

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

WELL WATER TESTING

(No.)

CODE 355

DEFINITION

Testing for physical, biological, and chemical characteristics of groundwater in wells or spring developments.

PURPOSE

This practice may be applied as part of a conservation management system to determine the quality of a groundwater supply for the following intended uses: irrigation, livestock, fish and wildlife habitat, aquaculture enterprises, or other agricultural uses.

CONDITIONS WHERE PRACTICE APPLIES

This standard only applies to private water supplies that are used or have potential to be used on farms or ranches.

This practice does not apply to groundwater for human consumption, nor wells for monitoring groundwater hydrology or contamination associated with animal waste storage or treatment installations.

New wells constructed using Oklahoma Conservation Practice Standard 642 – Water Well, require testing after disinfection.

CRITERIA

The specific use of the water and the water quality concerns shall be identified.

The required tests and applicable standards shall be determined based on the planned use of the water.

Testing shall be conducted by a laboratory certified under the Oklahoma Department of Environmental Quality (DEQ) Drinking Water Laboratory Certification Program or through the Oklahoma Cooperative Extension Service via a County Extension Service Office. Other testing facilities which are geographically more

accessible may be approved as requested.

Water samples shall be collected and analyzed in accordance with established procedures. Specific parameters, sampling procedures, and laboratory analyses may be specifically required by local, State, Tribal, or Federal laws and regulations. Contact the testing entity for specific guidance.

Interpretation of test results and recommendations for remedial actions, shall be obtained from a source knowledgeable of the testing procedures and objectives.

Interpreting Test Results

pH. The preferred range for pH in livestock water is 6.0 to 8.5 standard units depending on the alkalinity and other factors. Animals can tolerate water outside of this range, but use is not recommended.

Total Soluble Solids (TSS) or Electrical Conductivity (EC). Total soluble solids refer to the salt particles that are dissolved in a water sample. TSS can impact animal health. Levels below 3000 ppm are considered very satisfactory for most animals. Levels above 7000 ppm shall not be used for livestock.

High levels of TSS can also impact crop growth and yield. When testing water for irrigation, seek guidance on specific crop tolerances.

Nitrate-Nitrogen. Nitrates are a salt that can be particularly harmful to livestock. Nitrate levels below 132 ppm NO₃ or 20 ppm NO₃-N are generally considered safe. Those nearing the upper limit may need a diet of low nitrate feed. Levels between 133-200 ppm NO₃ or 20-40 ppm NO₃-N could be harmful over long periods of time. Levels over 200 ppm NO₃ or 40 ppm NO₃-N put animals at risk and shall not be used for livestock.

Contaminated Water. Any analysis outside the ranges above which would be harmful to livestock shall be considered contaminated. If

determined to be contaminated, a second test shall be run. If the second test indicates contamination, consult with the testing laboratory or a water quality specialist for further guidance. Water shall not be used unless the laboratory or water quality specialist provides recommendations for treatment.

Contaminated wells shall be appropriately plugged or decommissioned.

Irrigation Water. Chemical analysis of water planned for irrigation use, especially for micro-irrigation systems or any system where chemigation or fertigation is planned, is critical. Certain chemicals or fertilizers can react with elements in the irrigation water causing precipitants to form which can clog emitters, nozzles, and/or pipelines. Make sure testing facilities know the proposed use of the water sampled.

CONSIDERATIONS

The following items should be considered in planning water supply testing:

- Location and depth of supply, aquifer characteristics, geology, and history of site in relationship to sources of potential contamination, such as surface water, septic systems, chemical storage facilities, landfills, roads, animal waste storage or treatment facilities, or naturally occurring sources of contamination
- Water supply construction practices used such as dug, drilled, or cased well, or spring development.
- Using a computerized total farm record keeping system for ease of data input, analysis, and retrieval

Additional Testing

Total Coliform Bacteria. Testing for fecal coliform shall be conducted if the presence of total coliform is indicated.

Total Dissolved Solids. The recommended upper limit for total dissolved solids (TDS) is 500 mg/l (ppm). If TDS exceeds the recommended limit, additional testing to determine the individual constituents may be necessary to determine treatment options.

Hardness. Waters with a total hardness less than 75 mg/l (ppm) are considered to be soft, those between 75 and 150 mg/l (ppm) are

moderately hard, those between 150 and 300 mg/l (ppm) are hard, and those greater than 300 mg/l (ppm) are very hard. Hardness is generally derived from contact of the water with natural accumulations of salts in soil and geological formations. If water tests hard or extremely hard, additional tests for total alkalinity, calcium, and magnesium, may be necessary to determine treatment options.

PLANS AND SPECIFICATIONS

Plans and specifications for water testing shall be consistent with this standard to achieve the desired results.

Plans and specifications shall include a description of processes for collecting, storing, transporting, testing samples, and reporting results.

Test laboratories may have specific criteria and forms that must be completed before they will perform water well tests. It is recommended that a laboratory be contacted for this information before a sample is obtained.

OPERATION AND MAINTENANCE

Water testing records shall be maintained, and include at a minimum:

- Sample site, location, and depth
- Remotely-sensed or in-situ records of water quality conditions within the well (pH, conductivity, turbidity, etc.)
- Date and time water sample taken
- Name and title of person who collected sample
- Type of sampler and sample taken
- Standard collection procedure followed
- Water test analysis date
- Laboratory performing the analysis, including documentation of certification
- Tested contaminants
- Schedule of additional testing at required frequency according to applicable standards
- Records to evaluate trends and the effects of any remedial actions to produce water of sufficient quality for the intended purpose
- Rainfall data

- Observations of well or developed spring condition. If conditions exist that could have an impact on water quality, list actions taken to correct the potential problem. Include records of any well or developed spring maintenance, such as disinfection or sediment removal, that requires the use of chemicals.
- A record of any incidents such as spills, leaks, changes in use, or other, involving pesticides, fertilizers, herbicides, degreasers, fuels, and other pollutants near the well or developed spring between scheduled testing.
- Other records as required
- Oklahoma Department of Environmental Quality List of Accredited Laboratories; <https://labaccreditation.deq.ok.gov/labaccreditation/default.aspx>
- Oklahoma County Health Department; County Health Departments Listed Alphabetically; http://www.ok.gov/health/County_Health_Departments/Oklahoma_County_Health_Departments_Reference_Guide.html
- Oklahoma Department of Environmental Quality, Disinfection of individual water wells; <http://www.deq.state.ok.us/factsheets/local/dsinfctwtr.pdf>
- Zhang, Hailin, and Payne, Josh, Livestock and Poultry Drinking Water Quality: Understanding Your Water Test Report, L-256; Oklahoma Cooperative Extension and Oklahoma State University Division of Agricultural Sciences and Natural Resources; <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7406/L-256%20Final%203-24-11.pdf>

REFERENCES

- Oklahoma Water Resources Board; Oklahoma Water Quality Standards, Title 785, Chapter 45; http://www.owrb.ok.gov/util/rules/pdf_rul/RulesCurrent2011/Ch45-Current2011.pdf
- Oklahoma Department of Environmental Quality 2009 list of accredited general water quality/sludge laboratories and analytes; <http://www.deq.state.ok.us/CSDnew/LabCert/GWQ%20Certification%20book%202008-2009.pdf>