Guidance for Public Water System Disposal of Water from Construction, Maintenance, and Operations

Idaho Department of Environmental Quality
Drinking Water Program
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Summary

This document presents guidance to assist with disposal of water generated from public water system construction, maintenance, and operations. While the Idaho Department of Environmental Quality (DEQ) recognizes the need for routine discharge activities and the potential for emergency discharges, there are certain contaminants, such as chlorine, which can be detrimental to aquatic life, even in low concentrations when discharged to state waters. Moreover, discharges have the potential to cause erosion to land surfaces and can add suspended solids and other pollutants to water supplies.

Purpose

This guidance document is intended to provide information related to managing the disposal of water related to construction, maintenance, and operations of public water system facilities. DEQ guidance does not have the force of law or regulation, nor does it replace best professional judgment; it provides a starting point and assistance for disposal of water in the construction, maintenance, and operation of public water system (PWS) facilities.

Scope

This guidance focuses on discharges and disposal of water made during construction, maintenance, and operations; such discharges may include, but are not limited to, the following:

- Flushing
- Disinfecting
- Pressure testing
- Pump-to-waste or pump test
- Rupture of water mains or tanks

This guidance excludes water used in treatment processes. For waste residuals, please see DEQ's Guidance for Handling Waste Residuals Resulting from Drinking Water Treatment, 2007.

Authority

Authority for controlling and regulating the discharge and disposal of water from PWS facilities stems from Titles 37 and 39 of Idaho Code:

- **Water Quality**. Pursuant to Sections 39-105 and 39-3601 et seq., Idaho Code, the Director is directed to formulate and recommend to the Board such rules and regulations and standards as may be necessary to deal with the problems related to personal health and water pollution and to fully meet the goals and requirements of the Clean Water Act. The Director is further charged with the supervision and administration of a system to safeguard the quality of the waters of the state including the enforcement of standards relating to the discharge of effluent into the waters of the state. Authority to adopt rules, regulations and standards as are necessary and feasible to protect the environment and health of the citizens of the state is vested in the Board pursuant to Section 39-107, Idaho Code.

- **Ground Water Quality**. The Idaho Legislature has given the Board of Environmental Quality authority to promulgate the Ground Water Quality Rule pursuant to Sections 39-105, 39-107, 39-120, and 39-126, Idaho Code.
- **Hazardous Waste**. Idaho rules and standards regarding hazardous waste are adopted pursuant to the authority vested in the Board of Environmental Quality by the Hazardous Waste Management Act of 1983, as amended (HWMA), Sections 39-4401 et seq., Idaho Code, and the authority vested in the Director of the Department of Environmental Quality by the Hazardous Waste Facility Siting Act of 1985, as amended, Sections 39-5801 et seq., Idaho Code.
- **Rules for Drinking Water Systems**. The Idaho Legislature has given the Idaho Board of Environmental Quality the authority to promulgate rules governing quality and safety of drinking water, pursuant to Title 39, Chapter 1, Idaho Code. DEQ promulgated IDAPA 58.01.08, "Idaho Rules for Public Drinking Water Systems," for the purpose of controlling and regulating the design, construction, operation, maintenance, and quality control of public drinking water systems, to provide a degree of assurance that such systems are protected from contamination and maintained free from contaminants that may injure the health of the consumer.

Additionally, discharges must comply with the lawful requirements of federal agencies, municipalities, counties, drainage districts, irrigation districts, or other local agencies regarding discharges to watercourses under their jurisdiction. This guidance in no way reduces the existing authority of these entities.

Definitions

The following definitions are provided for convenience and are not intended to supersede any existing definitions provided by specific rules:

- A **Municipal Separate Storm Sewer System (MS4)** is "a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a state, city, town, borough, county, parish, district, association, or other public body (created to or pursuant to state law) including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States. (ii) Designed or used for collecting or conveying stormwater; (iii) Which is not a combined sewer; and (iv) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2" (40 CFR 122.26(b)(8)). A "regulated municipal separate storm sewer system (MS4)" is the term used to refer to a Large, Medium, or Small Municipal Separate Storm Sewer System regulated under the federal NPDES permit program; in general, regulated MS4s are those which are located within the urbanized areas of Idaho Falls, Pocatello, Boise/Garden City, Nampa/Caldwell, Lewiston, and Post Falls/Coeur d'Alene.
- **Potable water** is water that is safe for human consumption. Human consumption includes drinking, bathing, showering, cooking, dishwashing, and maintaining oral hygiene.
- **Super-chlorinated water** is water used to disinfect water system components following repair, new construction, or well disinfection, and it is generated prior to those components being put into service. Specific chlorine concentrations required for disinfection vary, as defined in the American Water Works Association (AWWA) standards incorporated into IDAPA 58.01.08 by reference, but any water with more than 4 milligrams per liter (mg/L) of total residual chlorine is considered to be super-chlorinated for the purposes of this guidance document. Such super-chlorinated water is a wastewater and should be managed as summarized in this guidance document.

- **Total chlorine residual** is the total chlorine present in a sample, consisting of free chlorine residual and combined available chlorine residual.
- **Wastewater** Any combination of liquid or water and pollutants from activities and processes occurring in dwellings, commercial buildings, industrial plants, institutions and other establishments, together with any ground water, surface water, and storm water that may be present, liquid or water that is chemically, biologically, physically or rationally identifiable as containing blackwater, gray water or commercial or industrial pollutants; and sewage (IDAPA 58.01.16.010.89).

1 Agency Contacts

For planned discharges resulting from construction, maintenance, and operation, the public water system owner or operator should contact the appropriate permitting agency, as described below, to obtain any needed permits or other authorizations and to ensure compliance with applicable rules and laws. DEQ regional managers can assist the public water system owner in determining the permitting and regulatory requirements.

For all unplanned and emergency releases, the public water system owner or operator should inform the regional DEQ office as soon as possible regarding the characteristics of the release, such as location, volume, and concentrations of disinfectants.

The recommended point of contact at DEQ is the Regional Engineering Manager for discharge to the land; EPA is the point of contact for discharges to surface water that require a permit under the federal Clean Water Act; and the Idaho Department of Water Resources is the point of contact for subsurface discharges that require a permit:

- DEQ Boise Region (208) 373-0550, toll-free: (888) 800-3480
- DEQ Coeur d'Alene Region (208) 769-1422, toll-free: (877) 370-0017
- DEQ Idaho Falls Region (208) 528-2650, toll-free: (800) 232-4635
- DEQ Lewiston Region (208) 799-4370, toll-free: (877) 541-3304
- DEQ Pocatello Region (208) 236-6160, toll-free: (888) 655-6160
- DEQ Twin Falls Region (208) 736-2190, toll-free (800) 270-1663
- U.S. EPA Region 10 (206) 553-1200, toll-free (800)-424-4372
- Idaho Department of Water Resources (208) 287-4800

2 Discharge Requirements by Discharge Path

Requirements for discharges of all water depend upon the path of the discharge, which is likely to be one of the following:

- Discharge to land
- Discharge to subsurface
- Discharge to waters of the state through a municipal separate storm sewer system (MS4)
- Discharge to a publically owned treatment works (POTW)
- Discharge to state waters

For each path, there is a distinct set of requirements, as described in the following.

2.1 Discharge to Land

DEQ does not consider potable water, as defined in this guidance, to be a wastewater subject to the Recycled Water Rules, IDAPA 58.01.17. Typically, discharge of wastewater to land requires a reuse permit issued by DEQ under the Recycled Water Rules and must comply with the Ground Water Quality Rule (IDAPA 58.01.11), and the Wastewater Rules (IDAPA 58.01.16). However, DEQ has determined, pursuant to the discretion afforded the agency under IDAPA 58.01.17.100.02.c, to exclude discharges of potable water from the permitting requirements. Given the character of the water and the episodic nature of the discharge, the potential risk of harm to public health and the environment, and the benefit gained by issuing a permit, is very low.

While a permit is not required for discharges of potable water, care should be taken to ensure that the water is discharged in a manner that avoids erosion and avoids the creation of a nuisance condition. The public water system owner or operator should contact the DEQ regional office to discuss the discharge.

If the water produced is otherwise potable except that it contains more than 4.0 mg/L of chlorine (such as is the case with water used for disinfection of new mains and reservoirs), then the risk of harm to public health and the environment caused by a discharge to land increases. This super-chlorinated water is a wastewater subject to the Recycled Water Rules unless it is dechlorinated to a chlorine concentration less than 4.0 mg/L prior to discharge. Dechlorination does not render this wastewater potable, but it can be discharged to land without a permit. For additional information on dechlorination, see the appendix to this guidance, page 9.

Discharge of any other wastewater treated to potable water standards is considered wastewater and remains subject to the Recycled Water Rules (IDAPA 58.01.17).

2.2 Underground Injection or Subsurface Discharge

Any planned discharge to the subsurface requires a permit, with the type of permit defined by the purpose of the discharge:

- Underground injection of wastewater for the purpose of disposal requires an application to the Idaho Department of Water Resources (IDWR) for the use of an injection well—most likely a shallow injection well (SIW), which requires submission of an SIW Inventory Form:

  http://www.idwr.idaho.gov/WaterManagement/WellInformation/Injection/shallow/default.htm

- Subsurface discharge for the purpose of wastewater treatment requires a permit from the local Public Health District. Discharge of chlorinated water to a septic system used to treat domestic sewage should be avoided because it can interfere with treatment, but there could be other contaminants that might be effectively treated if allowed under the permit.

2.3 Discharge to Municipal Separate Storm Sewer System

The public water system owner or operator should contact the MS4 owner/operator regarding such a discharge. Whether water can be discharged to waters of the state through a municipal separate storm sewer system (MS4) depends upon obtaining the permission of the MS4 owner/operator and any existing local requirements. In certain urban areas of Idaho,[1] the MS4 operator may themselves be subject to a National Pollution Discharge Elimination System (NPDES) permit issued by EPA and certified by DEQ;

[1] Note: EPA regulates MS4 discharges through unique permits issued to public entities in the greater urbanized areas of Idaho Falls, Pocatello, Boise/Garden City, Caldwell/Nampa, Lewiston, and Post Falls/Coeur d'Alene.

in these geographic areas, the public water system owner/operator must obtain the permission of the NPDES permit holder and comply with any applicable terms and conditions of the MS4 permit.

2.4 Discharge to a Publicly Owned Treatment Works

Whether water can be discharged to a publicly owned treatment works (POTW) depends upon the terms and conditions in the POTW's NPDES permit, pretreatment requirements and the permission of the POTW. The public water system owner or operator should contact the POTW regarding such a discharge.

2.5 Discharge to State Waters

Discharges of pollutants directly to surface waters from a point source require a National Pollution Discharge Elimination System (NPDES) permit issued by EPA. DEQ reviews federally issued discharge permits, including NPDES permits, to ensure that Idaho Water Quality Standards will be met through issuance and implementation of the permit. DEQ will grant or deny certification of the permit pursuant to Section 401 of the Clean Water Act, or may waive the right to certify.

The public water system owner or operator should contact EPA regarding obtaining a permit prior to planned releases into surface water. Unplanned or emergency discharges to surface water need to be reported to EPA. Idaho does not have NPDES primacy over administration and regulation of NPDES permitting.

EPA's NPDES permit, coupled with DEQ's 401 certification, will contain the requirements that must be met for a discharge to surface waters. NPDES permits must contain provisions that ensure compliance with Idaho Water Quality Standards (WQS) (IDAPA 58.01.02). The provisions in the WQS most likely to be relevant to a discharge from a public water system are as follows:

- Discharges containing chlorine must comply with the acute and chronic criteria for chlorine:
    - The 1-hour average chlorine concentration of the stream should not exceed 19 micrograms per liter (µg/L) more than once every three years.
    - The 4-day average concentrations should not exceed 11µg/L more than once every three years.
- Where dechlorination of chloramines generates ammonia, such concentrations must not exceed the chronic and acute criteria of Section 250 of the Water Quality Standards, which depend upon the temperature and pH of the water body.
- DEQ may consider the applicability of a mixing zone in the certification of the permit that provides an area of transition from a higher effluent concentration (at the point of discharge) to a lower ambient concentration. Concentrations within this zone may exceed criteria.

EPA indicates that the NPDES permit process has regulatory requirements regarding length of time to apply prior to a discharge and mandatory public review requirements. Since EPA historically has operated with a backlog of applicants seeking permit coverage, EPA recommends providing adequate lead-time for permit development and issuance.

3 Best Management Practices (BMPs)

In addition to meeting the discharge requirements described in the preceding, plans and specifications for PWS projects and PWS Operation and Maintenance Manuals should specify Best Management Practices (BMPs) for reducing the impacts of discharges. Examples of such practices may include the following actions.

3.1 Flushing

System flushing can generate large volumes of water. Environmental impacts can be minimized by performing flushing during dry months.

3.2 Storage or Treatment Tank Dewatering

Environmental impacts of storage tank dewatering can be minimized by the following actions:

- Prior to dewatering, the water level in the tank should be reduced to the lowest elevation possible through normal withdrawals without replenishment.
- If possible, the tank should be allowed to sit for an extended amount of time to allow any chlorine residual to dissipate; tank mixing may expedite this process.
- Tank draining should be conducted at a rate slow enough to not overwhelm the local stormwater or other drainage system if used for disposal.
- Any sediment-laden water should be treated to remove sediment prior to discharge.

3.3 Construction Dewatering

Construction activities in Idaho are covered by a general permit for stormwater discharges from construction sites (EPA, 2013). This permit outlines a set of provisions construction operators must follow to comply with the requirements of the NPDES stormwater regulations. This permit covers any construction activities disturbing one or more acres, including smaller site disturbances that are part of a larger common plan of development or sale that will exceed one acre.

Questions about specific requirements for construction dewatering can be directed to the Water Quality Manager of the DEQ regional office in which the discharge will be made.

3.4 Pump Tests or Pump-to-Waste

Pump tests or Pump-to-waste operations may generate large volumes of water, and the requirements for disposal of the water will depend on the path of discharge chosen, as described in this guidance. If the discharge is to land, special attention should be given to the prevention of erosion.

3.5 Unplanned or Emergency Discharge

Actions to accompany unplanned or emergency discharges should be addressed in the PWS Operation and Maintenance Manual, and employers and contractors should be familiar with and trained in the use of these actions. In all instances, the PWS should notify DEQ as described in the Agency Contacts section of this guidance.

3.5.1 Main break

Main breaks will usually produce large quantities of sediment-laden water. If possible, the discharge should be directed to a ponding area where the discharge may be allowed to settle out sediment and dissipate chlorine before disposal.

3.5.2 Fire hydrant discharge

Unplanned hydrant discharges, such as might occur from a vehicle collision with a hydrant, should not contain as much sediment as main breaks, but the discharge should still be directed to areas where the discharge may dissipate chlorine prior to disposal.

3.5.3 Facility failure

Total failure of facilities, such as storage tanks, can produce extremely large volumes of water that can overwhelm adjacent stormwater systems, cause severe erosion of nearby land, and potentially impact state waters or ground water. Directing the flow to ponding areas, if possible, will allow the sediment and chlorine to settle and dissipate. An attempt should be made to slow the discharge flow rate so as to not overwhelm any nearby stormwater system.

3.5.4 Post Fire-flow Disinfection

Significant fire flow events might occur from fighting multiple structure fires and result in production water in the distribution system that was not adequately disinfected. The systematic flushing of the distribution system may be needed to restore the distribution system and may generate large volumes of water. Follow Section 2 for the discharge of flushing waters.

3.6 Other BMPs

DEQ maintains a Catalog of Stormwater Best Management Practices for Cities and Counties (DEQ, 2005) that can also be used to reduce the impacts of PWS discharges:

http://www.deq.idaho.gov/media/622263-Stormwater.pdf

When in doubt regarding how to proceed, call your local DEQ regional office for assistance.

4 Discharge of Cleaning Materials and Chemicals

Discharges of cleaning materials and chemicals or water containing cleaning materials and chemicals must be disposed of in accordance with requirements that are applicable to the disposal method chosen. Depending upon the character of the material discharged and the path of disposal, the following may be applicable: NPDES permit for a surface water discharge, for recycled water (IDAPA 58.01.17), wastewater (IDAPA 58.01.16), or hazardous waste (IDAPA 58.01.05), whichever is applicable.

When in doubt, call your DEQ regional office and talk with the Waste and Remediation Manager for assistance with the proper discharge of cleaning materials and chemicals.

References

ANSI/AWWA C655-09. 2010. Field Dechlorination. American Water Works Association (AWWA). Denver, Co.

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IDAPA 58.01.16. 2013. Wastewater Rules. Accessed 7/18/2013 at http://adminrules.idaho.gov/rules/current/58/0116.pdf.

IDAPA 58.01.17. 2013. Recycled Water Rules. Accessed 8/5/2013 at http://adminrules.idaho.gov/rules/2012/58/0117.pdf.

Tikkanen M, et al. 2001. Guidance Manual for Disposal of Chlorinated Water. AWWA Research Foundation and American Water Works Association, ISBN 1-58321-143-8, Denver.

Appendix: Dechlorination Reference

Because free and combined chlorine can be toxic to some aquatic species in concentrations as low as 0.1 mg/L (Tikkanen, 2001, p2), it is recommended that super-chlorinated water (greater than 4 mg/L total chlorine) be dechlorinated prior to disposal, as described in the best practices documented in the AWWA Research Foundation's *Guidance Manual for Disposal of Chlorinated Water* (Tikkanen, 2001). It is also recommended that potable water be dechlorinated prior to discharge to storm sewers if these do not provide sufficient concentrations of impurities to react with the chlorine prior to reaching waters containing aquatic life (Tikkanen, 2001, p50).

Idaho has not set a maximum chlorine concentration for potable discharge, but the following limitations on chlorine and chloride apply:

- Idaho *Water Quality Standards* (IDAPA 58.01.02), sets an acute criterion of 0.019 mg/L total chlorine residual (1-hour average concentration not to be exceeded more than once every 3 years on average) and a chronic criterion of 0.011 mg/L (4-day average concentration not to be exceeded more than once in every 3 years average) for waters designated for aquatic life, recreation, or domestic water supply use; any discharge must not cause the receiving water to exceed these limits.
- The Idaho *Ground Water Quality Rule* (IDAPA 58.01.11), defines a secondary constituent standard for chloride of 250 mg/L. Discharges of chlorinated water should not cause ground water to exceed this limit.

Dechlorination can be achieved using natural (non-chemical) and chemical methods, as described in the following.

Non-Chemical Dechlorination

Where practical, non-chemical chlorine dissipation is preferred because it does not introduce neutralizing chemicals into receiving water bodies. In addition, the cost, health, and safety concerns related to storage, transport, and handling of chemicals are avoided. Several non-chemical methods of dechlorination, along with their advantages and disadvantages are listed in Table 1.

Table 1. Non-chemical dechlorination methods (Source: Tikkanen, 2001, p48).

Method	Advantages	Disadvantages
Retention in holding tanks	Does not add neutralizing chemicals.	Natural chlorine decay is slow, having a decay coefficient of 0.85 to 0.1 d^{-1}; decay of free chlorine residuals in a distribution system can take hours to days. Decay of combined chlorine can be three to four times slower still.
Land application	Does not add neutralizing chemicals.	May not be effective if applied to roads and pavements. Studies indicate poor chlorine decay for such surfaces, necessitating long travel distances to dissipate chlorine to concentrations non-toxic to aquatic life.
Discharge to a Municipal Separate Storm Sewer System (MS4)	Can be effective if storm sewers contain sufficient impurities to react with chlorine.	Chlorine may not be adequately dissipated over short distances. May not be acceptable to some MS4 owner/operators.

Discharge to a publicly owned treatment works (POTW)	The most safe and effective method, overall.	Requires availability of a sanitary sewer, permission of the treatment works, may require a discharge fee, and it may upset the treatment works.

Tikkanen (2001) describes additional non-chemical methods of chlorine dissipation.

Chemical Dechlorination

If non-chemical chlorine dissipation is not possible, there are a variety of chemical methods available (Table 2). As with non-chemical methods, there are advantages and disadvantages to each.

Table 2. Chemical dechlorination methods (Source: Tikkanen, 2001, p53).

Method	Advantages	Disadvantages
Sulfur Dioxide (SO_2)	Effective, and widely used by utilities.	SO_2 is a toxic chemical, and it can deplete dissolved oxygen in discharge water.
Sodium Thiosulfate ($Na_2S_2O_3$)	Effective, and widely used by utilities. Does not deplete oxygen to the extent some chemicals do.	Skin, eye, nose, and throat irritant that is moderately toxic. Dechlorination of chloramines may produce ammonia or ammonium, depending on pH.
Sodium Sulfite (Na_2SO_3)	Effective, and widely used by utilities. The only dechlorination chemical available in tablet form, which makes it easier to store, handle, and apply.	Eye, skin, mucous membrane, and respiratory tract irritant.
Sodium Metabisulfite ($Na_2S_2O_5$)	Reacts with chlorine and chloramine according to known stoichiometry.	Eye, throat, skin, and lung irritant. Can produce ammonia or ammonium, depending on pH.
Calcium Thiosulfate (CaS_2O_3)	Reacts well with chlorine and chloramine, but the stoichiometry of the chloramine reaction is not well known.	May cause eye and skin irritation.
Additional methods (ANSI/AWWA C655-09, p5):		
Ascorbic Acid	Does not scavenge dissolved oxygen.	May decrease pH in low alkaline waters.

Sodium Ascorbate	Does not scavenge dissolved oxygen.	Solutions can degrade rapidly, so prepare at time of use.

Tikkanen (2001 p70) provides additional information on these chemicals, including comparison by cost, dose requirements, pH, off-gassing, and oxygen scavenging characteristics. AWWA/ANSI C655-09, Field Dechlorination Standard (2010 p5) provides dechlorination reactions with free chlorine and chloramines, along with a discussion of the elements that should be included in dechlorination plans and procedures.