

**NATURAL RESOURCES CONSERVATION SERVICE
INTERIM CONSERVATION PRACTICE STANDARD**

WATER TREATMENT FACILITY

(No.)

INTERIM CODE 724

DEFINITION

The mechanical, chemical, or biological treatment of ground water to meet livestock drinking water standards.

PURPOSE

Improve ground water quality by reducing nutrient content, inorganic compounds, temperature, electrical conductivity, pathogens, and/or other contaminants to meet the intended use.

Improve air quality by reducing odors and gaseous emissions from a water source.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where:

- Water from wells and springs contain concentrations of nutrients, inorganic compounds, dissolved solids, temperature and other contaminants that make the water unsuitable for livestock use water supplied from wells and springs.
- The water has odors and/or gaseous emissions that make the water unsuitable for livestock use and/or contribute to air pollution.
- High ground water temperatures cause excessive increase in the cost of plumbing materials.
- Reduction of pathogens is required.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations. Plan, design and construct the water treatment facility to comply with all pertinent federal, state, and local laws and regulations.

Design. Prepare a detailed design of the facility/process that clearly outlines the objectives and anticipated outcomes of implementation.

Include a process diagram that contains the following minimum information:

- Description of the proposed solution.
- Volumetric flow rates including inflow and discharge from the water treatment facility.
- Inflow pressure requirements and expected discharge pressure conditions.
- Inflow water chemistry including nutrient content, inorganic compounds, temperature, Total Dissolved Solids, pathogens, and/or other contaminants.
- Anticipated discharge water chemistry following installation.
- Projected water temperature reductions.
- Process monitoring and control system demonstrating results of the use of the facility or process in other similar situations and locations.

Location. Locate the water treatment facility or process as close as practicable to the source of the ground water and its point of use.

If the water treatment facility requires power, locate the facility as near the power source as practicable.

Provide access to the water treatment facility or process for its installation and maintenance. Include protective sensors to detect low or stopped flow, or pressures that are too high or too low.

Locate the water treatment facility outside of the 100-year flood plain or protect the facility from inundation.

Components. Where applicable, use AWWA M46 2nd Edition Reverse Osmosis and Nanofiltration, ASTM D4516 – 00 (2010) Standard Practice for Standardizing Reverse Osmosis Performance Data, and ASTM D4472 – 08 Standard Guide for Recordkeeping for Reverse Osmosis and Nanofiltration Systems, for planning, design, installation and operations of the treatment facility.

A water treatment facility and its processes may consist of multiple components. Ensure the water treatment facility or process has a minimum practice life of ten years. Where components have less than a 10-year service life, clearly identify the replacement schedule in the Operation and Maintenance (O&M) plan.

Buildings and accessories. Mount the water treatment facility on a solid foundation such as pilings or concrete. Design foundations to meet manufacturer recommendations and meet local and state building codes.

Where buildings are necessary to protect the water treatment facility, include provisions for adequate ventilation and accessibility for equipment maintenance, repairs, or removal. Design structures and equipment with safety features to protect operators, workers, and the public from potential injury. Drive shaft covers shall be required on all exposed rotating shafts. Install warning signs and access controls, as needed.

Secure the building to limit unauthorized access by providing locking doors or security fencing. Include provisions for connection of flow and pressure measurement devices in power plant system design.

Criteria to Improve Water Quality

The selected treatment process must reduce contaminant levels below the maximum recommended levels for the intended use of the water.

For livestock, use the recommended water quality levels provide in the National Engineering Handbook Part 651 - Agricultural Waste Management Field Handbook Table 1-8 Desired and potential problem levels of pollutants in livestock water supplies and Table 1-9 Effect of salinity of drinking water on livestock and poultry.

As applicable, the maximum contaminates levels listed in the EPA National Primary and Secondary Drinking Water Regulations should be considered.

Criteria to Improve Air Quality

When there is an air quality problem associated with ground water withdrawals, take appropriate safety measures to avoid toxic and potentially explosive gases.

Measures may include installation of carbon filters or a chemical feed pump to inject an oxidizer.

CONSIDERATIONS

Consider an alternative water source such as, surface water, rural water system, or a different aquifer that meets required quality standards. During the planning and design stage, consider the availability of any parts or filters the system may require.

In determining the location of the facility, consider elevation and distance from various components to take advantage of gravity flow. Consider the visual appearance of the buildings or structures associated with the water treatment facility or process in terms of aesthetic compatibility with the surrounding environment.

PLANS AND SPECIFICATIONS

Include engineering drawings, all supporting documentation and related plans required to manage the system.

Prepare plans and specifications for the water treatment facility and processes in accordance with the criteria of this standard and good engineering practice.

As a minimum, the plans and specifications will include the following:

- Description of the water quality problem, the intended use of the water, and the recommended system for water treatment.
- A plan view showing the location of the water treatment facility or process in relationship to other structures or natural features.
- Location of all inflow and discharge pipelines, pipeline materials, diameter and slope.
- Details of support systems for all components of the water treatment facility or process.

- Written specifications that describe the site specific details of installation, including all safety features.
- Operation and Maintenance Plan.
- Plans and procedures for the proper disposal of the removed byproducts, flush water, and/or cleaning agents.

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Warranties. The contractor must provide a one-year warranty on all construction. If a manufactured water treatment process is installed, the manufacturer must provide a warranty that describes the design life of the device and what the warranty covers.

OPERATION AND MAINTENANCE

Develop an O&M plan and review it with the owner/operator prior to construction of the water treatment facility or process. Ensure the O&M plan is consistent with proper operation of all system components and contains, as a minimum, the following requirements:

- Proper operating procedures for the water treatment facility, including the amount and timing of any chemicals added or filter replacement.
- Description of the planned startup procedures, normal operation, safety issues, and normal maintenance items, including procedures for the planned replacement of components that have less than a 10-year service life.
- Troubleshooting guide.
- Monitoring and reporting plan that demonstrates system performance on an ongoing basis.

Attach the operation and maintenance manuals for pumps, instrumentation and control devices, and other equipment used as components of the water treatment facility or process to the O&M Plan.

REFERENCES

National Engineering Handbook Part 651 –
Agricultural Waste Management Field Handbook
North Dakota State University Extension
Publication AS-954