 20 psi to 50 psi (138 kPa to 345 kPa).

57.31 Hazardous Chemical Container Identification

The identification and hazard warning data included on shipping containers must appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. Wastewater and sludge sample containers should be adequately labeled. Below is a suitable label to identify a wastewater sample as a hazardous substance:

RAW SEWAGE WASTEWATER

Sample point No.______

Contains Harmful Bacteria.

May contain hazardous or toxic material.

Do not drink or swallow.

Avoid contact with openings or breaks in the skin.

58. LABORATORY

Follow OSHA Laboratory Safety Standard found in Title 29 CFR Part 1910.1450.

58.1 General

All mechanical treatment~~ works~~ facilities must include a laboratory for making the necessary analytical determinations and operating control tests.~~, except for~~ A laboratory is not required for those ~~plants~~ facilities ~~utilizing only processes that~~ do not ~~requiring~~ require laboratory testing for ~~plant~~ operational control and where satisfactory off-site laboratory provisions are made to meet the permit monitoring requirements. For ~~plants~~ facilities where a fully equipped laboratory is not required, the requirements for utilities, fume hoods, etc., may be reduced. The laboratory must have sufficient size, bench space, equipment, and supplies to perform all self-monitoring analytical work required by discharge permits, and to perform the process control tests necessary for good management of each treatment process included in the design.

The facilities and supplies necessary to perform analytical work to support industrial waste control programs will normally be included in the same laboratory. The laboratory arrangement should be sufficiently flexible to allow future expansion should more analytical work be needed. Laboratory instrumentation and size should reflect treatment plant size, staffing requirements, and process complexity. Experience and training of plant operators should also be assessed in determining treatment plant laboratory needs.

Treatment plant laboratory needs may be divided into the following three general categories:

I. Plants performing only basic operational testing; this typically includes pH, temperature, and dissolved oxygen.

II. Plants performing more complex operational and permit laboratory tests including all Category I testing, biochemical oxygen demand, suspended solids, and ~~fecal coliform~~ bacterial analysis (e.g., *E. coli*), ~~process control~~, and;

III. Plants performing more complex operational, permit, industrial pretreatment, including all Category II testing, nutrient analysis, metals testing, and multiple plant laboratory testing.

Expected minimum laboratory needs for these three plant classifications are outlined in this section. However, in specific cases laboratory needs may have to be modified or increased due to the industrial monitoring needs or special process control requirements.

58.2 Category I: Plants performing only basic operational testing

58.21 Location and Space

A floor area up to 150 square feet (14 square meters) should be adequate. It is recommended that this be at the treatment site. Another location in the community utilizing space in an existing structure owned by the involved sewer authority may be acceptable.

58.22 Design and Materials

The facility must provide electricity, water, heat, sufficient storage space, a sink, and a bench top. The lab components need not be of industrial grade materials. Laboratory equipment and glassware must be of types recommended by "Standard Methods for the Examination of Water and Wastewater" and the ~~reviewing authority~~ Department.

58.3 Category II: Plants performing more complex operational and permit laboratory tests including biochemical oxygen demand, suspended solids, and ~~fecal coliform~~ bacterial analysis

58.31 Location and Space

The laboratory size should be based on providing adequate room for the equipment to be used. In general, the laboratories for this category of plant should provide a minimum of approximately 300 square feet (28 square meters) of floor space. The laboratory should be located at the treatment site on ground level. The laboratory must be isolated away from vibrating, noisy, high-temperature machinery or equipment, which might have adverse effects on the performance of laboratory staff or instruments.

58.32 Floors

Floor surfaces should be fire resistance, and highly resistant to acids, alkalies, solvents, and salts.

58.33 Cabinets and Bench Tops

Laboratories in this category usually perform both ~~the NPDES~~ discharge permit testing and operational control monitoring utilizing "acids" and "bases" in small quantities, such that laboratory grade metal cabinets and shelves are not mandatory. The cabinets and shelves selected may be of wood or other durable materials. Bench tops should be of acid resistant laboratory grade materials for protection of the non-acid proof cabinets. Glass doors on wall-hung cabinets are not required.

One or more cupboard style base cabinets should be provided. Cabinets with drawers should have stops to prevent accidental removal. Cabinets for Category II laboratories are not required to have gas, air, vacuum, and electrical service fixtures. Built-in shelves should be adjustable.

58.34 Fume Hoods, Sinks, and Ventilation

58.341 Fume Hoods

Fume hoods must be provided for laboratories in which required analytical work produces noxious fumes. Air intake should be balanced against all exhaust ventilation to maintain an overall positive pressure relative to atmospheric pressure in the laboratory.

58.342 Sinks

A laboratory grade sink and drain trap must be provided.

58.343 Ventilation

Laboratories should be air conditioned. In addition, separate exhaust ventilation should be provided.

58.35 Balance and Table

An analytical balance of the automated digital readout, single pan 0.1 milligram sensitivity type, must be provided. A heavy special-design balance table, which will minimize vibration of the balance, is recommended. If provided, it must be located as far as possible from windows, doors, or other sources of drafts or air movements, so as to minimize undesirable impacts from these sources upon the balance.

58.36 Equipment, Supplies, and Reagents

The laboratory must be provided with all of the equipment, supplies and reagents that are needed to carry out all of the facility's analytical testing requirements. If any required analytical testing produces malodorous or noxious fumes, the engineer should verify that the in-house analysis is more cost-effective than use of an independent off-site laboratory. Composite samplers may be required to satisfy permit sampling requirements. Discharge permit, process control, and industrial waste monitoring requirements should be considered when specifying equipment needs. References such as Standard Methods for the Examination of Water and Wastewater and the U.S.E.P.A Analytical Procedures Manual should be consulted prior to specifying equipment items.

58.37 Utilities

58.371 Power Supply

Consideration should be given to providing line voltage regulation for power supplied to laboratories using delicate instruments.

58.372 Laboratory Water

Reagent water of a purity suitable for analytical requirements must be supplied to the laboratory. In general, reagent water prepared using an all glass distillation system is adequate. However, some analyses require deionization of the distilled water. Consideration should be given to softening the feed water to the still.

58.38 Safety

~~**58.381 Equipment**~~

At a minimum, laboratories must provide the following: first aid equipment, protective clothing including goggles, gloves, lab aprons, etc., and a fire extinguisher.

~~**58.382 Eyewash Fountains and Safety Showers**~~

~~Eyewash fountains and safety showers utilizing potable water must be provided in the laboratory and should be as close as practical to, and no more than 25 feet (7.6 m) from points of hazardous chemical exposure.~~

~~The eyewash fountains must be supplied with water of moderate temperature, 50° to 90° F (10° to 32° C), suitable to provide 15 minutes to 30 minutes of continuous irrigation of the eyes. The emergency showers must be capable of discharging 30 to 50 gpm (1.9 to 3.2 L/s) of water at moderate temperature and at pressures of 20 to 50 psi (138 to 345 kPa).~~

58.4 Category III. Plants performing more complex operational, permit, industrial pretreatment and multiple plant laboratory testing

58.41 Location and Space

The laboratory should be located at the treatment site on ground level, with environmental control as an important consideration. It must be located away from vibrating, noisy, high temperature machinery or equipment, which might have adverse effects on the performance of laboratory staff or instruments. The laboratory facility needs for Category III plants should be described in the engineering report or facilities plan. The laboratory floor space and facility layout should be based on an evaluation of the complexity, volume, and variety of sample analyses expected during the design life of the plant including testing for process control, industrial pretreatment control, user charge monitoring, and discharge permit monitoring requirements.

Consideration should be given to the necessity to provide separate (and possibly isolated) areas for some special laboratory equipment, glassware, and chemical storage. The analytical and sample storage areas should be isolated from all potential sources of contamination. It is recommended that the organic chemical facilities be isolated from other facilities. Adequate security must be provided for sample storage areas. Provisions for the proper storage and disposal of chemical wastes must be provided. At large plants, office and administrative space needs should be considered.

For less complicated laboratory needs bench-top working surface should occupy at least 35 percent of the total laboratory floor space. Additional floor and bench space should be provided to facilitate performance of analysis of industrial wastes, as required by the discharge permit and the utility's industrial waste pretreatment program. Ceiling height should be adequate to provide for the installation of wall-mounted water stills, deionizers, distillation racks, hoods, and other equipment with extended height requirements.

58.42 Floors and Doors

58.421 Floors

Floor surfaces should be fire resistant, and highly resistant to acids, alkalies, solvents, and salts.

58.422 Doors

Two exit doors should be located to permit a straight egress from the laboratory, preferably at least one to outside the building. Panic hardware should be used. They should have large glass windows for easy visibility of approaching or departing personnel.

Automatic door closers should be installed; swinging doors should not be used. .

Flush hardware should be provided on doors if cart traffic is anticipated. Kick plates are also recommended.

58.43 Cabinets and Bench Tops

58.431 Cabinets

Wall-hung cabinets are useful for dust-free storage of instruments and glassware. Units with sliding glass doors are preferable. A reasonable proportion of cupboard style base cabinets and drawer units should be provided.

Drawers should slide out so that entire contents are easily visible. They should be provided with rubber bumpers and with stops, which prevent accidental removal. Drawers should be supported on ball bearings or nylon rollers, which pull easily in adjustable steel channels. All metal drawer fronts should be double-wall construction.

All cabinet shelving should be acid resistant and adjustable. The laboratory furniture must be supplied with adequate water, gas, air, and vacuum service fixtures, traps, strainers, plugs and tailpieces, and all electrical service fixtures.

58.432 Bench Tops

Bench tops should be constructed of materials resistant to attacks from normally used laboratory reagents. Generally, bench-top height should be 36 inches (914 mm). However, areas to be used exclusively for sit-down type operations should be 30 inches (762 mm) high and include kneehole space. One inch (25.4 mm) overhangs and drip grooves should be provided to keep liquid spills from running along the face of the cabinet. Tops should be furnished in large sections, 1-1/4 inches (32 mm) thick. They should be field-jointed into a continuous surface with acid, alkali, and solvent resistant cements which are at least as strong as the material of which the top is made.

58.44 Hoods

58.441 General

Fume hoods and canopy hoods over heat-releasing equipment must be provided.

58.442 Fume Hoods

a. Location

Fume hoods ~~should~~ must be located where air disturbance at the face of the hood is minimal. Air disturbance may be created by persons walking past the hood; by heating, ventilating, or air-conditioning systems; by drafts from opening or closing a door; etc.

Safety factors ~~should~~ must be considered in locating a hood. If a hood is situated near a doorway, a secondary means of egress must be provided. Bench surfaces should be available next to the hood so that chemicals need not be carried long distances.

b. Design and Materials

The selection, design, and materials of construction of fume hoods and their appropriate safety alarms must be made by considering the variety of analytical work to be performed. The characteristics of the fumes, chemicals, gases, or vapors that will or may be released by the activities therein ~~should~~ must be considered. Special design and construction is necessary if perchloric acid use is anticipated. Consideration ~~should~~ must be given to providing more than one fume hood to minimize potential hazardous conditions throughout the laboratory. An overall positive pressure relative to atmospheric must be maintained in the laboratory.

Fume hoods are not appropriate for operation of heat-releasing equipment that does not contribute to hazards, unless they are provided in addition to those needed to perform hazardous tasks.

c. Fixtures

One ~~cup~~ sink should be provided inside each fume hood. A cup sink is usually adequate.

All switches, electrical outlets, and utility and baffle adjustment handles ~~should~~ must be located outside the hood. Light fixtures ~~should~~ must be explosion-proof.

d. Exhaust

Twenty-four hour continuous exhaust capability ~~should~~ must be provided. Exhaust fans ~~should~~ must be explosion-proof. Exhaust velocities ~~should~~ must be checked when fume hoods are installed.

58.443 Canopy Hoods

Canopy hoods ~~should~~ must be installed over the bench-top areas where hot plate, steam bath, or other heating equipment or heat-releasing instruments are used. The canopy should be constructed of heat and corrosion resistant material.

58.45 Sinks, Ventilation, and Lighting

58.451 Sinks

The laboratory should have a minimum of two sinks (not including cup sinks). At least one of them should be a double-well sink with drainboards. Additional sinks should be provided in separate work areas as needed and identified for the use intended.

Sinks should be made of epoxy resin or plastic materials highly resistant to acids, alkalies, solvents, and salts, and should be abrasion and heat resistant, non-absorbent, and light in weight. Traps should be made of glass, plastic, or lead and easily accessible for cleaning. Waste openings should be located toward the back so that a standing overflow will not interfere.

All water fixtures on which hoses may be used should be provided with reduced zone pressure backflow preventers to prevent contamination of water lines.

58.452 Ventilation

Laboratories should be separately air conditioned, with external air supply for one hundred percent make-up volume. In addition, separate exhaust ventilation should be provided. Ventilation outlet locations should be remote from ventilation inlets. Consideration should be given to providing dehumidifiers.

58.453 Lighting

Good lighting, free from shadows, must be provided for reading dials, meniscuses, etc., throughout the laboratory.

58.46 Balance and Table

An analytical balance of the automatic, digital readout, single pan, 0.1 milligram sensitivity type, must be provided. A heavy special-design balance table that will minimize vibration of the balance is needed. The table must be located as far as practical from windows, doors, or other sources of drafts or air movements, to minimize undesirable impacts from these sources upon the balance.

58.47 Equipment, Supplies, and Reagents

The laboratory must be provided with all of the equipment, supplies, and reagents that are needed to carry out all of the facility's analytical testing requirements. Composite samplers may be required to satisfy permit sampling requirements. Discharge permit, process control, and industrial waste monitoring requirements should be considered when specifying equipment needs. References such as Standard Methods for the Examination of Water and Wastewater and the U.S.E.P.A Analytical Procedures Manual should be consulted prior to specifying equipment items.

58.48 Utilities and Services

58.481 Power Supply

Consideration should be given to providing line voltage regulation for power supplied to laboratories using delicate instruments.

58.482 Laboratory Water

Reagent water of a purity suitable for analytical requirements must be supplied to the laboratory. In general, reagent water prepared using an all glass distillation system is adequate. However, some analyses require deionization of the distilled water. Consideration should be given to softening the feed water to the still.

58.483 Gas and Vacuum

Natural or LP gas should be supplied to the laboratory. Digester gas should not be used. An adequately-sized line source of vacuum should be provided with outlets available throughout the laboratory.

58.49 Safety

~~58.491 Equipment~~

Laboratories must contain the following: first aid equipment; protective clothing and equipment such as, goggles, safety glasses, full face shields, gloves, etc.; fire extinguishers; chemical spill kits; "No Smoking" signs in hazardous areas; and appropriately placed warning signs for slippery areas, non-potable water fixtures, hazardous chemical storage areas, flammable fuel storage areas, etc.

~~58.492 Eyewash Fountains and Safety Showers~~

~~Eyewash fountains and safety showers utilizing potable water must be provided in the laboratory and should be as close as practical to and no more than 25 feet (7.6 m) from points of hazardous chemical exposure.~~

~~The eyewash fountains must be supplied with water of moderate temperature, 50° to 90° F (10° to 32° C), suitable to provide 15 minutes to 30 minutes of continuous irrigation of the eyes. The emergency showers must be capable of discharging 30 to 50 gpm (1.9 to 3.2 L/s) of water at moderate temperature and at pressures of 20 to 50 psi (138 to 345 kPa).~~

CHAPTER 60

SCREENING, GRIT REMOVAL, AND FLOW EQUALIZATION

61. SCREENING DEVICES

61.1 Coarse Screens

61.11 When Required

Protection for pumps and other equipment must be provided by trash racks, coarse bar racks, or coarse screens.

61.12 Design and Installation

61.121 Bar Spacing

Clear openings between bars should be no less than one inch (25.4 mm) for manually cleaned screens. Clear openings for mechanically cleaned screens may be smaller. Maximum clear openings should be 1 3/4 inches (44.5 mm).

61.122 Slope and Velocity

Manually cleaned screens should be placed on a slope of 30 to 45 degrees from the horizontal.

At design average flow conditions, approach velocities should be no less than 1.25 feet per second (fps) (0.38 m/s), to prevent settling; and no greater than 3.0 fps (0.91 m/s) to prevent forcing material through the openings.

61.123 Channels

Dual channels must be provided and equipped with the necessary gates to isolate flow from any screening unit. Provisions must also be made to facilitate dewatering each unit. The channel preceding and following the screen must be shaped to eliminate stranding and settling of solids.

61.124 Auxiliary Screens

Where a single mechanically cleaned screen is used, an auxiliary manually cleaned screen must be provided. Where two or more mechanically cleaned screens are used, the design must provide for taking any unit out of service without sacrificing the capability to handle the design peak instantaneous flows.

61.125 Invert

The screen channel invert should be 3.0 to 6.0 inches (76 to 152 mm) below the invert of the incoming sewer.

61.126 Flow Distribution

Entrance channels should be designed to provide equal and uniform distribution of flow to the screens.

61.127 Backwater Effect on Flow Metering

Flow measurement devices should be selected for reliability and accuracy. The effect of changes in backwater elevation, due to intermittent cleaning of screens, should be considered in locations of flow measurement equipment.

61.128 Freezing Protection

Screening devices and screening storage areas must be protected from freezing.

61.129 Screenings Removal and Disposal

A convenient and adequate means for removing screenings must be provided. Hoisting or lifting equipment may be necessary depending on the depth of pit and amount of screenings or equipment to be lifted. Washing of screenings is required for screens with 0.5 inch openings or less.

Facilities must be provided for handling, storage, and disposal of screenings in a manner acceptable to the ~~regulatory agency~~ Department. Separate grinding of screenings and return to the sewage flow is unacceptable.

Manually cleaned screening facilities must include an accessible platform from which the operator may rake screenings easily and safely. Suitable drainage facilities must be provided for both the platform and the storage area.

61.130 Materials

Due to the corrosive environment, bar racks must be constructed of aluminum, stainless steel, fiberglass, or other non-corrosive material.

61.13 Access and Ventilation

Screens located in pits more than 4 feet (1.2 m) deep must be provided with stairway access. Access ladders are acceptable for pits less than 4 feet (1.2 m) deep, in lieu of stairways.

Screening devices, installed in a building where other equipment or offices are located, must be isolated from the rest of the building, be provided with separate outside entrances, and be provided with separate and independent fresh air supply.

Fresh air must be forced into enclosed screening device areas or into open pits more than 4 feet (1.2 m) deep. Dampers should not be used on exhaust or fresh air ducts and fine screens or other obstructions should be avoided to prevent clogging. Where continuous ventilation is required, at least 12 complete air changes per hour must be provided. Where continuous ventilation would cause excessive heat loss, intermittent ventilation of at least 30 complete air changes per hour must be provided when workers enter the area. The air change requirement must be based on 100 percent fresh air.

Switches for operation of ventilation equipment should be marked and located conveniently. All intermittently operated ventilation equipment must be interconnected with the respective pit lighting system. The fan wheel should be fabricated from non-sparking material. ~~Gas~~ Explosion proof gas detectors must be provided in accordance with Section 57 (Safety).

61.14 Safety and Shields

61.141 Railings and Gratings

Manually cleaned screen channels, must be protected by guard railings and deck gratings, with adequate provisions for removal or opening to facilitate raking.

Mechanically cleaned screen channels, must be protected by guard railings and deck gratings. Consideration should also be given to temporary access arrangements to facilitate maintenance and repair.

61.142 Mechanical Devices

Mechanical screening equipment must have adequate ~~removal~~ removable enclosures to protect personnel against accidental contact with moving parts and to prevent dripping in multi-level installations.

A positive means of locking out each mechanical device and temporary access for use during maintenance must be provided.

61.143 Drainage

Floor design and drainage must be provided to prevent slippery areas.

61.144 Lighting

Suitable lighting must be provided in all work and access areas. Refer to Section 61.152 (Electrical Equipment, Fixtures, and Controls).

61.15 Electrical Equipment and Control Systems

61.151 Timing Devices

All mechanical units that are operated by timing devices must be provided with auxiliary controls that will set the cleaning mechanism in operation at a preset high water elevation. If the cleaning mechanism fails to lower the high water, a warning ~~should~~ must be signaled.

61.152 Electrical Equipment, Fixtures and Controls

Electrical equipment, fixtures and controls in the screening area where hazardous gases may accumulate must meet the requirements of the National Electrical Code for Class I, ~~Group D~~, Division 1, Group D locations.

61.153 Manual Override

Automatic controls must be supplemented by a manual override.

61.16 Servicing

Hosing equipment must be provided to facilitate cleaning. Refer to Section 56.2 (Water Supply).

61.2 Fine Screens

61.21 General

Fine screens ~~as discussed here~~ have openings ~~of approximately 1/16 inch (1.6 mm)~~ less than 0.25 inch (6 mm). The amount of material removed by fine screens is dependent on the waste stream being treated and screen opening size. Automated washing of screenings is required for all fine screens. Fine screens may require close operational attention to function properly.

Fine screens should not be considered equivalent to primary sedimentation, but may be ~~considered for use~~ used in lieu of primary sedimentation where subsequent treatment units are designed on the basis of anticipated screen performance and absence of primary sedimentation. Selection of screen capacity should consider flow restriction due to retained solids, gummy materials, frequency of cleaning, and extent of cleaning. Where fine screens are used, additional provision for removal of floatable oils and greases must be considered.

61.22 Design and Installation

Tests should be conducted to determine BOD_5 and suspended solids removal efficiencies at the design maximum day flow and design maximum day BOD_5 loadings. Pilot testing for an extended time is preferred.

A minimum of two parallel fine screens must be provided, each unit being capable of independent operation. Capacity must be provided to treat design peak instantaneous flow with one unit out of service.

Fine screens must be preceded by a coarse bar screening device, unless not required by the fine screen manufacturer. Fine screens must be protected from freezing and located to facilitate maintenance.

61.23 Electrical Equipment, Fixtures and Control

Electrical equipment, fixtures and controls in the screening area where hazardous gases may accumulate must meet the requirements of the National Electrical Code for Class I, ~~Group D,~~ Division 1, Group D locations.

61.24 Servicing

Hosing equipment must be provided to facilitate cleaning. Provision must be made for isolating and removing units from their location for servicing.

61.25 Safety and Shields

Hoods must be provided for safety and to contain backwash sprays to reduce operator contact with aerosols and sprays and prevent floors from becoming wet and slippery.

62. COMMINUTORS AND GRINDERS

62.1 General

Provisions for access, ventilation, shields, and safety must conform to Sections 61.13 (Access and Ventilation), 61.14 (Safety and Shields), and 61.15 (Electrical Equipment and Control Systems).

62.2 When Used

Comminutors or grinders may be used in lieu of screening devices to protect equipment ~~where stringy substance accumulation on downstream equipment will not be a substantial problem~~. Special consideration must be given to downstream unit process design and operations due to the fact that comminutors and grinders do not remove solids and their use may result in the accumulation of stringy material on downstream equipment.

62.3 DESIGN CONSIDERATIONS

62.31 Location

Comminutors or grinders should be located downstream of any grit removal equipment and should be protected by a coarse screening device. Comminutors or grinders not ~~proceeded~~ preceded by grit removal equipment must be protected by a 6.0 inch (152 mm) deep gravel trap.

62.32 Size

Comminutor or grinder capacity must be adequate to handle design peak hourly flow.

62.33 **Installation**

A screened bypass channel must be provided. The use of the bypass channel should be automatic for all comminutor or grinder failures.

Gates must be provided in accordance with Sections 61.123 (Channels) and 61.124 (Auxiliary Screens).

62.34 **Servicing**

Provision must be made to facilitate servicing units in place and removing units from their location for servicing.

62.35 **Electrical Controls and Motors**

Electrical equipment in comminutor or grinder chambers where hazardous gases may accumulate must meet the requirements of the National Electrical Code for Class I, ~~Group D,~~ Division 1, Group D locations. Motors must be protected against accidental submergence.

63. GRIT REMOVAL FACILITIES

63.1 When Required

Grit removal facilities are required for all mechanical wastewater treatment plants, and are required for plants receiving wastewater from combined sewers or from sewer systems receiving substantial amounts of grit. If a plant serving a separate sewer system is designed without grit removal facilities, the design must include provision for future installation. Consideration must be given to possible damaging effects on pumps, comminutors, grinders, and other preceding equipment, and the need for additional storage capacity in treatment units where grit is likely to accumulate.

63.2 Location

63.21 **General**

Grit removal facilities should be located ahead of pumps and comminuting devices. Coarse bar racks should be placed ahead of grit removal facilities.

63.22 **Housed Facilities**

63.221 **Ventilation**

~~Uncontaminated~~ Fresh air must be introduced continuously at a rate of at least 12 air changes per hour, or intermittently at a rate of at least 30 air changes per hour. Odor control facilities may also be warranted. Refer to Section 61.13 (Access and Ventilation).

63.222 **Access**

Adequate stairway access to above or below grade facilities must be provided.

63.223 **Electrical**

All electrical work in enclosed grit removal areas where hazardous gases may accumulate must meet the requirements of the National Electrical Code of Class I~~, Group D~~, Division 1, Group D locations. Explosion-proof gas detectors must be provided in accordance with Section 57 (Safety).

63.23 Outside Facilities

Grit removal facilities located outdoors must be protected from freezing.

63.3 Type and Number of Units

Plants treating wastes from combined sewers should have at least two mechanically cleaned grit removal units, with provisions for bypassing. A single manually cleaned or mechanically cleaned grit chamber with bypass is acceptable for small wastewater treatment plants (average daily flow less than 25,000 gallons per day) serving separate sanitary sewer systems. Minimum facilities for larger plants serving separate sanitary sewers should be at least one mechanically cleaned unit with a bypass.

Facilities other than channel-type must be provided with adequate and flexible controls for velocity and/or air supply devices and with grit collection and removal equipment.

Aerated grit chambers should have air rates adjustable in the range of 3 to 8 cubic feet per minute per foot (0.3 to 0.7 m^3/m) of tank length. Detention time in the tank should be in the range of 3 to 5 minutes at design peak hourly flows. The aerated grit chamber length-to-width ratio should range from 2.5:1 to 5:1. Likewise, the aerated grit chamber width-to-depth ratio should range from1:1 to 5:1.

Horizontal flow grit chambers should have a detention time of 45 to 90 seconds at design peak hourly flows.

63.4 Design Factors

63.41 General

The design effectiveness of a grit removal system must be commensurate with the requirements of the subsequent process units.

63.42 Inlet

Inlet turbulence must be minimized in channel type units.

63.43 Velocity and Detention

Channel-type chambers must be designed to control velocities during normal variations in flow as close as possible to one foot per second (0.30 m/s). The detention period must be based on the size of particle to be removed. All aerated grit removal facilities should be provided with adequate control devices to regulate air supply and agitation.

63.44 Grit Washing

The need for grit washing should be determined by the method of grit handling and final ~~grit~~ disposal.

63.45 Dewatering

Provision must be made for isolating and dewatering each unit. The design must provide for complete draining and cleaning by means of a sloped bottom equipped with a drain sump.

63.46 Water

An adequate supply of water under pressure must be provided for cleanup in accordance with Section 56.2 (Water Supply).

63.47 Grit Handling

Grit removal facilities located in deep pits should be provided with mechanical equipment for hoisting or transporting grit to ground level. Impervious, non-slip, working surfaces with adequate drainage must be provided for grit handling areas. Grit transporting facilities must be provided with protection against freezing and loss of material.

64. PRE-AERATION

Pre-aeration of wastewater to reduce septicity may be required in special cases.

65. FLOW EQUALIZATION

65.1 General

Use of flow equalization should be considered where significant variations in organic and hydraulic loadings can be expected.

65.2 Location

Equalization basins ~~should~~ must be located downstream of pretreatment facilities such as bar screens, comminutors, and grit chambers.

65.3 Type

Flow equalization can be provided by using separate basins or on-line treatment units, such as aeration tanks. Equalization basins may be designed as either in-line or side-line units. Unused treatment units, such as sedimentation or aeration tanks, may be utilized as equalization basins during the early period of design life.

65.4 Size

Equalization basin capacity should be sufficient to effectively reduce expected flow and load variations to the extent deemed to be economically advantageous. With a diurnal flow pattern, the volume required to achieve the desired degree of equalization can be determined from a cumulative flow plot over a representative 24-hour period.

65.5 Operation

65.51 Mixing

Aeration or mechanical equipment must be provided to maintain adequate mixing. Corner fillets and hopper bottoms with draw-offs ~~should~~ must be provided to alleviate the accumulation of sludge and grit.

65.52 Aeration

Aeration equipment must be sufficient to maintain a minimum of 1.0 mg/L of dissolved oxygen in the mixed basin contents at all times. Air supply rates should be a minimum of 1.25 cfm/1000 gallons (0.15 L/s/m^3) of storage capacity. The air supply should be isolated from other treatment plant aeration requirements to facilitate process aeration control, although process air supply equipment may be utilized as a source of standby aeration.

65.53 Controls

Inlets and outlets for all basin compartments must be suitably equipped with accessible external valves, stop plates, weirs, or other devices to permit flow control and the removal of an individual unit from service. Facilities must also be provided to measure and indicate liquid levels and flow rates.

65.6 Electrical

All electrical work in housed equalization basins, where hazardous concentrations of flammable gases or vapors may accumulate, must meet the requirements of the National Electrical Code for Class I, ~~Group D,~~ Division 1, Group D locations.

65.7 Access

Suitable access must be provided to facilitate cleaning and the maintenance of equipment.

CHAPTER 70
SETTLING

71. GENERAL

71.1 Number of Units

Multiple units capable of independent operation are desirable and must be provided in all plants where design average flows exceed 100,000 gallons/day (379 m^3/d). Plants not having multiple units must include other provisions to assure continuity of treatment.

71.2 Flow Distribution

Effective flow splitting devices and control appurtenances (i.e., gates, splitter boxes, etc.) must be provided to permit proper proportioning of flow to each unit, throughout the expected range of flows. Valves used for flow proportioning are not acceptable.

72. DESIGN CONSIDERATIONS

72.1 Dimensions

The minimum length of flow from inlet to outlet is 10 feet (3 m) unless special provisions are made to prevent short-circuiting. The vertical side water depths must be designed to provide an adequate separation zone between the sludge blanket and the overflow weirs. The side water depths may not be less than the following values:

Type of Settling Tank	Minimum Side Water Depth (ft.)	(m)
Primary	~~7~~ 10	~~2.1~~ 3.0
Secondary tank following activated sludge process*	12	3.7
Secondary tank following fixed film reactor	10	3.0

* Greater side water depths are recommended for secondary clarifiers in excess of 4,000 square feet (372 m^2) surface area (equivalent to 70 feet (21 m) diameter) and for nitrification plants. A minimum side water depth of 16 feet (4.9 m) is recommended for plants that are required to meet stringent TSS and/or phosphorus limits. Depending on required effluent quality, side water depths of less than 12 feet (3.7 m) ~~side water depths~~ may be permitted for package plants with a design average flow less than 25,000 gallons per day (95 m^3/d), if justified, based on successful operating experience.

72.2 Surface Overflow Rates

72.21 Primary and Intermediate Settling Tanks

Primary settling tank sizing should reflect the degree of solids removal needed and the need to avoid septic conditions during low flow periods. Liquid detention times should not be greater than 2.5 hours at design average flow. Sizing must be calculated for both design average and design peak hourly flow conditions, and the larger surface area determined must be used. The following surface overflow rates ~~should~~ must not be exceeded in the design:

	Surface Overflow Rates* at:	
Type of Settling Tank ~~Type~~	Design Avg. Flow gpd/ft^2 ~~(L/s/m^2)~~ (m^3/(m$^2 \cdot$d))	Design Peak Hourly Flow gpd/ft^2 ~~(L/s/m^2)~~ (m^3/(m$^2 \cdot$d))
Primary - Tanks not receiving waste activated sludge **	1,000 ~~(0.47)~~ (41)	1,500 – 3,000 ~~(0.71 – 1.42)~~ (61 – 122)
Primary - Tanks receiving waste activated sludge		~~1,000~~ 1,200 ~~(0.47)~~ (49)
Intermediate – Tanks following series units of fixed film reactor processes		1,500 (61)

* Surface overflow rates must be calculated with all flows received at the settling tanks. Primary settling of normal ~~domestic~~ public sewage can be expected to remove~~d~~ approximately 1/3 of the ~~influent~~ BOD when operating at an overflow rate of 1,000 gallons/day/ft^2 ~~(0.47 L/s/m^2)~~ [41 m^3/(m$^2 \cdot$d)] .

** Anticipated BOD removal should be determined by laboratory tests and consideration of the character of the wastes. Significant reduction in BOD removal efficiency will result when the peak hourly overflow rate exceeds 1,500 gallons/day/ft^2 ~~(0.71 L/s/m^2)~~ [61 m^3/(m$^2 \cdot$d)] .

72.22 Final Settling Tanks

Settling tests must be conducted wherever a pilot study of biological treatment is warranted by unusual waste characteristics, treatment requirements, or where proposed loadings go beyond the limits set forth in this Section.

72.221 Final Settling Tanks - Attached Growth Biological Reactors

Surface overflow rates for settling tanks following trickling filters may not exceed 1,200 gallons per day per square foot ~~(0.56 L/s/m^2)~~ [49 m^3/(m$^2 \cdot$d)] based on design peak hourly flow.

72.222 Final Settling Tanks - Activated Sludge

To perform properly while producing a concentrated return flow, activated sludge settling tanks must be designed to meet thickening as well as solids separation requirements. Since the rate of recirculation of return sludge from the final settling tanks to the aeration or reaeration tanks is quite high in activated sludge processes, surface overflow rate and weir overflow rate should be adjusted for the various processes to minimize the problems with sludge loadings, density currents, inlet hydraulic turbulence, and occasional poor sludge settleability. The size of the settling tank must be based on the larger surface area determined for surface overflow rate and solids loading rate. The following design criteria ~~must be used~~ shall not be exceeded:

Treatment Process	Surface Overflow Rate at Design Peak Hourly Flow* gallons/day/ft² ~~(L/s/m²)~~ [m³/(m²·d)]	Peak Solids Loading Rate*** lb/day/ft² ~~(kg/d/m²)~~ [kg/(m²·d)]
Conventional, Step Aeration, Complete Mix Contact Stabilization, Carbonaceous Stage of Separate Stage Nitrification	1,200** ~~(0.56)~~ (49)	50 ~~(245)~~ (244)
Extended Aeration Single Stage Nitrification	1,000 ~~(0.47)~~ (41)	35 (171)
2 Stage Nitrification	800 ~~(0.38)~~ (33)	35 (171)
Activated Sludge with Chemical Addition to Mixed Liquor for Phosphorus Removal	900**** (37)	As Above

* Based on influent flow only.

** Plants needing to meet 20 mg/l or less suspended solids should reduce surface overflow rate to 1,000 gallons per day per square foot ~~(0.47 L/s/m²)~~ 41 m³/(m²·d))

*** Clarifier peak solids loading rate must be computed based on the design maximum day flow rate plus the design maximum return sludge rate requirement and the design MLSS under aeration.

**** When phosphorus removal to a concentration of less than 1.0 mg/l is required.

72.3 Inlet Structures

Inlets should be designed to dissipate the inlet velocity, to distribute the flow equally both horizontally and vertically and to prevent short-circuiting. Channels must be designed to maintain a velocity of at least one foot per second (0.3 m/s) at one-half of the design average flow. Corner pockets and dead ends must be eliminated and corner fillets or channeling must be used where necessary. Provisions must be made for elimination or removal of floating materials in inlet structures.

72.4 Weirs

72.41 General

Overflow weirs must be readily adjustable over the life of the structure to correct for differential settlement of the tank. Launders and weirs must be accessible for cleaning.

72.42 Location

Overflow weirs must be located to optimize actual hydraulic detention time, and minimize short-circuiting. Peripheral weirs must be placed at least one foot from the wall.

72.43 Design Rates

Weir loadings should not exceed:

Average Plant Capacity	Loading Rate at Design Peak Hourly Flow - gallons/day/lin ft ~~(L/s/m)~~ [m³/(m·d)]
Equal to or less than 1 MGD (3785 m^3/d)	20,000 ~~(2.9)~~ (250)
Greater than 1 MGD (3785 m^3/d)	30,000 ~~(4.3)~~ (375)

If pumping is required, the pumps must be operated as continuously as possible. Also, weir loadings should be related to pump delivery rates to avoid short-circuiting.

72.44 Weir Troughs

Weir troughs must be designed to prevent submergence at design peak hourly flow, and to maintain a velocity of at least one foot per second (0.3 m/s) at one-half design average flow. Submerged weirs may be allowed for biological nutrient removal facilities to minimize the introduction of oxygen.

72.5 Submerged Surfaces

The tops of troughs, beams, and similar submerged construction elements must have a slope of at least 1.4 vertical to 1 horizontal; the underside of these elements must have a slope of 1 to 1 to prevent the accumulation of scum and solids.

72.6 Unit Dewatering

Unit dewatering features must conform to the provisions outlined in Section 54.3 (Unit Dewatering, Flotation Protection, and Plugging). The bypass design must also provide for distribution of the plant flow to the remaining units.

72.7 Freeboard

Walls of settling tanks must extend at least 6 inches (152 mm) above the surrounding ground surface and must provide at least 12 inches (304 mm) freeboard. Additional freeboard or the use of wind screens is recommended where larger settling tanks are subject to high velocity wind currents that would cause tank surface waves and inhibit effective scum removal.

72.8 Baffles

Incline baffles, which reduce short-circuiting caused by density currents, should be installed in final settling basins where settling performance must be optimized in order to meet stringent TSS and/or phosphorus limits.

73. SLUDGE AND SCUM REMOVAL

73.1 Scum Removal

Full surface mechanical scum collection and removal facilities, including baffling, must be provided for all settling tanks. The unusual characteristics of scum that may adversely affect pumping, piping, sludge handling and disposal, must be considered in design. Provisions may be made for the discharge of scum with the sludge; however, other special provisions for disposal may be necessary.

73.2 Sludge Removal

Mechanical sludge collection and withdrawal facilities must be designed to assure rapid removal of the sludge. Suction withdrawal should be provided for activated sludge ~~plants designed for reduction of the nitrogenous demand and is recommended for those plants designed for carbonaceous oxygen demand reduction.~~ clarifiers over 60 feet (18 m) in diameter, especially for activated sludge plants that nitrify.

Each settling tank must have its own sludge withdrawal lines to insure adequate control of sludge wasting rate for each tank.

73.21 Sludge Hopper

The minimum slope of the side walls must be 1.7 vertical to 1 horizontal. Hopper wall surfaces should be made smooth with rounded corners to aid in sludge removal. Hopper bottoms may not have a maximum dimension of greater than 2 feet (610 mm). Extra depth sludge hoppers for sludge thickening are not acceptable.

73.22 Cross Collectors

Cross collectors serving one or more settling tanks may be useful in place of multiple sludge hoppers.

73.23 Sludge Removal Piping

Each hopper must have an individually valved sludge withdrawal line at least six inches (152 mm) in diameter, except for Sequencing Batch Reactor (SBR) and Membrane Bioreactor (MBR) plants in which the withdrawal line may be 4 inches (102 mm) in diameter. The static head available for withdrawal of sludge must be 30 inches (762 mm) or greater, as necessary to maintain a three foot per second (0.91 m/s) velocity in the withdrawal pipe. Clearance between the end of the withdrawal line and the hopper walls must be sufficient to prevent "bridging" of the sludge. Adequate provisions must be made for rodding or back-flushing individual pipe runs. Provisions must be made to allow for visual confirmation and sampling of return sludge. Piping must be provided to return sludge for further processing.

73.24 Sludge Removal Control

Separate settling tank sludge lines may drain to a common sludge well.

Sludge wells equipped with telescoping valves or other appropriate equipment must be provided for viewing, sampling, and controlling the rate of sludge withdrawal. A means of controlling and measuring the sludge removal rate must be provided for each clarifier. The air-lift type of sludge removal will not be approved for removal of primary sludges and are discouraged for secondary sludge removal where stringent TSS or phosphorous limits are required.

74. PROTECTIVE AND SERVICE FACILITIES

74.1 Operator Protection

All settling tanks must be equipped to enhance safety for operators. Such features must include machinery covers, life lines, stairways, walkways, handrails, and slip-resistant surfaces. ~~, where appropriate.~~

74.2 Mechanical Maintenance Access

The design must provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanisms, baffles, weirs, inlet stilling baffle areas, and effluent channels.

74.3 Electrical Fixtures and Controls

Electrical equipment, fixtures and controls in enclosed settling basins and scum tanks, where hazardous concentrations of flammable gases or vapors may accumulate, must meet the requirements of the National Electrical Code for Class I, ~~Group D,~~ Division 1, Group D locations, with the exception of secondary clarifiers following extended aeration activated sludge treatment plants. Unless hazardous gasses are known to be present, enclosed secondary clarifiers following extended aeration processes are not classified as an explosive environment. In all cases, adequate ventilation must be provided.

The fixtures and controls must be located so as to provide convenient and safe access for operation and maintenance. Adequate area lighting must be provided.

74.4 Covering

Covering of ~~secondary clarifiers~~ final settling tanks for extended aeration facilities or nitrogen removal facilities must be considered to prevent freezing of the water surface. Covers must be designed to facilitate all necessary maintenance. Adequate ventilation and corrosion control must be provided for enclosed tanks.

CHAPTER 80

SLUDGE PROCESSING, STORAGE, AND DISPOSAL

81. GENERAL

Facilities for processing sludge must be provided at all mechanical wastewater treatment plants. Handling equipment must be capable of processing sludge to a form suitable for ultimate disposal unless provisions acceptable to the ~~regulatory agency~~ Department are made for processing the sludge at an alternate location.

The Department must be contacted if sludge unit processes not described in this Chapter are being considered or are necessary to meet state or federal sludge disposal requirements.

82. PROCESS SELECTION

The selection of sludge handling unit processes should be based upon at least the following considerations:

a. Local land use;

b. System energy requirements;

c. Cost effectiveness of sludge thickening and dewatering;

d. Equipment complexity and staffing requirements;

e. Adverse effects of heavy metals and other sludge components upon the unit processes;

f. Sludge digestion or stabilization requirements, including appropriate residence time and temperature requirements for pathogen and vector attraction reduction according to 40 CFR Part 503 regulations.

g. Sidestream or return flow treatment requirements (e.g., digester or sludge storage facilities supernatant, dewatering unit filtrate, wet oxidation return flows);

h. Sludge storage requirements;

i. Methods of ultimate disposal emphasizing beneficial use indicating compliance with local, state and federal sludge disposal regulations; and

j. Back-up techniques of sludge handling and disposal.

83. SLUDGE THICKENERS

83.1 Design Considerations

Sludge thickeners to reduce the volume of sludge should be considered. The design of thickeners (gravity, dissolved-air flotation, centrifuge, and others) should consider the type and concentration of sludge, ~~the~~ sludge stabilization processes, storage requirements, ~~the~~ method of ultimate sludge disposal, chemical needs, and ~~the~~ cost of operation. The use of gravity thickening tanks for unstabilized sludges is not recommended because of problems due to septicity unless provisions are made for adequate control of process operational problems and odors at the gravity thickener and any following unit processes.

Particular attention should be given to the pumping and piping of the concentrated sludge and possible onset of anaerobic conditions.

83.2 Prototype Studies

Process selection and unit process design parameters should be based on prototype studies. The ~~regulatory agency~~ Department will require such studies where the sizing of other plant units is dependent on performance of the thickeners. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives) for any new process determination.

84. ANAEROBIC SLUDGE DIGESTION

84.1 General

84.11 Multiple Units

Multiple units or alternate methods of sludge processing must be provided. Facilities for sludge storage and supernatant separation in an additional unit may be required, depending on raw sludge concentration and disposal methods for sludge and supernatant.

84.12 Depth

If process design provides for supernatant withdrawal, the proportion of depth to diameter should be such as to allow for the formation of a reasonable depth of supernatant liquor. A minimum side water depth of 20 feet (6.1 m) is recommended.

84.13 Design Maintenance Provisions

To facilitate emptying, cleaning and maintenance, the following features are ~~desirable~~ required, where applicable.

84.131 Slope

The tank bottom must slope to drain toward the withdrawal pipe. For tanks equipped with a suction mechanism for sludge withdrawal, a bottom slope not less than 1 to 12 is recommended. Where the sludge is to be removed by gravity alone, 1 to 4 slope is recommended.

84.132 Access Manholes

At least 2 access manholes not less than 30 inches (760 mm) in diameter should be provided in the top of the tank in addition to the gas dome. There should be stairways to reach the access manholes.

A separate side wall manhole must be provided that is large enough to permit the use of mechanical equipment to remove grit and sand. The side wall access manhole should be low enough to facilitate heavy equipment handling and may be buried in the earthen bank insulation.

84.133 Safety

Non-sparking tools, rubber-soled shoes, safety harness, gas detectors for flammable and toxic gases, and at least two self-contained breathing units must be provided for emergency use. Refer to other safety items as appropriate in Section 57 (Safety).

84.14 Toxic Materials

If the anaerobic digestion process is proposed, the basis of design must be supported by wastewater analyses to determine the presence of undesirable materials, such as high concentrations of sulfates and inhibitory concentrations of heavy metals.

84.2 Sludge Inlets, Outlets, Recirculation, and High Level Overflow

84.21 Multiple Inlets and Draw-Offs

Multiple sludge inlets and draw-offs and, where used, multiple recirculation suction and discharge points to facilitate flexible operation and effective mixing of the digester contents, must be provided unless adequate mixing facilities are provided within the digester.

84.22 Inlet Configurations

One inlet should discharge above the liquid level and be located at approximately the center of the tank to assist in scum breakup. The second inlet should be opposite to the suction line at approximately the 2/3 diameter point across the digester.

84.23 Inlet Discharge Location

Raw sludge inlet discharge points should be so located as to minimize short circuiting to the digested sludge or supernatant draw-offs.

84.24 Sludge Withdrawal

Sludge withdrawal to disposal should be from the bottom of the tank. The bottom withdrawal pipe should be interconnected with the necessary valving to the recirculation piping, to increase operational flexibility in mixing the tank contents.

84.25 Emergency Overflow

An unvalved vented overflow must be provided to prevent damage to the digestion tank and cover in case of accidental overfilling. This emergency overflow must be piped to an appropriate point and at an appropriate rate in the treatment process or sidestream treatment facilities to minimize the impact on process units.

84.3 Tank Capacity

84.31 Rational Design

The total digestion tank capacity must be determined by rational calculations based upon such factors as: volume of sludge added, percent solids and character; the temperature to be maintained in the digesters; the degree or extent of mixing to be obtained; the degree of volatile solids reduction required; the solids retention time at peak loadings; method of sludge disposal, and the size of the installation with appropriate allowances for gas, scum, supernatant, and digested sludge storage. Secondary digesters of two-stage series digestion systems that are utilized for digested sludge storage and concentration may not be credited in the calculations for volumes required for sludge digestion. Calculations ~~should~~ must be submitted to justify the basis of design with consideration given to ultimate disposal of sludge.

84.32 Standard Design

When such calculations are not submitted to justify the design based on the above factors, the minimum digestion tank capacity outlined below will be required. Such requirements assume that the raw sludge is derived from ordinary ~~domestic wastewater~~ public sewage, a digestion temperature is to be maintained in the range of 85° to 95° F (29° C to 35° C), 40 to 50 percent volatile matter in the digested sludge, and that the digested sludge will be removed frequently from the process (See also Sections 84.11 (Multiple Units) and 89.11 (General).)

84.321 Completely Mixed Systems

For digestion systems providing for intimate and effective mixing of the digester contents, the system may be loaded up to 80 pounds of volatile solids per 1000 cubic feet (1.3 kg/m^3) of volume per day in the active digestion units.

84.322 Moderately Mixed Systems

For digestion systems where mixing is accomplished only by circulating sludge through an external heat exchanger, the system may be loaded up to 40 pounds of volatile solids per 1000 cubic feet of volume per day (0.65 kg/m^3) in the active digestion units. This loading may be modified upward or downward depending upon the degree of mixing provided.

84.323 Multistage Systems

For digestion systems utilizing two stages (primary and secondary units), the first stage (primary) may be either completely mixed or moderately mixed and loaded in accordance with Sections 84.321 (Completely Mixed Systems) or 84.322 (Moderately Mixed Systems). The second stage (secondary) is to be designed for sludge storage, concentration, and gas collection and may not be credited in the calculations for volumes required for sludge digestion.

84.324 Digester Mixing

Facilities for mixing the digester contents must be provided where required for proper digestion by reason of loading rates or other features of the system. Where sludge recirculation pumps are used for mixing, they must be provided in accordance with appropriate requirements of Section 87.1 (Sludge Pumps).

84.4 Gas Collection, Piping and Appurtenances

84.41 General

All portions of the gas system including the space above the tank liquor, storage facilities, and piping must be designed so that under all normal operating conditions, including sludge withdrawal, the gas will be maintained under pressure. All enclosed areas where any gas leakage might occur must be adequately ventilated.

84.42 Safety Equipment

All necessary safety facilities must be included where gas is produced. Pressure and vacuum relief valves and flame trap, together with automatic safety shut off valves must be provided and protected from freezing. Water seal equipment may not be installed. Safety equipment and gas compressors should be housed in a separate room with an exterior door.

84.43 Gas Piping and Condensate

Gas piping must have a diameter of at least 4 inches (102 mm). A smaller diameter pipe at the gas production meter is acceptable. Gas piping must slope to condensation traps at low points. The use of float-controlled condensate traps is not permitted. Condensation traps must be protected from freezing.

Tightly fitted self-closing doors should be provided at connecting passageways and tunnels, which connect digestion facilities to other facilities to minimize the spread of gas.. Piping galleries must be ventilated in accordance with Section 84.47 (Ventilation).

84.44 Gas Utilization Equipment

Gas burning boilers, engines, etc., must be located in well-ventilated rooms. Such rooms would not ordinarily be classified as a hazardous location if isolated from the digestion gallery or ventilated in accordance with Section 84.47 (Ventilation). Gas lines to these units must be provided with suitable flame traps.

84.45 Electrical Equipment, Fixtures, and Controls

Electrical equipment, fixtures and controls, in places enclosing and adjacent to anaerobic digestion appurtenances, where hazardous gases ~~are normally contained in the tanks and piping,~~ may accumulate, must comply with the National Electrical Code for Class 1, ~~Group D~~ Division ~~2~~ 1, Group D locations. Refer to Section 84.47 (Ventilation).

84.46 Waste Gas

84.461 Location

Waste gas burners must be readily accessible and should be located at least 50 feet (15.2 m) away from any plant structure. Waste gas burners must be of sufficient height and so located to prevent injury to personnel due to wind or downdraft conditions.

84.462 Pilot Light

All waste gas burners must be equipped with automatic ignition such as a pilot light or a device using a photoelectric cell sensor. Consideration should be given to the use of natural or propane gas to insure reliability of the pilot.

84.463 Gas Piping Slope

Gas piping must be sloped at a minimum of 2 percent up to the waste gas burner with a condensate trap provided in a location not subject to freezing.

84.47 Ventilation

Any underground enclosures connecting with digestion tanks or containing sludge or gas piping or equipment must be provided with forced ventilation for dry wells in accordance with Sections 42.71 (General) through 42.74 (Fans, Heating and Dehumidification) and 42.76 (Dry Wells). The ventilation rate for Class I, Division 2, Group D locations including enclosed areas without a gas tight partition from the digestion tank or areas containing gas compressors, sediment traps, drip traps, gas scrubbers, or pressure regulating and control valves, if continuous, must be at least 12 complete air changes per hour.

84.48 Meter

A gas meter with bypass must be provided, to meter total gas production for each active digestion unit. Total gas production for two-stage digestion systems operated in series may be measured by a single gas meter with proper interconnected gas piping.

Where multiple primary digestion units are utilized with a single secondary digestion unit, a gas meter must be provided for each primary digestion unit. The secondary digestion unit may be interconnected with the gas measurement unit of one of the primary units. Interconnected gas piping must be properly valved with gas tight gate valves to allow measurement of gas production from either digestion unit or maintenance of either digestion unit.

Gas meters may be of the orifice plate, turbine, or vortex type. Positive displacement meters should not be utilized. The meter must be specifically designed for contact with corrosive and dirty gases.

84.5 Digestion Tank Heating

84.51 Insulation

Wherever possible digestion tanks should be constructed above ground water level and must be suitably insulated to minimize heat loss. Maximum utilization of earthen bank insulation should be used.

84.52 Heating Facilities

Sludge may be heated by circulating the sludge through external heaters or by units located inside the digestion tank. Refer to Section 84.522 (Other Heating Methods).

84.521 External Heating

Piping must be designed to provide for the preheating of feed sludge before introduction into the digesters. Provisions must be made in the layout of the piping and valving to facilitate heat exchanger tube removal and cleaning of the lines. Heat exchanger sludge piping should be sized for peak heat transfer requirements. Heat exchangers should have a heating capacity of 130 percent of the calculated peak heating requirement to account for the occurrence of sludge tube fouling.

84.522 Other Heating Methods

a. The use of hot water heating coils affixed to the walls of the digester, or other types of internal heating equipment that require emptying the digester contents for repair, are not acceptable.

b. Other systems and devices have been developed recently to provide both mixing and heating of anaerobic digester contents. These systems will be reviewed on their own merits. Operating data detailing their reliability, operation, and maintenance characteristics will be required. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives).

84.53 Heating Capacity

84.531 Capacity

Sufficient heating capacity must be provided to consistently maintain the design sludge temperature considering insulation provisions and ambient cold weather conditions. Where digester tank gas is used for other purposes, an auxiliary fuel may be required. The design operating temperature should be in the range of 85° to 100 °F (29° to 38°C) where optimum mesophilic digestion is required.

84.532 Standby Requirements

The provision of standby heating capacity or the use of multiple units sized to provide the heating requirements must be considered unless acceptable alternative means of handling raw sludge are provided for the extended period that digestion process outage is experienced due to heat loss.

84.54 Hot Water Internal Heating Controls

84.541 Mixing Valves

A suitable automatic mixing valve must be provided to temper the boiler water with return water so that the inlet water to the removable heat jacket or coil in the digester can be held below a temperature at which caking will be accentuated. Manual control should also be provided by suitable bypass valves.

84.542 Boiler Controls

The boiler ~~should~~ must be provided with suitable automatic controls to maintain the boiler temperature at approximately 180° F (82° C) to minimize corrosion and to shut off the main gas supply in the event of pilot burner or electrical failure, low boiler water level, low gas pressure, or excessive boiler water temperature or pressure.

84.543 Boiler Water Pumps

Boiler water pumps must be sealed and sized to meet the operating conditions of temperature, operating head, and flow rate. Duplicate units must be provided.

84.544 Thermometers

Thermometers must be provided to show inlet and outlet temperatures of the sludge, hot water feed, hot water return, and boiler water.

84.545 Water Supply

The chemical quality should be checked for suitability for this use. Refer to Section 56.23 (Indirect Connections) for required break tank for indirect water supply connections.

84.55 External Heater Operating Controls

All controls necessary to ensure effective and safe operation are required. Provision for duplicate units in critical elements should be considered.

84.6 Supernatant Withdrawal

Where supernatant separation is to be used to concentrate sludge in the digester units and increase digester solids retention time, the design must provide for ease of operation and positive control of supernatant quality.

84.61 Piping Size

Supernatant piping should not be less than 6 inches (152 mm) in diameter.

84.62 Withdrawal Arrangements

84.621 Withdrawal Levels

Piping should be arranged so that withdrawal can be made from 3 or more levels in the tank. An unvalved vented overflow must be provided. The emergency overflow must be piped to an appropriate point and at an appropriate rate in the treatment process or side stream treatment units to minimize the impact on process units.

84.622 Withdrawal Selection

On fixed cover tanks the supernatant withdrawal level should preferably be selected by means of interchangeable extensions at the discharge end of the piping.

84.623 Supernatant Selector

A fixed screen supernatant selector or similar type device may be used only in an unmixed secondary digestion unit. If such supernatant selector is provided, provisions must be made for at least one other draw-off level located in the supernatant zone of the tank, in addition to the unvalved emergency supernatant draw-off pipe. High pressure back-wash facilities must be provided.

84.63 Sampling

Provisions must be made for sampling at each supernatant draw-off level. Sampling pipes should be at least 1 1/2 inches (38 mm) in diameter and should terminate at a suitably sized sampling sink or basin.

84.64 Supernatant Disposal

Supernatant return and disposal facilities should be designed to alleviate adverse hydraulic and organic effects on plant operations. If nutrient removal (e.g., phosphorus, ammonia) must be accomplished at a plant, then a separate supernatant side stream treatment system should be provided.

84.7 Anaerobic Digestion Sludge Production

For calculating design sludge handling and disposal needs, sludge production values from a two-stage anaerobic digestion process shall be based on a maximum solids concentration of 5 percent without additional thickening. The solids production values on a dry weight basis must be based on the following for the listed processes:

Primary plus waste activated sludge – at least 0.12 lb/P.E./day [0.05 kg/ (P.E.·d)].

Primary plus fixed film sludge – at least 0.09 lb/P.E./day [0.04 kg/P.E.·d)].

where P.E. = Population Equivalent

85. AEROBIC SLUDGE DIGESTION

85.1 General

The aerobic sludge digestion system must include provisions for digestion, supernatant separation, sludge concentration, and any necessary sludge storage. These provisions may be accomplished by separate tanks or processes, or in the digestion tanks.

85.2 Multiple Units

Multiple digestion units capable of independent operation are desirable and must be provided in all plants where the design average flow exceeds 100,000 gallons per day (379 m^3/d). ~~All~~ Plants not having multiple units must provide alternate sludge handling and disposal methods.

85.3 Tank Capacity

85.31 Volume Required

The following digestion tank capacities are based on a solids concentration of 2 percent with supernatant separation performed in a separate tank. If supernatant separation is performed in the digestion tank, a minimum of 25 percent additional volume is required. These capacities must be provided unless sludge thickening facilities (refer to Section 83 (Sludge Thickeners) are utilized to thicken the feed solids concentration to greater than 2 percent. If such thickening is provided, the digestion volumes may be decreased proportionally.

Sludge Source	Volume/Population Equivalent (P.E.)
	ft^3/P.E. (m^3/P.E.)
Waste activated sludge -- no primary settling	4.5 (0.13)*
Primary plus waste activated sludge	4.0 (0.11)*
Waste activated sludge exclusive of primary sludge	2.0 (0.06)*
Extended aeration activated sludge	3.0 (0.09)
Primary plus fixed film reactor sludge	3.0 (0.09)

** These volumes also apply to waste activated sludge from single stage nitrification facilities with less than 24 hours detention time based on design average flow.

85.32 Effect of Temperature on Volume

The volumes in Section 85.31 (Volume Required) are based on digester temperatures of 59° F (15° C) and a solids retention time of 27 days. Aerobic digesters must be covered to minimize heat loss or these volumes must be increased for colder temperature applications. Refer to Section ~~85.8~~ 85.9 (Digested Sludge Storage Volume) for necessary sludge storage. Additional volume may be required if the land application disposal method is used in order to meet applicable federal regulatory requirements.

85.4 Mixing

Aerobic digesters must be provided with mixing equipment that can maintain solids in suspension and ensure complete mixing of the digester contents. Energy requirements for mixing with mechanical aeration equipment must not be less than 0.75 horsepower per 1000 cu. ft. of digester capacity. Refer to Section 85.5 (Air Requirements).

85.5 Air Requirements

Sufficient air must be provided to keep the solids in suspension and maintain dissolved oxygen between 1 and 2 milligrams per liter (mg/L). For minimum mixing and oxygen requirements, an air supply of 30 cfm per 1000 cubic feet (0.5 L/s/m^3) of tank volume must be provided with the largest blower out of service. If diffusers are used, the non-clog type is recommended and they should be designed to permit continuity of service. If mechanical turbine aerators are utilized, at least two turbine aerators per tank must be provided to permit continuity of service. Mechanical aerators are not recommended for use in aerobic digesters where freezing conditions will cause ice build-up on the aerator and support structures.

85.6 Supernatant Separation and Scum and Grease Removal

85.61 Supernatant Separation

Facilities must be provided for effective separation or decanting of supernatant. Separate facilities are recommended; however, supernatant separation may be accomplished in the digestion tank provided additional volume is provided per Section 85.3 (Tank Capacity). The supernatant draw-off unit must be designed to prevent recycle of scum and grease back to plant process units. Provisions should be made to withdraw supernatant from multiple levels of the supernatant withdrawal zone.

85.62 Scum and Grease Removal

Facilities must be provided for the effective collection of scum and grease from the aerobic digester for final disposal and to prevent its recycle back to the plant process and to prevent long term accumulation and potential discharge in the effluent.

85.7 High Level Emergency Overflow

An unvalved high level overflow and any necessary piping must be provided to return digester overflow back to the head of the plant or to the aeration process in case of accidental overfilling. Design considerations related to the digester overflow must include waste sludge rate and duration during the period the plant is unattended, potential effects on plant process units, discharge location of the emergency overflow, and potential discharge of suspended solids in the plant effluent.

85.8 Aerobic Digestion Sludge Production

For calculating design sludge handling and disposal needs, sludge production values from aerobic digesters must be based on a maximum solids concentration of 2 percent without additional thickening. The solids production values on a dry weight basis must be based on the following for the listed processes:

Primary plus waste activated sludge - at least 0.16 lbs./P.E./day (0.07 kg/P.E./d.).

Primary plus fixed film sludge - at least 0.12 lbs./P.E./day (0.05 kg/P.E./d.).

where P.E. – Population Equivalent

~~85.8~~ 85.9 Digested Sludge Storage Volume

~~85.81~~ 85.91 Sludge Storage Volume

Sludge storage must be provided in accordance with Section 89 (Sludge Storage and Disposal) to accommodate daily sludge production volumes and as an operational buffer for unit outage and adverse weather conditions. Designs utilizing increased sludge age in the activated sludge system as a means of storage are not acceptable.

~~85.82~~ 85.92 Liquid Sludge Storage

Liquid sludge storage facilities must be based on the following values unless digested sludge thickening facilities are utilized (refer to Section 83 Sludge Thickeners) to provide solids concentrations of greater than 2 percent.

Sludge Source	Volume/Population Equivalent (P.E.)
	ft^3/P.E./day (m^3/P.E./day)
Waste activated sludge - no primary settling, primary plus waste activated sludge, extended aeration activated sludge	0.13 (0.004)

Waste activated sludge exclusive of primary sludge	0.06 (0.002)
Primary plus fixed film reactor sludge	0.10 (0.003)

86. HIGH pH STABILIZATION

86.1 General

Alkaline material may be added to liquid primary or secondary sludges for sludge stabilization in lieu of digestion facilities; to supplement existing digestion facilities; or for interim sludge handling. There is no direct reduction of organic matter or sludge solids with the high pH stabilization process. There is an increase in the mass of dry sludge solids. Without supplemental dewatering, additional volumes of sludge will be generated. The design must account for the increased sludge quantities for storage, handling, transportation, and disposal methods and associated costs.

86.2 Operational Criteria

Sufficient alkaline material must be added to liquid sludge to produce a homogeneous mixture with a minimum pH of 12 after 2 hours of vigorous mixing without further alkali addition. The pH of the sludge must remain above 11.5 for an additional 22 hours. Facilities for adding supplemental alkaline material must be provided to maintain the pH of the sludge during interim sludge storage periods.

86.3 Odor Control and Ventilation

Odor control facilities must be provided for sludge mixing and treated sludge storage tanks when located within 1/2 mile (0.8 km) of residential or commercial areas. ~~The reviewing authority should be contacted for design and air pollution control objectives to be met for various types of air scrubber units.~~ Ventilation is required for indoor sludge mixing, storage or processing facilities. See Section 42.71 (General) through 42.74 (Fans, Heating and Dehumidification) and 42.76 (Dry Wells) for ventilation requirements.

86.4 Mixing Tanks and Equipment

86.41 Tanks

Mixing tanks may be designed to operate as either a batch or continuous flow process. A minimum of two tanks must be provided of adequate size to provide a minimum 2 hours contact time in each tank. The following items must also be factored into the determination of the number, configuration and size of tanks:

a. peak sludge flow rates;

b. storage between batches;

c. dewatering or thickening performed in tanks;

d. repeating sludge treatment due to pH decay of stored sludge;

e. sludge thickening prior to sludge treatment; and

f. type of mixing device used and associated maintenance or repair requirements.

86.42 Equipment

Mixing equipment must be designed to provide vigorous agitation within the mixing tank, maintain solids in suspension and provide for a homogeneous mixture of the sludge solids and alkaline material. Mixing may be accomplished either by diffused air or mechanical mixers. If diffused aeration is used, an air supply of 30 cfm per 1000 cubic feet (0.5 $L/s/m^3$) of mixing tank volume must be provided with the largest blower out of service. When diffusers are used, the non-clog type is recommended, and they should be designed to permit continuity of service. If mechanical mixers are used, the impellers must be designed to minimize fouling with debris in the sludge and consideration must be given to providing continuity of service during freezing weather conditions.

86.5 Chemical Feed and Storage Equipment

86.51 General

Alkaline material is caustic in nature and can cause eye and tissue injury. Equipment for handling or storing alkaline material must be designed for adequate operator safety. Refer to Section 57 (Safety) for proper safety precautions. Storage, slaking, and feed equipment should be sealed as airtight as practical to prevent contact of alkaline materials with atmospheric carbon dioxide and water vapor and to prevent the escape of dust material. All equipment and associated transfer lines or piping must be accessible for cleaning.

86.52 Feed and Slaking Equipment

The design of the feeding equipment must be based on the treatment plant size, type of alkaline material used, slaking required, and operator requirements. Equipment may be either of batch or automated type. Automated feeders may be of the volumetric or gravimetric type depending on accuracy, reliability, and maintenance requirements. Manually operated batch slaking of quicklime (CaO) should be avoided unless adequate protective clothing and equipment are provided. At small plants, use of hydrated lime [$Ca(OH)_2$] is recommended over quicklime due to safety and labor-saving reasons. Feed and slaking equipment must be sized to handle a minimum of 150% of the peak sludge flow rate including sludge that may need to be retreated due to pH decay. Duplicate units must be provided.

86.53 Chemical Storage Facilities

Alkaline materials may be delivered either in bag or bulk form depending upon the amount of material used. Material delivered in bags must be stored indoors and elevated above floor level. Bags should be of the multi-wall moisture-proof type. Dry bulk storage containers must be as airtight as practical and must contain a mechanical agitation mechanism. Storage facilities must be sized to provide a minimum of a 30-day supply.

86.6 Sludge Storage

Refer to Section 89 (Sludge Storage and Disposal) for general design considerations for sludge storage facilities. The design must incorporate the following considerations for the storage of high pH stabilized sludge.

86.61 Liquid Sludge

Liquid high pH stabilized sludge may not be stored in a ~~lagoon~~ pond. This sludge must be stored in a tank or vessel equipped with rapid sludge withdrawal mechanisms for sludge disposal or retreatment. Provisions must be made for adding alkaline material in the storage tank. Mixing equipment in accordance with Section 86.42 (Equipment) above must also be provided in all storage tanks.

86.62 Dewatered Sludge

On-site storage of dewatered high pH stabilized sludge should be limited to 30 days. Provisions for rapid retreatment or disposal of dewatered sludge stored on-site must also be made in case of sludge pH decay.

86.63 Off-Site Storage

There may not be any off-site storage of high pH stabilized sludge unless specifically permitted by the ~~regulatory agency~~ Department.

86.7 Disposal

Immediate sludge disposal methods and options are recommended to be utilized in order to reduce the sludge inventory on the treatment plant site and amount of sludge that may need to be retreated to prevent odors if sludge pH decay occurs. If the land application option is utilized for high pH stabilized sludge, the sludge should be incorporated into the soil during the same day of delivery to the site and application must comply with applicable state and federal disposal regulations.

87. SLUDGE PUMPS AND PIPING

87.1 Sludge

87.11 Capacity

Pump capacities must be adequate but should not be excessive. Provision for varying pump capacity is desirable. A rational basis of design must be provided with the plan documents. Variability in sludge mass and volume must be considered in pump selection.

87.12 Duplicate Units

Duplicate units must be provided at all installations.

87.13 Type

Plunger pumps, screw feed pumps, or other types of pumps with demonstrated solids handling capability must be provided for handling raw sludge. Where centrifugal pumps are used, a parallel positive displacement pump must be provided as an alternate to pump heavy sludge concentrations, such as primary or thickened sludge, that may exceed the pumping head of the centrifugal pump.

87.14 Minimum Head

A minimum positive head of 24 inches (610 mm) must be provided at the suction side of centrifugal type pumps and is desirable for all types of sludge pumps. Maximum suction lifts should not exceed 10 feet (3 m) for plunger pumps.

87.15 Sampling Facilities

Unless sludge sampling facilities are otherwise provided, quick-closing sampling valves must be installed at the sludge pumps. The size of valve and piping should be at least 1 1/2 inches (38 mm) and terminate at a suitably sized sampling sink or floor drain.

87.16 Safety

High pressure shut off switches and alarms must be used on positive displacement pumps to prevent dangerous conditions.

87.2 Sludge Piping

87.21 Size and Head

Digested sludge withdrawal piping should have a minimum diameter of 8 inches (203 mm) for gravity withdrawal and 6 inches (152 mm) for pump suction and discharge lines. Where withdrawal is by gravity, the available head on the discharge pipe should be at least 4 feet (1.2 m) and preferably more. Undigested sludge withdrawal piping must be sized in accordance with Section 73.23 (Sludge Removal Piping).

87.22 Slope and Flushing Requirements

Gravity piping should be laid on uniform grade and alignment. Slope on gravity discharge piping should not be less than 3 percent for primary sludges and all sludges thickened to greater than 2 percent solids. Slope on gravity discharge piping should not be less than 2 percent for aerobically digested sludge or waste activated sludge with less than 2 percent solids. Cleanouts must be provided for all gravity sludge piping. Provisions must be made for draining and flushing discharge lines. All sludge pipes must be suitably located or otherwise adequately protected to prevent freezing.

87.23 Supports

Special consideration ~~should~~ must be given to the corrosion resistance and permanence of supporting systems for piping located inside the digestion tank.

88. SLUDGE DEWATERING

88.1 General

On-site sludge dewatering facilities must be provided for all plants~~,~~. ~~although the following requirements~~ The sludge production values presented in Sections 84.7 (Anaerobic Digestion Sludge Production) and 85.8 (Aerobic Digestion Sludge Production) may be reduced, if justified, with on-site liquid sludge storage facilities or approved off-site sludge disposal.

~~88.11 Anaerobic Digestion Sludge Production~~

~~For calculating design sludge handling and disposal needs, sludge production values from a two-stage anaerobic digestion process must be based on a maximum solids concentration of 5 percent without additional thickening. The solids production values on a dry weight basis must be based on the following for the listed processes:~~

~~Primary plus waste activated sludge – at least 0.12 lbs./P.E./day(0.05 kg/P.E./d.~~

~~Primary plus fixed film sludge – at least 0.09 kbs/P.E./d)~~

~~88.12 Aerobic Digestion Sludge Production~~

~~For calculating design sludge handling and disposal needs, sludge production values for aerobic digesters must be based on a maximum solids concentration of 2 percent without additional thickening. The solids production values on a dry weight basis must be based~~

~~on the following for the listed processes.~~

~~Primary plus waste activated sludge at least 0.16 lbs/P.E./day (0.07 kg/P.E./d.)~~

~~Primary plus fixed film sludge at least .12 lbs./P.E./day (0.05 kg/P.E./d.)~~

~~88.13 Production from Other Sludge Stabilization Processes~~

For calculating design sludge handling and disposal needs for sludge stabilization processes other than those described in Sections ~~88.11~~ <u>84.7</u> and ~~88.12~~ <u>85.8</u>, a rational basis of design for sludge production values must be developed and provided to the Department for approval on a case-by-case basis.

88.2 Sludge Drying Beds

~~86.21~~ <u>88.21</u> Applicability

Sludge drying beds may be used for dewatering well digested sludge from either the anaerobic or aerobic process. Due to the large volume of sludge produced by the aerobic digestion process, consideration should be given to using a combination of dewatering systems or other means of ultimate sludge disposal.

88.22 Unit Sizing

Sludge drying bed area must be calculated on a rational basis with the following items considered:

a. The volume of wet sludge produced by existing and proposed processes<u>;</u>~~.~~

b. Depth of wet sludge drawn to the drying beds. For design calculation purposes<u>,</u> a maximum depth of 8 inches (203 mm) must be utilized. For operational purposes, the depth of sludge placed on the drying bed may increase or decrease from the design depth based on the percent solids content and type of digestion utilized<u>;</u>~~.~~

c. Total digester volume and other wet sludge storage facilities<u>;</u>~~.~~

d. Degree of sludge thickening provided after digestion<u>;</u>~~.~~

e. The maximum drawing depth of sludge, which can be removed from the digester or other sludge storage facilities without causing process or structural problems<u>;</u>~~.~~

f. The time required on the bed to produce a removable cake. Adequate provision must be made for sludge dewatering and/or sludge disposal facilities for those periods of time during which outside drying of sludge on beds is hindered by weather. Drying during the winter months should not be anticipated in sizing beds<u>; and</u>~~.~~

g. Capacities of auxiliary dewatering facilities.

88.23 Percolation Type Bed Components

88.231 Gravel

The lower course of gravel around the underdrains should be properly graded and should be 12 inches (305 mm) in depth, extending at least 6 inches (152 mm) above the top of the underdrains. It is desirable to place this in 2 or more layers. The top layer of at least 3 inches (76 mm) should consist of gravel 1/8 to 1/4 inch (3 to 6 mm) in size.

88.232 Sand

The top level should consist of 6 to 9 inches (152 to 229 mm) of clean, washed, course sand. The effective size of the sand should be in the range of 0.8 to 1.5 millimeter (mm).

The finished sand surface should be level.

88.233 Underdrains

Underdrains should be at least 4 inches (102 mm) in diameter laid with open joints. Perforated pipe may also be used. Underdrains should be spaced no more than 20 feet (6.1 m) apart and sloped at a minimum of 1 percent. Lateral tiles should be spaced at 8 to 10 feet (2.4 to 3.0 m). Various pipe materials may be selected provided the pipe is corrosion resistant and appropriately bedded to ensure that the underdrains are not damaged by sludge removal equipment.

88.234 Additional Dewatering Provisions

Consideration must be given to providing a means of decanting supernatant of sludge placed on the sludge drying beds. More effective decanting of supernatant may be accomplished with polymer treatment of sludge.

88.235 Seal

The bottom must be sealed in a manner approved by the ~~reviewing authority~~ Department.

88.24 Walls

Walls should be water-tight and extend 18 inches (457 mm) above and at least ~~6~~ 9 inches (~~152~~ 230mm) below the surface of the bed. Outer walls should be extended at least 4 inches (102 mm) above the outside grade elevation to prevent soil from washing on to the beds.

88.25 Sludge Removal

Each bed must be constructed so as to be readily and completely accessible to mechanical cleaning equipment. Concrete runways spaced to accommodate mechanical equipment must be provided. Special attention should be given to assure adequate access to the areas adjacent to the sidewalls. Entrance ramps down to the level of the sand bed must be provided. These ramps should be high enough to eliminate the need for an entrance end wall for the sludge bed.

~~88.3 Sludge Lagoons as Dewatering Units~~

~~88.31 General~~

~~Sludge lagoons as a means of dewatering digested sludge will be permitted only upon proof that the character of the digested sludge and the design mode of operation are such that offensive odors will not result. Where sludge lagoons are permitted, adequate provisions must be made for other sludge dewatering facilities or sludge disposal in the event of upset or failure of the sludge digestion process.~~

~~88.32 Location~~

~~Sludge lagoons must be located as far as practible from inhabited areas or areas likely to be inhabited during the lifetime of the structures. Siting of sludge lagoons must comply with the requirements of the reviewing authority.~~

~~88.33 Seal~~

~~Adequate provisions must be made to seal the sludge lagoon bottoms and embankments in accordance with Section 93.422 to prevent leaching into adjacent soils or groundwater.~~

~~88.34 Access~~

~~Provisions must be made for pumping or heavy equipment access for sludge removal from the sludge lagoon.~~

~~88.4~~ 88.3 Mechanical Dewatering Facilities

~~88.41~~ 88.31 General

Provision must be made to maintain sufficient continuity of service so that sludge may be dewatered without accumulation beyond storage capacity. The number of vacuum filters, centrifuges, filter presses, belt filters, or other mechanical dewatering facilities should be sufficient to dewater the sludge produced with the largest unit out of service. Unless other standby wet sludge facilities are available, adequate storage facilities of at least 4 days production volume must be provided. Documentation must be submitted justifying the basis of design of mechanical dewatering facilities.

88.32 Water Supply Protection

Provisions for water supply to mechanical dewatering facilities must be in accordance with Section 56.23 (Indirect Connections).

~~88.42~~ 88.33 Auxiliary Facilities for Vacuum Filters

Back-up vacuum and filtrate pumps must be provided. It is permissible to have uninstalled back-up vacuum and filtrate pumps for every three or less vacuum filters, provided that the installed units can easily be removed and replaced. At least one filter media replacement unit must be provided.

~~88.43~~ 88.34 Ventilation

Adequate facilities must be provided for ventilation of the dewatering area. The exhaust air should be properly conditioned to avoid odor nuisance. Ventilation must be provided in accordance with Section 42.7 (Safety Ventilation).

~~88.44~~ 88.35 Chemical Handling Enclosures

Lime-mixing facilities should be completely enclosed to prevent the escape of lime dust. Chemical handling equipment should be automated to eliminate the manual lifting requirement. Refer to Section 57 (Safety).

~~88.5~~ 88.4 Drainage and Filtrate Disposal

Drainage from beds, ~~lagoon~~ pond supernatant and filtrate from dewatering units must be returned to the wastewater treatment process at appropriate points and rates. See also Sections 56.7 (Sampling Equipment) and 84.64 (Supernatant Disposal).

~~88.6~~ 88.5 Other Dewatering Facilities

If dewatering sludge is proposed by other methods, a detailed description of the process and design data must accompany the plans. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives) for any new process determinations.

89. SLUDGE STORAGE AND DISPOSAL

89.1 Storage

89.11 General

Sludge storage facilities must be provided at all mechanical treatment plants.

Appropriate storage facilities may consist of any combination of drying beds, ~~lagoons~~ ponds, separate tanks, additional volume in sludge stabilization units, pad areas or other means to store either liquid or dried sludge. Refer to Sections 88.2 (Sludge Drying Beds) and ~~88.3~~ 89.2 (Sludge Storage Ponds) for drying bed and pond design criteria respectively.

The design must provide for odor control in sludge storage tanks and sludge ~~lagoons~~ ponds, including aeration, covering or other appropriate means.

89.12 Volume

Calculations justifying the number of days of storage to be provided must be submitted and must be based on the total sludge handling and disposal system. Refer to Sections ~~88.1~~ 84.7 (Anaerobic Digestion Sludge Production) and 85.8 (Aerobic Digestion Sludge Production) for ~~anaerobically and aerobically~~ digested sludge production values. Sludge production values for other stabilization processes should be justified in the basis of design. If land application is the only means of sludge disposal utilized at a treatment plant, sludge storage provisions must be based on the following factors:

a. Inclement weather effects on access to the application land;

b. Temperatures including frozen ground and stored sludge cake conditions;

c. Haul road restrictions including spring thawing conditions;

d. Area seasonal rainfall patterns;

e. Cropping practices on available land, including nutrient requirements;

f. Potential for increased sludge volumes from industrial sources during the design life of the plant;

g. Available area for expanding sludge storage; and

h. Appropriate pathogen reduction and vector attraction reduction requirements.

A minimum of 180 days storage should be provided for the design life of the plant where land application is the only means of disposal, unless a different period is approved by ~~the regulatory agency~~ Department. Refer to Section ~~89.22~~ 89.33 (Land Application) for other sludge land application considerations.

89.2 Sludge Storage Ponds

89.21 General

Sludge storage ponds will be permitted only upon proof that the character of the digested sludge and the design mode of operation are such that offensive odors will not result. Where sludge ponds are permitted, adequate provisions must be made for other sludge dewatering facilities or sludge disposal in the event of upset or failure of the sludge digestion process. Sludge must be removed from the storage pond within 2 years or it must meet the surface disposal requirements in Federal 40 CFR Part 503 Sludge Disposal regulations.

89.22 Location

Sludge ponds must be located as far as practicable from inhabited areas or areas likely to be inhabited during the lifetime of the structures. Siting of sludge ponds must comply with the requirements of the Department. In accordance with MCA 75-5-605, a minimum separation of 500 feet (152.4 m) between the outer toe of the sewage pond embankments and any existing water well must be maintained.

89.23 Seal

Adequate provisions must be made to seal the sludge pond bottoms and embankments in accordance with Section 93.422 (Seal) to prevent leaching into adjacent soils or groundwater. The seal must be protected to prevent damage from sludge removal activities. Testing methodology and results must be approved by the Department.

89.24 Access

Provisions must be made for pumping or heavy equipment access for sludge removal from the sludge pond on a routine basis.

89.25 Supernatant Disposal

A method of decanting must be provided. Pond supernatant must be returned to the wastewater treatment process at appropriate points and rates. See also Sections 56.7 (Sampling Equipment) and 84.64 (Supernatant Disposal).

~~89.2~~ 89.3 Disposal

89.31 General

Drainage facilities for sludge vehicle transfer stations must be provided to allow any spillage or washdown material to be collected and returned to the wastewater treatment plant or sludge storage facility.

~~89.21~~ 89.32 Sanitary Landfilling

Sludge and sludge residues may be disposed of in approved Class II sanitary landfills under the terms and conditions of the ~~reviewing authority~~ Department. Typically sludges must pass a Toxicity Characteristic Leaching Procedure (TCLP) test and be ~~dewatered and~~ capable of passing a paint filter test to be suitable for disposal in an approved landfill. Documentation must be submitted to the Department from the operating authority of the landfill indicating that they are licensed and willing to accept sewage sludge. The Federal 40 CFR Part 258 - Criteria for Municipal Solid Waste Landfills regulations govern the placement of sludge in landfills.

~~89.22~~ 89.33 Land Application

The beneficial use of sludge is encouraged in all cases. The Department should be contacted for specific design and approval requirements governing land application of municipal sludges. Additional operating criteria may be obtained from applicable federal regulations. Sludge may be utilized as a soil conditioner for agricultural, horticultural, or reclamation purposes. Important design considerations include, but are not necessarily limited to: sludge stabilization process, ~~sludge chemical make up, pathogen density~~ appropriate pathogen and vector attraction reduction, sludge characteristics including the presence of inorganic and organic chemicals, application site characteristics (soil, groundwater elevations, setback distance requirements, etc.), local topography and hydrology, cropping practices, spreading and incorporation techniques, population density and odor control, local groundwater quality and usage. ~~In order to comply with the facility's effluent standards, alternative sludge disposal options are recommended for all treatment facilities due to inclement weather and cropping practices.~~

Sludge mixing equipment or other provisions to assist in the monitoring of land applied sludge should be considered in the design of sludge handling and storage facilities.

Due to inclement weather and cropping practices, alternative sludge disposal options are recommended to ensure the sludge is properly managed.

Sludge must not be applied to land which is used for growing food crops to be eaten raw, such as leafed vegetables and root crops.

The Federal 40 CFR Part 503 Sludge Disposal regulations govern the application of sludge to land. A sludge disposal permit from EPA must be obtained by the Owner before any sludge can be applied to any land application site. The land application of sludge (including abandonment in place) will only be approved by the Department in situations where it is clearly demonstrated that impacts to groundwater or surface water will not occur. In some cases, a solid waste permit may be required.

~~89.23~~ 89.34 Sludge ~~Lagoons~~ Ponds for Disposal

The utilization of ~~lagoons~~ ponds for ultimate disposal of sludge is not allowed.

~~89.24~~ 89.35 Other Disposal Methods

If disposal of sludge by other methods is proposed, a detailed description of the technique and design data must accompany the plans. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives) for any new process determinations.

CHAPTER 90

BIOLOGICAL TREATMENT

91. TRICKLING FILTERS

91.1 General

Trickling filters may be used for treatment of wastewater amenable to treatment by aerobic biologic processes. Trickling filters must be preceded by effective settling tanks equipped with scum and grease collecting devices, or other suitable pretreatment facilities.

Filters must be designed to provide for reduction in carbonaceous and/or nitrogenous oxygen demand in accordance with water quality standards and objectives for the receiving waters as established by the ~~reviewing agency~~ Department, or to properly condition the wastewater for subsequent treatment processes. Multi-stage filters should be considered if needed to meet more stringent effluent standards.

91.2 Hydraulics

91.21 Distribution

91.211 Uniformity

The wastewater may be distributed over the filter by rotary distributors or other suitable devices which will ensure uniform distribution to the surface area. At design average flow, the deviation from a calculated uniformly distributed volume per square foot (m^2) of the filter surface may not exceed plus or minus 10 percent at any point. All hydraulic factors involving proper distribution of wastewater on the filters must be carefully calculated. Such calculations must be submitted to the ~~reviewing agency~~ Department.

For rotary distributors, reverse reaction nozzles, hydraulic brakes or motor driven distributor arms must be provided to not exceed the maximum speed recommended by the distributor manufacturer and to attain the desired media flushing rate.

91.212 Head Requirements

For reaction type distributors, a minimum head of 24 inches (610 mm) between low water level in the siphon chamber and center of the arms is required. Similar allowance in design must be provided for added pumping head requirements where pumping to the reaction type distributor is used.

91.213 Clearance

A minimum clearance of 12 inches (305 mm) between media and distributor arms must be provided.

91.22 Dosing

Wastewater may be applied to the filters by siphons, pumps or by gravity discharge from preceding treatment units when suitable flow characteristics have been developed. Application of the wastewater must be practically continuous. The piping system must be designed for recirculation.

91.23 Piping System

The piping system, including dosing equipment and distributor, must be designed to provide capacity for the design peak hourly flow rate, including recirculation required under Section 91.55 (Recirculation).

91.3 Media

91.31 Quality

The media may be crushed rock, slag, or manufactured material. The media must be durable, resistant to spalling or flaking and relatively insoluble in wastewater. The top 18 inches (457 mm) may not have a loss by the 20cycle, sodium sulfate soundness test of more than 10 percent, as prescribed by ASCE Manual of Engineering Practice, Number 13. The balance must pass a 10-cycle test using the same criteria. Slag media must be free from iron or other leachable materials that will adversely affect the process or effluent quality. Manufactured media must be resistant to ultraviolet degradation, disintegration, erosion, aging, all common acids and alkalies, organic compounds, and fungus and biological attack. This media must be structurally capable of supporting a person's weight or a suitable access walkway must be provided to allow for distributor maintenance.

91.32 Depth

Trickling filter media must have a depth of at least 6 feet (1.8 m) above the underdrains. Rock and/or slag filter media depths should not exceed 10 feet (3 m) and manufactured filter media depths may not exceed the recommendations of the manufacturer. Forced ventilation should be considered in accordance with Section 91.43 (Ventilation).

91.33 Size, Grading and Handling of Media

91.331 Rock, Slag, and Similar Media

Rock, slag, and similar media may not contain more than 5 percent by weight of pieces with the longest dimension three times the least dimension. They must be free from thin, elongated and flat pieces, dust, clay, sand or fine material and must conform to the following size and grading when mechanically graded over a vibrating screen with square openings.

Passing 4 1/2 inch (114 mm) screen - 100% by weight
Retained on 3 inch (76 mm) screen - 95-100% by weight
Passing 2 inch (51 mm) screen - 0-2% by weight
Passing 1 inch (25 mm) screen - 0-1% by weight

91.332 Manufactured Media

Suitability will be evaluated on the basis of experience with installations handling similar wastes and loadings. To insure sufficient void clearances, media with specific surface areas of no more than 30 square feet per cubic foot (100 m^2/m^3) are acceptable for filters employed for carbonaceous reduction, and 45 square feet per cubic foot (150 m^2/m^3) for second stage ammonia reduction.

91.333 Handling and Placing of Media

Material delivered to the filter site must be stored on wood-planked or other approved clean, hard-surfaced areas. All material must be rehandled at the filter site and no material may be dumped directly into the filter. Crushed rock, slag, and similar media must be washed and rescreened or forked at the filter site to remove all fines. This material must be placed by hand to a depth of 12 inches (305 mm) above the tile underdrains. The remainder of material may be placed by means of belt conveyors or equally effective methods approved by the engineer. All material must be carefully placed so as not to damage the underdrains. Manufactured media must be handled and placed as approved by the engineer. Trucks, tractors, and other heavy equipment may not be driven over the filter during or after construction.

91.4 Underdrainage System

91.41 Arrangement

Underdrains with semicircular inverts or equivalent should be provided and when provided, the underdrainage system must cover the entire floor of the filter. Inlet openings into the underdrains must have an unsubmerged gross combined area equal to at least 15 percent of the surface area of the filter.

91.42 Hydraulic Capacity

The underdrains must have a slope of at least 1 percent. Effluent channels must be designed to produce a velocity of at least 2 feet per second (0.61 m/s) at design average flow rates of application to the filter including recirculated flows. Refer to Section 91.43 (Ventilation).

91.43 Ventilation

The underdrainage system, effluent channels and effluent pipe must be designed to permit free passage of air. The size of drains, channels, and pipe should be such that not more than 50 percent of their cross-sectional area will be submerged under the design peak instantaneous flow, including proposed or possible future recirculated flows.

Forced ventilation should be provided for covered trickling filters to insure adequate oxygen for process requirements. Windows or simple louvered mechanisms arranged to ensure air distribution throughout the enclosure must be provided. The design of the ventilation facilities must provide for operator control of air flow in accordance with outside seasonal temperature. Design computations showing the adequacy of air flow to satisfy process oxygen requirements must be submitted.

91.44 Flushing

Provision should be made for flushing the underdrains unless high rate recirculation is utilized. In small rock and slag filters, use of a peripheral head channel with vertical vents is acceptable for flushing purposes. Inspection facilities should be provided.

91.5 Special Features

91.51 Flooding

Appropriate valves, sluice gates, or other structures must be provided to enable flooding of filters comprised of rock or slag media for filter fly control.

91.52 Freeboard

A freeboard of 4 feet (1.2 m) or more should be provided for tall, manufactured filters to contain windblown spray. Provide at least 6 foot (1.8 m) headroom for maintenance of the distributor on covered filters.

91.53 Maintenance

All distribution devices, underdrains, channels, and pipes must be installed so that they may be properly maintained, flushed or drained.

91.54 Winter Protection

Covers must be provided to maintain operation and treatment efficiencies when climatic conditions are expected to result in problems due to cold temperatures.

91.55 Recirculation

The piping system must be designed for recirculation as required to achieve the design efficiency or effluent quality. The recirculation rate must be variable and subject to plant operator control at the range of 0.5:1 up to 4:1 (ratio of recirculation rate versus design average flow). A minimum of two recirculation pumps must be provided.

91.56 Recirculation Measurement

Devices must be provided to permit measurement of the recirculation rate. Elapsed time meters and pump head recording devices are acceptable for facilities treating less than 1 MGD (3785 m^3/d). The design of the recirculation facilities must provide for both continuity of service and the range of recirculation ratios. Reduced recirculation rates for periods of brief pump outages may be acceptable depending on water quality requirements.

91.6 Rotary Distributor Seals

Mercury seals are not permitted. Ease of seal replacement must be considered in the design to ensure continuity of operation.

91.7 Unit Sizing

Required volumes of filter media must be based upon pilot testing with the particular wastewater or any of the various empirical design equations that have been verified through actual full scale experience. Such calculations must be submitted if pilot testing is not utilized. Pilot testing is recommended to verify performance predictions based upon the various design equations, particularly when significant amounts of industrial wastes are present.

Trickling filter design must consider peak organic load conditions including the oxygen demands due to recycle flows (i.e. heat treatment supernatant, vacuum filtrate, anaerobic digester supernatant, etc.) due to high concentrations of BOD_5 and TKN associated with such flows. The volume of media determined from either pilot plant studies or use of acceptable design equations must be based upon the design maximum day BOD_5 organic loading rate rather than the design average BOD_5 rate. Refer to Section 11.251 (Organic Load Definitions and Identification).

92. ACTIVATED SLUDGE

92.1 General

92.11 Applicability

92.111 Biodegradable Wastes

The activated sludge process and its various modifications may be used where wastewater is amenable to biological treatment.

92.112 Operational Requirement

This process requires close attention and competent operating supervision, including routine laboratory control. These requirements must be considered when proposing this type of treatment.

92.113 Energy Requirements

This process requires major energy usage to meet aeration demands. Energy costs and potential mandatory emergency public power reduction events in relation to critical water quality conditions must be carefully evaluated. Capability of energy usage phasedown, while still maintaining process viability, both under normal and emergency energy availability conditions must be included in the activated sludge design.

92.12 Specific Process Selection

The activated sludge process and its several modifications may be employed to accomplish varied degrees of removal of suspended solids and reduction of carbonaceous and/or nitrogenous oxygen demand. Choice of the process most applicable will be influenced by the degree and consistency of treatment required, type of waste to be treated, proposed plant size, anticipated degree of operation and maintenance, and operating and capital costs. All designs must provide for flexibility in operation and should provide for operation in various modes, if feasible.

Extended aeration and oxidation ditch treatment facilities may be prone to the growth of filamentous organisms which can adversely impact treatment efficiency. The design of extended aeration and oxidation ditch facilities must consider this potential problem, and should provide a means for control of filamentous organisms.

~~The fill and draw mode of the activated sludge process, commonly termed the Sequencing Batch Reactor, may be approved by the reviewing authority on a case-by-case basis under section 53.2. The design must be based on experience at other facilities. Continuity and reliability of treatment equal to that of the continuous flow through modes of the activated sludge process must be provided. The reviewing authority should be contacted for design guidance and criteria when such systems are being considered.~~

92.13 Winter Protection

In severe climates, protection against freezing should be incorporated into the design to ensure continuity of operation and performance. Insulation of the tanks by earthen banks should be considered.

92.2 Pretreatment

Where primary settling tanks are not used, effective removal or exclusion of grit, debris, excessive oil or grease, and screening of solids must be accomplished prior to the activated sludge process. <u>Screening devices with clear openings of ¼ inch (6 mm) or less must be provided.</u>

Where primary settling is used, provision must be made for discharging <u>screened</u> raw wastewater directly to the aeration tanks to facilitate plant start-up and operation during the initial stages of the plant's design life.

92.3 Aeration

92.31 Capacities and Permissible Loadings

The size of the aeration tank for any particular adaptation of the process must be determined by full scale experience, pilot plant studies, or rational calculations based mainly on solids retention time, food to microorganism ratio and mixed liquor suspended solids levels. Other factors, such as size of treatment plant, diurnal load variations, and degree of treatment required, must also be considered. In addition, temperature, pH and reactor dissolved oxygen must be considered when designing for nitrification (see Section 95.31 Nitrification).

Calculations should be submitted to justify the basis for design of aeration tank capacity. Calculations using values differing substantially from those in the accompanying table should reference actual operational plants. Mixed liquor suspended solids levels greater than 5000 mg/L may be allowed providing adequate data is submitted showing the aeration and clarification system capable of supporting such levels.

When process design calculations are not submitted, the aeration tank capacities and permissible loadings for the several adaptations of the processes shown in the following table must be used. These values apply to plants receiving diurnal load ratios of design peak hourly BOD_5 to design average BOD_5 ranging from about 2:1 to 4:1. Thus, the utilization of flow equalization facilities to reduce the diurnal design peak hourly BOD_5 organic load may be considered by the ~~appropriate reviewing agency~~ Department as justification to approve organic loading rates that exceed those specified in the table.

PERMISSIBLE AERATION TANK CAPACITIES AND LOADINGS			
Process	******Aeration Tank Organic Loading lbs. BOD_5/d/1000 ft^3 (kg/d/m^3)*****	**F/M Ratio lb. BOD_5/day per lb. MLVSS *****	**MLSS* mg/L**
Conventional Step Aeration Complete Mix	40 (0.64)	0.2-0.5	1000-3000
Contact Stabilization	50** (0.8)	0.2-0.6	1000-3000
Extended Aeration Single Stage Nitrification	15 (0.24)	0.05-0.1	3000-5000

* MLSS values are dependent upon the surface area provided for sedimentation and the rate of sludge return as well as the aeration process.

** Total aeration capacity, includes both contact and re-aeration capacities. Normally the contact zone equals 30 to 35% of the total aeration capacity.

*** Refer to 11.251(a) for definition of BOD.

**** Loadings are based on the organic load influent to the aeration tank at plant design average BOD5.

92.32 Arrangement of Aeration Tanks

a. Dimensions

The dimensions of each independent mixed liquor aeration tank or return sludge re-aeration tank must be such as to maintain effective mixing and utilization of air. Ordinarily, liquid depths should not be less than 10 feet (3 m) or more than 30 feet (9 m) except in special design cases. An exception is that horizontally mixed aeration tanks must have a depth of at least 5.5 feet (1.7 m).

b. Short-circuiting

For very small tanks or tanks with special configuration, the shape of the tank, the location of the influent and sludge return, and the installation of aeration equipment ~~should~~ must provide for positive control to prevent short-circuiting through the tank.

92.321 Number of Units

Total aeration tank volume must be divided among two or more units, capable of independent operation, when required by the ~~reviewing agency~~ Department to meet applicable effluent limitations and reliability guidelines.

92.322 Inlets and Outlets

a. Controls

Inlets and outlets for each aeration tank unit must be suitably equipped with valves, gates, stop plates, weirs, or other devices to permit controlling the flow to any unit and to maintain reasonably constant liquid level.

The effluent weir for a horizontally mixed aeration tank system must be easily adjustable by mechanical means and must be sized based on the design peak instantaneous flow plus the maximum return sludge flow. Refer to Section 92.41 (Return Sludge Rate). The hydraulic properties of the system must permit the design peak instantaneous flow to be carried with any single aeration tank unit out of service.

b. Conduits

Channels and pipes carrying liquids with solids in suspension must be designed to maintain self-cleansing velocities or must be agitated to keep such solids in suspension at all rates of flow within the design limits. Adequate provisions should be made to drain segments of channels which are not being used due to alternate flow patterns.

92.323 Freeboard

All aeration tanks should have a freeboard of not less than 18 inches (457 mm). However, if a mechanical surface aerator is used, the freeboard should be not less than 3 feet (914 mm) to protect against windblown spray freezing on walkways, etc.

92.33 Aeration Equipment

92.331 General

Oxygen requirements generally depend on maximum diurnal organic loading (design peak hourly BOD_5 as described in Section 11.251(a)(3)), degree of treatment, and level of suspended solids concentration to be maintained in the aeration tank mixed liquor. For nitrogen removal plants, the diurnal peak TKN loading (as described in 11.251(b)(2) must also be taken into account.

Aeration equipment must be capable of maintaining a minimum of 2.0 mg/l of dissolved oxygen in the mixed liquor at all times and provide thorough mixing of the mixed liquor. In the absence of experimentally determined values, the design oxygen requirements for all activated sludge processes must be 1.1 lbs. O_2/lb. design peak hourly BOD_5 ~~applied to the aeration tanks~~ (1.1 kg O_2/kg design peak hourly BOD_5) applied to the aeration tanks, with the exception of the extended aeration process, for which the value must be 1.5 to include endogenous respiration requirements.

In the case of nitrification, the oxygen requirement for oxidizing ammonia must be added to the above requirement for carbonaceous BOD_5 removal and endogenous respiration requirements. The nitrogen oxygen demand (NOD) must be taken as 4.6 times the diurnal peak TKN content of the influent. In addition, the oxygen demands due to recycle flows (i.e., heat treatment supernatant, vacuum filtrate, elutriates, etc.) must be considered due to the high concentrations of BOD_5 and TKN associated with such flows. See Section 95.31 (Nitrification) for additional design considerations.

Careful consideration should be given to maximizing oxygen utilization per unit power input. Unless flow equalization is provided, the aeration system should be designed to match the diurnal organic load variation while economizing on power input. Refer to Section 92.31 (Capacities and Permissible Loadings).

92.332 Diffused Air Systems

The diffused air system that provides the oxygen ~~requirements~~ must be designed according to either of the two methods described below in (a) and (b), augmented as required by consideration of items (c) through (h):

a. Having determined the oxygen requirements under Section 92.331 (General), air requirements for a diffused air system must be determined by use of any of the well known equations incorporating such factors as:

1. Tank depth;
2. Alpha factor of waste;
3. Beta factor of waste;
4. Certified aeration device transfer efficiency;
5. Minimum aeration tank dissolved oxygen concentration;
6. Critical wastewater temperature; and
7. Altitude of plant.

In the absence of experimentally determined alpha and beta factors, wastewater transfer efficiency must be assumed to be not greater than 50 percent of clean water efficiency for plants treating primarily (90% or greater) ~~domestic wastewater~~ public sewage. Treatment plants where the waste contains higher percentages of industrial wastes must use a correspondingly lower percentage of clean water efficiency and must submit calculations justifying a lower percentage. The design transfer efficiency should be included in the specifications.

b. Normal air requirements for all activated sludge processes except extended aeration (assuming equipment capable of transmitting to the mixed liquor the amount of oxygen required in Section 92.331(General)) must be considered to be 1500 cubic feet at standard conditions of pressure, temperature, and humidity per pound of BOD_5 tank loading (94 m^3/kg of BOD_5). For the extended aeration process the value must be 2050 cubic feet per pound of BOD_5 (128 m^3/kg of BOD_5).

c. Air required for channels, pumps, aerobic digesters, filtrate, and supernatant or other air-use demand must be added to the air requirements calculated above.

d. The specified capacity of blowers or air compressors, particularly centrifugal blowers, should take into account that the air intake temperature may reach 115°F (46°C) or higher and the pressure may be less than normal. The specified capacity of the motor drive should also take into account that the intake air may be -20°F (-29°C) or less and may require over-sizing of the motor or a means of reducing the rate of air delivery to prevent overheating or damage to the motor.

e. The blowers must be provided in multiple units, so arranged and in such capacities as to meet the maximum air demand with the single largest unit out of service. The design must also provide for varying the volume of air delivered in proportion to the load demand of the plant. Aeration equipment must be easily adjustable in increments and must maintain solids suspension within these limits.

f. Diffuser systems must be capable of providing for 200 percent of the design average day oxygen demand. The air diffusion piping and diffuser system must be capable of delivering normal air requirements with minimal friction losses.

g. Air piping systems should be designed such that total head loss from blower outlet (or silencer outlet where used) to the diffuser inlet does not exceed 0.5 psi (3.4 kPa) at average operating conditions.

h. The spacing of diffusers should be in accordance with the oxygen requirements through the length of the channel or tank, and should be designed to facilitate adjustment of their spacing without major revisions to air header piping.

i. All plants having less than four independent aeration tanks must be designed to incorporate removable diffusers that can be serviced and/or replaced without dewatering the tank.

~~g.~~ **j.** Individual assembly units of diffusers must be equipped with control valves, preferably with indicator markings for throttling, or for complete shutoff. Diffusers in any single assembly must have substantially uniform pressure loss.

~~h.~~ **k.** Air filters must be provided in numbers, arrangements, and capacities to continuously furnish an air supply sufficiently free from dust to prevent damage to blowers and clogging of the diffuser system used.

92.333 Mechanical Aeration Systems

a. Oxygen Transfer Performance

The mechanism and drive unit must be designed for the expected conditions in the aeration tank in terms of the power performance. Certified testing must be provided to verify mechanical aerator performance. Refer to applicable provisions of Section 93.332 (Diffused Air Systems). In the absence of specific design information, the oxygen requirements must be calculated using a transfer rate not to exceed 2 pounds of oxygen per horsepower per hour (1.22 kg O2/kw/hr) in clean water under standard test conditions. Design transfer efficiencies must be included in the specifications.

b. Design Requirements

The design requirements of a mechanical aeration system must accomplish the following:

1. Maintain a minimum of 2.0 mg/L of dissolved oxygen in the mixed liquor at

all times throughout the tank or basin;

2. Maintain all biological solids in suspension (for a horizontally mixed aeration tank system an average velocity of 1 foot per second [0.3 m/sec] must be maintained);
3. Meet maximum oxygen demand and maintain process performance with the largest unit out of service;
4. Provide for varying the amount of oxygen transferred in proportion to the load demand on the plant; and
5. Provide that motors, gear housing, bearings, grease fittings, etc., be easily accessible and protected from inundation and spray as necessary for proper functioning of the unit.

c. Winter Protection

Where extended cold weather conditions occur, the aerator mechanism and associated structure must be protected from freezing due to splashing. Due to high heat loss, subsequent treatment units must be protected from freezing.

92.4 Return Sludge Equipment

92.41 Return Sludge Rate

The minimum permissible return sludge rate of withdrawal from the final settling tank is a function of the concentration of suspended solids in the mixed liquor entering it, the sludge volume index of these solids, and the length of time these solids are retained in the settling tank. Since undue retention of solids in the final settling tanks may be deleterious to both the aeration and sedimentation phases of the activated sludge process, the rate of sludge return expressed as a percentage of the design average daily flow (ADF) of wastewater should generally be variable between the limits set forth as follows:

Type of Process	% ADF Minimum	% ADF Maximum
Conventional, Step Aeration or Complete Mix	15	100
Carbonaceous Stage of Separate Stage Nitrification	15	100
Single Stage Nitrification	50	150
Contact Stabilization	50	150
Extended Aeration	50	150
Nitrification Stage of Separate Stage Nitrification	50	200
Biological Nutrient Removal	70	120

The rate of sludge return must be varied by means of variable speed motors, drives, or timers (small plants) to pump sludge at the above rates. All designs must provide for flexibility in operation and should provide for operation in various process modes, if feasible.

92.42 Return Sludge Pumps

If motor driven return sludge pumps are used, the maximum return sludge capacity must be obtained with the largest pump out of service. A positive head should be provided on pump suctions. Pumps should have at least 3 inch (76 mm) suction and discharge openings.

If air lifts are used for returning sludge from each settling tank hopper, no standby unit will be required provided the design of the air lifts facilitates their rapid and easy cleaning and provided other suitable standby measures are provided. Air lifts should be at least 3 inches (76 mm) in diameter.

92.43 Return Sludge Piping

Discharge piping should be at least 4 inches (102 mm) in diameter and should be designed to maintain a velocity of not less than 2 feet per second (0.61 m/s) when return sludge facilities are operating at normal return sludge rates. Suitable devices for observing, sampling, and controlling return activated sludge flow from each settling tank hopper must be provided, as outlined in Section 73.24 (Sludge Removal Control).

92.44 Waste Sludge Facilities

Waste sludge control facilities should have a capacity of at least 25 percent of the design average rate of wastewater flow and function satisfactorily at rates of 0.5 percent of design average wastewater flow or a minimum of 10 gallons per minute (0.63 L/s), whichever is larger. Means for observing, measuring, sampling, and controlling waste activated sludge flow must be provided. Waste sludge may be discharged to the concentration or thickening tank, primary settling tank, sludge digestion tank, vacuum filters, or any practical combination of these units.

92.5 Measuring Devices

Devices ~~should~~ must be installed in all plants for indicating flow rates of raw wastewater or primary effluent, return sludge, and air to each tank unit. For plants designed for design average wastewater flows of 1 MGD (3785 m^3/d) or more, these devices ~~should~~ must totalize and record, as well as indicate flows. Where the design provides for all return sludge to be mixed with the raw wastewater (or primary effluent) at one location, then the mixed liquor flow rate to each aeration unit ~~should~~ must be measured.

93. WASTEWATER TREATMENT PONDS

93.1 General

This Section deals with generally used variations of treatment ponds capable of achieving secondary treatment including controlled-discharge pond systems, flow-through pond systems and aerated pond systems. Ponds utilized for equalization, percolation, and sludge storage are not discussed in this Section.

93.2 Location

93.21 Distance from Habitation

A pond site should be located as far as practicable, with a recommended minimum of 1/4 mile (0.4 km), from human habitation or from any area that may be built up within the foreseeable future. Consideration should be given to site specifics including but not limited to vector transport, odor, public safety, topography, prevailing winds, and forest.

93.22 Surface Runoff

Adequate provision must be made to divert stormwater runoff around the ponds and protect pond embankments from erosion.

93.23 Soil Borings

Data from soil borings conducted by an independent soil testing laboratory to determine subsurface soil characteristics and groundwater characteristics (including elevation and flow) of the proposed site and their effect on the construction and operation of a pond must ~~also~~ be provided.

93.24 Groundwater Separation

A minimum separation of 4 feet (1.2 m) between the bottom of the pond and the maximum groundwater elevation should be maintained.

93.25 Bedrock Separation

A minimum separation of 10 feet (3.0 m) between the pond bottom and any bedrock formation is recommended.

93.26 Water Well Separation

In accordance with MCA 75-5-605, a minimum separation of 500 feet (152.4 m) between the outer toe of the sewage pond embankments and any existing water well must be maintained.

Separation requirements for storage ponds are discussed in Section 121.115 (Storage Analysis) and Section B.6 (Setbacks, Separation and Buffer Distances for Reclaimed Wastewater Use).

93.3 Basis of Design

93.31 Area and Loadings for Continuous and Controlled-Discharge Facultative Treatment Pond Systems

See Table 93-1 for facultative pond design criteria.

93.32 Aerated Treatment Pond Systems

For the development of final design parameters, it is recommended that actual experimental data be developed; however the aerated treatment pond system design for minimum detention time may be estimated using the following formula applied separately to each aerated cell:

$$t = \frac{E}{2.3K_1 \times (100-E)}$$

t = detention time, days

E = percent of BOD_5 to be removed in an aerated pond

K_1 = reaction coefficient, aerated ~~lagoon~~ pond, base 10. For normal ~~domestic wastewater~~ public sewage, the K_1 value may be assumed to be 0.12/day at 68° F (20° C) and 0.06/day at 34° F (1° C)

The reaction rate coefficient for ~~domestic wastewater~~ public sewage, which includes some industrial wastes, other wastes, and partially treated wastewater, must be determined experimentally for various conditions which might be encountered in the aerated ponds. Conversion of the reaction rate coefficient at other temperatures must be made based on experimental data.

Raw wastewater strength should also consider the effect of any return sludge. Also, additional storage volume should be considered for sludge, and in northern climates, ice cover.

Design should consider recirculation within the system.

Oxygen requirements generally will depend on the design average BOD_5 loading, the degree of treatment, and the concentration of suspended solids to be maintained. Aeration equipment must be capable of maintaining a minimum dissolved oxygen level of 2 mg/L in the ponds at all times and should also be capable of increasing the dissolved oxygen level for periodic upsets. Suitable protection from weather must be provided for electrical controls.

See Table 93-2 for partially mixed aerated pond design criteria.

See Section 92.33 (Aeration Equipment) for details on aeration equipment.

93.33 Industrial Wastes

Consideration must be given to the type of industrial wastes and effects on the treatment process. In some cases it may be necessary to pretreat industrial or other discharges.

Industrial wastes may not be discharged to ponds without assessment of the effects these substances may have upon the treatment process or discharge requirements in accordance with state and federal laws.

93.34 Number of Cells Required

At a minimum, a wastewater treatment pond system should consist of 3 cells designed to facilitate both series and parallel operations. The maximum size of a pond cell should be 40 acres (16 ha). Two-cell systems may be utilized in very small installations (approximately 25,000 gallons/day or less).

All systems ~~should~~ must be designed with piping flexibility to permit isolation of any cell without affecting the transfer and discharge capabilities of the total system. In addition, the ability to discharge the influent waste load to a minimum of 2 cells and/or all primary cells in the system ~~should~~ must be provided.

~~93.341 Controlled Discharge Facultative Treatment Pond Systems~~

~~For controlled discharge systems the area specified as the primary ponds should be equally divided into two cells. The third or secondary cell volume should as a minimum, be equal to the volume of each of the primary cells.~~

~~93.342 Flow-Through Facultative Treatment Pond Systems~~

~~At a minimum, primary cells must provide adequate detention time to maximize BOD_5 removal. Secondary cells should then be provided for additional detention time with depths to 8 feet (2.4 m) to facilitate solids reduction.~~

93.35 Pond Shape

The shape of all cells should be such that there are no narrow or elongated portions. Rectangular ponds (length not exceeding three times the width) are considered most desirable. Islands, peninsulas and coves are not permitted. Dikes should be rounded at corners to minimize accumulations of floating materials. Common-wall dike construction, wherever possible, is strongly encouraged.

93.36 Pond Design Criteria

The following tables summarize the criteria for facultative and aerated ponds.

TABLE 93-1 FACULTATIVE POND DESIGN CRITERIA	Disposal Method			
	Continuous Discharge	Controlled Discharge	Land Application	Total Retention[6]
Primary Cells				
Minimum Number[1]	2	2	1	1
BOD_5 Loading lb/acre/day	15-35	15-35	15-35	15-35
~~Normal~~ Operating Range Limits[2], feet	2-6	2-6	2-6	~~2~~ 4 -6
Detention Time, days	40-80	40-80	40-80	40-80
Maximum Seepage Rate[2] inches/year	6	6	6	6
Secondary or Storage Cells				
Minimum Number	1	1	1	1
Maximum Depth without Aeration, ft	8	8	8	8
Minimum Depth, ft	2	2	~~2~~ 1	~~2~~ 1
Maximum Seepage Rate, inches/year	6	6	6	6
Overall System				
Maximum BOD_5 Loading, lb/acre/day	20	20	20	20
Minimum Detention Time, days[2]	180	180	90-120	Total Retention[4,5]
Emergency or Winter Storage	N/A	N/A	60-150[3,4]	

1. All primary cells must be approximately equal in size.
2. Primary cell detention times must be based on volume between the 2 foot level and maximum depth. Secondary and storage cell detention times may be based on volume between the 1- foot level and maximum depth.
3. Shorter time periods for infiltration/percolation disposal and longer time periods for irrigation.
4. An annual month-by-month water balance must be submitted for land application and total retention.
5. Net evaporation rate must be calculated by using mean annual lake evaporation rate and the 10-year precipitation return period for annual precipitation and distribute it monthly based on the ratio of average monthly to average annual precipitation. ~~Net loss for pond sizing would also include the allowable annual seepage rate for the pond site.~~
6. Total retention systems must be designed for at least 2 cells, and the primary cell must be designed to remain full within the ~~2~~ 4 to 6-foot water surface level at minimum expected flows.

TABLE 93-2 PARTIALLY MIXED AERATED POND DESIGN CRITERIA	Disposal Method		
	Continuous Discharge	Controlled Discharge	Land Application
Minimum Number of Aerated Cells[1]	3	3	1-2[2]
Recommended Mode of Aeration[3]	Tapered	Tapered	Equal
Minimum System Oxygen Requirements, lbs 0_2 / lb BOD_5 removed[4]	2.5	2.5	2.5
Minimum Dissolved Oxygen, mg/l[5]	2.0	2.0	2.0
Depth, feet	10-15	10-15	10-15
Minimum Detention Time Under Aeration, days[6]	20	20	15
Maximum Seepage Rate, inches/year	6	6	6
Emergency Storage for Infiltration/ Percolation, days	N/A	N/A	30-90
Winter Storage for Irrigation	N/A	N/A	See foot- note 7
Mixing in Aerated Cells, Hp/MG	5-10	5-10	5-10

1. The outlet area of all final cells must have a quiescent zone of at least one to two days hydraulic detention time for settling solids.
2. One aeration cell if large storage cell is proposed. Two aeration cells if infiltration/percolation is proposed.
3. If first cell is out of service, sufficient oxygen must be dispersed in remaining cells to keep cells aerobic.
4. Criteria for Primary Cells: Oxygen supplied must be sufficient to meet the organic, nitrogenous, benthic and algal demands in the pond.
5. Measured two feet below the surface of the pond.
6. Base design on provisions of Section 93.32. Detention time must be sufficient to provide adequate BOD reduction to meet waste discharge requirements. Volume calculated from two feet from bottom to maximum depth. Time not inclusive of quiescent zone. Waste load and climatic conditions may require more stringent criteria.
7. An annual month-by-month water balance must be submitted with each land application plan to determine winter storage.

93.4 Pond Construction Details

93.41 Embankments and Dikes

93.411 Material

Dikes must be constructed of relatively impervious soil and compacted to at least ~~90 percent Standard Proctor Density~~ 95 percent of maximum dry density as determined by AASHTO T99 or ASTM D698, or as recommended by a geotechnical engineer, to form a stable structure. Vegetation and other unsuitable materials must be removed from the area where the embankment is to be placed.

93.412 Top Width

The minimum dike width is 8 feet (2.4 m) to permit access for maintenance vehicles.

93.413 Maximum Slopes

Inner and outer dike slopes may not be steeper than 1 vertical to 3 horizontal (1:3).

93.414 Minimum Slopes

Inner slopes should not be flatter than 1 vertical to 4 horizontal (1:4). Flatter slopes can be specified for larger installations because of wave action but have the disadvantage of added low areas being conducive to emergent vegetation. Outer slopes must be sufficient to prevent surface runoff from entering the ponds.

93.415 Freeboard

Freeboard must be at least 3 feet (914 mm), except for small systems (25,000 gpd or less) where 2 feet (610 mm) may be acceptable.

93.416 Erosion Control

All ~~lagoons~~ ponds must be protected from erosion caused by wave action, weather and flooding. A justification and detailed discussion of the method of erosion control which encompasses all relative factors such as pond location and size, seal material, topography, prevailing winds, cost breakdown, application procedures, etc., must be provided. ~~Lagoons~~ Ponds with proposed uncovered synthetic liners must include provisions to reduce the hazard associated with the slick surface.

a. Seeding

The dikes must have a cover layer of at least 4 inches (102 mm) of fertile topsoil to promote establishment of an adequate vegetative cover wherever riprap or synthetic liner is not utilized. Perennial-type, low-growing, spreading grasses that minimize erosion and can be mowed are most satisfactory for seeding on dikes. ~~In general,~~ Alfalfa and other long-rooted crops should not be used for seeding since the roots of this type are apt to impair the water-holding efficiency of the dikes.

b. Additional Erosion Protection

Riprap or some other acceptable method of erosion control is required as a minimum around all piping entrances and exits and on interior dike slopes of all ~~lagoons~~ ponds utilizing soil liners. ~~Where justified, riprap can be limited to interior dikes receiving prevailing winds.~~ Riprap, or an acceptable equal, must be placed from one foot above the high water mark to two feet below the low water mark (measured on the vertical). For aerated cells the design should ensure erosion protection on the slopes and bottoms in the areas where turbulence will occur. Additional erosion control may also be necessary on the exterior dike slope to protect the embankment from erosion due to severe flooding of a watercourse.

93.42 Pond Bottom

93.421 Soil

Soil used in constructing the pond bottom (not including the seal) and dike cores must be tight and compacted at or up to 4 percent above the optimum water content to at least ~~90 percent Standard Proctor Density~~ 95 percent of maximum dry density as determined by AASHTO T99 or ASTM D698, or as recommended by a geotechnical engineer.

93.422 Seal

Ponds must be sealed so that seepage loss through the seal is as low as practicably possible. Seals consisting of soils, bentonite, or synthetic liners may be considered provided the permeability, durability, and integrity of the proposed material can be satisfactorily demonstrated for anticipated conditions. ~~Results of a testing program that substantiate the adequacy of the proposed seal must be incorporated into and/or accompany the engineering report.~~ The proposed hydraulic testing procedure must be included in the project specifications. The test must take place at the maximum operating depth and must be a minimum of 14 days in length. ~~Standard ASTM procedures or acceptable similar methods must be used for all tests.~~ The liner is considered watertight if leakage is less than 0.23 inches in a 14-day time period (6-inches per year). The effects of evaporation and precipitation during the testing period must be considered. Testing results that substantiate the adequacy of the proposed seal must be submitted to the Department. In the event of a failed test, the lagoon cell shall be drained, patched, and retested.

The use of the following equipment and testing method (or equivalent) is recommended:

> Equipment and method. Two 12-inch (minimum) diameter PVC pipes shall be securely placed vertically (and temporarily) to the floor or sidewall of the pond being tested. The top of each pipe shall be at least 12-inches above the water surface. Both pipes shall be open to the atmosphere and must have a waterproof scale secured to the interior of the pipe near the water surface in increments no less than 1/16". One pipe (control pipe) shall be water tight below the water surface and filled to the level of the basin at the start of the testing period. The second pipe shall have holes below the water surface to allow a hydraulic connection between the inside of the pipe and the water in the basin. The leakage through the liner is the difference between the two levels over the testing period.

To achieve an adequate seal in systems using soil, bentonite, or other seal materials, the coefficient of permeability (k) in centimeters per second specified for the seal may not exceed the value derived from the following expression:

$$\mathbf{k = \cancel{3.0}\ \underline{2.6} \times 10^{-9} L}$$

Where L equals the thickness of the seal in centimeters, the "k" obtained by the above expression corresponds to a percolation rate of pond water of less than ~~500~~ 450 gallons per day per acre (~~4.68~~ 4.22 m^3/ha/d) at a water depth of six feet (1.8 m) and a liner thickness of 1 foot (0.3 m), using the Darcy's law equation. For a seal consisting of a synthetic liner, seepage loss through the liner may not exceed the quantity equivalent to seepage loss through an adequate soil seal.

93.423 Uniformity

Finished elevations for soil and bentonite liners may not vary more than 3 inches (76 mm) from the average elevation of the bottom and should be as level as possible. Sloped pond bottoms are allowed for synthetic liners, however they must be uniformly sloped.

93.424 Prefilling

Prefilling the pond should be considered in order to protect the liner, to prevent weed growth, to reduce odor, and to maintain the moisture content of soil liners ~~the seal~~. However, the dikes must be completely prepared as described in Sections 93.416 (Erosion Control) (a) and (b) before the introduction of water.

93.43 Influent Lines

93.431 Material

Generally accepted material for underground sewer construction will be given consideration for the influent line to the pond. Corrugated metal pipe must not be used due to corrosion problems. In material selection, consideration must be given to the characteristics of the wastes, exceptionally heavy external loadings, abrasion, soft foundations, and similar problems.

93.432 Manhole

A manhole or vented clean-out wye must be installed prior to entrance of the influent line into the primary cell and must be located as close to the dike as topography permits. Its invert must be at least 6 inches (152 mm) above the maximum operating level of the pond and provide sufficient hydraulic head without surcharging the manhole.

93.433 Flow Distribution

Flow distribution structures must be designed to effectively split hydraulic and organic loads equally to primary cells.

93.434 Placement

Influent lines must be located along the bottom of the pond (above the required sludge storage depth) and be adequately supported.

93.435 Point of Discharge

All primary cells must have individual influent lines which terminate approximately at the midpoint of the width and at approximately 10 feet from the toe of the dike slope and be located as far as possible from the outlet structure to minimize short-circuiting.

All aerated cells must have influent lines that distribute the load within the mixing zone of aeration equipment.

93.436 Influent Discharge Apron

The influent line must discharge onto a concrete apron.
The end of the discharge line must rest on a suitable concrete apron large enough to prevent the terminal influent velocity at the end of the apron from causing soil

erosion. A minimum size apron of 25 square feet must be provided.

93.44 Control Structures and Interconnecting Piping

93.441 Structure

~~Where possible,~~ Facility design must consider the use of multipurpose control structures to facilitate normal operational functions such as drawdown and flow distribution, flow and depth measurement, sampling, pumps for recirculation, chemical additions and mixing, and minimization of the number of construction sites within the dikes.

At a minimum, control structures must be: (a) accessible for maintenance and adjustment of controls; (b) adequately ventilated for safety and to minimize corrosion; (c) locked to discourage vandalism; (d) contain controls to permit water level and flow rate control, and complete shutoff; (e) constructed of non-corrodible materials (metal-on-metal contact in controls should be of similar alloys to discourage electrochemical reactions); and (f) located to minimize short-circuiting within the cell and avoid freezing and ice damage.

Recommended devices to regulate water level are valves, slide tubes or dual slide gates. Stop logs are not to be used to regulate water levels. Regulators should be designed so that they can be preset to prevent the pond surface elevation from dropping below the desired operational level.

93.442 Piping

All piping must be of ductile iron, PVC or other acceptable material. Pipes should be anchored with adequate erosion control. All interpond piping and takeoffs must be submerged.

a. **Drawdown Structure Piping**

1. Single Takeoffs for the Final Treatment Pond

   For ponds ~~designed for shallow depth operations (6 feet or less)~~ with operating depths that are 6 feet or less, single takeoffs are allowed. The intake of the takeoff must be located 10 feet (3.0 m) from the toe of the dike and a minimum of 2 feet (610 mm) ~~from~~ above the bottom of the pond, and ~~shall~~ must employ vertical withdrawal.

2. Multi-Level Takeoffs for the Final Treatment Pond

   For ponds that are variable in depth or designed deep enough to permit stratification of pond content, multiple takeoffs are required. Three withdrawal pipes at different elevations are recommended. The bottom pipe must be located 10 feet (3.0m) from the toe of the dike, 2 feet (610mm) ~~from~~ above the bottom of the pond, and ~~shall~~ must employ vertical withdrawal. The other pipes must be located a minimum of 2 feet from the edge of the dike and should utiljze horizontal entrance. Adequate structural support must be provided for all piping.

3. Irrigation Storage Ponds

   The use of multiple takeoffs or a floating pump is recommended. The bottom pipe must be located 10 feet (3.0 m) from the toe of the dike, 1 foot (305 mm) above the bottom of the pond, and must employ vertical withdrawal.

~~3.~~ 4. Emergency Overflow

To prevent overtopping of dikes, emergency overflow ~~should~~ must be provided with capacity to carry the peak instantaneous flow expected.

~~4. Piping flexibility must allow any cell to be taken out of service while maintaining a minimum series operation for the remaining cells.~~

b. Hydraulic Capacity

The hydraulic capacity for continuous discharge structures and piping must allow for a minimum of 250 percent of the design maximum day flow of the system. The hydraulic capacity for controlled-discharge systems must permit transfer of water at a minimum rate of ~~six~~ 6 inches (152 mm) of pond water depth per day at the available head.

93.5 Miscellaneous

93.51 Fencing

The pond area must be enclosed with an adequate fence to prevent entering of livestock and discourage trespassing. Chain link fencing or equivalent should be seriously considered for ~~lagoons~~ ponds near urban areas. Fencing should not obstruct maintenance vehicle traffic on top of the dikes. A vehicle access gate of sufficient width to accommodate mowing equipment must be provided. All access gates must be ~~provided~~ secured with locks.

93.52 Access

An all-weather access road must be provided to the pond site to allow year-round maintenance of the facility.

93.53 Warning Signs

Appropriate permanent signs must be provided along the fence around the pond to designate the nature of the facility and advise against trespassing. At least one sign must be provided on each side of the site and one for every 500 feet (150 m) of its perimeter.

93.54 Flow Measurement

Flow measurement requirements are presented in Section 56.6 (Flow Measurement.) Effective weather protection must be provided for the recording equipment.

93.55 Groundwater Monitoring

An approved system of wells or lysimeters may be required around the perimeter of the pond site to facilitate groundwater monitoring. The need for such monitoring will be determined on a case-by-case basis.

93.56 Pond Level Gauges

Pond level gauges must be provided.

93.57 Service Building

A service building for laboratory and maintenance equipment must be provided if required in Section 58 (Laboratory).

93.58 Sulfate Content of Water Supply

Non-aerated ~~lagoons~~ ponds should not be used if excessive sulfate is present in the wastewater.

94 ROTATING BIOLOGICAL CONTACTORS

94.1 General

94.11 Applicability

The Rotating Biological Contactor (RBC) process may be used where sewage is amenable to biological treatment. The process may be used to accomplish carbonaceous and/or nitrogenous oxygen demand reductions. Design standards, operating data and experience for this process ~~are not well established~~ will vary according to site-specific conditions. Therefore, expected performance of RBC's must be based upon experience at similar full scale installations or thoroughly documented pilot testing with the particular wastewater.

94.12 Winter Protection

Wastewater temperature affects rotating contactor performance. Year-round operation in colder climates requires that rotating contactors be covered to protect the biological growth from cold temperatures and the excessive loss of heat from the wastewater with the resulting loss of performance.

Enclosures must be constructed of a suitable corrosion resistant material. Windows or simple louvered mechanisms that can be opened in the summer and closed in the winter must be installed to provide adequate ventilation. To minimize condensation, the enclosure should be adequately insulated and/or heated.

94.2 Required Pretreatment

RBC's must be preceded by effective settling tanks equipped with scum and grease collecting devices unless substantial justification is submitted for other pretreatment devices which provide for effective removal of grit, debris and excessive oil or grease prior to the RBC units. Bar screening or comminution are not suitable as the sole means of pretreatment.

94.3 Unit Sizing

Unit sizing must be based on experience at similar full-scale installations or thoroughly documented pilot testing with the particular wastewater. In determining design loading rates, expressed in units of volume per day per unit area of media covered by biological growth, the following parameters must be considered:

a. Design flow rate and influent waste strength;

b. Percentage of BOD to be removed;

c. Media arrangement, including number of stages and unit area in each state;

d. Rotational velocity of the media;

e. Retention time within the tank containing the media;

f. Wastewater temperature; and

g. Percentage of influent BOD which is soluble.

In addition to the above parameters, loading rates for nitrification will depend upon influent total Kjeldahl nitrogen (TKN), pH, and the allowable effluent ammonia nitrogen concentration.

94.4 Design Safety Factor

Effluent concentrations of ammonia nitrogen from the RBC process designed for nitrification are affected by diurnal load variations. Therefore, it may be necessary to increase the design surface area proportional to the ammonia nitrogen diurnal peaking rates to meet effluent limitations. An alternative is to provide flow equalization sufficient to ensure process performance within the required effluent limitations.

~~95. OTHER BIOLOGICAL SYSTEMS~~

~~95.1 General~~

~~Biological treatment processes not included in these standards may be considered in accordance with Section 53.2.~~

95. BIOLOGICAL NUTRIENT REMOVAL (BNR)

95.1 General

BNR is an advanced form of activated sludge treatment where processes are manipulated to encourage the biochemical removal of nitrogen and/or phosphorus from the wastewater.

BNR facilities must be designed to allow for flexibility with respect to all recycle streams, recycle inputs and wasting rates. A BNR system should be designed with locations for chemical inputs to enhance settling, nutrient removal or other chemically enhanced options, even if not proposed with the planned operation mode. These potential chemical enhancements should be supported with the appropriate sizing of tanks and basins to allow for effective chemical enhancement should that level of treatment become necessary in the future. Designs should include flexibility for start-up (i.e. low flow conditions) and seasonal adjustments with swing zones and recycle piping.

In addition to the requirements of this section, applicable portions of Section 92 (Activated Sludge) must be considered in the design of BNR systems.

95.11 Design Report

BNR system design must be based on experience at comparable facilities under similar climatic locations and must provide for accessibility and flexibility in operation. A design report must be submitted, which at a minimum, addresses the following:

a. The engineer must indicate ~~justify that the technology is appropriate for the specific set of parameters presented and provide documentation for~~ how the modes of operation were selected and configured to achieve the treatment goals and produce a finished effluent that will meet all applicable requirements.

b. A nutrient removal analysis (i.e., modeling) must be provided (including seasonal variations) to justify system design. The analysis must consider maximum month flow and the lowest anticipated wastewater temperature.

c. Design flow and water quality parameters must be based on one (1)-year of actual plant influent wastewater data, if available. This data should include temperature, alkalinity, pH, BOD_5, COD, TSS, total phosphorus, ortho-phosphate, total nitrogen, ammonia, total Kjeldahl nitrogen (TKN), volatile fatty acid (VFA), and seasonal flow variations. Other data may be required by the Department depending on the treatment process proposed, or if there is a relevant discharge permit or total maximum daily load (TMDL) issue specific to the discharge.

95.12 Full Scale Plant Data and Pilot Studies

Full-scale plant data or pilot studies may be required by the Department on a case-by-case basis, particularly if the system will treat industrial wastewater. The Department encourages the use of pilot studies in advance of selecting a BNR alternative as a means of comparing performance and ease of operation and maintenance.

95.2 Phosphorus Removal

When low TP effluent levels (around 0.3 mg/L) are needed, chemical removal and effluent filtration may be required and must be designed in accordance with Chapter 110 (Supplemental Treatment Processes).

95.21 Biological Phosphorus Removal

To enhance the microbial uptake of soluble phosphorus (P), the treatment system must contain an anaerobic zone and a simple carbon source (e.g., VFAs) for P release, and an aerobic zone for P uptake.

a. The anaerobic zone(s) must be designed to prevent the introduction of dissolved oxygen, nitrate, or sulfate. Designs should utilize interzone baffles incorporating a hydraulic drop in the water surface across the top of the baffle to prevent the backflow of water high in nitrates or dissolved oxygen.

b. An influent $cBOD_5$:TP ratio of 20:1 or greater, or a COD:TP ratio of 45:1 or greater to the anaerobic zone is necessary to achieve a final effluent level of 1 mg/L or less phosphorus. This ratio should take into account all recycle loads and removal in the primary clarifiers, if provided. When this ratio is not met, provisions to add short chain carbon compounds (e.g., VFAs) to the anaerobic zone should be considered.

c. Depending on the BNR process utilized and the availability of VFAs, the anaerobic basin(s) should have a solids retention time (SRT) of 0.5 to 2 days and a hydraulic retention time (HRT) of approximately 0.5 hours to 2 hours. The longer retention times may be required when VFAs are produced in the anaerobic basin. A swing zone, to adjust the anaerobic zone volume, should be considered.

d. Adequate mixing must be provided in the anaerobic zone to keep solids in suspension (1 ft/sec) but must be designed to prevent turbulence or vortexing that will introduce oxygen from the atmosphere. A mixing energy of 0.1 to 0.2 Hp/1000 ft^3 should be adequate.

e. Dissolved oxygen concentrations of approximately 1 mg/L to 2 mg/L in the aeration zone are sufficient for phosphorus uptake to occur.

f. The aerobic zone design should have a solids retention time (SRT) of 2 to 5 days and a hydraulic retention time of (HRT) of 2 to 6 hours (temperature dependent). For systems designed for both phosphorus removal and nitrification, the latter will determine the aerobic zone sizing requirements (see section 95.31 Nitrification). In any case, the minimum required SRT and HRT to achieve the performance goals should be utilized since longer retention times can lead to phosphorus release.

g. The aeration basin should be designed with tapered aeration so adequate oxygen is available at the head of the tank for phosphorus uptake.

h. The pH should be > 7.0 in the aerobic zone with the optimal pH range being 7.5 to 8.0.

i. Consideration must be given to sludge handling processes. If the sludge becomes anaerobic, phosphorus can be released and returned in a recycle stream.

95.22 Fermenters

If a fermenter is utilized to generate the VFAs necessary for phosphorus release the design engineer should keep in mind that the fermentation process can reduce the amount of gas produced in anaerobic digesters by 30% to 40%. A fermenter is essentially the acid stage of digestion and functions much like an anaerobic digester without gas production. Therefore, in addition to the information provided below, the fermenter must be designed in accordance with applicable parts of Section 84 (Anaerobic Sludge Digestion) and Section 87 (Sludge Pumps and Piping).

a. Approximately 7 to 10 mg/L of VFA should be provided for each mg/L of P to be removed.

b. An SRT of 3 to 8 days, depending on wastewater temperature, is recommended. SRTs longer than this can lead to gas production.

c. The HRT of the fermenter is typically 12 to 36 hours.

d. Elutriate water from the secondary clarifier is recommended to increase VFA removal from the fermenter and to maintain optimal oxidation/reduction potential (ORP) conditions of the fermenter. Primary effluent or dissolved-air-floatation (DAF) underflow can be used as elutriate water as well.

e. Sludge in the fermenter should be continually pumped (recirculated) to prevent thickened sludge from developing at the bottom of the fermenter which can plug piping. Positive displacement pumps are recommended.

f. A back-up chemical feed system for VFA addition should be provided in the case of fermenter failure.

g. The use of ORP and pH probes is strongly encouraged to optimize and monitor the fermentation process. If ORP is not utilized in the design, another method of monitoring the fermentation process must be provided which is acceptable to the Department.

h. Odor control for the fermenter is strongly recommended.

i. The internal components and tank covers must be constructed with materials that are capable of withstanding prolonged exposure to a corrosive environment.

95.3 Nitrogen Removal

This section discusses biological nitrogen removal. For chemical nitrogen removal see Chapter 110 (Supplemental Treatment Processes).

95.31 Nitrification

The following criteria are recommended for facilities designed to optimize nitrification:

a. If industrial wastewater is to be treated, an effective pretreatment program must be provided to minimize the possibility of toxins (e.g., certain heavy metals, halogenated solvents, cyanide, etc.) upsetting the biological process.

b. System design must prevent short-circuiting. Basins must be designed to optimize plug flow, with consideration given to dividing the basin into a series of compartments by installing dividers across the basin width, and ports through the dividers. At least two stages are needed to assure year-round nitrification.

c. The aeration basin(s) must be designed in accordance with Section 92.3 (Aeration). For systems with complete denitrification, oxygen requirements for nitrification can be based on 2.5 lbs O_2 rather than the 4.6 lbs O_2/ lb of diurnal peak TKN required for nitrification-only facilities.

In order to balance seasonal oxygen requirements, provisions to adjust one or more of the following must be included: (1) sludge age; (2) basin pH; (3) volume in service, or (4) oxygen supply to the basin.

d. For systems with denitrification, aeration system design should incorporate a decrease in residual dissolved oxygen levels (0.8 mg/L to 1.0 mg/L) at the end of the aeration zone to minimize the transfer of oxygen to the anoxic zone. A post aeration zone may be required to meet effluent dissolved oxygen requirements.

e. The SRT should be 8 to 15 days, depending on wastewater temperature.

f. The food to mass ratio (F/M) should be approximately 0.25 or less.

g. A MLVSS concentration of 2000 to 5000 mg/L is recommended in the aeration zone.

h. System pH must be maintained between 7.4 and 8.6, (optimum 8.2 to 8.6).

i. Nitrification destroys 7.2 lbs of alkalinity as $CaCO_3$ per pound of NH_4-N oxidized. Designs must include an evaluation of the potential need to add alkalinity to maintain a neutral effluent pH and residual alkalinity of 30 to 50 mg/L of alkalinity after complete nitrification. The analysis must presume that the system will achieve complete nitrification whether required or not. If the wastewater is deficient in alkalinity, alkaline feed and pH control must be provided. When alkalinity addition is required, designs must identify the preferred alkalinity source or mix of chemicals which supplies carbonate ions.

j. For combined carbon oxidation/nitrification, the BOD_5/TKN ratio should be 5:1or greater. For separate stage nitrification the ratio can be less than 5:1.

k. The dissolved oxygen concentration in the aeration basin must be designed for 2.0 mg/L during average flow conditions and at least 1.0 mg/L during peak flow conditions, based on critical wastewater temperature.

l. The HRT of the aeration zone for nitrification should be 4 to 12 hours depending on wastewater temperature.

m. Where performance data or pilot plant data are not available, the following nitrification rates may be employed in the design of the aeration basin. These rates are established for optimum pH. If the design is based on a pH range other than the optimum range, the nitrification rates should be reduced.

Temperature °F (°C)	Nitrification rate (lbs NH_4-N nitrified/day/lb MLVSS)
41 (5)	0.04
50 (10)	0.08
59 (15)	0.13
68 (20)	0.18

77 (25)	0.24
86 (30)	0.31

n. Consideration must be given to side stream flows from sludge handling processes since some sludge conditioning chemicals used for sludge dewatering can inhibit nitrification.

95.32 Denitrification

The following criteria are recommended for facilities designed to optimize denitrification:

a. Basin design must prevent short-circuiting. Basins must be designed to optimize plug flow, with consideration given to dividing the basin into a series of compartments by installing dividers across the basin width, and ports through the dividers.

b. The anoxic zone(s) must be designed to minimize the introduction of dissolved oxygen from the aerobic zone.

c. A supplemental organic substrate feed (e.g., methanol) may be required to achieve denitrification if the influent and recycled flows from the mainstream process do not provide a sufficient amount of substrate.

If chemical feed equipment for substrate is proposed, duplicate feed pumps must be provided. The feed rate of the organic substrate must be closely controlled to avoid residual BOD in the effluent. A means of pacing the feed to the incoming nitrate concentration must be provided. Feed rates based on flow pacing are not acceptable, due to varying nitrate concentrations.

d. Complete denitrification may require at least two anoxic stages with a total HRT of 1 to 3 hours. A shorter HRT is appropriate if a simple carbon source (i.e., methanol) is provided while a longer HRT is required if endogenous respiration is needed to provide the carbon source.

e. An aeration zone should follow the final anoxic zone to control BOD and/or increase the dissolved oxygen level in the final effluent.

f. An SRT of 8 to 15 days should be provided depending on wastewater temperature.

g. A MLVSS concentration of 2000 to 5000 mg/L in the anoxic zone is recommended.

h. System pH must be maintained between 6.5 and 8.5, (optimum 7.0).

i. Denitrification produces 3.6 lbs of alkalinity as $CaCO_3$ per pound of NO_3-N reduced.

j. Dual internal recycle pumps must be provided, each with the capacity to return 100% to 400% of the average daily flow, from the end of the system's main aeration zone to the main anoxic zone.

j. Adequate mixing must be provided in the anoxic zone(s) to keep solids in suspension (1 ft/sec) but must be designed to prevent turbulence or vortexing that will introduce oxygen from the atmosphere. A mixing energy of 0.1 to 0.2 Hp/1000 ft^3 should be adequate.

k. Ponds utilized for denitrification should be covered to retain heat and prevent wind mixing and photosynthetic oxygen production, which reduce denitrification rates.

95.4 Instrumentation and Controls

95.41 Automation

A programmable logic controller (PLC) unit that automatically controls much of the routine operation of BNR facilities must be provided. Typical automated functions must include blower operations, recirculation pumping, and flow routing in some systems. Design must provide operators with the ability to alter set-points as treatment goals change or if operator experience indicates a need for process adjustments. BNR systems must be able to run in a full manual mode in the event the PLC system fails. An uninterruptible power supply, with electrical surge protection, must be provided for each PLC to retain program memory through a power loss.

The PLC system should be tied into the facility's Supervisory Control and Data Acquisition (SCADA) or Human Machine Interface (HMI) software system to enable continuous monitoring of all system components and modes of operation from the main office

95.42 Monitoring and Alarms

Typical trend data monitored for automated process control include: dissolved oxygen, ORP, pH, alkalinity, nitrate, ammonia, ortho-phosphate, VFAs, and MLSS. Continuous monitoring of these parameters should be provided as necessary, with outputs connected to a common PLC to control aerator output, recycle rates, chemical additions, etc.

Alarm conditions that must be monitored include, but are not necessarily limited to: high/low water levels, failure of automatically operated valves, blower failure (including low pressure and high temperature), and pump failure (including high temperature and seal leakage).

95.5 Performance Sampling

Convenient and safe access for the sampling of each treatment basin must be provided so that system performance can be determined and needed process control and operational modifications can be made. Consideration must be given to the types of parameters that should be monitored.

In addition to the monitoring requirements within the facility's discharge permit, the Department may require BNR facilities to perform additional monitoring as a condition of approval.

96. SEQUENCING BATCH REACTOR (SBR)

96.1 General

SBR systems are a fill and draw activated sludge wastewater treatment system that utilizes a single basin for treatment and clarification. To provide continuous treatment, SBR systems typically contain two basins that are operated with alternating cycles. SBRs generally contain the following phases of operation: fill, react, settle, decant and idle.

SBRs rely on the use of automatic controls and motor-operated control valves; therefore, coordination of the controls, process design, and equipment must be carefully considered. This typically leads to SBR systems designed as complete packages by a single manufacturer.

Since individual SBR equipment manufacturers often provide proprietary control system and process components, early identification of a preferred SBR manufacturer may be necessary for plant design. Pre-selection or pre-qualification of an SBR system must follow applicable federal and state procurement laws.

Depending on treatment goals, in addition to the requirements of this section, applicable portions of Section 92 (Activated Sludge) and/or Section 95 (Biological Nutrient Removal (BNR)) will be applied to the design of SBR systems.

96.11 Design Report

SBR system design must be based on experience at comparable facilities under similar climatic locations and must provide for accessibility and flexibility in operation. A design report must be submitted which at a minimum addresses the following:

a. The engineer must justify how the modes of operation were selected and configured to achieve the treatment goals and produce a finished effluent that will meet all applicable water quality requirements.

b. The engineer must evaluate proprietary system designs and document how the system will meet the criteria of this section. This analysis must include the calculations needed to support any performance claims.

c. At a minimum, designs must identify the following parameters: food to mass (F/M) ratio, oxygen demand/supply, high and low water levels, mixing energy, sludge residence time, cycle times at various flow conditions, and basin dimensions.

d. Design flow and water quality parameters must be based on one (1) year of actual data, if available. This data should include raw wastewater alkalinity, pH, temperature, BOD_5, TSS, total phosphorus, total nitrogen, ammonia, and total Kjeldahl nitrogen (TKN) concentrations. Other data may be required by the Department if it is relevant to a discharge permit, or total maximum daily load (TMDL) issue specific to the discharge.

96.2 Pretreatment

Pretreatment of wastewater must be provided in accordance with Chapter 60 (Screening, Grit Removal, and Flow Equalization), or as recommended by the manufacturer if more stringent.

The use of a grinder on the influent flow is discouraged since a neutral buoyancy portion of masticated plastic or other material can accumulate in the tank and get passed out with each decant.

96.3 Design Flow Rate

The SBR system must be designed to handle all expected flow scenarios. A minimum peaking factor of 2 will be applied to the average daily flow to determine the maximum day flow unless flow data indicates otherwise.

The engineer must consider existing flows at the time of installation and base SBR sizing on the ability to treat the range of flows expected after start-up. Should these "start-up" flows be substantially less than the 20-year design flows, multiple units must be planned. The Department may allow for installation of additional basins at a later date as the capacity of the initial set of SBRs is reached, as long as the design allows for this growth with respect to equalization capacity, available land area, and discharge constraints.

96.4 Process Characteristics

96.41 Solids Retention Time (SRT)

Basin sizing must be based on SRT and mass balance calculations reflecting that solids removal will allow the effluent to meet design and permit criteria throughout the design life. Designs must provide sufficient tank volume to operate with an "oxic" sludge age of approximately 8 to 15 days depending on wastewater temperature. The "oxic" sludge age equals the SRT multiplied by the proportion of time the tank is in the aeration phase. Designs must assess the need for longer sludge ages if basins will operate below 59 °F (15 °C).

96.42 Food to Mass (F/M) Ratio

Where nutrient removal is required, the F/M ratios typically range from (0.05 to 0.1) lb BOD_5/day/lb MLSS at the design average daily loading rate. For conventional treatment, the F/M ratios typically range from (0.15 to 0.4) lb BOD_5/day/lb MLSS at the design average daily loading rate. The basin mass (lb MLSS) should be calculated at the high-water level.

96.43 Mixed Liquor Suspended Solids (MLSS) Concentrations

Typical MLSS concentrations range from 2,000 to 4,500 mg/L at the high water level. The engineer must provide operating examples to support design MLSS concentrations outside the range presented above.

96.44 Mass Loading Rate

Designs should provide adequate tank volume to limit the mass loading rate to approximately 15 lb BOD_5/d/1000 ft^3 (0.24 kg BOD_5/d/m^3). This criterion should be evaluated using the tank volume at the low-water level and the average loading for BOD_5.

96.5 Basin Design

a. Adequate space must be provided for equipment access (e.g., cranes) for the removal of grit, debris or equipment from each basin.

b. Each basin must be provided with an overflow to the other basin(s) or to pre-equalization tank(s).

c. Common basin walls must be structurally designed for liquid forces on one side of wall only.

d. Designs should provide stub-outs for additional basins to accommodate system expansion.

96.51 Minimum Number of Basins

A minimum of two fully-functional basins are required. A pre-equalization basin is recommended, and when provided must be designed in accordance with Section 65 (Flow Equalization). The Department may require the installation of a pre-equalization basin based on project-specific conditions.

Designs must allow the operator to isolate, replace, or service a malfunctioning component with little or no reduction in treatment capacity. Such functionality typically requires the installation of an adequately sized equalization basin, or the installation of retrievable components (diffuser grids, mixers, etc.) that can be removed without dewatering the basin. Designs must provide backup for all proprietary equipment including; major assemblies, motors, pumps, valves, blowers, and control logic. In addition, provisions must be made that allow the basins to operate in a continuous flow-through mode during emergency operations.

96.52 Emergency Operation

a. Two basin systems must be designed for operating each basin as a flow through unit if one basin is out of service. The distance between the inlet pipe and decanter must be maximized horizontally and vertically to minimize short-circuiting. This includes extending the inlet pipe two to three feet from the bottom of the basin(s) or installing a baffle wall in the inlet area at the opposite end of the decanter location.

b. The average horizontal velocities through each SBR or through baffle wall opening should not exceed 1 ft/sec.

c. Rectangular basins are recommended as they encourage plug flow and therefore are an advantage during flow through operations.

96.6 Influent Lines

Gravity influent lines must enter the SBR basin above the high water level to prevent the backflow of water into the SBR basin with the lowest water level. Pressure influent lines must contain provisions for backflow protection.

96.7 Minimum Operating Levels

The low water level of each basin must not be less than 10 feet to allow for adequate separation of solids from the wastewater. Where simultaneous fill and decant may occur (i.e., no equalization) the low water level must not be less than 12 feet unless additional treatment is provided.

96.8 Decantable Volume and Decanter Sizing

The decantable volume should not exceed one-third of the total tank volume.
The decantable volume and decanter capacity of the SBR system, with the largest basin out of service, must be sized to pass at least 75% of the design maximum day flow for systems that nitrify, or 50% of the design maximum flow for systems that provide secondary treatment only, on a continuous basis without changing cycle times.

96.81 Decanter Details

a. Each decanter must draw treated effluent from below the water surface and provide a means of excluding scum during the decant phase. An adequate zone of separation between the sludge blanket and the decanter(s) must be maintained at all times during the decant phase. The decanter must be designed with an entrance velocity that is less than 1.0 ft/sec to prevent floatables and sludge from being drawn into the decanter.

b. A means of excluding solids from entering the decanter during a reaction phase must be provided.

c. Decanters must fail in the closed position. It is recommended that the decanter have a "fail safe" feature where at least two independent control signals or valves must open.

d. Floating decanters must have a physical restraint that prevents continued lowering if a drain valve fails.

e. Fixed decanters should not be used in basins where simultaneous fill and decant may occur.

f. Fixed decanters should only be utilized when preceded by equalization facilities or followed by final clarifiers/filtration. Added settling time before a discharge must be considered for SBRs with fixed decanters.

96.9 Mixing Equipment

a. Mechanical mixing independent of aeration must be provided for all basins where biological nutrient removal is required, with mixing equipment sized to thoroughly mix the entire basin from a settled condition within 5 minutes, without aeration. Mixing may be accomplished via the same equipment that performs aeration, but the equipment must be able to function separately as an aeration device, as a mixing device, and as a combined aeration/mixing device to provide operational flexibility.

b. Floating mixers must be accessible, adequately moored, and protected from excessive icing.

96.10 Aeration Equipment

a. The aeration equipment must be able to quickly achieve and sustain a dissolved oxygen concentration of at least 2 mg/L throughout the basin. This analysis must be based on the average water depth between the low and maximum water levels of the basin. SBRs that utilize mixers as the sole air source must also meet these aeration requirements.

b. The oxygen demand must be designed in accordance with section 92.331 (General) where pounds of BOD_5 and TKN are based on 2 times the average daily concentrations unless monitoring data indicates otherwise. For facilities designed to completely nitrify and denitrify, the oxygen requirements for nitrification can be based on 2.5 lbs O_2/ lb of peak diurnal TKN.

96.101 Blower and Diffuser System Requirements

a. Design discharge pressure of blowers must be established at the maximum water depth. Blower discharge pressure (psig) = (diffuser depth (ft.) at high water level x 0.4335) + line losses (psig).

b. Multiple blowers must be provided and meet the maximum air demand in the aerated portions of the SBR with the single largest blower out of service.

c. A segment of the air supply line must be placed above the high water level of the basin to prevent water from flowing back to the blowers when off.

d. Self sealing medium to fine bubble diffusers should be specified for SBR processes. Ceramic diffusers are not recommended due to clogging.

e. Provisions to easily remove aeration diffusers without dewatering the basin are recommended to permit maintenance and repair without interrupting operation of the basin or inhibiting operation of the other aeration equipment. For fixed diffuser systems, an alternate method of cleaning or back-flushing the diffusers should be provided. In systems with only two basins, the engineer must configure diffusers in multiple banks that can be independently isolated and repaired.

f. Aeration equipment must allow for varying water depths and cyclical operation. Positive displacement blowers should be used to handle wastewater level variations in the basin.

g. Oxygen transfer rates from the aerators must be designed in accordance with Section 92.332 (Diffused Air Systems). The engineer must provide the basis for selected factors. Site specific data should be used.

96.12 Solids Wasting

a. A separate piping and pumping system must be provided for sludge wasting in each SBR basin.

b. Sludge wasting should be automated to ensure performance stability of the system.

c. All sludge transfer and wasting pumps must be accessible for maintenance without dewatering the basin.

d. To maximize the removal of solids, the waste sludge pump or suction pipe must extend to the bottom of the basin. The basin floor must slope towards waste sludge pumps or suction pipe.

e. The capability to transfer sludge between basins must be provided.

96.13 Post Equalization Basin

A post equalization basin is recommended to dampen flows for downstream operations such as disinfection and filtering units. If post equalization is not provided, then downstream units and piping must be sized to handle the peak discharge rate of the decanter.

Post-SBR flow equalization should be designed to meet the following criteria:

a. Store a minimum of one design capacity decantable volume;

b. If effluent pumps are utilized, at least two must be provided with each sized to empty the post equalization basin before the next decant starts.

c. If required in the facility's discharge permit, aeration may be required to increase the dissolved oxygen level in the final effluent.

96.14 Freezing Protection

SBR basins and components must be protected from freezing. The engineer must indicate how an outdoor installation, if proposed, will not cause operational and maintenance issues during freezing conditions.

For facilities that require nutrient removal, the SBR basins should be housed in a heated structure to maintain wastewater temperature. For covered SBR basins, consideration must be given to the need and means for equipment removal. Electrical equipment, fixtures and controls must comply with the National Electrical Code for Class I, Division 2, Group D locations.

96.15 Freeboard

All open basin SBRs must have a minimum freeboard of 18 inches to serve as storage in emergency situations and to handle resultant foaming.

96.16 Foam and Scum Control

Scum removal features such as telescoping valves or scum troughs, must be provided in the SBR basins. Where designs employ scum troughs, they may either be fixed or floating (e.g., attached to the decant boom). Entrainment by mixing must not be the sole means of scum control in the SBR basin.

Designs must include spray bars or manual spray hose connections supplied with chlorinated non-potable water for foam suppression and facilitation of scum collection.

96.17 Instrumentation and Controls

96.171 Automation

A programmable logic controller (PLC) unit that automatically controls much of the routine operation of SBR facilities must be provided. Typical automated functions include: valve positioning, oxygen delivery, decant operations, and sludge wasting. Design must provide operators with the ability to alter set points as influent flows vary, treatment goals change, or operator experience indicates a need for process adjustments. SBR systems must be able to run in a full manual mode in the event the PLC system fails. An uninterruptible power supply, with electrical surge protection, must be provided for each PLC to retain program memory through a power loss.

The PLC system should be tied into the facility's Supervisory Control and Data Acquisition (SCADA) or Human Machine Interface (HMI) software system to enable continuous monitoring of all system components and modes of operation from the main office.

96.172 Controls and Alarms

a. SBR controls must at a minimum allow for the following modes of operation: static fill, mixed fill, aerated fill, react, settle, decant, sludge waste and idle.

b. Designs must include automatically controlled, motor-operated (or hydraulic cylinder-operated) valves for influent, decant, and air control. All motor-operated valves must have the ability to be manually operated should the electronics fail, or the design must include a manual backup valve. Both automatic and manual controls must allow independent operation of each basin.

c. Motor control centers should be located in close proximity to the process and a view of the basins is highly recommended.

d. Data typically monitored for automated process control include, but is not limited to: dissolved oxygen, oxidation/reduction potential (ORP), pH, alkalinity, nitrate, ammonia, ortho-phosphate, and MLSS. Continuous monitoring of these parameters should be provided as necessary, with outputs connected to a common PLC to control aerator output, cycle times, chemical additions, etc.

e. Pressure transducers and floats may be used as tank level sensors. Floats must be shielded from prevailing winds and adequately protected from freezing. Bubbler systems must not be used.

f. Visual display and recording of instantaneous and totalized flow rates, both influent, as well as discharge, must be provided.

g. Designs must address the operational strategy for high flow situations. The control system should automatically and progressively adjust cycle times when influent flows exceed what "normal" cycle times can handle. Designs must include a level-based high water alarm and cycle structure override.

Under all operational strategies, a minimum settling time of at least 20 minutes between the react and decant phases must be maintained.

h. Alarm conditions that must be monitored include, but are not necessarily limited to: high and low water level in each basin, failure of all automatically operated valves, decanter failure, mixer failure, blower failure (including low pressure and high temperature), sludge pump failure (including high temperature and seal leak).

96.18 Performance Sampling

Convenient and safe access for the sampling of each treatment basin must be provided so that system performance can be determined and needed process control and operational modifications can be made. Consideration must be given to the types of parameters that should be monitored.

In addition to the monitoring requirements within the facility's discharge permit, the Department may require SBR facilities to perform additional monitoring as a condition of approval.

97. MEMBRANE BIOREACTOR (MBR)

97.1 General

MBR systems combine suspended growth activated sludge with membrane filtration to provide wastewater treatment. Low-pressure membranes, generally classified as microfiltration or ultrafiltration, are commonly used for MBR systems and are the filtration units defined within this section.

It is generally accepted that the design of MBR systems is manufacturer-specific; therefore, consideration must be given to the proprietary nature of the selected product. A comparison of various types of MBR systems should be evaluated during the preliminary design process with consideration given to the future dependency on a specific manufacturer for parts, technical assistance, and support. Early identification of a preferred MBR manufacturer may be necessary for plant design. Pre-selection or pre-qualification of an MBR system must follow applicable federal and state procurement laws for publicly-owned facilities.

Depending on treatment goals, in addition to the requirements of this section, applicable portions of Section 92 (Activated Sludge) and/or Section 95 (Biological Nutrient Removal (BNR)) will need to be applied to the design of MBR systems.

97.11 Design Report

MBR system design must be based on experience at comparable facilities under similar climatic locations and must provide for accessibility and flexibility in operation. A design report must be submitted which at a minimum addresses the following:

a. The engineer must justify how the modes of operation were selected and configured to achieve the treatment goals and produce a finished effluent that will meet all applicable water quality requirements.

b. The engineer must evaluate proprietary system designs and document how the system will meet the criteria of this section. This analysis must include the calculations needed to support any performance claims.

c. Designs must identify the following: flux rates (average and peak instantaneous); mixed liquor concentrations; recycle rate and flexibility; transmembrane pressures (TMPs); air scour demand and effect on recycle streams; flow scenarios (considering seasonal variations with corresponding minimum water temperature); life expectancy of membranes and components; and cleaning requirements as specified by the manufacturer.

d. Design flows (including average day, peak day, maximum month, and peak hourly) and water quality parameters must be identified (based on one (1) year of actual plant influent data, if available). This data should include temperature, alkalinity, pH, BOD_5, COD, TSS, total phosphorus, total nitrogen, ammonia, total Kjeldahl nitrogen (TKN), and seasonal flow variations. Other data may be required by the Department depending on the treatment process proposed, or if there is a relevant discharge permit or total maximum daily load (TMDL) issue specific to the discharge.

97.12 Full Scale Plant Data and Pilot Studies

Full-scale plant data or pilot studies may be required by the Department on a case-by-case basis, particularly if the system will treat industrial wastewater. The Department encourages the use of pilot studies in advance of selecting an MBR alternative as a means of comparing performance and ease of operation and maintenance. Pilot testing must be performed at systems treating industrial wastewater.

97.2 Pretreatment

In addition to the requirements listed in Chapter 60 (Screening, Grit Removal, and Flow Equalization), fine screens with maximum openings of 0.5 mm to 3.0 mm (perforated plate), or as recommended by the MBR manufacturer, must be provided. Fine screens must not be bypassed; therefore, full redundancy must be provided.

In addition to the use of fine screens, the use of either primary clarification and/or grit removal is strongly recommended. If required by the manufacturer, a means for the removal of fat, oil, and grease (FOG) from the wastewater must be provided.

97.3 MBR Process Design Characteristics

97.31 Mixed Liquor Suspended Solids (MLSS) Concentrations

The activated sludge portion of an MBR system typically operates with an MLSS concentration in the range of 6,000 to 18,000 mg/L. MLSS concentrations greater than 18,000 mg/L require justification from the MBR manufacturer.

In order to control the concentration of mixed liquor in the membrane tank, a minimum recycle rate (typically between 200% and 400% of the average daily flow) is required to maintain a maximum MLSS concentration of 18,000 mg/L in the membrane tank during peak hour conditions.

Depending on treatment goals, the recommended sludge retention time (SRT) for MBR systems ranges from 10 to 50 days.

97.32 Membrane Flux Rates

Flux rates used in design must be based on manufacturer-specific data that takes into account the full range of flow conditions expected, allowable transmembrane pressure (TMP), MLSS concentration, and minimum water temperature. Cleaning intervals and durations must be considered in determining net flux rates. Average net flux rates for public sewage typically range from 8 to 20 gfd at 68 °F (20 °C).

Sufficient justification must be provided to show that flux rates and number of membrane modules are practical and reasonable. Spare space should be provided in the membrane tanks for future additional membrane modules. When one membrane tank is out of service for maintenance procedures, the remaining tanks must still operate within the manufacturer's recommended net flux requirements.

97.33 Transmembrane Pressure (TMP)

The TMP range must be provided by the membrane manufacturer and must be used in the design of appropriate permeate pumping equipment and automated cleaning cycles at the established flux rates.

97.4 Pumping Requirements

Major pumps must be designed in accordance with Section 53.8 (General Plant Pumping).

Hollow fiber designs should consider using reversible rotary-lobe pumps to serve the dual option of permeate forward flow and back pulse reverse flow.

97.5 Cleaning and Chemical Feed Systems

Designs must incorporate manufacturer's on-line and off-line cleaning strategies to restore membrane permeability during operation

Designs must provide for recovery cleaning within an isolated section of the membrane basin or with membrane removal to a dedicated recovery cleaning tank. Special considerations must be given to the disposal of cleaning chemicals (e.g., sodium hypochlorite, oxalic acid, citric acid, hydrochloric acid, etc.) so that they do not disrupt biological processes. When equalization or storage basins are available, this waste stream may be returned to the headworks of the facility to be diluted and processed with the influent wastewater.

Basin or tank walls that will be exposed to membrane cleaning chemicals (bleach, acid, etc.) must be lined to protect against corrosion or constructed of a corrosion resistant material.

97.6 Aeration

Designs must ensure that sufficient aeration and diffuser arrangements will be provided to meet all biological and membrane scouring needs. Aeration systems for MBR applications must be based on criteria similar to Section 92.33 (Aeration Equipment) or Section 95.31 (Nitrification), depending on treatment goals. Designs must take into account lower oxygen transfer due to higher MLSS concentrations. Increased MLSS concentrations and mixed liquor viscosities result in decreased alpha (α) values for fine bubble diffusers (typically 0.3 to 0.4). The design must provide clear rationale to support the choice of the α-value used for the proposed project.

The use of coarse bubble diffusers for membrane scouring may affect the overall aeration requirements of the system.

Designs may use the oxygen in the RAS to offset air needs in the aeration tanks. In claiming this "oxygen credit", designs must provide a reasonable accounting of the oxygen balance within the system and justify that sufficient aeration capacity will exist. This credit can only be counted when RAS is directed into the aerobic tank(s).

In cases where the recycle stream is directed to the anoxic or anaerobic zone, designs must incorporate features to limit the introduction of dissolved oxygen from the RAS. Features may include, but are not limited to, use of a de-aeration basin, mixing with the influent, or inclusion of a larger anoxic or anaerobic basin. Oxygen concentration in membrane basins should be monitored to aid in managing oxygen transfer in recycle flows.

97.7 Freezing Protection

Membrane tanks and components must be protected from freezing. The engineer must indicate how an outdoor installation, if proposed, will not cause operational and maintenance issues during freezing conditions.

97.8 Freeboard

All system tanks must have freeboard of 18 inches or more to serve as storage in emergency situations and to handle resultant foaming.

97.9 Membrane Removal

A means to remove the membranes from service, such as a bridge crane or monorail, must be provided. A membrane maintenance area with a drain capable of handling drainage waste from out-of-service membranes must be provided.

The crane/hoist lifting power must be designed for the membrane cassette wet weight plus additional weight of the solids accumulated on the membranes.

97.10 Foam and Scum Control

Design must include a means to remove foam and scum from the basins (e.g., surface wasting). Spray-down nozzles or hose bibs must be provided to assist in foam control and wash down.

97.11 Instrumentation and Controls

97.111 Automation

A programmable logic controller (PLC) unit that automatically controls much of the routine operation of MBR facilities must be provided. Typical automated functions must include all cleaning cycles, except for recovery cleaning (large facilities may choose to include automated recovery cleaning), blower operations, recirculation and permeate pumping, and flow routing in some systems. Design must provide operators with the ability to alter set-points as treatment goals change or if operator experience indicates a need for process adjustments. A redundant PLC system must be provided to ensure system reliability unless the design allows for manual mode operation and sufficient on-site storage is available. An uninterruptible power supply, with electrical surge protection, must be provided for each PLC to retain program memory through a power loss.

The PLC system should be tied into the facility's Supervisory Control and Data Acquisition (SCADA) or Human Machine Interface (HMI) software system to enable continuous monitoring of all system components and modes of operation from the main office.

97.112 Monitoring and Alarms

The ability to detect and isolate membrane failures must be a provision of the design or the manufacturer's equipment. Membrane permeate turbidimeters with continuous recording equipment must be installed to monitor effluent quality.

Integrated sensors and control valves must be connected to a common PLC. Typical trend data monitored for automated process control include: TMP, turbidity, dissolved oxygen, filtrate flow/flux rate, temperature, and permeability. Continuous monitoring of these parameters should be provided as necessary, with outputs connected to a common PLC to control aerator output, cleaning cycles, chemical additions, etc.

To protect membranes from catastrophic damage, control systems such as manual override capability, automatic high-pressure TMP shutdown, or other manufacturer requirements must be provided.

Alarm conditions that must be monitored include, but are not necessarily limited to: high effluent turbidity, transmembrane pressure (outside of normal set points), failure of automatically operated valves, blower failure (including low pressure and high temperature), and pump failure (including high temperature and seal leakage).

97.113 Flow Control

Designs should allow placing individual membrane trains into standby when influent flow is low. When influent flows increase, the design should include automatic controls to remove individual trains from standby as needed and abort cleaning operations, if necessary. If the engineer provides automated controls with the ability to abort cleaning operations, the design must have appropriate safeguards to ensure proper disposal of cleaning chemicals.

97.12 Performance Sampling

Convenient and safe access for the sampling of each treatment basin must be provided so that system performance can be determined and needed process control and operational modifications can be made. Consideration must be given to the types of parameters that should be monitored.

In addition to the monitoring requirements within the facility's discharge permit, the Department may require MBR facilities to perform additional monitoring as a condition of approval.

98. OTHER BIOLOGICAL SYSTEMS

Biological treatment processes not included in these standards may be considered in accordance with Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives).

CHAPTER 100
DISINFECTION

101. GENERAL

Disinfection of the effluent must be provided as necessary to meet applicable standards. The design must meet both the bacterial standards and the disinfectant residual limit in the effluent. The disinfection process should be selected after due consideration of waste characteristics, type of treatment process provided prior to disinfection, waste flow rates, pH of waste, disinfectant demand rates, current technology application, cost of equipment and chemicals, power cost and maintenance requirements.

Chlorine is the most commonly used chemical for wastewater disinfection. The forms most often used are liquid chlorine and calcium or sodium hypochlorite. Other disinfectants, including chlorine dioxide, ozone, bromine, or ultraviolet disinfection, may be accepted by the ~~approving authority~~ Department in individual cases. If halogens are utilized, it may be necessary to dehalogenate if the residual level in the effluent exceeds ~~effluent~~ limitations or would impair the natural aquatic habitat of the receiving stream.

Municipalities are encouraged to investigate the use of ~~U.V.~~ ultraviolet disinfection due to safety and toxicity benefits.

Where a disinfection process other than ~~chlorine~~ the processes included in this Chapter is proposed, supporting data from pilot plant installations or similar full scale installations may be required as a basis for the design of the system. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives).

102. CHLORINE DISINFECTION

102.1 Type

Chlorine is available for disinfection in gas, liquid (hypochlorite solution), and pellet (hypochlorite tablet) form. The type of chlorine should be carefully evaluated during the facility planning process. The use of chlorine gas or liquid will be most dependent on the size of the facility and the chlorine dose required. Large quantities of chlorine, such as are contained in ton cylinders and tank cars, can present a considerable hazard to plant personnel and to the surrounding area, should such containers develop leaks. Both monetary costs and the potential public exposure to chlorine should be considered when making the final determination.

102.2 Dosage

For disinfection, the capacity must be adequate to produce an effluent that will meet the ~~coliform~~ applicable bacterial limits specified by the regulatory agency for that installation. Required disinfection capacity will vary, depending on the uses and points of application of the disinfection chemical. The chlorination system must be designed on a rational basis and calculations justifying the equipment sizing and number of units must be submitted for the whole operating range of flow rates for the type of control to be used. System design considerations must include the controlling wastewater flow meter (sensitivity and location), telemetering equipment and chlorination controls. For normal ~~domestic~~ public sewage, the following may be used as a guide in sizing chlorination facilities:

Type of Treatment	Dosage
~~Trickling filter~~ Fixed film plant effluent	10 mg/L
Activated sludge plant effluent	8 mg/L
Tertiary filtration effluent	6 mg/L
Nitrified effluent	6 mg/L

102.3 Containers

102.31 Cylinders

150 pound (68 kg) cylinders are typically used where chlorine gas consumption is less than 150 pounds per day (68 kg/day). Cylinders ~~should~~ must be stored in an upright position with adequate support brackets and chains at 2/3 of cylinder height for each cylinder.

102.32 Ton Containers

The use of one-ton (909 kg) containers should be considered where the average daily chlorine consumption is over 150 pounds (68 kg). Containers must be properly secured.

102.33 Liquid Hypochlorite Solutions

Storage containers for hypochlorite solutions must be of sturdy, nonmetallic lined construction and must be provided with secure tank tops and pressure relief and overflow piping. Storage tanks should be either located or vented outside. Provision must be made for adequate protection from light and extreme temperatures. Tanks must be located where leakage will not cause corrosion or damage to other equipment. A means of secondary containment must be provided to contain spills and facilitate cleanup. Due to deterioration of hypochlorite solutions over time, it is recommended that containers not be sized to hold more than one month's needs. At larger facilities and locations where delivery is not a problem, it may be desirable to limit on-site storage to one week. Refer to Section 57 (Safety).

102.34 Dry Hypochlorite Compounds

Dry hypochlorite compounds should be kept in tightly closed containers and stored in a cool, dry location. Some means of dust control should be considered, depending on the size of the facility and the quantity of compound used. Refer to Section 57 (Safety).

102.4 Equipment

102.41 Scales

Scales for weighing cylinders must be provided at all plants using chlorine gas. At large plants, scales of the indicating and recording type are recommended. At least a platform scale must be provided. Scales must be of corrosion-resistant material.

102.42 Evaporators

Where manifolding of several cylinders or ton containers will be required to evaporate sufficient chlorine, consideration should be given to the installation of evaporators to produce the quantity of gas required.

102.43 Mixing

The disinfectant must be positively mixed as rapidly as possible, with a complete mix being ~~effected~~ affected in 3 seconds. This may be accomplished by either the use of turbulent flow regime or a mechanical flash mixer.

102.44 Contact Period and Tank

For a chlorination system, a minimum contact period of 15 minutes at design peak hourly flow or maximum rate of pumpage must be provided after thorough mixing. For evaluation of existing chlorine contact tanks, field tracer studies should be done to assure adequate contact time.

The chlorine contact tank must be constructed so as to reduce short-circuiting of flow to a practical minimum. Tanks not provided with continuous mixing must be provided with "over-and-under" or "endaround" baffling to minimize short-circuiting.

The tank should be designed to facilitate maintenance and cleaning without reducing effectiveness of disinfection. Duplicate tanks, mechanical scrapers, or portable deck-level vacuum cleaning equipment must be provided. Consideration should be given to providing skimming devices on all contact tanks. Covered tanks are discouraged.

102.45 Piping and Connections

Piping systems should be as simple as possible, specifically selected and manufactured to be suitable for chlorine service, with a minimum number of joints. Piping should be well supported and protected against temperature extremes.

Due to the corrosiveness of wet chlorine, all lines designated to handle dry chlorine must be protected from the entrance of water or air containing water. Even minute traces of water added to chlorine results in a corrosive attack. Low pressure lines made of hard rubber, saran-lined, rubber-lined, polyethylene, polyvinylchloride (PVC), or other approved materials are satisfactory for wet chlorine or aqueous solutions of chlorine.

<u>The chlorine system piping must be color coded and labeled to distinguish it from other plant piping. Refer to Section 54.6 (Painting). Where sulfur dioxide is used, the piping and fittings for chlorine and sulfur dioxide systems must be designed so that interconnection between the two systems cannot occur.</u>

102.46 Standby Equipment and Spare Parts

Standby equipment of sufficient capacity should be available to replace the largest unit during shutdowns. Spare parts must be available for all disinfection equipment to replace parts that are subject to wear and breakage.

102.47 Chlorinator Water Supply

An ample supply of water must be available for operating the chlorinator. Where a booster pump is required, duplicate equipment should be provided, and, when necessary, standby power as well. Protection of a potable water supply must conform to the requirements of Section 56.2 (Water Supply). Adequately filtered plant effluent should be considered for use in the chlorinator.

102.48 Leak Detection and Controls

A bottle of 56 percent ammonium hydroxide solution must be available for detecting chlorine leaks. Where ton containers (909 kg) or tank cars are used, a leak repair kit approved by the Chlorine Institute must be provided. Consideration should be given to the provision of caustic soda solution reaction tanks for absorbing the contents of leaking one-ton (909 kg) containers where such containers are in use. At large chlorination installations, consideration should be given to the installation of automatic gas detection and related alarm equipment.

102.5 Housing

102.51 Feed and Storage Rooms

If gas chlorination equipment or chlorine cylinders are to be in a building used for other purposes, a gas-tight room must separate this equipment from any other portion of the building. Floor drains from the chlorine room ~~may~~ must not be connected to floor drains from other rooms. Doors to this room may open only to the outside of the building, and must be equipped with panic hardware. Chlorine rooms must be at ground level, and should permit easy access to all equipment.

Storage areas for 1-ton (909 kg) cylinders should be separated from the feed area. In addition, the storage area must have designated areas for "full" and "empty" cylinders. Chlorination equipment should be situated as close to the application point as reasonably possible. For additional safety considerations, refer to Section 57 (Safety).

102.511 Locker-Type Chlorine Enclosure

This section applies to small systems that wish to avoid the cost of a large chlorine room by installing a small locker-type enclosure to a building. The enclosure must be sized such that it is just big enough to house the chlorination equipment. Under no circumstances can it be big enough for a person to enter. Chlorine gas feed equipment and storage must be enclosed and separated from other operating areas. Because the enclosure is sized to prevent entry, section 102.52 Inspection Window, and section 102.54 Ventilation and Accidental Release requirements of this section are not applicable to the locker type enclosure. The enclosure must be heated. The access doors must be properly secured and labeled with an appropriate chlorine warning placard.

102.52 Inspection Window

A clear glass, gas-tight, window must be installed in an exterior door or interior wall of the chlorinator room to permit the units to be viewed without entering the room.

102.53 Heat

Rooms containing disinfection equipment must be provided with a means of heating so that a temperature of at least 60° F (16° C) can be maintained. The room should be protected from excess heat. Cylinders must be kept at essentially room temperature. If liquid hypochlorite solutions are used, the containers may be located in an unheated area.

102.54 Ventilation and Accidental Release

With chlorination systems, forced, mechanical ventilation must be installed that will provide one complete air change per minute when the room is occupied. The entrance to the air exhaust duct from the room must be near the floor and the point of discharge must be located so as not to contaminate the air inlet to any buildings or inhabited areas. Air inlets must be located so as to provide cross ventilation with air and at such temperature that will not adversely affect the chlorination equipment. The outside air inlet must be at least three feet above grade. The vent hose from the chlorinator must discharge to the outside atmosphere above grade. Where public exposure may be extensive, scrubbers may be required on ventilation discharge.

See the Uniform Fire Code requirements for treatment of gases as:

Treatment systems may be necessary to handle the accidental release of gas.

Treatment systems may be necessary to process all exhaust ventilation to be discharged from gas cabinets, exhausted enclosures or separate gas storage rooms.

102.55 Electrical Controls

Switches for fans and lights must be outside of the room at the entrance. A labeled signal light indicating fan operation must be provided at each entrance, if the fan can be controlled from more than one point.

102.56 Protective and Respiratory Gear

Respiratory air-pac protection equipment, meeting the requirements of the National Institute for Occupational Safety and Health (NIOSH), must be available where chlorine gas is handled, and must be stored at a convenient location, but not inside any room where chlorine is used or stored. Instructions for using the equipment must be posted. The units must use compressed air, have at least 30-minute capacity, and be compatible with the units used by the fire department responsible for the plant.

102.6 Sampling and Control

102.61 Sampling

Facilities must be included for sampling disinfected effluent after the contact chamber as monitoring requirements warrant. In large installations, or where ~~stream~~ permit conditions warrant, provisions should be made for continuous monitoring of effluent chlorine residual.

102.62 Testing and Control

Equipment must be provided for measuring chlorine residual using accepted test procedures. The installation of demonstrated effective facilities for automatic chlorine residual analysis, recording, and proportioning systems should be considered at all large installations.

Equipment must also be provided for measuring fecal coliform (e.g., *E. coli*) organisms, using accepted test procedures as required by the ~~regulatory agency~~ Department.

103. DECHLORINATION

103.1 Types

Dechlorination of wastewater effluent may be necessary to reduce the toxicity due to chlorine residuals. The most common dechlorination chemicals are sulfur compounds, particularly sulfur dioxide gas or aqueous solutions of sulfite or bisulfite. Pellet dechlorination systems are also available for small facilities.

The type of dechlorination system should be carefully selected considering criteria including the following: type of chemical storage required, amount of chemical needed, ease of operation, compatibility with existing equipment, and safety.

103.2 Dosage

The dosage of dechlorination chemical should depend on the residual chlorine in the effluent, the final residual chlorine limit, and the particular form of the dechlorinating chemical used. The most common dechlorinating agent is sulfite. The following forms of the compound are commonly used and yield sulfite (SO_2) when dissolved in water.

Dechlorination Chemical	Theoretical mg/L Required to Neutralize 1 mg/L Cl_2
Sulfur dioxide (gas)	0.9
Sodium meta bisulfite (solution)	1.34
Sodium bisulfite (solution)	1.46
Sodium thiosulfate (solution)	0.56
Sodium sulfite (tablet)	1.78

Theoretical values may be used for initial approximations, to size feed equipment with the consideration that under good mixing conditions 10% excess dechlorinating chemical is required above theoretical values. Excess sulfur dioxide may consume oxygen at a maximum of 1.0 mg dissolved oxygen for every 4 mg SO_2.

The liquid solutions come in various strengths. These solutions may need to be further diluted to provide the proper dose of sulfite.

103.3 Containers

Depending on the chemical selected for dechlorination, the storage containers will vary from gas cylinders, liquid in 50 gallon (190 L) drums, or dry compounds. Dilution tanks and mixing tanks will be necessary when using dry compounds and may be necessary when using liquid compounds to deliver the proper dosage. Solution containers should be covered to prevent evaporation and spills.

103.4 Feed Equipment, Mixing, and Contact Requirements

103.41 Equipment

In general, the same type of feeding equipment used for chlorine gas may be used with minor modifications for sulfur dioxide gas. However, the manufacturer should be contacted for specific equipment recommendations.

No equipment should be ~~alternately~~ used alternately for the two gases. The common type of dechlorination feed equipment utilizing sulfur compounds include vacuum solution feed of sulfur dioxide gas and a positive displacement pump for aqueous solutions of sulfite or bisulfite.

The selection of the type of feed equipment utilizing sulfur compounds must include consideration of the operator safety and overall public safety relative to the wastewater treatment plant's proximity to populated areas and the security of gas cylinder storage. The selection and design of sulfur dioxide feeding equipment must take into account that the gas reliquifies quite easily. Special precautions must be taken when using ton (909 kg) containers to prevent reliquification.

Where necessary to meet the operating ranges, multiple units must be provided for adequate peak capacity and to provide a sufficiently low feed rate on turn down to avoid depletion of the dissolved oxygen concentrations in the receiving waters.

103.42 Mixing Requirements

The dechlorination reaction with free or combined chlorine will generally occur within 15 to 20 seconds. ~~Mechanical mixers are required unless the mixing facility will provide the required hydraulic turbulence to assure thorough and complete mixing~~. The dechlorination chemical should be introduced at a point in the process where the hydraulic turbulence is adequate to assure thorough and complete mixing. If no such point exists, mechanical mixing must be provided. The high solubility of SO_2 prevents it from escaping during turbulence.

103.43 Contact Time

A minimum of 30 seconds for mixing and contact time must be provided at the design peak hourly flow or maximum rate of pumpage. A suitable sampling point must be provided downstream of the contact zone. Consideration must be given to a means of reaeration to assure maintenance of an acceptable dissolved oxygen concentration in the stream following sulfonation.

103.44 Standby Equipment and Spare Parts

The same requirements apply as for chlorination systems. See Section 102.46 (Standby Equipment and Spare Parts).

103.45 Sulfonator Water Supply

The same requirements apply as for chlorination systems. See Section 102.47 (Chlorinator Water Supply).

103.5 Housing Requirements

103.51 Feed and Storage Rooms

The requirements for housing SO_2 gas equipment ~~should~~ must follow the same guidelines as used for chlorine gas. Refer to Section 102.5 (Housing) for specific details.

When using solutions of the dechlorinating compounds, the solutions may be stored in a room that meets the safety and handling requirements set forth in Section 57 (Safety). The mixing, storage, and solution delivery areas must be designed to contain or route solution spillage or leakage away from traffic areas to an appropriate containment unit.

103.52 Protective and Respiratory Gear

The respiratory air-pac protection equipment is the same as for chlorine. See Section 102.56 (Protective and Respiratory Gear). Leak repair kits of the type used for chlorine gas that are equipped with gasket material suitable for service with sulfur dioxide gas may be used. (Refer to The Compressed Gas Association Publication CGA G-3-1995 ~~88~~, "Sulfur Dioxide.") For additional safety considerations, see Section 57 (Safety).

103.6 Sampling and Control

103.61 Sampling

Facilities must be included for sampling the dechlorinated effluent for residual chlorine. Provisions must be made to monitor for dissolved oxygen concentration after sulfonation when required by the regulatory agency.

103.62 Testing and Control

Provision must be made for manual or automatic control of sulfonator feed rates based on chlorine residual measurement or flow.

104. ULTRAVIOLET RADIATION DISINFECTION

~~Design standards, operating data, and experience for this process are not well established. Therefore, expected performance of the ultraviolet radiation disinfection (UVRD) units must be based upon experience at similar full scale installations or thoroughly documented prototype testing with the particular wastewater. Critical parameters for UVRD units are dependent upon the manufacturers' design, lamp selection, tube materials, ballasts, configuration, control systems, and associated appurtenances. Proposals on this disinfection process will be reviewed on a case-by-case basis at the discretion of the reviewing authority under Section 53.2.~~

~~Open channel designs with modular UVRD units that can be removed from the flow are required. At least two banks in series must be provided in each channel for disinfection reliability and to ensure uninterrupted service during tube cleaning or other required maintenance. Operator safety and tube cleaning frequency must also be considered. The hydraulic properties of the system must be designed to simulate plug flow conditions under the full operating flow range. In addition, a positive means of water level control must be provided to achieve the necessary exposure time. Also refer to paragraphs 54.2 and 54.3.~~

~~This process should be limited to high quality effluent having at least 65% ultraviolet radiation transmittance at 254 nanometers wave length. As a general guide in systems sizing for an activated sludge effluent with the preceding characteristics at the design peak hourly flow, a UV radiation dosage of at least 30,000 uWsec/cm^2 may be used after adjustments for maximum tube fouling, lamp output reduction after 8760 hours of operation, and other energy absorption losses.~~

104.1 General

The effectiveness of an ultraviolet (UV) disinfection system depends on characteristics of the wastewater (i.e., clarity), the intensity of UV radiation, the amount of time the microorganisms are exposed to the radiation, and the reactor configuration. The requirements of this section apply to both open channel and closed vessel UV systems.

104.2 Design Considerations

104.21 Wastewater Characteristics

Whenever possible, a representative wastewater sample must be collected and sent to the UV manufacturer for chemical analysis and design considerations.

For all UV systems, the wastewater should contain low levels of total suspended solids, preferably 30 milligrams per liter or below and the effluent should have at least 65% ultraviolet radiation transmittance at 254 nanometers. In addition, iron, calcium, aluminum, manganese and magnesium should be evaluated due to their tendency for fouling quartz sleeves.

104.22 Hydraulics

The UV system must be designed to effectively treat the expected minimum, average, and maximum effluent flows. The Department may require a hydraulic analysis to justify maximum effluent flows.

Inlet and outlet structures for the UV system must be designed to achieve relatively uniform flow velocities for all flows. A minimum of 5 feet should be provided between inlet/outlet structures and the closest lamp array in open channel systems to help achieve uniform flow.

Optimum plug flow characteristics in open channels will be considered to be a depth:width ratio of 1:1. A positive means of water level control in each channel must be provided to achieve the necessary exposure time.

"Flow-pacing" and/or "dose-pacing" including the ability to turn lamps on or off in relation to flow and/or light dimming capabilities to respond to changes in flow or UV transmittance should be considered.

104.23 Installation and Maintenance

Adequate space must be provided around the UV units to accommodate maintenance activities. Building layout must provide adequate floor space for separate components of the UV system including requirements for power supply cabinets and cleaning equipment.

Multiple units must be provided to allow uninterrupted service due to equipment failure or maintenance activities. Wastewater systems that can store and not discharge for a reasonable period of time (e.g., one week) will not be required to have multiple units, but must be equipped with a means to stop the discharge upon unit failure.

Accessory cleaning equipment, generally in the form of chemical cleaning, mechanical wipers or ultrasonics must be provided. The system must be able to continue providing adequate disinfection during replacement of UV lamps, quartz sleeves, ballasts and cleaning of the UV lamp sleeves. Closed vessel and open channel units must be equipped with drains for maintenance activities. A closed vessel system should be installed in a "trap" in order to make sure the UV lamps are always submerged.

104.24 System Sizing

As a general guide in system sizing for an activated sludge effluent (BOD and TSS < 30 mg/L), a UV radiation dosage not less than 30,000 μWsec/cm² may be used after adjustments for maximum tube fouling, lamp output reduction after 8760 hours of operation, and other energy absorption losses.

104.25 Electrical

Electrical standards must conform to the National Electrical Code and State of Montana and all local applicable codes and standards.

For emergency power requirements see Section 56.1 (Emergency Power Facilities). An exception to this requirement would be a wastewater system that can store and not discharge during a power outage. These facilities must be equipped with a means to stop the discharge automatically upon power loss.

Systems must be equipped with safety interlocks that shut off operating modules if they are moved out of their position or the water level drops below a specified point. Ground fault interruption circuitry must be provided with each operating module. An alarm system shall be provided to separately indicate lamp failure and low UV intensity.

Adequate ventilation of the structure housing the electrical components of the system must be provided to prevent failures from overheating.

104.26 Spare Parts

Spare parts that are subject to wear and breakage (e.g., bulbs, sleeves, etc.) must be provided. A complete standby UV unit must be provided when redundant units are not installed.

105. OZONE

Ozone systems for disinfection ~~should~~ will be evaluated on a case-by-case basis. Design standards, operating data, and experience for this process are not well established. Therefore, design of these systems should be based upon experience at similar full scale installations or thoroughly documented prototype testing with the particular wastewater.

CHAPTER 110

SUPPLEMENTAL TREATMENT PROCESSES

111. ~~PHOSPHORUS REMOVAL BY CHEMICAL TREATMENT~~ CLARIFICATION PROCESSES

111.1 General

111.11 Method

Addition of lime or the salts of aluminum or iron may be used for the chemical removal of soluble phosphorus and other suspended particulate. The phosphorus and other suspended particulate react, or bind, with the ~~calcium,~~ aluminum, or iron ions to form insoluble compounds. ~~These~~ Insoluble compounds may require the use of an additional ~~be flocculated with or without the addition of a~~ coagulant aid ~~such as a polyelectrolyte~~ to facilitate separation by sedimentation, or sedimentation followed by filtration.

111.12 Design Basis

111.121 Preliminary Testing

Laboratory, pilot or full scale studies of various chemical feed systems and treatment processes are recommended for existing plant facilities to determine the achievable performance level, cost-effective design criteria and ranges of required chemical dosages.

The selection of a treatment process and chemical dosage for a new facility should be based on such factors as influent wastewater characteristics, effluent requirements, and anticipated treatment efficiency.

111.122 System Flexibility

Systems must be designed with sufficient flexibility to allow for several operational adjustments in chemical feed location, chemical feed rates, and for feeding alternate chemical compounds.

111.123 Feed Water Characterization

Clarification processes must be capable of functioning efficiently and reliably at all anticipated loading rates and for all different types of solids that need to be removed.

The design engineer must define the water and solids characteristics for the entire range of possible feed water conditions. Seasonal changes in water temperature, solids loading, and water chemistry (pH, alkalinity, hardness, conductivity, etc.) can have a significant effect on clarification and filter performance. Solids characteristics such as floc size and strength may also change seasonally and should be defined during design. Water and solids characteristics (rate, concentration, composition, etc.) of the flow stream should be defined on a monthly basis (or at a minimum seasonally) and peak loading conditions must be established.

Other feed water characteristics that may be detrimental to specific clarification processes or filter media must be identified. Chemicals, inorganic precipitates, or particles (for example ozone, calcium carbonate, or clay, respectively) may damage or clog certain media and should be identified and considered in filter media selection. Industrial inputs to wastewater may have specific characteristics (such as chemical reactions with filter aids) that pose problems for filtration systems and must be considered.

111.2 Process Requirements

111.21 Dosage

The design chemical dosage must include the amount needed to react with the phosphorus, or other suspended particulate, in the wastewater, the amount required to drive the chemical reaction to the desired state of completion and the amount required due to inefficiencies in mixing or dispersion. Excessive chemical dosage should be avoided.

111.211 Coagulation design must include the following:

a. Provisions for multiple coagulants with separate injection points for each coagulant.
b. Provisions for chemical pH control.
c. Identification of the injection point for caustic soda or lime upstream of the coagulant addition.
d. Contact/mixing times and the order of introduction where multiple chemicals are proposed.

111.212 Coagulation occurs either by:

a. **Charge Neutralization**

Charge neutralization typically:
- Works at low chemical dosages producing small, destabilized pinpoint floc.
- Is ideal for treating low turbidity, low alkalinity effluent.
- Is followed by direct filtration or in-line filtration.

The design must disperse the chemical quickly and use rapid, high intensity mixing.

Charge neutralization depends on the water chemistry, type of coagulant, water temperature, particles size and concentration in the water. With alum, charge neutralization typically occurs in a pH range of 3 to 5 standard units and chemical dosages less than 20 mg/L.

For very low turbidity water, organic polymers are not effective as primary coagulants and must not be used. Although coagulation by organic polymers occurs by charge neutralization, chemical reactions are slower (between 2 and 10 seconds) than with inorganic salts and is dependent upon water temperature and alkalinity. Successful use of organic polymers as the primary coagulant may require conventional filtration or extended contact time for the flocculation.

b. **Sweep Coagulation**

For sweep coagulation, design must provide for sufficiently high coagulant concentrations to cause precipitation of a metal hydroxide. Since reactions take between 1 and 10 seconds, instantaneous chemical dispersion and high intensity mixing are not as critical for this type of coagulation.

Sweep coagulation is typically:

- Suitable for treating low or high turbidity, high alkalinity waters.
- Followed by conventional filtration process trains.

For alum, sweep coagulation occurs with chemical dosages > 20mg/L and a pH range of 6 to 9 standard units.

Table 111-1 lists the most common coagulants and representative dosing rates for sweep coagulation.

Table 111-1 Typical Coagulant Dosing Rate for Sweep Coagulation

Coagulant	Typical Dosing Rate (ppm)*
Alum	30 to 150
Poly-aluminum chloride (PaCl)	15 to 75
Ferric Chloride	15 to 75
Polymers	0.05 to 2

* Jar testing should be used and may be required to justify the coagulation/flocculation design if unique conditions or design approaches are proposed.

111.22 Chemical Selection

The choice of lime or the salts of aluminum or iron should be based on the wastewater characteristics, jar or pilot testing, chemical availability and handling, sludge processing and disposal methods and the economics of the total system. When lime is used, it may be necessary to neutralize the high pH prior to subsequent treatment in secondary biological systems or prior to discharge in those flow schemes where lime treatment is the final step in the treatment process.

111.23 Chemical Feed Points

Selection of chemical feed points must include consideration of the chemicals used in the process, necessary reaction times between chemical and polyelectrolyte additions, and the wastewater treatment processes and components utilized. Flexibility in feed locations must be provided to optimize chemical usage and treatment efficiency.

111.24 ~~Flash~~ Chemical Mixing

Each chemical must be mixed rapidly and uniformly with the flow stream. Where separate mixing basins are provided, they should be equipped with mechanical mixing devices. ~~The detention period should be at least 30 seconds.~~

Proper chemical mixing (also called flash or rapid mixing) is fundamental to satisfactory coagulation. Designers should provide justification (which may include pilot test results) when recommending other types of mixing devices.

Designs must use hydraulic detention time at peak hour flow as the controlling design criteria for rapid mixing units. Hydraulic detention time is typically 1.0 second with a range of 0.5-5 seconds.

111.241 Mechanical Mixing

Mechanical rapid mixing units are effective for the addition of coagulants prior to flocculation. Design criteria include the following:

- Average rapid mix detention periods not exceeding 30 seconds.
- A spare motor when only a single mechanical mixer is used.
- Cleaning and draining of the rapid mix basin.

Applied mixing energy should generally achieve an average velocity gradient (G) value in the range of 1500/sec to 6000/sec for rapid mixing prior to flocculation. The design engineer must submit the design basis for the G selected, considering the chemicals, water temperature, color and other related parameters. The velocity gradient (G) can be determined using the following equation:

$$G = \sqrt{\frac{P}{\mu V}}$$ **(Equation 110-1)**

Where

G = velocity gradient
P = power input
μ = dynamic viscosity
V = effective volume

1. Effective volume (V) indicates the contact time provided in the process. This is not the physical dimensions of the vessel. Effective volume depends on tank inlet and outlet locations and conditions, internal baffling, and the type of mixing.

   (a) Rectangular, unbaffled contact tanks often provide effective volumes of 10 percent to 15 percent of the physical volume.

   (b) The effective volume, often identified as a baffling factor, is expressed as a proportion [i.e., 0.1 to 1.0] or hydraulic efficiency of the tank expressed as a percentage of the physical volume [i.e., 10 percent to 100 percent (for plug flow conditions)].

2. The dynamic viscosity (μ) varies with temperature and calculations must address the expected range.

111.242 In-line Static Mixers

Static in-line mixers use a circuitous path through fixed blades or chambers to achieve rapid mixing. Dynamic in-line mixers use powered impellers. Mixing generally occurs within 1 second. Use manufacturer's recommendations and/or studies for static mixer design. Provide for servicing or removing in-line mixer components without excavation.

111.25 Flocculation

The particle size of the precipitate formed by chemical treatment may be very small. Consideration should be given in the process design to the addition of ~~synthetic polyelectrolytes~~ polymeric flocculant aid to ~~aid~~ improve settling. The flocculation equipment should be adjustable in order to obtain optimum floc growth, control deposition of solids, and prevent floc destruction.

Polymeric flocculant aids may improve floc size, density and settling rates. Floc particles can remain fragile and mixing shear force can break them easily. For this reason, flocculation requires adequate detention time (t) at low velocity gradients (G), making Gt the basic design parameter.

Flocculation basin design must include baffling to minimize short-circuiting. Design values for flocculation basins should include:

- Hydraulic detention time (t) of 20 minutes with a range from 10-30 minutes.
- Velocity gradient (G) of 40/sec with a range from 20/sec to 100/sec.
- Typical mixing energy-detention time (Gt) of 50,000 with a range of 20,000 to 150,000.

111.26 Liquid - Solids Separation

The velocity through pipes or conduits from flocculation basins to settling basins should not exceed 1.5 feet per second (0.46 m/s) in order to minimize floc destruction. Entrance works to settling basins should also be designed to minimize floc shear.

When clarifier type settling basins are used, they must be designed in accordance with Chapter 70 (Settling). For design of the sludge handling system, special consideration should be given to the type and volume of sludge generated in the ~~phosphorus~~ solids removal process.

For additional clarification processes see Circular DEQ 1 Section 4.1.4 (Sedimentation), Section 4.1.5 (Solids Contact Units), Section 4.1.6 (Tube or Plate Settlers), or Section 4.1.7 (High Rate Clarification Processes) for applicable design requirements. The Department will review and approve other clarification approaches on a case-by-case basis and may require on-site pilot studies and/or full-scale demonstrations. For full-scale demonstrations, a minimum of 3 years of performance data must be submitted from facilities with similar wastewater characteristics and operating conditions.

111.27 Filtration

~~Effluent filtration must be considered where effluent phosphorus concentrations of less than 1 mg/L must be achieved.~~

Filtration may be required to achieve phosphorus concentrations of less than 1 mg/L, or to reach low concentrations of some minerals and metals in the final effluent. See Section 112 (High Rate Effluent Filtration), or Section 97 (Membrane Bioreactor (MBR)) for filtration equipment to meet these objectives.

When human exposure to the effluent is a concern, such as when reclaimed wastewater reuse is proposed, the design for filtration must meet the criteria presented within Circular DEQ 1 Section 4.2 (Filtration), or DEQ 2 Section 97 (Membrane Bioreactor (MBR)).

The Department will review alternative filtration approaches on a case-by-case basis and may require on-site pilot studies prior to final approval. Successful use of alternative filtration devices in other States with equivalent filtration standards may be used by the applicant to justify alternative filtration approaches. A minimum of 3 years of performance data supporting these alternative approaches will need to be submitted for facilities with similar filter influent wastewater characteristics.

Filtered wastewater facility design must include provisions for coagulant addition after secondary clarification where high rate media filters are used. In general, coagulants are necessary after secondary clarification when the filter influent turbidity exceeds 5 NTU for more than 15 minutes.

111.3 Feed Systems

111.31 Location

All liquid chemical mixing and feed installations should be installed on corrosion resistant pedestals and elevated above the highest liquid level anticipated during emergency conditions. The chemical feed equipment must be designed to meet the maximum dosage requirements for the design conditions. Lime feed equipment should be located so as to minimize the length of slurry conduits. All slurry conduits must be accessible for cleaning.

111.32 Liquid Chemical Feed System

Liquid chemical feed pumps should be of the positive displacement type with variable feed rate. Pumps must be selected to feed the full range of chemical quantities required for the phosphorus mass loading conditions anticipated with the largest unit out of service. Consideration should be given to systems including pumps and piping that will feed either ferric or aluminum compounds to provide flexibility. Refer to Section 111.51 (Materials).

Screens and valves must be provided on the chemical feed pump suction lines.

An air break or anti-siphon device must be provided where the chemical solution stream discharges to the transport water stream to prevent an induction effect resulting in overfeed.

Consideration must be given to providing pacing equipment to optimize chemical feed rates.

111.33 Dry Chemical Feed System

Volumetric or gravimetric feeders must be used to facilitate automated dry chemical feed to the mixing tank. The equipment must be chemically compatible with the chemicals to be used. Each dry chemical feeder must be equipped with a dissolver that is capable of providing a minimum of 5-minutes retention at the maximum feed rate. Dissolved solutions must be continuously mixed to prevent settling within the mixing tank and to maintain a uniform strength of solution.

Polyelectrolyte feed installations should be equipped with two solution vessels and transfer piping for solution make-up and daily operation.

Make-up tanks must be provided with an educator funnel or other appropriate arrangement for wetting the polymer during the preparation of the stock feed solution. Adequate mixing should be provided by a large-diameter, low-speed mixer.

111.4 Storage Facilities

111.41 Size

Storage facilities must be sufficient to insure that an adequate supply of the chemical is available at all times. Exact size required will depend on size of shipment, length of delivery time, and process requirements. Storage for a minimum supply of 10 days ~~supply~~ should be provided.

111.42 Location and Containment

The liquid chemical storage tank and tank fill connections must be located within a containment structure having a capacity exceeding the total volume of all storage vessels. Valves on discharge lines must be located adjacent to the storage tank and within the containment structure. Refer to Section 57.2 (Hazardous Chemical Handling).

Auxiliary facilities, including pumps and controls, within the containment area must be located above the highest anticipated liquid level. Containment areas must be sloped to a sump area and may not contain floor drains.

Bag storage should be located near the solution make-up point to avoid unnecessary transportation and housekeeping problems.

111.43 Accessories

Platforms, stairs, and railings should be provided as necessary, to afford convenient and safe access to all filling connections, storage tank entries, and measuring devices.

Storage tanks must have reasonable access provided to facilitate cleaning.

111.5 Other Requirements

111.51 Materials

All chemical feed equipment and storage facilities must be constructed of materials resistant to chemical attack by all chemicals normally used for phosphorus removal. Refer to Section 57 (Safety).

111.52 Temperature, Humidity, and Dust Control

Precautions must be taken to prevent chemical storage tanks and feed lines from reaching temperatures likely to result in freezing or chemical crystallization at the concentration employed. A heated enclosure or insulation may be required.

Consideration should be given to temperature, humidity, and dust control in all chemical feed room areas.

111.53 Cleaning

Consideration must be given to the accessibility of piping. Piping should be installed with plugged wyes, tees or crosses with removable plugs at changes in direction to facilitate cleaning.

111.54 Filling Drains and Draw-off

Above-bottom draw off from chemical storage or feed tanks must be provided to avoid withdrawal of settled solids into the feed system. A bottom drain must also be installed for periodic removal of accumulated settled solids. Provisions must be made in the fill lines to prevent back siphonage of chemical tank contents.

111.6 Safety and Hazardous Chemical Handling

The chemical handling facilities must meet the appropriate safety and hazardous handling facilities requirements of Section 57 (Safety).

111.7 Sludge Handling

Consideration must be given to the type and additional capacity of the sludge handling facilities needed when chemicals are added. Design of dewatering systems should be based, where possible, on an analysis of the characteristics of the sludge to be handled. Consideration should be given to the ease of operation, effect of recycle streams generated, production rate, moisture content, dewaterability, final disposal, and operating costs. Refer to Chapter 80 (Sludge Processing, Storage and Disposal).

112. HIGH RATE EFFLUENT FILTRATION

112.1 General

112.11 Applicability

Granular media filters may be used as an advanced treatment device for the removal of residual suspended solids from secondary effluents. Filters may be necessary where effluent concentrations of less than 20 mg/L of suspended solids and/or 1.0 mg/L of phosphorus must be achieved. A pretreatment process such as chemical coagulation and sedimentation or other acceptable process should precede the filter units where effluent suspended solids requirements are less than 10 mg/L.

112.12 Design Considerations

Care should be given in designing pipes or conduits ahead of filter units, if applicable, to minimize shearing of floc particles. Consideration should be given in the plant design to providing flow-equalization facilities to moderate filter influent quality and quantity.

112.2 Filter Types

Filters may be of the gravity type or pressure type. Pressure filters must be provided with ready and convenient access to the media for inspection or cleaning. Where abnormal quantities of greases or similar solids~~, which~~ that result in filter plugging are expected, filters should be of the gravity type.

112.3 Filtration Rates

112.31 Allowable Rates

Filtration rates may not exceed 5 gpm/sq. ft. (3.40 L/m^2s) based on the design peak hourly flow rate applied to the filter units. The expected design maximum suspended solids loading to the filter should also be considered in determining the necessary filter area.

112.32 Number of Units

Total filter area must be provided in two or more units, and the filtration rate must be calculated based on the total available filter area with one unit out of service.

112.4 Backwash

112.41 Backwash Rate

The backwash rate must be adequate to fluidize and expand each media layer a minimum of 20 percent based on the media selected. The backwash system must be capable of providing variable backwash rates. Minimum and maximum backwash rates must be based on demonstrated satisfactory field experience under similar conditions. The design must provide for a backwash period of at least 10 minutes.

112.42 Backwash Pumps

Pumps for back-washing filter units must be sized and interconnected to provide the required backwash rate to any filter with the largest pump out of service. Filtered water from the clear well or chlorine tank must be used as the source of backwash water. ~~Waste filter backwash must be adequately treated~~. Provisions must be made to adequately treat and/or dewater the waste filter backwash.

112.43 Backwash Surge Control

The rate of return of waste filter backwash water to treatment units must be controlled so that the rate does not exceed 15 percent of the design average daily flow rate to the treatment unit. The hydraulic and organic load from waste backwash water must be considered in the overall design of the treatment plant. Surge tanks must have a capacity of at least two backwash volumes, although additional capacity should be considered to allow for operational flexibility. Where waste backwash water is returned for treatment by pumping, adequate pumping capacity must be provided with the largest unit out of service.

112.44 Backwash Water Storage

Total backwash water storage capacity provided in an effluent clearwell or other unit must equal or exceed the volume required for two complete backwash cycles.

112.5 Filter Media Selection

Selection of proper media type and size will depend on required effluent quality, the type of treatment provided prior to filtration, the filtration rate selected, and filter configuration. In dual or multi-media filters, media size selection must consider compatibility among media. Media must be selected and provided to meet specific conditions and requirements relative to the project under consideration. The selection and sizing of the media must be based on demonstrated satisfactory field experience under similar conditions. All media must have a uniformity coefficient of 1.7 or less. The uniformity coefficient, effective size, depth, and type of media must be set forth in the specifications.

112.6 Filter Appurtenances

The filters must be equipped with wash-water troughs, surface wash or air scouring equipment, means of measurement and positive control of the backwash rate, equipment for measuring filter head loss, positive means of shutting off flow to a filter being backwashed, and filter influent and effluent sampling points. If automatic controls are provided, there must be a manual override for operating equipment, including each individual valve essential to the filter operation. The underdrain system must be designed for uniform distribution of backwash water (and air, if provided) without danger of clogging from solids in the backwash water.

If air is to be used for filter backwash, separate backwash blower(s) must be provided. Provision must be made to allow periodic chlorination of the filter influent or backwash water to control slime growths. When chemical disinfection is not provided at the plant, manual dosage of chlorine compounds is acceptable.

112.7 Access and Housing

Each filter unit must be designed and installed so that there is ready and convenient access to all components and the media surface for inspection and maintenance without taking other units out of service.

Housing for filter units must be provided. The housing must be constructed of suitable corrosion-resistant materials. All controls must be enclosed and the structure housing filter, controls and equipment must be provided with adequate heat and ventilation equipment to minimize problems with excess humidity.

112.8 Proprietary Equipment

Where proprietary filtration equipment not conforming to the preceding requirements is proposed, data which supports the capability of the equipment to meet effluent requirements under design conditions must be provided. Such equipment will be reviewed on a case-by-case basis at the discretion of the regulatory agency. Refer to Section 53.2 (Engineering and Performance Requirements for Innovative Wastewater Treatment Alternatives).

~~APPENDIX B~~
CHAPTER 120

IRRIGATION AND RAPID INFILTRATION SYSTEMS

121. STANDARDS FOR THE ~~SPRAY IRRIGATION OF~~ USE OF RECLAIMED WASTEWATER FOR IRRIGATION

~~B.1~~ 121.1 General

~~These standards must be used for the design and review of projects involving spray irrigation of sewage effluent from a domestic wastewater treatment facility. It was assumed in the development of these standards that the industrial component of the influent wastes is relatively small with the discharge of toxic substances regulated by an effective pretreatment program.~~

Irrigation, as discussed in this chapter; involves the controlled application of treated effluent (reclaimed wastewater) from public sewage systems to harvestable crops in a beneficial manner. The use of an irrigation system for effluent disposal requires that any industrial component of the wastewater be relatively small, with the discharge of toxic substances regulated by an effective treatment program. If significant industrial users discharge to the system, additional requirements may be imposed by the Department.

The intention and purpose of the standards and methods described in this chapter are for complete crop uptake of nutrients with no impact to groundwater and to prevent impacts to surface water from runoff. A Montana Ground Water Pollution Control System (MGWPCS) discharge permit from the Department will be required when the effluent does not meet the standards for class A-1 or class B-1 reclaimed wastewater (see Appendix B) and the system is designed or operated in a manner that applies wastewater effluent at rates greater than agronomic uptake rates.

The Department may require a groundwater monitoring and testing program for compliance determinations at an approved irrigation site. The level of monitoring and testing will be determined by the Department during the plan review and approval process.

Reclaimed wastewater mains must be installed in a manner that protects potable water mains from contamination, and which protects the water quality of the reclaimed wastewater from sewer mains. See DEQ-2, Section 38 (Protection of Water Supplies) and DEQ- 1, Section 8.8 (Separation of Water Mains, Sanitary Sewers and Storm Sewers) for separation requirements.

Prior to receiving Department approval for a reclaimed wastewater project, the applicant must provide a copy of the Department of Natural Resources and Conservation's (DNRC) approved change of appropriation or water right, or a written statement from DNRC that no authorization is needed under Title 85, Water Use. An approval from the DNRC regarding water rights must be obtained prior to approval of plans and specifications by the Department.

~~B.2~~ 121.2 Definitions

a. Agronomic Rate

Controlled application of treated effluent (reclaimed wastewater) from public sewage treatment facilities to crops in a manner such that all nutrients are utilized by the crop and no impact to groundwater or surface water occurs.

b. Irrigation Site

A Department approved site with well defined boundaries, designated to receive reclaimed wastewater for an approved irrigation use, in conformance with laws and regulations of all applicable regulatory agencies.

~~B.24~~ **c. Coagulated Wastewater**

Coagulated wastewater ~~means~~ is oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated by the addition of suitable floc-forming chemicals or by an equally effective method.

~~B.26~~ **d. Disinfected Wastewater**

Disinfected wastewater ~~means~~ is wastewater in which ~~the pathogenic organisms~~ most microorganisms have been ~~destroyed by chemical, physical or biological means~~ killed, inactivated, or otherwise rendered non-virulent.

~~B.25~~ **e. Filtered Wastewater**

Filtered wastewater ~~means~~ is an oxidized, clarified wastewater which has been passed through ~~natural undisturbed soils or~~ filter media, such as sand or diatomaceous earth, anthracite, approved cartridges, or membranes so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of ~~two~~ 2 nephelometric turbity units (NTU) and does not exceed ~~five~~ 5 NTU ~~more than five percent of the time during any 24 hour period~~ at any time.

~~B.21~~ **f. Food Crops**

Food crops ~~means~~ are any crops intended for human consumption.

g. Nutrient Management Plan

Nutrient management plan (NMP) is a written plan that establishes the operation, maintenance and sampling steps necessary to prevent the over-application of nutrients (primarily nitrogen and phosphorus) at an approved irrigation site. The strategy of the NMP is to prevent inadvertent runoff of nutrients to surface water or discharge to groundwater in quantities that could lead to degradation or impairment.

~~B.23~~ **h. Oxidized Wastewater**

Oxidized wastewater ~~means~~ is wastewater in which the organic matter has been stabilized, is non-putrescible, and contains dissolved oxygen. This level of treatment is comparable to that from facilities producing secondary effluent. ~~See Tables 93-1 and 93-2.~~ For wastewater treatment pond systems see Section 93.36 (Pond Design Criteria) for treatment requirements.

i. Reclaimed Wastewater

Means wastewater treated by a public sewage system for reuse for private, public, or commercial purposes. Wastewater must be treated to the standards in Table 121-1 or Table B-1 and used in accordance with Table 121-2 and Table B-2.

j. Reuse

The practice of placing reclaimed wastewater into service in a manner appropriate with the level of treatment.

~~B.22~~ **k. ~~Spray~~ Irrigation**

~~Spray irrigation means application of reclaimed wastewater to crops by spraying it from orifices in piping.~~ Irrigation means a conservative land application process using reclaimed wastewater, where the primary use of the reclaimed wastewater is for crop growth. This conservative process utilizes the nutrient uptake and evapotranspiration mechanisms of plants and soil surfaces to prevent or minimize discharge to groundwater.

I. Supplemental Irrigation Water

Is water used in addition to reclaimed wastewater in order to sustain a crop or optimize crop growth.

~~B.3 DESIGN REPORT~~

~~In addition to the requirements of Chapter 10, the design report must include:~~

~~**B.31** Justification of the hydraulic, nitrogen and trace element loading rates.~~

~~**B.311** The methods published in Chapter 4 of the "Process Design Manual for Land Treatment of Municipal Wastewaters" (EPA 625/1-81-013) or succeeding documents, published by the U.S. Environmental Protection Agency, must be employed in determining hydraulic and nitrogen loading rates.~~

~~**B.312** Hydraulic loading must be based on the wettest year in ten.~~

~~**B.32** Further investigation will be required when the application of any trace element exceeds the amount specified in Table 19 of EPA Guidelines for Water Reuse EPA/625/R-92004 September 1992.~~

~~**B.33** Representative data on the chemical quality of the treated wastewater must be submitted including the concentration of calcium, magnesium, sodium, bicarbonate, chloride, sulfate, nitrate, boron, hardness, TDS, iron, and heavy metals.~~

~~**B.34** Groundwater, soil, and agronomic information specific to the irrigation site.~~

121.3 Classes and Standards for Reclaimed Wastewater

This section addresses four classes of reclaimed wastewater that are required for various irrigation uses. These four classes are differentiated by the degree of additional treatment provided following secondary treatment, which is defined in 40 CFR Part 133. The treatment standards defined for each class must be met prior to delivery to the reuse system. The four reclaimed wastewater classes and additional treatment requirements are defined in Table 121-1.

Table 121.1
Reclaimed Wastewater Classifications and Associated Treatment Requirements

CLASS	TREATMENT STANDARDS
A	Class A reclaimed wastewater must, at all times, be oxidized, coagulated, filtered and disinfected, as described below or defined in this chapter. Following treatment, Class A reclaimed wastewater effluent quality should have 10 mg/L or less of BOD_5 and TSS. To achieve the turbidity requirements for Class A reclaimed wastewaters, a treatment process that incorporates coagulation, flocculation, sedimentation, and filtration is typically required. See Section 111 (Clarification Processes) for the required design standards. Class A reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection, does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed and such that the number of total coliform organisms does not exceed 23CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup) must include: continuous turbidity analysis with recorder, weekly total coliform analysis, and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
B	Class B reclaimed wastewater must, at all times, be oxidized, settled and disinfected, as described below or defined in this chapter. Class B reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the effluent does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup) must include: weekly total coliform analysis and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
C	Class C reclaimed wastewater must, at all times, be oxidized, settled and disinfected, as described below or defined in this chapter. Class C reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the effluent does not exceed 23 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 240 CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup) must include: monthly total coliform and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*

Table 121-1: Reclaimed Wastewater Classifications and Associated Treatment Requirements	
CLASS	TREATMENT STANDARDS
D	Class D reclaimed wastewater must, at all times, be oxidized and settled, as described below or defined in this chapter. Disinfection will generally not be required for Class D reclaimed wastewater; however, proximity to areas of public access or habitation may dictate that disinfection be provided in order to protect public health. The minimum monitoring level required during periods of use (including prior to seasonal startup) must include: monthly total nitrogen analysis. *

* The Department, where appropriate to protect public health and ensure water quality protection, may require additional sampling and/or annual or quarterly reporting. If industrial sources are contributors to the treated public sewage being proposed for reuse, monitoring for the various metals and contaminants described in Table 121-4 may be required annually. If the industrial source qualifies under the Federal Clean Water Act, Title 40, Chapter I, Part 401-403, a pretreatment program must be implemented before reuse of the effluent can be allowed by the Department.

~~B.4 Spray Irrigation of Food Crops~~

~~B.41 Reclaimed wastewater used for the spray irrigation of food crops must be at all times an adequately disinfected, oxidized, coagulated, clarified, and filtered wastewater. The wastewater effluent quality should have approximately 10 mg/L or less of BOD and TSS. The wastewater is considered adequately disinfected if at some location in the treatment process the median number of coliform organisms in the effluent does not exceed 23 per 100 milliliters in more than one sample within any 30-day period. The median value must be determined from the bacteriological results of the last seven days for which analyses have been completed.~~

~~B.42 A relaxation of the treatment requirements for reclaimed wastewater used for irrigation of food crops may be considered by the Department on an individual basis where the reclaimed wastewater is to be used to irrigate a food crop which must undergo extensive commercial, physical or chemical processing sufficient to destroy pathogenic agents before it is suitable for human consumption.~~

~~B.5 Spray Irrigation of Fodder, Fiber and Seed Crops~~

~~B.51 Reclaimed wastewater used for surface or spray irrigation of fodder, fiber and seed crops must be an adequately oxidized wastewater.~~

~~B.52 Disinfection will generally not be required for fodder, fiber and seed crops. Where effluent is not disinfected, fencing must be provided and, in general, a 200-foot buffer zone must be maintained between the fencing and the irrigated land. A distance of 200 feet must also be maintained between the irrigated land and any dwelling, including residential property. Where the 200-foot buffer zone is not owned by the party irrigating, an easement must be obtained prohibiting construction of any dwelling within the buffer zone. In all cases the department may require a buffer zone wider than 200 feet.~~

~~The buffer zone may be reduced with improved levels of treatment and disinfection or in cases of minimal potential for public contact.~~

~~B.53 Reclaimed wastewater used for irrigation of pasture to which milking cows or goats have access must be at all times an adequately disinfected, oxidized wastewater. Wastewater is considered adequately disinfected if at some location in the treatment process the median number of coliform organisms does not exceed 23 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed.~~

~~B.6 Landscape Irrigation~~

~~**B.61** Reclaimed wastewater used for the irrigation of golf courses, cemeteries, freeway landscapes, and landscapes in other areas where the public has similar access or exposure must be at all times an adequately disinfected, oxidized wastewater. Wastewater is considered adequately disinfected if the median number of fecal coliform organisms in the effluent does not exceed 200 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of fecal coliform organisms does not exceed 400 per 100 milliliters in any two consecutive samples. Public access to the spray irrigation site must be restricted during the period of application.~~

~~Buffer zones will be determined on a case-by-case basis if less than 200 feet. If low trajectory nozzles are used, the buffer zone can be reduced to 50 feet.~~

~~**B.62** Reclaimed wastewater used for the irrigation of parks, playgrounds, school yards, unrestricted golf courses and other areas where the public has similar access or exposure must be at all times an adequately disinfected, oxidized, coagulated, clarified, filtered wastewater, or a wastewater treated by a sequence of unit processes that will assure an equivalent degree of treatment and reliability. Wastewater is considered adequately disinfected if the median number of coliform organisms in the effluent does not exceed 2.2 per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of coliform organisms does not exceed 23 per 100 milliliters in any sample.~~

121.4 <u>Use of Reclaimed Wastewater</u>

<u>Reclaimed wastewater can be used for any of the allowable uses identified in Appendix B. This chapter, however, focuses on the use of reclaimed wastewater for irrigation at or below agronomic rates only. Direct contact of reclaimed wastewater on food crops that will be consumed raw is not allowed. Examples of reclaimed wastewater for various irrigation uses and associated classifications are displayed in Table 121-2.</u>

Table 121-2
Allowable Irrigation Uses of Reclaimed Wastewater and Associated Classes

Allowable Irrigation Uses of Reclaimed Wastewater	Class of Reclaimed Wastewater Required for Identified Irrigation Use			
	A	B	C	D
Spray Irrigation of Nonfood Crops				
Trees and Fodder, Fiber, and Seed Crops	YES	YES	YES	YES
Sod, Ornamental Plants for Commercial Use, and Pasture to Which Milking Cows or Goats Have Access	YES	YES	YES	NO
Drip or Subsurface Irrigation of Nonfood Crops				
Trees	YES	YES	YES	YES
Spray Irrigation of Food Crops				
Food Crops Which Undergo Physical or Chemical Processing Sufficient to Destroy All Pathogenic Agents	YES	YES	YES	NO
Drip or Subsurface Irrigation of Food Crops				
Food Crops Where There is No Reclaimed wastewater Contact With Edible Portion of Crop (e.g. orchards, vineyards)	YES	YES	NO	NO
Root Crops	YES	NO	NO	NO
Landscape Irrigation				
Restricted Access Areas (e.g., Cemeteries and Freeway Landscapes)	YES	YES	YES	NO
Unrestricted Access Areas (e.g., Golf Courses, Parks, Playgrounds, School Yards and Residential Landscapes	YES	NO	NO	NO

121.5 Buffer Zone

Table 121-3 indicates the buffer zone requirements for each class of reclaimed wastewater. The buffer zone must be maintained between the fencing and the irrigated land. No dwelling, residential property, or areas with public access are allowed within the buffer zone. Where the buffer zone is not owned by the party irrigating, an easement must be obtained prohibiting construction of any dwelling or access road within the buffer zone.

In all cases, the Department may require a wider buffer zone than listed in Table 121-3, if necessary to protect public health.

Cultivation of trees and shrubs to serve as a screen around the spray field is encouraged.

Table 121-3
Buffer Zone Requirements

Class	Buffer Zone Width (ft)
A	NA
B and C[1]	50
D	200

1. Class B reclaimed wastewater utilized for subsurface or drip irrigation do not require a buffer zone.

121.6 Spray Irrigation Equipment

The use of low trajectory nozzles is required on spray irrigation equipment to reduce airborne aerosols. Effluent may not be disposed of through the use of an end gun or big gun due to the high potential for aerosol drift.

Carryover of treated wastewater effluent outside the buffer zone is not allowed. The irrigation system must contain a wind sensor that will shut down the system during periods of high winds. In general, the maximum allowable wind velocity during operation is 25 mph; however, the Department may require a lower maximum limit

For grazing operations, the irrigation equipment (e.g., sprinklers, risers, pipes, monitoring wells, etc.) must be protected from damage caused by animals.

~~B.7~~ 121.7 Setback Distance from Surface Waters and Wells

~~B.71~~ In all cases, ~~the spray irrigation site must be at least 100 feet from any water supply well~~ the edge of the buffer zone must be at least 50 feet from any water supply well.

The required distance from surface water will be determined by the Department on a case-by-case basis based on the quality of effluent and the level of disinfection. In no case can reclaimed wastewater be applied directly onto surface water. A buffer zone must not include any surface water bodies.

121.8 Access Control and Advisory Signs

Appropriate fencing and advisory signs, if required by the Department, must be placed along the site boundaries to designate the use of reclaimed wastewater at the application area.

121.81 Fencing

When fencing is required, pasture or approved similar fencing must be placed along the outer perimeter of the entire buffer zone of the irrigation site.

Fencing is required for all irrigation sites with the following exceptions: Class A reclaimed wastewater; Class B reclaimed wastewater utilized for subsurface or drip irrigation; and Class C reclaimed wastewater utilized in restricted public access areas or where off-hour irrigation is practiced.

121.82 Signing

For irrigation sites with fencing requirements, signs must be posted along the fence line every 250 feet and at each corner. Signs should read "No Trespassing – Irrigated With Reclaimed Wastewater" or an approved equivalent.

All other irrigation sites must have signs posted along the perimeter of the application area, every 250 feet and at each corner. Signs must be posted at conspicuous public access points. Signs should read "Irrigated With Reclaimed Wastewater – Do Not Drink" or an approved equivalent.

121.9 Control of Irrigation Site

When the irrigation site is not owned by the treatment facility, a 20-year lease or similar assurance must be negotiated in order to ensure control of irrigated land. Longer leases or purchasing of land is encouraged. A copy of the signed lease must be submitted to the

Department for review and approval. A statement detailing responsibility of operation must be included in the lease agreement as outlined in Section 121.123 (Responsibility of Operation).

121.10 Effluent Monitoring

121.101 Flow

The capability to measure the amount of water applied to the irrigation site on a daily basis must be provided. This can be accomplished with either a flow meter device or through the use of pump run time (e.g., hour meters) and pump capacity.

121.102 Quality

Provisions must be made that will enable the water to be sampled prior to application. Testing may be required for both biochemical and bacteriological constituents.

121.11 Design Report

A design report must be submitted to the Department demonstrating conformity with the standards provided within this Section. The design report must address the following:

121.111 Trace Element and Chemical Quality Testing

When required by the Department, an assessment pertaining to trace element and chemical loading must be conducted on treated effluent. The recommended limits for constituents in reclaimed wastewater used for irrigation are listed in Table 121-4.

Table 121-4
Recommended Limits for Constituents in Reclaimed Wastewater for Irrigation

Elements	For use up to 20 years on fine textured soils of pH 6.0 to 8.5, mg/L	For waters used continuously on all soil, mg/L
Aluminum	20.0	5.0
Arsenic	2.0	0.10
Beryllium	0.50	0.10
Boron	2.0-10.0	0.75
Cadmium	0.050	0.010
Chromium	1.0	0.10
Cobalt	5.0	0.050
Copper	5.0	0.20
Fluoride	15.0	1.0
Free Chlorine Residual	< 1mg/L	< 1mg/L
Iron	20.0	5.0
Lead	10.0	5.0
Lithium	2.5[a]	2.5[a]
Manganese	10.0	0.20
Molybdenum	0.050[b]	0.010
Nickel	2.0	0.20
Selenium	0.020	0.020

Table 121-4 Recommended Limits for Constituents in Reclaimed Wastewater for Irrigation[c]		
Element	For use up to 20 Years on fine-textured soils of pH 6.0 to 8.5, mg/L	For waters used continuously on all soil, mg/L
Vanadium	1.0	0.1
Zinc	10.0	2.0

[a] Recommended maximum concentration for irrigating citrus is 0.075 mg/L.

[b] For only acid fine-textured soils or acid soils with relatively high iron oxide contents.

[c] Source: "Guidelines for Water Reuse 2004" (EPA/625/R-04/108) published by the U.S. Environmental Protection Agency.

121.112 Groundwater and Soil Information

Groundwater, soil, and agronomic information specific to the irrigation site must be provided that addresses the following:

121.112.1 Maps/Sensitive Resource Areas

A site map, including a soil map of the irrigation site must be provided. The soil map must include soil survey geographic (SSURGO) mapping units or similar means of identification. The map unit name and symbol for all soil types at the irrigation site must be provided.

The site map must identify sensitive resource areas within 500 feet of the application site (wetlands, surface water, wells, roads, buildings, property lines, etc.).

121.112.2 Soil Management, Monitoring, and Testing

When required by the Department, soil sampling adequate to define existing conditions throughout the irrigation site must be collected to characterize the existing soil conditions.

At the discretion of the Department, a composite soil sample for each major soil type within the irrigation site boundaries may need to be analyzed for total nitrogen, pH, organic matter, sodium adsorption ratio (SAR), phosphorus, potassium, and chloride. The composite sample must contain a minimum of 1 individual soil sample for every 3 acres of the proposed irrigation site. Field permeability must be verified for design purposes. Soil descriptions should be made by a qualified soil scientist.

121.112.3 Sodium Adsorption Ratio and Salinity Considerations

a. Sodium Adsorption Ratio (SAR)

When required by the Department, an analysis of the SAR must be conducted along with soil data (e.g., clay content) to determine if soil permeability will be negatively impacted. An SAR of 10 or less should be acceptable on soils with significant clay content (15 percent clay or greater). Soils with little clay or non-swelling clays can typically tolerate an SAR up to 20.

b. Salinity

When required by the Department, an analysis of the electrical conductivity (EC_I) or total dissolved solids (TDS) must be conducted on treated effluent to determine if plant growth will be negatively impacted

Potential impacts of salinity and SAR can be determined based upon information provided in Table 121-5. Design criteria must account for any mitigation requirements.

Table 121-5
Irrigation Water Quality Guidelines[1]

Potential irrigation water quality problem	Describing parameter	←—Degree of restriction on use—→ None	Slight to moderate	Severe
Salinity				
(affects crop water availability)	**EC_I**[2], mmho/cm, dS/m	< 0.7	0.7 – 3.0	> 3.0
	or **TDS**[3], mg/L	< 450	450 – 2,000	> 2,000
Infiltration				
(affects infiltration rate of water into the soil based on EC_I and SAR together)[4]	**SAR**	**EC_I**, mmho/cm, dS/m		
	0 – 3	> 0.7	0.7 – 0.2	< 0.2
	3 – 6	> 1.2	1.2 – 0.3	< 0.3
	6 – 12	> 1.9	1.9 – 0.5	< 0.5
	12 – 20	> 2.9	2.9 – 1.3	< 1.3
	20 – 40	> 5.0	5.0 – 2.9	< 2.9

(1) Adapted from University of California Committee of Consultants (1974); and Ayers and Westcot (1985).
(2) EC_I means electrical conductivity of the irrigation water reported in mmho/cm or dS/m at 77 °F (25 °C).
(3) TDS means total dissolved solids reported in mg/L.
(4) SAR means sodium adsorption ratio. At a given SAR, infiltration rate increases as water salinity increases.

$$SAR = \frac{[Na^+]}{\sqrt{\left[\frac{1}{2}\left([Ca^{2+}]+[Mg^{2+}]\right)\right]}}$$

121.112.4 Ground and Surface Water

The minimal depth to groundwater at the irrigation site must be at least 4 feet. The irrigation site should not be located within the 100-year floodplain.

121.112.5 Soil Water Holding Capacity

The moisture retention properties of the soil must be provided. This data can typically be found in the Soil Data Mart database located on the Montana Natural Resources Conservation Service website. To avoid runoff and/or direct discharge to groundwater, the application rate must not exceed the infiltration rate of the soil and a single application must not exceed one-half of the soil water holding capacity within the root zone. Table 121-6 presents effective rooting depth for some common crops.

Table 121-6 Typical Effective Rooting Depth of Plants[1]			
Plant	**Effective rooting depth, m (ft)**	**Plant**	**Effective rooting depth, m (ft)**
Alfalfa	1.2-2.0 (4-6)	Lettuce	0.3-0.6 (1-2)
Avocado	0.6-1.0 (2-3)	Melons	0.6-1.0 (2-3)
Barley	1.0-1.5 (3-5)	Potatoes	0.6-1.0 (2-3)
Beans	0.3-1.0 (1-3)	Safflower	1.5-2.0 (5-6)
Citrus	0.6-1.5 (2-5)	Sorghum	1.0-1.5 (3-5)
Corn	1.0-1.5 (3-5)	Strawberries	0.3-0.6 (1-2)
Deciduous Orchard	1.2-2.0 (4-6)	Sugar beet	1.0-1.5 (3-5)
Grains, small	1.0-1.2 (3-4)	Tomatoes	1.0-1.5 (3-5)
Grapes	1.0-2.0 (3-6)	Turf grass	0.2-0.5 (0.5-1.5)
Grass	1.0-1.2 (3-4)		

1 Adapted from Burt C.M. (1995) The Surface Irrigation Manual. Waterman Industries, Inc.

121.113 Irrigation Application Analysis

Justification and calculations associated with the hydraulic and nitrogen loading rates must be provided. The methods, procedures, and considerations published herein must be employed in the design process for the irrigation of wastewater.

The loading rates analysis generally follows the recommended methods and procedures outlined in the "Process Design Manual for Land Treatment of Municipal Wastewater Effluents" (EPA 625/1-81-013) published by the U.S. Environmental Protection Agency.

Where crop rotation is implemented, the hydraulic and nitrogen loading rate analysis must be done for each crop considered.

121.113.1 Annual Hydraulic Loading Rate

The design maximum irrigation application rates must be calculated for each month using hydraulic loading rates based on soil permeability (L_P) and nitrogen loading (L_N). The corresponding monthly value for L_P and L_N must be compared, with the lower of the two values used for design. The monthly hydraulic loading rates must be summed to yield the annual hydraulic loading rate (L_H).

121.113.11 Soil Permeability Calculations

The hydraulic loading rate based on soil permeability (L_P) is determined as:

$$L_P = (ETc - P + P_w)/SE \qquad (120\text{-}1)$$

where, L_P = Hydraulic loading rate, in/month (cm/month)
ETc = Crop evapotranspiration, in/month (cm/month)
P = Precipitation, in/month (cm/month)
P_w = Percolation rate, in/month (cm/month)
SE = Distribution system efficiency, fraction (0.70 to 0.85 for sprinklers)

a. Evapotranspiration (ETc)

Crop evapotranspiration, or consumptive water use, must be based on average regional values for the selected crop(s). This data is typically provided by local or regional field offices of the United States Department of Agriculture Natural Resources Conservation Service (NRCS), local field offices of the Cooperative Extension Service, or similar.

b. Precipitation (P)

Precipitation must be based on a 10-year precipitation return period as determined using the Weibull formula or other applicable probability method of analysis, with Department approval. The Weibull analysis is given as:

$$m = (n + 1) / 10 \qquad (120\text{-}2)$$

Where: m = ranking
n = the number of years of record.

Climate data for Montana communities can be found at http://www.wrcc.dri.edu

c. Percolation Rate (P_w)

The percolation rate is a function of the limiting permeability or hydraulic conductivity in the soil profile, not to exceed 4% to 10% of the soil permeability. Percentages on the lower end of the scale must be used for variable or poorly defined soil conditions. In determining soil permeability, actual values based on hydraulic conductivity field measurements should be used. If the soil permeability is variable over the site, an average permeability based on areas of different soil types must be determined.

The monthly percolation rate must take into account non-operational periods. At a minimum, consideration must be given to system startup and shutdown, maintenance, cropping/harvesting practices, and adverse weather (e.g. excessive wind, freezing temperatures, excessive precipitation).

The drying/wetting ratio must be no less than 3 to 1; however, the Department may require a larger ratio.

121.113.12 Nitrogen Calculations

With the exception of Class A-1 and Class B-1 waters (see Appendix B), to be exempt from a MGWPCS permit, the irrigation system must be designed for 100% uptake of total nitrogen with zero contribution of nitrogen to groundwater.

The hydraulic loading based on nitrogen limits (L_N) is determined as:

$$L_N = (U \times C) / [C_n(1 - f)] \qquad (120\text{-}3)$$

where, L_N = Hydraulic loading, in/month (cm/month)
U = Crop uptake as a function of yield, lb/acre•month (kg/ha•month)
C = Conversion constant, 4.41 (10)
C_n = Applied total nitrogen concentration, mg/L
f = Nitrogen loss factor

a. Crop Nutrient Uptake (U)

Guidance on crop selection for sites irrigated with reclaimed wastewater should be obtained from a qualified scientist such as a representative from NRCS, Cooperative Extension Service, or similar.

Whenever possible, the nutrient uptake rate and specific yield expected from a site must be based on information available from the local or regional NRCS field offices or from local field offices of the Cooperative Extension Service.

In the absence of site specific data, Table 121-7 must be used in determination of an expected crop nutrient uptake rate and specific yield.

Monthly crop uptake (U) values can be estimated by assuming that annual crop uptake is distributed monthly according to the same ratio of average monthly Etc to the total annual Etc.

Table 121-7
Yield Based N, P, and K Uptake of Various Crops

Crop	Dry Weight lb/bu	Typical Yield/acre-yr Plant Part	Percent of Dry Harvested Material N	P	K
Grain Crops					
Barley	48	50 bu	1.82	0.34	0.43
		1 ton straw	0.75	0.11	1.25
Buckwheat	48	30 bu	1.65	0.31	0.45
		0.5 tons straw	0.78	0.05	2.26
Corn	56	120 bu	1.61	0.28	0.40
		4.5 tons straw	1.11	0.20	1.34
Oats	32	80 bu	1.95	0.34	20.49
		2 tons straw	0.63	0.16	1.66
Rice	45	5,500 lbs	1.39	0.24	0.23
		2.5 tons straw	0.60	0.09	1.16
Rye	56	30 bu	2.08	0.26	0.49
		1.5 tons straw	0.50	0.12	0.69
Sorghum	56	60 bu	1.67	0.36	0.42
		3 tons straw	1.08	0.15	1.31
Wheat	60	40 bu	2.08	0.62	0.52
		1.5 tons straw	0.67	0.07	0.97
Oil Crops					
Flax	56	15 bu	4.09	0.55	0.84
		1.75 ton straw	1.24	0.11	1.75
Oil Palm	--	2,200 lbs	1.13	0.26	0.16
		5 tons fronds & stems	1.07	0.49	1.69
Peanuts	22-30	2,800 lbs	3.60	0.17	0.50
		2.2 tons vines	2.33	0.24	1.75
Rapeseed	50	35 bu	3.60	0.79	0.76
		3 tons straw	4.48	0.43	3.37
Soybeans	60	35 bu	6.25	0.64	1.90
		2 tons stover	2.25	0.22	1.04
Sunflower	25	1,100 lbs	3.57	1.71	1.11
		4 tons stover	1.50	0.18	2.92
Fiber Crops					
Cotton		600 lb Lint and 1,000 lb seeds,	2.67	0.85	0.83

Table 141.7
Yield Based N, P and K Uptake of Various Crops

Crop	Dry Weight lb/bu	Typical Yield/acre/yr & Plant Part	Percent of Dry Harvested Material N	P	K
		burs & stalks	1.75	0.22	1.45
Pulpwood		98 cords	0.12	0.02	0.06
		bark, branches	0.12	0.02	0.06
Forage Crops					
Alfalfa		4 tons	2.25	0.22	1.87
Bahiagrass		3 tons	1.27	0.13	1.73
Big bluestem		3 tons	0.99	0.85	1.75
Birdsfoot trefoil		3 tons	2.49	0.22	1.82
Bluegrass-pasted		2 tons	2.91	0.43	1.95
Bromegrass		5 tons	1.87	0.21	2.55
Clover-grass		6 tons	1.52	0.27	1.69
Dallisgrass		3 tons	1.92	0.20	1.72
Guineagrass		10 tons	1.25	0.44	1.89
Bermudagrass		8 tons	1.88	0.19	1.40
Indiangrass		3 tons	1.00	0.85	1.20
Lespedeza		3 tons	2.33	0.21	1.06
Little bluestem		3 tons	1.10	0.85	1.45
Orchardgrass		6 tons	1.47	0.20	2.16
Pangolagrass		10 tons	1.30	0.47	1.87
Paragrass		10.5 tons	0.82	0.39	1.59
Red clover		2.5 tons	2.00	0.22	1.66
Reed canarygrass		6.5 tons	1.35	0.18	
Ryegrass		5 tons	1.67	0.27	1.42
Switchgrass		3 tons	1.15	0.10	1.90
Tall fescue		3.5 tons	1.97	0.20	2.00
Timothy		2.5 tons	1.20	0.22	1.58
Wheatgrass		1 ton	1.42	0.27	2.68
Fruit Crops					
Apples		12 tons	0.13	0.02	0.16
Bananas		9,900 lbs	0.19	0.02	0.54
Cantaloupe		17,500 lbs	0.22	0.09	0.46
Grapes		12 tons	0.28	0.10	0.50
Oranges		54,000 lbs	0.20	0.02	0.21
Peaches		15 tons	0.12	0.03	0.19
Pineapple		17 tons	0.43	0.35	1.68
Tomatoes		22 tons	0.30	0.04	0.33
Silage Crops					
Alfalfa haylage (50%dm)		10 wet/ 5 dry	2.79	0.33	2.32
Corn silage (35%dm)		20 wet/ 7 dry	1.10	0.25	1.09
Forage sorghum (30%dm)		20 wet/ 6 dry	1.44	0.19	1.02
Oat haylage (40%dm)		10 wet/ 4 dry	1.60	0.28	0.94
Sorghum-sudan (50%dm)		10 wet/ 5 dry	1.36	0.16	1.45
Sugar Crops					
Sugarcane		37 tons	0.16	0.04	0.37
Sugar beets		20 tons	0.20	0.03	0.14
Tops			0.43	0.04	1.03
Turf Grass					
Bluegrass		2 tons	2.91	0.43	1.95
Bentgrass		2.5 tons	3.10	0.41	2.21
Bermudagrass		4 tons	1.88	0.19	1.40

Table 121-7 Yield Based N, P, and K Uptake of Various Crops					
Crop	Dry Weight lb/bu	Typical Yield/acre/yr Plant Part	Percent of Dry Harvested Material		
			N	P	K
Vegetable Crops					
Bell peppers		9 tons	0.40	0.12	0.49
Beans, dry		0.5 tons	3.13	0.45	0.86
Cabbage		20 tons	0.33	0.04	0.27
Carrots		13 tons	0.19	0.04	0.25
Cassava		7 tons	0.40	0.13	0.63
Celery		27 tons	0.17	0.09	0.45
Cucumbers		10 tons	0.20	0.07	0.33
Lettuce (heads)		14 tons	0.23	0.08	0.46
Onions		18 tons	0.30	0.06	0.22
Peas		1.5 tons	3.68	0.40	0.90
Potatoes		14.5 tons	0.33	0.06	0.52
Snap beans		3 tons	0.88	0.26	0.96
Sweet corn		5.5 tons	0.89	0.24	0.58
Sweet potatoes		7 tons	0.30	0.04	0.42
Table beets		15 tons	0.26	0.04	0.28

(1) Forest Crops

For forest crops, biomass production and nutrient uptake are relatively slow during the initial stages of growth (1 to 2 years) as tree seedlings are establishing a root system. To prevent leaching of nitrogen to groundwater during this period, nitrogen loading must be limited, or understory vegetation must be established that will take up and store applied nitrogen that is in excess of the tree crop needs.

In the absence of site specific data, Table 121-8 must be used in determination of an expected tree nutrient uptake rate. With respect to hybrid and other unique tree farms, data may need to be obtained from similar operations in other locations with similar climatic conditions.

Table 121-8 Nitrogen Uptake for Selected Forest Ecosystems with Whole Tree Harvesting		
	Tree Age, Years	Average Annual Nitrogen Uptake lb/(acre-year)
Western forests:		
Hybrid poplar[a]	4-5	270
Douglas fir plantation	15-25	200

a Short-term rotation with harvesting at 4 to 5 years; represents first-growth cycle from planted seedlings.

*lb/acre-yr = 1.12 kg/ha-yr.

The nitrogen stored within the biomass of trees is not uniformly distributed among the tree components, therefore the amount of nitrogen that can actually be removed from a forest crop system is dependent on the components of the tree that are harvested. Only in a whole-tree harvesting operation can 100% of the nitrogen uptake be assumed. The distributions of biomass and nitrogen for naturally growing hardwood and conifer (pines, Douglas-fir, fir, larch, etc.) stands in temperate regions are shown in Table 121-9.

Table 121-9
Biomass and Nitrogen Distributions by Tree Component for Stands in Temperate Regions

Tree Component	Conifers		Hardwoods	
	Biomass	Nitrogen	Biomass	Nitrogen
Roots	10%	17%	12%	18%
Trunks	80%	50%	65%	32%
Branches	8%	12%	22%	42%
Leaves	2%	20%	1%	8%

(2) Grazing Operations

Where an irrigation site is used for grazing, nutrient contribution from manure must be accounted for in the overall nitrogen loading to the site. The nutrient loading from various animal wastes should be based on the values listed in Table 121-10.

Table 121-10
Animal Waste Characterization[1]
(per 1000 pounds livestock live weight)

Animal	Nitrogen (lb/day)	Phosphorous (lb/day)	Potassium (lb/day)
Dairy Cow	0.45	0.07	0.27
Beef	0.31	0.11	0.24
Goat/Sheep[2]	0.45	0.07	0.30
Horse	0.28	0.05	0.19

1. Source: USDA Agricultural Waste Management Field Handbook.
2. Source: ASAE Manure Production and Characteristics. ASAE D384.1 Feb03

Not all nitrogen in land-applied manure is available to the crop during the year of application. Organic material decomposition is required before it is made available for plants. A percentage of last year's nitrogen and an even smaller percentage of the previous year's nitrogen will become plant-available during the current crop season. Therefore, mineralization rates as specified in Table 121-11 should be used to determine the amount of nitrogen available from previous manure application(s).

Table 121-11 **Mineralization Rates**[1]			
Type of Waste	1st Year after Application Fraction Available	2nd Year after Application Fraction Available	3rd Year after Application Fraction Available
Fresh Cattle Manure	0.65	0.04	0.02
Fresh Sheep and Horse	0.55	0.06	0.02

1. Source: NRCS Specification MT633-JS1, September 2004.

Cattle, sheep, etc. must not be allowed on wet fields to avoid severe soil compaction and reduced soil infiltration rates. It is recommended that 4 to 7 days of drying time be allowed following an application before livestock are returned to the pasture. Pasture rotation should be practiced so that wastewater can be applied immediately after the livestock are removed.

In general, the pasture area should not be grazed longer than 7 days. Typical regrowth periods between grazings range from 14 to 36 days.

(3) Additional Nitrogen Sources

Where supplemental nitrogen is applied to the irrigation site (i.e., fertilizer) the amount of nitrogen removed through crop uptake (U) must be reduced by the additional nitrogen load. Where turf grass is mulched (e.g., golf courses) it must be assumed that 25% of the nitrogen in the mulched grass is returned to the soil.

b. Total Nitrogen Concentration (C_n)

When existing effluent nitrogen data is not available, the effluent total nitrogen concentration for wastewater treatment ponds must be based on the following:

$$C_n = (N_o)e^{-0.0075(t)} \qquad (120\text{-}4)$$

where, C_n = Total nitrogen concentration, mg/L
N_o = Influent nitrogen concentration, mg/L
t = Minimum detention time in treatment/storage ponds, \ days

c. Nitrogen Loss (f)

In accounting for nitrogen losses due to denitrification, volatilization, and soil storage, the nitrogen loss factor (f) must not exceed 0.2 for secondary treatment effluent and 0.1 for effluent from facilities utilizing nutrient removal methods in their treatment process.

121.113.13 Additional Nutrient Considerations

Phosphorus and potassium are considered essential macronutrients and are required at moderately high levels to support a healthy crop. Table

121-7 shows the phosphorus and potassium needs for various crops. Crop requirements for phosphorus and potassium must be addressed in the nutrient management plan (Section 121.122).

a. **Phosphorus**

When required by the Department, a phosphorus breakthrough analysis must be performed to ensure breakthrough to the nearest down gradient surface water will not occur within 50 years. The results of this analysis must be submitted to the Department.

b. **Potassium**

Potassium is an essential nutrient required for vegetative growth. However, reclaimed wastewater does not typically contain sufficient levels in the optimum combination with nitrogen and phosphorus (see Table 121-7 for crop requirements). Therefore, it may be necessary to add supplemental potassium to maintain nitrogen removals at the optimum level.

121.114 Irrigation Area Analysis

Justification and calculations associated with irrigation land area requirements must be provided as indicated below.

121.114.1 Required Land Area

The required land area for irrigation can be determined from the design hydraulic loading rate according to the following equation:

$$A = (Q + \Delta V_s) / (C \times L_H) \qquad (120\text{-}5)$$

where, A = Field area, acre (ha)
Q = Annual average daily flow, ft^3/yr (m^3/yr)
V_s = Net loss or gain in stored wastewater volume due to precipitation and evaporation at storage pond(s), ft^3/yr (m^3/yr)
C = Conversion constant, 3,630 (100)
L_H = Annual design hydraulic loading rate as defined in Section 121.103.1(Annual Hydraulic Loading Rate), in/yr (cm/yr)

Additional land area must be accounted for as a result of buffer zone requirements described in Section 121.4 (Buffer Zone).

121.114.2 Slope

Design slopes must be less than 15 percent to promote infiltration rather than surface runoff.

121.115 Storage Analysis

Adequate storage during inoperable periods must be provided. Justification and calculations associated with storage volume requirements must be provided including a month by month water balance based on maximum design conditions.

Design precipitation must be based on a 10-year precipitation return period as described in Section 121.103.11 b (Precipitation). Storage requirements for wastewater treatment ponds are located in Section 93.36 (Pond Design Criteria, Tables 93-1 and 93-2).

Evaporation (E) rates must be based on estimated lake evaporation in the local area, if available. Where monthly evaporation data is unavailable, average annual evaporation may be distributed based on the ratio of average monthly ETc to average annual ETc.

Average annual evaporation and monthly precipitation values for Montana communities can be found at the Western Regional Climate Center website.

Storage ponds are exempt from the requirements of Section 93.26 (Water Well Separation) provided the content has been treated to the levels established in Table 121-1 (Reclaimed Wastewater Classifications and Associated Treatment Requirements) and has been adequately disinfected. Wastewater is considered adequately disinfected if the geometric mean number of *E. coli* in the influent flow to the storage pond does not exceed 630 colony forming units per 100 milliliters and 10% of the total samples does not exceed 1,260 colony forming units per 100 milliliters during any 30-day period.

121.116 Crop Management

The crop must be harvested and removed from the irrigation site or used for grazing. Mulching is allowed for turf grass only.

A crop management plan must be developed and submitted to the Department for approval in accordance with Section 121.122 (Plan of Operation).

The Department may require on-going soil monitoring to be performed to substantiate agronomic use of nutrients as a condition of approval.

121.117 Supplemental Water

The crop must be effectively managed to maintain a harvestable crop as long as treated wastewater effluent is applied. In some situations, this may require use of a supplemental water source. Application of additional water must not exceed agronomic uptake or result in leaching of nutrients below the root zone. Where supplemental water will be utilized, the volume needed, nutrient make-up, and salinity impacts must be addressed in the nutrient management plan (Section 121.122).

~~B.8~~ 121.12 OPERATION AND MAINTENANCE ~~MANUAL~~ PROCEDURES

~~An Operation and Maintenance Manual must be submitted, including operating procedures for:~~

~~B.81 Cold weather operation.~~

~~B.82 Responsibility of operation. Where spray irrigation is part of the treatment process, the wastewater system operator must make the final decision on when spray irrigation may proceed. Safe operating practices must be described and encouraged.~~

~~B.83 Maximum allowable wind velocity during operation. In general, the maximum is 25 mph, however, the reviewing authority may require a lower maximum limit.~~

~~B.84 Drying/wetting ratio. The drying/wetting ratio must generally be no less than 3 to 1. However, the reviewing authority may require a larger ratio.~~

~~**B.85** Monitoring of groundwater. Monitoring data may be required by the reviewing authority on a case-by-case basis. Consideration will be given to groundwater characteristics, past practices, depth to groundwater, cropping practices, etc. when determining the need for monitoring. Procedures for collection and analyses of samples must be provided.~~

~~**B.86** Effluent must be monitored on a regular basis to show the biochemical and bacteriological quality of the applied wastewater. The reviewing authority will determine the monitoring frequency on a case-by-case basis. The frequency, parameters and procedures for monitoring must be included in the Operation and Maintenance Manual.~~

~~**B.87** The O&M manual must include instructions for development of an operating plan for the irrigation system including cropping practices, nutrient loading, water balances, etc. giving consideration to the agronomic practices applicable to a specific site.~~

~~B.9 CONTROL OF IRRIGATED LAND~~

~~When the spray field is not owned by the party irrigating, a 20 year lease or similar assurance must be negotiated in order to ensure control of irrigated land. A copy of the signed lease must be submitted to the reviewing authority.~~

~~B.10 ENCOURAGED PRACTICES~~

~~The following practices are encouraged:~~

~~**B.101** Cultivation of trees and shrubs to serve as a screen around the spray field.~~

~~**B.102** The use of low trajectory nozzles on spray irrigation equipment as a measure to reduce airborne aerosols.~~

Operation and maintenance procedures for the irrigation system must be approved by the Department prior to plan and specification approval and incorporated into the treatment system's final O&M manual (see Section 25 Operation & Maintenance Manual). These procedures must contain information that addresses the following:

121.121 Startup and Shutdown Procedures of the Irrigation System

Startup and shutdown of the irrigation system, including cold weather operation, must be described.

121.122 Nutrient Management Plan

A nutrient management plan (NMP) must be developed in order to remain in compliance with the approved design. At a minimum, the NMP must include the following:

a. Requirements for training of the system operator prior to start up.

b. A site map and a soil map of the irrigation area. The site map must show the location of the irrigation site(s) and buffer zone(s) as well as identify sensitive resource areas within 500 feet of the application site(s) (wetlands, surface water, wells, roads, buildings, property lines, etc.). The soil map must include soil survey geographic (SSURGO) mapping units or similar means of identification and the map unit name and symbol for all soil types at the irrigation site.

c. A crop management plan including planting techniques, schedules, anticipated crops, current and planned crop production sequence, crop rotation, harvesting plan (method, timing, etc.), expected yield, etc.

It is recommended that consultation with the United States Department of Agriculture Natural Resources Conservation Service (NRCS), local offices of the Cooperative Extension Service, or similar should be held to aid in the development of an appropriate crop management plan. A summary of this consultation must be submitted to the Department.

d. Land/soil management plan (e.g., soil testing, tilling, disking, salinity mitigation measures, etc.).

e. Quantification of all essential macronutrient (i.e., nitrogen, phosphorus, and potassium) sources available and crop requirements. Nutrient contributions from all sources (including fertilizer, manure, mulching, etc.) must be accounted for in application rate calculations.

f. Proposed application rates (including supplemental water), timing, and method of irrigation.

g. The development of an agricultural pest control program (e.g., weeds, insects, etc.), if needed. At a minimum, contact information for state and local pest control experts must be provided.

h. Best-management-practices (BMPs), if necessary, to prevent run-off to surface water.

121.123 Record Keeping Protocol

Data sheets to record the frequency, parameters and procedures for effluent (and groundwater, if required) monitoring must be provided. At a minimum, the following procedures and requirements must be incorporated into record keeping of irrigation practices:

a. Irrigation water quantity and quality must be documented.

1. The amount of water applied on a daily basis (reclaimed or supplemental) must be logged and the basis for this quantity must be documented (e.g. meter reading or pump times and pump rates).
2. Effluent must be monitored to show the biochemical and bacteriological quality of the applied wastewater. See Table 121-1 for sampling and monitoring requirements.

b. The level of the water in the storage cell must be recorded at a minimum on a monthly basis.

c. Estimated daily irrigated area must be logged.

d. When required by the Department, soil monitoring test results and mitigation activities must be documented. The Department will determine what parameters and the monitoring frequency on a case-by-case basis. See Section 121.112.2 (Soil Management, Monitoring, and Testing) and Section 121.112.3 (Sodium Adsorption Ratio and Salinity Considerations).

e. Groundwater monitoring activities and test results must be documented, if applicable.

f. Actual crop production (i.e. crop yield) must be recorded.

g. Weather events, such as rainfall or freezing temperatures must be documented during irrigation periods and that the application rates were reduced or stopped during these conditions.

h. Operation and maintenance activities must be logged.

i. Records of correspondence with local, state, and federal agencies must be maintained.

121.124 Responsibility of Operation

Irrigation is considered part of the wastewater treatment process; therefore, the wastewater system operator must make the final decision on when irrigation may proceed. Safe operating practices must be described and encouraged.

~~**APPENDIX D**~~

122. STANDARDS FOR RAPID INFILTRATION ~~BASINS~~ SYSTEMS

~~D.1~~ 122.1 General

~~These standards should be used for the design and review of projects involving rapid infiltration (RI) or infiltration/percolation (I/P) cells for the land application of effluent from a domestic wastewater treatment facility. It was assumed in the development of these standards that the industrial component of the influent wastes is relatively small, with the discharge of toxic substances regulated by an effective pretreatment program. If significant industrial users discharge to the system, additional requirements may be imposed.~~

~~Systems using rapid infiltration basins may be required to obtain a groundwater discharge permit from the regulatory agency. In addition, if the groundwater discharge is hydrologically connected to a surface water, a Montana Pollutant Discharge Elimination System permit may be required.~~

Rapid Infiltration (RI) systems are utilized for the disposal of treated effluent to groundwater. The use of an RI system requires that the industrial component of the wastewater be relatively small, with the discharge of toxic substances regulated by an effective pretreatment program. If significant industrial users discharge to the system, additional requirements may be imposed by the Department.

RI systems, as discussed in this chapter, consist of the controlled application of wastewater to either open shallow earthen basins (commonly referred to as infiltration/percolation (I/P) basins), or subsurface absorption cells. The use of subsurface absorption cells will be considered by the Department on a case-by-case basis and only when a high quality effluent is discharged.

All RI systems owners must obtain a groundwater discharge permit (MGWPCS) from the Department in advance of constructing any RI system unless the system qualifies for one or more of the exemptions defined within ARM 17.30.1022 of the Administrative Rules of Montana relative to the facility. If it is determined that the groundwater beneath the proposed RI site is hydrologically connected to surface water, then the discharge will be considered the same as a surface water discharge and a Montana Pollutant Discharge Elimination System (MPDES) permit will be required by the Department.

~~D.2~~ 122.2 Pre-Application Treatment Requirements

At a minimum, treatment comparable to secondary treatment must precede all rapid infiltration applications.

122.21 Infiltration/Percolation Basins

For ~~RI applications~~ I/P basins following ~~lagoon~~ wastewater treatment pond systems, ~~preapplication~~ treatment must be provided in accordance with ~~to Section 93, Tables 93-1 and 93-2~~ the applicable table in Section 93.36 (Pond Design Criteria).

Algae from lagoons or storage ponds can inhibit infiltration rates as well as result in the rapid fouling of the I/P basins. To minimize problems associated with algae, the withdrawal structure in the final treatment pond should be designed with multiple takeoffs.

122.22 Subsurface Absorption Cells

For subsurface absorption cells, only high quality effluent meeting the following parameters must be discharged:

BOD_5	< 10 mg/L
TSS	< 10 mg/L
Turbidity	<5 NTU
Total N	< 5 mg/L

These systems must be designed to discharge rapidly and in a manner to prevent plugging or biofouling. Cleanout ports or other access must be provided to allow for cleaning and maintenance.

~~D.3~~ 122.3 Preliminary Design Report

A comprehensive ~~preliminary~~ design report must be submitted to the ~~reviewing authority~~ Department prior to the ~~final~~ design phase. In addition to the requirements outlined in Chapter 10 (Engineering Reports and Facility Plans), the preliminary design report must include the following:

1. Field observations of exposed soil profiles (on and near the site) to include road cuts, borrow pits, and plowed fields.
2. Field observation of groundwater indicators: wet spots, seepage areas, vegetation changes, ponds and streams, and general drainage characteristics within 500 feet of the application site.
3. Backhoe test pit results, to 10 feet, in the major soil types on the proposed site with special consideration ~~should be~~ given to ~~the evaluation of the~~ soil characteristics ~~of the soil near the surface of the proposed basin~~ and the elevation of the groundwater on the site.
4. Water levels in adjacent or on-site wells and nearby surface waters should be used to prepare a preliminary water table map. Include flow direction, depth, and discharge areas for groundwater and the re-charge characteristics for the site.
5. Included in the preliminary design report should be information describing the quality of the groundwater, current nitrate levels, its uses and classification.
6. Calculations supporting the proposed hydraulic loading ~~to the cell~~, including ~~analyses of~~ depth to groundwater, groundwater quality, aquifer thickness, groundwater mounding potential, nitrate loading to groundwater, percolation rates and cycle times. Groundwater mounding must not be allowed to reach the surface using historical depth to groundwater records, where the shallowest depth is used in the mounding analysis.

7. Winter time storage requirements if necessary.

8. Chemical characteristics and compatibility of the soil and wastewater~~, predicted organic and nutrient removal rates~~.

9. A preliminary layout of the proposed ~~basins~~ RI system showing dimensions of the ~~cells~~ application area and its proximity to wells, seeps, springs, lakes and streams.

~~10. A preliminary cost breakdown of the proposed basins and storage cells if required.~~

When gathering specific data for the preliminary design report, consideration should be given to final design requirements outlined in Sections 122.4 (Site Selection) and 122.5 (Site Investigation).

~~D.4~~ 122.4 Site Selection

~~D.41~~ a. The site location must be selected so that the ~~basins are~~ RI system is protected from flooding and must not be located in the 100-year flood plain.

~~D.42~~ b. ~~If the groundwater beneath the proposed RI site is hydrologically connected to surface water, then the discharge will be considered the same as a surface water discharge and surface water standards will apply.~~

The location of RI systems must be a minimum of 500 feet from water supply wells. The Department may require an increased setback distance and a hydrological analysis when the time of travel "zone of influence" between a proposed RI system and a water supply well is less than 200 days (which may pose public health concerns).

~~D.43~~ c. The operation of an RI system on the proposed site ~~may~~ must not affect any existing or anticipated uses of groundwater or surface water.

~~D.5~~ 122.5 Site Investigation

~~D.51~~ Final field testing must be conducted on the actual site and at the actual depth in the soil profile intended for the RI system. Extrapolation of data from nearby sites is not an acceptable basis for design.

~~D.52~~ 122.51 Soils Investigation

~~D.521~~ a. Sufficient information on soil gradation, plasticity, texture, moisture, and structural characteristics should be obtained to thoroughly evaluate the permeability and drainage characteristics of the site.

~~D.522~~ b. Test pits and borings are required on all sites proposed in the final design. The number of pits and borings depends on the uniformity of the soils in the area. However, enough test pits must be dug and enough borings drilled to adequately characterize the soil profile and soil characteristics of the entire site. Generally, a grid-type approach must be used to establish the test pit locations. A minimum of one test pit is required within each I/P basin or subsurface cell location.

~~D.523~~ c. Infiltration and permeability tests must be conducted *in-situ* at the proposed site. ~~whenever possible. Laboratory permeability tests may be allowed in certain limited situations.~~ Sufficient wetting and drying cycles should be used so that conditions similar to the proposed conditions of the RI ~~cell~~ system can be evaluated.

~~D.524~~ d. A phosphorous break-through analysis must be performed for each major soil type within the site. The analysis must include a phosphorous adsorption test.

~~D.6~~ 122.6 Loading Rates

~~D.61~~ a. The hydraulic loading rate must be based directly upon the field and laboratory test results for infiltration, permeability, ~~and~~ hydraulic conductivity, and transmissivity.

~~D.62~~ b. Hydraulic conductivity must be based on the layer of soil that is most restrictive of water flow. If there is not an obvious restricting layer in the soil profile, then the effective hydraulic conductivity of the profile is the mean of the values observed in the tests. Soil permeability (or hydraulic conductivity) should be greater than 0.6 in/hr for a site to be considered for RI.

~~D.63~~ c. ~~A percentage of the effective hydraulic conductivity must be used as the design loading rate. This percentage must be based on the following table.~~ The design loading rate must be based on a percentage of the minimum measured hydraulic loading rate as shown in Table 122-1.

Table 122-1
Hydraulic Loading Rates

Test Procedure [1]	Adjustment Factor for Annual Loading Rate
Basin Flooding Test	~~10-15~~ 7 - 10% of ~~"effective" rate observed~~ minimum measured infiltration rate
Air entry permeameter & cylinder infiltrometers	2 - 4% of ~~"effective" rate observed~~ minimum measured infiltration rate
~~Laboratory permeability measurements~~	~~4 - 10% of "effective" rate observed or of restricting soil layer.~~

1. The methodology for these test procedures are included in the EPA Process Design Manual Land Treatment of Municipal Wastewater Effluents, (EPA/625/R-06/016) September 2006, pp 3-12 to 3-18

~~D.64~~ d. Hydraulic loading rate must be given in gal/(yr ft^2). The annual loading rate must be reduced to account for periods when ~~RI cells~~ I/P basins cannot be used, such as when the ground is frozen or during maintenance periods.

~~D.7~~ 122.7 Maximum Groundwater Elevation

There must be, at all times, an unsaturated zone between the bottom of the RI ~~basin~~ system and the maximum groundwater surface as determined by a groundwater mound analysis. This analysis must be performed by a qualified hydrogeologist.

~~D.8~~ 122.8 Underdrains

Underdrains may be required to control groundwater mounding and to prevent surfacing of infiltrated wastewater. The discharge from underdrains which collect treated effluent from RI systems will be considered the same as a surface water discharge, and surface water standards will apply.

~~D.9~~ 122.9 Wet/Dry Ratios

~~Wet/dry ratios appropriate for the treatment goals must be used. Special consideration should be given in the design phase to allow enough~~ Adequate drying time between applications must be provided to prevent soil clogging. To maximize infiltration rates, the wetting/drying periods shown in Table 122-2 should be utilized.

Table 122-2 I/P Loading Cycles[1]		
Season	Application Period, days	Drying Period, days
Summer	1-3	4-5
Winter	1-3	5-10

1. Source: Table 10-8 in the "Process Design Manual for Land Treatment of Municipal Wastewater Effluents" (EPA 625/R-06/016) published by the U.S. Environmental Protection Agency

~~D.10~~ 122.10 Application Rates

Application rates must be based on the annual hydraulic loading rate, time available for application, wet/dry ratios, nondegradation and other applicable water quality regulations for groundwater and surface water. For subsurface absorption cells application rates must be designed to allow for complete drainage of the area between dosings.

~~D.11~~ 122.11 Number of Basins/Cells

In determining the number of ~~RI cells~~ I/P basins or subsurface cells to use, consideration must be given to drying time ~~for the cells and for the maintenance of cells~~, if applicable, and to maintenance activities without disrupting the continual operation of the treatment works. At a minimum, three I/P basins or subsurface absorption cells must be provided.

For I/P basins, Table 122-3 should be used to determine the minimum number of basins required for continuous wastewater application.

Table 122-3 Minimum Number of Basins[1]		
Loading Application Period, days	Cycle Drying Period, days	Minimum Number of Infiltration Basins
1	5-7	6-8
2	5-7	4-5
1	7-12	8-13
2	7-12	5-7
1	4-5	5-6
2	4-5	3-4
3	4-5	3
1	5-10	6-11
2	5-10	4-6
3	5-10	3-5
1	10-14	11-15
2	10-14	6-8
1	12-16	13-17
2	12-16	7-9
7	10-15	3-4
8	10-15	3
9	10-15	3
7	12-16	3-4
8	12-16	3
9	12-16	3

1. Source: Table 10-9 in the "Process Design Manual for Land Treatment of Municipal Wastewater Effluents" (EPA 625/R-06/016) published by the U.S. Environmental Protection Agency

~~D.12~~ 122.12 Inlet Structures

Inlet structures must be provided for all basins and designed to prevent erosion of the basin or adjacent dike. At a minimum, concrete splash pads are required for I/P basins.

For subsurface cells, the distribution laterals must extend the entire length of the cell and be structurally sound for their intended use. Where open-bottom chambers are used they must consist of high-density polyolefin or other approved material. Products must maintain at least 90 percent of their original height (vertical deflection shall not exceed 10 percent of original product height) when installed according to manufacturer's installation guidelines and subjected to a 4,000-pound axle load. Vertical deflection is the combined product height deflection due to installation (soil dead load) and the 4,000-pound axle load measured when the tire is directly over the product.

~~D.13~~ 122.13 Flow Distribution

~~D.131~~ a. Influent wastewater should be distributed uniformly over the entire ~~basin~~ RI system area.

~~D.132~~ b. ~~Interpond or~~ Flow control structures must be provided as necessary to adequately direct and control wastewater flow to any individual RI ~~basin~~ system discharge area.

~~D.14~~ 122.14 Storage Requirements

Where ~~the RI~~ I/P basins will not perform satisfactorily during the winter months, provisions for storing the wastewater during that period ~~are required~~ must be provided. Emergency/winter storage requirements for I/P basins are listed in Section 93.36 (Pond Design Criteria).

~~D.15~~ 122.15 ~~DIKES~~ I/P Basin Embankments

~~D.151~~ a. ~~Minimum dike slope is 3:1~~ Slopes must not be steeper than 1 vertical to 3 horizontal (1:3).

~~D.152~~ b. ~~Dike height must be sufficient to prevent washout from wind-induced waves. However, dikes may not be excessively high so that erosion of the soil fines from runoff is kept to a minimum.~~ All embankments must be protected from erosion caused by wave action, weather, or flooding through seeding, rip-rap, or other acceptable method of erosion control.

c. An access road/ramp must be provided to each basin so that maintenance equipment for surface scarification may enter. Each access road/ramp must be a minimum of 10 feet (3.0 m) wide.

~~D.16~~ 122.16 Overflow Protection

Overflow protection must be provided for all ~~RI~~ I/P basins to prevent washout of the ~~dikes~~ embankments. Overflow pipes must be inter-cellular and may not discharge outside of the basin area.

~~D.17~~ 122.17 Construction Practices

~~D.171~~ a. RI ~~basins~~ systems may not be constructed on backfilled materials without specific approval by the ~~reviewing authority~~ Department.

~~D.172~~ b. The final surface of the RI ~~basin~~ system must be uniformly graded to allow even distribution of the wastewater and utilization of the entire soil profile for ~~treatment~~ infiltration.

~~D.173~~ c. Every effort must be made to avoid compaction of the treatment/infiltration area within the I/P basins or subsurface absorption cells. The I/P basin bottom surface must be scarified prior to facility start-up.

d. For subsurface RI systems the maximum spacing between distribution laterals, measured on center, must be 30 inches or 1.5 times the width of the open-bottom chamber. It is recommended that the burial depth of the distribution laterals be no greater than 3 feet for maintenance purposes. A minimum of two distribution laterals must be provided for each subsurface infiltration area.

~~D.18~~ 122.18 Groundwater Monitoring

~~A minimum of three groundwater monitoring wells must be installed near the RI basins. One of the wells must be placed upgradient (with respect to groundwater flow) and two wells must be placed downgradient from the RI site.~~ Groundwater monitoring wells must be installed near the RI system. The number and placement of the wells will be determined by the Department, or as required in the groundwater discharge permit.

~~D.19~~ 122.19 ~~ACCESS~~ Fencing

The ~~RI~~ I/P basin site must be enclosed with a fence and posted with signs designed to discourage the entrance of unauthorized persons and animals. Access gates must be secured with locks and be of sufficient width to accommodate mowing and scarification equipment.

122.20 Cold Weather Operation

Pumps, piping, and valves must be protected from freezing.

APPENDIX A

HANDLING AND TREATMENT OF SEPTAGE AT A WASTEWATER TREATMENT PLANT

A.1 GENERAL

One method of septage disposal is the discharge to a municipal or district wastewater treatment plant (WWTP). ~~The handling and treatment of septage received at a WWTP is the subject of this appendix.~~ All plants require special design considerations prior to the acceptance of septage.

A.11 Septage Defined

Septage is a general term for the contents removed from septic tanks, portable vault toilets, privy vaults, holding tanks, grease traps, very small wastewater treatment plants, or semi-public facilities (i.e., schools, motels, mobile home parks, campgrounds, small commercial endeavors) receiving wastewater from domestic sources.

Non-domestic (industrial) wastes are not included in the definition and are not covered by this appendix.

Contents from grease traps should not be hauled to most municipal wastewater treatment plants for disposal.

A.12 Septage Characteristics

Compared to raw ~~domestic wastewater~~ public sewage from a conventional municipal sewer collection system, septage usually is quite high in organic, grease, and solids concentrations. Substantial quantities of phosphorus, ammonia nitrogen, bacterial growth inhibitors, and cleaning materials may be present in septage depending on the source. Tables No. 1 and No. 2 (Table 3-4 and 3-8 from the U.S. EPA handbook entitled "Septage Treatment and Disposal" 1984, EPA-625/6-84-009 reprinted herein) give a comparison of some of the common parameters for septage and municipal wastewater.

Data for local septage to be received should be collected for design of septage receiving and treatment systems. Characteristics of septage may be expected to vary widely from load to load depending on the source (i.e., septic tank pumpage compared to grease traps or to recreational vehicles, or dump station holding tanks containing bacteria inhibitors).

A.2 TREATEMENT OF SEPTAGE AT A WWTP

Septage is normally considered treatable at a WWTP with the exception of facultative lagoons. However, unless proper engineering planning and design ~~is~~ are provided, septage may represent a shock load~~ing~~, or have other adverse impacts on plant processes and effluent quality which will be influenced by many factors including the following:

A.21 Capacity (MGD) (m^3/d) of the WWTP relative to the amount and rate of septage feed to the plant;

A.22 Unused WWTP capacity available (above current sewer collection system loadings) to treat septage loadings;

A.23 Sensitivity of the treatment plant process to daily fluctuations in loadings brought about by the addition of septage;

A.24 ~~Sludge~~ Slug septage load~~ing~~s of BOD, ammonia, ~~or~~ phosphorus or other chemical agents which may pass through to the effluent, cause process upset, ~~pass through to effluent,~~ odor nuisance ~~or other problems such as foaming aeration tank/aerated digester;~~ ,foaming within the aeration tank/aerated digester, or other problems;

A.25 The point of introduction of the septage into the WWTP process. ~~Feasible alternative points of feed to the WWTP units must be evaluated including feed to the sludge processing units provided the unit function will not be adversely affected;~~ The point of introduction should be upstream of the headworks or into the headworks. Alternative points of introduction into the WWTP process may be allowed with adequate justification;

A.26 The ability to control feed rates of septage to the WWTP during off peak loading periods; and

A.27 The volume and concentrations of bacterial growth inhibitors in septage from some portable vault toilets and recreational dump station holding tanks~~; and~~.

~~A.28~~ The permitted plant effluent regulatory limits for WWTP on each of the controlled parameters must be considered when evaluating these factors.

A.3 ~~WWTP FACILITIES CONSIDERED~~ CONSIDERATIONS FOR SEPTAGE TREATMENT AT WASTEWATER TREATMENT FACILITIES

It is essential that an adequate engineering evaluation be made of the existing WWTP and the anticipated septage loading being considered prior to receiving septage at the WWTP. The regulatory agency must be contacted to obtain the appropriate approvals prior to the acceptance of septage. For proposed WWTP expansion and upgrading, the engineering report or facility plan (refer to Chapter 10 Engineering Report and Facility Plans) must include anticipated septage loading in addressing treatment plant sizing and process selection. The following items should be included as appropriate in the engineering evaluation and facility planning:

A.31 The uninterrupted and satisfactory treatment (within the plant regulatory limits) of waste loads from the sewer system must not be adversely affected by the addition of septage to the plant;

A.32 In general, the smaller the WWTP design capacity relative to the septage loading proposed, the more subject the WWTP will be to upset and potential violation of permitted discharge effluent limits;

A.33 Allocation of organic plant capacity originally planned for future growth;

A.34 For plants to be expanded and upgraded, the engineering evaluation and facility planning should jointly consider the sensitivity of the WWTP process to receiving of septage, and the impact on the discharge parameter limits;

A.35 An evaluation should be made of available WWTP operator staff and the staffing requirements necessary when septage is to be received. Staff should be present when septage is being received and unloaded. Added laboratory work associated with the receiving of septage for treatment should be included in the staffing evaluation;

A.36 ~~The space for constructing~~ Septage receiving facilities ~~that are to~~ should be off-line from the raw wastewater incoming from the sewer system and be designed to allow for the slow release of the septage into the treatment system during non-peak periods. Selection of the location of the septage receiving facility and the septage hauler unloading area should consider other plant activity, and traffic flow; and

A.37 The impact of the septage handling and treatment on the WWTP sludge handling and processing units and ultimate sludge disposal procedures.

A.4 ~~WWTP~~ SEPTAGE RECEIVING FACILITY DESIGN CRITERIA

The design of the septage receiving station at the WWTP should provide for the following elements:

A.41 A hard surface haul truck unloading ramp sloped to a drain to allow ready cleaning of any spillage and washing of the haul tank, connector hoses, and fittings. The ramp drainage must be tributary to treatment facilities and must exclude excessive stormwater;

A.42 A flexible hose fitted with ~~easy~~ quick connect coupling to provide for direct connection from the haul truck outlet to minimize spillage and help control odors;

A.43 Washdown water with ample pressure, hose, and spray nozzle for convenient cleaning of the septage receiving station and haul trucks. The use of ~~chlorinated~~ disinfected WWTP effluent may be considered for this purpose. If a potable water source is used, it must be protected in accordance with Section 56.2 (Water Supply); ~~of these Recommended Standards;~~

A.44 An adequate off-line septage receiving tank should be provided. Capability to collect a representative sample of any truck load of waste accepted for discharge ~~at~~ to the WWTP must be provided. The receiving tank should be designed to provide complete draining and cleaning by means of a sloped bottom equipped with a drain sump. The design should give consideration to adequate mixing, for testing, uniformity of septage strength, and chemical addition, if necessary, for treatability and odor control. The WWTP must have authority to prevent and/or stop discharge that is likely to cause a WWTP discharge violation;

A.45 Screening, grit, and grease removal of the septage as appropriate to protect the WWTP treatment units;

A.46 Pumps provided for handling the septage should be of the non-clogging design and capable of passing 3-inch (76.2 mm) diameter solids;

A.47 Valving and piping for operational flexibility to allow the control of the flow rate and point of discharge of the septage to the WWTP;

A.48 Safety features to protect the operational personnel. Refer to Section 57 (Safety); ~~and~~

A.49 Laboratory and staffing capability to determine the septage strength and/or toxicity to the WWTP treatment processes. Provision for the WWTP operation reports to include the plant load attributed to septage; and

A.50 Septage receiving stations should be designed with a key pad, card reader or other device capable of recording the source of septage.

APPENDIX A
TABLE NO. 1*

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SEPTAGE, AS FOUND IN THE LITERATURE, WITH SUGGESTED DESIGN VALUES [a, b]

	United States ~~(5) (9-19)~~				Europe/Canada ~~(4) (20)~~					
Parameter	Average	Minimum	Maximum	Variance	Average	Minimum	Maximum	Variance	EPA Mean	Suggested Design
TS	34,106	1,132	130,475	115	33,800	200	123,860	619	38,800	40,000
TVS	23,100	353	71,402	202	31,600	160	67,570	422	25,260	25,000
TSS	12,862	310	93,370	301	45,000	5,000	70,920	14	13,000	15,000
VSS	9,027	95	51,500	542	29,900	4,000	52,370	13	8,720	10,000
BOD_5	6,480	440	78,600	179	8,343	700	25,000	36	5,000	7,000
COD	31,900	1,500	703,000	469	28,975	1,300	114,870	88	42,850	15,000
TKN	588	66	1,060	16	1,067	150	2,570	17	677	700
NH_3-N	97	3	116	39	---	---	---	---	157	150
Total P	210	20	760	38	155	20	636	32	253	250
Alkalinity	970	522	4,190	8	---	---	---	---	---	1,000
Grease	5,600	208	23,368	112	---	---	---	---	9,090	8,000
pH	---	1.5	12.6	8	---	5.2	9.0		6.9	6.0
LAS	---	110	200	2	---	---	---	---	157	150

a Values expressed as mg/L, except for pH.

b The data presented in this table were compiled from many sources. The inconsistency of individual data sets results in some skewing of the data and discrepancies when individual parameters are compared. This is taken into account in offering suggested design values.

* Table No. 1 including footnotes is taken from the US EPA Handbook entitled, "Septage Treatment and Disposal," 1984, EPA-625/6-84-009 and is designated in that document as "Table 3-4."

APPENDIX A
TABLE NO. 2*

COMPARISON OF SEPTAGE AND MUNICIPAL WASTEWATER [a]

Parameter	Septage [b]	Wastewater [c]	Ratio of Septage to Wastewater
TS	40,000	720	55:1
TVS	25,000	365	68:1
TSS	15,000	220	68:1
VSS	10,000	165	61:1
BOD_5	7,000	220	32:1
COD	15,000	500	30:1
TKN	700	40	17:1
NH_3-N	150	25	6:1
Total P	250	8	31:1
Alkalinity	1,000	100	10:1
Grease	8,000	100	80:1
pH	6.0	---	---
LAS	150	---	---

a. Values expressed as mg/L, except for pH.
b. Based on suggested design values in Table No. 1 (US EPA Table 3-4).
c. From Metcalf and Eddy, 2nd Edition, "medium strength sewage."
* Table No. 2 including footnotes is taken from the US EPA Handbook entitled "Septage Treatment and Disposal," 1984, EPA-625/6-84-009 and is designated in that document as "Table 3-8."

NEW APPENDIX B
WATER RECLAMATION AND REUSE

B.1 General

The required treatment and water quality requirements for the various classes of reclaimed wastewater are described in Table B-1. In addition to the irrigation standards for the use of reclaimed wastewater in Chapter 120, other allowable uses of reclaimed wastewater are listed in Table B-2. Table B-2 also specifies the class of reclaimed wastewater required for each allowable use. In addition, provisions that will ensure an adequate demonstration of public health and environmental protection are set forth throughout Appendix B and will be required of the applicant with any application requesting approval of the use of reclaimed wastewater.

Prior to receiving Department approval for a reclaimed wastewater reuse project, the applicant must provide a copy of the Department of Natural Resources and Conservation approved change of appropriation or water right, or a written statement that no authorization is needed under Title 85, Water Use. An approval from the DNRC regarding water rights must be obtained prior to approval of plans and specifications by the Department.

A public sewage system that meets the treatment standards for Class A-1 or Class B-1 standards for a reuse project that has been approved by the Department under Title 75, Chapter 6, MCA, is exempt from groundwater permit requirements pursuant to ARM 17.30.1022. In addition, a public sewage system that land applies reclaimed wastewater according to the requirements of Chapter 120 and has been approved by the Department is similarly exempt from groundwater permit requirements pursuant to ARM 17.30.1022.

In addition to the provisions of Section 11 (Engineering Report or Facility Plan), an alternatives analysis with respect to effluent reuse must consider market stability and environmental impacts associated with the reuse location. The screening of potential markets should include comparison of unit costs of potable or other water and reclaimed wastewater. Reliability of supply, value of reclaimed wastewater nutrients, and social benefits should be considered, as well as possible savings in the potable system due to the reduced demand.

B.2 Definitions

A list of terms commonly used in Appendix B to describe reclaimed wastewater, its uses, classifications, and related processes follow:

B.2.1 Approved Use Area

A Department approved site with well defined boundaries, designated to receive reclaimed wastewater for an approved use, in conformance with laws and regulations of all applicable regulatory agencies.

B.2.2 Aquifer Injection

Aquifer injection means the use of a well to inject water directly into an aquifer system without filtration through the geologic materials overlying the aquifer system for purpose of aquifer recharge or for an aquifer storage and recovery project.

B.2.3 Aquifer Recharge

Aquifer recharge means either the controlled subsurface addition of water directly to the aquifer or controlled application of water to the ground surface for the purpose of replenishing the aquifer to offset adverse effects resulting from the net depletion of surface water.

B.2.4 Aquifer Storage and Recovery Project

An aquifer storage and recovery project means a project involving the use of an aquifer to temporarily store water through various means, including but not limited to injection, surface spreading and infiltration, drain fields, or another method approved by the Department of Natural Resources and Conservation. The stored water may be either pumped from the injection well or other wells for beneficial use or allowed to naturally drain away for a beneficial use.

B.2.5 Coagulated

A treatment process in which colloidal and finely divided suspended matter have been destabilized and agglomerated by the addition of suitable floc-forming chemicals or by an equally effective method.

B.2.6 Disinfected

A treatment process in which most microorganisms have been killed, inactivated, or otherwise rendered non-virulent.

B.2.7 Filtered

A treatment process in which oxidized, coagulated wastewater passes through filter media, such as sand, anthracite, diatomaceous earth, or manmade ultra filtration products such as membranes so that the turbidity as determined by an approved laboratory method does not exceed an average operating turbidity of 2 nephelometric turbidity units (NTU) and does not exceed 5 NTU at any time.

B.2.8 Indirect Potable Reuse

The conveyance of reclaimed wastewater directly into an aquifer or reservoir used as a raw water source for a drinking water supply with the intent of supplementing the raw water supply.

B.2.9 Irrigation

Reclaimed wastewater irrigation, where the primary use of the effluent is for crop growth. Utilizes the evapotranspiration mechanism of plants and soil surfaces to prevent or minimize discharge.

B.2.10 Landscape Use

Means an approved use area, where reclaimed wastewater is used to support turf, flowers, shrubs, trees and decorative ponds of an ornamental nature. Landscape irrigation can include restricted and non-restricted application areas depending upon the class of reclaimed wastewater to be used.

B.2.11 Oxidized Wastewater

Means wastewater in which the organic matter has been stabilized, is non-putrescible, and contains dissolved oxygen. This level of treatment is comparable to that from facilities producing secondary effluent. Biological treatment to produce oxidized wastewater is discussed in Chapter 90 (Biological Treatment).

B.2.12 Reclaimed Wastewater

Means wastewater treated to the standards in Table 121-1 or Table B-1 that is reused for private, public, or commercial purposes.

B.2.13 Reuse

Means the practice of placing reclaimed wastewater into service in a manner appropriate with the level of treatment.

B.2.14 Restricted Recreational Impoundment (Landscape Ponds, Fishing Ponds)

Means a body of reclaimed wastewater where recreation is limited to fishing, boating, and other non-body-contact water recreation activities, or a body of reclaimed wastewater used for aesthetic features or otherwise serves a function not intended to include public contact.

B.2.15 Stream Flow Augmentation

Means a discharge to surface waters of the state, either directly or via groundwater transfer, for the purpose of sustaining minimum flows within the stream.

B.2.16 Unrestricted Recreational Impoundment

Means a body of reclaimed wastewater on which no limitations are imposed on body-contact water recreation activities.

B.3 Classes of Reclaimed Wastewater

There are six classes of reclaimed wastewater, differentiated by the degree of additional treatment provided following secondary treatment, as defined in 40 CFR 133, which applies to all reclaimed wastewater. The treatment standards defined for each class must be met prior to delivery to the reuse system. The six reclaimed wastewater classes and the treatment standards that apply to each of those classes are listed in Table B-1. Reclaimed wastewaters classified as A-1 and B-1 can be applied at rates that exceed the agronomic uptake rate. Even though Class A-1 and Class B-1 reclaimed wastewater may meet most drinking water standards, direct reuse for human consumption is not permitted. Bodily contact with Class A-1 reclaimed wastewater may be permitted at the discretion of the Department, when it can be shown by the applicant to be safe for the proposed use.

Table B-1 Reclaimed Wastewater Classifications and Associated Treatment Requirements

CLASS	TREATMENT STANDARDS
A-1	Class A-1 reclaimed wastewater must, at all times, be oxidized, coagulated, filtered and disinfected, as described below or defined in this Appendix B. Class A-1 reclaimed wastewater that is treated to the standards below is exempt from ground water permit requirements pursuant to ARM 17.30.1022. Following treatment, Class A-1 reclaimed wastewater effluent quality should have approximately 10 mg/L or less of BOD and TSS. To achieve the turbidity requirements for Class A-1 reclaimed wastewaters, a treatment process that incorporates coagulation, flocculation, sedimentation and filtration is typically required. See Section 111 (Clarification Processes) for the required design standards. Class A-1 reclaimed wastewater must be disinfected such that the median number of total coliform organisms, in the wastewater after disinfection, does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed and such that the number of total coliform organisms does not exceed 23 CFU per 100 milliliters in any sample.

CLASS	TREATMENT STANDARDS
	Class A-1 reclaimed wastewater has the quality of effluent such that all constituents meet Montana nondegradation requirements prior to application, allowing it to be applied to land at rates that exceed the agronomic uptake rate. Specifically, total nitrogen must not exceed 5.0 mg/L at any time. Per MCA 75-5-410, reclaimed wastewater proposed for aquifer recharge or injection purposes must meet, at a minimum, secondary treatment, as defined in 40 CFR Part 133, and Level II treatment for the removal of nitrogen. For aquifer recharge proposals, the effluent quality must meet either primary drinking water standards or non-degradation requirements at the point of discharge. For aquifer injection proposals, the effluent quality must meet the more stringent of either the primary drinking water standards or the nondegradation requirements at the point of discharge. Soil aquifer treatment (infiltration/percolation basins) may not be considered in meeting these requirements. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: continuous turbidity analysis with recorder, weekly total coliform analysis, and bi-weekly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
A	Class A reclaimed wastewater must, at all times, be oxidized, coagulated, filtered and disinfected, as described below or defined in this Appendix B. Following treatment, Class A reclaimed wastewater effluent quality should have 10 mg/L or less of BOD and TSS. To achieve the turbidity requirements for Class A reclaimed wastewaters, a treatment process that incorporates coagulation, flocculation, sedimentation and filtration is typically required. See Section 111 (Clarification Processes) for the required design standards. Class A reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and such that the number of total coliform organisms does not exceed 23CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: continuous turbidity analysis with recorder, weekly total coliform analysis, and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
B-1	Class B-1 reclaimed wastewater must, at all times, be oxidized, settled and disinfected, as described below or defined in this Appendix B. Class B-1 reclaimed wastewater that is treated to the standards below is exempt from ground water permit requirements pursuant to ARM 17.30.1022. Class B-1 reclaimed waste water must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 CFU per 100 milliliters in any sample. Class B-1 reclaimed wastewater has the quality of effluent such that all constituents meet Montana nondegradation requirements prior to application, allowing it to be applied to land at rates that exceed the agronomic uptake rate. Specifically, total nitrogen must not exceed 5.0 mg/L at any time. Per MCA 75-5-410, reclaimed wastewater proposed for aquifer recharge or injection purposes must meet, at a minimum, secondary treatment, as defined in 40 CFR Part 133, and Level II treatment for the removal of nitrogen. For aquifer recharge proposals, the effluent quality must meet either primary drinking water standards or nondegradation requirements at the point of discharge. For aquifer injection proposals, the effluent quality must meet the more stringent of either the primary drinking water standards or the nondegradation requirements at the point of discharge. Soil aquifer treatment (infiltration/percolation basins) may not be considered in meeting these

CLASS	TREATMENT STANDARDS
	requirements. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: weekly total coliform analysis and bi-weekly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
B	Class B reclaimed wastewater must, at all times, be oxidized, settled and disinfected, as described below or defined in this Appendix B. Class B reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection does not exceed 2.2 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 23 CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: weekly total coliform analysis and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
C	Class C reclaimed wastewater must, at all times, be oxidized, settled and disinfected, as described below or defined in this Appendix B. Class C reclaimed wastewater must be disinfected such that the median number of total coliform organisms in the wastewater after disinfection does not exceed 23 colony forming units (CFU) per 100 milliliters, as determined from the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform organisms does not exceed 240 CFU per 100 milliliters in any sample. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: monthly total coliform and monthly total nitrogen analysis. Weekly disinfectant residual analysis if chemical disinfection is being utilized.*
D	Class D reclaimed wastewater must, at all times, be oxidized and settled, as described below or defined in this Appendix B. Disinfection will typically not be required for Class D reclaimed wastewater; however, proximity to areas of public access or habitation may dictate that disinfection be provided in order to protect public health. The minimum monitoring level required during periods of use (including prior to seasonal startup, if applicable) must include: monthly total nitrogen analysis. *

* The Department, where appropriate to protect public health and ensure water quality protection, may require additional sampling and direct annual or quarterly reporting. If industrial sources are contributors to the treated public sewage being proposed for reuse, monitoring for the various metals and contaminants described in Table 121-4 may be required annually. If the industrial source qualifies under the Federal Clean Water Act, Title 40, Chapter I, Part 401-403, a pretreatment program must be implemented before reuse of the effluent can be allowed by the Department.

B.4 Allowable Uses of Reclaimed Wastewater and Associated Classes

Reclaimed wastewater can be used for a variety of purposes. Allowable reclaimed wastewater uses and associated treatment levels are presented in Table B-2.

Table B-2 Allowable Uses of Reclaimed Wastewater and Associated Classes

Allowable Uses of Reclaimed Wastewater	Class of Reclaimed Wastewater Required for Identified Use					
	A-1	A	B-1	B	C	D
Spray Irrigation of Nonfood Crops ***(greater than agronomic uptake rate)****						
Trees and Fodder, Fiber, and Seed Crops	YES	NO	YES	NO	NO	NO
Sod, Ornamental Plants for Commercial Use, and Pasture to Which Milking Cows or Goats Have Access	YES	NO	YES	NO	NO	NO
Drip or Subsurface Irrigation of Nonfood Crops ***(greater than agronomic uptake rate)****						
Trees	YES	NO	YES	NO	NO	NO
Spray Irrigation of Food Crops ***(greater than agronomic uptake rate)****						
Food Crops Which Undergo Physical or Chemical Processing Sufficient to Destroy All Pathogenic Agents	YES	NO	YES	NO	NO	NO
Drip or Subsurface Irrigation of Food Crops ***(greater than agronomic uptake rate)****						
Food Crops Where There is No Reclaimed wastewater Contact With Edible Portion of Crop (e.g. orchards, vineyards)	YES	NO	YES	NO	NO	NO
Root Crops	YES	NO	NO	NO	NO	NO
Landscape Irrigation ***(greater than agronomic uptake rate)****						
Restricted Access Areas (e.g., Cemeteries and Freeway Landscapes)	YES	NO	YES	NO	NO	NO
Unrestricted Access Areas (e.g., Golf Courses, Parks, Playgrounds, School Yards and Residential Landscapes)	YES	NO	NO	NO	NO	NO
Impoundments						
Landscape Impoundments	YES	NO	NO	NO	NO	NO
Restricted Recreational Impoundments	YES	NO	YES	NO	NO	NO
Unrestricted Recreational Impoundments	YES	NO	NO	NO	NO	NO
Animal & Fish Operations						
Fish Hatchery Basins (with discharge permit)	YES	YES	YES	NO	NO	NO
Zoo Operations and Animal Shelter Wash Down Water *(discharge to sewer)*	YES	YES	YES	YES	NO	NO
Decorative Fountains *(discharge to sewer)*	YES	YES	NO	NO	NO	NO
(discharge to groundwater)	YES	NO	NO	NO	NO	NO
Jetting and Flushing of Sanitary Sewers	YES	YES	YES	YES	YES	NO
Street Cleaning and Washing Operations						
Street Sweeping, Brush Dampening	YES	YES	YES	YES	YES	NO
Sidewalks and Parking Lot Washing Spray	YES	NO	YES	NO	NO	NO
Dust Control and Soil Compaction/Consolidation						
Unpaved road dust control, road construction compaction, backfill consolidation around pipelines (Not Drinking Water lines)	YES	YES	YES	YES	YES	NO
Fire Fighting and Fire Protection Systems						
Dumping from Aircraft	YES	YES	YES	YES	YES	NO
Hydrants or Sprinkler Systems in Buildings	YES	YES	NO	NO	NO	NO
Toilet and Urinal Flushing	YES	YES	NO	NO	NO	NO
Washing Aggregate and Concrete Batching Operations	YES	YES	YES	YES	YES	NO

*Allowable Uses of Reclaimed Wastewater	Class of Reclaimed Wastewater Required for Identified Use					
	A-1	A	B-1	B	C	D
(no discharge)						
Industrial Uses						
Aerosols not created (e.g. heat pumps, boilers) (non-discharging recirculation type)	YES	YES	YES	YES	YES	NO
Aerosols or other mist created (e.g., cooling towers, forced air evaporation, or spraying)	YES	YES	NO	NO	NO	NO
Aquifer Recharge						
Controlled Surface or Subsurface Addition to Replenish the Aquifer **	YES	NO	NO	NO	NO	NO
Aquifer Injection						
Direct Injection into Aquifer for Purpose of Enhancing a Water Right or Allocation **	YES	NO	NO	NO	NO	NO
Indirect Potable Reuse						
Intentional Return of Reclaimed Wastewater to Augment Raw Water Supplies***	YES	YES	NO	NO	NO	NO
Stream flow Augmentation						
Fisheries Support, or Recreational Enhancement with Unrestricted Access ***	YES	YES	YES	YES	NO	NO
Snow Making						
Restricted Access – designed for discharge to groundwater	YES	NO	YES	NO	NO	NO
Unrestricted Access – such as ski slopes***	YES	NO	NO	NO	NO	NO

* At the discretion of the Department, applicable portions of Section 121 (Standards for the Use of Reclaimed Wastewater for Irrigation) will be applied to the design of irrigation systems where agronomic rates are exceeded.

** Per MCA 75-5-410, reclaimed wastewater proposed for aquifer infiltration or aquifer recharge must meet at a minimum level two treatment for the removal of nitrogen and the effluent quality must meet either primary drinking water standards or nondegradation requirements prior to discharge. Soil aquifer treatment may not be considered in meeting these provisions for augmentation.

*** Any discharge to surface water must be authorized under an NPDES or MPDES permit, and the discharge will need to meet the provisions of the permit(s).

B.5 Conveyance and Distribution of Reclaimed Wastewater

The distribution network includes pipelines, pump stations, and storage facilities. Reuse water systems may present more corrosion challenges than typically experienced in potable water systems. Generally, reclaimed wastewater is more mineralized with a higher conductance and chloride content and lower pH, enhancing the potential for corrosion of metallic pipe. Where a reclaimed wastewater distribution system is created, the design must follow Circular DEQ 1, Chapters 6 (Pumping Facilities), 7 (Finished Water Storage), and 8 (Transmission Mains, Distribution Systems, Piping & Appurtenances) as described below. If the reclaimed wastewater distribution system does not provide for essential services, such as fire protection or sanitary uses, or does not result in a sanitary or environmental risk, the reliability of the reuse water system need not be as stringent with respect to sizing and redundancy. However, redundancy may be required to meet effluent disposal needs.

Note that circular DEQ 1 must be used with the interpretation that reclaimed wastewater is to be considered sewage for the purpose of complying with Section 8.8 (Separation of Water Mains, Sanitary Sewers and Storm Sewers). Likewise, in DEQ 2, Section 38.3 (Relation to Water Works) adequate separation must be maintained between pipes carrying sewage and pipes carrying reclaimed wastewater. Therefore, the required vertical and horizontal separation distances must be met.

B.5.1 Pumping facilities used to convey reclaimed wastewater, must meet the provisions of Circular DEQ 1, Chapter 6, unless the Department determines some provisions of this chapter are unnecessary based on the level of service to be provided or requirements for continuity of effluent disposal.

B.5.2 Storage facilities used to hold reclaimed wastewater must meet the provisions of Circular DEQ 1, Chapter 7, Sections 7.0.2 through 7.0.16* and 7.3. It may be necessary to supplement the disinfectant dosage in reclaimed wastewater storage tanks to ensure minimal regrowth of bacteria. In cases where UV disinfection is used at the treatment plant, it may be necessary to add oxidizing disinfectants such as chorine in low dosages, on a continual basis, to ensure control of bacteria. Provisions for total coliform and residual disinfectant sampling must be provided at the point of reclaimed wastewater delivery to document the efficacy of the residual disinfectant. Disposal of heavily chlorinated water from the tank disinfection process must be in accordance with the requirements of the Department.

* Section 7.0.7 (Overflow) applies with the exception that the overflow must discharge to a sanitary sewer main.

Storage ponds, tanks and other vessels holding reclaimed wastewater must be signed or labeled to ensure easy identification.

B.5.3 Conveyance systems for delivery of reclaimed wastewater must follow the provisions contained within Circular DEQ 1, Chapter 8, unless the Department determines some provisions of this chapter are unnecessary based on the level of service to be provided. Conveyance systems for delivery of reclaimed wastewater must be easily identifiable. The use of purple piping or purple striped piping is encouraged. In lieu of that approach, permanent markings or labels must be installed at intervals (not to exceed 10 feet) to ensure easy identification when pipes are buried and later excavated.

Plumbing within structures must utilize the purple pipe or other approved identification system and must be inspected to ensure they are not cross connected to any potable water supply within the structure(s). Reclaimed wastewater delivered to a commercial building must have adequate back-flow prevention on the domestic water line entering the building in accordance with Circular DEQ-1, Section 8.10 (Cross-Connections and Inter Connections). It is recommended that a cross connection management agreement be in place to protect the water supply in the building from cross connection with reclaimed wastewater.

B.6 Setbacks, Separation and Buffer Distances for Reclaimed Wastewater Use

The required distance of the approved use area from surface water and any well will be determined by the Department case-by-case based on the quality of effluent and the level of disinfection. In no case can reclaimed wastewater be discharged or applied directly to surface water unless an MPDES discharge permit is obtained from the Department.

Storage ponds are exempt from the requirements of Section 93.26 (Water Well Separation) provided the content has been treated to the levels established in Table B-1 (Reclaimed

Wastewater Classifications and Associated Treatment Requirements) and has been adequately disinfected. Wastewater is considered adequately disinfected if the geometric mean number of *E. coli* in the influent flow to the storage pond does not exceed 630 colony forming units per 100 milliliters and 10% of the total samples does not exceed 1,260 colony forming units per 100 milliliters during any 30-day period.

The Department will establish buffer zones on a case by case basis as necessary to protect public health.

B.7 Access Control and Advisory Signs

Appropriate fencing and advisory signs, if required by the Department, must be utilized designating the use of reclaimed wastewater in the approved use area.

B.7.1 Fencing

When fencing is required, pasture or approved similar fencing must be placed along the outer perimeter of the approved use area.

B.7.2 Signing

For approved use areas with fencing requirements, signs must be posted along the fence line every 250 feet and at each corner. Signs should read "No Trespassing – Reclaimed wastewater" or an approved equivalent.

All other approved use areas must have signs posted at conspicuous public access points and should read "Reclaimed wastewater – Do Not Drink" or an approved equivalent.

B.8 Control of Reclaimed Wastewater Use Area

When an approved use area is not owned by the party responsible for the delivery of the reclaimed wastewater, a 20-year lease or similar assurance must be negotiated. Longer leases or purchasing of land is encouraged. A copy of the signed lease or assurance must be submitted to the Department for review and approval. A statement detailing responsibility of operation must be included in the lease agreement as outlined in Section 121.123 (Responsibility of Operation) and Section B.10 (Operation and Maintenance Manual Specific to Reuse).

B.9 Effluent Monitoring

B.9.1 Flow

The capability to measure the amount of water applied to the reuse site on a daily basis must be provided. This can be accomplished with either a flow meter device or through the use of pump run time (e.g., hour meters) and pump capacity.

B.9.2 Quality

Provisions must be made that will enable the water to be sampled prior to use. Testing provisions for the various uses of reclaimed wastewater are defined in Section B.10 (Operation and Maintenance Manual Specifics for Reuse Alternatives).

B.10 Operation and Maintenance Manual Specific to Reuse

Operation and maintenance (O&M) procedures are critical to the success of a reclaimed wastewater treatment and application project. As such, an O&M manual must be prepared to help direct and establish appropriate monitoring, recordkeeping and operations during start up and after the project is constructed. A complete draft O&M manual must be submitted to the Department prior to plan and specification approval. This manual can become fairly complex depending on the nature of the project and the types of equipment involved. Emphasis must be placed on development of daily logs and balance sheets to be used by operations staff to operate the reclamation system and document compliance with approval conditions. In addition to those requirements listed under each reuse alternative, the Department may identify project-specific monitoring and operational provisions within the conditions of approval, where circumstances warrant.

a. Irrigation of Nonfood Crops, Food Crops, and Landscaping

Only reclaimed wastewater as classified in Table B-2 may be used for the irrigation of crops and landscaping at rates that exceed the agronomic uptake of nitrogen.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Document that the reclaimed wastewater continuously meets the provisions of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
2. At the discretion of the Department, applicable portions of Section 121.12 (Operation and Maintenance Procedures) must be addressed in the O&M manual.
3. Develop a plan for maintenance of water balance to ensure overflow or over-application will not occur.

b. Landscape and Recreational Impoundments

Only reclaimed wastewater as classified in Table B-2 may be used for the development of landscape or recreational impoundments.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. If discharge from impoundment is other than to a sewer collector, a groundwater or surface water discharge permit must be obtained from the Department. Class A-1 and B-1 reclaimed wastewater is exempt from permitting requirements if the discharge occurs to groundwater only.
2. A pond management plan to ensure control of algae, weeds and erosion due to wind or other impacts.
3. Document that the reclaimed wastewater continuously meets the provisions of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
4. Where the pond serves as a winter storage basin for later land application or turf watering, apply the appropriate O&M provisions to the combined system.
5. At the discretion of the Department, applicable portions of Section 121.12 (Operation and Maintenance Procedures) must be addressed in the O&M manual.
6. Develop a plan for maintenance of water balance to ensure overflow will not occur.

7. Implement all BMP's, such as signage, control structures and liners where appropriate.

c. Animal and Fish Operations

Only reclaimed wastewater as classified in Table B-2 may be used for zoos, shelter or rearing facilities. Reclaimed wastewater must be used as wash-down water only and not for consumption by the animals. Runoff from these uses must be directed to the facilities wastewater collection system.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Develop a pond management plan to ensure control of algae, fungi or weeds or other impacts.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
3. Where the pond serves as a winter storage basin for later land application or turf watering, apply the appropriate O&M provisions to the combined system.
4. Develop a plan for maintenance of water balance to ensure overflow will not occur.
5. Implement all BMP's, such as signage, control structures and liners where appropriate.
6. Ensure appropriate worker training and worker safety provisions including appropriate showering or washing facilities.
7. Ensure that plumbing within structures supplying reclaimed wastewater utilize the purple pipe or other approved identification system and are inspected to ensure they are not cross connected to any potable water supply within the structure(s).

d. Decorative Fountains

Only reclaimed wastewater as classified in Table B-2 may be used for decorative fountains and other similar features. Decorative fountains and similar features must be adequately signed to ensure public notice.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Secure and maintain a groundwater or surface water discharge permit unless the effluent at all times discharges to a sewer collector. Class A-1 reclaimed wastewater is exempt from permitting requirements if the discharge occurs to groundwater only.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
3. Implement all BMP's, such as signage, control structures and liners where appropriate.

4. Ensure that plumbing within structures supplying reclaimed wastewater utilize the purple pipe or other approved identification system and are inspected to ensure they are not cross connected to any potable water supply within the structure(s).

e. Jetting and Flushing of Sanitary Sewers

Only reclaimed wastewater as classified in Table B-2 may be used for sanitary sewer flushing or jetting operations. Flushing or jetting operations are considered a periodic process where effluent reuse in lieu of fresh water or drinking water use is appropriate.

The use of reclaimed wastewater for this purpose would involve the following:

1. Notify the permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Track the volume of effluent used for the flushing operation.
4. Implement BMP's, such as signage, control structures and worker safety as appropriate.

f. Street Cleaning and Washing Operations

Only reclaimed wastewater as classified in Table B-2 may be used by road crews or contractors for the seasonal wash down of paved surfaces, sidewalks and building structures. Water used must either evaporate from the surface or be directed to a storm water collection system with a groundwater connection. In no case shall this reclaimed wash down water be discharged to surface water.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Notify the Department permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
3. Track the volume of effluent used for the washdown operation.
4. Implement BMP's, such as signage, control structures and worker safety as appropriate.

g. Dust Control and Soil Compaction/Consolidation

Only reclaimed wastewater as classified in Table B-2 may be used for unpaved road dust control, unpaved road construction compaction and backfill compaction. Water used must be limited to quantities which wet the surfaces but not saturate those soils. In no case shall this reclaimed wastewater be discharged to storm drains or stormwater collection systems with a surface water connection.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Notify the permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Track the volume of effluent used for the dust control or compaction operation.
4. Implement BMP's, such as signage, control structures and worker safety as appropriate.

h. Fire Fighting and Fire Protection Systems

Only reclaimed wastewater as classified in Table B-2 may be used for forest fire fighting and fire protection within a structure. The use of reclaimed wastewater for forest fire suppression (i.e., dumping from aircraft) would normally be an incidental operation and involve access to a reclaimed wastewater filling station. This approach must ensure the following minimum level of operation:

1. Notify the permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Track the volume of effluent used for forest fire suppression.
4. Implement BMP's, such as signage, control structures and worker safety as appropriate.

The use of reclaimed wastewater for fire protection within buildings or on structures (i.e., hydrants or sprinkler system) involves a higher degree of worker and occupant safety and may include the use of storage reservoirs, vessels and fires suppression standpipe or pressurized systems within commercial or residential structures. If this approach to reclaimed wastewater use is proposed, the O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established:

1. Notify the permit program if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Where a pond or basin serves as a storage basin for fire suppression, the water must be recirculated and a residual disinfectant must be applied to control regrowth.
4. Implement BMP's, such as signage, control structures and liners where appropriate.
5. Ensure appropriate worker training and worker safety provisions.

6. Ensure that plumbing within structures supplying reclaimed wastewater utilize the purple pipe or other approved identification system and are inspected to ensure they are not cross connected to any potable water supply within the structure(s).

i. Toilet or Urinal Flushing

Only reclaimed wastewater as classified in Table B-2 may be used for commercial business toilet or urinal flushing. These uses must be adequately signed to ensure the public is aware the facilities use reclaimed wastewater for this purpose.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Ensure that plumbing within structures where toilets and urinals are supported by reclaimed wastewater utilize the purple pipe or other approved identification system and are inspected to ensure they are not cross connected to any potable water supply within the structure(s).
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Implement BMP's, such as signage, control structures and user safety as appropriate.

j. Washing Aggregate and Concrete Batching Operations

Only reclaimed wastewater as classified in Table B-2 may be used for gravel washing and batching operations associated with concrete plants. Water used must be limited to quantities which achieve the desired washing and batching, but do not result in a discharge to ground or surface waters. In no case shall this reclaimed wastewater be discharged to storm drains or stormwater collection systems with a surface water connection.

Use of reclaimed wastewater in concrete batching processes where the water is mechanically dispensed into the truck mixer drum through a metal chute, or as an on-truck water supply to use for maintaining and adjusting concrete slump is appropriate.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Notify the permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.
2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
3. Track the volume of effluent used for the washing and or batching operation.
4. Implement BMP's, such as signage, control structures and worker safety as appropriate.

k. Industrial Uses

Only reclaimed wastewater as classified in Table B-2 may be used for industrial operations. Water used must be limited to quantities which achieve the desired industrial need, but do not result in a discharge to ground or surface waters unless the industry obtains an appropriate discharge permit for that purpose.

In areas where workers may be exposed to, or come in direct contact with, reclaimed wastewater, a specific worker safety program must address potential and actual contact with the reclaimed wastewater. Although reclaimed wastewater can be deemed safe for workers after a given treatment, there are general precautions for hygiene, emergency situations, and ingestion that must be covered in O&M manuals or user agreements with the generator. Worker safety programs are viewed as part of proper management of the reclaimed wastewater after meeting permit requirements.

Reclaimed wastewater delivered to a commercial building must have adequate back-flow prevention on the domestic water line entering the building in accordance with Circular DEQ-1, Section 8.10 (Cross-Connections and Inter Connections). It is recommended that a cross connection management agreement be in place to protect the water supply in the building from cross connection with reclaimed wastewater.

l. On-Site Applications

Because suspended matter may exist in the reclaimed wastewater, certain features must be incorporated into the design of a project for safe and adequate distribution of the water.

(a) Strainers at Meter

Depending on the quality of reclaimed wastewater and the type of storage used, strainers may be required at the meter or service to building. Strainer types that are generally satisfactory are as follows:

- Wye strainers. Not recommended for belowground installations (in vaults).
- Basket strainers. Suitable for aboveground or belowground installations (in vaults).
- Filter strainers. Normally used above ground on drip systems.

In choosing the location, consider the following:

- Installation before any meter to protect the meter as well as the on-site reclaimed wastewater system. Maintenance of the strainer should be the responsibility of the reclaimed wastewater purveyor.

Strainers can range in mesh size from 20 to 325. A mesh size of 20 to 80 is normally adequate. An analysis of the potential debris in the reclaimed wastewater will aid in prescribing the optimum strainer size.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Notify the permit program in advance if the reclaimed wastewater is a portion of effluent normally discharged through an associated permit.

2. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
3. Ensure that plumbing within structures supplying reclaimed wastewater utilize the purple pipe or other approved identification system and are inspected to ensure they are not cross connected to any potable water supply within the structure(s).
4. Track the volume of effluent used via the industrial application.
5. Implement BMP's, such as signage, control structures and worker safety as appropriate.

I. Aquifer Recharge or Aquifer Injection

Only reclaimed wastewater as classified in Table B-2 may be used for the specific intent of replenishing groundwater. Although practices such as reclaimed wastewater irrigation may contribute to groundwater augmentation, the replenishment is an incidental byproduct of the primary activity and is not further discussed. Should the reuse project be proposed as a means of providing for aquifer recharge in a "closed basin" as defined in State law (MCA 75-5-410), the application must address the following:

"75-5-410. Water quality requirements – aquifer recharge or certain mitigation plans – minimum requirements. (1) (a) Except as provided in subsection (1)(b), a person who proposes an aquifer recharge or mitigation plan pursuant to 85-2-362 shall apply for, if necessary, a current permit pursuant to this chapter."

(b) The requirements of this section do not apply to the portion of a mitigation plan that consists of a change in appropriation rights for instream flow filed pursuant to 85-2-402.

(2) The minimum treatment requirements for sewage systems subject to this section are the federal requirements provided for in 40 CFR 133, and the system must meet, at a minimum, the requirements of level two treatment for the removal of nitrogen in the effluent.

(3) In addition to the minimum treatment requirements of subsection (2), sewage systems subject to this section that are used for aquifer injection must meet the more stringent of either primary drinking water standards pursuant to Title 75, chapter 6, or the nondegradation requirements pursuant to 75-5-303 at the point of discharge.

(4) In addition to the minimum treatment requirements of subsection (2), sewage systems subject to this section that are used for aquifer recharge must meet either primary drinking water standards pursuant to 75, chapter 6, or the nondegradation requirements pursuant to 75-5-303 at the point of discharge."

1. Purposes for Groundwater Recharge

Infiltration and percolation of reclaimed wastewater takes advantage of the natural removal mechanisms within soils, including biodegradation and filtration, thus providing additional in-situ treatment of reclaimed wastewater and additional treatment reliability to the overall reclaimed wastewater management system. The treatment achieved in the subsurface environment must not be considered for groundwater augmentation projects proposed for closed basins.

2. Methods of Groundwater Recharge

Groundwater recharge can be accomplished by surface spreading, vadose zone injection wells, or direct injection. These methods of groundwater recharge use more advanced engineered systems. With the exception of direct injection, all engineered methods require the existence of an unsaturated aquifer.

(a) Surface Spreading

Surface spreading is a direct method of recharge whereby the water moves from the land surface to the aquifer by infiltration and percolation through the soil matrix. This method must be compared against the following characteristics and rejected where it cannot be relied upon to achieve the desired objective:

- Rapid infiltration rates and transmission of water. Soil permeability should exceed 0.6 inches per hour to be considered.
- No layers that restrict the movement of water to the desired unconfined aquifer.

The following geologic and hydrologic characteristics must be investigated to determine the total usable storage capacity and the rate of movement of water from the spreading grounds to the area of groundwater withdrawal:

- Physical character and permeability of subsurface deposits
- Depth to groundwater
- Specific yield, thickness of deposits, position and allowable fluctuation of the water table
- Transmissivity, hydraulic gradients and pattern of pumping
- Structural and lithologic barriers to both vertical and lateral movement of groundwater
- Oxidation state of groundwater throughout the receiving aquifer

For surface spreading of reclaimed wastewater to be effective, the wetted surfaces of the soil must remain unclogged, the surface area must maximize infiltration and the quality of the reclaimed wastewater must not inhibit infiltration. Techniques for surface spreading may include ridge and furrow systems and infiltration basins.

Section 122 (Standards for Rapid Infiltration Systems) defines design constraints and parameters for rapid infiltration basins.

(b) Vadose Zone Injection

An advantage of vadose zone injection wells is the significant cost savings as compared to direct injection wells. The infiltration rates per well are often similar to direct injection wells. A significant disadvantage is that they cannot be backwashed and a severely clogged well can be permanently destroyed.

(c) Direct Injection

In many cases, wells used for injection and recovery are classified by the EPA as Class V injection wells and must be addressed as such in the planning stages.

Direct injection involves pumping reclaimed wastewater directly into the groundwater zone, which is usually a well-confined aquifer. Direct injection is used where groundwater is deep or where hydrogeologic conditions are not conducive to surface spreading. Such conditions might include unsuitable soils of low permeability, unfavorable topography for construction of basins, the desire to recharge confined aquifers, or scarcity of land.

For direct injection, locating the extraction wells as great a distance as possible from the recharge site, enhances the ability of the underlying aquifer to further treat and dilute the reclaimed wastewater.

Remediation in a direct injection system can be costly and time consuming. The most frequent causes of clogging are accumulation of organic and inorganic solids, biological and chemical contaminants and dissolved air and gases from turbulence. Very low concentrations of suspended solids, on the order of 1 mg/l, can clog an injection well. Even low concentrations of organic contaminants can cause clogging due to bacteriological growth near the point of injection.

Many criteria specific to the quality of the reclaimed wastewater, groundwater, and aquifer material must be considered prior to construction and operation. These include possible chemical reactions between the reclaimed wastewater and groundwater, iron precipitation, ionic reactions, biochemical changes, temperature differences, and viscosity changes. Most clogging problems are avoided by proper pretreatment, well construction, and proper operation. Injection well design and operations must consider the need to occasionally reverse the flow or back flush the well much like a conventional filter or membrane.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue injection if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
2. Track the volume of effluent used for groundwater recharge.
3. Implement BMP's, such as signage, control structures and worker safety as appropriate.

m. Indirect Potable Reuse

Only reclaimed wastewater as classified in Table B-2 may be used for indirect potable reuse. Indirect potable reuse is the use of highly treated reclaimed wastewater to augment raw water supplies. The Department will review proposed "Indirect Potable Reuse" projects on a case-by-case basis. Any discharge to surface water must be authorized under an NPDES or MPDES permit, and the discharge will need to meet the provisions of the permit(s).

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue injection if water quality does not meet the minimum provisions of Table B-1 for the water utilized.
2. Track the volume of effluent used to augment raw water supplies.

3. Implement BMP's, such as signage, control structures and worker safety as appropriate.

n. Stream flow Augmentation

Only reclaimed wastewater as classified in Table B-2 may be used for stream flow augmentation, the need for which may be dictated by various downstream water reservations or issues. Discharge must be authorized under an NPDES or MPDES permit, and the discharge will need to meet the provisions of the permit(s).

o. Snow Making

Only reclaimed wastewater as classified in Table B-2 may be used for snow making.

Reclaimed wastewater used for snow making may be approved by the Department if the applicant can demonstrate that public health and the environment will be protected. Snow making for use in augmenting ski slopes or where public exposure will be expected must be Class A-1 water and will only be allowed if the reclaimed wastewater is applied during times when the public will not be exposed to airborne particulate such as at night or on closed slope areas. Any discharge to surface water must be authorized under an NPDES or MPDES permit, and the discharge will need to meet the provisions of the permit(s).

Snow making as a means of storage with seasonal percolation, depending upon the proposed location and potential for public exposure, may be used with best management practices as a means of groundwater discharge. This approach would typically involve development of some form of impoundment to contain runoff and a means to optimize the hydrologic transfer of snowmelt to groundwater. Proposals for snow making will be reviewed on a case specific basis and pilot studies may be required to verify performance prior to final Department approval.

The O&M document prepared by the designer must develop a means to ensure the following minimum level of operation is established. Systems utilizing this reuse approach must:

1. Document that the reclaimed wastewater continuously meets the provision of Table B-1 for the class of reclaimed wastewater utilized. Discontinue use if water quality does not meet the minimum provisions of Table B-1 for the water utilized for the proposed use.
2. Track the volume of effluent used for snow making.
3. Implement BMP's, such as signage, control structures and worker safety as appropriate.

APPENDIX C

~~DESIGN STANDARDS FOR~~ ALTERNATIVE ~~SEWER~~ COLLECTION SYSTEMS

C.1 GENERAL

These standards must be used for design of alternate ~~sewer~~ wastewater collection systems. Alternative wastewater collection systems, as discussed in this chapter, include gravity or pressurized sewers carrying septic tank effluent, pressurized sewers carrying raw wastewater from grinder pumps, and combinations thereof. ~~Variances will be allowed where adequate justification is provided by the design engineer. These standards may be modified as the technology evolves.~~

Alternative sewer collection systems may only be used when the engineer provides detailed justification within an engineering report or facility plan per Chapter 10 (Engineering Reports and Facility Plans). This justification must document that conventional collection systems cannot be used at the proposed site. Appendix E (Capacity Development for Wastewater Systems) of Circular DEQ-2 must be adequately addressed in developing this justification.

C.11 Small Diameter Gravity Systems

Small diameter gravity (SDG) systems utilize septic tanks and small diameter sewer mains for the conveyance of wastewater to a centralized location for treatment. The removal of solids in the septic tank at each service connection enables smaller diameter pipes to be used. Solids must be removed from the septic tanks periodically. Since the liquid conveyed in an SDG system is generally septic, odor and corrosion issues for the downstream collection system may be a concern.

C.12 Septic Tank Effluent Pump Systems

Septic tank effluent pump (STEP) systems utilize septic tanks and small diameter force mains for the conveyance of wastewater. Septic tank effluent flows to a pump vault where it is pumped to a centralized collection system. The removal of solids in the septic tank at each service connection enables smaller diameter force mains to be used. Solids must be removed from the septic tanks periodically. Since the liquid conveyed in a STEP system is generally septic, odor and corrosion issues for the downstream collection system may be a concern.

C.13 Grinder Pump Systems

Grinder pump (GP) systems use a macerating type pump to grind the waste into a slurry, which is then pumped to a centralized sewer system for treatment. The slurry enables smaller diameter force mains to be utilized for the conveyance of sewage. Grinder pumps are commonly used in conjunction with conventional gravity collection systems where a particular service is located below the invert of a gravity collection pipe or there is insufficient vertical drop between the structure and the gravity pipe.

C.14 Combined Alternative Systems

Where SDG and STEP systems comprise a single collection system, the STEP units must not create a backpressure in the SDG lines that negatively impacts flow in the gravity main under all flow conditions.

C.2 MATERIALS/DESIGN CONSIDERATIONS

C.21 All piping, valves, pumps and other alternative sewer system components must be ASTM or ANSI/AWWA rated for wastewater applications. For small diameter components (less than 4"), the specified material must have a pressure rating of 200 psi. All system components must be constructed of material that is not readily subject to corrosion by raw or septic wastewater and able to withstand the pressures created during pressure cleaning.

C.22 Detection wires for locating buried pipe are recommended.

C.23 Cleanouts, air release structures or valve access vaults located in traffic areas must be designed to withstand normal traffic loads without damage.

C.24 Service lines, mainlines, force mains, and all other system components must be designed and constructed to prevent freezing. The minimum depth of bury must not be less than 6 feet to the top of pipe for pressurized pipes. The minimum depth of bury must not be less than 4 feet to the top of SDG pipe without justification by the design engineer.

C.24 Except as revised herein, the standards of Chapter 6 (Design of Sewers), and Chapter 7 (Septic Tanks) of Circular DEQ-4 also apply.

C.3 PEAK DESIGN FLOWS/ HYDRAULIC CONSIDERATIONS

C.31 Peak design flow must be based upon water use records when available. When water use records are not available the peak flow used in the pipeline design must be based on equation B.3-1:

$$Q = 20 + 0.5D \qquad \textbf{(B.3-1)}$$

Where:
Q = Peak design flow, gpm
D = Homes (or equivalent dwelling units) served at full build-out

C.32 The Department may require that a hydraulic analysis (including pump head calculations and pump curves) be submitted to verify that the system will function as proposed.

~~C.2~~ C.4 SMALL DIAMETER GRAVITY SEWER DESIGN

~~C.21~~ **C.41** Small diameter gravity (SDG) sewers may be used for filtered septic tank effluent only.

~~C.22~~ ~~**C.42** **Hydraulic Considerations**~~

~~**C.221** Design flow must be based upon water use records where available. If water use records are not available, 70 gpcd per residential connection must be used with additional flow allowances for infiltration and an appropriate peaking factor (see section 11.24).~~

~~**C.222** Hydraulic calculations must be based on the Manning's formula with a roughness coefficient of n = 0.013.~~

~~**C.223**~~ Hydraulic design must be based upon ~~an approximately~~ 1/2 to 3/4 full pipe at ~~20-year peak design flow~~ peak design flow (Equation B.3-1). A minimum design velocity equal to 1 ft/sec and a Manning roughness coefficient of 0.013 must be used.

~~**C.224** Minimum design velocity of 1.0 fps in controlling sections should be used considering existing peak flow conditions.~~

~~C.23~~ **C.43** All SDG sewer ~~mains~~ piping must be 4-inch diameter pipe or larger.

~~C.24~~ **C.44** To minimize potential sources of infiltration, 20 foot minimum pipe lengths and in-line service fittings should be used.

~~C.25~~ ~~Detection wires for locating buried pipe should be considered.~~

~~C.26~~ ~~Turbulence should be minimized wherever possible.~~

~~C.27~~ **C.45** The installation requirements and performance tests specified in Chapter 30 (Design of Sewers) must be included in the technical specifications. ~~utilized for determining water-tightness, deflection and alignment of installed pipes.~~

~~C.28~~ ~~Service lines and main lines must be designed and constructed to prevent freezing of the wastewater within the lines~~.

~~C.3~~ C.5 CLEANOUTS/MANHOLES

~~C. 31~~ **C.51** The limited use of manholes is encouraged. Cleanouts may be used in place of manholes at changes in grade, alignment, and at the end of each line to minimize infiltration, reduce odor potential, limit introduction of extraneous materials and reduce cost. Manholes ~~are to~~ must be located at major junctions of three or more pipes and limited to strategic locations for cleaning purposes. Watertight manhole covers are ~~recommended~~ required for odor control and to limit inflow.

~~C.32~~ C.52 Manholes ~~located in groundwater~~ must be waterproofed and tested for watertightness and should be of the type, which has the base riser section cast with an integral floor. Manholes must meet the requirements of Section 34.6 (Watertightness) and Section 34.7 (Inspection and Testing).

~~C.33~~ C.53 ~~Cleanouts should be used in place of manholes at changes in grade, alignment, and at intersections of pipe.~~ Spacing of cleanouts and manholes depends upon cleaning capabilities. A maximum of 600 feet for mechanically cleaned and jet-cleaned systems and a maximum of 1000 feet for systems cleaned by pigging.

~~C.34~~ ~~Cleanouts located in traffic areas must be designed to withstand normal traffic loads without damage.~~

C.6 PUMP STATIONS ~~DESIGN STANDARDS FOR PUMP STATIONS~~ FOR ALTERNATIVE COLLECTION SYSTEMS

~~C.4 GENERAL~~

In addition to the requirements of ~~Sections 41 through 48~~ Chapter 40 (Wastewater Pumping Stations), the following standards apply to pump stations that pump septic tank effluent:

~~C.41~~ **C.61** ~~Pumps other than those capable of passing spheres of at least 3 inches in diameter are acceptable.~~ Pumps must be sized to pass the expected wastewater and for the proposed force main diameter. Filters or screens ~~should be considered~~ must be used to protect the pump(s) and force main from clogging ~~where this type of pump is used~~.

~~C.42~~ **C.62** ~~The~~ Inlet pipes must be extended below the low water elevation in the wet well in order to reduce turbulence and odors.

~~C.43~~ **C.63** The lift station wet well ~~cover must be watertight for odor control~~ must have watertight covers for odor control and to limit inflow.

~~C.44~~ **C.64** A vent must be provided with odor control. The vent can be connected to ~~a buried gravel bed or to a charcoal filter.~~ activated carbon, soil filters, or other odor control devices.

~~C.45~~ ~~Materials in the wet well must be protected from corrosion. Stainless steel, plastic, or bronze materials are recommended.~~

~~C.46~~ C.65 The force main sizing must be based ~~up~~on hydraulic requirements using a minimum design velocity of 1.0 ft/sec based on ~~a Manning's roughness coefficient of n = 0.013~~ a Hazen-Williams friction coefficient of 130 to 140. The minimum pipe diameter for force mains is 1.5 inches.

~~C.47 The force main must be designed and constructed to prevent freezing.~~

C.66 Leakage tests must be specified including testing methods and leakage limits.

~~C.5~~ C.7 SEPTIC TANK EFFLUENT PUMPS (STEP) AND GRINDER PUMP (GP) SEWER DESIGN

~~C.51~~ ~~Typically one septic tank and one effluent pump~~ One STEP or GP unit must be provided per household. ~~will be provided. Multiple units may be considered where serving~~ Where multiple family dwellings or trailer courts are served, ~~D~~duplex pumps, each capable of handling maximum flow must be provided~~, may be required in these situations.~~

C.71 System hydraulic requirements for STEP systems must be based on a minimum design velocity of 1.0 ft/sec, and a Hazen-Williams friction coefficient of 130 to 140. System hydraulic requirements for GP systems must be based on 2ft/sec, and a Hazen-Williams friction coefficient of 120.

C.72 Pumping Units

C.721 STEP and GP units receiving wastewater from private sewers must be provided with pumps and controls that are corrosion resistant and are listed by Underwriters Laboratories, Canadian Standards Association, or other approved testing and/or accrediting agency as meeting the requirements for National Electric Code Class I, Division 2 locations. Submersible pumps and motors must be designed specifically for totally submerged operation and meet the requirements of the National Electric Code for such units. In addition, the design must provide for the pumps and motors to be totally submerged at all times.

~~C.52~~ C.722 Pumping units ~~will~~ must be activated by appropriate level control switches. High and low level alarms ~~will be~~ required with audio-visual alarms recommended. Low level pump deactivation controls must be provided. A control panel with appropriate circuit protection and electrical safety devices must be used. The alarm circuit should be separately wired from the pump circuit. All applicable electrical codes must be satisfied. The power cables to the pump must be designed for extra-hard usage. Electrical components must be designed to facilitate maintenance of the pumping unit. Wiring must be exterior to the residence for maintenance purposes.

~~C.53~~ C.723 ~~Screens limiting solids carryover into the pump must be provided.~~ Pipe fittings used should be commonly available. Appropriate isolation, check, and air release valves must be used with ease of maintenance in mind. STEP and GP pumping equipment must be serviceable from the surface without requiring operations personnel to enter vaults, tanks or other enclosed spaces. ~~All components must be protected from freezing.~~

~~C.54 All septic tanks must be vented.~~

C.73 For systems served by a community water system, STEP and GP tanks must have a minimum of 24 hours of storage within the tank. Storage volume is defined as the volume between the pump "off" switch and the invert of the influent line. The engineer must review historical records of the local power provider to determine if the area has a history of prolonged power outages. Where such conditions exist, additional storage requirements or a backup generator may be required by the Department.

C.74 Inlet pipes to wet wells must be extended below the low water elevation in the wet well in order to reduce turbulence and odors.

C.75 Each service line between the STEP or GP pump and the collection line must be a minimum of 1-1/4 inch in diameter and have a gate or ball valve installed at the main with a stem and riser to the surface. In addition, a minimum of two check valves must be installed on STEP and GP service lines to prevent surcharge. A check valve integral to either the STEP or GP pump may be one of the check valves.

C.76 Sufficient mainline valves must be installed at locations to isolate portions of the system and to ensure continuous operation for maintenance and repair.

Isolation valves must be placed upstream of where two mains intersect and at the terminal end of the system to facilitate the future extension of the main. Valves must also be installed at railroad crossings, bridge crossings, waterway crossings, and long force main lengths.

C.77 STEP and GP sewers must be installed with cleanouts (pig ports) at the end of each line and at all line size changes to necessitate cleaning. Cleanouts must be designed to launch a minimum 2 lb/cu-ft polyfoam pig for scouring the pipelines.

C.78 Air relief valves must be placed at high points to prevent air locking. Vacuum relief valves may be necessary to relieve negative pressures on force mains. The force main configuration and head conditions should be evaluated as to the need for and placement of vacuum relief valves.

Where air release devices are used, odor control such as activated carbon, soil filters or other odor control must be provided.

C.79 Leakage tests must be specified including testing methods and leakage limits. Pressure testing of service lines must be completed with the ball valve at the mainline in the closed position. Pressure testing of the mainline must be completed with the service line ball valves in the open position to verify the effectiveness of check valves.

C.8 DISCHARGE TO A CONVENTIONAL COLLECTION SYSTEM

Discharge to a conventional gravity system must be made by installing a wye on the gravity main or by connection at a manhole. Drop manholes must not be used. Discharge in a manhole must be accomplished by producing a laminar flow in the manhole channel.

When a STEP or GP system is connected to a conventional force main, the engineer must provide hydraulic calculations that demonstrate the system pump(s) will operate across the expected range of head conditions.

C.9 CORROSION CONTROL

If required by the receiving wastewater facility owner, the effluent must be conditioned to reduce or eliminate the effects of hydrogen sulfide release. Conditioning may include aeration or chemical addition with enough contact time to stabilize the hydrogen sulfide prior to connection to the conventional collection system. Special consideration should be taken to ensure the structural integrity of concrete structures (manholes) immediately downstream of the septic effluent connection due to hydrogen sulfide release.

~~C.6 SEPTIC TANK~~

~~**C.61** Septic tanks must conform to the requirements of DEQ Circular DEQ 4, Chapter 50, Septic Tanks.~~

~~**C.62** In addition to the requirements of Circular DEQ 4, the following guidelines must be considered:~~

~~**C.621** Two compartment tanks or screening of effluent should be evaluated to minimize solids carryover.~~

~~**C.622** "Tee" inlet and outlet baffles with removable caps for control of venting are recommended. Caps should have 1/8-inch hole drilled in them.~~

~~**C.623** Watertight precast concrete, fiberglass or polyethylene tanks must be utilized.~~

~~**C.624** All septic tanks must be individually tested for watertightness.~~

~~**C.625** Concrete tanks must be constructed with type II or V cement and coated with a heavy cement-base waterproof coating on both the inside and outside surfaces. Tanks must be designed to carry all expected loads utilizing sufficient concrete thickness and reinforcing steel.~~

~~**C.626** Walls and bottom of reinforced concrete tanks must be poured monolithically. Cold joints located below the waterline are not allowed.~~

~~**C.627** Tanks must be installed at level grade, placed on undisturbed earth free of large stones or suitable structural fill.~~

~~**C.628** Screens around effluent tee should be considered to minimize solids carryover.~~

~~C.7 GRINDER PUMPS~~

~~Small grinder pump stations which are approved by UL or other independent laboratory are exempt from meeting the requirements of chapter 40. However, the dry well must be completely separated and sealed from the wet well.~~

~~C.8 AERATORS~~

~~**C.81** Aerators of either the mechanical or nonmechanical type must be provided so that all septic tank effluent is aerated prior to entering a conventional sewer or treatment facility. A reaction time of at least two minutes should be provided between the aerator and the discharge point in order to maximize the contact between anaerobic sewer gases and the newly introduced oxygen.~~

~~**C.82** Consideration should be given to isolating the septic tank effluent gases prior to discharging into a conventional gravity sewer.~~

C.10 OPERATION AND MAINTENANCE

A complete and comprehensive Operation and Maintenance Manual (O&M Manual) is required for alternative collection systems. Two copies of the O&M Manual are required and must be submitted to DEQ for review and approval prior to start-up of the new system. Once approved by DEQ, a copy of the O&M Manual will be marked approved and provided to the Owner.

The O&M Manual must, at a minimum, include the following information: system description (including an overall system schematic plan showing the number of connections contributing to each reach, pump stations with pump sizing information, pipe routes and sizes, valve locations, etc.), routine inspection requirements and checklists, operation and maintenance responsibilities (including septic tank maintenance, odor control devices, etc.), cleaning strategies, trouble-shooting, equipment and component contact information, monitoring and sampling plan for operational purposes and permit requirements, solids handling plan, record keeping, operator safety (including confined space entry and H_2S exposure issues), an emergency response plan, and warranty information.

The wastewater system entity must maintain spare pumps and a supply of spare parts for both individual and central pumping units.

The design engineer must be retained by the system owner to provide technical assistance during system start-up and to modify the manual as needed during the first year of operation.

The municipality or sewer utility should be responsible for O&M of all system components to ensure a high degree of system reliability. General easement agreements are needed to permit access to components such as septic tanks or STEP units on private property.

Section E.4 of Appendix E includes additional financial O&M information that may be required by DEQ prior to approval of the project. The owner or design engineer should contact DEQ during plan approval to determine if Appendix E.4 will be required prior to plan and specification approval.

NEW APPENDIX D

GUIDELINES FOR SEWER REHABILITATION

Sewer rehabilitation work as described in this guideline, shall only be used when the existing infrastructure complies with the standards defined in DEQ-2, Chapter 30, unless a deviation from those standards is first sought and secured by the engineer. A rehabilitation project must be submitted to the Department by an engineer for approval unless the Department has issued written clarification that the project can be considered maintenance and not system modification. Plans and specifications or other documents, sufficient to allow for this determination, must be submitted to the Department to allow for this written determination.

D.1 SEWER SYSTEM REHABILITATION/REPLACEMENT TECHNIQUES

The objectives of sewer system rehabilitation/replacement are principally to preserve structural integrity and reduce I/I. There are a number of products available from a variety of manufacturers and contractors to help meet these objectives. Sewer system owners should take care to verify that a certain class of product is suited for its proposed application and that a specific product and its installer meet appropriate guidelines, including successful performance history. The purpose of this section is to highlight the advantages, disadvantages, and other issues for the various classes of sewer rehabilitation/replacement products.

D.11 Sewer Mains

The rehabilitation/replacement techniques for sewer mains are discussed in Table D-1.

Table D-1
Rehabilitation/Replacement Techniques for Sewer Mains

Technique	Advantages	Disadvantages	Issues
Sliplining Sliplining is the insertion of a new pipe, either continuous (typically butt-fused HDPE) or segmented (typically PVC, ductile iron, or HDPE), of smaller diameter into an existing host pipe.	• Economical. • Strong. • Bypass pumping of sewage may not be needed (for segmented slipliner pipe).	• Hydraulic capacity reduced. • Entry pits usually required. • Service lateral connections must be excavated.	• Flotation of sewer must be prevented during grouting of annular space. • Condition of existing pipe may limit length of slipliner runs between pits, diameter of slipliner pipe, and/or lengths of segmented pipe pieces.

Cured-In-Place Pipe (CIPP) The CIPP lining process consists of inverting a resin-impregnated flexible tube into an existing sewer using hydrostatic head or air pressure. The resin is cured using heat.	• No access pits. • Service laterals can be internally reopened. • Minimal annular space. • Suitable for various cross-sectional shapes. • Strength can be selected as a function of sewer thickness and resin formula. • Manholes can be rehabilitated rather than replaced.	• Bypass pumping of sewage required. • Limited local competition.	• Liner wet-out with resin must be ensured. • Resin pot life must not be exceeded. • Proper curing temperatures and times must be maintained. • I/I must be controlled during installation. • Expertise and performance of manufacturer and installer must be ensured.
Fold-and-Form Lining The fold-and-form process involves inserting a heated PVC or HDPE thermoplastic liner, folded or deformed into a U-shape, into an existing sewer and rerounding the liner using heat and pressure.	• No access pits. • Service laterals can be internally reopened. • Manholes can be rehabilitated rather than replaced.	• Annular space allows migration of I/I unless service lateral connections are sealed. • Bypass pumping of sewage required. • Limited local competition.	• Sewer contraction during cooling induces stresses; consider use of materials with lower coefficients of thermal expansion/contraction and minimize installation tension. • I/I must be controlled during installation. • Expertise and performance of manufacturer and installer must be ensured.
Pipe Bursting Pipe bursting is a trenchless replacement technology. Through pipe bursting, the existing pipeline is fragmented and forced into the surrounding soil by pulling a bursting head through the sewer. A new pipe (typically butt-fused HDPE) of equal or larger diameter is pulled behind the bursting head. New manholes are usually provided at insertion and withdrawal pits.	• Creates a new, strong pipeline, not just rehabilitation of existing pipes. • Capacity can be increased. • Preparation of existing sewer is not critical.	• Entry pits are required. • Service lateral connections must be excavated. • Bypass pumping of sewage required. • Manholes must usually be replaced.	• Condition and location of adjacent buried utilities and foundations as well as surface improvements should be considered. • Dense or rocky soil may limit suitability of this method.
Point Repairs Point repairs can structurally rehabilitate and eliminate infiltration in short sections of sewers by such methods as short CIPP liners, epoxy resins, and structural grouting sleeves. Defects such as protruding laterals can be repaired by robotic grinding. Point repairs may be needed to properly prepare the sewer for some of the manhole-to-manhole rehabilitation/replacement options described in the techniques listed above.	• Economical. • Repairs only what is needed.	• May not be appropriate for old sewers if many more repairs may be needed in near future.	• Goals of project must be considered, along with cost estimates, to ensure manhole-to-manhole rehabilitation and replacement is not warranted.

D.12 Side Sewer Repairs

Side sewers (also referred to as private service laterals) are sewers that connect building drains on private property to the public sewer main in the public right-of-way or easements.

Research studies by EPA and others indicate that a significant percentage of system-wide I/I is caused by private property sources. These include sump pumps, foundation drains, roof drains, and defects in service laterals. Service lateral defects include cracked, broken, or open-jointed laterals. In addition, infiltration frequently occurs at a leaky connection of the lateral to the sewer main.

Repair of service lateral defects can be accomplished using many of the same methods listed above for sewer mains. Currently, chemical grouting, CIPP lining, and pipe bursting, in addition to open-cut excavation and replacement, are most widely used.

Removal of other private property I/I sources requires an effective public awareness and disconnection program.

In cases where sewage backups have occurred through service laterals and into buildings, installation of backwater valves provides an immediate solution until the longer term sewer system rehabilitation/replacement program shows results. Backwater valves are typically installed beneath basement floor slabs on that portion of the building drain serving the basement only. This allows plumbing fixtures on the main floor and above to drain even during times when the sewer main is surcharged.

D.13 Manhole Rehabilitation

Manhole rehabilitation can be performed to correct structural deficiencies, address maintenance concerns, and/or eliminate I/I. Some of the manhole rehabilitation options include lining, sealing, grouting, or replacing various components or the entire manhole. The rehabilitation method selected depends on whether inflow or infiltration, or both, are to be eliminated and whether structural integrity is an issue.

Inflow typically occurs through holes in the manhole cover or around the manhole frame and cover. Manhole covers can be sealed by replacing them entirely with new watertight covers, or by sealing existing covers with rubber-covered gaskets, rubber vents, and pick-hole plugs, or by installing watertight inserts under the existing manhole covers (inflow protectors). Inflow protectors should contain vacuum and gas release valves.

Chemical grouting is commonly used to eliminate infiltration.

D.14 Trench Excavation for System Repairs and Retrofits

Pipeline separation is a necessity for protection of public health and safety, property, and the quality of the product in the pipeline. Pipeline failure or leaks result in contamination of the pipeline product that leads to a public health and safety risk. The process of excavating one pipeline to repair a leak increases the risk of complete failure of adjacent pipelines. This can also be a concern when excavating trenches for reclaimed wastewater retrofit project.

NEW APPENDIX E

CAPACITY DEVELOPMENT FOR PUBLIC SEWAGE SYSTEMS

E.1 GENERAL

In addition to the information required in the circular, information on management, operation, maintenance, and financing of the system must be submitted. The purpose of this information is to allow evaluation of a new system for proper system management, operation and maintenance (O&M), and financial planning that provides long-term stability of the new system.

Capacity terms are defined as follows:

Managerial capability (capacity) means the management structure of the system, including but not limited to ownership accountability, staffing, and organization.

Technical capability (capacity) means the operation and maintenance resources of the system, including but not limited to technical knowledge, experience and adequate staffing.

Financial capability (capacity) means the financial resources of the system, including but not limited to the revenue sufficiency, credit worthiness, and fiscal controls.

The Department is granted the authority in Title 75, Chapter 6, Part 103 (2)(f), MCA, to ensure the financial, managerial, and technical viability of proposed public sewage systems.

E.2 MANAGERIAL CAPACITY

Provide the following information:

E.21 Name, address, and telephone number of the owner(s). If ownership is to change in the near future, such as in a subdivision where the developer will eventually relinquish ownership to another responsible entity, provide a projected timeline for change of ownership.

E.22 Administrative and management organizational charts. Define the functions and responsibilities of the organization and each administrative/managerial position. For example, if the organization has a secretary, provide a brief description of the secretary's responsibilities.

E.23 Plans for staffing the system with a certified operator and back-up operator. Provide the name of the operator if an operator has been selected. An operator should be available to operate the system even if the system has not yet become public. If the system is operated under contracted services, provide a copy of the contract.

E.24 A system or plan for maintaining records, plans and specifications for construction, as-built drawings, O&M manuals, collection system histories/maps, and compliance information. Preferably, an office space should be dedicated for storing all information so that it is readily accessible by the operator, manager(s), and owner(s) of the system.

E.25 If applicable, copies of the articles of incorporation, by-laws, or similar documents that provide the following information:

a. Define the purpose of the responsible entity.

b. Describe the procedures for compliance with the requirements of the Secretary of State's Office for creating and maintaining a non-profit association.

c. List membership and define membership rights (all lot owners should automatically become members unless they are not in good standing, which should be defined).

d. Define the format and schedule for meetings and requirements for quorums.

e. Describe the powers and duties of the board of directors.

f. Describe the process for transferring control of the system from the developer to lot owners where applicable.

g. Explain the procedures for amendment of the by-laws.

h. Confer authority to assess and collect fees for O&M, monitoring, personnel, capital improvements and equipment replacement.

i. Establish the service area of the responsible entity.

j. Confer authority to require installation of backflow prevention devices and to maintain such devices where appropriate.

Also, provide policies on how delinquent accounts, system violations, fee changes, and customer complaints will be addressed. The responsible entity must file its Articles of Incorporation with the Secretary of State.

E.26 In the event a responsible entity becomes insolvent, how will perpetuation of the system be maintained? Has a second party been considered for future ownership in the event that the responsible entity becomes insolvent?

The managerial plan must provide for:

a. Efficient operation of the system.

b. Adequate control of and accountability for the system by the owner(s), manager(s), and operator(s).

c. Adequate resources and accountability for regulatory compliance by the owner(s), manager(s) and operator(s).

d. Dissemination of information to all customers and the regulatory agencies.

E.3 TECHNICAL, OPERATIONAL, AND MAINTENANCE CAPACITY

Provide the following information in the form of an O&M manual that will be available to the operator(s), owner(s), and manager(s):

E.31 An explanation of startup and normal operation procedures. Startup should address operation of the system throughout system build-out if applicable (i.e., a subdivision will experience varying demands as the subdivision develops and builds out).

E.32 Will any equipment be leased or rented? Are easements or lease agreements necessary for any portion of the system? If applicable, provide pertinent information (i.e., copy of easement or lease agreement). Are changes in local zoning necessary to protect the proposed source(s)?

E.33 Record keeping method and system for reporting to the Department.

E.34 Sampling and analyses program to demonstrate compliance with any applicable discharge permit.

E.35 Staffing and training requirements to operate the system in compliance with any applicable approval statements and discharge permit(s).

E.36 Documentation of a safety program.

E.37 Documentation of an emergency plan and operating procedures (e.g., in the case of equipment failure or loss of power).

E.38 Manufacturers' manuals for all equipment and contact names for service. A routine maintenance program and maintenance schedules must also be included. Forms for recording routine maintenance checks per manufacturers' guidelines should be provided, including recording the frequency of maintenance and anticipated replacement dates for major equipment.

E.39 If a mechanical or other advanced level treatment facility is being proposed, the applicant must submit a plan of operation which commits the owner(s) as follows:

a. Staffing levels anticipated (i.e. number and qualifications of operational staff),

b. Documentation that operations staff is available and is, or will be qualified to operate the facility prior to the facility being activated.

c. Annual training and enhancement budget,

d. Adequate operations budget to maintain qualified staff, with provisions for long-term retention based pay.

Items E.31 – E.35 must be submitted in the form of an O&M manual prior to approval of the system. Item E.39 must be submitted in the form of a Plan of Operation prior to approval of the system.

A letter from the applicant must be provided prior to the system being used indicating that the system (or portion of the system that has been completed) was constructed in conformance with the approved plans and specifications. As-built record drawings for the system (or portion of the system that has been completed) must be provided within 90 days after the system has become operational. The as-built record drawings must include an O&M manual addressing items E.31 through E.39 and containing manufacturers' manuals and other pertinent information to complete the O&M manual.

The manual must demonstrate that the system will be operated in a manner to:

a. Maintain compliance with the Montana Water Quality Act and any discharge permit.

b. Allow effective operation of the system in accordance with the approved plans and specifications.

c. Remain consistent with operating conditions presented in the engineer's report..

E.4 FINANCIAL CAPACITY

The following financial information must be submitted prior to receiving approval of the system:

E.41 The financial information in Table E-1 must be completed for a 5-year period.

E.42 O&M rates and capital improvement/replacement rates must be developed based on information in Table E-1. A capital improvement/replacement plan must be developed for a 20-year period and the rate set accordingly. A reserve fund must be established and maintained to address future replacement of equipment based on anticipated replacement dates for equipment?

E.43 Demonstrate how monthly sewer rates are established for each connection (e.g., meter readings, water service size, etc.)

E.44 Connection/system development fee and basis for fee, if applicable.

E.45 A description of the owner(s) or responsible entity's access to financial capital? If a large sum of money is necessary for replacement, improvement, or expansion, can the owner(s) or responsible entity obtain a loan or grant?

E.46 Budgetary controls and audit schedule.

E.47 If the system is privately owned, has the Department of Public Service Regulation been contacted?

E.48 Provide a financial plan that demonstrates that all improvements will be constructed in conformance with the proposed plans and specifications. If bonding has been provided with a regulating entity (such as the county) for improvements, provide information on the bonded improvements.

The financial plan must demonstrate:

a. Revenues exceed expenses.

b. Adequate funds will be maintained for replacement of equipment.

c. A reserve account will be maintained.

d. The budget will be controlled, preferably by audits every 3 to 5 years.

e. The 5-year cash flow presented in Table E-1 is sufficient to properly operate the system.

f. That all proposed improvements will be constructed and in accordance with the approved plan and specifications.

TABLE E-1 - SYSTEM BUDGET

Applicant: Completed by: Date:

[redacted]

Enter Year:					
[redacted]					
b. Connection Fees					
c. Interest and Dividend Income					
d. Other Income					
[redacted]					
f. Transfers in/Additional Rev Needed					
g. Loans, Grants or other Cash Injection					
h. other - please specify					
[redacted]					
b. Employee Pensions and Benefits					
c. Purchased Water					
d. Purchased Power					
e. Fuel for Power Production					
f. Chemicals					
g. Materials and Supplies					
h. Contractual Services - Engineering					
i. Contractual Services - Other					
j. Rental of Equipment/Real Property					
k. Transportation Expenses					
l. Laboratory					
m. Insurance					
n. Regulatory Commission Expenses					
o. Advertising					
p. Miscellaneous					
[redacted]					
r. Replacement Expenditures					
[redacted]					
t. Loan Principal/Capital Lease Payments					
u. Loan Interest Payments					
v. Transfers Out					
w. Capital Purchases (specify)					
x. Other					
[redacted]					
[redacted]					
[redacted]					
b. Bond Retirement Reserve					
c. Capital Improvement Reserve					
d. Replacement Reserve					
[redacted]					
[redacted]					

BOARD OF ENVIRONMENTAL REVIEW
AGENDA ITEM
EXECUTIVE SUMMARY FOR PROPOSED RULE AMENDMENT AND REPEAL

Agenda Item # <u>III.A.4.</u>

Agenda Item Summary – The Department requests that the Board initiate rulemaking to adopt changes to Department Circular DEQ-7 (DEQ-7) incorporated by reference in ARM 17.24.645, 17.24.646, 17.30.502, 17.30.619, 17.30.637, 17.30.702, 17.30.1001, 17.30.616, and 17.30.658.

The Department also requests that the Board initiate rulemaking to amend ARM 17.30.602, 17.30.629 and 17.30.635, which are included in the surface water quality rules found in ARM Title 17, Chapter 30, Subchapter 6.

The changes to DEQ-7 include adopting surface and ground water standards for: (1) new numeric water standards for 5 pesticides and revised standards for 12 pesticides; (2) new and revised aquatic life standards for 2 parameters; (3) new and revised human health standards for 9 parameters; (4) revision of the toxic and carcinogenic categories of 12 parameters; (5) adoption of new and revised required reporting values for 213 parameters; (6) revision of 8 footnotes; (7) correction of 28 numeric standard source attributions; (8) deletion of references to the narrative water quality standards for nutrients; (9) elimination of manganese from DEQ-7 as well as elimination of references to secondary maximum contaminant limits; and (10) revision of the introduction.

The proposed revisions to Subchapter 6 fall into five categories: (1) repeal and amendment of two definitions; (2) repeal of two federal regulations incorporated by reference; (3) amendment of the C-3 classification; (4) removal of sewage and mining treatment provisions to eliminate duplication and inconsistencies with Montana Pollutant Discharge Elimination System rules and the Strip and Underground Mine Reclamation Act; and (5) repeal of the G-1 classification for ponds and reservoirs.

List of Affected Board Rules – ARM 17.24.645, 17.24.646, 17.30.502, 17.30.602, 17.30,619, 17.30.629, 17.30.635, 17.30.637, 17.30.702, 17.30.1001, 17.30.616, and 17.30.658.

List of Affected Department Rules – ARM 17.36.345, 17.55.109, 17.56.507, 17.56.608 (all changes are incorporation by reference to DEQ-7).

Affected Parties Summary – These proposed changes would affect parties required to monitor surface or ground water quality due to real or potential contamination from remediation sites, underground storage tanks, and subdivisions. Also affected would be strip and underground mine sites required to monitor ground water and surface water. Additionally, the agricultural community may be affected by the proposed changes and additions to pesticide standards.

Scope of Proposed Proceeding –The department requests that the Board initiate rulemaking and schedule a public hearing to take comment on the amendments to Department Circular DEQ-7, incorporated by reference in the rules cited above, and amendments to the surface water quality standards in the rules cited above.

Background – In general**,** the amendments to Department Circular DEQ-7 are being proposed to ensure that the numeric water quality standards reflect the best current science, to correct errors, to provide clarity and consistency of terminology, and to avoid duplication and inconsistency with narrative standards in both the surface water and ground water rules.

The proposed amendments to DEQ-7 would incorporate interim standards for five new pesticides and revise existing interim standards for twelve pesticides. These pesticides are agricultural chemicals that have no federally-promulgated standard adopted by EPA for the protection of water quality. Pursuant to 80-15-201(3) and 80-15-203(2)(a), MCA, the Board is required to adopt an "interim numerical standard" for ground water when there is no federally-promulgated or published standard for an agricultural chemical that has been detected in Montana's ground water. The Board is also required to review the interim standard whenever EPA promulgates a standard for the agricultural chemical at issue (80-15-201(3), MCA) or as new scientific information becomes available. The Department, in conjunction with EPA, has developed interim standards for five new pesticides detected in Montana's ground water and has revised the existing interim standards for 12 pesticides.

The proposed amendments to DEQ-7 would incorporate one new and one revised aquatic life standard to reflect the national recommended 304(a) criteria promulgated by the U.S. Environmental Protection Agency (EPA). In addition, five new human health standards based on EPA's Maximum Contaminant Levels and one human health standard based on EPA's 304(a) criteria are proposed for inclusion in DEQ-7. Revisions to three human health standards are also proposed to correct errors or to reflect new science.

The proposed amendments to DEQ-7 would change the categories (i.e., harmful, carcinogenic, or toxic) for 12 parameters and adopt or revise the Required Reporting Values (RRV's) for 213 parameters. Changes to the sources of information for 28 parameters are also proposed to reflect new information.

Other revisions to DEQ-7 include changes to the footnotes and the introduction. These changes are being proposed for clarification and consistency of interpretation.

The proposed revisions to the surface water standards in Subchapter 6 fall into five categories: (1) repeal and amendment of definitions to ensure consistency with statutory definitions; (2) repeal of two federal regulations incorporated by reference in order to eliminate duplication with Montana Pollutant Discharge Elimination System (MPDES) rules; (3) amendment of the C-3 classification to avoid conflict with Montana's nondegradation requirements; (4) removal of sewage and mining treatment provisions to eliminate duplication and inconsistencies with MPDES rules and the Strip and Underground Mine Reclamation Act; and (5) repeal of the G-1 classification for ponds and reservoirs constructed for the disposal of coal bed methane water.

Hearing Information – The Department recommends that the Board appoint a hearing officer and conduct a public hearing to take comment on the proposed amendments.

Board Options – The Board may:

1. Initiate rulemaking and issue the attached notice of public hearing on the proposed amendments;
2. Determine that amendment of the rules is not appropriate and decline to initiate rulemaking, or ;
3. Modify the notice and initiate rulemakeing:.

DEQ Recommendation – The Department recommends that the Board initiate rulemaking and appoint a hearings officer.

Enclosures –

1. Final Draft of Department Circular DEQ-7
2. Draft Administrative Register Notice of Public Hearing on Proposed Amendment and Repeal

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
AND THE DEPARTMENT OF ENVIRONMENTAL QUALITY
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.24.645, 17.24.646, 17.30.502, 17.30.602, 17.30.619, 17.30.629, 17.30.635, 17.30.637, 17.30.702, 17.30.1001, 17.36.345, 17.55.109, 17.56.507, and 17.56.608 pertaining to Department Circular DEQ-7, definitions, incorporations by reference, C-3 classification standards, general treatment standards, and general prohibitions, and the repeal of ARM 17.30.616 and 17.30.658 pertaining to water-use classification and descriptions for ponds and reservoirs constructed for the disposal of coal bed methane water and G-1 classification standards	)	NOTICE OF PUBLIC HEARING ON PROPOSED AMENDMENT AND REPEAL (RECLAMATION) (WATER QUALITY) (SUBDIVISIONS) (CECRA) (UNDERGROUND STORAGE TANKS)

TO: All Concerned Persons

1. On _________________, 2011 at ____ __.m., the Board of Environmental Review and the Department of Environmental Quality will hold a public hearing [in/at address], Montana, to consider the proposed amendment and repeal of the above-stated rules.

2. The board and department will make reasonable accommodations for persons with disabilities who wish to participate in this public hearing or need an alternative accessible format of this notice. If you require an accommodation, contact Elois Johnson, Paralegal, no later than 5:00 p.m., ________________, 2011, to advise us of the nature of the accommodation that you need. Please contact Elois Johnson at Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2630; fax (406) 444-4386; or e-mail ejohnson@mt.gov.

3. The rules proposed to be amended provide as follows, stricken matter interlined, new matter underlined:

17.24.645 GROUND WATER MONITORING (1) through (5)(c) remain the same.

(6) Methods of sample collection, preservation, and sample analysis must be conducted in accordance with 40 CFR Part 136 titled "Guidelines Establishing Test Procedures for the Analysis of Pollutants" (July 2003) and the department's document titled "Department Circular ~~WQB~~ DEQ-7, Montana Numeric Water Quality Standards~~"~~," ~~January 2004~~ August 2012 edition. Copies of Department Circular

~~WQB~~ DEQ-7 are available at the Department of Environmental Quality, 1520 E. 6th Ave., P.O. Box 200901, Helena, MT 59620-0901. Sampling and analyses must include a quality assurance program acceptable to the department.

(7) and (8) remain the same.

AUTH: 82-4-204, MCA
IMP: 82-4-231, 82-4-232, MCA

REASON: The board is proposing to amend Montana's reclamation and water quality rules in ARM 17.24.645, 17.24.646, 17.30.502, 17.30.619, 17.30.702, and 17.30.1001, to incorporate proposed revisions to Montana's numeric water quality standards contained in Department Circular DEQ-7 (August 2010 edition). The proposed revisions to the Circular fall into ten categories:

(1) adopt new surface and ground water standards for five pesticides recently detected in Montana's ground water and revise the existing standards for 12 pesticides based on new information;

(2) adopt new and revised aquatic life standards for two parameters, in order to be consistent with the U.S. Environmental Protection Agency's (EPA's) national recommended water quality criteria, promulgated under Section 304(a) of the federal Clean Water Act;

(3) adopt new and revised human health standards for nine parameters in order to be consistent with EPA's recent promulgation of new or revised criteria under Section 304(a) of the federal Clean Water Act and the Safe Drinking Water Act;

(4) revise the categories of 12 parameters currently listed in Department Circular DEQ-7 pertaining to toxins and carcinogens;

(5) adopt new and revised Required Reporting Values (RRV) for 213 parameters currently listed in Department Circular DEQ-7 based on a recent review of minimum detection limits achieved by laboratories in Montana;

(6) adopt revisions to eight footnotes to correct errors, eliminate text, or add information, as well as add three footnotes to clarify quantitation for newly listed parameters;

(7) correct 28 errors concerning the sources of information obtained from EPA. For instance, a parameter has been attributed to the Non Priority Pollutant (NPP) list when in fact the information was obtained from the Priority Pollutant list (PP); and

(8) delete all references to the narrative water quality standard for nutrients in surface water by specifically deleting the parameters listed as “Nitrogen, total inorganic (as Nitrogen N)” and “Phosphorus, inorganic,” and modifying footnote 8 as well. This change is being proposed, in part, due to the department’s development of numeric nutrient standards that will be brought to the board for consideration in the upcoming year.

(9) eliminate manganese entirely from DEQ-7 as no numeric aquatic life or human health standards have been adopted for this parameter.

(10) generally revise the introduction to DEQ-7 for clarity and consistency of commonly used terms.

In this rulemaking, the department is proposing to amend ARM 17.36.345 regarding subdivisions, ARM 17.55.109, implementing the Comprehensive Environmental Cleanup and Responsibility Act (CECRA), and ARM 17.56.507 and 17.56.608, implementing the underground storage tank program, in order to incorporate the board's revisions to Department Circular DEQ-7. These amendments are necessary to ensure that the department's programs for the regulation of water quality affected by remediation sites, underground storage tanks, and subdivisions will use the most current version of Montana's numeric water quality standards adopted by the board.

The revisions to Department Circular DEQ-7, and the reasons for them, are summarized below. Copies of Department Circular DEQ-7 with the proposed revisions may be obtained by contacting Rod McNeil at Water Quality Planning Bureau, Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901, by phone at (406) 444-5361, or by e-mail at rmcneil@mt.gov, or may be obtained on-line at http://www.deq.mt.gov/wqinfo/Standards.

(1) Interim Standards for Pesticides

The board is proposing to adopt numeric water quality standards for five pesticides that were recently detected in ground water by the Montana Department of Agriculture. These pesticides and metabolites are agricultural chemicals that have no federally promulgated standards adopted by EPA for the protection of water quality. In addition, the department has developed revised interim pesticide standards for twelve parameters adopted into Department Circular DEQ-7 during the period from 1998 to 2000. The water quality standards for these twelve parameters were initially developed using data from federal sources available on the internet as of June 1998. Given that new scientific information has become available since the adoption of those standards, the board is proposing to revise the interim water quality standards for ten pesticides described below to reflect current scientific information. The same process of EPA review, also described below, was used to derive both the new and revised interim standards for each pesticide indicated below.

Pursuant to 80-15-201(3), MCA, the board is required to adopt an "interim numerical standard" for ground water when there is no federally promulgated or published standard for an agricultural chemical that has been detected in Montana's ground water. The board is also required to review the interim standard whenever EPA promulgates a standard for the agricultural chemical at issue. 80-15-201(3), MCA.

The department, in conjunction with EPA, has developed interim standards for the following five pesticides detected in Montana's ground water in 2010-2011: Fluroxypyr, Dichlorprop(2,4DP), Fipronil, Myclobutanil and Pyroxsulam. In addition, the department, in conjunction with EPA, has developed revised interim standards for 12 pesticides based on new scientific health based information. The 12 pesticides are the following: Chlorothalonil, Clopyralid, MCPP, Metalaxyl, Methamidophos, Metsulfuron Methyl, Mirex, Nicosulfuron, Oxydemeton methyl, Primisulfuron Methyl, Tribenuron Methyl, and Triclopyr. The new and revised interim standards were developed using the process recommended by the Region VIII EPA toxicologist.

The levels set in the interim standards are determined in a two-stage process. First, the department reviews the available scientific literature and does preliminary calculations to determine a level that is protective of human health. The department then determines whether a compound is toxic or carcinogenic by using the Chemical Index List at www.toxnet.nlm.nih.gov or by using EPA's Integrated Risk Information System (IRIS). Depending on the identification of the pesticide as either toxic or carcinogenic, an interim standard is calculated using a chronic reference dose (RfD) for toxins or the oral cancer slope factor for carcinogens. If an RfD is used in the calculation, a Relative Source Contribution (RSC) is also used. The purpose of the RSC is to take into account all environmental sources of input, such as drinking water, food, and air. In the second step, the scientific references selected for these calculations are submitted to EPA for further review by the agency's toxicologist. If a pesticide is defined as carcinogenic, the appropriate cancer slope index is used along with a risk factor of 1×10^{-5} (1 in 100,000) to produce a final interim standard. The EPA has reviewed the proposed interim standards and has determined that they are protective of public health. Supporting documentation used to establish the standards is available from the department.

The board finds that modifying Department Circular DEQ-7 to adopt interim standards for the above-listed pesticides is necessary in order to fulfill its statutory obligation to establish ground water standards for agricultural chemicals that have been detected in Montana's ground water. The board also finds that it is necessary and reasonable to adopt interim standards for surface waters for the protection of human health that address these same pesticides and metabolites. The board could choose to adopt only ground water standards and meet the requirements of state law, but rejects that alternative as inconsistent with the policy of the state to "protect and maintain" all state waters, both surface and ground water. By adopting standards for surface waters as well as ground waters, Montana's surface waters will receive the same protection as ground water whenever state law mandates a ground water standard for an agricultural chemical.

(2) Aquatic Life Standards

(a) New standard: In 2010, the board adopted an acute aquatic life standard for acrolein in response to EPA's publication of a national recommended acute criterion for that parameter. In this rulemaking, the board is now proposing to adopt a chronic aquatic life standard for acrolein in response to EPA's recent promulgation of a chronic criterion for that same parameter.

The board finds it is reasonable and necessary to adopt a chronic aquatic life standard for this pollutant based upon EPA's recommended criteria, because the board does not have the resources necessary to develop aquatic life standards for Montana. In order to ensure that aquatic life in Montana's surface waters is protected from the toxic effects of this chemical, the board finds it necessary to use EPA's recommended criteria as the scientific basis for adopting a standard that ensures the protection of aquatic life from chronic adverse affects.

(b) Revised standards: The board is proposing to revise the acute aquatic life standard for Endrin currently in Department Circular DEQ-7 to correct a previous error.

In 2010, the board revised the acute aquatic life standards for six parameters to reflect the change in exceedance frequency adopted by the board during the same rulemaking. The revised standards were calculated by dividing the existing acute standards for the six parameters by a factor of two in order to derive an acute standard that was consistent with EPA's 1985 method. The acute aquatic life standard for Endrin was one of the six acute aquatic life standards that were revised by this method. This particular revision, however, was in error, because EPA's guidance indicates that dividing the acute standard for Endrin applies only to saltwater criteria. The revision to the aquatic life standard for Endrin proposed in this rulemaking corrects that error. The board finds it necessary to adopt this revision to make the acute aquatic life standard for Endrin consistent with EPA's 1985 method.

(3) Human Health Standards

The board is proposing to adopt five new human health standards: Sulfone, Bromate, Chlorite, Haloacetic acids, and Dichloroethylene,1,1-, based upon maximum contaminant levels (MCLs) recently published by EPA under the federal Safe Drinking Water Act.

In addition, the board is proposing to revise the human health standard for two parameters, due to EPA's recent promulgation of an MCL for each of these parameters. This proposed revision will result in changing the existing water quality standard for alpha emitters from 1.5 pico-curies/liter (based on a former Health Advisory analysis) to a standard of 15 pico-curies/liter (based on EPA's promulgation of an MCL for this parameter). The proposed revision will also result in changing the existing water quality standard for metolachlor from 100 µg/liter (based on a former Health Advisory analysis) to 700 µg/liter (based on EPA's promulgation of an MCL for this parameter.

The board is proposing to revise the human health standard for Aldicarb Sulfone in order to correct an error in listing the existing standard.

Finally, the board is proposing to adopt a new human health standard for Hexachlorocyclohexane, based upon EPA's recent promulgation of a human health-based criterion for this NPP under section 304(a) of the Clean Water Act.

The board finds it reasonable and necessary to adopt these new or revised human health standards based upon EPA's recommendation, because the board does not have the resources necessary to develop human health standards using state-sponsored research. In order to ensure that the quality of state waters protects public health, the board finds it necessary to use EPA's recommended criteria as the scientific basis for adopting standards that ensure the protection of human health from adverse effects. For the parameters listed above that are carcinogens, the board is using EPA's recommended criteria to establish human health standards based on a risk level of 1×10^{-5} as required by 75-5-301(2)(b)(i), MCA.

(4) Revisions to the Categories of 12 Parameters

The board is revising the categories of 12 parameters currently listed in Department Circular DEQ-7 as toxic or carcinogenic, based upon EPA's revisions to the manner in which it classifies carcinogens in the IRIS system. Based upon EPA's revisions to IRIS, the board is proposing the following revisions to the existing categories of certain parameters in Department Circular DEQ-7 as described below.

First, the board is proposing to change the category of the following parameters from carcinogenic to toxic: Alachlor, Atrazine, Butylate, Dichlorobenzene,1,4-, Dichloropropane,1,2-, Gamma-hexachlorocyclohexane, and Propane,1,2,Dibromo-3-chloro-. The board is proposing these changes based on new scientific evidence proving that these parameters have no discernable human carcinogenic potential. As such, the board finds it reasonable and necessary to revise the Department Circular DEQ-7 category for these parameters.

Second, the board is proposing to change the category of the following parameters from toxic to carcinogenic: Butyl Benzyl Phthalate, Cadmium, and Nitrobenzene. The board is proposing these changes based on new scientific evidence proving that these parameters have a measurable human carcinogenic potential. As such, the board finds it reasonable and necessary to revise the category for these parameters in Department Circular DEQ-7.

Third, the board is proposing to change the category of the following parameters from harmful to toxic: Phenol and Trichlorophenol,2,4,5-. The board is proposing these changes due to recent scientific information which has led to the development of chronic reference dose information for these parameters indicating toxicity. As such, the board finds it reasonable and necessary to revise the Department Circular DEQ-7 category for these parameters from harmful to toxic.

(5) <u>Required Reporting Values</u>

The board is proposing to adopt new or revised required reporting values (RRVs) for 213 parameters currently listed in Department Circular DEQ-7.

These proposed changes are due, in part, to significant advances in detection limits that have developed over the past ten years and also in response to EPA guidance. These detection limits, using new EPA-approved procedures promulgated under 40 CFR Part 136, allow the quantification of many pollutants to levels well below the current water quality standards in Department Circular DEQ-7. In contrast, some of the existing RRVs in Department Circular DEQ-7 specify reporting values for many parameters at levels that exceed the water quality standard for the parameter. These reporting values make compliance determinations by the department difficult, if not impossible, to achieve. Consequently, the board is proposing to adopt new or revised RRVs using the procedures summarized below and is also modifying the description of RRVs in Department Circular DEQ-7 for clarity and accuracy. As explained in the revised description, the RRVs proposed for adoption represent the board's "best selection of an appropriate laboratory reporting limit that is sufficiently sensitive to meet the most stringent numeric water quality standard."

The department's RRV calculation primarily uses method detection limits (MDLs) provided by analytical laboratories. MDLs and minimum reporting levels

(MRLs) were collected from seven state and commercial labs using methods listed in 40 CFR Part 136 and the Safe Drinking Water Act, as well as for select methods approved by EPA's Office of Pesticides. The department then calculated RRVs for the parameters in Department Circular DEQ-7 for each method using the 75th percentile of the MDLs obtained from the labs and multiplied the resulting value by 3.18. This method of calculating RRVs is based upon the method set forth in EPA 821-B-04-005 (Revised Assessment of Detection and Quantitation Approaches), as modified to account for MDLs from multiple laboratories.

From the RRVs calculated for each analytical procedure described above, the department selected the RRV for each pollutant closest to 10 percent of the most restrictive standard. In situations where all calculated RRVs for a pollutant were larger than the most restrictive standard or less than 10 percent of the most restrictive standard, the department reviewed the laboratory-provided MRLs, and, if one of the MRLs was closer to 10 percent of the standard, that MRL became the default RRV. Based on this selection procedure, the board is proposing new and revised RRVs for 213 parameters in Department Circular DEQ-7.

The board finds it reasonable and necessary to adopt new and revised RRVs for 213 parameters using the selection method described above, in order to establish RRVs that are sufficient for determining compliance with all applicable water quality standards. If the RRVs are not updated using this selection method, many RRVs would not meet Department Circular DEQ-7 numeric water quality standards, making compliance determination by the department unfeasible, while other RRVs would be too restrictive, making implementation by the laboratories impractical. A copy of Department Circular DEQ-7, with all new or revised RRVs indicated by interlining and underlining, is available for review.

(6) Revisions to the Footnotes of Department Circular DEQ-7

The board is modifying the following footnotes, for the reasons given below:

Footnote (1) is being modified to correct an error. As currently written, the footnote indicates that the categories for toxic, carcinogenic, and harmful parameters are all derived from EPA references. The category for harmful parameters, however, is a state-adopted category and the footnote is being revised to reflect this fact.

Footnote (2) is being modified to add categories from EPA's new scale used in IRIS to identify parameters that are carcinogenic. Since the older 1986 scale and the newer 2005 scale are in simultaneous use to identify parameters as carcinogens, both scales are identified in the footnote as the basis for classifying a particular parameter as carcinogenic.

Footnote (7) is being revised to correct an error. The revised footnote eliminates reference to ammonia concentrations as being related to flow, since they are not. This correction is necessary to clarify the basis for the ammonia standard in Department Circular DEQ-7.

Footnote (8) is being modified to indicate that numeric nutrient criteria for aquatic life will be listed in Department Circular DEQ-12, which will be proposed for adoption in a future rulemaking. Footnote 8 is also being removed as a reference for the aquatic life standards for ammonia, because the existing numeric aquatic life standards for ammonia will remain within Department Circular DEQ-7 and will not be included in proposed Department Circular DEQ-12.

Footnote (17) is being revised to eliminate I and the Secondary Maximum Contaminant Level (SMCL) as a source for human health standards in Department Circular DEQ-7. Since the board's proposed revisions to the human health standards in this rulemaking eliminate these sources as a basis for these standards, the revision to the footnote is also necessary.

Footnote (19) is being revised to more clearly explain the derivation of RRV values proposed in this rulemaking.

Footnote (23) is being modified to eliminate the current text within that footnote for the reasons given in paragraph (9).

Footnote (24) is being modified to eliminate the current text within that footnote for the reasons given in paragraph (9).

Footnote (37) is being added to explain that the sum of Aldicarb with any of its degradates cannot exceed 7 µg/L, because all of the degradates and their parent compound have a similar mode of action.

Footnote (38) is being added to explain that the measured concentration of Haloacetic acids must include all five of the listed compounds found in the listing.

Footnote (39) is being added to make clear that the cis and trans isomers of Endosulfan (Endosulfan I and Endosulfan II) are to be quantitatively added together with the parent compound (Endosulfan) in determining the total concentration for this parameter.

(7) Correcting Information Sources for 28 Parameters

The board is revising Department Circular DEQ-7 to correct errors and update the sources of information obtained from EPA that were used in the development of the water quality standards for the following parameters, as indicated below:

Parameter	Old Source	New Source
Alpha emitters	HA	MCL
Alpha-chlordane	PP	HA
Beta emitters	HA	MCL
Butylate	HA	MCL
Clopyralid	I	HA
Dichloroethylene,1,1-	PP	MCL
Gamma chlordane	PP	HA
Gamma-hexachlorocyclohexane	HA	MCL
Imazamethabenz-methyl ester	I	HA
Imazapyr	I	HA
Lead	PP	MCL
MCPP	I	HA
Metalaxyl	I	HA
Methamidaphos	I	HA
Metsulfuron methyl	I	HA

Mirex	I	NPP
Nicosulfuron	I	HA
Nitrate	MCL	NPP
N-nitrosopyrrolidine	PP	NPP
Oxydemeton methyl	I	HA
P-chloro-m-cresol	PP	OL
Phenol	PP	OL
Primisulfuron, methyl	I	HA
Radon 222	HA	MCL
Thifensulfuron, methyl	I	HA
Triasulfuron	I	HA
Tribenuron, methyl	I	HA
Triclopyr	I	HA

HA = Health Advisory
I = data obtained from federal data sources available on the internet from 1998 to 2000.
MCL = Maximum Contaminant Level
NPP = Non Priority Pollutant Criteria
OL = Organoleptic Pollutant Criteria
PP = Priority Pollutant Criteria

(8) Repealing References to the Narrative Water Quality Standard for Nutrients in Surface Waters

The board is proposing to modify footnote 8 in Department Circular DEQ-7, which references a narrative standard in ARM 17.30.637(1)(e) that prohibits undesirable aquatic growth in surface waters. Currently, footnote 8 indicates that various nutrient parameters in Department Circular DEQ-7 are subject to this narrative standard, because none of the nutrient parameters have a numeric water quality standard for the protection of aquatic life. Since the narrative standard in ARM 17.30.637(1)(e) may be applied to nutrients without the need of referencing it in Department Circular DEQ-7, the board is proposing to delete the existing text of footnote 8 since it serves no purpose other than inform the public that nutrients have no numeric standards.

The board is aware, however, that the department has been in the process of developing numeric standards for nutrients that, if adopted by the board, will protect aquatic life by controlling eutrophication in surface waters. Consequently, leaving the narrative standard in Department Circular DEQ-7 may result in two separate and potentially conflicting aquatic life standards for nutrients in the event numeric standards are adopted. Given that the numeric standards for nutrients, if adopted, will be contained in a new Department Circular DEQ-12, the board is proposing to replace the existing text of Footnote 8 with a reference to the numeric nutrient standards that will be contained in proposed Department Circular DEQ-12.

The board is also proposing to remove from Department Circular DEQ-7 two nutrient parameters that have no numeric water quality standards for either aquatic life or human health. The specific nutrient parameters proposed for removal are

"Nitrogen, total inorganic (as Nitrogen in [N])" and "Phosphorus, inorganic." Since there are no numeric standards for these parameters, removing them from Department Circular DEQ-7 is reasonable given that the narrative aquatic life standard in ARM 17.30.637(1)(e) may be applied independently from its inclusion in Department Circular DEQ-7 and no human health standard for these two nutrients exist. Other nutrient parameters in Department Circular DEQ-7, for which a numeric human health-based standard has been adopted, will remain unchanged.

(9) Removing Manganese and Eliminating References to Secondary Maximum Contaminant Levels (SMCLs)

The board is proposing to remove manganese and Footnote 24 from Department Circular DEQ-7, because no water quality standards for manganese have been adopted by the board. Despite the lack of numeric standards for manganese, manganese is currently listed in Department Circular DEQ-7 with Footnote 24 indicating a standard to protect human health is contained within the footnote. The text of Footnote 24, however, does not establish human health standards. Instead, the footnote simply refers to administrative rules containing narrative water quality standards that are used by the department when developing site-specific standards to protect the beneficial uses of surface and ground water. The footnote further indicates that the SMCL for manganese (i.e., 50 micrograms per liter) may be used by the department when interpreting a level of harm to beneficial uses caused by manganese. The board is proposing to remove manganese and the text of Footnote 24 for two reasons. First, referencing the narrative standards is not necessary because the narrative standards contained in ARM 17.30.637 and 17.30.1006 provide the department with an independent source of authority to develop site-specific standards when no numeric standards exist. Second, the reference to the SMCL within the footnote may be misconstrued as binding rather than mere guidance. In order to eliminate any confusion between the narrative standards developed by the department using site-specific information and the state-wide numeric standards contained in Department Circular DEQ-7, the board is proposing to eliminate the parameter manganese and the entire text of Footnote 24.

For the same reasons given above, the board is also proposing to eliminate the text of Footnote 23, which references the SMCL for iron to be used as guidance when developing human health standards under existing rules. Although the board is proposing to eliminate the text of the footnote, the board is not proposing to entirely remove iron from Department Circular DEQ-7. Since the circular currently includes an aquatic life standard for iron, the board will retain iron and its aquatic life standard in the revised Department Circular DEQ-7.

(10) General Revisions to the Introduction

The board is proposing to generally revise the Introduction to Department Circular DEQ-7 in order to provide consistency among commonly used terms, to clarify the meaning of acronyms, and to more clearly and accurately specify the sources of information used to develop water quality standards. These revisions are necessary to assist the public's understanding of an inherently complex and technical document.

17.24.646 SURFACE WATER MONITORING (1) through (5) remain the same.

(6) Methods of sample collection, preservation and sample analysis must be conducted in accordance with 40 CFR Part 136 titled "Guidelines Establishing Test Procedures for the Analysis of Pollutants" (July 2003) and Part 434 titled "Coal Mining Point Source Category BPT, BAT, BCT Limitations and New Source Performance Standards" (January 2002), and the ~~January 2004 version~~ August 2012 edition of the department's document titled "Department Circular ~~WQB~~ DEQ-7, Montana Numeric Water Quality Standards~~"~~." Copies of 40 CFR Part 136, 40 CFR 434, and Department Circular ~~WQB~~ DEQ-7 are available at the Department of Environmental Quality, 1520 E. 6th Ave., P.O. Box 200901, Helena, MT 59620-0901. Sampling and analyses must include a quality assurance program acceptable to the department.

(7) remains the same.

AUTH: 82-4-204, MCA
IMP: 82-4-231, 82-4-232, MCA

REASON: The board is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.30.502 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, and ARM Title 17, chapter 30, subchapters 6 and 7, apply throughout this subchapter:

(1) through (13) remain the same.

(14) The board adopts and incorporates by reference Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters. Copies of Department Circular DEQ-7 are available from the Department of Environmental Quality, P.O. Box 200901, Helena, MT 59620-0901.

AUTH: 75-5-301, MCA
IMP: 75-5-301, MCA

REASON: The board is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.30.602 DEFINITIONS In this subchapter the following terms have the meanings indicated below and are supplemental to the definitions given in 75-5-103, MCA:

~~(1) "Acutely toxic conditions" means conditions lethal to aquatic organisms passing through the mixing zone. Lethality is a function of the magnitude of pollutant~~

~~concentrations and the duration of organism exposure to those concentrations.~~

(2) through (4) remain the same, but are renumbered (1) through (3).

~~(5) "Chronic toxicity" means that death or functional impairment occurs or can be expected to occur to organisms exposed for periods of time exceeding 96 hours.~~

(6) through (15) remain the same, but are renumbered (4) through (13).

~~(16)~~ <u>(14)</u> "Mixing zone" ~~means the area of a water body contiguous to an effluent with characteristics qualitatively or quantitatively different from those of the receiving water. The mixing zone is a place where effluent and receiving water mix and not a place where effluents are treated. Certain water quality standards may not apply in the mixing zone for those parameters regulated by a MPDES or NPDES permit. An effluent, in its mixing zone, may not block passage of aquatic organisms nor may it cause acutely toxic conditions, except that ammonia, chlorine, and dissolved oxygen may be present at concentrations so as to cause potentially toxic conditions in no more than 10% of the mixing zone provided that there is no lethality to aquatic organisms passing through the mixing zone. The area in which these exceedences may be allowed shall be as small as practicable. Provisions for specific mixing zones will be determined on a case-by-case basis by application of the department's surface water mixing zone rules in ARM 17.30.501 through 17.30.518~~ <u>is defined in 75-5-103, MCA, and also means a limited area of a surface water body or a portion of an aquifer, where initial dilution of a discharge takes place and where water quality changes may occur and where certain water quality standards may be exceeded</u>.

(17) through (23) remain the same, but are renumbered (15) through (21).

~~(24)~~ <u>(22)</u> "Pollutants" means sewage, industrial wastes and other wastes as those terms are defined in 75-5-103~~(12), (19), (26)~~, MCA.

(25) through (41) remain the same, but are renumbered (23) through (39).

AUTH: 75-5-201, 75-5-301, MCA
IMP: 75-5-301, MCA

<u>REASON</u>: The board is proposing the amendments to the definitions in ARM 17.30.602 for the reasons given below:

First, the board is proposing to repeal the definition of "acutely toxic conditions," because that term will no longer be used in the surface water quality standards rules due to the proposed amendment to the definition of "mixing zone" described below. The board is also proposing to repeal the definition of "chronic toxicity" in the surface water quality standards rules, because that term is not used within ARM Title 17, chapter 30, subchapter 6.

Second, the board is proposing to amend the definition of "mixing zone" in the surface water quality standards rules in order to ensure that the definition is consistent with the statutory definition of "mixing zone" in Title 75, chapter 5, MCA, and with the definitions in ARM 17.30.502 (mixing zone rules) and in ARM 17.30.702 (nondegradation rules). The board is proposing this amendment because the definition in ARM 17.30.602 includes provisions that may conflict with the board's rules governing the granting of mixing zones. The board finds that the proposed amendment is necessary to ensure consistency with existing statutory and regulatory provisions defining "mixing zones" and to eliminate any inconsistency between the definition and the requirements for granting mixing zones established in ARM 17.30.501 through 17.30.518.

Finally, the board is proposing to amend the definition of "pollutant" in order to eliminate incorrect citations to the statutory definitions of "sewage," "industrial wastes," and "other wastes." Since the statutory definitions in 75-5-103, MCA, are renumbered from time to time by legislative additions to the definitions, the board is proposing to simply eliminate specific references to the statutory numbering system.

17.30.619 INCORPORATIONS BY REFERENCE (1) The board adopts and incorporates by reference the following state and federal requirements and procedures as part of Montana's surface water quality standards:

(a) Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters;

(b) remains the same.

~~(c) 40 CFR Part 133 (July 1, 1991), which establishes requirements for the level of effluent quality through the application of secondary treatment or its equivalent;~~

~~(d) 40 CFR Chapter I, Subchapter N (July 1, 1991), which establishes effluent guidelines and standards for point source discharges;~~

~~(e)~~ (c) 40 CFR Part 136 (July 1, ~~2007~~ 2011), which establishes guidelines and procedures for the analysis of pollutants; and

(f) remains the same, but is renumbered (d).

(2) remains the same.

AUTH: 75-5-201, 75-5-301, MCA
IMP: 75-5-301, MCA

REASON: The board is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

Also, the board is proposing to repeal the federal regulations incorporated by reference in ARM 17.30.619(1)(c) and (d) because the board is also proposing to eliminate the treatment requirements that are based on these federal regulations set forth in ARM 17.30.635. Since the treatment requirements currently in ARM 17.30.635 will no longer be a component of the surface water quality standards rules, incorporating the federal regulations upon which they are based is no longer necessary. The board is proposing these amendments in order to eliminate duplication between rules establishing surface water quality standards and rules establishing effluent limitations and treatment standards for MPDES permits set forth in ARM Title17, chapter 30, subchapter 12.

The board is also proposing to update the incorporation by reference of 40 CFR Part 136 in order to adopt the U.S. Environmental Protection Agency's (EPA) recent revisions to those methods. According to EPA, the recent revisions to 40 CFR Part 136 will provide greater flexibility to the regulated community in terms of providing more methods that satisfy EPA's requirements for the sampling and analysis of pollutants.

17.30.629 C-3 CLASSIFICATION STANDARDS (1) Waters classified C-3 are to be maintained suitable for bathing, swimming, and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply. ~~Degradation which will impact established beneficial uses will not be allowed.~~

(2) through (2)(k) remain the same.

AUTH: 75-5-201, 75-5-301, MCA
IMP: 75-5-301, MCA

REASON: The board is proposing to amend the C-3 classification in the surface water quality standards rules in order to eliminate language implying that degradation occurs only when a beneficial use is impacted. This amendment is necessary, because allowing degradation to the point that uses may be impacted without requiring the activity to undergo nondegradation review pursuant to 75-5-303, MCA, conflicts with Montana's statutory and regulatory nondegradation requirements.

17.30.635 GENERAL TREATMENT STANDARDS (1) through (1)(e) remain the same.

~~(2) Sewage must receive a minimum of secondary treatment as defined by EPA in accordance with requirements set forth in the Federal Water Pollution Control Act, 33 USC Sections 1251 through 1387 and 40 CFR Part 133 (July 1, 1991). Copies of 40 CFR Part 133 may be obtained from the department.~~

~~(3) Industrial waste must receive, as a minimum, treatment equivalent to the best practicable control technology currently available (BPCTCA) as defined in 40 CFR Chapter I, Subchapter N (July 1, 1991). Copies of 40 CFR Subchapter N may be obtained from the department.~~

(4) and (5) remain the same, but are renumbered (2) and (3).

AUTH: 75-5-201, 75-5-301, MCA
IMP: 75-5-301, MCA

REASON: The board is proposing to remove the treatment requirements currently found in (2) and (3) of ARM 17.30.635 in order to eliminate duplication and inconsistencies between these requirements and the rules establishing technology-based treatment requirements for point source discharges in ARM Title 17, chapter 30, subchapter 12.

17.30.637 GENERAL PROHIBITIONS (1) through (2) remain the same.

~~(3) Leaching pads, tailing ponds, or water, waste, or product holding facilities must be located, constructed, operated, and maintained in such a manner and of such materials so as to prevent the discharge, seepage, drainage, infiltration, or flow~~

~~which may result in the pollution of surface waters. The department may require that a monitoring system be installed and operated if the department determines that pollutants are likely to reach surface waters or present a substantial risk to public health.~~

~~(a) Complete plans and specifications for proposed leaching pads, tailing ponds, or water, waste, or product holding facilities utilized in the processing of ore must be submitted to the department no less than 180 days prior to the day on which it is desired to commence their operation.~~

~~(b) Leaching pads, tailing ponds, or water, waste, or product holding facilities operating as of the effective date of this rule must be operated and maintained in such a manner so as to prevent the discharge, seepage, drainage, infiltration, or flow which may result in the pollution of surface waters.~~

~~(4) Dumping of snow from municipal and/or parking lot snow removal activities directly into surface waters or placing snow in a location where it is likely to cause pollution of surface waters is prohibited unless authorized in writing by the department.~~

~~(5)~~ (3) Until such time as minimum stream flows are established for dewatered streams, the minimum treatment requirements for discharges to dewatered receiving streams must be no less than the minimum treatment requirements set forth in ARM ~~17.30.635(2) and (3)~~ 17.30.1203.

~~(6)~~ (4) Treatment requirements for discharges to ephemeral streams must be no less than the minimum treatment requirements set forth in ARM ~~17.30.635(2) and (3)~~ 17.30.1203. Ephemeral streams are subject to ARM 17.30.635 through 17.30.637, 17.30.640, 17.30.641, 17.30.645, and 17.30.646 but not to the specific water quality standards of ARM 17.30.620 through 17.30.629.

(7) through (9) remain the same, but are renumbered (5) through (7).

AUTH: 75-5-201, 75-5-301, 75-6-112, MCA
IMP: 75-5-301, MCA

REASON: The board is proposing to delete the requirements in (3) and (4) of ARM 17.30.637, because these activities are addressed under other regulatory programs administered by the department.

In ARM 17.30.637(3), the board is proposing to eliminate the provision that requires mining facilities and wastes be operated in a manner that prevents pollution of surface waters, because that provision is no longer necessary. Mining activities that result in a discharge to surface waters are subject to the Montana Pollutant Discharge Elimination System (MPDES) permit requirements in ARM Title 17, chapter 30, subchapters 12 and 13. In addition, the location and construction of leach pads, tailing facilities, and related structures associated with mining activities are subject to regulation under the Strip and Underground Mine Reclamation Act, Title 82, chapter 4, part 2, MCA, or the metal mine reclamation laws in Title 82, chapter 4, part 3, MCA. Since the department has adequate authority under these other laws to protect state waters from pollution associated with mining activities, the board is removing the requirements in (3) to eliminate duplication and potential conflicts with other regulatory requirements.

In ARM 17.30.637(4), the board is proposing to eliminate the prohibition against dumping snow from parking lots into state surface waters. The removal of snow is not a significant threat to water quality and is adequately addressed by the board's rules establishing requirements for municipal separate storm sewer systems (MS4).

The board is also amending ARM 17.30.637(5) and (6) to delete the citation to ARM 17.30.635 as the authority to impose minimum treatment. The board is proposing these amendments because the proposed amendments to ARM 17.30.635 in this rulemaking will remove all treatment requirements from that rule. Since minimum treatment is now defined and authorized only under ARM 17.30.1203, the board is replacing the citation to ARM 17.30.635 with ARM 17.30.1203.

17.30.702 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, apply throughout this subchapter (Note: 75-5-103, MCA, includes definitions for "degradation," "existing uses," "high quality waters," "mixing zone," and "parameter"):

(1) through (25) remain the same.

(26) The board adopts and incorporates by reference:

(a) Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters;

(b) through (d) remain the same.

AUTH: 75-5-301, 75-5-303, MCA
IMP: 75-5-303, MCA

REASON: The board is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.30.1001 DEFINITIONS The following definitions, in addition to those in 75-5-103, MCA, apply throughout this subchapter:

(1) remains the same.

(2) "DEQ-7" means Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition), which establishes water quality standards for toxic, carcinogenic, radioactive, bioconcentrating, nutrient, and harmful parameters.

(a) The board adopts and incorporates by reference Department Circular DEQ-7, entitled "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition), which establishes water quality standards for toxic, carcinogenic, bioconcentrating, nutrient, radioactive, and harmful parameters.

(3) through (15) remain the same.

AUTH: 75-5-201, 75-5-401, MCA
IMP: 75-5-301, 75-5-401, MCA

REASON: The board is proposing to amend the incorporation by reference of

Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.36.345 ADOPTION BY REFERENCE (1) For purposes of this chapter, the department adopts and incorporates by reference the following documents. All references to these documents in this chapter refer to the edition set out below:

(a) through (d) remain the same.

(e) Department Circular DEQ-7, "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012 edition);

(f) through (2) remain the same.

AUTH: 76-4-104, MCA
IMP: 76-4-104, MCA

REASON: The department is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.55.109 INCORPORATION BY REFERENCE (1) For the purposes of this subchapter, the department adopts and incorporates by reference:

(a) Department Circular DEQ-7, Montana Numeric Water Quality Standards (~~February 2008~~ August 2012);

(b) through (5) remain the same.

AUTH: 75-10-702, 75-10-704, MCA;
IMP: 75-10-702, 75-10-704, 75-10-711, MCA

REASON: The department is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.56.507 ADOPTION BY REFERENCE (1) For purposes of this subchapter, the department adopts and incorporates by reference:

(a) Department Circular DEQ-7, "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012);

(b) through (3) remain the same.

AUTH: 75-11-319, 75-11-505, MCA
IMP: 75-11-309, 75-11-505, MCA

REASON: The department is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

17.56.608 ADOPTION BY REFERENCE (1) For purposes of this subchapter, the department adopts and incorporates by reference:

(a) Department Circular DEQ-7, "Montana Numeric Water Quality Standards" (~~August 2010~~ August 2012);

(b) through (3) remain the same.

AUTH: 75-11-319, 75-11-505, MCA
IMP: 75-11-309, 75-11-505, MCA

REASON: The department is proposing to amend the incorporation by reference of Department Circular DEQ-7 in this rule for the reasons given by the board for amending ARM 17.24.645.

4. The rules proposed for repeal are as follows:

17.30.616 WATER-USE CLASSIFICATION AND DESCRIPTIONS FOR PONDS AND RESERVOIRS CONSTRUCTED FOR THE DISPOSAL OF COAL BED METHANE WATER (AUTH: 75-5-301, MCA; IMP: 75-5-301, MCA), located at page 17-2709, Administrative Rules of Montana. The board is proposing to repeal the G-1 water-use classification because the Ninth Circuit has held that ground water produced during coal bed methane development is a "pollutant." Since coal bed methane produced water is a pollutant, ponds and reservoirs constructed for the purpose of impounding those pollutants are not defined as "state waters" in 75-5-103, MCA. Consequently, the board is repealing the G-1 classification because it is not appropriate to classify coal bed methane ponds or reservoirs that are used to impound pollutants as state waters.

17.30.658 G-1 CLASSIFICATION STANDARDS (AUTH: 75-5-301, MCA; IMP: 75-5-301, MCA), located at pages 17-2756 and 17-2757, Administrative Rules of Montana. The board is proposing to repeal the water quality standards that are applicable to waters classified as G-1, because the board is also proposing to repeal the entire G-1 classification in ARM 17.30.616. The board is proposing that both ARM 17.30.616 and 17.30.658 be removed from the surface water quality standards rules, because the Ninth Circuit has held that ground water produced during coal bed methane development is a "pollutant." Since coal bed methane produced water is a pollutant, ponds and reservoirs constructed for the purpose of impounding those pollutants are not defined as "state waters" in 75-5-103, MCA. Consequently, the board is repealing the G-1 classification and associated water quality standards since it is not appropriate to apply water quality standards to ponds or reservoirs that are not state waters.

5. Concerned persons may submit their data, views, or arguments, either orally or in writing regarding the proposed rule amendments and changes to Department Circular DEQ-7, at the hearing. Written data, views, or arguments regarding the rule amendments and changes to Department Circular DEQ-7 also may be submitted to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana 59620-0901; faxed to (406) 444-4386; or e-mailed to ejohnson@mt.gov, no later than 5:00 p.m., ______________________, 2011. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

6. Katherine Orr, attorney for the board, or another attorney for the Agency Legal Services Bureau, has been designated to preside over and conduct the hearing.

7. The board and department maintain a list of interested persons who wish to receive notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding: air quality; hazardous waste/waste oil; asbestos control; water/wastewater treatment plant operator certification; solid waste; junk vehicles; infectious waste; public water supplies; public sewage systems regulation; hard rock (metal) mine reclamation; major facility siting; opencut mine reclamation; strip mine reclamation; subdivisions; renewable energy grants/loans; wastewater treatment or safe drinking water revolving grants and loans; water quality; CECRA; underground/above ground storage tanks; MEPA; or general procedural rules other than MEPA. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be mailed or delivered to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Ave., P.O. Box 200901, Helena, Montana 59620-0901, faxed to the office at (406) 444-4386, e-mailed to Elois Johnson at ejohnson@mt.gov; or may be made by completing a request form at any rules hearing held by the board or department.

8. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

Reviewed by: BOARD OF ENVIRONMENTAL REVIEW

__________________________ BY: _______________________________
JAMES M. MADDEN JOSEPH W. RUSSELL, M.P.H.,
Rule Reviewer Chairman

DEPARTMENT OF ENVIRONMENTAL QUALITY

BY: _______________________________
RICHARD H. OPPER, Director

Certified to the Secretary of State, __________________, 2011.

Introduction

~~This document~~ The Department of Environmental Quality (Department) Circular DEQ-7 (DEQ-7) contains numeric water quality standards for Montana's surface and ground waters. The standards were developed in compliance with Section 75-5-301, Montana Code Annotated (MCA) of the Montana Water Quality Act, Section 80-15-201, MCA (the Montana Agricultural Chemical Groundwater Protection Act), and Section 303(c) of the Federal Clean Water Act (CWA). Together, these provisions of state and federal law require the adoption of narrative and numeric standards that will protect the designated beneficial uses of state waters, such as growth and propagation of fishes and associated wildlife, waterfowl and furbearers, drinking water, culinary and food processing, recreation, and ~~or~~ agriculture.

~~CIRCULAR~~ DEQ-7 contains a great deal of information about Montana's numeric standards in a compact form. In addition to providing the numeric water quality standards for each parameter, ~~the Circular~~ DEQ-7 also contains the following:

- The primary synonyms of each parameter. This section also includes any identification numbers used by the U.S. Environmental Protection Agency (EPA), such as ~~and~~ the Resource Conservation and Recovery Act (RCRA) waste number, ~~(~~if ~~it exists~~ available~~)~~, as the last entry in the synonyms section;
- the Chemical Abstracts Service Registry Number (CASRN) ~~number~~ for each chemical, as well as the National Institute for ~~of~~ Occupational Safety and Health (NIOSH) and the SAX reference numbers (taken from *Dangerous ~~p~~Properties of Industrial Materials*, by N. Irving Sax);
- the categorization of each parameter according to the type of pollutant;
- the bioconcentration factor, if known;
- trigger values used to determine "nonsignificant changes in water quality" under Montana's nondegradation policy (ARM 17.30.701-718); and
- required reporting values (RRV). See footnote 19 for a further explanation of RRV usage.

~~In addition, the Circular contains ground water criteria for pesticides, developed in compliance with the Montana Agricultural Chemical Ground Water Protection Act (80-15-201, MCA).~~

The numeric water quality standards in ~~this Circular~~ DEQ-7 have been established for parameters (i.e., "pollutants") in ~~five~~ four categories: toxic, carcinogenic, radioactive~~, nutrient~~, ~~or~~and harmful. ~~You will find~~ ~~a~~An explanation of each of these categories is given below under "Explanation of Terms".

~~The Department will provide hard copies of this document upon request or the document may be retrieved from the Department WEB site at, http://www.deq.mt.gov/wqinfo/Circulars/DEQ-7.PDF. Use of an electronic copy will enable the reader to search for synonyms or CASRN numbers. Such searches will make this document easier to use.~~

Parameters are listed in alphabetical order. In order to facilitate listing by alphabetical order, parameters that are normally written with the numbers first are listed with the numbers last. For example, 2,4-Dinitrophenol is listed as Dinitrophenol, 2,4-.

There are many explanatory notes following the table portion of ~~CIRCULAR~~ DEQ-7. Footnotes referencing the explanatory notes are found in both the table headings and in individual line items. The notes following the table explain various aspects of the standards. For example, the standards for some metals, ammonia, dissolved oxygen, and phenol, cover a range of values that are computed by using tables or formulas, ~~with~~ using such parameters as pH, hardness, or temperature.

The Department will provide hard copies of this document upon request or the document may be retrieved from the Department website at, http://www.deq.mt.gov/wqinfo/Circulars/DEQ-7.PDF. Use of an electronic copy will enable the reader to search for synonyms or CASRN. Such searches will make this document easier to use.

Standards Development

Montana's numeric water quality standards were developed using guidance from the EPA which includes:

- National Recommended Water Quality Criteria (NRWQC)[1] for the protection of human health and aquatic life, developed under Section

[1] See http://www.epa.gov/waterscience/criteria/wqctable/

304(a) of the CWA. These include criteria for priority pollutants (PP), non priority Pollutants (NPP), and organoleptic pollutants (OL); and

- Drinking Water ~~Lifetime~~ Health Advisoryies (HA) and Maximum Contaminant Levels (MCLs) developed under the Safe Drinking Water Act.[2]

The 2011 versions of NRWQC and Drinking Water Standards and Health Advisories were used to develop the standards in this version of DEQ-7.

~~EPA's guidance includes the NRWQC for priority pollutants (PP), non-priority pollutants (NPP) and organoleptic pollutants (OL), developed under Section 304 of the CWA, health advisories (HA), and drinking water standards referred to as Maximum Contaminant Levels (MCL). Publications containing EPA guidance include: 1986 Quality Criteria for Water, EPA 440/5/86-001 (the "Gold Book") and numerous updates; Toxics Criteria for those States not Complying with Clean Water Act 303(c)(2)(B); (The National Toxics Rule [NTR]) which was published in the Code of Federal Regulations, 40 CFR 131.36 (1992); Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; (62 F.R. 42159 [1997]); National Recommended Water Quality Criteria :2002 (EPA 822-R-02-047); and 2004 Edition of the Drinking Water Standards and Health Advisories (EPA 822-R-04-005). The most recent EPA NRWQC and 2009 Edition of the Drinking Water Standards and Health Advisories guidance was used to develop the standards in this Circular.~~

~~The NRWQC published by EPA include criteria recommendations for the protection of aquatic life and human health.~~

Aquatic life criteria take into consideration the magnitude (how much of a pollutant is allowable), duration of exposure to the pollutant (averaging period), and frequency (how often criteria can be exceeded). Acute criteria are based on a one hour exposure event and can only be exceeded once, on average, in a three year period. Chronic criteria are based on a 96 hour exposure and can only be exceeded, on average, once ~~o~~in a three year period. For more information, see EPA's ***Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic organisms and Their Uses.***[3] The techniques used for determining Aquatic

[2] See http://www.epa.gov/waterscience/criteria/drinking/

[3] Available at:~~http://www.epa.gov/waterscience/criteria/library/85guidelines.pdf~~ http://water.epa.gov/scitech/swgudance/standards/criteria/aqlife/

Life numeric standards are complex and take a great deal of time to develop. They require a detailed accumulation of scientific evidence from multiple studies, reviewed by experts in their field ~~consensus of information within the scientific community~~ that may take ~~10+~~ years to ~~develop~~complete. Aquatic Life Standards are added to DEQ-7 as they become available.

Nutrient standards for aquatic life are not included in DEQ-7 but are addressed in Circular DEQ-12. Nutrients in the aquatic environment are essential substances (organic or inorganic) which are used by living organisms such as algae or bacteria for cellular metabolism or construction. Examples include nitrogen (typically as ammonia, nitrate, or nitrite) and phosphorus. If present in excessive amounts (which depends on the ecosystem involved), nutrients can produce excessive algal and plant growth, which can lead to undesirable deterioration of beneficial uses of State waters. The human health standards for nitrogenous compounds are still found in DEQ-7 and are listed as toxic compounds. Inorganic nitrogen and phosphorus do not have human health standards and are therefore addressed solely in DEQ-12.

Human health criteria also have a magnitude, duration and frequency component. The standard assumption in calculating the magnitude of the pollutant for groundwater exposure is that a 70 kg person will consume ~~2~~ two liters a day~~,~~ for 70 years. Water consumption is assumed to be the only route of exposure in that time frame. For surface water criteria, two routes of exposure are considered, water consumption and fish consumption. ~~(~~EPA and ~~DEQ-7~~ The Department use~~s~~ a fish consumption rate of 17.5 grams of fish per day~~)~~.

Other publications used by the Department in the development of standards include: the *1986 Quality Criteria for Water*, EPA 440/5/86-001 (the "Gold Book") and numerous updates; *Toxics Criteria for those States not Complying with Clean Water Act* 303(c)(2)(B); *The National Toxics Rule* [NTR], which was published in the Code of Federal Regulations, 40 CFR 131.36 (1992); and *Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California*, 62 F.R. 42159 [1997].

EXPLANATION OF TERMS

Toxics: A toxin is any chemical which has an immediate, deleterious effect on the metabolism of a living organism. The surface water quality standards for human health toxins are the more restrictive of either the MCL or the NRWQC. The ground water standards for human health toxins are ~~based on~~ the drinking water MCL or, if an MCL is not available, the NRWQC criteria. If neither an MCL nor an NRWQC criteria is available, an HA will be developed by the Department with the aid of the regional EPA toxicologist.

Carcinogens: The Montana Water Quality Act requires that human health standards for carcinogens be the more restrictive of either of the following: (1) the risk-based level of one in one hundred thousand [$1x10^{-5}$] for all carcinogens except arsenic, which is based upon one in one thousand [$1x10^{-3}$]; or, (2) the MCL. For surface water, the risk-based levels ~~given~~ in EPA's NRWQC criteria or the MCL ~~were~~was used, or if not available, ~~health advisory~~HA information was used. In cases where a risk based level was not available, the most recent oral reference dose (RfD) or cancer potency factor (q1*) in the Integrated Risk Information System (IRIS) was used to compute the standard. In cases where no risk-based levels were available for known carcinogens, the standards in ~~this Circular~~DEQ-7 are based on toxic effects. Ground water standards are based on EPA Drinking Water ~~Health Advisories~~MCLs or HAs, NRWQC criteria, or IRIS information.

~~Bioconcentrating: Bioconcentration factors are not a separate category in DEQ-7, but are included in either the toxic or carcinogenic category. The human health standards for carcinogens and other parameters that exhibit bio-concentration properties were developed using the assumption that there are two routes of exposure: through consumption of water and fish. EPA's water quality criteria are derived using an average fish consumption rate of 17.5 grams/day. Montana has not conducted its own fish consumption survey. The standards in this Circular use EPA's recommended average daily fish consumption value.~~

Pesticides: The Montana Agricultural Chemical Ground Water Protection Act requires that ~~MCLs~~ federal water quality criteria be adopted as ground water standards for pesticides if ~~MCLs~~ they are available. Pesticides are not a separate category in DEQ-7, but are included in either the toxic or carcinogenic categories, and the criteria derivation would follow the process described above for those categories. If no MCLs or other federal criteria are available, standards must be developed using available data on health effects ~~reference dose,~~ ~~[~~RfD~~]~~) and standard assumptions. The standard assumptions are~~: 2~~that two liters of water are consumed per day and that adults weighing 70 kilograms are exposed for 70 years (life long exposure) to a single source of water. When information was available, a relative source contribution (RSC) factor was also applied. The RSC is the percentage of a parameter's intake through drinking water versus other dietary sources. A RSC of 0.2 was used in most cases to develop ground water standards for pesticides. In some cases, no data was available to develop a water quality standard for a pesticide in surface water. In these cases, the ground water standard (developed for a pesticide according to the risk-based analysis provided above) was also adopted as a surface water standard. Other federal data sources were used when the EPA's most recent drinking water regulations and health advisories did not include data for a pesticide.

Bioconcentration: Bioconcentration factors (BCF) are not a separate category in DEQ-7, but are included with each pollutant for which there is a known bioconcentration effect. Bioconcentration is a biological amplification process which results in a higher concentration of a pollutant in a living organism than in the environment to which the organism is exposed. Pollutants such as mercury can be hundreds of times more concentrated in fish tissues than in the water the fish lives in. The calculation of a BCF is complex and is dependent on the age of the organism and the chemistry of its environment. A detailed discussion of bioconcentration can be found in EPA 823-B-94-004 *Guidance for Assessing Chemical Contaminant Data for use in Fish Advisories.*

The human health standards for carcinogens and other parameters that exhibit bioconcentration were developed using the assumption that there are two routes of human exposure: through consumption of water and fish. EPA's water quality criteria are derived using an average fish consumption rate of 17.5 grams/day and water consumption of two liters per day. The Department follows the EPA guidance for fish consumption rates.

Radioactive: All elements that emit alpha, beta, or gamma radiation are regulated in ground water by the EPA. As all forms of radiation are carcinogenic, the calculation of a numeric standard is derived either from MCL~~'~~s set by the EPA or calculated from the Oral Cancer Slope Factor (OCSF) provided by the EPA Region~~al~~ VIII toxicologist, the use of a risk based level of one ~~1~~ in one hundred thousand (1×10^{-5}) and the consumption of ~~2~~two liters of water daily for 70 years for an adult weighing 70 kilograms ~~man~~. Unlike pesticides, a relative source correction (RSC) is not applied to the calculation of numeric standards for radioactive substances as discussed in EPA 402-R-11-001, *EPA Radiogenic Cancer Risk Models and Projections.*

Harmful: Pollutants typically classified as harmful include substances or measures which are controlled by both numeric and narrative standards. Examples of numeric standards would be pH, color or bacterial concentration. The numeric standards ~~will~~ vary depend~~ent~~ ing on the water body's~~ies~~ classification for beneficial use. The use of tables from the footnotes section of ~~this Circular~~ DEQ-7 is pivotal to the proper selection of the appropriate standard. Narrative standards are not covered in DEQ-7, but include such parameters as alkalinity, sulfates, chloride, hardness, sediment, and total dissolved solids. ~~and nutrients (for surface waters).~~

~~Nutrient: A nutrient in the aquatic environment is an essential substance (organic or inorganic) which is utilized by living organisms (such as algae or bacteria) for cellular metabolism or construction. Examples include nitrogen (typically as ammonia, nitrate or nitrite) and phosphorus. If present in excessive amounts (which depends on the ecosystem involved), nutrients can produce excessive algal and plant, which can lead to undesirable deterioration of beneficial uses of State waters.~~

Required Reporting Value: Each pollutant's required reporting value (RRV) is the Department's selection of a laboratory reporting limit that is sufficiently sensitive to meet the most stringent numeric water quality standard. The Department's RRVs calculation is modified from EPA Guidance 821-B-04-005, "Revised Assessment of Detection and Quantitation Approaches," and uses method detection limits (MDLs) provided by laboratories. An MDL, as defined in 40 CFR 136 Appendix B, is "the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte." EPA's guidance is based on MDL studies conducted at individual labs and recommends multiplying the MDL by 3.18 to calculate the RRV. Since the Department calculates RRVs based on an interlaboratory study, the guidance has been modified to use the 75th percentile of the MDLs from the labs multiplied by 3.18.

Because DEQ-7 contains numeric standards for pollutants regulated under 40 CFR 136, EPA's Safe Drinking Water Act (SDWA), and EPA's Office of Pesticides, MDLs used to calculate RRVs in DEQ-7 include those from methods in 40 CFR 136 Appendix A, EPA's SDWA methods, and select methods approved by EPA for the analysis of pesticides. It is the responsibility of the sampling entity to ensure that appropriate methods and reporting limits are requested from the laboratory to meet analytical and reporting limit needs. For pollutants with low standards and RRVs, the Department realizes that the RRVs may be below the laboratory's lowest calibration standards. In these cases, laboratories are encouraged to report values down to the RRV when possible, and to qualify data reported below their lowest calibration standard.

Rules Containing Montana's Water Quality Standards

The Administrative Rules of Montana (ARM), 17.30.620 through 17.30.670, contain numeric surface water quality standards that vary with each stream classification. Examples of numeric standards that change under each stream classification include Escherichia coli bacteria, color, turbidity, pH, and temperature.

Both Montana's surface water and ground water rules contain narrative standards (ARM 17.30.620 through 17.30.670 and ARM 17.30.1001 through 17.30.1045). The narrative standards cover a number of parameters, such as alkalinity, chloride, hardness, sediment, sulfate, and total dissolved solids~~ and nutrients (for surface water),~~ for which sufficient information does not yet exist to develop specific numeric standards. These narrative standards are directly translated to protect beneficial uses from adverse effects, supplementing the existing numeric standards.

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
Except where indicated, values are listed as micro-grams-per-liter (µg/L). A '—' indicates that a Standard has not been adopted or information is currently unavailable. A '( )' indicates that a detailed note of explanation is provided.									
Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Acenaphthene §§— § 3Acenaphthalene § Naphthyleneethylene § 1,8-Ethylenenaphthalene § 1,8-Ethylene Naphthalene § 1,2-Dihydroacenphthylene § Acenphthylene, 1,2-Dihydro-	83-32-9 AB 1255500 AAE750	Toxic	—	—	242	670 PP	670 PP	N/A	10
Acetochlor ~~(excludes metabolites Acetochlor ESA and Acetochlor OA)~~ (30) §§— § Acenit § Azetochlor § C10925 § Erunit § Harness § MG 02 § MON 097 § Nevirex	34256-82-1	Toxic			—	140 HA	140 HA	—	— 0.4
Acifluorfen §§ Blazer § Tackle § Scepter § as sodium salt	62476-59-9	Carcinogen	—	—	—	10 HA	10 HA	N/A	— 0.5
Acrolein §§ Aqualine § Biocide § Crolean § Aqualin § Propenal § SHA 00701 § 2-propenal § Acraldehyde § Acrylaldehyde § Acrylic Aldehyde § Ethylene Aldehyde	107-02-8 AS 1050000 ADR000	Carcinogen	3 PP	3 PP	215	60 PP	60 PP	0.7	~~20~~ 3
Acrylamide §§ 2-Propenamide § Propenamide§ Acrylic Amide § Ethylenecarboxamide § RCRA Waste Number U007	79-06-1 AS 3325000 ADS250	Carcinogen	—	—	—	0.08 HA	0.08 HA	—	— 0.008
Acrylonitrile §§ Fumigrain § Ventox § ENT 54 § TL 314 § Carbacryl § Cyanoethylene § Vinyl cyanide § Propenenitrile § 2-Propenenitrile § Acrylonitrile monomer § RCRA Waste Number U009	107-13-1 AT 5250000 ADX500	Carcinogen	—	—	30	0.51 PP	0.51 PP	N/A	~~20~~ 3

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Alachlor (includes metabolites Alachlor ESA and Alachlor OA) (31) §§ Lasso § Lazo § Alator § Alanex § Alochlor § Pillarzo § Metachlor § Chimiclor § SHA 090501 § Methachlor § 2-Chloro-N-(2,6-Diethyl)Phenyl-N-Methoxymethylacetamide § 2-Chloro-2',6'-Diethyl-N-(Methoxymethyl)Acetanilide	15972-60-8 AE 1225000 CFX000	~~Carcinogen~~ Toxic			---	2 MCL	2 MCL	N/A	~~0.4~~ 0.3
Aldicarb (37) §§ Temik § Temic § Ambush § OMS 771 § Temik G 10 § Aldecarb § Carbamyl § SHA 098301 § Carbanolate § Sulfone Aldoxycarb § Union Carbide 21149 § § Propanal, 2-Methyl-2-(Methylthio)-, O-[(Methylamino)Carbonyl]Oxime RCRA Waste Number P070	116-06-3 UE 2275000 CBM500	Toxic			---	3 MCL	3 MCL	1	~~1~~ 0.4
Aldicarb Sulfone (37) §§ Aldoxycarb § Standak § UC 21865 § Sulfocarb § SHA 110801 § Propionaldehyde, 2-Methyl-2-(Methylsulfonyl)-, O-(Methylcarbomoyl)Oxime § 2-Methyl-2-(Methylsulfonyl)Propanal O-[(Methylamino)Carbonyl]Oxime	1646-88-4 UE 2080000 AFK000	Toxic		—	---	~~3~~ 2 MCL	~~3~~ 2 MCL	2	~~1~~ 0.5
Aldicarb Sulfoxide (37) §§ ---	1646-87-3	Toxic		---	---	4 MCL	4 MCL	2	~~1~~ 0.4

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Aldrin §§ — § HHDN § Altox § Drinox § Aldrex § Aldrite § Seedrin § Octalene § SHA 045101 § Hexachlorohexahydro-endo-exo-Dimethanonaphthalene § 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8, 8a-Hexahydro-1,4,5,8-Dimethanonaphthalene § 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexahydro-endo,exo- § 1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-Hexa-Hydro-1,4:5,8-Endo,Exo-Dimethanonaphthalene § RCRA Waste Number P004	309-00-2 IO 2100000 AFK250	Carcinogen	1.5 PP	—	4,670	0.00049 PP	0.02 HA	N/A	~~0.2~~ 0.1
Alpha Emitters (11) §§ — § Gross Alpha § Adjusted Gross Alpha	Multiple	Carcinogen / Radioactive	—	—	—	~~1.5~~ 15 pico-curies/liter ~~HA~~ MCL	~~1.5~~ 15 pico-curies/liter ~~HA~~ MCL	N/A	—
alpha-Chlordane §§ -Chlordane § cis-Chlordan § cis-Chlordane § c (cis)-Chlordane § Chlordane, cis-Isomer	5103-71-9 PB 9705000 CDR675	Carcinogen	—	—	14,100	0.0080 ~~PP~~ HA	1 HA	N/A	~~0.4~~ 0.006

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
alpha-Hexachlorocyclohexane §§ — § a-BHC § alpha-BHC § HCH-alpha § alpha-HCH § alpha-Lindane § a Hexachlorocyclohexane § alpha-Benzenehexachloride § alpha-Hexachlorocyclohexane § Benzene Hexachloride-alpha-isomer § alpha-1,2,3,4,5,6-Hexachlorocyclohexane § Cyclohexane, alpha-1,2,3,4,5,6-Hexachloro- § 1-alpha,2-alpha,3-beta,4-alpha,5-beta,6-beta-Hexachlorocyclohexane § Cyclohexane, alpha-1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-beta, 4-alpha, 5-beta, 6-beta)-	319-84-6 GV 3500000 BBQ000	Carcinogen	—	—	130	0.026 PP	0.026 PP	N/A	~~0.1~~ 0.03
Aluminum, dissolved, pH 6.5 to 9.0 only (9) §§ Al	7429-90-5 BD 0330000 AGX000	Toxic	750 NPP	87 NPP	—	—	—	30	~~30~~ 9
Ametryn §§ Ametrex	834-12-8	Toxic			—	60 HA	60 HA	—	~~—~~ 6
Aminomethylphosphonic Acid (AMPA) Glyphosate metabolite §§ —		Toxic	—	—	—	2,000 HA	2,000 HA		200
Aminopyralid § 4-amino-3,6-dichloropyridine-2carboxilic acid, § 4 amino-3,6 dichlro-2-pyridinecarboxilic acid § Milestone	150114-71-9	Toxic				4,000 HA	4,000 HA		0.2
Ammonia [total ammonia nitrogen (NH3-N plus NH4-N)] as ~~mg/l~~ ug/L N §§ — § Ammonia Anhydrous § Anhydrous Ammonia § Spirit of Hartshorn	7664-41-7 BO 0875000 AMY500	Toxic	(7)~~(8)~~ NPP	(7)~~(8)~~ NPP	—	—	—	10	~~50~~ 70
Ammonium Sulfamate §§ —	7773-06-0	Toxic	—	—	—	2,000 HA	2,000 HA	—	~~—~~ 200
Anthracene (PAH) §§ Paranaphthalene § Green Oil § Anthracin § Tetra Olive N2G	120-12-7 CA 9350000 APG500	Toxic	—	—	30	8,300 PP	2,100 HA	0.04	~~0.2~~ 10

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Antimony §§ Sb § Antimony Black § Antimony Regulus § C.I. 77050 § Stibium	7440-36-0 CC 4025000 AQB750	Toxic	—	—	1	5.6 PP	6 MCL	0.4	~~3~~ 0.5
Arsenic (36) §§ As § Arsenicals § Arsenic-75 § Arsenic Black § Colloidal Arsenic § Grey Arsenic § Metallic Arsenic	7440-38-2 CG 0525000 ARA750	Carcinogen	340 PP	150 PP	44	10 MCL	10 MCL	N/A	~~3~~ 1
Asbestos, fibers longer than 10 microns in length §§ — § Amianthus § Amosite (Obs.) § Amphibole § Asbestos Fiber § Fibrous Grunerite § NCI CO8991 § Serpentine, includes Chrysotile, Actinolite, Aurosite, Anthophyllite, Crocidolite, and Tremolite	Multiple	Carcinogen	—	—	—	7.E+06 fibers/liter MCL	7.E+06 fibers/liter MCL	N/A	—
Atrazine (includes metabolites deethyl atrazine, deisopropyl atrazine, and deethyl deisopropyl atrazine) (32) §§ — § Aatrex § Aktikon § Atrasine § Atred § Candex § Crisatrina § Crisazine§ Cyazin § Fenamin § Fenamine § Zeaphos § Fenatrol § Gesaprim § Hungazin § Inakor § Primatol § Malermais § Radazin § Radizine § Shell Atrazine herbicide § Strazine § Zeazine § SHA 080803 § 1-Chloro-3-Ethylamino-5-Isopropylamino-2,4,6-Triazine § s-Triazine, 2-Chloro-4-Ethylamino-6-Isopropylamino- § 2-Chloro-4-Ethylamino-6-Isopropylamino-s-Triazine	1912-24-9 XY 5600000 PMC325	~~Carcinogen~~ Toxic			—	3 MCL	3 MCL	0.1	~~0.6~~ 0.3
Azinophos and degredate azinphos methyl oxon metiltriazotion § Azimil § Bay 9027 § Bay 17147 § Carfene § Cotnion-methyl § Gusathion § Gusathion-M§ Guthion § Methyl-Guthion	961-22-8	Toxic				10 HA	10 HA		0.1

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Azoxystrobin §§ --- § azoksystrobin § Azoxistrobin § Azoxistrobina § Azoxystrobin (BSI, ISO) § azoxystrobine § Azoxystrolin	131860-33-8	Toxic			---	1,000 HA	1,000 HA	---	— 0.03
Barium §§ Ba	7440-39-3 CA 8370000 BAH250	Toxic	—	—	---	1000 NPP	1000 NPP	2	~~5~~ 3
Bentazon Methyl §§ --- § Basagran	~~50723-80-3~~ 25057-89-0	Toxic		—	---	200 HA	200 HA	—	— 3
Benzene §§ --- § Phene § Benzol § Benzolene § Pyrobenzol § Carbon Oil § SHA 109301 § Coal Naphtha § Motor Benzol § Phenyl hydride § Cyclohexatriene C § Caswell Number 077 § EPA Pesticide Chemical Code 008801 § NCI C55276 § RCRA Waste Number U019	71-43-2 CY 1400000 BBL250	Carcinogen	—	—	5.2	5 MCL	5 MCL	N/A	~~0.5~~ 0.6
Benzidine §§ --- § p,p'-Bianiline § 4,4'-Bianiline § 4,4'-Biphenyldiamine § p,p'-Diaminobiphenyl § 4,4'-Diaminodiphenyl § 4,4'-Biphenylenediamine § 4,4'-Diphenylenediamine § Biphenyl, 4,4'-Diamino- § 4,4'-Diamino-1,1'-Biphenyl § (1,1'-Biphenyl)-4,4'-Diamine § NCI C03361 § RCRA Waste Number U021	92-87-5 DC 9625000 BBX000	Carcinogen	---	—	87.5	0.00086 PP	0.00086 PP	N/A	~~20~~ 5
Benzo(g,h,i)perylene (PAH) §§ --- § 1,12-Benzoperylene § 1,12-Benzperylene § Benzo(ghi)Perylene	191-24-2 DI 6200500 BCR000	Toxic	—	---	30	---	---	0.076	10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Benzo[a]Pyrene (PAH) §§ — § BaP § 3,4-BP § Benz(a)Pyrene § Benzo-a-Pyrene § 3,4-Benzpyrene § 6,7-Benzopyrene § 3,4-Benzopyrene § 3,4-Benz(a)Pyrene § Benzo(d,e,f)Chrysene	50-32-8 DJ 3675000 BCS750	Carcinogen	—	—	30	0.038 PP	0.05 HA	N/A	~~0.10~~ 0.06
Benzo[b]Fluoranthene (PAH) §§ — § B(b)F § Benzo(b)Fluoranthene § Benzo(e)Fluoranthene § 2,3-Benzfluoranthene § 3,4-Benzfluoranthene § 3,4-Benzofluoranthene § 2,3-Benzofluoranthene § 2,3-Benzofluoranthrene § Benz(e)Acephenanthrylene § 3,4-Benz(e)Acephenanthrylene	205-99-2 CU 1400000 BAW250	Carcinogen	—	—	30	0.038 PP	0.5 (29) HA	N/A	~~0.10~~ 5
Benzo[k]fluoranthene (PAH) §§ — § Benzo(k)Fluoranthene § 8,9-Benzofluoranthene § Dibenzo(b,jk)Fluorene § 2,3,1'8'-Binaphthylene § 11,12-Benzofluoranthene § 11,12-Benzo(k)Fluoranthene	207-08-9 DF 6350000 BCJ750	Carcinogen	—	—	30	0.038 PP	5 (29) HA	N/A	0.1
Benzo[a]anthracene (PAH) §§ — § Tetraphene § Benzanthracene § Benzoanthracene § Naphthanthracene § 1,2-Benzanthrene § Benz(a)Anthracene § Benzo(a)Anthracene § 1,2-Benzanthracene § Benzo(b)Phenanthrene § 1,2-Benzoanthracene § Benzanthracene, 1,2- § 1,2-Benz(a)Anthracene § 2,3-Benzophenanthrene § RCRA Waste Number U018	56-55-3 CV 9275000 BBC250	Carcinogen	—	—	30	0.038 PP	0.5 (29) HA	N/A	0.1
Beryllium §§ Be § Beryllium-9 § Glucinum § RCRA Waste Number P015	7440-41-7 DS 1750000 BFO750	Carcinogen	—	—	19	4 MCL	4 MCL	N/A	~~1~~ 0.8

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Beta Emitters (11) §§ — § Gross Beta	Multiple	Carcinogen/ Radioactive	—	---	—	0.4 mrem /yr ~~HA~~ MCL	0.4 mrem /yr ~~HA~~ MCL	N/A	—
Beta-Chloronaphthalene §§ 2-Chloronaphthalene § ß-Chloronaphthalene § Naphthalene, 2-Chloro- § 2 Chlornaftalen § A13-01537 § CCRIS 5995 § HSDB 4014 § Halowax § EINECS 202-079-9 § RCRA waste number U047	91-58-7 QJ 2275000 CJA000	Toxic	—	—	202	1,000 PP	1,000 PP	0.94	10
beta-Hexachlorocyclohexane §§ --- § ß-BHC § beta-BHC § HCH-beta § beta-HCH § ß-Lindane § beta-Lindane § Hexachlorocyclohexane, beta- § trans-alpha-Benzenehexachloride § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, beta- § 1-alpha,2-beta,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane § Cyclohexane, 1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-beta, 3-alpha, 4-beta, 5-alpha, 6-beta)- § Benzenehexachloride, trans-alpha- § beta-1,2,3,4,5,6-Hexachlorocyclohexane	319-85-7 GV 4375000 BBR000	Carcinogen	---	---	130	0.091 PP	0.091 PP	N/A	~~0.1~~ <u>0.02</u>
Bis(2-Chloroisopropyl) Ether §§ --- § DCIP § NCI C50044 § Dichlorodiisopropyl Ether § 2,2'-Oxybis(1-Chloropropane) § Bis (2-Chloroisopropyl) ether § Propane, 2,2'-Oxybis(2-Chloro- § Propane, 2,2'-Oxybis[1-Chloro- § 2',2'-Dichlorodiisopropyl Ether § Dichlorodiisopropyl Ether (DOT) § Bis(2-Chloro-1-Methylethyl) Ether § RCRA Waste Number U027 Reregistration decision CAS-RN	108-60-1 KN 1750000 BII250 39638-32-9	Toxic	—	—	2.47	1,400 PP	1,400 PP	0.8	10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Bis(2-Chloroethoxy)Methane §§ — § Bis(ß-Chloroethyl)Formal	111-91-1 PA 3675000 BID750	Toxic	—	—	0.64	—	—	0.5	— 10
Bis(Chloroethyl)Ether §§ — § BCEE § DCEE § Clorex § Chlorex § Chloroethyl Ether § Dichloroethyl Ether § Dichloroethyl Oxide § Bis(Chloroethyl) Ether § Di(2-Chloroethyl) Ether § Bis (Chloroethyl) Ether § Bis(2-Chloroethyl) Ether § Bis(ß-Chloroethyl) Ether § ß,ß'-Dichloroethyl Ether § 2,2'-Dichloroethyl Ether § Bis (2-Chloroethyl) Ether § 1,1'-Oxybis(2-Chloro)Ethane § Ethane, 1,1'-Oxybis[2-Chloro- § beta,beta'-Dichloroethyl Ether § 1-Chloro-2-(beta-Chloroethoxy)Ethane § RCRA Waste Number U025	111-44-4 KN 0875000 BIC750	Carcinogen	—	—	6.9	0.30 PP	0.30 PP	N/A	~~10~~ 5
Bis(Chloromethyl)ether §§ — § BCME § bis-CME § Chloromethyl Ether § Oxybis(Chloromethane) § Bis (Chloromethyl) Ether § sym-Dichlorodimethyl Ether § 1,1'-Dichlorodimethyl Ether § Dimethyl-1,1'-Dichloroether § Chloro(Chloromethoxy) Methane § RCRA Waste Number P016	542-88-1 KN 1575000 ~~SAX:~~ BIK000	Carcinogen	—	—	63	0.0010 NPP	0.0010 NPP	N/A	~~10~~ 1.E-04
Bromacil §§ Hyvar § —	314-40-9	Carcinogen			—	90 HA	90 HA	N/A	~~0.5~~ 0.03
Bromate	7789-38-0	Carcinogen				10 MCL	10 MCL		1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Bromodichloromethane (HM) §§ Dichlorobromomethane § BDCM § NCI C55243 § Methane, bromodichloro- § Dichloromonobromomethane § Monobromodichloromethane	75-27-4 PA 5310000 BND500	Carcinogen	—	---	3.75	5.5 PP	10 HA	N/A	~~0.5~~ 0.6
Bromoform (HM) §§ Tribromomethane § NCI C55130 § Methane, Tribromo- § Methenyl Tribromide § RCRA Waste Number U225	75-25-2 PB 5600000 BNL000	Carcinogen	—	---	3.75	43 PP	80 HA	N/A	~~0.5~~ 5
Bromoxynil §§ ---	1689-84-9	Carcinogen	—	---	---	3.4 HA	3.4 HA	—	— 0.3
Butyl Benzyl Phthalate §§ --- § BBP § Sicol 160 § Unimoll BB § Palatinol BB § Santicizer 160 § Butylbenzylphthalate § Butylbenzyl Phthalate § Benzyl Butyl Phthalate § n-Benzyl Butyl Phthalate § Benzyl n-Butyl Phthalate § Phthalic Acid, Benzyl Butyl Ester § Butyl Phenylmethyl 1,2-Benzenedicarboxylate § 1,2-Benzenedicarboxylic Acid, Butyl Phenylmethyl Ester § NCI C54375	85-68-7 TH 9990000 BEC500	~~Toxic with Carbon Tetrachlort~~ Carcinogen	—	—	414	1,500 PP	1,500 PP	N/A	10
Butylate §§ Sutan § ---	2008-41-5	~~Carcinogen~~ Toxic			---	400 ~~HA~~ MCL	400 ~~HA~~ MCL	N/A	— 0.02
Cadmium §§ Cd § C.I. 77180 § Colloidal Cadmium	7440-43-9 EU 9800000 CAD000	~~Toxic~~ Carcinogen	0.52@25 mg/l hardness (12) PP	0.097@25 mg/l hardness (12) PP	64	5 MCL	5 MCL	0.1	~~0.08~~ 0.03
Carbaryl §§ Sevin § ---	63-25-2	Toxic			---	700 HA	700 HA	2	— 1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Carbofuran §§ — § Yaltox § Euradan § Furadan § Curaterr § Furacarb § SHA 090601 § Niagra 10242 § 2,2-Dimethyl-7-Coumaranyl N-Methylcarbamate § 2,2-Dimethyl-2,3-Dihydro-7-Benzofuranyl N-Methylcarbamate § Carbamic Acid, Methyl-, 2,3-Dihydro-2,2-Dimethyl-7-Benzofuranyl Ester	1563-66-2 FB 9450000 FPE000	Toxic			—	40 MCL	40 MCL	1	1
Carbon Tetrachloride §§ Freon 10 § R 10 § Univerm § Tetrasol § Fasciolin § Flukoids § Necatorina § Necatorine § Halon 104 § Tetraform § Carbon Tet § Benzinoform § Carbon Chloride § Perchloromethane § Tetrachloromethane § Methane Tetrachloroide § RCRA Waste Number U211	56-23-5 FG 4900000 CBY000	Carcinogen	—	—	18.75	2.3 PP	3 HA	N/A	~~0.5~~ 0.6
Carboxin §§ Vitavax § —	5234-68-4	Toxic		—	—	700 HA	700 HA	1	~~—~~ 70
Chloramben §§ Vegiben § —	133-90-4	Toxic	—	—	—	100 HA	100 HA	—	~~—~~ 0.5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Chlordane §§ Termex § Belt § Niran § Dowchlor § Chlortox § Chlordan § Clordano § Chlor Kil § Toxichlor § Octa-Klor § Ortho-Klor § SHA 058201 § Gold Crest C-100 § Chlordane, Technical § Octachloro-4, 7-Methanohydroindane § Octachlorodihydrodicyclopentadiene § Octachloro-4,7-Methanotetrahydroindane-4,7-Methylene Indane § 4,7-Methanoindan, 1,2,4,5,6,7,8,8-Octachloro-3a,4,7,7a-tetrahydro- § 4,7-Methano-1H-Indene § RCRA Waste Number U036	57-74-9 PB 9800000 CDR750	Carcinogen	1.2 PP	0.0043 PP	14,100	0.0080 PP	1 HA	N/A	~~0.4~~ 0.1
Chlorimuron Ethyl §§ Classic § —	90982-32-4	Toxic	—	—	—	700 HA	700 HA	0.1	— 0.1
Chlorine, total residual §§ Cl § Bertholite § Chlorine, molecular § Molecular Chlorine	7782-50-5 FO 2100000 CDV750	Toxic	19 NPP	11 NPP	—	4,000 MCL	4,000 MCL	—	— 100
Chlorite	7758-19-2	Toxic				1000 MCL	1000 MCL		100
Chlorobenzene §§ Monochlorobenzene § MCB § Chlorobenzol § Chlorbenzene § Phenyl Chloride § Benzene Chloride § Benzene, Chloro- § Monochlorbenzene § NCI C54886 § RCRA Waste Number U037	108-90-7 CZ 0175000 BBM750	Toxic	—	—	10.3	100 MCL	100 MCL	0.5	~~0.5~~ 0.8
Chlorodibromomethane §§ Monochlorodibromomethane § CDBM § NCI C55254 § Methane, Dibromochloro- § Dibromochloromethane (THM)	124-48-1 PA 6360000 CFK500	Carcinogen	—	—	3.75	4.0 PP	4.0 PP	N/A	~~0.5~~ 0.6

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Chloroethane §§ Ethyl Chloride § Aethylis § Aethylis Chloridum § Anodynon § Chelen § Chlorethyl § Chloridum § Chloryl § Chloryl Anesthetic § Ether Chloratus § Ether Hydrochloric § Ether Muriatic § Hydrochloric Ether § Kelene § Monochlorethane § Muriatic Ether § Narcotile § NCI C06224	75-00-3 KH 7525000 EHH000	Toxic	—	—	—	—	—	0.52	—
Chloroform (THM) §§ Trichloromethane § TCM § Freon 20 § Trichloroform § R-20 Refrigerant § Methenyl Chloride § Formyl Trichloride § Methyl Trichloride § Methane Trichloride § Methane, Trichloro- § Methenyl Trichloride § NCI CO2686§ RCRA Waste Number U044	67-66-3 FS 9100000 CHJ500	Carcinogen	—	—	3.75	57 PP	70 HA	N/A	~~0.5~~ 0.9
Chlorophenol, 2- §§ Phenol, 2-Chloro § o-Chlorophenol § 2-Chlorophenol § Phenol, o-Chloro- § RCRA Waste Number U048	95-57-8 SK 2625000 CJK250	Toxic	—	—	134	81 PP	81 PP	0.3	10
Chlorophenyl Phenyl Ether, 4- §§ — § 4- Chlorophenyl Phenyl Ether	7005-72-3	Toxic with BCF >300	—	—	1,200	—	—	—	— 10
Chlorsulfuron §§ Glean §§ Telar	64902-72-3	Toxic	—	—	—	1750 HA	1750 HA	—	— 0.02
Chlorothalonil §§ Bravo § —	1897-45-6	Carcinogen			—	~~15~~ 100 HA	~~15~~ 100 HA	N/A	— 0.05

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Chlorpyrifos §§ Dursban § Ethion § Brodan § Eradex § Lorsban § Pyrinex § NA 2783 § Piridane § DowCo 179 § SHA 059101 § Ethion, dry § Chlorothalonil § Chlorpyrifos-Ethyl § O,O-Diethyl O-3,5,6-Trichloro-2-Pyridyl Phosphorothioate § Phosphorothioic Acid, O,O-Diethyl O-(3,5,6-Trichloro-2-Pyridyl) Ester	2921-88-2 TF 6300000 DYE000	Toxic	0.083 NPP	0.041 NPP	---	20 HA	20 HA	0.25	~~1~~ 0.1
Chromium, all forms §§ Cr § Chrome	7440-47-3 GB 4200000 CMI750	Toxic	---	---	---	100 MCL	100 MCL	1	~~1~~ 10
Chromium, hexavalent §§ Chromium (VI) § ---	18540-29-9	Toxic	16 PP	11 PP	16	---	---	---	~~5~~ 2
Chromium, trivalent §§ Chromium (III) § ---	16065-83-1	Toxic	579@25mg/l hardness(12) PP	27.7 @ 25 mg/l hardness (12) PP	16	---	---	1	~~---~~ 3
Chrysene (PAH) §§ --- § Benz(a)Phenanthrene § Benzo(a)Phenanthrene § 1,2-Benzphenanthrene § 1,2-Benzophenanthrene § 1,2,5,6-Dibenzonaphthalene § RCRA Waste Number U050	218-01-9 GC0700000 CML810	Carcinogen	---	---	30	0.038 PP	50 (29) HA	N/A	0.1
cis-1,2-Dichloroethylene §§ --- § 1,2-Dichloroethylene § cis-Dichloroethylene § cis-1,2-Dichloroethene § 1,2,cis-Dichloroethylene § ethylene,	156-59-2 KV 9420000 DFI200	Toxic	---	---	---	70 MCL	70 MCL	0.002	~~0.5~~ 0.9
cis-1,3-Dichloropropene §§ Telone II § 1,3-Dichloropropene § 1,3-Dichloropropylene § (Z)-1,3-Dichloropropene § cis-1,3-Dichloropropylene § 1-Propene, 1,3-Dichloro-, (Z)-	10061-01-5 UC 8325000 DGH200	Carcinogen	---	---	1.91	3.4 ~~PP~~ HA	4 HA	N/A	~~0.5~~ 0.6
Clopyralid §§ Stinger § ---	1702-17-6	Toxic		---	---	~~3,500~~ 1000 ~~I~~ HA	~~3,500~~ 1000 ~~I~~ HA	1	~~---~~ 0.3

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Color §§ —	N/A	Harmful	—	—	—	(18)	(18)	—	5 UNITS
Copper §§ Cu § Allbri Natural Copper § ANAC 110 § Arwood Copper § Bronze Powder § CDA 101 § CDA 102 § CDA 110 § CDA 122 § C.I. 77400 § C.I. Pigment Metal 2 § Copper Bronze § 1721 Gold § Gold Bronze § Kafar Copper § M1 (Copper) § M2 (Copper) § OFHC Cu § Raney Copper	7440-50-8 GL 5325000 CNI000	Toxic	3.79@25mg/l hardness (12) PP	2.85@25 mg/l hardness (12) PP	36	1,300 PP	1,300 PP	0.5	~~1~~ 2
Cyanazine §§ Bladex § —	21725-46-2	Toxic	—	—	—	1.0 HA	1.0 HA	N/A	— 0.02
Cyanide, total §§ — § Cyanide § Isocyanide § Cyanides, includes soluble salts and complexes § RCRA Waste Number P030	57-12-5 GS 7175000 COI500	Toxic	22 PP	5.2 PP	1	140 PP	200 MCL	—	~~5~~ 3
Dacthal §§ DCPA § —	1861-32-1	Toxic		—	—	70 HA	70 HA	0.025	— 1
Dalapon §§ Revenge § Dalpon § Unipon § Dowpon § Radapon § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § a-Dichloropropionic Acid § a,a-Dichloropropionic Acid § alpha-alpha-Dichloropropionic Acid	75-99-0 UF 0690000 DGI400	Toxic	—	—	—	200 MCL	200 MCL	1.3	3

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dalapon, sodium salt §§ Dalpon § Unipon § Dowpon § Radapon § Revenge § Basinex § Ded-Weed § Dalacide § Gramevin § Crisapon § Dalpon Sodium § Sodium Dalapon § 2,2-Dichloropropionic Acid § SHA 28902, for sodium salt § SHA 28901, for dalapon only § Propionic Acid, 2,2-Dichloro- § Sodium 2,2-Dichloropropionate § alpha-alpha-Dichloropropionic Acid	127-20-8 UF 1225000 DGI600	Toxic	—	—	—	200 MCL	200 MCL	1.3	3
~~delta-Hexachlorocyclohexane~~ ~~§§ —~~ ~~§ BHC § delta-BHC § HCH-delta § delta-HCH § BHC § Lindane § delta-Lindane § Hexachlorocyclohexane § delta-Benzenehexachloride § Hexachlorocyclohexane-delta § Hexachlorocyclohexane, delta- § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro- § delta-1,2,3,4,5,6-Hexachlorocyclohexane § 1-alpha,2-alpha,3-alpha,4-beta,5-alpha,6-beta-Hexachlorocyclohexane § Cyclohexane, delta-1,2,3,4,5,6-Hexachloro-, (1-alpha, 2-alpha, 3-alpha, 4-beta, 5-alpha, 6-beta)~~	~~319-86-8~~ ~~GV 4550000~~ ~~BFW500~~	~~Carcinogen~~	—	—	~~130~~	~~0.2~~ ~~PP~~	~~0.2~~ ~~PP~~	~~N/A~~	~~0.1~~ ~~0.08~~
Demeton §§ Systox § Bay 10756 § Bayer 8169 § Demox § Diethoxy Thiophosphoric Acid Ester of 2-Ethylmercaptoethanol § O,O-Diethyl 2-Ethylmercaptoethyl Thiophosphate § O,O-Diethyl O(and S)-2-(Ethyl-Thio)Ethyl Phosphorothioate Mixture § E 1059 § ENT 17,295 § Mercaptophos § Systemox § Systox § ULV § Demeton-O + Demeton-S	8065-48-3 TF 3150000 DAO600	Toxic	—	0.1 NPP	—	1.4 HA	1.4 HA	0.25	~~—~~ 0.01

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Di(2-Ethylhexyl)Phthalate (PAE) §§ Bis(2-Ethylhexyl)Phthalate § BEHP § DEHP § Octoil § Fleximel § Flexol DOP § Kodaflex DOP§ Ethylhexyl Phthalate § Diethylhexyl Phthalate § 2-Ethylhexyl Phthalate § Di(Ethylhexyl)phthalate § Di(2-Ethylhexyl)phthalate § Bis (2-Ethylhexyl) Phthalate § Bis(2-Ethylhexyl)-1,2-Benzene-Dicarboxylate § 1,2-Benzenedicarboxylic Acid, Bis(2-Ethylhexyl)Ester	117-81-7 TI 0350000 BJS000	Carcinogen	—	—	130	6 MCL	6 MCL	—	6 2
Di(2-Ethylhexyl)Adipate §§ Hexanedioic Acid § DEHA § BEHA § Bisoflex DOA § Effemoll DOA § Ergoplast AdDO § Flexol A 26 § PX-238 § Reomol DOA § Vestinol OA § Wickenol 158 § Kodaflex DOA § Monoplex DOA § NCI C54386 § Octyl Adipate § Dioctyl Adipate § Di-2-Ethylhexyl Adipate § Di (2-Ethylhexyl) Adipate § Bis(2-Ethylhexyl) Adipate § Adipic Acid, Bis(2-Ethylhexyl) Ester § Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	103-23-1 AU 9700000 AEO000	Carcinogen	—	—	—	300 HA	300 HA	N/A	6
Diazinon §§ —	333-41-5	Toxic	0.17 NPP	0.17 NPP	—	0.6 HA	0.6 HA	0.25	— 0.03
Dibenz[a,h]Anthracene (PAH) §§ — § DBA § DB(a,h)A § Dibenz(a,h)Anthracene § Dibenzo(a,h)anthracene § 1,2:5,6-Benzanthracene § Dibenzo (a,h) Anthracene § 1,2,5,6-Dibenzanthracene § 1,2:5,6-Dibenz(a)Anthracene § RCRA Waste Number U063	53-70-3 HN 2625000 DCT400	Carcinogen	—	—	30	0.038 PP	0.05 (29) HA	N/A	0.1

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dibromoethane, 1,2- **§§ Ethylene Dibromide** **§ DBE § EDB § Nephis § Kopfume § Celmide § E-D-Bee § Soilfume§ Bromofume § Dowfume 40 § SHA 042002 § Pestmaster § Soilbrom-40§ Dibromoethane § Ethylene Bromide § Glycol Dibromide § 1,2-Dibromoethane § 1,2-Ethylene Dibromide § RCRA Waste Number U067**	106-93-4 KH 9275000 EIY500	Carcinogen	---	---	---	0.004 HA	0.004 HA	N/A	~~0.5~~ 0.01
Dibutyl Phthalate **§§ ---** **§ DPB § Celluflex DPB § Elaol § Hexaplas M/B § Palatinol C§ Polycizer DBP § PX 104 § Staflex DBP § Witcizer § SHA 028001 § Butylphthalate § N-Butylphthalate § Di-n-Butylphthalate § Di-n-Butylphthalate § Dibutyl-o-Phthalate § Di-n-Butyl Phthalate § RCRA Waste Number U069 § Phthalic Acid Dibutyl Ester § Dibutyl 1,2-Benzene Dicarboxylate § 1,2-Benzenedicarboxylic Acid Dibutyl Ester § 1,2-Benzenedicarboxylic Acid, Dibutyl Ester § Benzene-o-Dicarboxylic Acid Di-n-Butyl Ester**	84-74-2 TI 0875000 DEH200	Toxic	---	---	89	2,000 PP	2,000 PP	0.25	10
Dicamba **§§ Banvel** **§ ---**	1918-00-9	Toxic	---	---	---	200 HA	200 HA	0.28	~~---~~ 0.7
Dichlorobenzene, 1,2- **§§ DCB** **§ ODB § ODCB § Dizene § Cloroben § Chloroben § Chloroden § Termitkil § Dilatin DB § Dowtherm E § Dilantin DB § o-Dichlorobenzene § Orthodichlorobenzene § ortho-Dichlorobenzene § Special Termite Fluid § Benzene, 1,2-Dichloro- § RCRA Waste Number U070**	95-50-1 CZ 4500000 DEP600	Toxic	---	---	55.6	420 PP	600 MCL	0.02	10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dichlorobenzene, 1,3- §§ Benzene, 1,3-Dichloro § M-Dichlorobenzene § m-Dichlorobenzene § meta-Dichlorobenzene § 1,3-Dichlorobenzene-	541-73-1 CZ 4499000 DEP699	Toxic	—	—	55.6	320 PP	600 HA	0.006	~~10~~ 5
Dichlorobenzene, 1,4- §§ Benzene, 1,4-Dichloro- § 1,4- Dichlorobenzene § PDB § PDCB § NCI C54955 § Evola § Paradi § Paradow§ Persia-Perazol § Paracide § Parazene § Paramoth § Santochlor § Paranuggets § di-Chloricide § Para Chrystals § p-Dichlorobenzene § Caswell Number 632 § Paradichlorobenzene § para-Dichlorobenzene- § p-Chlorophenyl Chloride § EPA Pesticide Chemical Code 061501 § RCRA Waste Number U070 § RCRA Waste Number U071 § RCRA Waste Number U072	106-46-7 CZ 4550000 DEP800	~~Carcinogen~~ Toxin	—	—	55.6	75 MCL	75 MCL	N/A	~~10~~ 5
Dichlorobenzidine, 3,3'- §§ DCB § C.I. 23060 § Curithane C126 § Dichlorobenzidine § o,o'-Dichlorobenzidine § Dichlorobenzidine Base § Benzidine, 3,3'-Dichloro- § 3,3'-Dichloro-4,4'-Diaminodiphenyl § 3,3'-Dichloro-(1,1'-Biphenyl)-4,4'-Diamine § 1,1'-Biphenyl-4,4'-Diamine, 3,3'-Dichloro- § RCRA Waste Number U073	91-94-1 DD 0524000 DEQ400	Carcinogen	—	—	312	0.21 PP	0.21 PP	N/A	~~20~~ 5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dichlorodifluoromethane (HM) §§ Freon 12 § F 12 § R 12 § FC 12 § Halon § CFC-12 § Arcton 6 § Electro-CF 12 § Eskimon 12 § Frigen 12 § Gentron 12 § Isceon 122 § Kaiser Chemicals 12 § Ledon 12 § Ucon 12 § Propellant 12 § Refrigerant 12 § Fluorcarbon-12 § Difluorodichloromethane § Methane, dichlorodifluoro- § RCRA Waste Number U075	75-71-8 PA 8200000 DFA600	Toxic	---	---	3.75	1,000 HA	1,000 HA	0.05	~~0.5~~ 0.8
Dichloroethane, 1,2- §§ Ethylene Chloride § EDC § Brocide § 1,2-DCE § NCI C00511 § Dutch Oil § Dutch Liquid § Dichloremulsion § Di-Chlor-Mulsion § 1,2-Bichlorethane § 1,2-Dichlorethane § Ethane Dichloride § 1,2-Bichloroethane § Ethylene Dichloride § 1,2-Dichloroethane § Ethane, 1,2-Dichloro- § 1,2-Ethylene Dichloride § alpha,beta-Dichloroethane § RCRA Waste Number U077	107-06-2 KI 0525000 DFF900	Carcinogen	---	---	1.2	3.8 PP	4 HA	N/A	0.5
Dichloroethylene, 1,1- §§ Vinylidene Chloride § VDC § 1,1-DCE § Sconatex § NCI C54262 § 1,1-Dichloroethene § Vinylidene Chloride § 1,1-Dichloroethylene § Vinylidene Dichloride § Ethene, 1,1-Dichloro- § Vinylidene Chloride II § Dichloroethylene, 1,1- § Ethylene, 1,1-Dichloro- § RCRA Waste Number U078	75-35-4 KV 9275000 DFI000	Carcinogen	---	---	5.6	~~0.57~~ 7 ~~330PP~~ ~~PP~~ MCL	~~0.6~~ 7 ~~HA~~ MCL	N/A	~~0.5~~ 0.7
Dichlorophenol, 2,4- §§ Phenol, 2,4-Dichloro § DCP § 2,4-DCP § NCI C55345 § 2,4-Dichlorophenol § RCRA Waste Number U081	120-83-2 SK 8575000 DFX800	Toxic	---	---	40.7	77 PP	77 PP	10	10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Dichlorophenoxyacetic Acid, 2,4- §§ Dichlorophenoxyacetic Acid § 2,4-D § Salvo § Phenox § Farmco § Amidox § Miracle § Agrotect § Weedtrol § Herbidal § Ded-Weed § Lawn-Keep § Fernimine § Crop Rider § Dichlorophenoxyacetic Acid, 2,4- § Acetic Acid, (2,4-Dichlorophenoxy)- § 2,4-Dichlorophenoxyacetic Acid, salts and esters	94-75-7 AG 6825000 DFY600	Toxic	—	—	—	70 MCL	70 MCL	0.02 N/A	1
Dichloropropane, 1,2- §§ Propylene Chloride § 1,2-Dichloropropane § NCI C55141 § Propylene Dichloride § Caswell Number 324 § Propane, 1,2-Dichloro- § a,ß-Propylene Dichloride § alpha,beta-Dichloropropane § EPA Pesticide Chemical Code 029002 § RCRA Waste Number U083	78-87-5 TX 9625000 DGF600	~~Carcinogen~~ Toxic	—	—	4.11	5.0 PP	5 MCL		~~0.5~~ 0.7
Dichloropropene, 1,3- §§ Telone II § Telone § NCI C03985 § Vidden D § Dichloropropene § a-Chloroallyl Chloride § g-Chloroallyl Chloride § 1,3-Dichloropropene § 1,3-Dichloropropylene § 1,3-Dichloro-2-Propene § Propene, 1,3-Dichloro- § Telone II Soil Fumigant § 3-Chloropropenyl Chloride § alpha,gamma-Dichloropropylene	542-75-6 UC 8310000 CEF750	Carcinogen	—	—	1.91	3.4 PP	4 HA	N/A	~~0.5~~ 0.3
Dichlorprop §§ — § Canapur DP § Basagran DP § Cornox RX § Hedonil DP § Kildip § Mayclene § Polyclene § Weedone DP § Polytox	120-36-5	Toxin				300 HA	300 HA		1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dieldrin §§ --- § Alvit § Quintox § Octalox § Illoxol § Dieldrex § NCI C00124 § Dieldrite § Hexachloroepoxyoctahydro-endo,exo-Dimethanonaphthalene § 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro-2,7:3,6-Dimethanonaphth(2,3-b)Oxirene § 2,7:3,6-Dimethanonaphth(2,3-b)Oxirene, 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro- § SHA 045001 § 1,4:5,8-Dimethanonaphthalene § RCRA Waste Number P037	60-57-1 IO 1750000 DHB400	Carcinogen	0.24 PP	0.056 PP	4,670	0.00052 PP	0.02 HA	N/A	0.02
Diethyl Phthalate §§ --- § Anozol § Neantine § Solvanol § NCI C60048 § Placidole E § Ethyl Phthalate § Diethylphthalate § Diethyl-o-Phthalate § 1,2-Benzenedicarboxylic Acid, Diethyl Ester § RCRA Waste Number U088	84-66-2 TI 1050000 DJX000	Toxic	—	---	73	17,000 PP	17,000 PP	0.25	10
Difenoconazole §§ — § 1-[2-[2-chloro-4-(4-chlorophenoxy)phenyl1]-4-methyl-1,3-dioxolan-2ymethyl]-1H-1,2,4-triazole § CGA169374 § Dividend § Dragon § Plover § Score § Score EC250	119446-68-3	Carcinogen				70 HA	70 HA		0.06
Dimethenamid and degredate demethenamid OA § 2-Chloro-N-(2,4-dimethyl-3-thienyl)-N-(2-methoxy-1-methylethyl)acetamide § San 682H § Frontier herbicide § EPA pesticide Code 129051	87674-68-8	Carcinogen				400 HA	400 HA		0.03
Dimethoate §§ ---	60-51-5	Toxic			---	7 HA	7 HA	---	— 6
Dimethrin §§ ---	70-38-2	Toxic	—	---	---	2,000 HA	2,000 HA	---	— 200

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dimethyl Phthalate §§ — § DMP § NTM § ENT 262 § Mipax § Avolin § Fermine § Solvanom § Solvarone § Palatinol M § Methyl Phthalate § Dimethylphthalate § Phthalic Acid, Dimethyl Ester § Dimethyl Benzene-o-Dicarboxylate § Dimethyl 1,2-Benzenedicarboxylate § 1,2-Benzenedicarboxylic Acid, Dimethyl Ester	131-11-3 TI 1575000 DTR200	Toxic	—	—	36	270,000 PP	270,000 PP	0.04	10
Dimethylphenol, 2,4- §§ Phenol, 2,4-Dimethyl- § m-Xylenol § 2,4-Xylenol § 4,6-Dimethylphenol § Caswell Number 907A § 2,4-Dimethyl Phenol § 1-Hydroxy-2,4-Dimethylbenzene § 4-Hydroxy-1,3-Dimethylbenzene § EPA Pesticide Chemical Code 086804 § RCRA Waste Number U101	105-67-9 ZE 5600000 XKJ500	Toxic	—	—	93.8	380 PP	380 PP	10	10
Dinitro-o-Cresol, 4,6- §§ Dinitrocresol § Detal § Sinox § DNOC § Arborol § Capsine § Dinitrol § Trifocide § Antinonin § Winterwash § Dinitro-o-Cresol § 2,4-Dinitro-o-Cresol § 4,6-Dinitro-o-Cresol § o-Cresol, 4,6-dinitro- § 2-Methyl-4,6-Dinitrophenol § 4,6-Dinitro-2-Methylphenol § 2,4-Dinitro-6-Methylphenol § 3,5-Dinitro-2-Hydroxytoluene § Phenol, 2-Methyl-4,6-Dinitro- § Caswell Number 390 § RCRA Waste Number P047	534-52-1 GO 9625000 DUT400	Toxic	—	—	5.5	13 PP	13 PP	—	~~50~~ 10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dinitrophenol, 2,4- §§ Phenol, 2,4-Dinitro § Nitro § Kleenup § Aldifen § 2,4-Dinitrophenol § 2,4-DNP § Chemox PE § Maroxol-50 § Solfo Black B § alpha-Dinitrophenol § Dinitrophenol, 2,4- § Tertrosulphur Black PB § 1-Hydroxy-2,4-Dinitrobenzene § RCRA Waste Number P048	51-28-5 SL 2800000 DUZ000	Toxic	---	---	1.5	69 PP	69 PP	13	~~50~~ 60
Dinitrotoluene, 2,4- §§ Toluene, 2,4-Dinitro § 2,4-DNT § NCI C01865 § 2,4-Dinitrotoluol - § Benzene, 1-Methyl-2,4-Dinitro- § RCRA Waste Number U105	121-14-2 XT 1575000 DVH000	Carcinogen	---	---	3.8	1.1 PP	1.1 PP	N/A	~~10~~ 0.2
Dinitrotoluene, 2,6- §§ Toluene-dinitro § 2,4-DNT § Methyl-1,3-Dinitrobenzene § RCRA Waste Number U106	606-20-2 XT 1925000 DVH400	Carcinogen	---	---	---	0.5 HA	0.5 HA	0.01	~~---~~ 0.2
Dinoseb §§ --- § DNBP § DBNF § Aretit § Basanite § Caldon § Sparic § Kiloseb § Spurge § Premerge § Dinitro § Hel-Fire § SHA 037505 § Dow General § Sinox General § Dow General Weed Killer § Vertac General Weed Killer § 2-sec-Butyl-4,6-Dinitrophenol § Dinitro-Ortho-Sec-Butyl Phenol § 2-(1-Methylpropyl)-4,6-Dinitrophenol § 4,6-Dinitro-2-(1-Methyl-n-Propyl)Phenol§ Phenol, 2-(1-Methylpropyl)-4,6-Dinitro- § RCRA Waste Number P020	88-85-7 SJ 9800000 BRE500	Toxic	---	---	---	7 MCL	7 MCL	0.19	~~1.5~~ 1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Dioxin –Chlorinated Dibenzo-p-dioxins and Chlorinated Dibenzofurans Calculation of an equivalent concentration of 2,3,7,8-TCDD is to be based on congeners of CDDs/CDFs and the toxicity equivalency factors (TEF) in van den Berg, M: et al. (2006) The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 93(2):223-241.	1746-01-6	Carcinogen	---	---	5,000	0.00000005 (10) PP	0.000002 (10) HA	N/A	footnote (10)
Diphenamid §§ ---	957-51-7	Carcinogen	---	---	---	200 HA	200 HA	N/A	— 20
Diphenylhydrazine, 1,2- §§ Hydrazine, 1,2-Diphenyl- § Hydrazobenzene § NCI C01854 § N,N'-Bianiline § Benzene, Hydrazodi- § (sym)-Diphenylhydrazine § 1,2-Diphenylhydrazine § RCRA Waste Number U109	122-66-7 MW 2625000 HHG000	Carcinogen	---	---	24.9	0.36 PP	0.36 PP	N/A	~~10~~ 0.04
Diquat §§ --- § Actor § Feglox § Deiquat § Reglone § Aquacide § Dextrone § Paraquat § Preeglove § SHA 032201 § Weedtrine-D § Diquat Dibromide § Ethylene Dipyridylium Dibromide § 1,1-Ethylene 2,2-Dipyridylium Dibromide § 5,6-Dihydro-	~~85-00-7~~ 2764-72-9 DWX800 JM 5690000	Toxic	---	---	---	20 MCL	20 MCL	0.44	~~10~~ 2
Disulfoton §§ --- § Disyston	298-04-4	Toxic			---	0.3 HA	0.3 HA	0.07	— 0.09
Diuron §§ --- § Karmex	330-54-1	Toxic			---	10 HA	10 HA	1	— 0.5

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Endosulfan (39) §§ — § NCI C00566 § Malixv § Ensure § Beosit § Endocel § Thiodan § Cyclodan § Crisulfan § Benzoepin § Thiosulfan § SHA 079401 § Chlorthiepin § Endosulfan (mixed isomers) § Hexachlorohexahydromethano 2,4,3-Benzodioxathiepin-3-Oxide § 1,4,5,6,7,7-Hexachloro-5-Norbornene-2,3-Dimethanol Cyclic Sulfite § 5-Norbornene-2, 3-Dimethanol, 1,4,5,6,7,7-Hexachloro Cyclic Sulfite § RCRA Waste Number P050	115-29-7 RB 9275000 BCJ250	Toxic	0.11 PP	0.056 PP	270	62 PP	62 PP	0.014	see Cis and trans isomers
Endosulfan, I (39) (the cis isomer of Endosulfan) §§ --- § Thiodan I § Endosulfan-I § Alpha-Endosulfan § alpha-Endosulfan	959-98-8	Toxic	0.11 PP	0.056 PP	270	62 PP	62 PP	---	~~0.015~~ 0.02
Endosulfan, II (39)(the trans isomer of endosulfan) §§ --- § Thiodan II § Endosulfan-II § Beta-Endosulfan § beta-Endosulfan	33213-65-9	Toxic	0.11 PP	0.056 PP	270	62 PP	62 PP	0.004	~~0.024~~ 0.02
Endosulfan Sulfate §§ --- § 6,9-Methano-2,3,4-Benzodioxathiepin, 6,7	1031-07-8	Toxic			270	62 PP	62 PP	0.05	0.05
Endothall §§ — § Hydout § Hydrothal-47 § Aquathol § SHA 038901 § Accelerate § Tri-Endothal § Endothal Hydout § 3,6-Endooxohexahydrophthalic Acid § Phthalic Acid, Hexahydro-3,6-endo-Oxy- § 7-Oxabicyclo(2,2,1)Heptane-2,3-Dicarboxylic Acid § 1,2-Cyclohexanedicarboxylic Acid, 3,6-endo-Epoxy- § RCRA Waste Number P088	145-73-3 RN 7875000 EAR000	Toxic			---	100 MCL	100 MCL	1	~~8~~ 2

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Endrin §§ — § NCI C00157 § Endrex § Mendrin § Nendrin § Hexadrin § SHA 041601 § Compound 269 § 1,2,3,4,10,10-Hexachloro-6,7-Epoxy-1,4,4(a)5,6,7,8,8a-Octahydro-endo § 3,4,5,6,9,9-Hexachloro-1a,2,2a,3,6,6a,7,7a-Octahydro-2, 7:3,6-Dimethanonaphth[2,3-b]oxirene § 1,4:5,8-Dimethanonaphthalene, 1,2,3,4,10,10-Hexachloro-6,7-Epoxy-1,4,4a,5,6,7,8,8a-Octahydro-Endo,Endo- § RCRA Waste Number P051	72-20-8 IO 1575000 EAT500	Toxic with BCF >300	~~0.043~~ 0.086 PP	~~0.0036~~ 0.036 PP	3,970	0.059 PP	2 MCL	N/A	~~0.3~~ 0.006
Endrin Aldehyde §§ —	7421-93-4	Toxic with BCF >300	—	—	3,970	0.29 PP	0.29 PP	N/A	~~0.025~~ 0.03
Epichlorohydrin §§ — § ECH § Epoxy Propane § - Epichlorohydrin § Chloromethyloxirane § RCRA Waste Number U041 § y-Chloropropyleneoxide § 2-Chloropropylene Oxide § Glycerol Epichlorhydrin § 2,3-Epoxypropyl Chloride § 1-Chlor-2,3-Epoxypropane§ 3-Chlor-1,2-Epoxypropane	106-89-8 TX 4900000 CGN750	Carcinogen	—	—	—	30 HA	30 HA	N/A	— 3
Escherichia coli **(Bacteria)**	N/A	Harmful	—	—	—	(13)	Less than 1 (6)	1 per 100ml	1 per 100ml
Ethion §§ Phosphorodithioic acid, S,S'-methylene O,O,O',O'-tetraethyl ester § Diethion § Embathion § Ethanox § Ethiol 100 § Ethodan § Ethopaz § ethyl methylene phosphorodithioate § FMC-1240 § Fosfatox E § Fosfono P § HSDB 399 § Hylemox § KWIT § NIA 1240 § Niagara 1240 § Nialate § Phosphotox E § RP 8167 § Rhodocide § Rodocid § Vegfru fomisate	563-12-2	Toxic				4 HA	4 HA		0.3

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Ethofumesate §§ 2-Ethoxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl methanesulfonate § BRN 5759730 § CR 14658 § Caswell #427BB § HSDB 7451 § Nortron § Progress § Tramat	26225-79-6	Toxic				9000 HA	9000 HA		0.08
Ethylbenzene §§ --- § EB § NCI C56393 § Ethylbenzol § Phenylethane § Ethyl Benzene § Benzene, Ethyl	100-41-4 DA 0700000 EGP500	Toxic	—	---	37.5	530 PP	700 MCL	0.002	~~0.5~~ 1
Fenamiphos §§ --- § Nemacur	22224-92-6	Toxic	---	---	---	2 HA	2 HA	N/A	— 0.2
Fenbuconazole §§ 1H-1,2,4-Triazole-1-propanenitrile,alp-ha-(2-(4-chlorophenyl)ethyl)-alpha-phenyl- § 4-(4-chlorophenyl)-2-(1H-1,2,4-triazol-1-ylmethyl)butyronitrile	114369-43-6	Carcinogen				100 HA	100 HA		0.02
Fipronil §§ §HSDB 7051 §MB 46030 §RM1601 §Regent §UNII-QGH063955F	120068-37-3	Carcinogen				1 HA	1 HA		0.004
Flucarbazone §§ Flucarbazone § 1H-1,2,4-Triazole-1carboxamide, 4,5-dihydro-3-methoxy-4-methyl-5-oxo-N((2-(trifluoromethoxy)phenyl)sulfonyl)-	~~181274-17-9~~ 145026-88-6	Toxic				3000 HA	3000 HA		300
Flucarbazone sulfonamide §§ §	37526-59-3	Toxic				3000 HA	3000 HA		300
Fluometuron §§ --- § Flo-Met	2164-17-2	Carcinogen		---	---	90 HA	90 HA	N/A	— 0.5

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Fluoranthene §§ — § Idryl § Benzo(jk)Fluorene § Benzo(j,k)Fluorene § 1,2-Benzacenaphthene § 1,2-(1,8-Naphthylene)Benzene § Benzene, 1,2-(1,8-Naphthalenediyl)- § RCRA Waste Number U120	206-44-0 LL 4025000 FDF000	Toxic BCF >300	—	—	1,150	130 PP	130 PP	N/A	10
Fluorene (PAH) §§ — § 9H-Fluorene § Diphenylenemethane § o-Biphenylenemethane § 2,2'-Methylenebiphenyl	86-73-7	Toxic	—	—	30	1,100 PP	1,100 PP	0.25	~~0.25~~ 5
Fluoride §§ Flourine § Fluoride § Fluoride(1-) § Perfluoride § Fluoride Ion § Fluorine, Ion § Soluable§ Fluoride § Hydrofluoric Acid, Ion(1-) § RCRA Waste Number P056	16984-48-8 NIOSH: L FEX875	Toxic	—	—	—	4,000 MCL	4,000 MCL	5	~~100~~ 200
Fluroxypyr	69377-81-7	toxic				7000 HA	7000 HA		0.1
Fonofos §§ — § Dyfonate	944-22-9	Toxic	—	—	—	10 HA	10 HA	—	— 1
Gamma Emitters (11) §§ —	Multiple	Carcinogen / Radioactive	—	—	—	0.4 mrem /yr MCL	0.4 mrem /yr MCL	N/A	—
gamma-Chlordane §§ — § Chlordane, beta-Isomer	5566-34-7	Carcinogen	—	—	14,100	0.0080 ~~PP~~ HA	1 HA	N/A	~~0.4~~ 0.006

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
gamma-hexachlorocyclohexane §§ Lindane § BHC § -BHC § Gamene § Lintox § Lentox § Hexcide § Aparsin § Agrocide § Afcide § BHC-gamma § gamma-BHC § HCH-gamma § gamma-HCH § Hexachlorocyclohexane § gamma-Hexachlorobenzene § gamma-Benzenehexachloride § gamma-Benzene Hexachloride § Hexachlorocyclohexane-gamma § Hexachlorocyclohexane (gamma)	58-89-9 GV 4900000 BBQ500	~~Carcinogen~~ Toxic	0.95 PP	---	130	0.2 ~~HA~~ MCL	0.2 ~~HA~~ MCL	N/A	~~0.1~~ 0.02
Gases, dissolved, total-pressure (20) §§ ---	Multiple	Toxic	110% of saturation	---	---	---	---	---	---
Glyphosate §§ --- § Jury § Honcho § Rattler § Weedoff § Roundup § Glifonox § n-(Phosphonomethyl)-Glycine § Glycine, n-(Phosphonomrthyl)- § Glyphosate plus inert ingrediants § MON 0573	1071-83-6 MC 1075000 PHA500	Toxic			---	700 MCL	700 MCL	6	~~50~~ 6
Glyphosate Isopropylamine Salt §§ --- § SHA 103601	38641-94-0	Toxic		---	---	700 HA	700 HA	6	~~50~~ 70

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Guthion §§ — § DBD § NCI C00066 § Carfene § Gothnion § Azinphos § Crysthyon § Gusathion § Bay 17147 § Methylazinphos § Methyl Guthion § Methyl-Guthion § Azinphos-Methyl § Azinphos Methyl § Caswell Number 374 § o,o-Dimethylphosphorodithioate S-Ester § Benzotriazinedithiophosphoric Acid Dimethoxy Ester § Phosphorodithioic Acid, O,O-Dimethyl Ester, S-Ester with 3-(Mercaptomethyl)-1,2,3-Benzotriazin-4(3H)-One § EPA Pesticide Chemical Code 058001	86-50-0 TE 1925000 ASH500	Toxic	—	0.01 NPP	—	—	—	—	— 0.1
Haloacetic acids (38) § Dichloroacetic acid (79-43-6) § Trichloroacetic acid (76-03-9) § Chloroacetic acid (79-11-8) § Bromoacetic acid(79-08-3) §Dibromoacetic acid (631-64-1)	various	Carcinogen				60 MCL	60 MCL		1
Heptachlor §§ — § NCI C00180 § Drinox § Heptamul § Agroceris § Heptagran § SHA 04481 § Rhodiachlor § Velsicol-104 § 3,4,5,6,7,8,8a-heptachlorodicyclopentadiene § Dicyclopentadiene, 3,4,5,6,7,8,8a-Heptachloro- § 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-Tetrahydro-4,7-Methanol-1H-Indene § 4,7-Methano-1H-Indene, 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-Tetrahydro- § 1(3a),4,5,6,7,8,8-Heptachloro-3a(1),4,7,7a-Tetrahydro-4,7-Methanoindene § RCRA Waste Number P059	76-44-8 PC 0700000 HAR000	Carcinogen	0.26 PP	0.0038 PP	11,200	0.00079 PP	0.08 HA	N/A	~~0.2~~ 0.02

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Heptachlor Epoxide §§ --- § HCE § Velsicol 53-CS-17 § Epoxyheptachlor § 1,4,5,6,7,8,8-Heptachloro-2,3-Epoxy-2,3,3a,4,7,7a-Hexahydro-4,7-Methanoindene § 2,5-Methano-2H-Indeno[1,2b]Oxirene, 2,3,4,5,6,7,7-Heptachloro-1a,1b,5,5a,6,6a-Hexahydro-(alpha, beta, and gamma isomers)	1024-57-3 PB 9450000 EBW500	Carcinogen	0.26 PP	0.0038 PP	11,200	0.00039 PP	0.04 HA	N/A	~~0.1~~ 0.01
Hexachlorobenzene §§ --- § HCB § Amatin § Smut-Go § Sanocide § Anticarie § Bunt-Cure § Bunt-No-More § Perchlorobenzene § Phenyl Perchloryl § No Bunt Liquid § Julin's Carbon Chloride § Co-op Hexa § Hexa C.B. § Benzene, Hexachloro-	118-74-1 DA 2975000 HCC500	Carcinogen	---	---	8,690	0.0028 PP	0.2 HA	N/A	~~0.2~~ 0.03
Hexachlorobutadiene §§ --- § 1,3-Hexachlorobutadiene § 1,3-Butadiene, Hexachloro- § 1,1,2,3,4,4-Hexachloro-1,3-Butadiene § 1,3-Butadiene, 1,1,2,3,4,4-Hexachloro- § HCBD § Dolan-Pur § Perchlorobutadiene § RCRA Waste Number U128	87-68-3 EJ 0700000 PCF000	Carcinogen	---	---	2.78	4.4 PP	5 HA	N/A	~~10~~ 0.5
Hexachlorocyclohexane	608-73-1	Carcinogen				0.123 NPP	0.123 NPP		0.01
Hexachlorocyclopentadiene §§ --- § HEX § HCP § PCL § C-56 § HCCPD § NCI C55607 § Hexachloropentadiene § Perchlorocyclopentadiene § 1,3-Cyclopentadiene, 1,2,3,4,5,5-Hexachloro- § RCRA Waste Number U130	77-47-4 GY 1225000 HCE500	Toxic	---	---	4.34	40 PP	50 MCL	1	5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Hexachloroethane §§ — § Avlotane § Distokal § Distopan § Distopin § Egitol § Falkitol § Fasciolin § NCI C04604 § Phenohep § Mottenhexe § Perchloroethane § Hexachloroethylene § Ethane, Hexachloro- § Carbon Hexachloride § Ethane Hexachloride § Ethylene Hexachloride § 1,1,1,2,2,2-Hexachloroethane § RCRA Waste Number U131	67-72-1 KI 4025000 HCI000	Carcinogen	—	—	86.9	14 PP	30 HA	N/A	~~10~~ 1
Hexazinone §§ —	51235-04-	Toxic	—	—	—	400 HA	400 HA	1	— 0.02
Hydrogen Sulfide §§ — § Stink Damp § Sulfur Hydride § Hydrogen Sulphide § Dihydrogen Sulfide § Dihydrogen Monosulfide § Hydrogen Sulfuric Acid § Hydrosulfuric Acid § Sulfurated Hydrogen § RCRA Waste Number U135	7783-06-4 MX 1225000 HIC500	Toxic	—	2 NPP	—	—	—	NA	— 20
Hydroxyatrazine §§ — § Hydroxydechloroatrazine	2163-68-0	Toxic	—	—	—	70 HA	70 HA	—	— 7
Imazalil (Parent name Enilconazole) §§ 1-(2-(2,4-dichlorophenyl)-2-(2-propenyloxy)ethyl)-1H-imidazole § Enilconazole § BRN 054683 § Caswell #497AB § Chloramizol § Deccozil § Secozil S 75 § Fungaflor § HSDB 6672 § R 23979 § EPA Pesticide Code 111901	35554-44-0	Carcinogen				6 HA	6 HA		0.6
Imazamethabenz-methyl ester (includes the metabolite imazamethabenz methyl acid) (33) §§ Assert § —	81405-85-8	Toxic	—	—	—	400 ~~1~~ HA	400 ~~1~~ HA	N/A	— 40

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Imazamox §§ --- § Ammonium salt of imazamox	114311-32-9	Toxic		---	---	20,000 HA	20,000 HA	—	~~—~~ 0.04
Imazapic §§ Imazapic § AC263222, Cadre, Imazameth, Imazamethapyr, Imazmethapyr	104098-48-8	Toxic				4000 HA	4000 HA		0.01
Imazapyr §§ Arsenal § ---	81334-34-1	Toxic			---	21,000 ~~I~~ HA	21,000 ~~I~~ HA	N/A	~~—~~ 0.01
Imazethapyr §§ 3-pyridinecarboxilic acid, 2-(4,5-dihydro-4-methyl-4-(1-methylethyl)-5oxo-1H-imidazol-2-yl)-5-ethyl- § AC 263,499 § CL263499 § HSDB 6678 § Pivot § Pursuit § EPA Pesticide Code# 128922	81335-77-5	Toxic				20,000 HA	20,000 HA		0.03
Imidacloprid §§ ---	105827-78-9 138261-41-3	Toxic			---	400 HA	400 HA	---	~~—~~ 0.07
Indeno(l,2,3-cd)pyrene (PAH) §§ --- § o-Phenylenepyrene § 2,3-Phenylenepyrene § 2,3-o-Phenylenepyrene § Indeno (l,2,3-cd) Pyrene § 1,10-(o-Phenylene)Pyrene § 1,10-(1,2-Phenylene)Pyrene § RCRA Waste Number U137	193-39-5 NK 9300000 IBZ000	Carcinogen	—	---	30	0.038 PP	0.5 (29) HA	N/A	~~0.10~~ 0.08
Iron §§ Fe § Ancor EN 80/150+A622 § Armco Iron	7439-89-6 NO 4565500 IGK800	Harmful (aquatic life)	—	1,000 NPP	---	~~(23)~~	~~(23)~~	N/A	~~50~~ 20
Isophorone §§ --- § Isoforon § NCI C55618 § Isoacetophorone § alpha-Isophorone § 1,1,3-Trimethyl-3-Cyclohexene-5-One § 3,5,5-Trimethyl-2-Cyclohexene-1-One § 3,5,5-Trimethyl-2-Cyclohexone	78-59-1 GW 7700000 IHO000	Carcinogen	—	---	4.38	350 PP	400 HA	N/A	10

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Lead §§ Pb § C.I. 77575 § C.I. Pigment Metal 4 § Glover § Lead Flake § Lead 22 § Omaha § Omaha & Grant § SI § SO	7439-92-1 OF 7525000 LCF000	Toxic	13.98 @ 25 mg/l hardness (12) PP	0.545 @ 25 mg/l hardness (12) PP	49	15 ~~PP~~ MCL	15 ~~PP~~ MCL	0.1	~~0.5~~ 0.3
m-Xylene §§ — § m-Xylol § 1,3-Xylene § meta-Xylene § m-Dimethylbenzene § m-Methyltoluene § 1.3-Dimethylbenzene § 1,3 Dimethyl Benzene	108-38-3 ZE 2275000 XHA000	Toxic	—	—	1.17	10,000 MCL	10,000 MCL	0.5	~~1.5~~ 2
Malathion §§ — § Formal § Sumitox § Emmatos § Celthion § Forthion § Malacide § Kop-Thion § Calmathion § Carbethoxy § NCI C00215 § Carbethoxy Malathion § SHA 057701 § Phosphothion § S-1,2-Bis(Ethoxycarbonyl)Ethyl-O,O-Dimethyl Thiophosphate § O, O-Dimethyl-S-(1,2-Dicarbethoxyethyl) Dithiophosphate § O,O-Dimethyl S-1,2-Di(Ethoxycarbamyl)Ethyl Phosphorodithioate § Succinic Acid, mercapto-, diethyl ester, S-Ester with O,O-Dimethyl Phosphorodithioate	121-75-5 WM 8400000 CBP000	Toxic		0.1 NPP	—	100 HA	100 HA	—	— 0.09
~~Manganese~~ ~~§§ Mn~~ ~~§ Colloidal Manganese § Magnacat § Tronamang~~	~~7439-96-5~~ ~~OO 9275000~~ ~~MAP750~~	~~Harmful~~	—	—	—	~~(24)~~	~~(24)~~	~~N/A~~	~~5~~
MCPA §§ 4-chloro-2 methylphenoxy acetic acid	94-74-6	Toxic	—	—	—	4 HA	4 HA	N/A	— 0.008

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
MCPP §§ 2-(4-chloro-2-methylphenoxy)propionic acid § Mecoprop § 2M 4KhP § 2M-4CP § Anicon B § Anicon P § CMPP § Caswell #559 § Celatox CMPP § iso-Cornox § Isocarnox § Kilprop § Liranox § Mechlorprop § Mecomec § Mecopar § Mecopeop § Mecoper § Mecopex § Mecoprop § Mecoturf § Mecprop § Mepro § Methoxone § Morogal § Okultin § Proponex-pluse § RD 4593 § Rankotex § Runcatex § SYS 67 Mecmin § U 46 KV fluid § Vi-Par § Vi-Pex § EPA pesticide Code #031501	7085-19-0 93-65-2	Toxic	---	---	---	~~7~~ 300 ~~1~~ HA	~~7~~ 300 ~~1~~ HA	---	— 0.007
Mercury §§ Hg § Colloidal Mercury § Mercury, Metallic § NCI C60399 § Quick Silver § RCRA Waste Number U151	7439-97-6 OV 4550000 MCW250	Toxic with BCF >300	1.7 PP	0.91 PP	5,500	0.05 PP	2 MCL	N/A	~~0.01~~ 0.005
Metalaxyl § Ridomil § ---	57837-19-1	Toxic			---	~~420~~ 600 ~~1~~ HA	~~420~~ 600 ~~1~~ HA	3.5	— 0.04
Methamidophos §§ Monitor § ---	10265-92-6	Toxic			---	~~0.35~~ 2 ~~1~~ HA	~~0.35~~ 2 ~~1~~ HA	—	— 0.2
Methomyl §§ Lannate § ---	16752-77-5	Toxic			---	200 HA	200 HA	1	— 1

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Methoxychlor §§ — § DMDT § Metox § Moxie § Methoxcide § NCI C00497 § Methoxy-DDT § Dimethoxy-DDT § 1,1,1-Trichloro-2,2-Bis(p-Methoxyphenyl)Ethane § Benzene, 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxy- § 1,1'-(2,2,2-Trichloroethylidene)Bis[4-Methoxybenzene] § Ethane, 1,1,1-Trichloro-2,2-Bis(p-Methoxyphenyl)- § RCRA Waste Number U247	72-43-5 KJ 3675000 DOB400	Toxic	—	0.03 NPP	—	40 MCL	40 MCL	—	~~1~~ 0.02
Metsulfuron Methyl §§ Ally § —	74223-64-6	Toxic	—	—	—	~~1,750~~ 2000 ~~1~~ HA	~~1,750~~ 2000 ~~1~~ HA	0.1	— 0.08
Methyl Bromide §§Bromomethane (HM) § EDCO § Celfume § Dowfume § Methogas § SHA 053201 § Brom-O-Sol § Brom-O-Gas § Terr-O-Gas § Halon 1001 § Terr-O-Cide § Bromo-O-Gas § Bromo Methane § Methylbromide § Methane, Bromo- § Monobromomethane § RCRA Waste Number U029	74-83-9 PA 4900000 BNM500	Toxic			3.75	47 PP	10 HA	0.11	~~0.5~~ 1
Methyl Chloride §§ Chloromethane § Arctic § Monochloromethane § RCRA Waste Number U045	74-87-3 PA 6300000 CHX500	Toxic	—	—	3.75	30 HA	30 HA	0.08	— 1
Methylene chloride §§ Dichloromethane (HM) § R 30 § DCM § Freon 30 § Aerothene MM § NCI C50102 § Solmethine § Methane Dichloride § Methane, Dichloro- § 1,1-Dichloromethane § Methylene Bichloride § Methylene Dichloride	75-09-2 PA 8050000 MDR000	Carcinogen	—	—	0.9	5 MCL	5 MCL	N/A	~~0.5~~ 2
Metolachlor (includes the metabolites metolachlor ESA and metolachlor OA (34) §§ Dual § —	51218-45-2	Carcinogen			—	~~100~~ 700 HA	~~100~~ 700 HA	N/A	— 0.2

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Metribuzin §§ Sencor § ---	21087-64-9	Toxic			---	200 HA	200 HA	10	--- 0.1
Mirex §§ --- § NCI C06428 § Dechlorane § Bichlorendo § Ferriamicide § Perchloropentacyclodecane § Dodecachloropentacyclodecane § Hexachlorocyclopentadiene Dimer § Cyclopentadiene, Hexachloro-, Dimer § Perchloropentacyclo(5.2.1.0[sup 2,6].0[sup 3,9].0[sup 5,8])Decane § Dodecachlorooctahydro-1,3,4-Metheno-2H-Cyclobuta (c,d)Pentalene § 1,3,4-Metheno-1H-Cyclobuta[cd]Pentalene, 1,1a,2,2,3,3a,4,5,5,5a,5b,6,-Dodecachlorooctahydro-	2385-85-5 PC 8225000 MQW500	Carcinogen	---	0.001 NPP	---	~~14~~ 1 ~~1~~ NPP	~~14~~ 1 ~~1~~ NPP	0.01	~~0.1~~ 0.01
MTBE §§ Methyl Tertiary-Butyl Ether	1634-04-4	Harmful	---	---	---	30 (21)	30 (21)	---	--- 1
Myclobutanil §§ § EPA PCC 128857 § Nova § Rally § Systhane § Systhane 12E § Systhane 6 Flo	88671-89-0	Toxic				200 HA	200 HA		0.03
N-Nitrosodimethylamine §§ Dimethylnitrosamine A707 § DMN § NDMA § DMNA § Nitrosodimethylamine § Dimethylnitrosoamine § N-Nitrosodimethylamine § N,N-Dimethylnitrosamine § Methylamine, N-Nitrosodi- § Dimethylamine, N-Nitroso- § N-Methyl-N-Nitrosomethanamine § Methamine, N-Methyl-N-Nitroso- § Methanamine, N-Methyl-N-Nitroso- § RCRA Waste Number P082	62-75-9 IQ 0525000 DSY400	Carcinogen	---	---	0.026	0.0069 PP	0.0069 PP	N/A	~~10~~ 5

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N-Nitrosodiphenylamine §§ — § NDPA § NDPhA § Vultrol § Curetard A § NCI C02880 § Redax § TJP § Retarder J § Vulcalent A § Vulcatard § Vultrol § Nitrosodiphenylamine § Diphenylnitrosamine § N,N-Diphenylnitrosamine § N-Nitroso-N-Phenylaniline § Diphenylamine, N-Nitroso- § Benzenamine, N-Nitroso-N-Phenyl-	86-30-6 JJ 9800000 DWI000	Carcinogen	—	—	136	33 PP	33 PP	N/A	10
n-Dioctyl Phthalate §§ — § DNOP § PX-138 § Vinicizer 85 § Dinopol NOP § n-Octyl Phthalate § Octyl Phthalate § Dioctyl Phthalate § Di-n-Octyl Phthalate § Di-sec-Octyl Phthalate § 1,2-Benzenedicarboxylic Acid, Dioctyl Ester § RCRA Waste Number U107	117-84-0 TI 1925000 DVL600	Carcinogen	—	—	—	—	—	N/A	10
N-Nitrosodi-N-Propylamine §§ — § DPN § DPNA § NDPA § Dipropylnitrosamine § N-Nitrosodipropylamine § Di-n-Propylnitrosamine § Dipropylamine, N-Nitroso- § N-Nitrosodi-n-propylamine § N-Nitroso-di-n-propylamine § 1-Propanamine, N-Nitroso-n-Propyl- § RCRA Waste Number U111	621-64-7 JL 9700000 DWU600	Carcinogen	—	—	1.13	0.05 PP	0.05 PP	N/A	~~10~~ 5
N-Nitrosopyrrolidine §§ — § NPYR § NO-pyr § N-N-pyr § 1-Nitrosopyrrolidene § Pyrrolidine, 1-Nitroso- § Tetrahydro-N-Nitrosopyrrole § Pyrrole, Tetrahydro-N-Nitroso- § RCRA Waste Number U180	930-55-2 UY 1575000 NLP500	Carcinogen	—	—	0.055	0.16 ~~PP~~ NPP	0.16 ~~PP~~ NPP	N/A	~~10~~ 0.02

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Naphthalene §§ Moth Balls § Mighty 150 § NCI C52904 § Naphthene § White Tar§ Naphthalin § Tar Camphor § Caswell Number 587 § EPA Pesticide Chemical Code 055801 § RCRA Waste Number U165	91-20-3 QJ 0525000 NAJ500	Carcinogen	---	---	10.5	100 HA	100 HA	0.04	10
Nickel §§ Ni § C.I. 77775 § Ni 270 § Nickel 270 § Ni 0901-S § Ni 4303T § NP 2 § Raney Alloy § Raney Nickel	7440-02-0 QR 5950000 NCW500	Toxic	145@25mg/l hardness (12) PP	16.1 @ 25 mg/l hardness (12) PP	47	100 HA	100 HA	0.5	~~10~~ 2
Nicosulfuron §§ Accent § ---	111991-09-4	Toxic	---	---	---	~~8,750~~ 9000 ~~1~~ HA	~~8,750~~ 9000 ~~1~~ HA	0.01	— 0.03
Nitrate (as Nitrogen[N]) §§ NO3	14797-55-8	Toxic	(8)	(8)	---	10,000 ~~MCL~~ NPP	10,000 ~~MCL~~ NPP	~~10~~ surface water | 5000, ground water, see ARM 17.30.715	20
Nitrate plus nitrite (as Nitrogen[N]) §§ $NO_3 + NO_2$	See nitrate and nitrite	Toxic	(8)	(8)	---	10,000 MCL	10,000 MCL	~~10~~ surface water | 5000, ground water, see ARM 17.30.715	20
Nitrite (as Nitrogen[N]) §§ NO_2	14797-65-0	Toxic	(8)	(8)	---	1,000 MCL	1,000 MCL	4	10
Nitrobenzene §§ --- § NCI C60082 § Mirbane Oil § Nitrobenzol § Oil of Mirbane § Benzene, Nitro- § Essence of Myrbane § RCRA Waste Number U169	98-95-3 DA 6475000 NEX000	~~Toxic~~ Carcinogen	—	—	2.89	17 PP	17 PP	1.9	10
~~Nitrogen, total inorganic (as Nitrogen[N])~~ ~~§§ the sum of ammonia, nitrite, and nitrate~~	~~See ammonia, nitrate and nitrite~~	~~Nutrient~~	~~(8)~~	~~(8)~~	—	—	—	~~10~~	~~10~~

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Nitrophenol, 4- §§p-Nitropheno (DOT)l § 4-Hydroxynitrobenzene § NCI C55992) § RCRA Waste Number U170	100-02-7 SM 2275000 NIF000	Toxic	—	—	3.31	60 HA	60 HA	2.4	— 60
o-Nitrophenol §§ --- § 2-Nitrophenol oxynitrobenzene	88-75-5 SM 2100000 NIE500	Toxic	—	—	2.33	—	—	0.45	— 10
Nitrosamines §§ -Nitrosamide § -NSC223080	35576-91-1	Carcinogen				0.008 NPP	0.008 NPP		8.E-04
Nitrosodibutylamine, N §§ Dibutylnitrosamine § -1-Butanamine § BRN 1760378 § CCRIS 217 § EINECS 213-101-1 § HSDB 5107 § N-butyl-N-nitroso-1-butamine § NDBA § NSC 6830 § RCRA waste number U172	924-16-3	Carcinogen				0.063 NPP	0.063 NPP		3
Nitrosodiethylamine, N §§ Diethylnitrosamine § -BRN 1744991 § CCRIS 239 § DEN § EINECS 200-226-1 § Ethanamine, N-ethyl-N-nitroso § HSDB 4001 § NDEA § NSC 132 § RCRA waste number U174	55-18-5	Carcinogen				0.008 NPP	0.008 NPP		8.E-04
Nonylphenol §§ --- § 2,6-Dimethyl-4-heptylphenol § Hydroxyl No. 253 ~~§ Potassium nonylphenate § Sodium nonylphenol § Strontium-bis(nonylphenolate) § Strontium nonylphenolate~~	25154-52-3	Toxic	28 NPP	6.6 NPP	—	—	—	—	— 0.7
o-Xylene §§ --- § o-Xylol § 1,2-Xylene § ortho-Xylene § o-Methyltoluene § o-Dimethylbenzene § 1,2-Dimethylbenzene § 1,2-Dimethyl Benzene	95-47-6 ZE 2450000 XHJ000	Toxic	—	—	1.17	10,000 MCL	10,000 MCL	0.5	~~1.5~~ 1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Oxamyl §§ --- § D-1410 § DPX 1410 § Insecticide-Nematicide 1410 § Vydate § Thioxamyl § Methyl 2-(Dimethylamino)-N- § Vydate L, Insecticide/Nematicide § ({[Methylamino]Carbonyl}Oxy)-2-Oxoethanimidothioate § 2-Dimethylamino-1-(Methylthio)Glyoxal O-Methylcarbamoylmonozime § Methyl N',N'-Dimethyl-N-({Methylcarbamoyl}Oxy)-1-Thiooxamimidate § N',N'-Dimethyl-N-[(Methylcarbamoyl)oxy]-1-Methylthiooxamimidic Acid	23135-22-0 RP 2300000 DSP600	Toxic	---	---	---	200 MCL	200 MCL	1	1
Oxydemeton Methyl §§ Metasystox R § ---	301-12-2	Toxic			---	~~3.5~~ 0.7 ~~1~~ HA	~~3.5~~ 0.7 ~~1~~ HA	1.4	~~---~~ 0.07
Oxygen, dissolved (20) §§ O2 § Oxygen, Compressed § Oxygen, Refrigerated Liquid	7782-44-7 RS 2060000 OQW000	Toxic	(15)	(15)	---	---	---	---	~~50~~ 0.3 mg/L
p,p'-Dichlorodiphenyldichloroethylene §§ DDE § DDE § p,p'-DDE § 4,4'-DDE § NCI C00555 § Dichlorodiphenyldichloroethylene § Dichlorodiphenyldichloroethylene, p,p'- § 2,2'-bis(4-Chlorophenyl)-1,1-Dichloroethylene § 1,1'-(Dichloroethenylidene)bis(4-Chlorobenzene) § 2,2'-bis(p-Chlorophenyl)-1,1-Dichloroethylene § Benzene, 1,1'-(DichloroethenylideneBis[4-Chloro-	72-55-9 KV 9450000 BIM750	Carcinogen	---	---	53,600	0.0022 PP	0.0022 PP	N/A	~~0.01~~ 0.02

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
p,p'-Dichlorodiphenyldichloroethane §§ DDD § TDE § Dilene § NCI C00475 § Rothane § Rhothane § 4,4'-DDD § p,p'-DDD § p,p'-TDE § 4',4'-D-DDD § RCRA Waste Number U060 § Tetrachlorodiphenylethane § Dichlorodiphenyldichloroethane § Dichlorodiphenyl Dichloroethane § 2,2-bis (4-Chlorophenyl)-1,1-Dichloroethane § 1,1-Dichloro-2,2-bis(p-Chlorophenyl) Ethane § 1,1-bis(4-Chlorophenyl)-2,2-Dichloroethane § 2,2-bis(p-Chlorophenyl)-1,1-Dichloroethane § Benzene, 1,1'(2,2-Dichloroethylidene)Bis[4-Chloro-	72-54-8 KI 0700000 BIM500	Carcinogen	—	—	53,600	0.0031 PP	0.0031 PP	N/A	~~0.01~~ 0.02
p,p'-Dichlorodiphenyltrichloroethane §§ DDT § DDT § 4,4'-DDT § Agritan § Anoflex § Arkotine § Azotox § Bosan Supra § Bovidermol § Chlorophenothan § Chlorophenothane § Chlorophenotoxum § Citox § Clofenotane § Dedelo § § Chlorophenothane § Diphenyltrichloroethane § Dichlorodiphenyltrichloroethane § 4,4'-Dichlorodiphenyltrichloroethane § 1,1,1-Trichloro-2,2,-bis(p-Chlorophenyl) Ethane § 1,1,1-Trichloro-2,2,-bis(p-Chlorophenyl)Ethane	50-29-3 KJ DAD200	Carcinogen	0.5 PP	0.001 PP	53,600	0.0022 PP	0.0022 PP	N/A	~~0.06~~ 0.02
p-Bromodiphenyl Ether §§ Benzene, 1-Bromo-4-Phenoxy- § p-Bromodiphenyl Ether § 4-Bromophenoxybenzene § 4-Bromodiphenyl Ether § 1-Bromo-4-Phenoxybenzene § p-Bromophenylphenyl Ether § 4-Bromophenyl Phenyl Ether	101-55-3 — —	Toxic with BCF >300	—	—	1,640	—	—	N/A	10

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
p-Chloro-m-Cresol §§---3-methyl-4-chlorophenol § PCMC § Parol § Aptal § Baktol § Baktolan § Ottafact § Raschit § Rasen-Anicon § Parmetol § Candasetpic § Chlorocresol § Preventol CMK § Parachlorometra Cresol § 4-Chloro-3-methylphenol § 2-Chloro-Hydroxytoluene § Phenol, 4-Chloro-3-methyl- § Chlorophenol, 4-, methyl, 3- § RCRA Waste Number U039	59-50-7 GO 7100000 CFE250	Harmful	---	---	---	3,000 ~~PP~~ OL	3,000 ~~PP~~ OL	N/A	~~20~~ 10
p-Xylene §§ --- § p-Xylol § Chromar § Scintillar § 1,4-Xylene § para-Xylene § p-Methyltoluene § p-Dimethylbenzene § 1,4-Dimethylbenzene § 1,4-Dimethyl Benzene	106-42-3 ZE 2625000 XHS000	Toxic	---	---	1.17	10,000 MCL	10,000 MCL	0.5	~~1.5~~ 2
Paraquat Dichloride §§ ---	1910-42-5	Toxic	---	---	---	30 HA	30 HA	0.8	— 3
Parathion §§ --- § DNTP § Niran § Phoskil § Paradust § Stathion § Strathion § Pestox Plus § Nitrostigmine § Parathion Ethyl § Parathion-ethyl § Ethyl Parathion § Diethylparathion § Diethyl para-Nitrophenol Thiophosphate § Diethyl-p-Nitrophenyl Monothiophosphate § O,O-Diethyl O-4-Nitrophenyl Thiophosphate § Phosphorothioic Acid, O,O-Diethyl O-(4-Nitrophenyl) Ester § Caswell Number 637 § EPA Pesticide Chemical Code 057501 § RCRA Waste Number P089	56-38-2 TF 4920000,dry-liquid PAC250,dry	Carcinogen	0.065 NPP	0.013 NPP	---	---	---	---	~~1~~ 0.2
Pentachlorobenzene §§ Benzene, Pentachloro- § QCB- § RCRA Waste Number U183	608-93-5 DA 6640000 PAV500	Toxic with BCF >300	---	---	2,125	1.4 ~~PP~~ NPP	1.4 ~~PP~~ NPP	N/A	~~0.1~~ 5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Pentachlorophenol §§ Penta § PCP § Durotox § Weedone § Chem-Tol § Lauxtol A § NCI C54933 § NCI C55378 § NCI C56655 § Permite § Dowcide 7 § Permacide § Penta-Kil§ Permagard § Penchlorol § Chlorophen § Pentachlorphenol § Pentaclorofenolo § Thompson's Wood Fix § Phenol, Pentachloro- § 2,3,4,5,6-Pentachlorophenol § 1-Hydroxy- 2,3,4,5,6-Pentachlorobenzene	87-86-5 SM 6300000 PAX250	Carcinogen	5.3 @ pH of 6.5 (14) PP	4 @ pH of 6.5 (14) PP	11	1 MCL	1 MCL	N/A	~~0.05~~ 0.1
pH §§ ---	N/A	Harmful	(13)	(13)	—	(18)	(18)	N/A	—
Phenanthrene (PAH) §§ — § Phenantrin	85-01-8 SF 7175000 PCW250	Toxic	—	—	30	—	—	0.01	~~0.25~~ 0.2
Phenol §§ — § Baker's P and S Liquid and Ointment § NCI C50124 § Benzenol § Monophenol § Oxybenzene § Phenic Acid § Carbolic Acid § Phenylic Acid § Hydroxybenzene § Hydroxybenzene § Phenyl Alcohol § Phenyl Hydrate § Phenylic Alcohol § Phenyl Hydroxide § Benzene, Hydroxy- § Monohydroxybenzene § RCRA Waste Number U188	108-95-2 SJ 3325000 PDN750	~~Harmful~~ Toxic	—	—	1.4	300 ~~PP~~ OL	300 ~~PP~~ OL	100	10
~~Phosphorus, inorganic (20) §§ — § Ortho-phosphorus § phosphorus, Ortho- § reactive phosphorus~~	~~14265-44-2~~ ~~7723-14-0~~	~~Nutrient~~	~~(8)~~	~~(8)~~	—	—	—	~~1~~	~~1~~

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards: Acute (3)	Aquatic Life Standards: Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16): Surface Water	Human Health Standards (17) (16): Ground Water	Trigger Value (22)	Required Reporting Value (19)
Picloram §§ Tordon § ATCP § K-Pin § Borolin § Amdon Grazon § NCI C00237 § Tordon 10K § Tordon 22K § Tordon 101 Mixture § 3,5,6-Trichloro-4-Aminopicolinic Acid § 4-Amino-3,5,6-Trichloropicolinic Acid	1918-02-1 TJ 7525000 AMU250	Toxic	---	---	---	500 MCL	500 MCL	0.14	1
Pinoxaden (NOA 407855) (includes metabolites Pinoxaden NOA 407854 and pinoxaden NOA 447204) (35) §§ ---	N/A	Toxic		---	---	2,000 HA	2,000 HA	---	--- 200
Polychlorinated Biphenyls, (sum of all homolog, all isomer, all congener or all Aroclor analyses) §§ PCB's § Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1268, 2565, 4465 § Chlophen § Chlorextol § Chlorinated Biphenyl § Chlorinated Diphenyl § Chlorinated Diphenylene § Chloro Biphenyl § Chloro-1,1-Biphenyl § Clophen § Dykanol § Fenclor § Inerteen § Kanechlor 300, 400, 500 § Montar § Noflamol § PCB (DOT) § Phenochlor § Polychlorobiphenyl § Pyralene § Pyranol § Santotherm § Sovol § Therminol FR-1	Multiple	Carcinogen	---	0.014 PP	31,200	0.00064 PP	0.5 MCL	N/A	~~1~~ 0.08
Primisulfuron Methyl §§ Beacon § Exceed	86209-51-0	Toxic	---	---	---	~~42~~ 2000 ~~I~~ HA	~~42~~ 2000 ~~I~~ HA	0.1	--- 200
Prometon §§ Pramitol § ---	1610-18-0	Toxic			---	100 HA	100 HA	0.3	--- 0.002
Pronamide §§ Kerb § ---	23950-58-5	Carcinogen	---	---	---	50 HA	50 HA	N/A	--- 5
Propachlor §§ Ramrod § ---	1918-16-7	Toxic	---	---	---	90 HA	90 HA	0.5	--- 0.2

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Propane, 1,2-Dibromo-3-Chloro- §§ Dibromochloropropane § 1,2-Dibromo-3-Chloropopane § Fumagon § Fumazone § NCI C00500 § Nemabrom § Nemafume § Nemagon § Nemagone § Nemagone Soil Fumigant § Nemanax § Nemapaz § Nemaset § Nematocide § Nematox § OS 1897 § OXY DBCP § SD 1897 § Caswell Number 287 § 1-Chloro-2,3-Dibromopropane § DBCP § EPA Pesticide Chemical Code 011301 § RCRA Waste Number U066	96-12-8 TX 8750000 DDL800	~~Carcinogen~~ Toxic	—	—	—	0.2 MCL	0.2 MCL	N/A	~~0.05~~ 0.02
Propazine §§ —	139-40-2	Carcinogen	—	—	—	10 HA	10 HA	N/A	— 0.03
Propham §§ —	122-42-9	Toxic	—	—	—	100 HA	100 HA	0.13	— 0.5
Propioconazole §§ 1-((2-(2,4-dichlorophenyl)-4propyl-1,3-dioxolan-2-yl)methyl)-1H-1,2,4-triazole § Banner § CGA-64250 § Caswell#323EE § Desmel § HSDB 6731 § Orbit § Radar § Tilt § EPA Pesticide # 122101	60207-90-1	Carcinogen				700 HA	700 HA		70
Propoxur §§ Baygon § —	114-26-1	Carcinogen		—	—	3 HA	3 HA	N/A	— 0.4
Prosulfuron §§ Benezenesulfonamide, N(((4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino)carbonyl)-	94125-34-5	Toxic				100 HA	100 HA		0.02
Pyrasulfotole §§ pyrasulfotole §	365400-11-9	Toxic				70 HA	70 HA		0.07
Pyrene (PAH) §§ — § ß-Pyrine § beta-Pyrene § Benzo(def)Phenanthrene § Benzo[def]Phenanthrene	129-00-0 UR 2450000 PON250	Toxic	—	—	30	830 PP	830 PP	0.25	~~0.25~~ 10
Pyroxsulam	422556-08-9	Toxic				7000 HA	7000 HA		0.09

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Radium 226 §§ —	13982-63-6 --- ---	Carcinogen / Radioactive	---	---	---	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	5 picocuries/liter Note: The sum of Radium 226 and 228. MCL	N/A	---
Radium 228 §§ ---	15262-20-1 --- ---	Carcinogen / Radioactive	---	---	---	5 picocuries/ liter Note: The sum of Radium 226 and 228. MCL	5 picocuries/ liter Note: The sum of Radium 226 and 228. MCL	N/A	---
Radon 222 §§ ---	14859-67-7 --- ---	Carcinogen / Radioactive	---	---	---	300 picocuries/ liter ~~HA~~ MCL	300 picocuries/ liter ~~HA~~ MCL	N/A	---
Selenium §§ Se § C.I. 77805 § Colloidal Selenium § Elemental Selenium § Selenium Alloy § Selenium Base § Selenium Dust § Selenium Elemental § Selinium Homopolymer§ Selenium Metal Powder, Non-Pyrophoric § Vandex	7782-49-2 VS 7700000 and VS 8310000, colloidal SBO500 and SBP000,colloidal	Toxic	20 PP	5 ~~HA~~ PP	4.8	50 MCL	50 MCL	0.6	1
Silver §§ Ag § Argentum § C.I. 77820 § Shell Silver § Silver Atom	7440-22-4 NIOSH: VW 3500000 SAX: SDI500	Toxic	0.374 @ 25 mg/l hardness (12) PP	—	0.5	100 HA	100 HA	0.2	~~0.5~~ 0.2

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Simazine §§ — § CDT § Herbex § Framed § Bitemol § Radokor § A 2079 § Batazina § Cat (Herbicide) § CET § G 27692 § Geigy 27,692 § Gesaran § Gesatop 50 § Simazine 80W § Symazine § Taphazine § W 6658 § Zeapur § Princep § Aquazine § Herbazin § Tafazine § 2,4-bis(Ethylamino)-6-Chloro-s-Triazine § 1-Chloro, 3,5-Bisethylamino-2,4,6-Triazine § 2-Chloro-4,6-Bis(Ethylamino)-1,3,5-Triazine § 6-Chloro-N,N'-Diethyl-1,3,5-Triazine-2,4-Diyldiamine	122-34-9 XY 5250000 BJP000	Carcinogen			—	4 MCL	4 MCL	N/A	~~0.3~~ 0.5
Strontium §§ —	7447-24-6 —	Toxic	—	—	—	4,000 HA	4,000 HA	100	— 20
Styrene §§ — § Styrol § Cinnamol § Cinnamene § Cinnamenol § NCI C02200 § Styrole § Strolene § Styron § Stropor § Vinylbenzol § Phenethylene § Phenylethene § Vinylbenzene § Ethenylbenzene § Phenylethylene § Benzene, Vinyl- § Stryene, Monomer	100-42-5 WL 3675000 SMQ000	Carcinogen	—	—	—	100 HA	100 HA	N/A	~~0.5~~ 0.9
Sulfometuron Methyl §§ Oust § —	74222-97-2	Toxic	—	—	—	2000 HA	2000 HA	0.01	— 0.02
Sulfosulfuron §§ imidazo(1,2-a)pyridine-3-sulfonamide,N-(((4,6-dimethoxy-2-pyrimidinyl)amino)cabonyl)-2-(ethylsulfonyl)- § Sulfosulfuron (ISO)	141776-32-1	Toxic				300 HA	300 HA		30

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			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Tebuconazole §§ 1H-1,2,4-Triazole-1-ethanol,alpha-(2-(4-chlorophenyl)ethyl)-apha-(1,1-dimethylethyl)- § BAY-HWG 1608 § Elite § Ethyltrianol § Etiltrianol § Fenetrazole § Folicur § LYNX § Preventol A 8 § Raxil § Terbucanazole § Terbutrazole § HWG 1608 § HSDB 7448	107534-96-3	Carcinogen				200 HA	200 HA		0.04
Tebuthiuron §§ --- TebuconazoleSpike	34014-18-1	Toxic			---	500 HA	500 HA	2	— 0.002
Temperature §§ ---	N/A	Harmful	(13)	(13)	---	---	---	N/A	---
Terbacil §§ Sinbar § ---	5902-51-1	Toxic			---	90 HA	90 HA	2.2	— 0.02
Terbufos §§ Counter § —	13071-79-9	Toxic			---	0.9 HA	0.9 HA	0.5	— 0.07
Tetrachlorobenzene, 1,2,4,5- §§ Benzene, 1,2,4,5-Tetrachloro- § RCRA Waste Number U207 § 1,2,4,5-Tetrachlorobenzene	95-94-3 DB 9450000 TBN750	Toxic with BCF >300	---	---	1,125	0.97 NPP	0.97 NPP	N/A	~~0.1~~ 5
Tetrachloroethane, 1,1,2,2- §§ Tetrachloroethane § TCE § Cellon § Westron § Bonoform § sym-Tetrachloroethane § Acetylene Tetrachloride § 1,1,2,2-Tetrachloroethane § Ethane, 1,1,2,2-Tetrachloro- § 1,1-Dichloro-2,2-Dichloroethane § RCRA Waste Number U209	79-34-5 NIOSH: KI 8575000 SAX: ACK500	Carcinogen	---	---	5	1.7 PP	2.0 HA	N/A	0.5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Tetrachloroethylene §§ Perchlorethylene § NCI C04580 § PCE § Perk § PERC § ENMA § Dow-Per § Perchlor § Perclene § Perklone § Didakene § Tetra Cap § Percosolve § Perchloroethylene § Tetrachloroethene § Carbon Bichloride § Carbon Dichloride § Ethylene Tetrachloride § Ethylene, Tetrachloro- § 1,1,2,2-Tetrachloroethylene § RCRA Waste Number U210	127-18-4 KX 3850000 TBQ250	~~Carcinogen~~ <u>Toxic</u>	—	—	30.6	5 MCL	5 MCL	N/A	~~0.5~~ <u>0.7</u>
Thallium §§ Tl § Ramor	7440-28-0 XG 3425000 TEI000	Toxic	—	—	119	0.24 PP	2 MCL	0.3	0.2
Thifensulfuron Methyl §§ — § Pinnacle	79277-27-3	Toxic	—	—	—	910 ~~1~~ <u>HA</u>	910 ~~1~~ <u>HA</u>	1	~~—~~ <u>90</u>
Toluene §§ — § Antisal 1a § NCI C07272 § Toluol § Tolu-Sol § Methacide § Methylbenzol § Methylbenzene § Phenylmethane § Phenyl-Methane § Methyl-Benzene § Benzene, Methyl § RCRA Waste Number U220	108-88-3 XS 5250000 TGK750	Toxic	—	—	10.7	1,000 MCL	1,000 MCL	0.01	~~0.5~~ <u>1</u>
Toxaphene §§ — § Attac 4-2 § Alltox § Alltex § Attac 6 § Toxakil § Agricide § Chem-Phene § Clor Chem T-590 § Compound 3956 § Crestoxo § Estonox § Geniphene § Gy-Phene § Hercules 3956 § Melipax § Motox § PCC § Phenacide § Toxaphene mixture § Chlorinated-Camphene § Camphene, Octachloro- § RCRA Waste Number P123	8001-35-2 XW 5250000 THH750	Carcinogen	0.73 PP	0.0002 PP	13,100	0.0028 PP	0.3 HA	N/A	1

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards Acute (3)	Aquatic Life Standards Chronic (4)	Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16) Surface Water	Human Health Standards (17) (16) Ground Water	Trigger Value (22)	Required Reporting Value (19)
Tralkoxydim (28) §§ Achieve	87820-88-0	Carcinogen	3750	---	---	20 HA	20 HA	N/A	— 2
trans-1,2-Dichloroethylene §§ --- § trans-Dichloroethylene § RCRA Waste Number U079 § trans-1,2-Dichloroethane § trans-1,2-Dichloroethene § Dichloroethylene, trans-§ trans-Acetylene Dichloride § 1,2-trans-Dichloroethylene § Ethene, 1,2-Dichloro-, (E)- § 1,2-Dichloroethylene, trans-	156-60-5 KV 9400000 DFI600	Toxic	---	---	1.58	100 MCL	100 MCL	0.05	~~0.5~~ 0.6
trans-1,3-Dichloropropene §§ Telone II § 1,3-Dichloropropene § 1,3-Dichloropropylene § (E)-1,3-Dichloropropene § trans-1,3-Dichloropropylene § 1-Propene, 1,3-Dichloro-, (E)-	10061-02-6 UC 8320000 DGH000	Carcinogen	---	---	1.91	2 HA	2 HA	N/A	~~0.5~~ 0.3
trans-Nonachlor (Chlordane component) §§ --- § Chlordane, trans-Isomer	39765-80-5 ---	Carcinogen	---	---	14,100	0.0080 PP	1 HA	N/A	~~0.4~~ 0.1
Triallate §§ --- § Avadex BW § BRN 1875853 § Dipthal § Far-Go § Triamyl	2303-17-5	Carcinogen			---	5 HA	5 HA	---	— 5
Triasulfuron §§ Amber	82097-50-5	Toxic	---	—	---	70 ~~1~~ HA	70 ~~1~~ HA	1	— 0.03
Tribenuron Methyl §§ Express	101200-48-0	Carcinogen	---	---	---	~~8~~ 60 ~~1~~ HA	~~8~~ 60 ~~1~~ HA	0.1	— 6
Tributyltin (TBT) §§ §Tin-San § Tributylin chloride complex § EPA Pesticide Chemical #083108	56573-85-4	Toxic	0.46 NPP	0.072 NPP	---	---	---	N/A	— 0.007
Trichlorobenzene, 1,2,4- §§ Benzene, 1,2,4-Trichloro- § unsym-Trichlorobenzene § 1,2,4-Trichlorobenzene	120-82-1 DC 2100000 TIK250	Toxic	—	---	114	35 PP	70 MCL	0.02	~~0.5~~ 10

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)									
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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Trichloroethane, 1,1,2- §§ Vinyl Trichloride § 1,1,2-Trichloroethane § ß-T § Ethane Trichloride § beta-Trichloroethane § NCI C04579 § Ethane, 1,1,2-Trichloro- § Caswell Number 875A [NLM] § EPA Pesticide Chemical Code 081203 [NLM]§ 1,2,2-Trichloroethane § RCRA Waste Number U227	79-00-5 KJ 3150000 TIN000	Carcinogen	—	—	4.5	3 HA	3 HA	N/A	~~0.5~~ 0.7
Trichloroethane, 1,1,1- §§ Methyl Chloroform § -T § Strobane § Inhibisol § 1,1,1-TCE § Tri-Ethane § Solvent 111 § Aerothene TT § Chloroethene § Chlorten § NCI C04626 § Methylchloroform § Chloroform, Methyl- § 1,1,1-Trichloroethene § alpha-Trichloroethane § Methyltrichloromethane § 1,1,1-Trichloroethane § Ethane, 1,1,1-Trichloro-§ RCRA WAste Number U226	71-55-6 KJ 2975000 TIM750	Toxic	—	—	5.6	200 MCL	200 MCL	0.5	~~0.5~~ 0.7
Trichloroethylene §§ --- § TCE § Triad § Vitran § Algylen § Dow-Tri § Lanadin § Vestrol § Anamenth § Benzinol § Tri-Plus § Tri-Clene § Trichlorethene § Trichloroethene § Trichloroethane § Trichlorethylene § ~~Tetrachloroethene §~~ Ethene, Trichloro- § Ethylene Trichloride § Ethylene, Trichloro- § Acetylene Trichloride § 1,1,2-Trichloroethylene § 1,2,2-Trichloroethylene § 1-Chloro-2,2-Dichloroethylene § 1, 1-Dichloro-2-Chloroethylene	79-01-6 KX 4550000 TIO750	Carcinogen	—	—	10.6	5 MCL	5 MCL	N/A	0.5

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Trichlorofluoromethane (HM) §§ Freon 11 § F 11 § FC 11 § Arcton 9 § Eskimon 11 § Halocarbon 11 § Algofrene Type 1 § Fluorocarbon Number 11 § NC1 C04637 § Isotron 11 § Fluorotrichloromethane § Isceon 131 § Monofluorotrichloromethane § Ucon Refrigerant 11 § Trichloromonofluoromethane § RCRA Waste Number U121	75-69-4 PB 6125000 TIP500	Toxic	---	---	3.75	10,000 ~~PP~~ HA	10,000 ~~PP~~ HA	0.07	~~0.5~~ 0.8
Trichlorophenol, 2,4,5- §§ Dowcide B § 2,4,5-Trichlorophenol § Nurelle § Dowcide 2 § Collunosol § Preventol 1 § NCI C61187 § RCRA Waste Number U230	95-95-4 SN 1400000 TIV750	~~Harmful~~ Toxic	---	---	110	1800 NPP	1800 NPP	10	~~10~~ 60
Trichlorophenol, 2,4,6- §§ Phenachlor § Omal § Phenol, 2,4,6-trichloro- § NCI C02904 § 2,4,6-Trichlorophenol § Dowcide 2S § RCRA Waste Number U231	88-06-2 SN 1575000 TIW000	Carcinogen	---	---	150	14 PP	30 HA	N/A	10
Trichlorophenoxy Proprionic Acid, 2 (2,4,5-) §§ Fenoprop § 2 (2,4,5-Trichlorophenoxy) Proprionic Acid § Kuran § Propon § Silvex § Aqua-Vex § Ded-Weed § Sta-Fast § 2,4,5-TP § Color-Set § Weed-B-Gon § Double Strength § 2,4,5-Trichlorophenoxypropionic Acid § (2,4,5-Trichlorophenoxy)Propionic Acid § 2-(2,4,5-Trichlorophenoxy)-Proprionic Acid § (+/-)-2-(2,4,5-Trichlorophenoxy)propanoic Acid § RCRA Waste Number U233	93-72-1 UF 8225000 TIX500	Toxic	---	---	---	10 NPP	50 MCL	0.075	~~0.1~~ 0.2

CIRCULAR DEQ-7, MONTANA NUMERIC WATER QUALITY STANDARDS(9)

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Trichlorophenoxyacetic Acid §§ Brush-Rhap § 2,4,5-T (Brush-Rhap)	93-76-5	Toxic	—	—	—	70 HA	70 HA	N/A	— 0.2
Triclopyr §§ 3,4,5-Trichloro- § Confront § Dowco 233 §	55335-06-	Toxic				~~350~~ 400 ~~1~~ HA	~~350~~ 400 ~~1~~ HA		0.5
Trifluralin §§ Treflan § Buckle	1582-09-8	Carcinogen			—	5 HA	5 HA	N/A	— 0.5
Trihalomethanes, total §§ — § TTHMs	Multiple	Carcinogen	—	—	—	100 MCL	100 MCL	N/A	~~2~~ 3
Triticonazole §§ —	131983-72-7	Toxic	—	—	—	1,000 HA	1,000 HA	—	— 0.1
Turbidity (20) §§ —	N/A	Harmful	(13)	(13)	—	—	—	N/A	1 NTU
Uranium, natural §§ U § Uranium Metal, Pyrophoric	7440-61-1 YR 3490000 UNS000	Carcinogen / Radioactive	—	—	—	30 MCL	30 MCL	0.03	— 0.2
Vinyl 2-Chloroethyl Ether §§ Vinyl ß-Chloroethyl Ether- § 2-Chloroethyl Vinyl Ether § (2-Chloroethoxy)Ethene § RCRA Waste Number U042	110-75-8 KN 6300000 CHI250	Carcinogen	—	—	0.557	—	—	N/A	— 2
Vinyl Chloride §§ — § VC § VCM § Chlorethene § Chloroethene § Chlorethylene § Chloroethylene § Ethylene, Chloro- § Monochloroethylene § Ethylene Monochloride § Vinyl Chloride Monomer § Vinyl C Monomer § Trovidur § RCRA Waste Number U043	75-01-4 KU 9625000 VNP000	Carcinogen	—	—	1.17	0.25 PP	0.2 HA	N/A	~~0.5~~ 0.4

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Pollutant Element / Chemical Compound or Condition §§ - Primary Synonym § - Other Names	CASRN numbers, NIOSH number, SAX Number (25) (26) (27)	Category (1) (2)	Aquatic Life Standards		Bio-concentration Factor (BCF) (5)	Human Health Standards (17) (16)		Trigger Value (22)	Required Reporting Value (19)
			Acute (3)	Chronic (4)		Surface Water	Ground Water		
Xylenes §§ --- § Xylol § Violet 3 § Mixed Xylenes § Methyl Toluene § Dimethylbenzene § NCI C55232 § Total equals the sum of meta, ortho, and para. § RCRA Waste Number U239	1330-20-7 ZE 2100000 XGS000	Toxic	---	---	1.17	10,000 MCL	10,000 MCL	0.5	~~1.5~~ 3
Zinc §§ Zn § Blue Powder § C.I. 77945 § C.I. Pigment Black 16 § C.I. Pigment Metal 6 § Emanay Zinc Dust § Granular Zinc § Jasad § Merrillite § Pasco § Zinc, Powder or Dust, non-Pyrophoric § Zinc, Powder or Dust, Pyrophoric	7440-66-6 ZG 8600000 ZBJ000	Toxic	37 @ 25mg/l hardness (12) PP	37 @ 25 mg/l hardness (12) PP	47	2,000 HA	2,000 HA	5	~~10~~ 8

(1) Based on EPA's Integrated Risk Information System (IRIS) categories and includes parameters determined to be toxic (toxin) or carcinogenic (carcinogen) ~~or harmful~~. Harmful parameters are not defined by IRIS but are used in DEQ-7 and include ~~nutrients~~, biological agents (such as E. coli), ~~and~~ those parameters which are detrimental to aesthetics (such as color), parameters that cause taste and/or odor effects (such as MBTE), or parameters that generate physical effects (such as iron). ~~or manganese).~~

(2) Chemicals classified by EPA as carcinogens for an oral route of exposure in the drinking water regulations and health advisories (EPA 822-B-96-002 and EPA 820-R-11-002) and those listed as carcinogens in the EPA priority pollutants list. In 2005, the EPA added a new scale to describe carcinogens and both the 1986 and 2005 scales are now in simultaneous use. The classifications considered carcinogenic in the 1986 scale are as follows: A (human carcinogen); B1 or B2 (probable human carcinogens);and C (possible human carcinogen). In the 2005 scale, the following categories are considered carcinogens: H (human carcinogen);L (likely carcinogen); L/N (likely to be carcinogenic above a specified dose) and S (suggestive evidence of carcinogenic potential).

(3) The one-hour average concentration of these parameters in surface waters may not exceed these values more than once in any three year period, on average, with the exception of silver, which, at present, is interpreted as a "not to exceed" value.

(4) The 96 hour average concentration of these parameters in surface waters may not exceed these values more than once in any three year period, on average.

(5) All bioconcentration factors (BCF's) were developed by the EPA as part of the Standards development as mandated by Section 304(a) of the federal Clean Water Act. National Recommended Water Quality Criteria: 2002 Human Health Criteria Calculation Matrix (EPA-822-R-02-012).

(6) The 24 hour geometric mean value must not exceed these values.

(7) Freshwater Aquatic Life Standards for total ammonia nitrogen (~~mg/L~~ ug/L NH3-N plus NH4-N).

Because these formulas are non-linear in pH and temperature, the Standard is the average of separate evaluations of the formulas reflective of the fluctuations of ~~flow,~~ pH, and temperature within the averaging period; it is not appropriate to apply the formula to average pH and temperature ~~and flow.~~

1. The one-hour average concentration of total ammonia nitrogen (in ~~mg N/L~~ ug/L) does not exceed the CMC (acute criterion) calculated using the following equations.

Where salmonid fish are present:

$$\mathbf{CMC} = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Or where salmonid fish are not present:

$$\mathbf{CMC} = \frac{0.411}{1 + 10^{7.204 - pH}} + \frac{58.4}{1 + 10^{pH - 7.204}}$$

2. The thirty-day average concentration of total ammonia nitrogen (in ~~mg/L~~ ug/L) does not exceed the CCC (chronic criterion) calculated using the following equations.

When fish early life stages[1] are present:

$$\mathbf{CCC} = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \times \mathrm{MIN}\left(2.85,\ 1.45 \times 10^{0.028 \times (25 - T)}\right)$$

When fish early life stages[1] are absent:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right) \times 1.45 \times 10^{0.028 \times (25 - MAX(T,7))}$$

[1] Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching.

3. In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the CCC.

Table 1. pH-Dependent Values of the CMC (Acute Criterion) Ammonia Standard.

CMC, total ammonia nitrogen (~~mg/l~~ ug/L NH_3-N plus NH_4-N)		
pH	Salmonids	Salmonids
	Present	Absent
6.5	~~32.6~~ 32600	~~48.8~~ 48800
6.6	~~31.3~~ 31300	~~46.8~~ 46800
6.7	~~29.8~~ 29800	~~44.6~~ 44600
6.8	~~28.1~~ 28100	~~42.0~~ 42000
6.9	~~26.2~~ 26200	~~39.1~~ 39100
7.0	~~24.1~~ 24100	~~36.1~~ 36100
7.1	~~22.0~~ 22000	~~32.8~~ 32800
7.2	~~19.7~~ 19700	~~29.5~~ 29500
7.3	~~17.5~~ 17500	~~26.2~~ 26200
7.4	~~15.4~~ 15400	~~23.0~~ 23000
7.5	~~13.3~~ 13300	~~19.9~~ 19900
7.6	~~11.4~~ 11400	~~17.0~~ 17000
7.7	~~9.65~~ 9650	~~14.4~~ 14400
7.8	~~8.11~~ 8110	~~12.1~~ 12100
7.9	~~6.77~~ 6770	~~10.1~~ 10100
8.0	~~5.62~~ 5620	~~8.40~~ 8400
8.1	~~4.64~~ 4640	~~6.95~~ 6950
8.2	~~3.83~~ 3830	~~5.72~~ 5720
8.3	~~3.15~~ 3150	~~4.71~~ 4710
8.4	~~2.59~~ 2590	~~3.88~~ 3880
8.5	~~2.14~~ 2140	~~3.20~~ 3200
8.6	~~1.77~~ 1770	~~2.65~~ 2650
8.7	~~1.47~~ 1470	~~2.20~~ 2200
8.8	~~1.23~~ 1230	~~1.84~~ 1840
8.9	~~1.04~~ 1040	~~1.56~~ 1560
9.0	~~0.885~~ 885	~~1.32~~ 1320

Table 2. Temperature and pH-Dependent Values of the CCC (Chronic Criterion) for Fish Early Life Stages Present and for Fish Early Life Stages Absent.

pH	CCC for Fish Early Life Stages Present, total ammonia nitrogen (~~mg/l~~ ug/L NH_3-N plus NH_4-N)									
	Temperature, C									
	0	14	16	18	20	22	24	26	28	30
6.5	~~6.67~~ 6670	~~6.67~~ 6670	~~6.06~~ 6060	~~5.33~~ 5333	~~4.68~~ 4680	~~4.12~~ 4120	~~3.62~~ 3620	~~3.18~~ 3180	~~2.80~~ 2800	~~2.46~~ 2460
6.6	~~6.57~~ 6570	~~6.57~~ 6570	~~5.97~~ 5970	~~5.25~~ 5250	~~4.61~~ 4610	~~4.05~~ 4050	~~3.56~~ 3560	~~3.13~~ 3130	~~2.75~~ 2750	~~2.42~~ 2420
6.7	~~6.44~~ 6440	~~6.44~~ 6440	~~5.86~~ 5860	~~5.15~~ 5150	~~4.52~~ 4520	~~3.98~~ 3980	~~3.50~~ 3500	~~3.07~~ 3070	~~2.70~~ 2700	~~2.37~~ 2370
6.8	~~6.29~~ 6290	~~6.29~~ 6290	~~5.72~~ 5720	~~5.03~~ 5030	~~4.42~~ 4420	~~3.89~~ 3890	~~3.42~~ 3420	~~3.00~~ 3000	~~2.64~~ 2640	~~2.32~~ 2320
6.9	~~6.12~~ 6120	~~6.12~~ 6120	~~5.56~~ 5560	~~4.89~~ 4890	~~4.30~~ 4300	~~3.78~~ 3780	~~3.32~~ 3320	~~2.92~~ 2920	~~2.57~~ 2570	~~2.25~~ 2250
7.0	~~5.91~~ 5910	~~5.91~~ 5910	~~5.37~~ 5370	~~4.72~~ 4720	~~4.15~~ 4150	~~3.65~~ 3650	~~3.21~~ 3210	~~2.82~~ 2820	~~2.48~~ 2480	~~2.18~~ 2180
7.1	~~5.67~~ 5670	~~5.67~~ 5670	~~5.15~~ 5150	~~4.53~~ 4530	~~3.98~~ 3980	~~3.50~~ 3500	~~3.08~~ 3080	~~2.70~~ 2700	~~2.38~~ 2380	~~2.09~~ 2090
7.2	~~5.39~~ 5390	~~5.39~~ 5390	~~4.90~~ 4900	~~4.31~~ 4310	~~3.78~~ 3780	~~3.33~~ 3330	~~2.92~~ 2920	~~2.57~~ 2570	~~2.26~~ 2260	~~1.99~~ 1990
7.3	~~5.08~~ 5080	~~5.08~~ 5080	~~4.61~~ 4610	~~4.06~~ 4060	~~3.57~~ 3570	~~3.13~~ 3130	~~2.76~~ 2760	~~2.42~~ 2420	~~2.13~~ 2130	~~1.87~~ 1870
7.4	~~4.73~~ 4730	~~4.73~~ 4730	~~4.30~~ 4300	~~3.78~~ 3780	~~3.32~~ 3320	~~2.92~~ 2920	~~2.57~~ 2570	~~2.26~~ 2260	~~1.98~~ 1980	~~1.74~~ 1740
7.5	~~4.36~~ 4360	~~4.36~~ 4360	~~3.97~~ 3970	~~3.49~~ 3490	~~3.06~~ 3060	~~2.69~~ 2690	~~2.37~~ 2370	~~2.08~~ 2080	~~1.83~~ 1830	~~1.61~~ 1610
7.6	~~3.98~~ 3980	~~3.98~~ 3980	~~3.61~~ 3610	~~3.18~~ 3180	~~2.79~~ 2790	~~2.45~~ 2450	~~2.16~~ 2160	~~1.90~~ 1900	~~1.67~~ 1670	~~1.47~~ 1470
7.7	~~3.58~~ 3580	~~3.58~~ 3580	~~3.25~~ 3250	~~2.86~~ 2860	~~2.51~~ 2510	~~2.21~~ 2210	~~1.94~~ 1940	~~1.71~~ 1710	~~1.50~~ 1500	~~1.32~~ 1320
7.8	~~3.18~~ 3180	~~3.18~~ 3180	~~2.89~~ 2890	~~2.54~~ 2540	~~2.23~~ 2230	~~1.96~~ 1960	~~1.73~~ 1730	~~1.53~~ 1530	~~1.33~~ 1330	~~1.17~~ 1170
7.9	~~2.80~~ 2800	~~2.80~~ 2800	~~2.54~~ 2540	~~2.24~~ 2240	~~1.96~~ 1960	~~1.73~~ 1730	~~1.52~~ 1520	~~1.33~~ 1330	~~1.17~~ 1170	~~1.03~~ 1030
8.0	~~2.43~~ 2430	~~2.43~~ 2430	~~2.21~~ 2210	~~1.94~~ 1940	~~1.71~~ 1710	~~1.50~~ 1500	~~1.32~~ 1320	~~1.16~~ 1160	~~1.02~~ 1020	~~0.897~~ 897
8.1	~~2.10~~ 2101	~~2.10~~ 2101	~~1.91~~ 1910	~~1.68~~ 1680	~~1.47~~ 1470	~~1.29~~ 1290	~~1.14~~ 1140	~~1.00~~ 1000	~~0.879~~ 879	~~0.773~~ 773
8.2	~~1.79~~ 1790	~~1.79~~ 1790	~~1.63~~ 1630	~~1.43~~ 1430	~~1.26~~ 1260	~~1.11~~ 1110	~~0.973~~ 973	~~0.855~~ 855	~~0.752~~ 752	~~0.661~~ 661
8.3	~~1.52~~ 1520	~~1.52~~ 1520	~~1.39~~ 1390	~~1.22~~ 1220	~~1.07~~ 1070	~~0.941~~ 941	~~0.827~~ 827	~~0.727~~ 727	~~0.639~~ 639	~~0.562~~ 562
8.4	~~1.29~~ 1290	~~1.29~~ 1290	~~1.17~~ 1170	~~1.03~~ 1030	~~0.906~~ 906	~~0.796~~ 796	~~0.700~~ 700	~~0.615~~ 615	~~0.541~~ 541	~~0.475~~ 475
8.5	~~1.09~~ 1090	~~1.09~~ 1090	~~0.990~~ 990	~~0.870~~ 870	~~0.765~~ 765	~~0.672~~ 672	~~0.591~~ 591	~~0.520~~ 520	~~0.457~~ 457	~~0.401~~ 401
8.6	~~0.920~~ 920	~~0.920~~ 920	~~0.836~~ 836	~~0.735~~ 735	~~0.646~~ 646	~~0.568~~ 568	~~0.499~~ 499	~~0.439~~ 439	~~0.386~~ 386	~~0.339~~ 339
8.7	~~0.778~~ 788	~~0.778~~ 788	~~0.707~~ 707	~~0.622~~ 622	~~0.547~~ 547	~~0.480~~ 480	~~0.422~~ 422	~~0.371~~ 371	~~0.326~~ 326	~~0.287~~ 287
8.8	~~0.661~~ 661	~~0.661~~ 661	~~0.601~~ 601	~~0.528~~ 528	~~0.464~~ 464	~~0.408~~ 408	~~0.359~~ 359	~~0.315~~ 315	~~0.277~~ 277	~~0.244~~ 244
8.9	~~0.565~~ 565	~~0.565~~ 565	~~0.513~~ 513	~~0.451~~ 451	~~0.397~~ 397	~~0.349~~ 349	~~0.306~~ 306	~~0.269~~ 269	~~0.237~~ 237	~~0.208~~ 208
9.0	~~0.486~~ 486	~~0.486~~ 486	~~0.442~~ 442	~~0.389~~ 389	~~0.342~~ 342	~~0.300~~ 300	~~0.264~~ 264	~~0.232~~ 232	~~0.204~~ 204	~~0.179~~ 179

*At 15 C and above, the criterion for fish ELS absent is the same as the criterion for fish ELS present

(8) ~~A plant nutrient, excessive amounts of which may cause violations of Administrative Rules of Montana (ARM) 17.30.637 (1)(e).~~ Aquatic Life standards for this parameter are now covered in Circular DEQ-12.

(9) Approved methods of sample preservation, collection, and analysis for determining compliance with the standards set forth in DEQ-7 are found in the surface water quality standards (ARM17.30.601, et seq.) and the ground water rules (ARM 17.30.1001, et seq.).

Standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure (EPA Method 200.2, Supplement I, Rev. 2.8, May, 1994

Standards for alpha emitters, beta emitters and gamma emitters in surface waters are based upon the analysis of unfiltered samples and appropriate EPA approved analysis methods.

Standards for metals in ground water are based upon the dissolved portion of the sample (after filtration through a 0.45 µm membrane filter, as specified in "Methods for Analysis of Water and Wastes" 1983, Environmental Monitoring and Support Laboratory, U.S. Environmental Protection Agency, EPA-600/4-79-020, or equivalent). Standards for alpha emitters, beta emitters and gamma emitters in ground water are based upon the analysis of filtered samples and appropriate EPA approved analysis methods.

Standard for organic parameters in surface water and ground water are based on unfiltered samples.

(10) Calculation of an equivalent concentration of 2,3,7,8-TCDD is to be based on congeners of CDDs/CDFs and the toxicity equivalency factors (TEF) in van den Berg, M: et al. (2006) The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds. Toxicological Sciences 93(2):223-241. The analysis method to be used is EPA Method 1613, Revision B, Tetra- through Octa-Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS), EPA Method 8290, or other method approved by the department on case by case basis. The Required Reporting Value(s) (RRV) for Dioxin and congeners are to be the lowest detection level for the analysis method approved by the Department.

(11) Radionuclides consisting of alpha emitters, beta emitters and gamma emitters are classified as carcinogens. Alpha emitters means the total radioactivity due to alpha particle emission. Beta emitters means the total radioactivity due to beta particle emission. Gamma emitters means the total radioactivity due to gamma particle emission. The emitters covered under this Standard include but are not limited to: Cesium, radioactive Iodine, radioactive Strontium-89 and -90, radioactive, Tritium Gamma photon emitters

(12) Freshwater Aquatic Life Standards for these metals are expressed as a function of total hardness (mg/L, $CaCO_3$). The values displayed in the chart correspond to a total hardness of 25 mg/L. The hardness relationships are:

	Acute = exp.{ma[ln(hardness)]+ba}			**Chronic = exp.{mc[ln(hardness)]+bc}**	
	ma	**ba**		**mc**	**Bc**
cadmium	**1.0166**	**-3.924**		**0.7409**	**-4.719**
Copper	**0.9422**	**-1.700**		**0.8545**	**-1.702**
chromium (III)	**0.819**	**3.7256**		**0.819**	**0.6848**
Lead	**1.273**	**-1.46**		**1.273**	**-4.705**
Nickel	**0.846**	**2.255**		**0.846**	**0.0584**
Silver	**1.72**	**-6.52**		**--------**	**---------**
Zinc	**0.8473**	**0.884**		**0.8473**	**0.884**

Note: If the hardness is <25mg/L as $CaCO_3$, the number 25 must be used in the calculation. If the hardness is greater than or equal to 400 mg/L as $CaCO_3$, 400 mg/L must be used in the calculation.

(13) This standard is based upon Water-Use Classifications. See Administrative Rules of Montana (ARM), title 17, Chapter 30 - Water Quality, Sub-Chapter 6 - Surface Water Quality Standards.

(14) Freshwater Aquatic Life Standard for pentachlorophenol is dependent on pH. Values displayed in the chart correspond to a pH of 6.5 and are calculated as follows:

Acute = exp[1.005(pH) - 4.869]   Chronic = exp[1.005(pH) - 5.134]

(15) Freshwater Aquatic Life Standard for dissolved oxygen in milligrams per liter are as follows:

	Standards for Waters Classified A-1, B-1, B-2, C-1, and C-2		Standards for Waters Classified B-3, C-3, and I	
	Early Life Stages[1,2]	Other Life Stages	Early Life Stages[2]	Other Life Stages
30 Day Mean	N/A[3]	6.5	N/A[3]	5.5
7 Day Mean	9.5 (6.5)	N/A	6.0	N/A
7 Day Mean Minimum	N/A[3]	5.0	N/A[3]	4.0
1 Day Minimum[4]	8.0 (5.0)	4.0	5.0	3.0

1 These are water column concentrations recommended to achieve the required inter-gravel dissolved oxygen concentrations shown in parentheses. For species that have early life stages exposed directly to the water column, the figures in parentheses apply.
2 Includes all embryonic and larval stages and all juvenile forms of fish to 30-days following hatching.
3 N/A (Not Applicable).
4 All minima should be considered as instantaneous concentrations to be achieved at all times.

(16) Surface or groundwater concentrations may not exceed these values.

(17) Source of the criteria used to derive the standard:

PP = priority pollutant criteria
NPP = non-priority pollutant criteria
OL= organoleptic pollutant criteria
MCL = Maximum contaminant level from the drinking water regulations
~~SMCL =secondary maximum contaminant level~~
HA = health advisory developed from EPA's "Drinking Water Standards and Health Advisories" (October 1996) guidance, using recent scientific evidence and verified by EPA Region VIII toxicologist
~~I = standard derived from data obtained from federal data sources available on the Internet as of June 1998~~

(18) The Narrative Standards are located in the Administrative Rules of Montana (ARM) 17.30.601 et seq. and ARM 17.30.1001 et seq.

(19) ~~The Required Reporting Value (RRV) is the detection level that must be achieved in reporting surface water or ground water monitoring or compliance data to the Department unless otherwise specified in a permit, approval or authorization issued by the dDepartment. The RRV is the Department's best determination of a level of analysis that can be achieved by the majority of regional commercial, university, or governmental laboratories using EPA approved methods or methods approved by the department.~~
The required reporting value (RRV) is the Department's selection of a laboratory reporting limit that is sufficiently sensitive to meet the most stringent numeric water quality standard. The RRV shall be used when reporting surface water or ground water monitoring or compliance data to the Department unless otherwise specified by the Department in a permit, approval or authorization issued by the Department. It is the responsibility of the sampling entity to ensure that appropriate methods and reporting limits are requested from the laboratory to meet analytical and reporting limit needs.

(20) Applicable to surface waters only.

(21) Based on taste and odor thresholds given in EPA 822-f-97-008 December 1997.

(22) Trigger Values are used to determine if a given increase in the concentration of toxic parameters is significant or non-significant as per the non-degradation rules ARM 17.30.701 et seq. The acronym "N/A" means "not applicable".

(23) Reserved ~~The concentration of iron must not reach values that interfere with the uses specified in the surface and ground water standards (17.30.601 et seq. and 17.30.1001 et seq.) The Secondary Maximum Contaminant Level of 300 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.~~

(24) Reserved ~~The concentration of manganese must not reach values that interfere with the uses specified in the surface and ground water standards (17.30.601 et seq. and 17.30.1001 et seq.). The Secondary Maximum Contaminant Level of 50 micrograms per liter which is based on aesthetic properties such as taste, odor, and staining may be considered as guidance to determine the levels that will interfere with the specified uses.~~

(25) CASRN is an acronym for the American Chemical Society's Chemical Abstracts Service Registry Number.

(26) The NIOSH RTECS number is a unique number used for identification in the National Institute for Occupational Safety and Health (NIOSH) Registry of Toxic Effects of Chemical Substances.

(27) SAX number in the format AAA123 is a unique number for identification of materials in the Dangerous Properties of Industrial Materials, authors N. Irving Sax and Richard J. Lewis, publisher Van Nostrand Reinhold.

(28) The sum of the concentrations of tralkoxydim and its breakdown products shall not exceed the standards listed. For a list of known breakdown products, see EPA memorandum "EFED's Section 3 Review for Tralkoxydim (Chemical #121000; Case # 060780; DP Barcodes 0234682, 0234752, 0238697, 0235723 & 0239519)," and the associated "Environmental Fate Assessment for Tralkoxydim."

(29) Ground water human health standard is based on the relative potency for selected PAH compounds listed in Table 8 of the EPA "Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons" July 1993, EPA/600/R-93/089.

(30) The sum of the concentrations of acetochlor and the breakdown products, acetochlor ESA and acetochlor OA, shall not exceed the standards listed.

(31) The sum of the concentrations of alachlor and the breakdown products, alochlor ESA and alochlor OA, shall not exceed the standards listed.

(32) The sum of the concentrations of atrazine and the breakdown products, deethyl atrazine, deisopropyl atrazine, and deethyl deisopropyl atrazine, shall not exceed the standards listed

(33) The sum of the concentrations of imazamethabenz-methyl ester and the breakdown product, imazamethabenz methyl acid, shall not exceed the standards listed.

(34) The sum of the concentrations of metolachlor and the breakdown products, metolachlor ESA and metolachlor OA, shall not exceed the standards listed.

(35) The sum of the concentrations of pinoxaden (NOA 407855) and the breakdown products, pinoxaden NOA 407854 and pinoxaden NOA 447204, shall not exceed the standards listed.

(36) The human health criteria for arsenic is the more restrictive of the risk based level of 1 in 1000 [1x10-3], or the MCL.

(37) The quantitative combination of two or more of Aldicarb, Aldicarb sulfone and Aldicarb sulfoxide shall not exceed 7 ug/L because of a similar mode of action.

(38) The quantitative sum of all listed Haloacetic acids is used in determining the total Haloacetic acid concentration.

(39) The sum of the concentrations of Endosulfan and its isomers Endosulfan I and Endosulfan II, shall not exceed the standards listed

BOARD OF ENVIRONMENTAL REVIEW
AGENDA ITEM
EXECUTIVE SUMMARY FOR RULE ADOPTION

AGENDA # **III.B.1.**

AGENDA ITEM SUMMARY - The department requests approval of amendments to the public water supply rules to:

1. Amend existing public water supply cross connection rules to update documents adopted by reference, update existing rule language to incorporate current industry standard language, and for clarification;
2. Amend existing public water supply rules to remove duplicative language;
3. Amend existing disinfectant residual monitoring requirements for clarification; and
4. Amend existing record keeping rules to include water hauler records.

LIST OF AFFECTED RULES) - ARM 17.38.208, 225, 234, 301, 302, 305, 310, and 312

AFFECTED PARTIES SUMMARY - Owners of regulated public water supply systems.

SCOPE OF PROPOSED PROCEEDING - The Board is considering final action on adoption of amendments to the above-referenced rules as proposed in the Montana Administrative Register.

BACKGROUND - The Department is proposing to update the cross connection rules by updating the adoption by reference of the "Manual for Cross-Connection Control" to the 10^{th} edition, incorporating industry standard language into the rules, eliminating the adoption by reference of the "List of Approved Backflow Prevention Assemblies", and by clarifying those agencies that can certify backflow device testers.

The remaining proposed changes are housekeeping in nature. The proposed amendment to ARM 17.38.208 is intended to remove language that is no longer required. Previously, the Board adopted by reference federal language regulating the control of lead and copper but modified it to include changes described in the Federal Register. When the Board last updated the adoption by reference to the 2009 edition of the Code of Federal Regulations, that language was included. The proposed change is necessary to remove duplicative language.

The Department is proposing to amend ARM 17.38.234 to clarify that the Department may waive the disinfectant residual monitoring requirements for consecutive systems. In some cases, the benefits of collecting and reporting this information do not offset the associated costs.

The Department is also proposing to clarify the requirement for water haulers to collect, record, and maintain disinfectant residual monitoring records by adding ARM 17.38.513 to the list of rules required to produce records under ARM 17.38.234.

HEARING INFORMATION - Katherine Orr conducted a public hearing on March 2, 2012, on the proposed amendments. The Presiding Officer's Report and the draft Notice of Amendment, with public comments and proposed responses, are attached to this executive summary.

BOARD OPTIONS - The Board may:

1. Adopt the proposed amendments as set forth in the attached Notice of Public Hearing on Proposed Amendment;
2. Adopt the proposed amendments with revisions that the Board finds are appropriate and that are consistent with the scope of the Notice of Public Hearing on Proposed Amendment and the record in this proceeding; or
3. Decide not to adopt the amendments.

DEQ RECOMMENDATION - The Department recommends adoption of the proposed amendments as set forth in the attached Notice of Public Hearing on Proposed Amendment.

ENCLOSURES:

1. Notice of Public Hearing on Proposed Amendment
2. Presiding Officer’s Report
3. Public Comment
4. HB521 and 311 Analysis
5. Draft Notice of Proposed Amendment

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.38.208, 17.38.225, 17.38.234, 17.38.301, 17.38.302, 17.38.305, 17.38.310, and 17.38.312 pertaining to treatment requirements, control tests, testing and sampling records and reporting requirements, definitions, incorporation by reference, cross-connections: regulatory requirements, voluntary cross-connection control programs: application requirements, and standards and requirements for cross-connection control	)	NOTICE OF PUBLIC HEARING ON PROPOSED AMENDMENT (PUBLIC WATER AND SEWAGE SYSTEM REQUIREMENTS)

TO: All Concerned Persons

1. On March 2, 2012, at 1:30 p.m., the Board of Environmental Review will hold a public hearing in Room 111, Metcalf Building, 1520 East Sixth Avenue, Helena, Montana, to consider the proposed amendment of the above-stated rules.

2. The board will make reasonable accommodations for persons with disabilities who wish to participate in this public hearing or need an alternative accessible format of this notice. If you require an accommodation, contact Elois Johnson, Paralegal, no later than 5:00 p.m., February 20, 2012, to advise us of the nature of the accommodation that you need. Please contact Elois Johnson at Department of Environmental Quality, P.O. Box 200901, Helena, Montana 59620-0901; phone (406) 444-2630; fax (406) 444-4386; or e-mail ejohnson@mt.gov.

3. The rules proposed to be amended provide as follows, stricken matter interlined, new matter underlined:

<u>17.38.208 TREATMENT REQUIREMENTS</u> (1) through (3) remain the same.
(4) The board adopts and incorporates by reference the following:
(a) through (g) remain the same.
(h) 40 CFR 141.81, ~~as modified by 72 Fed. Reg. 57,782 (Oct. 10, 2007),~~ which sets forth the applicability of lead and copper corrosion control treatment steps to small, medium, and large water systems;
(i) remains the same.
(j) 40 CFR 141.83, ~~as modified by 72 Fed. Reg. 57,782 (Oct. 10, 2007),~~ which sets forth lead and copper source water treatment requirements;
(k) 40 CFR 141.84, ~~as modified by 72 Fed. Reg. 57,782 (Oct. 10, 2007),~~ which sets forth lead service line replacement requirements;
(l) through (w) remain the same.

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendments to ARM 17.38.208 clarify the adoption by reference of federal requirements. The proposed amendments are necessary to remove confusing language in the rules. When the department adopted the 2007 edition of 40 CFR, there were additional requirements that had been published in the Federal Register that were not included in the 2007 edition. To avoid adopting multiple editions of the CFR, the board adopted the 2007 edition as modified by the language in the Federal Register. The language in the Federal Register is now present in the 2009 edition, which the board has adopted by reference.

17.38.225 CONTROL TESTS (1) remains the same.

(2) Disinfectant residual tests must be conducted daily by:

(a) remains the same.

(b) ground water systems in accordance with 40 CFR Part 141, subpart S. Disinfectant residual tests must be conducted daily at each entry point to the distribution system to prove compliance with the ~~4~~ four-log virus inactivation or removal requirement; and

(c) ground water systems required by the department under ARM 17.38.229 to maintain a residual, and by consecutive systems connected to those systems, at each entry point to the distribution system and, if required to maintain a residual in the distribution system, one in the distribution system. For consecutive systems, the entry point is the point at which the purchased water enters the distribution system of the consecutive system.

(3) The department may waive, on a case-by-case basis, ~~the requirement~~ entry point sampling, distribution sampling, or both for ground water and consecutive systems that are referenced in ARM 17.38.225(2)(c)~~:~~

~~(i) entry point sampling; and~~

~~(ii) entry point sampling and distribution system sampling, if the consecutive system produces treated water for vending or bottling where the treatment is designed to produce a product free of chlorine~~.

(3) through (7) remain the same, but are renumbered (4) through (8).

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendments to ARM 17.38.225 clarify that the department may waive any or all of the disinfectant residual monitoring requirements on a case-by-case basis for systems identified in ARM 17.38.225(2)(c). The proposed clarifications are necessary to allow a regulated system to avoid regulatory requirements where the department has determined that the public health is protected through other means.

17.38.234 TESTING AND SAMPLING RECORDS AND REPORTING REQUIREMENTS (1) and (2) remain the same.

(3) Recordkeeping requirements for water haulers are set forth in ARM

17.38.513.
(3) through (9) remain the same, but are renumbered (4) through (10).

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendment would provide information on where the recordkeeping requirements for water haulers can be found. This proposed amendment is necessary so that confusion will not exist as to whether the recordkeeping requirements in ARM 17.38.234 are applicable to water haulers and so that the water haulers' recordkeeping requirements can be cross-referenced with the recordkeeping requirements of ARM 17.38.234.

17.38.301 DEFINITIONS For the purposes of this subchapter, unless the context requires otherwise, the following definitions, in addition to those in 75-6-102, MCA, apply:

(1) "Approved backflow prevention assembly or device" means an assembly or device ~~included in the "List of Approved Backflow Prevention Assemblies", incorporated by reference in ARM 17.38.302~~ approved by the department.

(2) through (6) remain the same.

(7) "Certified backflow prevention assembly tester" means a person who holds a current certificate issued by a certification program of any state authorizing the person to test backflow prevention assemblies or who holds a current certificate from the American ~~s~~Society of ~~s~~Sanitary ~~e~~Engineers~~,~~ or the American ~~b~~Backflow ~~p~~Prevention ~~a~~Association~~, foundation for cross-connection control and hydraulic research, or American water works association~~.

(8) remains the same.

(9) "Degree of hazard" means the level of risk created by either a pollutant (non-health hazard) or a contaminant (health hazard), as derived from an assessment of the materials that may come in contact with the distribution system through a cross-connection.

(9) remains the same, but is renumbered (10).

~~(10)~~ (11) "~~Water pollution~~ Non-health hazard" means a condition that causes or creates a potential for water quality degradation but does not constitute a health hazard.

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendment to ARM 17.38.301(1) is necessary because the list referred to in the current definition is being deleted in ARM 17.38.302. The proposed amendment will clarify that an "approved" backflow prevention assembly or device means that the assembly or device has been approved by the department. This proposed amendment is therefore consistent with the proposed amendment to ARM 17.38.305(3).

The proposed amendments to (7) clarify which agencies can certify cross-connection control assembly testers. The proposed amendments are necessary to correct current language that indicates that the Foundation for Cross-Connection Control and Hydraulic Research and the American Water Works Association are certifying agencies. Both of these agencies offer training and testing, but certification is through the organizations now listed in the proposed amendment to the rule.

The proposed addition of the new definition in (9) would clarify the term "degree of health hazard." The proposed definition is necessary to ensure that the term, which is common in the cross-connection control industry, is properly understood by the regulated community.

The proposed amendments to the definition of "water pollution hazard" would make the rule language consistent with standard industry terminology adopted by reference in the "Manual of Cross-Connection Control." The proposed amendment is necessary to remove language that may confuse the regulated public. The remaining amendments are necessary for renumbering purposes.

17.38.302 INCORPORATION BY REFERENCE (1) The board ~~hereby~~ adopts and incorporates by reference the ~~following:~~

~~(a) "List of Approved Backflow Prevention Assemblies" published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California (1998 edition);~~

~~(b)~~ "Manual of Cross-Connection Control" (~~9~~10th edition), published by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California (~~December 1993~~ October 2009).

~~(2) These~~ This publication~~s~~ set~~s~~ forth ~~approved backflow prevention assemblies or devices and~~ standards for cross-connections to public water supply systems. Copies of ~~the~~ this publication~~s listed above are available at~~ may be obtained by contacting the ~~Department of Environmental Quality, 1520 E. 6th Ave., PO Box 200901, Helena, MT 59620-0901~~ Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California, Kaperielian Hall 200, Los Angeles, CA 90089-2531 or at http://www.usc.edu/dept/fccchr/.

~~(3) Backflow prevention assemblies or devices not identified in the publications listed above may be approved by the department if the person demonstrates to the satisfaction of the department that strict adherence to this rule is not necessary to protect public health and the quality of state waters.~~

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendments to ARM 17.38.302(1) would remove the adoption by reference of the "List of Approved Backflow Prevention Assemblies" and update the adoption by reference of the "Manual of Cross-Connection Control" to the 10th edition. The proposed deletion of the "List of Approved Backflow Prevention Assemblies" is necessary because Montana law does not allow for the adoption by reference of new editions without going through the rulemaking process. By keeping this adoption by reference in the rule, systems are unable to use new tools that are listed until that edition has been adopted. By removing the list and referring only to assemblies approved by the department, as is being proposed in

ARM 17.38.305(3), the department may then still use the list as guidance and refer to the most recent edition. The proposed amendment to adopt the 10th edition of the "Manual of Cross-Connection Control" would update the adoption by reference to the most current edition. The proposed amendment is necessary to ensure that certified testers are testing the cross-connection control assemblies in accordance with current industry standards. The significant changes to the testing standards will: (1) ensure that a cross-connection is not created during testing; (2) protect the tester from pressure releases; and (3) provide a required minimum value, or improve the accuracy of the test, by detailing the procedure more fully.

The proposed amendments to (2) would clarify how copies of the document adopted by reference may be obtained. The proposed amendments are necessary to reflect proposed amendments in (1) and to clarify that the department does not have copies available. The "Manual of Cross-Connection Control" is offered for sale by the publisher. Previously, because the department is a member of the association and can purchase the manual at a reduced rate, the department offered this document for sale at its cost. The department has determined that it should not be selling the manual to non-members at the member price, nor should the department charge more than its cost. The department will now only give requestors the publisher's contact information and requestors can make arrangements to receive a copy of the manual.

The reason for the proposed deletion of (3) is the same as that given for the proposed amendments to ARM 17.38.305.

17.38.305 CROSS-CONNECTIONS: REGULATORY REQUIREMENTS

(1) A cross-connection on a public water supply system must be eliminated by the disconnection of the cross-connection whenever reasonably practicable. Whenever elimination of a cross-connection is not reasonably practicable and the cross-connection creates a health or ~~water contamination~~ non-health hazard, the hazard must be eliminated by the insertion into the piping of an approved backflow prevention assembly or device in accordance with (2) ~~of this rule~~.

(2) For the cross-connections identified below, the following types of approved backflow prevention assemblies or devices must be used:

(a) A health hazard created by a cross-connection that may be subject to back pressure must be eliminated by an approved reduced pressure ~~zone~~ principle backflow prevention assembly (RP) or an air-gap.

(b) A health hazard created by a cross-connection that may be subject to back siphonage, but not subject to back pressure, must be eliminated by an approved air-gap, pressure vacuum breaker assembly (PVB), spill-resistant pressure vacuum breaker assembly (SVB), atmospheric vacuum breaker (AVB), or a reduced pressure ~~zone~~ principle backflow prevention assembly (RP).

(c) A ~~water pollution~~ non-health hazard created by a cross-connection that may be subject to back pressure and back siphonage must be eliminated, at a minimum, by an approved double check valve assembly (DC). ~~The~~ This cross-connection condition ~~described in this subsection~~ may also be eliminated by an air-gap or by an approved reduced pressure ~~zone~~ principle backflow prevention assembly (RP).

(d) A ~~water pollution~~ non-health hazard created by a cross-connection that may be subject to back siphonage, but is not subject to back pressure, must be eliminated, at a minimum, by an approved double check valve assembly (DC), pressure vacuum breaker assembly (PVB), spill-resistant pressure vacuum breaker assembly (SVB), or an atmospheric vacuum breaker (AVB) ~~device~~. This cross-connection condition ~~described in this subsection~~ may also be eliminated by an air-gap or by an approved reduced pressure ~~zone~~ principle backflow prevention assembly (RP).

(3) Backflow prevention assemblies and devices must be approved by the department.

(3) through (5) remain the same, but are renumbered (4) through (6).

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendments to ARM 17.38.305 incorporate changes proposed under ARM 17.38.301, update the list of available treatment devices, and incorporate changes in industry naming. The proposed amendments are necessary to allow the regulated public the use of all available treatment options to achieve compliance with the requirements and to incorporate standard industry naming language.

17.38.310 VOLUNTARY CROSS-CONNECTION CONTROL PROGRAMS: APPLICATION REQUIREMENTS (1) remains the same.

(2) The application must be accompanied by a copy of the local ordinances or plan of operations that describes the methods for implementing the cross-connection control program. The local ordinances or plan of operations must include the following:

(a) and (b) remain the same.

(c) a requirement to eliminate cross-connections and hazards in compliance with ARM 17.38.305 on a priority basis beginning with those identified as having the highest degree of hazard. A health hazard must be assigned a higher degree of risk than all ~~water contamination~~ non-health hazards;

(d) remains the same.

(e) the method for identifying the appropriate backflow prevention assembly or device for a specific degree of hazard. The methodology must be in accordance with the "Manual of Cross-Connection Control" incorporated by reference in ARM 17.38.302, or as described in ARM 17.38.305(2);

(f) through (h) remain the same.

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

REASON: The proposed amendments to ARM 17.38.310 incorporate changes proposed under ARM 17.38.301 and clarify existing language. The proposed amendments are necessary to incorporate standard industry definitions and language and to clarify the backflow valve requirement without having to access the Manual of Cross-Connection Control.

<u>17.38.312 VOLUNTARY CROSS-CONNECTION CONTROL PROGRAMS: STANDARDS AND REQUIREMENTS FOR CROSS-CONNECTION CONTROL</u>

(1) The department shall approve a voluntary program for cross-connection control if:

(a) remains the same.

(b) the program provides for elimination of cross-connections, health hazards, and ~~water pollution~~ <u>non-health</u> hazards, and for installation and maintenance of backflow ~~protection~~ <u>prevention assemblies or</u> devices in accordance with ARM 17.38.305;

(c) through (2)(c) remain the same.

AUTH: 75-6-103, MCA
IMP: 75-6-103, MCA

<u>REASON:</u> The proposed amendments to ARM 17.38.312 incorporate changes proposed under ARM 17.38.301. The proposed amendments are necessary to incorporate standard industry definitions and language for clarification.

4. Concerned persons may submit their data, views, or arguments, either orally or in writing, at the hearing. Written data, views, or arguments may also be submitted to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Avenue, P.O. Box 200901, Helena, Montana 59620-0901; faxed to (406) 444-4386; or e-mailed to ejohnson@mt.gov, no later than 5:00 p.m., March 8, 2012. To be guaranteed consideration, mailed comments must be postmarked on or before that date.

5. Katherine Orr, attorney for the board, or another attorney for the Agency Legal Services Bureau, has been designated to preside over and conduct the hearing.

6. The board maintains a list of interested persons who wish to receive notices of rulemaking actions proposed by this agency. Persons who wish to have their name added to the list shall make a written request that includes the name, e-mail, and mailing address of the person to receive notices and specifies that the person wishes to receive notices regarding: air quality; hazardous waste/waste oil; asbestos control; water/wastewater treatment plant operator certification; solid waste; junk vehicles; infectious waste; public water supply; public sewage systems regulation; hard rock (metal) mine reclamation; major facility siting; opencut mine reclamation; strip mine reclamation; subdivisions; renewable energy grants/loans; wastewater treatment or safe drinking water revolving grants and loans; water quality; CECRA; underground/above ground storage tanks; MEPA; or general procedural rules other than MEPA. Notices will be sent by e-mail unless a mailing preference is noted in the request. Such written request may be mailed or delivered to Elois Johnson, Paralegal, Department of Environmental Quality, 1520 E. Sixth Ave., P.O. Box 200901, Helena, Montana 59620-0901, faxed to the office at (406)

444-4386, e-mailed to Elois Johnson at ejohnson@mt.gov, or may be made by completing a request form at any rules hearing held by the board.

7. The bill sponsor contact requirements of 2-4-302, MCA, do not apply.

Reviewed by:	BOARD OF ENVIRONMENTAL REVIEW
<u>/s/ James M. Madden</u>	BY: *<u>/s/ Joseph W. Russell</u>*
JAMES M. MADDEN Rule Reviewer	JOSEPH W. RUSSELL, M.P.H., Chairman

Certified to the Secretary of State, January 30, 2012.

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.38.208, 17.38.225, 17.38.234, 17.38.301, 17.38.302, 17.38.305, 17.38.310 and 17.38.312 pertaining to treatment requirements, control tests, testing and sampling records and reporting requirements, definitions, incorporation by reference, cross-connections: regulatory requirements, voluntary cross-connection control programs: application requirements, and standards and requirements for cross-connection control	**PRESIDING OFFICER REPORT**

1. On March 2, 2012, the undersigned presided over and conducted a public hearing held in Room 111 of the Metcalf Building, 1520 East Sixth Avenue, Helena, Montana, to take public comment on the above-captioned proposed amendments pertaining to (a) amendment of existing public water supply cross-connection rules to update documents adopted by reference, update existing rule language to incorporate current industry standard language and for clarification; (b) amendment of existing public water supply rules to remove duplicative language; (c) amendment of existing disinfectant residual monitoring requirements for clarification and (d) amendment of existing recordkeeping rules to include water hauler records.

2. The Notice of Public Hearing on Proposed Amendment was contained in the 2012 Montana Administrative Register (MAR) MAR Notice No. 17-331, published on February 9, 2012, on pages 267 through 274. A copy of the Notice Of Public Hearing On Proposed Amendment (Public Water and Sewage System Requirements) is attached to this report. (Attachments are provided in the same order as they are referenced in this report.)

3. The hearing began at 1:30 p.m. The proceeding was tape recorded by Mr. Eugene Pizzini.

4. The undersigned announced that persons at the hearing would be given an opportunity to submit their data, views, or arguments concerning the proposed action, either orally or in writing. At the hearing, the undersigned identified and summarized the MAR notice, and read the Notice of Function of Administrative Rule Review Committee as required by Mont. Code Ann. § 2-4-302(7)(a). The undersigned recited the authority to make the proposed rule amendments, announced the opportunity to present matters at the hearing or in writing, as stated in the MAR notice, and explained the order of presentation.

SUMMARY OF HEARING

5. Mr. Eugene Pizzini of the Public Water Supply and Subdivisions Bureau of the Department of Environmental Quality (DEQ) gave a brief oral statement recommending that the amendments be adopted as proposed in the MAR notice.

6. No one other than Department personnel presented oral testimony.

SUMMARY OF WRITTEN MATERIALS

7. After the hearing, written comments were timely submitted by Mr. Kevin Hart, the Utility Maintenance Superintendent of the Public Works Department of the City of Helena. His comments are attached. His comments include but are not limited to the following subject areas: an apparent conflict and lack of coordination among state agencies with oversight in the area of cross-connection control; definitions of cross-connections, elimination of the American Water Works Association as testers, the definitional concepts concerning the "degree of hazard" and "non-health hazard" and the cross connection regulatory requirements and jurisdiction over them. .

8. The Department also submitted a memorandum from DEQ staff

attorney, Ms. Carol Schmidt with HB 521 (involving the prohibition against adopting a rule that is more stringent than comparable federal regulations or guidelines) and HB 311 reviews of the proposed amendments and a Private Property Assessment Act Checklist. Ms. Schmidt's memorandum is attached to this report.

9. No HB 521 analysis is required for the amendments because (1) the amendments that incorporate by reference federal language are not more stringent than the federal requirements; (2) the amendments that address the Montana disinfection rule predated the federal rules and no federal regulations exist for disinfection of a ground water system unless the system has a fecal positive indicator at the source; (3) for the amendments that address water haulers, there are no federal regulations that address water haulers; (4) the amendments that address record retention for water haulers are no more stringent than federal regulations; (5) for the amendments that address the rules regarding cross connections in drinking water supplies, there are no comparable federal regulations.

10. With respect to HB 311 (the Private Property Assessment Act, Mont. Code Ann. §§ 2-10-101 through 105), the State is required to assess the taking or damaging implications of a proposed rule affecting the use of private real property. This rulemaking affects the use of private real property. A Private Property Assessment Act Checklist was prepared, which shows that the proposed amendments do not have taking or damaging implications. Therefore, no further assessment is required.

11. The period to submit comments ended at 5 p.m. on March 8, 2012.

PRESIDING OFFICER COMMENTS

12. The Board has the jurisdiction to amend rules for the administration, implementation, and enforcement under Mont. Code Ann. § 75-6-103.

13. House Bill 521 (1995) generally provides that the Board may not adopt a rule that is more stringent than comparable federal regulations or guidelines,

unless the Board makes written findings after public hearing and comment. The proposed amendments do not require a HB 521 analysis. Therefore, written findings concerning the stringency of the proposed amendments are not required.

14. House Bill 311 (1995), the Private Property Assessment Act, codified as Mont. Code Ann. § 2-10-101 through -105, provides that a state agency must complete a review and impact assessment prior to taking an action with taking or damaging implications. The proposed amendments affect real property. A Private Property Assessment Act Checklist was prepared in this matter. The proposed amendments do not have taking or damaging implications. Therefore, no further HB 311 assessment is necessary.

15. The procedures required by the Montana Administrative Procedure Act, including public notice, hearing, and comment, have been followed.

16. The Board may adopt the proposed rule amendments or reject them, or adopt the rule amendment with revisions not exceeding the scope of the public notice.

17. Under Mont. Code Ann. § 2-4-305(7), for the rulemaking process to be valid, the Board must publish a notice of adoption within six months of the date the Board published the notice of proposed rulemaking in the Montana Administrative Register, or by August 9, 2012.

Dated this ________ day of April, 2012.

____
KATHERINE J. ORR
Presiding Officer

City of Helena

City of Helena

Public Works
Kevin Hart, Utility Maintenance Superintendent
316 N. Park Avenue
Helena, MT 59623
Phone: (406) 457-8567 Fax: (406) 457-8552
E-Mail: khart@ci.helena.mt.us

Elois Johnson, Paralegal
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59601-0901

March 7, 2012

Dear Ms Johnson:

Enclosed please find City of Helena comments on proposed rule changes advertized in the Montana Administrative Register under notice number 17-331, and which a public hearing was held at 1:30 p.m. on March 2, 2012.

These comments are being sent via e-mail with a copy by regular U.S. mail.

Questions regarding these comments can be addressed to me at the address or phone number listed on the letterhead. Please include me in future notices regarding responses to comments and Board action on these rules.

Sincerely,

Kevin Hart

Kevin Hart
Utility Maintenance Superintendent

Attachment: Helena comments on proposed cross connection rules (pages 2 thru 6)

Comments on Proposed Rule Changes to Public Water and Sewer Requirements Related to Cross-Connection Control
By the City of Helena

General:

#1. The City of Helena recognizes the importance of cross-connection control in protecting potable water supplies and public health. However, Helena finds itself in the position of being critical of a concept that has public health and water utility benefits but is mired down in a regulatory maze that state regulatory agencies seem willing to ignore. These rule changes do nothing to resolve the apparent conflicts and lack of coordination among state agencies with oversight in the area of cross-connection control. Further the application of these changes in light of other DEQ rules fails to clarify a complex subject important to public health, yet one that may impose requirements that ultimately fall on the regulated utility. As noted below proposed changes seem to further confuse a complicated and technically complex issue rather than give clarity as the rationale suggests.

#2. As an example, State adopted plumbing codes dictate the installation of cross-connection control methods and procedures, and backflow devices and assemblies on private plumbing systems, including commercial or residential types of service connections and internal plumbing systems. Most municipalities can assume control of plumbing or building code enforcement and oversight within their jurisdiction by agreeing to certain state requirements for implementing them and adopting the state version of code. In Montana, the current version of the adopted plumbing code, as the previous version did, sets standards and provides for the installation of backflow protection devices or assemblies for cross-connection control, but eliminates the requirement for any testing either upon installation or on any periodic schedule thereafter. This seems to conflict with the requirements listed in renumbered rule 17.38.305 (4) and (5). Is DEQ proposing to duplicate or impose additional regulation of plumbing systems under the purview of the Department of Labor and Industry? Where do the respective lines of responsibility intersect or overlap in the protection of public health?

#3. As another example, the proposed rules make sense when applied to protection of public water supply systems except for the inherent conflicts presented by DEQ application of the rules. Does DEQ consider itself or any other state, commercial or private entity that serves 25 people or more daily to be a public water supply system under 17.38.101 (3) (m) or under 75-6-102 (14) MCA? As such these rules would make more sense and provide responsibility for internal building water quality and place protection at the hands of those who most benefit from the protection suggested by these rules. Evidence suggests that many backflow events affect internal building water quality but do not reach the public water main except in large events. Who has responsibility for drinking water quality protection in this case?

#4 There appears to be a large disconnect between what is or can be regulated under existing rules, the proposed rule amendments and the questions of ownership of service lines versus water mains. The disconnect limits the extent of authority a local jurisdiction can exert over these issues given how the state has chosen to regulate them. The scope and extent of these rules needs to be better defined in light of the changes regarding testing that accompany the new manual and the lack of required testing in the past.

#5 Helena has recently completed a survey of commercial connections to the City of Helena water system to determine the extent of "point of service" devices or assemblies existing for cross connection control. A total of 1794 service connections plus an additional 270 fire lines were surveyed. Some 704 service connections and all fire lines fall in the category of "High Hazard" under the terms used in the manual, while 1,090 services are classified "Low Hazard" connections. Of the high hazard connections 377 have some type of backflow protection but few of them are being tested due to lack of clear requirements to do so. Of the remaining high hazard connections, 327 services have no protection and present potential cross connections which under the circumstances described in the proposed rules could lead to back pressure, backflow, back siphon or some combination of these concerns. Similarly, only 109 out of 270 fire lines have been tested for backflow protection in the past year, again due to the lack of clear requirements to do so. In addition, a good portion of service connections with some sort of protection do not meet the device or assembly requirements listed in 17.38.305 regarding proper application. Of those in the high hazard category without protection, 34 are on state owned service lines and state occupied buildings. Further, Helena has been told by Department of Labor and industry that they cannot under plumbing code enforcement duties require the testing of installed devices even if we can require them to be installed in new or retrofit applications to protect against an identified cross connection hazard. What requirements do these proposed rules place on Helena or the business affected to correct these problems and at whose cost?

In our understanding, the requirements implied in the rule amendments continue to conflict with other existing rules, laws or adopted standards as noted below in comments on specific changes:

Comments on rule 17.38.301 Definitions: (1) Cross-connections: What "approved backflow prevention assembly or devices" are now approved or will be approved by the Department? Is DEQ to accept those assembly or devices provided for in state adopted plumbing or building code? More clarity and coordination is needed here. Are only devices referenced in 17.38.305 (2) a through d "approved"? Do devices or assemblies "approved by the department" need to meet any standards such as ANSI, be only of a particular brand, or simply meet the requirements found in the adopted manual (see Chapter 10 of the referenced manual)?

Under the rules as amended to what extent is the public water supplier responsible to investigate and determine cross-connections within private plumbing systems?
Is DEQ aware that the definition of cross connection found in the adopted plumbing codes and that in the manual to be adopted by these rules differs from that found in 75-6-102 MCA?

Comments on rule 17.38.301 Definitions: (7): Eliminating the AWWA from the list does not seem appropriate especially when agencies such as American Society of Sanitary Engineers rely upon training provided by groups like AWWA. It would be more appropriate to list criteria for acceptable certification such as renewal frequency or level of competency required to test, investigate or recommended the appropriate device or assembly.

Comments on rule 17.38.301 Definitions: (9)"Degree of hazard" This term requires additional definition in light of adopted standards and other definitions. Are the "pollutant" and "contaminant" in this definition the same as the corresponding terms referred in 75-6-102 (4) or (12a) MCA? If so there is a problem as the definitions in law relate impairment to "state waters" and "water quality standards" that are different than "drinking water standards". Drinking water standards refer to regulated constituents in drinking water delivered from the public system. The types of items that can enter into a building water system and potentially the public water main can be of different constituents. Typically these "contaminants" enter into plumbing systems only after treatment of state waters to drinking water standards and delivery to the customer has occurred. The terms used in "degree of hazard" definition maybe constituents that are not regulated under standards adopted by DEQ. What authority does DEQ assert in the regulation of "degrees of hazards" and risks they pose outside of adopted water quality, or drinking water quality standards beyond "the point of service"?

The definitions adopted in the referenced manual regarding "Point of delivery ", Public Potable Water System", and "Service Connection" present definitions that conflict with or do not exist in Rule 17.38.101 regarding delegated division of local government who can review and approve plans for public water or sewer supply systems. No rule adopted by DEQ speaks to service line requirements between the main connection and the consumption by the consumer; this is typically left to other codes such as plumbing codes. There appears to be a large disconnect between what is or can be regulated under existing rules, the proposed rule amendments and the questions of ownership of service lines versus water mains and the extent of authority a local jurisdiction can exert over these issues given how the state has chosen to regulate them. The scope and extent of these rules needs to be better defined or a clear way to navigate through them provided.

Comments on Rule 17.38.301 Definitions: (11) "Non-Health hazard". Same comments as noted for above seem to apply to this.

Comments on Rule 17.38.302 Incorporation by reference: Helena supports the adoption of the newest manual as the reference on this issue but we remain concerned that the adoption of the manual and DEQ application of the rules as regulatory requirements fundamentally change how this program may function in the future. Many of the practices contained in the manual are outside the scope and authority of the DEQ to require. This adoption should clearly state that the manual is simply a reference document. (See also following comment). The main difference between the current 9th addition manual and the proposed adoption of the 10th addition manual is improved language on proper testing. Will DEQ now be requiring and enforcing testing of devices and assemblies?

Removal of the list of devices and assemblies originally referenced is intended to be bettered by the substitution of "devices approved by the department" but this change does not add any clarity. Will the Department undertake the rigorous testing that is currently done by others under the standards contained in the adopted manual? How will those subject to the rules know what has been adopted?

Comments on rule 17.38.305 Cross Connections: Regulatory Requirements. We have the following comments or questions on this rule:

The Department is adopting by rule approved "backflow prevention assembly and device" types which implies that any future changes to these requirements will also need to occur by rule change. The necessity of additions to 17.38.305(3) stating devices must be approved by the department still presents the department with the problem of requiring a rule change to adjust to changing industry standards.

What is the applicability of section 17.38.305 to public water supplies systems absent an approved voluntary cross connection control program meeting the requirements of 17.38.310 through 17.38.312? See Helena's data and questions under the general comments above.

What authority does DEQ have to require the correction of a cross connection located within a building entirely on private property, just because it is connected to a public water supply system? Our understanding of the rules are that DEQ could exert authority over "systems and consecutive connections" deemed public water supply systems components but the application of this rule beyond this category appears lacking. Further, it is not clear how the adoption of a voluntary program provides a local authority the ability to regulate what is commonly referred to as private plumbing systems. Please explain.

What is the relationship of the DEQ rules which purport to regulate the public water supply system of a municipality in the area of cross-connection control and other state regulations such as those through the Department of Labor and Industry which also regulate cross-connection control through adopted plumbing codes related to individual structures, or buildings, fire lines or irrigation service lines? If requirements of these rules are additive what is the authority that DEQ relies upon to regulate private plumbing systems or to require or somehow grant powers to that municipal public water system in order to regulate them?

When does a service connection that serves more than 25 persons daily for more than 60 days become a "public water supply system"?

There is no further explicit mention of testing upon installation and periodic maintenance thereafter (including testing, repair or replacement) to ensure the proper operation and effectiveness of the devices approved for installation by the department in accordance with the adopted manual beyond renumbered rule 17.38.305 (4). Will installation and testing be a new requirement beyond what has been past practice?

Is the Department aware that the only sure way to eliminate "potential" of either a direct or indirect cross connection leading to backflow or back siphon hazards is to install an approved device on each and every service connection to a public water supply system? Is that the intent of these rules?

Comments on Rule 17.38.310 through 312: Voluntary Programs. Can a public water supply system such as the City of Helena adopt and operate a voluntary cross connection control program without making application to DEQ for review and approval? What is the benefit of the state approval to any voluntary cross connection control program?

MEMORANDUM

To: Board of Environmental Review

From: Carol Schmidt
DEQ Staff Attorney

Re: HB 521 Analysis and Takings Checklist

MAR Notice No. 17-331

In the matter of the amendment of ARM 17.38.208, 17.38.225, 17.38.234, 17.38.301, 17.38.302, 17.38.305, 17.38.310, and 17.38.312 pertaining to treatment requirements, control tests, testing and sampling records and reporting requirements, definitions, incorporation by reference, cross-connection: regulatory requirements, voluntary cross-connection control programs: application requirements, and standards and requirements for cross-connection control.

Date: March 8, 2012

HB 521 Analysis

Pursuant to § 75-6-116, MCA ("HB 521"), the Board may not adopt a rule that is more stringent than comparable federal regulations or guidelines that address the same circumstances.

The amendments to ARM 17.38.208 clarifies the adoption of the federal requirements and removes any unnecessary or confusing language. When the department adopted the 2007 edition of 40 CFR, the Federal Register included additional requirements that were not included in the 2007 CFR edition. The department therefore adopted the 2007 edition as modified by the language in the Federal Register. The language in the Federal Register is now present in the 2009 edition, which the board has adopted by reference. No HB 521 findings are necessary for this amendment.

The amendments to ARM 17.38.225 addresses Montana's disinfection rule, which existed prior to the current federal rules. Currently, no federal regulations exist for disinfection of a ground water system unless the system has a fecal positive indicator at the source in violation of the ground water rule, triggering 4-log virus inactivation. However, since the Montana rule existed prior to the federal regulations, HB 521 findings are not necessary for these amendments.

The amendments to ARM 17.38.234 provide information on where the recordkeeping requirements for water haulers can be found. The federal regulations do not regulate water haulers; nonetheless, the amendments that address record retention for water haulers are no more stringent than the federal regulations. No HB 521 findings are necessary for this amendment.

The amendments to ARM 17.38.301, 17.38.302, 17.38.305, 17.38.310 and 17.38.312 address the department's rules regarding cross-connections in drinking water supplies. There are no comparable federal regulations. No HB 521 findings are necessary for these amendments.

Private Property Assessment Act

Section 2-10-101, MCA, requires that, prior to adopting a proposed rule that has taking or damaging implications for private real property, an agency must prepare a taking or damaging impact statement. "Action with taking or damaging implications" means:

> [A] proposed state agency administrative rule, policy, or permit condition or denial pertaining to land or water management or to some other environmental matter that if adopted and enforced would constitute a deprivation of private property in violation of the United States or Montana Constitution.

Section 2-10-103, MCA.

Section 2-10-104, MCA, requires the Montana Attorney General to develop guidelines, including a checklist, to assist agencies in determining whether an agency action has taking or damaging implications. A completed Attorney General checklist for the proposed rules is attached. Based on the guidelines provided by the Attorney General, the proposed rule amendments do not constitute an "action with taking or damaging implications" in violation of the United States or Montana Constitutions.

Attachment: Attorney General HB 311 Checklist

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

In the matter of the amendment of ARM 17.38.208, 17.38.225, 17.38.234, 17.38.301, 17.38.302, 17.38.305, 17.38.310, and 17.38.312 pertaining to treatment requirements, control tests, testing and sampling records and reporting requirements, definitions, incorporation by reference, cross-connections: regulatory requirements, voluntary cross-connection control programs: application requirements, and standards and requirements for cross-connection control	)	NOTICE OF AMENDMENT (PUBLIC WATER AND SEWAGE SYSTEM REQUIREMENTS)

TO: All Concerned Persons

1. On February 9, 2012, the Board of Environmental Review published MAR Notice No. 17-331 regarding a notice of public hearing on the proposed amendment of the above-stated rules at page 267, 2012 Montana Administrative Register, issue number 3.

2. The board has amended the rules exactly as proposed.

3. The following comments were received and appear with the board's responses:

COMMENT NO. 1: Comments were received from the public works department of a city that implements a cross-connection control program. The city noted that the cross-connection rules can require that backflow prevention devices be installed in private water service lines. These private lines are also regulated under state plumbing codes adopted by the Montana Department of Labor and Industry. The city stated that there appears to be a lack of coordination among the state agencies regarding cross-connection requirements. For example, these rules require that backflow prevention devices be maintained in accordance with manufacturer’s specifications. ARM 17.38.305(3). The plumbing code sets standards for installation of backflow prevention devices, but does not require testing either upon installation or on any periodic schedule thereafter.

RESPONSE: The proposed amendments do not change ARM 17.38.305(3), other than renumbering, so this comment is outside the scope of this rulemaking. However, the comment can be addressed to clarify the application of the cross-connection rules. Backflow prevention devices may be subject to both the cross-connection rules and the plumbing codes. Under the cross-connection rules, backflow devices must be periodically tested if the manufacturer recommends it. In that case the public water supplier must require the line owner to provide evidence of periodic testing of the device. This requirement does not conflict with the plumbing code.

COMMENT NO. 2: Is a building, such as the DEQ Metcalf Building, which serves 25 or more people daily, considered to be a public water supply system under 75-6-102(14), MCA?

RESPONSE: The question is outside the scope of this rulemaking, but can be addressed to clarify the application of the cross-connection rules. A building that serves 25 or more people daily for any 60 or more days in a calendar year could be considered a "public water supply system" as the term is defined in 75-6-102(14), MCA. However, the department applies these rules only to public water supply systems that have their own water source or have water mains with multiple service connections.

COMMENT NO. 3: Many backflow events affect internal building water quality but do not reach the public water main except in large events. Who has responsibility for drinking water quality in that case?

RESPONSE: The cross-connection rules apply to public water supply systems that have their own water source or have water mains with multiple service connections. However, the rules require the public system to address potential sources of contamination from any source, whether public or private. See definition of "cross-connection" in 75-6-102(5), MCA. The proposed amendments to the rules have not changed this aspect, but this question will be addressed to help clarify the application of the rules.

Cross-connections within private buildings can contaminate the drinking water within the building and, if there is backflow from the building into the public water supply system, the private cross-connection can contaminate the public drinking water supply. Consequently, the rules require a public water supplier to address cross-connections that are identified within the plumbing systems of its customers. The public water supplier must eliminate an identified cross-connection or, if that is not reasonably practicable and the cross-connection creates a health or water contamination hazard, the hazard must be eliminated by installation of an approved backflow prevention device or assembly. ARM 17.38.305. Alternatively, the public water supplier has the option to disconnect a customer whose plumbing creates a potential hazard.

COMMENT NO. 4: If private building owners are not regulated under these rules, there is a "disconnect" that limits the extent of authority that a public water supply system can exert over cross-connection issues.

RESPONSE: As stated in the Response to Comment No. 3, a public water supplier has the option to discontinue service to connections that may contaminate the public water supply. This authority gives the public water supplier the ability to enforce the requirements of the cross-connection rules.

COMMENT NO. 5: A survey of service connections has shown that many high-hazard service connections have no backflow protection. Of the high-hazard connections with backflow protection, few are being tested. Also, many fire lines have not been tested for backflow protection due to lack of clear requirements to do so. What requirements do the proposed rules place on the city or on the affected businesses to correct these problems and at whose cost?

RESPONSE: As stated in the Response to Comment No. 3, the rules require public water supply systems to address potential sources of contamination from any source, whether public or private. The public water supplier, in this case the city, must require its customers to address cross-connections that are identified in their systems. This requirement is clearly stated in the rules. Standards for backflow prevention devices or assemblies are also set out in the rules and incorporated documents. The owner of the system with the cross-connection usually pays the cost of any corrective action.

COMMENT NO. 6: Under the proposed amendments, the definition of "approved backflow prevention assembly or devices" in ARM 17.38.301(1) no longer references the "List of Approved Backflow Prevention Assemblies." How will a city know which backflow prevention assemblies are approved?

RESPONSE: A public water supplier must now contact the department to determine whether a particular backflow prevention device or assembly is approved. The department will continue to use the "List of Approved Backflow Prevention Assemblies" as guidance. However, because the List changes continually, it is not practical to incorporate it by reference in rules. The change to the definition will have the added benefit of allowing the department to consider proposed assemblies or devices that are not on the List if they can be adequately justified.

COMMENT NO. 7: The definitions of "cross-connection" are not identical in the plumbing codes, the Manual of Cross-Connection Control, and 75-6-102, MCA.

RESPONSE: The three definitions of "cross-connection" are not identical, but the substance of the definitions is the same. A cross-connection is essentially a connection or potential connection between a potable water system and anything else that has the potential to lead to contamination of that water system.

COMMENT NO. 8: The American Water Works Association (AWWA) should not be eliminated from the definition of "certified backflow prevention assembly tester" in ARM 17.38.301(7). The proposed rules should list criteria for acceptable certification.

RESPONSE: The AWWA offers training and testing but does not certify backflow prevention assembly testers, so it is necessary to delete AWWA from the list of entities that issue certification. The proposed rules do not list criteria for certification because the department has no authority to certify a person to test backflow prevention assemblies.

COMMENT NO. 9: The proposed definition of "degree of hazard" in ARM 17.38.301(9) uses the terms "contaminant" and "pollutant." Do these terms have the same meaning as the terms "contamination" and "pollution" as defined in 75-6-102(4) and (12)(a), MCA?

RESPONSE: The terms "contaminant" and "pollutant," as used in these rules, do not have the same meaning as the terms defined in 75-6-102, MCA. The "degree of hazard" definition is based on the definition in the Manual for Cross-Connections, and the terms "contaminant" and "pollutant" have special meanings that are commonly understood in the cross-connection industry. The definition is necessary to ensure that the regulated community properly understands those terms.

COMMENT NO. 10: What authority does the board have to regulate degrees of hazards and the risks they pose outside of adopted water quality or drinking water quality standards beyond "the point of service?"

RESPONSE: The board's authority to adopt rules that address contamination from cross-connections is found in 75-6-103, MCA. The statutory authority does not limit the board to regulating cross-connections based on promulgated water quality or drinking water quality standards. The board has authority to require a public water supplier to address a contamination source beyond the "point of service" because the definition of "cross-connection" in statute refers to both public and private sources of contamination. See 75-6-102(5), MCA.

COMMENT NO. 11: Several definitions in the incorporated Manual of Cross-Connection Control conflict with, or do not exist in, ARM 17.38.101 regarding delegated authority to local government for review of plans for public water and sewage systems.

RESPONSE: The definitions in ARM 17.38.101 pertain to the review of plans for proposed public water and sewage systems and do not apply to the cross-connection rules in ARM Title 17, chapter 38, subchapter 3.

COMMENT NO. 12: The proposed amendments update the incorporation of the Manual of Cross-Connection Control from the 1993 to the 2009 edition. Many of the practices contained in the Manual are outside the scope and authority of the department to require.

RESPONSE: The comment is not specific about what practices the commentor believes may be outside the scope of the board's authority. The board believes that its statutory authority to promulgate cross-connection rules is broad enough to allow incorporation of the Manual of Cross-Connection Control. See 75-6-103, MCA.

COMMENT NO. 13: With the adoption of the Manual for Cross-Connection Control, will the department be requiring and enforcing testing of the devices and assemblies?

RESPONSE: The rules already require that backflow prevention assemblies and devices be tested according to the manufacturer's specification. ARM 17.38.305(3), renumbered in this rulemaking as ARM 17.38.305(4). The public water supplier is responsible to ensure that cross-connection assemblies or devices are installed and maintained properly. A violation of the rules can form the basis for an enforcement action by the department under 75-6-110, MCA.

COMMENT NO. 14: Removal of the "List of Approved Backflow Prevention Assemblies" does not add any clarity. Will the department now undertake the rigorous testing that is currently done by others, and how will those subject to the rules know what has been adopted?

RESPONSE NO. 14: The department will not, itself, test backflow prevention assemblies, but will continue to rely on the List for guidance about acceptable equipment. As stated in the Response to Comment No. 6, the change to the definition will have the added benefit of allowing the department to consider proposed assemblies or devices that are not on the List if they can be adequately justified. A public water supplier must now contact the department to determine whether a particular backflow prevention assembly is approved.

COMMENT NO. 15: The provision in proposed ARM 17. 38.305(3) stating that backflow prevention assemblies and devices must be approved by the department implies that future rule changes will be necessary to adjust to changing industry standards.

RESPONSE: Proposed ARM 17.38.305(3) will allow the department to approve assemblies on the "List of Approved Backflow Prevention Assemblies" and will also allow the department to approve assemblies that are not on the List which have been tested by another organization and found to be appropriate for the system. It is not anticipated that rule changes will be necessary each time the industry standard changes.

COMMENT NO. 16: Is the requirement in ARM 17.38.305 to eliminate cross-connections applicable to a public water supply system if the system does not have an approved voluntary cross-connection control program meeting the requirements of ARM 17.38.310 through 17.38.312?

RESPONSE: The requirements in ARM 17.38.305 apply to public water supply systems regardless of whether the systems have an approved voluntary cross-connection control program. Approval by the department of a cross-connection control program provides the benefit of allowing the public water supply system to verify that its cross-connection control program is in compliance with all of the requirements of the cross-connection rules.

COMMENT NO. 17: Can a public water supplier adopt and operate a voluntary cross-connection control program without making application to department for review and approval?

RESPONSE: A public water supplier is required to address cross-connections under ARM 17.38.305 but is not required to submit its cross-connection control program to the department for review. However, under the new amendments, the public water supplier must contact the department to determine whether a particular backflow prevention assembly is approved before it is installed.

Reviewed by:	BOARD OF ENVIRONMENTAL REVIEW
______________________________	By: ______________________________
JAMES M. MADDEN Rule Reviewer	JOSEPH W. RUSSELL, M.P.H. Chairman

Certified to the Secretary of State, _____________, 2012.

Carol E. Schmidt
Special Assistant Attorney General
Department of Environmental Quality
P.O. Box 200901
1520 E. Sixth Avenue
Helena, Montana 59620-0901
Telephone: (406) 444-1422
Attorney for Department

Kevin Torgenrud
Jore Corporation
34837 Innovation Drive
Ronan, MT 59864

Filed with the
MONTANA BOARD OF
ENVIRONMENTAL REVIEW mC
This 21st day of March, 2012,
at 12:07 o'clock P.m.
By: Misty Gable

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

IN THE MATTER OF: THE APPEAL BY JORE CORPORATION AT JORE CORPORATION, PWSID #MT0004060, RONAN, LAKE COUNTY, MONTANA. [FID #1993, DOCKET NO. PWS-10-34	Case No. BER 2011-05 PWS Stipulation for Dismissal

COME NOW the parties and stipulate, pursuant to Rule 41(a), M.R.Civ.P., to the dismissal of this appeal. The parties have reached a resolution of the matters at issue and Appellant hereby withdraws its appeal and request for hearing. The parties request that the Board issue an Order dismissing this matter with prejudice, with each party to bear its own costs.

STATE OF MONTANA Department of Environmental Quality	APPELLANT Jore Corporation
By: Carol Schmidt Carol E. Schmidt Attorney for Department	By: Kevin Torgenrud Kevin Torgenrud, Facilities Manager Jore Corporation
March 21, 2012 Date	20 March 2012 Date

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA

IN THE MATTER OF: THE APPEAL BY JORE CORPORATION AT JORE CORPORATION, PWSID #MT0004060, RONAN, LAKE COUNTY, MONTANA. [FID #1993; DOCKET NO. PWS 10-34.	))))))	Case No. BER 2011-05 PWS ORDER OF DISMISSAL

The parties have filed a Stipulation for Dismissal pursuant to Montana Rule of Civil Procedure 41(a) stating that Appellant has withdrawn its appeal and its request for a hearing in this matter. As provided in the parties' Stipulation for Dismissal,

IT IS HEREBY ORDERED THAT this appeal is dismissed with prejudice. Each party shall bear its own costs and attorney fees.

DATED this _______ day of _________, 2012.

____
JOSEPH W. RUSSELL, M.P.H., Chairman
Montana Board of Environmental Review

**BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA**

IN THE MATTER OF: THE REQUEST FOR HEARING BY NANCY SCOTT, DALE WHITTON, KIMBERLY MOLE, JESS HODGE, KATHERINE G. POTTER, SHARON B. JOHNSON, CLINTON C. JOHNSON, JAMES D. WARD, KORRIE L. WARD, JOHN HUTTON, PATRICIA WARRINGTON AND MARSHALL WARRINGTON, JR., REGARDING OPENCUT PERMIT NO. 487 ISSUED TO PLUM CREEK TIMBERLANDS, L.P., FOR THE DORR SKEELS SITE IN LINCOLN COUNTY, MONTANA.	**CASE NO. BER 2011-15 OC BER 2011-17 OC BER 2011-13 OC BER 2011-12 OC**

PROPOSED ORDER GRANTING MOTION FOR SUMMARY JUDGMENT

On August 29, 2011, the Department of Environmental Quality (Department) filed a Motion to Dismiss or, in the Alternative, for Summary Judgment as to the Petitioners, Nancy Scott, Dale Whitton, Kimberly Mole, Jess Hodge, Katherine G. Potter, Sharon B. Johnson, Clinton C. Johnson, James D. Ward, Korrie L. Ward, John Hutton, Patricia Warrington and Marshall Warrington, Jr., originally parties in separate appeals that were consolidated by order of the Hearing Examiner issued on December 13, 2011. The Department attached an Affidavit of Kris Brewer in Support of the Motion for Summary Judgment.

For the reasons stated below, the Department's Motion for Summary Judgment is GRANTED.

BACKGROUND

On December 13, 2011, the Hearing Examiner issued an "Order on Motion to Dismiss, Order Regarding the Alternative Motion for Summary Judgment and Order on Prehearing and Hearing Schedule, hereinafter, "Order." In this Order, the Hearing Examiner summarized the claims of Petitioners (objecting to the absence of a public hearing afforded to them under Mont. Code Ann.§ 82-4-432), denied the Motion to Dismiss, consolidated the four actions of Petitioners, Nancy Scott, Dale Whitton, Kimberly Mole, Jess Hodge, Katherine G. Potter, Sharon B. Johnson, Clinton C. Johnson, James D. Ward, Korrie L. Ward, John Hutton, Patricia Warrington and Marshall Warrington, Jr., and gave the Petitioners until January 13, 2012, to respond to the Department's Motion for Summary Judgment. The Petitioners had not timely responded to the Department's Motion for Summary Judgmentm, in any manner, prior to the issuance of the Order on December 13, 2011. The Order articulates, in detail, the form and substance of a response to the summary judgment motion that would be sufficient to defeat the Department's Motion for Summary Judgment. The following Petitioners filed Affidavits that gave legal descriptions of property they either own or live at that is located within one-half mile of the subject Dorr Skeels site for opencut mining for which the Plum Creek Timberlands, L. P. (Plum Creek) obtained a permit: Kimberly Mole (filed 1/10/12); Nancy Scott (filed 1/12/12); Dale Whitton (filed 1/12/12); John Alan Hutton (filed 1/17/12); Katherine Potter (filed 1/18/12); and, Clinton C. Johnson (filed 1/23/12). Diane Lynn Hutton, who is not a party to this action, also filed an affidavit. On January 13, 2012, the Department filed a Reply to Kimberly Mole's Affidavit, and its Reply Brief in Support of the Department's Motion for Summary Judgment on February 3, 2012. The Order stated that, by January 13, 2012, the Petitioners must file a response to the Motion for Summary Judgment along with:

> ...appropriate supporting evidence under Mont. R. Civ. P. 56(b)(c) and (e) such as a sworn affidavit, in which for example, they prove (with individual affidavits or an affidavit from the clerk and recorder, for example) that at least ten persons or 30% of the surrounding landowners who own land within the one-half mile range of the opencut mining operations actually do own the land within the one-half mile distance from the opencut mining operations in the appropriate time frame, and that through individual affidavits, for example) had these persons/ landowners with one-half mile received notice of the proposed amendment to the opencut mining permit, they would have timely requested a public meeting. (Order, page 9.)

None of the Affidavits filed, individually or in the aggregate, satisfy the requirements for surviving the summary judgment motion. As to Petitioners, Ms. Kimberly Mole, Mr. Dale Whitton and Mr. John Hutton, their requests for a public meeting were already counted toward the minimum number required for a public meeting to be held (Brewer Affidavit, Ex 6). Nothing they filed establishes facts to defeat the summary judgment motion, such as facts proving that notice was not sent to a sufficient number of other persons entitled to notice who would have requested a public meeting if notice had been sent to them.

As to Petitioner Katherine Potter, who filed an Affidavit that she owned property within one-half mile of the proposed project site, her name appears on the list of persons who were sent notice of the application to amend the permit by Plum Creek (Brewer Affidavit, Ex 4). Ms. Potter does not prove by the Affidavit that she would have submitted a request for a public meeting and that she didn't receive a notice.

Petitioner Ms. Nancy Scott submitted an Affidavit but does not state that she owns property within one-half mile of the site and that notice was not sent to a sufficient number of persons entitled to notice who would have requested a public meeting if notice had been sent to them.

Petitioner Mr. Clinton Johnson submitted an Affidavit stating he owned property within one-half mile of the project site. Mr. Johnson did not prove by the Affidavit that he would have requested a public meeting but for improper notice.

As stated above, the Petitioners failed to create a disputed issue of material fact that at least 10 persons, or 30% of the qualified landowners whose property is located within one-half mile of the subject Dorr Skeels site, were not given notice; that such ownership was recorded with the Clerk and Recorder prior to Plum Creek submitting its application and sending the notices; that the landowner's address listed with the Clerk and Recorder was accurate and notice would have been received if sent to that address; and that, had notice been received, the property owner would have requested a hearing. None of the Affidavits submitted in conjunction with the above-captioned contested cases establish a disputed issue of material fact as to the fulfillment of the requirements of Mont. Code Ann. § 82-4-432(9) sufficient to defeat the Department's Motion for Summary Judgment. The Department has successfully established there is no disputed issue of fact in its Motion for Summary Judgment.

DISCUSSION

In this case, the Department's Motion for Summary Judgment should be granted because the Department has shown an absence of genuine issues of material fact and an entitlement to judgment that there was no right to a public hearing; that the proper process was followed under Mont.Code Ann.§ 82-4-432; and that, therefore, the Petitioners have no right to a public hearing. The Petitioners have not provided any material or substantive evidence to raise a genuine issue of material fact.

When considering a motion for summary judgment under M. R. Civ. P. Rule 56, it is stated in Bruner v. Yellowstone County, 272 Mont. 261, 264-65, 900 P.2d 901, 903 (1995) that:

> The movant must demonstrate that no genuine issues of material fact exist and entitlement to judgment as a matter of law. Once this has been accomplished, the burden then shifts to the non-moving party to prove, by more than mere denial and speculation, that a genuine issue does exist. Having determined that genuine issues of fact do not exist, the court must then determine whether the moving party is entitled to judgment as a matter of law. Id.

Summary judgment is properly granted to the moving party if the adverse party fails to respond with specific facts showing that a genuine issue exists as to a material fact. Joyner v. Onstad, 240 Mont. 362, 364, 783 P.2d 1383, 1385 (1989). Evidence sufficient to raise a genuine issue of material fact, "must be in proper form, the proffered evidence must be material and of a substantial nature." Morales v. Tuomi, 214 Mont. 419, 693 P2d 532 (1985). In the absence of a proper response, as required by law and as described above, the properly sworn material facts presented by the Department remain undisputed and establish that the Petitioners are not entitled to a right to relief and that the Department is entitled to judgment as a matter of law.

The pertinent undisputed facts are that, on or about April 29, 2011, Plum Creek submitted to the Department an application to amend its permit for opencut mining to expand the permit area to a total of 19.1 acres (Brewer Affidavit, Ex. 2). Pursuant to Mont. Code Ann. § 82-4-432, Plum Creek submitted to the Department a list of 16 persons who owned land within one- half mile of the proposed amended permit boundary, along with its certification that an appropriate public notice had been sent to all of them on May 12, 2011 (Brewer Affidavit, Ex 4). Fewer than 10 persons who owned land within one-half mile of the proposed permit boundaries requested a hearing and, because of this, the Department did not schedule a public hearing (Brewer Affidavit, ¶ 13). Only a few Petitioners appear on the list of persons who live within one-half mile of the proposed permit boundaries and within the timeframe of the public notice. (Brewer Affidavit, Ex 4). Of those listed as living within one-half mile, only a few submitted a request for hearing to the Department (Brewer Affidavit, ¶ 12 and Ex 6). As noted above, Petitioners Mole, Scott, Whitton, Hutton and Potter, did not change the record in this regard by filing an affidavit about their own ownership.

As stated in the Order, the only way the Petitioners could survive the Department's Motion for Summary Judgment was to demonstrate by sworn affidavit that enough persons who own surface land within one-half mile of the permit boundary were not given notice as required by Mont. Code Ann. § 82-4-432 and that, if those persons had been given notice, they would have requested a public hearing. Petitioners did not do this. In a **contested case**, the unsworn allegations in the initial appeal letter, are not enough to defeat the Department's summary judgment motion supported by sworn facts. Judgment should be entered in favor of the Department that there is no basis to challenge its decision not to hold a public hearing.

For the above reasons, it is recommended that the Board, in its final order, adopt the Proposed Order Granting Motion for Summary Judgment by reference and enter judgment in favor of the Department in which it is stated that the Department was correct in not requiring a public hearing attendant to the issuance of an amended permit to Plum Creek.

DATED this 31st day of March, 2012.

KATHERINE J. ORR
Hearing Examiner
Agency Legal Services Bureau
1712 Ninth Avenue
P.O. Box 201440
Helena, MT 59620-1440

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing Proposed Order Granting Motion for Summary Judgment to be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Ms. Jane Amdahl
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. Ed Coleman, Bureau Chief
Industrial & Energy Minerals Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Ms. Nancy Scott
1288 Doonan Mtn. Road
Troy, MT 59935

Mr. Dale Whitton
1288 Doonan Mtn. Road
Troy, MT 59935

Ms. Kimberly Mole
322 Dorr Skeels Road
Troy, MT 59935

Mr. Jess Hodge
12641 Bull Lake Road
Troy, MT 59935

Mr. Katherine G. Potter
1280 Doonan Mtn. Road
Troy, MT 59935

Mr. Clinton C. Johnson
P.O. Box 531
Troy, MT 59935-0531

Mrs. Sharon B. Johnson
P.O. Box 531
Troy, MT 59935-0531

Mr. Clinton C. & Mrs. Sharon B. Johnson
1274 Doonan View Road
Troy, MT 59935

Mr. James D. Ward
P.O. Box 1626
Libby, MT 59923

Ms. Korrie L. Ward
P.O. Box 1626
Libby, MT 59923

Mr. John Hutton
11832 N. 22nd St.
Phoenix, AZ 85028

Ms. Patricia Warrington
900 Halo Dr.
Troy, MT 59935-9420

Mr. Marshall Warrington
900 Halo Dr.
Troy, MT 59935-9420

DATED: March 31, 2012

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW OF THE STATE OF MONTANA

IN THE MATTER OF: THE REQUEST FOR HEARING BY STEVEN K. ENDICOTT, RUTH ANN ENDICOTT, AND ROBERT W. GAMBILL REGARDING OPENCUT PERMIT NO. 487 ISSUED TO PLUM CREEK TIMBERLANDS, L.P., FOR THE DORR SKEELS SITE IN LINCOLN COUNTY, MONTANA.	**CASE NO. BER 2011-14 OC** **CASE NO. BER 2011-18 OC**

PROPOSED ORDER GRANTING MOTION FOR SUMMARY JUDGMENT

On August 29, 2011, the Department of Environmental Quality (Department) filed a Motion to Dismiss or in the Alternative, for Summary Judgment as to the Petitioners, Steven K. Endicott, Ruth Ann Endicott and Robert W. Gambill, originally parties in separate appeals that were consolidated by order of the Hearing Examiner issued on December 13, 2011. For the reasons stated below, the Department's Motion for Summary Judgment is GRANTED.

BACKGROUND

On December 13, 2011, the Hearing Examiner issued an "Order on Motion to Dismiss and Regarding the Alternative Motion for Summary Judgment; Order Consolidating Cases and Order Addressing Hearing Schedule (hereinafter, "Order"). In this Order, the Hearing Examiner summarized the claims of Petitioners (objecting to the absence of a public hearing afforded to them under Mont. Code Ann. § 82-4-432), denied the Motion to Dismiss, consolidated the two actions of Petitioners, Steven K. Endicott, Ruth Ann Endicott and Robert W. Gambill and gave the Petitioners until January 13, 2012, to respond to the Department's Motion for Summary Judgment. The Petitioners had not timely responded to the Department's Motion for Summary Judgment, in any manner, prior to the issuance of the Order on

December 13, 2011. The Order articulates, in detail, the form and substance of a response to the summary judgment motion that would be sufficient to defeat the Department's Motion for Summary Judgment. The Order directed that the Petitioners file a response by January 13, 2012. The Order stated that the Petitioners must file:

> ...appropriate supporting evidence under Mont. R. Civ. P. 56(c) and (e) such as a sworn affidavit in which for example, they prove (with individual affidavits or an affidavit from the clerk and recorder, for example) that at least ten persons or 30% of the surrounding landowners who own land within the one-half mile range of the opencut mining operations actually do own the land within the one-half mile distance from the opencut mining operations in the appropriate time frame, and that through individual affidavits, for example) had these persons/landowners with one-half mile received notice of the proposed amendment to the opencut mining permit, they would have timely requested a public meeting. (Order, page 9)

No response was filed by the Petitioners, even though they were given a second chance to file a response to the Department's Motion for Summary Judgment. On February 3, 2012, the Department filed a Reply Brief in Support of the Department's Motion for Summary Judgment.

DISCUSSION

In this case, the Department's Motion for Summary Judgment should be granted because the Department has shown an absence of genuine issues of material fact and an entitlement to judgment that there was no right to a public hearing, that the proper process was followed under Mont. Code Ann. § 82-4-432 and that, therefore, the Petitioners have no right to a public hearing. The Petitioners have not provided any material or substantive evidence to raise a genuine issue of material fact.

When considering a motion for summary judgment under M. R. Civ. P. Rule 56, it is stated in Bruner v. Yellowstone County, 272 Mont. 261, 264-65, 900 P.2d 901, 903 (1995) that:

> The movant must demonstrate that no genuine issues of material fact exist. Once this has been accomplished, the burden then shifts to the non-moving party to prove, by more than mere denial and speculation, that a genuine issue does exist. Having determined that genuine issues of fact do not exist, the court must then determine whether the moving party is entitled to judgment as a matter of law. Id.

Summary judgment is properly granted to the moving party if the adverse party fails to respond with specific facts showing that a genuine issue exists as to a material fact. Joyner v. Onstad, 240 Mont. 362, 364, 783 P.2d 1383, 1385 (1989). Evidence sufficient to raise a genuine issue of material fact, "must be in proper form, the proffered evidence must be material and of a substantial nature." Morales v. Tuomi, 214 Mont. 419, 693 P2d 532 (1985).

The pertinent undisputed facts are that, on or about April 29, 2011, Plum Creek Timberlands, L.P. (Plum Creek), submitted to the Department an application to amend its permit for opencut mining to expand the permit area to a total of 19.1 acres (Brewer Affidavit, Ex 2, attached to Dept's Motion for Summary Judgment). Pursuant to Mont. Code Ann. § 82-4-432, Plum Creek submitted to the Department a list of 16 persons who owned land within one-half mile of the proposed amended permit boundary, along with its certification that an appropriate public notice had been sent to all of them on May 12, 2011 (Brewer Affidavit, Ex 4). Fewer than ten persons who owned land within one-half mile of the proposed permit boundaries requested a hearing and, because of this, the Department did not schedule a public hearing (Brewer Affidavit, ¶13). Petitioners' names do not appear on the list of persons who live within one-half mile of the proposed permit boundaries and within the timeframe, they did not submit a request for hearing to the Department (Brewer Affidavit). As noted above, the Petitioners did not change the record in this regard by filing an affidavit to the contrary. As stated in the Order, the only way the Petitioners could survive the Department's Motion for Summary Judgment was to demonstrate, by sworn affidavit, that enough persons who own surface land within one-half mile of the permit boundary were not given notice as required by Mont. Code Ann. § 82-4-432 and, that if those persons had been given notice, they would have requested a public hearing. Petitioners did not do this. In a contested case, the unsworn allegations in the initial appeal letter are not enough to defeat a summary judgment motion supported by sworn facts. The Petitioners filed nothing that raises a genuine issue of fact. Judgment should be entered in favor of the Department that there is no basis to challenge its decision not to hold a public hearing.

For the above reasons, it is recommended that the Board, in its final order, adopt the Proposed Order Granting Motion for Summary Judgment by reference and enter judgment in favor of the Department in which it is stated that the Department was correct in not requiring a public hearing attendant to the issuance of an amended permit to Plum Creek.

The filing of exceptions to this Proposed Order Granting Summary Judgment may be allowable under Mont. Code Ann. § 2-4-621 and may be necessary if judicial review is sought. The next regularly scheduled meeting of the Board of Environmental Review (Board) is May 18, 2012, at which time the Board will consider whether to adopt, reject or modify this Proposed Order Granting Motion for Summary Judgment. If the Petitioners consider it appropriate and necessary to file exceptions, they must do so by April 20, 2012. If the Petitioners file exceptions, they must provide legal argument as to why exceptions are allowed. If the Petitioners file exceptions, the Department may file a response to exceptions no later than April 27, 2012.

DATED this 2nd day of April, 2012.

Katherine J. Orr

KATHERINE J. ORR
Hearing Examiner
Agency Legal Services Bureau
1712 Ninth Avenue
P.O. Box 201440
Helena, MT 59620-1440

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing Proposed Order Granting Motion for Summary Judgment be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Ms. Jane Amdahl
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. Ed Coleman, Bureau Chief
Industrial & Energy Minerals Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. Steven K. Endicott
Ms. Ruth Ann Endicott
110 Holly Dr.
Troy, MT 59935

Mr. Robert W. Gambill
276 Halo Dr.
Troy, MT 59935

DATED: April 2, 2012 [signature]

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW OF THE STATE OF MONTANA

IN THE MATTER OF: THE REQUEST FOR HEARING BY GLENN MILLER, RICK SANT, RALPH & EDNA NEILS, BERNEIEE A. ZUCKER, PATRICIA ANDERSON, TINA K. MOORE, MARC ZAHNER, DONALD E. WHITE, JACKI BRUEMMER, BETTY LONGO, TRACY NICELY, MICHAEL DUNN, DENNIS THAYER, JAMES HOPKINS, DEBBIE ZAHNER, JAMES P. TOMLIN, HOWARD C.A. HUNTER, GEORGE STACHECKI, MARIE MABEE, HAROLD MABEE, PATRICIA WARRINGTON, LILY S. PARKER, LINDA S. FISHER, STEVEN E. FISHER, CONNIE KARNS, JOHN RITCHIE, GRANT DENTON, KAREN & BEN PELZEL, RICHARD L. JOHNSON, N.E.W. BOSS, JANE O. DRAYTON, LEONARD H. DRAYTON, WARREN ROBBE, KATHERINE G. POTTER, ROBERT B. POTTER, BONNIE GANNON, KIM F. TAYLOR, LINDA COCHRAN, HELEN R. LOCKARD, MARSHALL WARRINGTON, JR., BRUCE KINNEY, DEVAN KINNEY, JON KINNEY, JOEL KINNEY, KAREN LEGUE, ANGELINE R. ALLEN, GARY ALLEN, BONNIE SONNENBERG, BUD BIDDLE, EUNICE BOEVE, RON BOEVE, KATHLEEN BURBRIDGE, HAROLD LEWIS, KEN MOLE, AND LOIS M. MOLE REGARDING OPENCUT PERMIT NO. 487 ISSUED TO PLUM CREEK TIMBERLANDS, L.P., FOR THE DORR SKEELS SITE IN LINCOLN COUNTY, MONTANA.	**CASE NO. BER 2011-16 OC**

PROPOSED ORDER GRANTING MOTION FOR SUMMARY JUDGMENT

On August 29, 2011, the Department of Environmental Quality (Department) filed a Motion to Dismiss or, in the Alternative, for Summary Judgment as to the Petitioners herein with an attached Affidavit of Kris Brewer in Support of the

Department's Alternative Motion for Summary Judgment. For the reasons stated below, the Department's Motion for Summary Judgment is GRANTED.

BACKGROUND

On December 13, 2011, the Hearing Examiner issued an "Order on Motion to Dismiss and Regarding the Alternative Motion for Summary Judgment and Order Addressing Hearing Schedule (hereinafter, "Order"). In this Order, the Hearing Examiner summarized the claims of Petitioners (objecting to the absence of a public hearing afforded to them under Mont. Code Ann. § 82-4-432), denied the Motion to Dismiss, and gave the Petitioners until January 13, 2012, to respond to the Department's Motion for Summary Judgment. The Petitioners had not timely responded to the Department's Motion for Summary Judgment, in any manner, prior to the issuance of the Order on December 13, 2011. The Order articulates, in detail, the form and substance of a response to the summary judgment motion that would be sufficient to defeat the Department's Motion for Summary Judgment. The Order stated that, by January 13, 2012, the Petitioners must file a response to the Motion for Summary Judgment along with:

> ...appropriate supporting evidence under Mont. R. Civ. P. 56(b)(c) and (e) such as a sworn affidavit, in which for example, they prove (with individual affidavits or an affidavit from the clerk and recorder, for example) that at least ten persons or 30% of the surrounding landowners who own land within the one-half mile range of the opencut mining operations actually do own the land within the one-half mile distance from the opencut mining operations in the appropriate time frame, and that through individual affidavits, for example) had these persons/landowners with one-half mile received notice of the proposed amendment to the opencut mining permit, they would have timely requested a public meeting. (Order, page 9)

The only parties to this proceeding who filed a response were Katherine G. Potter and Robert B. Potter, both of whom filed Affidavits on January 11, 2012. Both of the Potters' Affidavits state that they own property within one-half mile of the "proposed project," the Dorrs Skeel site for opencut mining, for which Plum

Creek Timberlands, L.P. (Plum Creek) obtained a permit. Both Potters' names appear on the certified list of persons who were sent notice of the application to amend the permit by Plum Creek. See the Department's Affidavit supporting its Motion for Summary Judgment, Brewer Ex.4. The Petitioners have failed to create a disputed issue of material fact that at least 10 persons, or 30% of the qualified landowners whose property is located within one-half mile of the subject Dorr Skeels site, were not given notice; that such ownership was recorded with the Clerk and Recorder prior to Plum Creek submitting its application and sending the notices; that the landowner's address listed with the Clerk and Recorder was accurate and notice would have been received if sent to that address; and that, had notice been received, the property owner would have requested a hearing. Both Katherine and Robert Potters' names appear on the certified list of persons who were sent notice of the application to amend the permit by Plum Creek Timberlands, L.P. (Plum Creek). There is no evidence that Ms. Potter would have submitted a request for a public meeting or that the requirements of a public hearing were met. None of the remaining Petitioners in this case filed any response of any kind. On February 3, 2012, the Department filed its Reply Brief in Support of its Motion for Summary Judgment.

DISCUSSION

In this case, the Department's Motion for Summary Judgment should be granted because the Department has shown an absence of genuine issue of material fact and an entitlement to judgment that there was no right to a public hearing and that the proper process was followed under Mont. Code Ann. § 82-4-432. The Petitioners have not provided any material or substantive evidence to raise a genuine issue of material fact.

When considering a motion for summary judgment under M.R. Civ. P.,Rule 56, it is stated in Bruner v. Yellowstone County, 272 Mont. 261, 264-65, 900 P.2d 901, 903 (1995) that:

> The movant must demonstrate that no genuine issues of material fact exist and entitlement to judgment as a matter of law. Once this has been accomplished, the burden then shifts to the non-moving party to prove, by more than mere denial and speculation, that a genuine issue does exist. Having determined that genuine issues of fact do not exist, the court must then determine whether the moving party is entitled to judgment as a matter of law. Id.

Summary judgment is properly granted to the moving party if the adverse party fails to respond with specific facts showing that a genuine issue exists as to a material fact. Joyner v. Onstad, 240 Mont. 362, 364, 783 P.2d 1383, 1385 (1989). Evidence sufficient to raise a genuine issue of material fact, "must be in proper form, the proffered evidence must be material and of a substantial nature." Morales v. Tuomi, 214 Mont. 419, 693 P2d 532 (1985).

The pertinent undisputed facts are that, on or about April 29, 2011, Plum Creek submitted to the Department an application to amend its permit for opencut mining to expand the permit area to a total of 19.1 acres (Brewer Affidavit, Ex 2). Pursuant to Mont. Code Ann. § 82-4-432, Plum Creek submitted to the Department a list of 16 persons who owned land within one-half mile of the proposed amended permit boundary, along with its certification that an appropriate public notice had been sent to all of them on May 12, 2011 (Brewer Affidavit, Ex 4). Fewer than ten persons who owned land within one-half mile of the proposed permit boundaries requested a hearing and, because of this, the Department did not schedule a public hearing (Brewer Affidavit, ¶ 13). Only the Potters appear on the list of persons who live within one-half mile of the proposed permit boundaries but their Affidavits don't change the record showing deficiencies in number or percentage of persons needed to warrant a public hearing.

As stated in the Order, the only way the Petitioners could survive the Department's Motion for Summary Judgment was to demonstrate, by sworn affidavit, that enough persons who own surface land within one-half mile of the permit boundary were not given notice as required by Mont. Code Ann. § 82-4-432 and that, if those persons had been given notice, they would have requested a public hearing. Petitioners did not do this. In a contested case, the unsworn allegations in the initial appeal letter, even if not defective as to correct assertions of ownership or requesting a public hearing pursuant to Mont. Code Ann. § 82-4-432, are not enough to defeat a summary judgment motion. Judgment should be entered in favor of the Department that there is no basis to challenge its decision not to hold a public hearing.

For the above reasons, it is recommended that the Board, in its final order, adopt the Proposed Order Granting Motion for Summary Judgment by reference and enter judgment in favor of the Department in which it is stated that the Department was correct in not requiring a public hearing attendant to the issuance of an amended permit to Plum Creek.

The filing of exceptions to this Proposed Order Granting Summary Judgment may be allowable under Mont. Code Ann. § 2-4-621 and may be necessary if judicial review is sought. The next regularly scheduled meeting of the Board of Environmental Review (Board) is May 18, 2012, at which time the Board will consider whether to adopt, reject or modify this Proposed Order Granting Summary Judgment. If the Petitioners consider it appropriate and necessary to file exceptions, they must do so by April 20, 2012. If the Petitioners file exceptions, they must provide legal argument as to why exceptions are allowed. If the Petitioners file exceptions, the Department may file a response to exceptions no later than April 27, 2012.

DATED this 2nd day of April, 2012.

KATHERINE J. ORR
Hearing Examiner
Agency Legal Services Bureau
1712 Ninth Avenue
P.O. Box 201440
Helena, MT 59620-1440

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing Proposed Order Granting Motion for Summary Judgment to be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Ms. Jane Amdahl
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. Ed Coleman, Bureau Chief
Industrial & Energy Minerals Bureau
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Ms. Katherine G. Potter
1280 Doonan Mtn. Road
Troy, MT 59935

Mr. Robert B. Potter
1280 Doonan Mtn. Road
Troy, MT 59935

Mr. Glenn Miller
64 Halo Drive
Troy, MT 59935

Mr. Rick Sant
80 Halo Drive
Troy, MT 59935

Mr. and Mrs. Ralph and Edna Neils
2235 Mission Way N
Kalispell, MT 59901-2226

Mr. and Mrs. Ralph and Edna Neils
Halo Drive
Troy, MT 59935

Ms. Berneice A. Zucker
464 Bethel Drive
Troy, MT 59935

Ms. Patricia Anderson
455 Bethel Drive
Troy, MT 59935

Ms. Tina K. Moore
P.O. Box 5
209 E. Kootenai Ave.
Troy, MT 59935

Mr. Marc Zahner
643 3rd Avenue East
Kalispell, MT 59901

Mr. Donald E. White
P.O. Box 475
Troy, MT 59935

Ms. Jacki Bruemmer
P.O. Box 224
Troy, MT 59935

Ms. Betty Longo
469 Bethal Drive
Troy, MT 59935

Ms. Tracy Nicely
650 Doonan Mtn Rd.
Troy, MT 59935

Mr. Michael Dunn
650 Doonan Mtn Rd.
Troy, MT 59935

Mr. Dennis Thayer
13 Halo Drive
Troy, MT 59935

Mr. James Hopkins
102 Halo Drive
Troy, MT 59935

Ms. Debbie Zahner
146 Halo Drive
Troy, MT 59935

Mr. James P. Tomlin
654 Halo Drive
Troy, MT 59935

Mr. Howard C.A. Hunter
644 Halo Drive
Troy, MT 59935

Mr. George Stachecki
546 Halo Drive
Troy, MT 59935

Ms. Marie Mabee
408 Halo Drive
Troy, MT 59935

Mr. Harold Mabee
408 Halo Drive
Troy, MT 59935

Ms. Patricia Warrington
900 Halo Drive
Troy, MT 59935

Ms. Lily S. Parker
826 Halo Drive
Troy, MT 59935

Ms. Linda S. Fisher
688 Halo Drive
Troy, MT 59935

Mr. Steven Fisher
688 Halo Drive
Troy, MT 59935

Ms. Connie Karns
370 SE Parkhill Drive
Chehalis, WA 98532

Mr. John Ritchie
18 Halo Ct. N.
Troy, MT 59935

Mr. Grant Denton
861 Halo Drive
Troy, MT 59935

Mr. and Ms. Ben and Karen Pelzel
861 Halo Drive
Troy, MT 59935

Mr. Richard L. Johnson
749 Halo Drive
Troy, MT 59935

N.E.W. Boss
16941 Bull Lake Rd.
Troy, MT 59935

Ms. Jane O. Drayton
401 Swanson Lodge Rd.
Troy, MT 59935

Mr. Leonard H. Drayton
401 Swanson Lodge Rd.
Troy, MT 59935

Mr. Warren Robbe
3291 Bull Lake Rd.
Troy, MT 59935

Ms. Bonnie Gannon
118 Kootenai Ave.
Troy, MT 59935

Ms. Kim F. Taylor
1624 Tamrrack Ln.
Columbia Falls, MT 59912

Ms. Linda Cochran
40 Halo Drive
Troy, MT 59935

Ms. Helen R. Lockard
914 Halo Drive
Troy, MT 59935

Mr. Marshall Warrington, Jr.
900 Halo Drive
Troy, MT 59935

Mr. Bruce Kinney
7023 172nd St.
Arlington, WA 98223

Mr. Devan Kinney
7023 172nd St.
Arlington, WA 98223

Mr. Jon Kinney
Circle Drive
Spokane, WA 99206

Mr. Joel Kinney
17920 N. Meadowbrook Rd.
Colbert, WA 99005

Ms. Karen Legue
210 Bayside Rd.
Bellingham, WA 98225

Ms. Angeline R. Allen
378 Bethel Drive
Troy, MT 59935

Mr. Gary Allen
378 Bethel Drive
Troy, MT 59935

Ms. Bonnie Sonnenberg
50 Holly Drive
Troy, MT 59935

Mr. Bud Biddle
Box 3017
Bull Lake Rd.
Troy, MT 59935

Ms. Eunice Boeve
382 Bethel Drive
Troy, MT 59935

Mr. Ron Boeve
382 Bethel Drive
Troy, MT 59935

Ms. Kathleen Burbridge
329 Bethel Drive
Troy, MT 59935

Mr. Harold Lewis
132 Holly Drive
Troy, MT 59935

Mr. Ken Mole
116 Michelle Lane
Libby, MT 59923

Ms. Lois M. Mole
116 Michelle Lane
Libby, MT 59923

DATED: April 2, 2012 [signature]

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW

OF THE STATE OF MONTANA

Filed with the
MONTANA BOARD OF
ENVIRONMENTAL REVIEW
This 15 day of May 2012
at 1:55 o'clock P.m.
By: [signature]

IN THE MATTER OF: VIOLATION OF THE METAL MINE RECLAMATION ACT BY NOBLE EXCAVATING, INC. AT NICKLEBACK ROCK QUARRY, LINCOLN COUNTY, MONTANA. (SMES NO. 56-079; FID #2090)	Case No. BER 2011-24 MM STIPULATION TO DISMISS AND REQUEST FOR DISMISSAL

Stipulation to Dismiss

The Department of Environmental Quality (DEQ) and Noble Excavating, Inc., have reached a resolution of the matters at issue in this enforcement action. All matters having been resolved, the parties hereby stipulate to dismissal of the enforcement action with prejudice, with each party bearing its own costs.

STATE OF MONTANA Department of Environmental Quality	NOBEL EXCAVATING, INC.
By: Edward Hayes Edward Hayes, Attorney	By: [signature] Sarah Simkins, Attorney
Date: April 17, 2012	Date: 3/19/12

Request for Dismissal

Pursuant to Rule 41(a)(ii), M.R.Civ.P., an action may be dismissed by the plaintiff by filing a stipulation for dismissal signed by all of the parties who have appeared in the action. Pursuant to the stipulation of the parties set forth above and Rule 41(a)(ii), M.R.Civ.P, DEQ respectfully requests the Board to issue an Order dismissing the enforcement action with prejudice, with each party bearing its own costs.

DATED this 17th day of April, 2012.

Edward Hayes
Edward Hayes
Attorney, Department of Environmental Quality

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing ~~Order of Dismissal~~ Stipulation to Dismiss to be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Sarah D. Simkins
Johnson, Berg & Saxby, PLLP
221 First Avenue East
P.O. Box 3038
Kalispell, Montana 59903-3038

Mr. Edward Hayes
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. John Arrigo
Administrator, Enforcement Division
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

DATED: May 1, 2012 Edward Hayes

**BEFORE THE BOARD OF ENVIRONMENTAL REVIEW
OF THE STATE OF MONTANA**

IN THE MATTER OF: VIOLATION OF THE METAL MINE RECLAMATION ACT BY NOBLE EXCAVATING, INC. AT NICKLEBACK ROCK QUARRY, LINCOLN COUNTY, MONTANA. (SMES NO. 56-079; FID #2090)	**Case No. BER 2011-24 MM** **ORDER OF DISMISSAL**

The parties have filed a Stipulation for Dismissal pursuant to Rule 41(a), M.R.Civ.P., and have requested the Board of Environmental Review to issue an order dismissing this matter with prejudice with each party to bear its own costs. There being good cause,

IT IS HEREBY ORDERED that the appeal in this matter is dismissed with prejudice and with each party bearing its own costs.

DATED this ______ day of __________________, 2012.

____
JOSEPH W. RUSSELL, M.P.H.
Chairman
Board of Environmental Review

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing Order of Dismissal to be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Sarah D. Simkins
Johnson, Berg & Saxby, PLLP
221 First Avenue East
P.O. Box 3038
Kalispell, MT 59903-3038

Mr. Edward Hayes
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. John Arrigo
Administrator, Enforcement Division
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

DATED: ______________________ ______________________________

Montana Department of
ENVIRONMENTAL QUALITY

MEMO

TO: Katherine Orr, Hearing Examiner
Board of Environmental Review

FROM: Joyce Wittenberg, Board Secretary
Board of Environmental Review
P.O. Box 200901
Helena, MT 59620-0901

DATE: March 19, 2012

SUBJECT: Board of Environmental Review case, Case No. BER 2012-03 SM

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW

OF THE STATE OF MONTANA

IN THE MATTER OF: VIOLATIONS OF THE MONTANA STRIP AND UNDERGROUND MINE RECLAMATION ACT BY WESTMORELAND RESOURCES, INC. AT THE ABSALOKA MINE, BIG HORN COUNTY, MONTANA. [FID #2133, DOCKET NO. SM-12-02]	Case No. BER 2012-03 SM

TITLE

BER has received the attached request for hearing. Also attached is DEQ's administrative document relating to this request (Enforcement Case FID #2133, Docket No. SM-12-02).

Please serve copies of pleadings and correspondence on me and on the following DEQ representatives in this case.

Jane Amdahl
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

John Arrigo, Administrator
Enforcement Division
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Attachments

BER 2012-03 SM

MOULTONBELLINGHAM PC

RECEIVED BY DEQ
FINANCIAL SERVICES

2012 MAR 13 A 8:12

Suite 1900, Crowne Plaza
27 North 27th Street
P. O. Box 2559
Billings, Montana 59103-2559
Phone (406) 248-7731
Fax (406) 248-7889

Brandon Hoskins
Brandon.Hoskins@moultonbellingham.com

RECEIVED

MAR 13 2012

DEQ/IEMB

March 12, 2012

Filed with the
MONTANA BOARD OF
ENVIRONMENTAL REVIEW
This 14th day of March, 2012
at 12:16 o'clock P.m.
By: Misty Gable

Board Secretary
Board of Environmental Review
1520 East Sixth Avenue
PO Box 200901
Helena, MT 59620-0901

RE: *In the Matter of Violations of the Montana Strip and Underground Mine Reclamation Act by Westmoreland Resources, Inc. at the Absaloka Mine, Big Horn County, Montana. (FID #2133) Docket No. SM-12-02*

Dear Board Secretary:

Enclosed please find a Request for Hearing by Westmoreland Resources, Inc. in regards to the above noted case. Thank you for your assistance in this matter.

MOULTON BELLINGHAM PC

By Marcie G. Treumann
Marcie G. Treumann
Assistant to Brandon J.T. Hoskins

BJTH/mt
Enclosure

BEFORE THE DEPARTMENT OF ENVIRONMENTAL QUALITY

OF THE STATE OF MONTANA

IN THE MATTER OF: VIOLATIONS OF THE MONTANA STRIP AND UNDERGROUND MINE RECLAMATION ACT BY WESTMORELAND RESOURCES, INC. AT THE ABSALOKA MINE, BIG HORN COUNTY, MONTANA. (FID #2133)	REQUEST FOR HEARING PURSUANT TO MONT. CODE ANN. § 82-4-254(3) Docket No. SM-12-02

Westmoreland Resources, Inc. ("Westmoreland") respectfully requests a hearing pursuant to Mont. Code Ann. § 82-4-254(3) regarding the Notice of Violation and Administrative Penalty Order ("Order") issued by the State of Montana Department of Environmental Quality ("DEQ") dated January 30, 2012. Westmoreland received the Order by mail after it was mailed February 16, 2012. This Request is being filed within 30 days of service of the Order.

Westmoreland requests a hearing because the administrative penalty amount is excessive for the following reasons:

1. The violation caused no risk of harm to human health or environment and, therefore, should be categorized as "impact to administration";
2. All affected property owners were notified in writing, and blasting warnings were posted around the property; and
3. Westmoreland self-reported immediately upon discovery of the violation and immediately abated the violation by publishing the blasting schedule in the Big Horn County News. Due to its proactive and quick response to both inform the DEQ of the violation and to abate the violation, a full 10% reduction on the base penalty should be given under the good faith and cooperation adjustment.

//

//

DATED this 12th day of March, 2012.

MOULTON BELLINGHAM PC

By:

W. ANDERSON FORSYTHE
BRANDON JT HOSKINS
Suite 1900 Crowne Plaza
PO Box 2559
Billings, MT 59103-2559

4830-8401-1279, v. 1

BEFORE THE DEPARTMENT OF ENVIRONMENTAL QUALITY

OF THE STATE OF MONTANA

IN THE MATTER OF: VIOLATIONS OF THE MONTANA STRIP AND UNDERGROUND MINE RECLAMATION ACT BY WESTMORELAND RESOURCES, INC. AT THE ABSALOKA MINE, BIG HORN COUNTY, MONTANA. (FID #2133)	NOTICE OF VIOLATION AND ADMINISTRATIVE PENALTY ORDER Docket No. SM-12-02

I. NOTICE OF VIOLATION

Pursuant to the authority of Section 82-4-254, Montana Code Annotated (MCA), the Department of Environmental Quality (Department) hereby gives notice to Westmoreland Resources, Inc. (Westmoreland) of the following Findings of Fact and Conclusions of Law with respect to violations of the Montana Strip and Underground Mine Reclamation Act (the Act) codified at Title 82, chapter 4, part 2, MCA; the administrative rules implementing the Act set forth in Title 17, chapter 24, Administrative Rules of Montana (ARM); and/or the provisions of Westmoreland's operating permit.

II. FINDINGS OF FACT AND CONCLUSIONS OF LAW

1. The Department is an agency of the executive branch of the State of Montana, created and existing under the authority of Section 2-15-3501, MCA.

2. The Department administers the Act.

3. Westmoreland is a "person" within the meaning of Section 82-4-203(41), MCA.

4. Westmoreland operates a surface coal mine, known as the Absaloka Mine, under Permit No. C1985005 (Permit) located near Hardin, Montana. The Permit was issued by the Department under the Act.

5. Westmoreland, therefore, is an "operator" as defined by Section 82-4-203(37), MCA.

6. As an operator, Westmoreland is subject to the requirements of the Act, the administrative rules adopted under the Act, and the provisions of their Permit.

Failure to timely publish a blasting schedule in the local newspaper

7. Section 82-4-231(10)(e), MCA, requires an operator to use explosives in connection with the operation only in accordance with Department regulations designed to minimize noise, damage to adjacent lands, and water pollution; ensure public safety; and for other purposes.

8. ARM 17.24.623 implements Section 82-4-231(10)(e), MCA. ARM 17.24.623(1) requires an operator to publish a blasting schedule before beginning a blasting program in which blasts that use more than five pounds of explosive or blasting agent are detonated. The blasting schedule must be published once in a newspaper of general circulation in the locality of the blasting site. ARM 17.24.623(2) requires an operator to distribute by mail the blasting schedule to local governments and public utilities and by mail or delivered to each residence within one-half mile of the permit area. ARM 17.24.623(3) requires an operator to republish and redistribute the blasting schedule by mail at least every 12 months.

9. According to Department records, Westmoreland last published its blasting schedule on September 23, 2010. Pursuant to ARM 17.24.623(3), Westmoreland was required to republish and redistribute by mail the blasting schedule by September 23, 2011.

10. On November 15, 2011, Westmoreland contacted the Department and self reported that the annual publication of a blasting notice was not published in the local newspaper on or before the publication anniversary date. Westmoreland indicated that it did, however, provide notification letters to property owners as required.

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11. In a letter dated December 12, 2011, Westmoreland provided the Department with a copy of an affidavit of publication documenting that the blasting schedule was published in the Big Horn County News on November 17, 2011.

12. On December 15, 2011, the Department issued a Notice of Noncompliance and Order of Abatement (NON 11-05-02) alleging that Westmoreland violated Section 82-4-231(10)(e), MCA, and ARM 17.24.623(3). The Order of Abatement required Westmoreland to submit proof of publication and distribution of the blasting schedule to the Department.

13. In its December 22, 2011 letter of mitigating circumstances, Westmoreland provided copies of the mine blasting schedule, dated September 30, 2011, that were sent to local governments, public utilities and residences located within one-half mile of the Permit area as well as a copy of an affidavit of publication documenting that the blasting schedule was published in the Big Horn County News on November 17, 2011.

14. The Department issued a Termination of Abatement Order to Westmoreland on January 17, 2012.

15. Westmoreland violated Section 82-4-231(10)(e), MCA, and ARM 17.24.623(3) by failing to republish its blasting schedule in the newspaper of general circulation in the locality of the blasting site.

Administrative Penalties

16. Section 82-4-254, MCA, provides that for every violation of the Act, rules adopted under the Act, or provisions of a permit, the Department may assess an administrative penalty of not less than $100 or more than $5,000 for the violation and an additional administrative penalty within the same limits for each day during which the violation continues.

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17. Pursuant to Section 82-4-1001, MCA, and ARM 17.24.301, *et seq.*, the Department has calculated an administrative penalty of $2,500 for the violation. The Penalty Calculation Worksheet is enclosed and is hereby incorporated by reference.

III. ADMINISTRATIVE PENALTY ORDER

This Notice of Violation and Administrative Penalty Order (Order) is issued to Westmoreland pursuant to the authority vested in the State of Montana, acting by and through the Department under the Act. Now, therefore, based on the foregoing Findings of Fact and Conclusions of Law, and under authority of Section 82-4-254, MCA, the Department hereby ORDERS Westmoreland to do the following:

18. Westmoreland is hereby assessed an administrative penalty in the amount of $2,400 for the violation cited in this Order.

19. Within 60 days of service of this Order, Westmoreland shall pay to the Department an administrative penalty of $2,500 to resolve the violation cited herein. The penalty must be paid by check or money order, made payable to the "Montana Department of Environmental Quality," and shall be sent to:

John L. Arrigo, Administrator
Enforcement Division
Montana Department of Environmental Quality
1520 East Sixth Ave.
P.O. Box 200901
Helena, MT 59620-0901

IV. NOTICE OF APPEAL RIGHTS

20. As provided in Section 82-4-254(3), MCA, Westmoreland is entitled to a hearing on the stated violation before the Board of Environmental Review. A written request must be submitted to the Board within 30 days of service of this Order. Service by mail is complete three business days after mailing. Westmoreland's request for a hearing should state its reasons for

objecting to the Department's determination of the violation or penalty amount and be directed to:

Board Secretary
Board of Environmental Review
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

21. Hearings are conducted as provided in the Montana Administrative Procedure Act, Title 2, chapter 4, part 6, MCA. Hearings are normally conducted in a manner similar to court proceedings, with witnesses being sworn and subject to cross-examination. Proceedings prior to the hearing may include formal discovery procedures, including interrogatories, requests for production of documents, and depositions. Because Westmoreland is not an individual, Westmoreland must be represented by an attorney in any contested case hearing. *See* ARM 1.3.231(2) and Section 37-61-201, MCA.

22. If Westmoreland does not request a hearing, or if it does not submit testimony at such hearing, Westmoreland forfeits its right to judicial review of the Department's determination of the violation or penalty.

23. If a hearing is not requested within 30 days after service of this Order, the opportunity for a contested case appeal is waived.

IT IS SO ORDERED:

DATED this 16th day of February, 2012.

STATE OF MONTANA
DEPARTMENT OF ENVIRONMENTAL QUALITY

John L. Arrigo

JOHN L. ARRIGO, Administrator
Enforcement Division

Department of Environmental Quality - Enforcement Division
Penalty Calculation Worksheet

Responsible Party Name:	Westmoreland Resources, Inc. (Westmoreland)
FID:	2133 Permit No. C1985005
Statute:	Strip and Underground Mine Reclamation Act
Date:	2/13/2012
Name of Employee Calculating Penalty:	Daniel R. Kenney
Maximum Penalty Authority:	$5,000.00

Penalty #1
Description of Violation:
ARM 17.24.623(3) requires that a blasting schedule be republished and redistributed by mail at least every 12 months. Westmoreland last published a blasting schedule on September 23, 2010; therefore, Westmoreland was required to republish the blasting schedule by September 23, 2011. Westmoreland did not publish its blasting schedule in the local newspaper until November 17, 2011. Therefore Westmoreland failed to republish its blasting schedule at least every 12 months in violation of ARM 17.24.623(3).

I. BASE PENALTY

Nature

Explanation:	
The Department's regulations on blasting are designed to minimize noise, damage to adjacent lands, and water pollution; to ensure public safety; and other purposes. Westmoreland failed to timely republish in a newspaper of general circulation in the locality of the blasting site a blasting schedule for blasts that were to be conducted from September 23, 2011 through September 23, 2012. Westmoreland was required to republish the blasting schedule by September 23, 2011, and did not do so until November 17, 2011. The requirement to annually publish and redistribute the blasting schedule is designed to give prior notice of the blasts to persons residing in the area in order to further public safety. Therefore the Nature of the violation is one that has the potential to harm human health or the environment.	
Potential to Harm Human Health or the Environment	X
Potential to Impact Administration	

Gravity and Extent

Gravity Explanation:
Under ARM 17.4.303(5), a violation that has major gravity if it causes harm to human health or the environment or poses a serious potential to harm human health or the environment. A violation has minor gravity if it poses no risk of harm to human health or the environment. A violation has moderate gravity if it is not major or minor and poses a potential to harm human health or the environment. The failure to timely republish and redistribute the blasting schedule is not a major or minor violation and poses a potential to harm human health because area residents are not timely notified of the blasts. The gravity of the violation is therefore moderate.
Extent Explanation:
The extent of this violation is minor. Westmoreland was required to republish the blasting schedule by September 23, 2011, and did not do so until November 17, 2011.

Harm to Human Health or the Environment

Extent	Gravity: Major	Moderate	Minor
Major	0.85	0.70	0.55
Moderate	0.70	0.55	0.40
Minor	0.55	0.40	0.25

Gravity and Extent Factor: 0.40

Impact to Administration

Gravity: Major	Moderate	Minor
.50	.40	.30

Gravity Factor: 0.00

BASE PENALTY (Maximum Penalty Authority x Gravity and Extent Factor): **$2,000.00**

II. ADJUSTED BASE PENALTY

A. Circumstances (up to 30% added to Base Penalty)

Explanation:
Westmoreland's behavior in this violation exhibited a moderate degree of culpability. As a regulated entity, Westmoreland is expected to have knowledge of its permit and the requirements of the Act. Westmoreland had control of the circumstances and failed to comply in a timely manner.

Circumstances Percent: 0.20

Circumstances Adjustment (Base Penalty x Circumstances Percent) $400.00

B. Good Faith and Cooperation (up to 10% subtracted from Base Penalty)

Explanation:
As soon as Westmoreland discovered that it failed to publish its blasting schedule in the local newspaper, it contacted the Department and self-reported that they had failed to republish the blasting schedule as required. Therefore, a 5% reduction is being allowed for this penalty factor.

Good Faith & Coop. Percent: 0.05

Good Faith & Coop Adjustment (Base Penalty x G F & Coop. Percent) $100.00

C. Amounts Voluntarily Expended (AVE) (up to 10% subtracted from Base Penalty)

Explanation:
The Department is not aware of any amounts voluntarily expended by Westmoreland to mitigate the violation and/or its impacts; therefore, no reduction is being allowed.

AVE Percent: 0.00

Amounts Voluntarily Expended Adjustment (Base Penalty x AVE Percent) $0.00

ADJUSTED BASE PENALTY SUMMARY

Base Penalty	$2,000.00
Circumstances	$400.00
Good Faith & Cooperation	-$100.00
Amt. Voluntarily Expended	$0.00
ADJUSTED BASE PENALTY	**$2,300.00**

III. DAYS OF VIOLATION

Explanation:
Westmoreland failed to republish and resubmit its blasting schedule by September 23, 2011 as required. Therefore, the Department is calculating a penalty for one day of violation.

Number of Days:	1

ADJUSTED BASE PENALTY x NUMBER OF DAYS: $2,300.00

Other Matters as Justice May Require Explanation:
Not applicable.

OTHER MATTERS AS JUSTICE MAY REQUIRE TOTAL:	$0.00

IV. ECONOMIC BENEFIT

Explanation:
Westmoreland did not accrue an economic benefit by not republishing its blasting schedule by September 23, 2011. Therefore, the Department will not assess an amount for this category.

ECONOMIC BENEFIT REALIZED:	$0.00

V. HISTORY

Explanation:
Westmoreland has incurred one other violation within the past three years: NON 09-05-01 - Failure to backfill and regrade within required two-year timeframe. Nature = Potential to Harm Human Health or the Environment. NON-09-05-01 was resolved with an Administrative Order on Consent on May 24, 2010.

Historical Violation: Harm to Human Health or the Environment - 10%
Historical Violation: Impact to Administration - 5%

Historical Violation #1 Percent:	0.10
Total History Percent **(cannot exceed 30%)**:	0.10

Base Penalty #1	$2,000.00
Total Base Penalties:	**$2,000.00**

HISTORY ADJUSTMENT (Base Penalty x History Percent)	$200.00

Department of Environmental Quality - Enforcement Division
Penalty Calculation Summary

Responsible Party Name:	Westmoreland Resources, Inc. (Westmoreland)
FID:	2133
Statute:	Strip and Underground Mine Reclamation Act
Date:	2/16/12
Signature of Employee Calculating Penalty:	Daniel R. Kenney DRKenney

I. Base Penalty (Maximum Penalty Authority x Matrix Factor)

	Penalty #1
Maximum Penalty Authority:	$5,000.00
Percent Harm - Gravity and Extent:	0.40
Percent Impact - Gravity:	0.00
Base Penalty:	$2,000.00

II. Adjusted Base Penalty

		Totals
Base Penalty:	$2,000.00	$2,000.00
Circumstances:	$400.00	$400.00
Good Faith and Cooperation:	-$100.00	-$100.00
Amount Voluntarily Expended:	$0.00	$0.00
Adjusted Base Penalty:	$2,300.00	$2,300.00

III. Days of Violation or Number of Occurrences	1	
Adjusted Base Penalty Total	$2,300.00	$2,300.00
Other Matters as Justice May Require Total	$0.00	$0.00
IV. Economic Benefit	$0.00	$0.00
V. History		$200.00
	TOTAL PENALTY	$2,500.00

BEFORE THE BOARD OF ENVIRONMENTAL REVIEW OF THE STATE OF MONTANA

IN THE MATTER OF: VIOLATIONS OF THE MONTANA STRIP AND UNDERGROUND MINE RECLAMATION ACT BY WESTMORELAND RESOURCES, INC. AT THE ABSALOKA MINE, BIG HORN COUNTY, MONTANA [FID #2133, DOCKET NO. SM-12-02]	**CASE NO. BER 2012-03 SM**

FIRST PREHEARING ORDER

Mr. Brandon J.T. Hoskins, Co-counsel for Westmoreland Resources, Inc. (hereafter, Appellant), has appealed the Notice of Violation and Administrative Penalty Order, Docket No. SM-12-02, dated February 16, 2012, pertaining to violations of the Montana Strip and Underground Mine Reclamation Act (the Act) and imposition of penalties codified at Mont. Code Ann. Title 82, Chapter 4, Part 2, and violations of administrative rules adopted under the Admin. R. Mont. Title 17, Chapter 24 and/or the provisions of Westmoreland Resources, Inc.'s operating permits.

The following guidelines and rules are provided to assist the parties in an orderly resolution of this contested case.

1. <u>REFERENCES</u>: This matter is governed by the Montana Administrative Procedure Act, Contested Cases, Mont. Code Ann. Tit. 2, ch. 4, pt. 6, and Mont. Admin. R. 17.4.101, by which the Board of Environmental Review (Board) has adopted the Attorney General's Model Rules for contested cases, Mont. Admin. R. 1.3.211 through 1.3.225, and by Mont. Code Ann. Tit. 82, ch. 4, pt. 2.

2. <u>FILING</u>: Except for discovery requests and responses (which are not routinely filed), **<u>original</u>** documents shall be sent for filing with the Board, addressed as follows:

JOYCE WITTENBERG
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901

One **copy** of each document that is filed should be sent to the Hearing Examiner, addressed as follows:

KATHERINE J. ORR
Hearing Examiner
Agency Legal Services Bureau
1712 Ninth Avenue
P.O. Box 201440
Helena, MT 59620-1440

Although discovery documents are not normally filed, when a motion or brief is filed making reference to discovery documents, the party filing the motion or brief should also attach the relevant discovery documents.

3. SERVICE: Copies of all documents filed with the Board and provided to the Hearing Examiner, including correspondence, must be served upon the opposing party. A certificate of service should be provided.

4. EX PARTE COMMUNICATIONS: The Montana Administrative Procedure Act in Mont. Code Ann. § 2-4-613, and the Attorney General's Model Rule 18 in Mont. Admin. R. 1.3.222, prohibit *ex parte* communications with a hearing examiner concerning any issue of fact or law in a contested case. In addition to observing this rule, please contact the opposing party before you communicate with the Hearing Examiner, even on purely procedural matters such as the need for a continuance.

5. SCHEDULING: The undersigned requests the parties consult with each other and propose a schedule to the Hearing Examiner upon which they agree by **May 1, 2012**. The schedule should include the following dates:

(a) for joinder/intervention of additional parties;

(b) for disclosure by each party to the other parties of: (1) the name and address of each individual likely to have discoverable information that the disclosing party may use to support its claims or defenses; and, (2) a copy of, or a description by category and location of, all documents and tangible things that are in the possession, custody, or control of the disclosing party and that the disclosing party may use to support its claims or defenses;

(c) for completion of discovery (if any party wishes to conduct discovery);

(d) for exchange of lists of witnesses and copies of documents that each party intends to offer at the hearing;

(e) for submitting any motions and briefs in support;

(f) for a Prehearing Conference to hear argument on any motions and resolve other prehearing matters; and

(g) for the contested case Hearing.

DATED this 11th day of April, 2012.

KATHERINE J. ORR
Hearing Examiner
Agency Legal Services Bureau
1712 Ninth Avenue
P.O. Box 201440
Helena, MT 59620-1440

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and accurate copy of the foregoing First Prehearing Order to be mailed to:

Ms. Joyce Wittenberg
Secretary, Board of Environmental Review
Department of Environmental Quality
1520 East Sixth Avenue
P.O. Box 200901
Helena, MT 59620-0901
(original)

Ms. Jane Amdahl
Legal Counsel
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. John Arrigo
Administrator, Enforcement Division
Department of Environmental Quality
P.O. Box 200901
Helena, MT 59620-0901

Mr. Brandon J.T. Hoskins
Mr. W. Anderson Forsythe
Suite 1900 Crowne Plaza
27 North 27th Street
P.O. Box 2559
Billings, MT 59103-2559

DATED: April 11, 2012 [signature]