

**Utah Department of Environmental Quality  
Division of Drinking Water**

**GUIDANCE FOR HAULING DRINKING  
WATER**

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## 1. Statement of Intent / Use of this Guidance

This guidance provides basic information about temporary water hauling by Public Water Systems during emergencies. Water hauling involves collecting drinking water in a portable tank or vessel from an approved Public Water System and source and delivering it to another Public Water System or directly to the public. A Public Water System that needs to haul water must assure that the water meets the same state and federal drinking water standards that normally apply to public drinking water.

Hauling drinking water during an emergency must be done in a manner that protects public health. Each step in the water hauling process has the potential to introduce contaminants to the drinking water, which could make it unfit for human consumption. This guidance provides information intended to limit the potential for water contamination during water hauling.

## 2. Proposal to Haul Water - Obtaining DDW Approval

The Director of the Division of Drinking Water (Director) has the authority to regulate the use of hauled water by Public Water Systems in Utah through UAC R309-550-10, *Water Hauling*. Public Water Systems may only use water hauling during emergencies or under the specific conditions described in UAC R309-550-10.

Community Water Systems that need to temporarily haul water during an emergency must obtain the Director's approval prior to the start of water hauling and submit a water hauling proposal either before or immediately after the start of water hauling. Non-community Water Systems that have no other option but to haul water are required to prepare a proposal and obtain the Director's approval prior to the start of water hauling. In either case, a Public Water System may complete the *Water Hauling Proposal* form, found in Appendix B, and submit it to the Director for approval as a proposal to haul water or for review as an after-the-fact description of its emergency water hauling process.

## 3. Use of an Approved Source to Supply Hauled Water

The source providing hauled water must be an approved drinking water source from a Public Water System rated as approved by the Division of Drinking Water. The Public Water System must be in compliance with drinking water Maximum Contaminant Levels and monitoring requirements.

## 4. Water Hauling Equipment

All equipment, including tanks, gaskets, hoses, fittings, pumps, etc., that may come into contact with the hauled water should be comparable to equipment meeting the standards of NSF/ANSI 61 - *Drinking Water System Components – Health Effects*. Prior to selecting used equipment for water hauling, a Public Water System must determine how the equipment was used; if the previous use of the equipment is unknown, it may **not** be used to haul water. Preferably, the equipment should have been previously used solely to transport, store, or pump **drinking** water.

In an emergency, the Director may approve the use of equipment that was previously used to transport, store, or pump food-grade liquids, such as juice, pasteurized milk, wine, spirits, or vinegar, provided that the rigorous cleaning and disinfection procedures described below are followed and that the Public Water System demonstrates that no other equipment is available.

#### **4.a. Tanks or Vessels**

The preferred method of water hauling is with tanks or vessels dedicated solely to drinking water. The tank should be constructed of a material suitable for holding drinking water and be comparable to equipment meeting NSF/ANSI 61 - *Drinking Water System Components – Health Effects*.<sup>1</sup> A tank used to haul drinking water must be watertight, be in good condition, be easy to clean, and have no interior features that can hold dirt or residue. It must have a drain or an outlet valve and be constructed to drain completely. If vented, the vent must be downturned and covered with No. 14, or finer, stainless-steel mesh screen. Tank openings, including hatches, must extend above the exterior tank surface and be sealed with watertight, food-grade gaskets with overlapping covers. The covers on tank openings should have security locks, which are locked when not in use. The covers should be secured to the tank with chains, cables, or hinges.

#### **4.b. Hoses**

Hoses used to load and unload hauled water should be comparable to equipment meeting NSF/ANSI 61 standards and be made of materials that impart no taste or odor to the water. Hoses should be kept off the ground at all times. They either should have end-caps or be stored in an enclosure for protection from contamination when not in use or during transportation. Hose end-caps should be secured with chains or cables. Garden hoses, rubber hoses, canvas fire hoses, and hoses previously used for non-drinking water should not be used.

#### **4.c. Pumps**

Pumps used to transfer hauled water should be new or have been previously used only to pump drinking water. Pump lubricants should meet NSF/ANSI 60 – *Drinking Water Treatment Chemicals – Health Effects*. Pumps previously used to pump food-grade liquids may only be used with the Director’s approval and after rigorous cleaning and disinfection.

### **5. Cleaning Water Hauling Equipment Prior to Disinfection**

Dirt or debris in the water hauling equipment can interfere with disinfection. Heavy particles may contain bacteria that even concentrated chlorine may not be able to contact and kill.<sup>2</sup> Therefore, equipment must be clean before final disinfection by chlorination. Water hauling equipment that is new; shows evidence of dust, dirt, debris, or other foreign matter; or has been previously used to transport, store, or pump food-grade liquids must be thoroughly cleaned prior to being disinfected as described below.

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<sup>1</sup> “Planning for an Emergency Drinking Water Supply,” EPA 600/R-11/054 (Washington, DC: Office of Research and Development, US EPA, 2011), p. 11.

<sup>2</sup> “Disinfecting Water Mains,” ANSI/AWWA C651-14 (Denver, CO: American Water Works Association, 2014), p. 12.

### 5.a. Cleaning Water Hauling Tanks

Prior to cleaning, drain the tank of residual liquid. Clean the tank interior with a mixture of detergent and drinking water using a clean brush or high-pressure water jet<sup>3</sup> if necessary. Warm or hot water may be used if available. No solvents or toxic cleaners may be used. Properly dispose of the water and detergent mixture as it drains from the tank.

When the tank is clean, rinse it using clean drinking water until the water draining from the tank is detergent-free. A high-pressure water jet may be used. Drain the water from the tank and properly dispose of the drained water. The tank is now ready to be disinfected according to the procedure below.

### 5.b. Cleaning Hoses and Pumps

The interior surfaces of hoses, pumps, and other equipment that will come into contact with the hauled water must be cleaned of dirt, debris, or residue. Prepare a mixture of detergent and drinking water, flush the hoses and pumps with the mixture, and then rinse the equipment with clean, drinking water until the water runs detergent-free. The hoses and pumps are now ready to be disinfected according to the procedure below.

## 6. Disinfection of Water Hauling Equipment

The interior surfaces of tanks and equipment must be disinfected with chlorine according to one of the methods described below prior to coming into contact with the drinking water that will be collected, transported, and delivered during the water hauling process. The following disinfection procedure applies to all water hauling equipment, including equipment that requires preliminary cleaning according to the above procedure and equipment regularly used to haul water.

### 6.a. Using Chlorine as a Disinfectant

A chlorine solution must be used to disinfect interior surfaces of the water hauling equipment, including tanks, hoses, pumps, etc. Trained Public Water System personnel may use any of the forms of chlorine described in ANSI/AWWA C652-11, *Disinfection of Water Storage Facilities*, to prepare the required chlorine solutions for disinfection.

Small-scale water hauling operations that choose to prepare chlorine solutions for disinfection must use a liquid hypochlorite solution that is certified to meet NSF/ANSI 60 – *Drinking Water Treatment Chemicals – Health Effects*. Commercially manufactured sodium hypochlorite is available from water treatment equipment suppliers. Regular liquid bleach, which contains sodium hypochlorite, may **only** be used if it carries the NSF/ANSI 60 certification. Typical household liquid bleaches that lack NSF/ANSI 60 certification may **not** be used as a disinfectant for drinking water or water hauling equipment.

Liquid sodium hypochlorite comes in various strengths ranging from approximately 5% to 15%

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<sup>3</sup> “Cleaning and Disinfecting Water Storage Tanks and Tankers,” Technical Notes on Drinking-Water, Sanitation and Hygiene in Emergencies, Technical Note No. 3 (Leicestershire, UK: Water Engineering and Development Centre, World Health Organization, 2011), p. 3.1.

available chlorine.<sup>4</sup> The strength and age of the sodium hypochlorite must be taken into consideration when preparing the solution to be used for disinfection. Tables in Appendix C show how to make different concentrations of chlorine disinfectant by adding liquid sodium hypochlorite to treated drinking water. Because liquid sodium hypochlorite loses 2 to 4 percent of its available chlorine content per month when stored at room temperature, the maximum recommended shelf life is 60 to 90 days.<sup>5</sup>

Sodium hypochlorite is corrosive and should be handled with care. Protective equipment, such as goggles and rubber gloves and aprons, should be worn when handling sodium hypochlorite solutions.<sup>6</sup>

## 6.b. Disinfection of Water Hauling Tanks

Tanks can be disinfected by one of the following methods:

**Method 1:** To disinfect a tank by full contact, fill the tank with drinking water containing sufficient chlorine that will provide a free chlorine residual of 50 mg/L. Seal the tank and let it stand undisturbed for 6 hours.<sup>7</sup>

If using liquid sodium hypochlorite to disinfect a tank by *Method 1*, determine the volume of water needed to fill the tank. Calculate the amount of liquid sodium hypochlorite needed to be added to that volume of water to provide a free chlorine residual of at least 50 mg/L (see tables in Appendix C). Begin filling the tank with water while gradually adding the liquid sodium hypochlorite. To achieve adequate mixing, add the bleach and water proportionally to maintain a uniform chlorine concentration while filling the tank. Seal the tank when full, and let it stand undisturbed for 6 hours.

**Method 2:** To disinfect a tank by spraying or painting, prepare a 200 mg/L solution of chlorinated water, spray or paint the interior tank surface with the solution making sure to wet the entire surface. Continue to re-wet the surface as necessary to keep it in contact with the solution for a minimum of 30 minutes.<sup>8</sup>

If using liquid sodium hypochlorite to disinfect a tank by *Method 2*, determine the volume of water needed to spray or paint the interior tank surface and keep it wet by re-application. Calculate the amount of liquid sodium hypochlorite needed to be added to that volume of water to provide an available chlorine concentration of at least 200 mg/L (see tables in Appendix C). Mix the water and chlorine together in a clean make-up tank and apply it by spraying or painting the interior tank surface as necessary to keep it wetted for a minimum of 30 minutes. (Avoid breathing the mist.)

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<sup>4</sup> "Disinfection of Water Storage Facilities," ANSI/AWWA C652-11 (American Water Works Association, 2011), p. 5.

<sup>5</sup> *Introduction to Water Treatment: Principles and Practices of Water Supply Operations*, Volume 2, American Water Works Association (Denver, CO: American Water Works Association, 1984), p. 296.

<sup>6</sup> *Water Chlorination Principles and Practices*, AWWA Manual M20, American Water Works Association (Denver, CO: American Water Works Association, 1973), p. 53.

<sup>7</sup> *Water Chlorination Principles and Practices*, AWWA Manual M20, p. 37.

<sup>8</sup> "Disinfection of Water Storage Facilities," ANSI/AWWA C652-11, p. 7.

After the minimum chlorine contact time has been met, using one of the above disinfection methods, drain the chlorine solution from the tank and dispose of it properly. Thoroughly rinse the tank with drinking water, drain, and properly dispose of the rinse water. The tank is now ready to be filled with drinking water.

**CAUTION:** Do not discharge highly chlorinated water on to the ground or to surface water (such as a stream, pond, lake, or wetlands) where it can kill aquatic life, wildlife, and vegetation. Contact the Utah Division of Water Quality to determine if the water may be discharged and what treatment is required. The chlorine solution may be discharged to a sanitary sewer only after obtaining permission from the sewer system owner.

### **6.c. Disinfection of Hoses and Pumps**

The interior surfaces of hoses and pumps that will come into contact with the treated drinking water must also be disinfected prior to use.

Hoses may be disinfected by full contact with a concentrated chlorine solution. If using liquid sodium hypochlorite, calculate the amount needed to be added to a sufficient volume of water to fill the hoses and to achieve a free residual chlorine of 50 mg/L (see tables in Appendix C). After capping one end, fill the hose with the chlorinated water, cap the open end, and let the hose stand undisturbed for 6 hours. At the end of the 6-hour contact time, drain the chlorine solution, flush with clean water, drain, and cap the hose to prevent contamination.<sup>9</sup>

A stand-alone pump can be disinfected along with the hoses by filling them with water containing an available chlorine concentration of 50 mg/L and letting them stand undisturbed for 6 hours. At the end of the 6-hour contact time, drain the chlorine solution, flush with clean water, drain, and cap the hoses and pump to prevent contamination.

For tanks equipped with pumps, the hoses and pumps may be disinfected simultaneously with the tank by circulating water containing an available chlorine concentration of 50 mg/L drawn by the pump from the tank and returned through the hoses. After setting up a closed loop, recirculate the chlorinated water for one hour,<sup>10</sup> let the tank, hoses, and pump stand undisturbed for another 5 hours (total contact time is 6 hours). Flush the hoses, pump, and tank with clean water, drain, and cap them to prevent contamination.

Spraying or painting with a highly concentrated chlorine solution may be inappropriate for disinfecting hoses and pumps. Pump materials may not be suitable for prolonged exposure to chlorine and sodium hypochlorite.<sup>11</sup>

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<sup>9</sup> Adapted from the procedure for disinfecting tanks and reservoirs found in *Water Chlorination Principles and Practices*, AWWA Manual M20, p. 37.

<sup>10</sup> "Cleaning and Disinfecting Water Storage Tanks and Tankers," p. 3.3.

<sup>11</sup> "Horizontal and Vertical Line-Shaft Pumps," ANSI/AWWA E103-07 (Denver, CO: American Water Works Association, 2008), pp. x-xi.

## 7. Water Hauling Procedure

After completing cleaning and disinfection, the equipment is ready for water hauling. Care must be taken not to contaminate the water or disinfected equipment during collection, loading, transport, and unloading. All equipment openings must be closed when not in use. The drinking water must be tested for coliform bacteria when it is first loaded into the tank and periodically during water hauling. Each batch of water must also be tested for free chlorine residual when loading and unloading.

### 7.a. Loading the Water

Fill the disinfected tank with treated drinking water from an approved Public Water System. The tank must be filled in a manner that prevents the backflow of water from the hauling tank to the water source. This may be accomplished by employing a double check assembly when a direct connection from the water source to the tank is used or by maintaining an air gap (see Appendix D) between the hose drawing water from the source and the tank receiving the water. Hoses must be kept off the ground during filling to avoid contamination of the hauling tank. When filling a tank using an air gap, care should be taken to prevent wind-born contaminants from entering the tank.

To keep the water safe for drinking, during transportation it should have a minimum free chlorine residual of 1 mg/L, but no greater than 4 mg/L, when loaded (see tables in Appendix C). Measure and record the free chlorine residual of the water in the tank prior to closing the filling port. If the concentration is less than 1 mg/L, add chlorine to the tank in the proper proportion to achieve the required concentration. Close the port through which the tank was filled and properly store the hoses.

### 7.b. Transporting the Water

After loading the water hauling tank, the water should be delivered without delay. The chlorine concentration of the water in the tank will decline over time. Water held in a water hauling tank must be discarded if a free chlorine residual is not detected at the time of unloading.<sup>12</sup> If a rapid decline in free chlorine residual occurs during transportation, additional chlorine should be added to provide a free chlorine residual of 1 mg/L but no greater than 4 mg/L.

### 7.c. Unloading the Water

Before delivering the hauled water, the water storage tank and distribution system that will receive the water must have remained free of contamination while they have stood unused. If the water system has completely run dry or pressure in the distribution system has fallen below 20 psi, the distribution system must be disinfected as required by ANSI/AWWA C651-05, *Disinfecting Water Mains*, before the hauled water can be delivered. If the sanitary condition of the water storage tank has been compromised, it must first be disinfected to prevent contamination of the delivered water when unloaded. Follow the procedures of ANSI/AWWA C652-11, *Disinfection of Water Storage Facilities*, to clean and disinfect the water storage tank if needed.

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<sup>12</sup> See discussion of disinfectant residual in the distribution system in Federal Register/Vol. 54, No. 124/Thursday, June 29, 1989/Rules and Regulations, p. 27495.



If hauled water is being unloaded into a temporary water storage tank, that tank must be certified to meet NSF/ANSI 61 - *Drinking Water System Components – Health Effects* and be cleaned and disinfected as described above.

Prior to unloading, the free chlorine residual of the water in the hauling tank must be tested and recorded.

- If the water contains a free chlorine residual of at least 1 mg/L, the water can be unloaded and used immediately.
- If a free chlorine residual is not detected, the water must be discarded and the cause of the chlorine residual depletion should be investigated.
- If a free chlorine residual is detected but is less than 1 mg/L, chlorine should be added to provide a minimum of 1 mg/L but no greater than 4 mg/L. After unloading the water, a free chlorine residual of at least 1 mg/L must be present after 30 minutes before distributing the water.

When unloading the water, hoses should be kept off the ground and not be submerged in the tank receiving the water. After unloading the water, the ports of both tanks should be closed to protect them from contamination and the hoses capped and properly stored.

## **8. Water Hauling Frequency – When to Repeat Cleaning and Disinfection**

The water hauling equipment does not have to be re-cleaned and re-disinfected after the initial delivery provided that the above procedures were followed and the equipment is used daily to deliver hauled water. Simply follow the water hauling procedures to maintain the sanitary condition of the equipment and test each load to assure the presence of a free chlorine residual as specified above.

If water hauling is done intermittently and the equipment is sealed to prevent contamination, water delivery may resume after rinsing the equipment with chlorinated drinking water. If the equipment has been open to the atmosphere or shows evidence of dust, dirt, debris, or foreign matter, it must be cleaned **and** disinfected according to the above procedures.

If the hauled water tests positive for coliform bacteria at any time during the period in which water is being hauled, the water must be discarded and the tank flushed and disinfected according to the above procedures.

If the equipment is used to load, store, or transport food-grade liquids after being cleaned and disinfected for water hauling, a new proposal for water hauling must be prepared and submitted to the Director and all of the above procedures completed once again.

## **9. Bacteriological and Free Chlorine Residual Monitoring and Reporting**

After disinfecting the water hauling equipment and filling the tank with the **first** load of drinking

water supplied by an approved Public Water System, the water must be sampled for total coliform bacteria. The samples must be analyzed by the state of Utah primacy laboratory or another certified laboratory. The date, time, and name of the person collecting the sample should be recorded (use the *Water Hauling Checklist* in Appendix E). Copies of the record of coliform sampling and the laboratory analysis results must be maintained by the Public Water System receiving the hauled water and made available to the Division of Drinking Water upon request.

If coliform bacteria are absent, the water may be delivered and regular water hauling may proceed. If coliform bacteria are present, the water must be discarded and the tank disinfected again using the above procedures. If multiple positive coliform bacteria samples continue to be found after repeated disinfection of the tank, the tank may not be used to haul water and a new tank must be found.

The water must be tested for coliform bacteria periodically during the period of water hauling. When hauling water daily, coliform samples should be collected and analyzed weekly. If water is hauled intermittently, coliform samples must be collected from the first load each time water hauling resumes. If coliform bacteria are detected, the water must be discarded and the water hauling equipment must be disinfected according to the above procedure before water hauling may resume.

The free chlorine residual must be measured twice for every load of water hauled. The free chlorine residual in the tank must be measured when the same batch of water is loaded and unloaded. The measured free chlorine residual must be recorded, be provided to the Division of Drinking Water monthly, and maintained by the Public Water System receiving the hauled water (use the *Water Hauling Checklist* in Appendix E). If a free chlorine residual is not detected at the time of delivery, the water must be discarded.

# Appendix A

## Brief Summary of Water Hauling Steps

### 1. Submit a Water Hauling Proposal

Notify the Director of the Division of Drinking Water of the need to haul water. Complete the Water Hauling Proposal form found in Appendix B and submit it for review.

### 2. Select the Equipment

The preferred method of selecting equipment is to find a commercial water hauler or Public Water System with the experience and equipment to safely deliver drinking water during an emergency. Alternately, choose equipment that has been used exclusively for drinking water, or purchase new equipment comparable to equipment certified to meet NSF/ANSI 61.

### 3. Clean the Equipment

If the equipment is new or shows evidence of dust, dirt, debris, or foreign matter, clean the tank, hoses, and pump with a solution of clean water and detergent. Drain the wash water and rinse with clean water until it runs clear of detergent. Drain the rinse water from the equipment and close all openings to protect the equipment from contamination.

### 4. Disinfect the Equipment

Use one of the following methods to disinfect the tank.

Method 1: To disinfect a tank by full contact, fill the tank with drinking water containing sufficient chlorine that will provide a free chlorine residual of 50 mg/L. Seal the tank and let it stand undisturbed for 6 hours.

Method 2: Prepare a 200 mg/L solution of chlorinated water and spray or paint the entire interior tank surface with the solution. Continue to re-wet the surface as necessary to keep it in contact with the solution for a minimum of 30 minutes. Drain the tank and properly dispose of the chlorinated water.

Disinfect the hoses and pump by filling them with water containing an available chlorine concentration of 50 mg/L and let them stand undisturbed for 6 hours. At the end of the 6-hour contact time, drain the chlorine solution, flush with clean water, drain, and cap the hoses and pump to prevent contamination.

### 5. Fill the Tank

Fill the water hauling tank through a water filling station or using clean disinfected hoses with drinking water from an approved Public Water System. Add chlorine to provide a free chlorine residual of 1 mg/L. Collect a water sample in a bottle supplied by an approved drinking water laboratory. Send the sample to the lab to test for total coliform bacteria.

### 6. Deliver the Water

Before delivering the first load of water, confirm that it is free of coliform bacteria based on sample results from a certified laboratory. At the water delivery point, test the water to confirm a minimum free chlorine residual of 1 mg/L. Transfer the water from the water hauling tank to the Public Water System tank receiving the water. Keep hoses off the ground. Do not submerge the hose in the water in the tank receiving it. After unloading, close the ports of both tanks. Cap and properly store the hoses.

### 7. Document Water Hauling Process

Use the *Water Hauling Checklist* in Appendix E to document the water hauling process.

## Appendix B

### Water Hauling Proposal

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*Provide the following information and submit the completed form to the Director, Utah Division of Drinking Water, or call the DDW Engineering Section at (801) 536-4200 with questions.*

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1. Name of Public Water System (PWS) Hauling Water:

ID Number of PWS Hauling Water:

2. Describe the Emergency or Reason for Requesting the Use of Hauled Water:

3. Identify How the Hauled Water Will Be Used (drinking, showering, cooking, food-washing, etc.):

4. Name of Approved PWS Supplying Hauled Water:

ID Number of Approved PWS Supplying Hauled Water:

Name of the Water Source and Source ID Providing the Water (if applicable):

Describe Specific Location and Particular Component of the PWS that Will Supply the Water (i.e., water storage tank, water filling station, water supply well, hydrant, etc.):

5. Name and Contact Information for the Company or Individual Hauling the Water (if applicable):

6. Describe Tanks, Vehicles, and Equipment Transporting Hauled Water:

7. Quantity of Water to Be Hauled (each time) in Gallons:

8. Frequency at which Water Will Be Hauled (twice daily, daily, twice weekly, etc.):

9. Anticipated Start and End Dates for Water Hauling:

10. Type of Disinfectant to Be Used (must meet ANSI/NSF Standard 60):

11. Frequency and Method of Cleaning Water Hauling Equipment:

12. Frequency and Method of Disinfecting Water Hauling Equipment:

13. Frequency and Method of Chlorine Residual Monitoring of Hauled Water:

14. Frequency of Bacteriological Sampling of Hauled Water:

15. Date, Name, and Contact Information of Local Authority Concurring with Water Hauling Request:

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**Name and Title:**

**Date:**

**Signature:**

**Phone Number/email:**

## Appendix C

### Mixing Chlorine Solutions Using Liquid Sodium Hypochlorite (5.25% & 12.5%)

#### 5.25% Liquid Sodium Hypochlorite (NSF/ANSI 60 certified)

Desired Chlorine Concentration:	Amount of 5.25% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
1 mg/L*	1 ½ tsp**	100 gallons
1 mg/L	⅓ cup	1,000 gallons
1 mg/L	1 ½ cups	5,000 gallons

Desired Chlorine Concentration:	Amount of 5.25% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
50 mg/L	1 ½ cups	100 gallons
50 mg/L	1 gallon	1,000 gallons
50 mg/L	5 gallons	5,000 gallons

Desired Chlorine Concentration:	Amount of 5.25% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
200 mg/L	6 cups (1 ½ quarts)	100 gallons
200 mg/L	4 gallons	1,000 gallons
200 mg/L	20 gallons	5,000 gallons

#### 12.5% Liquid Sodium Hypochlorite (NSF/ANSI 60 certified)

Desired Chlorine Concentration:	Amount of 12.5% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
1 mg/L	⅔ tsp	100 gallons
1 mg/L	6 tsp	1,000 gallons
1 mg/L	⅔ cups	5,000 gallons

Desired Chlorine Concentration:	Amount of 12.5% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
50 mg/L	⅔ cups	100 gallons
50 mg/L	6 ⅔ cups	1,000 gallons
50 mg/L	2 gallons	5,000 gallons

Desired Chlorine Concentration:	Amount of 12.5% Liquid Sodium Hypochlorite:	Amount of Drinking Water:
200 mg/L	2 ½ cups	100 gallons
200 mg/L	1 ⅔ gallons	1,000 gallons
200 mg/L	8 gallons	5,000 gallons

\*1 mg/L (milligram per liter) = 1 ppm (part per million)

\*\*tsp - teaspoon

**Note:** A chlorine dose calculator is available on the Division of Drinking Water web site.

## Appendix D

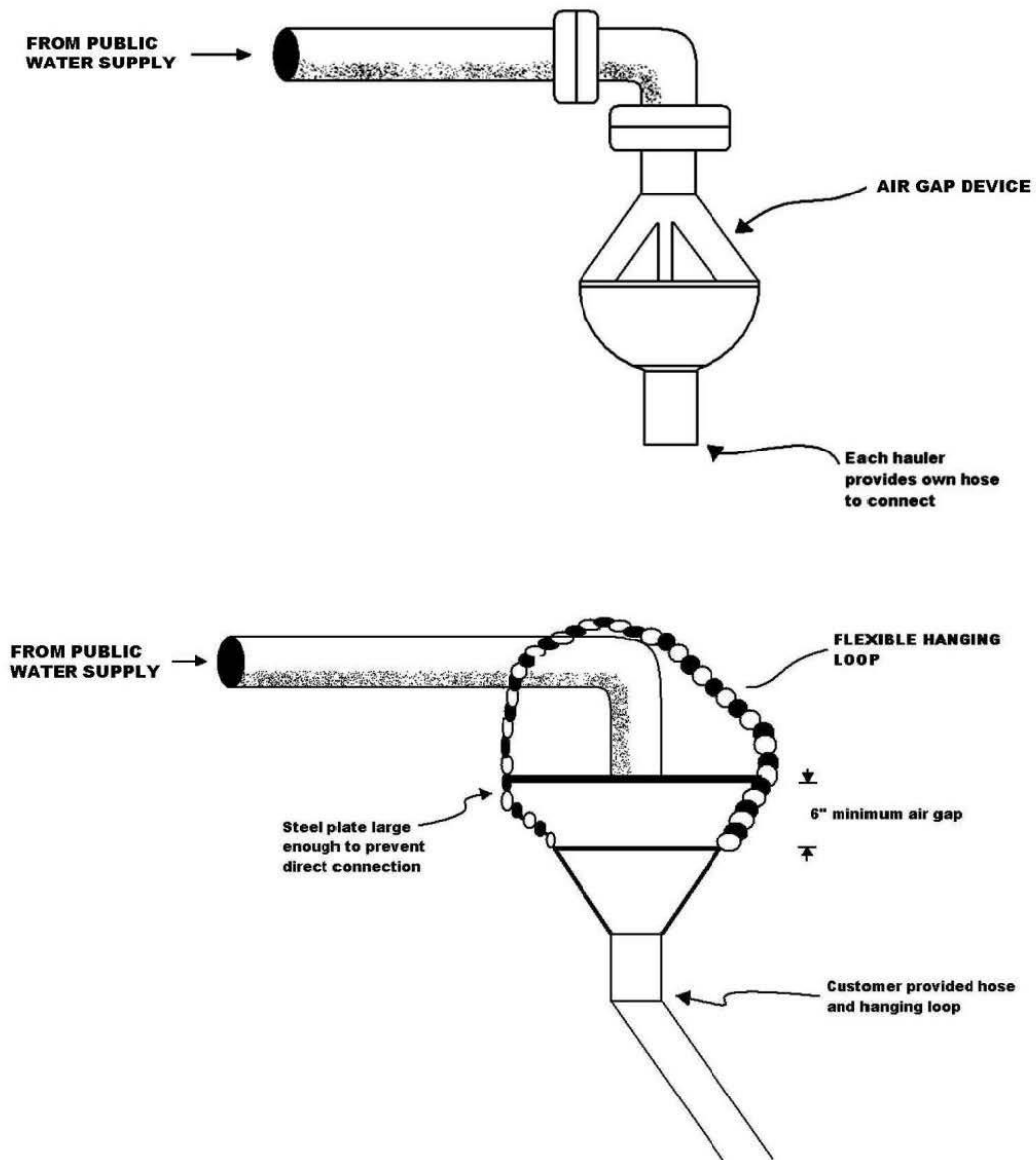


Figure 1. Suggested Methods of Providing Air Gap.  
(Reproduced From 2012 Edition of "Recommended Standards for Water Works")

**Appendix E** (this form is available as a fillable spreadsheet on the Division of Drinking Water web site)

Utah Division of Drinking Water - Water Hauling Checklist								
WATER SYSTEM NAME (WATER SYSTEM ID UTAH #XXXXX)								
Source of Hauled Water: WATER SYSTEM NAME (UTAH #XXXXX) or WATER SOURCE NAME (WS00X) or Address/Description								
Utah DDW Water Hauling Approval Date ____/____/____								
(If applicable) XXXXXX Health Department Water Hauling Approval Date ____/____/____								
Date								
Water Operator Certification No.								
Operator Signature (or initials)								
Tanker or vessel volume (gallons)								
Hauled water volume (gallons)								
Disinfectant meeting ANSI/NSF 60 standard?								
Chlorine residual > 1ppm & < 4ppm during loading?								
Chlorine res. > 1ppm & < 4ppm during unloading?								
Equipment (tanker/vessel, hoses, pumps, etc.) inspected for cleanliness or disinfected?								
Hoses protected from contaminant & hose ends not contacting the ground?								
Cap the inlets, outlets & hose ends when not in use?								
Tanker/vessel access port watertight and locked?								
Tanker/vessel lid gasket watertight?								
Tanker/vessel lid secure before moving?								
Bacteriological sampling (if applicable)	Bacteriological sample collected?							
	Sample Type (e.g., initial, weekly, monthly, after non-use period, etc.)?							
	Satisfactory bacteriological result?							
Tanker/vessel disinfection (if applicable)	Target chlorine level (in ppm)							
	Contact time (in minutes)							
	Proper discharge of chlorinated water?							
	Thoroughly rinse the vessel?							

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