

**A Guidance Document for the Design and Construction of
Groundwater Monitoring Wells for Use at Wastewater
Treatment Facilities**

**Technical Publication
WTS-4**

**Nevada Division of Environmental Protection
Bureau of Water Pollution Control
Technical Services Branch**



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GUIDANCE DOCUMENT FOR THE DESIGN AND CONSTRUCTION OF GROUNDWATER MONITORING WELLS

WTS-4

Monitoring wells provide a means to assess groundwater quality, estimate groundwater flow direction and velocity, and calculate aquifer hydraulic properties. With this information, hydrogeology can be characterized, contamination can be defined, and appropriate remedies can be designed to mitigate groundwater contamination.

Monitoring wells constructed as a requirement of a Nevada Division of Environmental Protection (NDEP) discharge permit or an Administrative Order shall include the following information, at a minimum, in the application to construct a new monitoring well. NDEP must approve the monitoring well design prior to drilling and construction, pursuant to Nevada Revised Statutes (NRS) and Nevada Administrative Code (NAC) Section 445A. The Nevada Division of Water Resources (DWR) must also approve the design of all monitoring wells prior to drilling and construction, pursuant to NRS and NAC Sections 533 and 534. BWPC reserves the right to require further information as needed.

All monitoring wells must be drilled by a water well driller currently licensed in the State of Nevada and drilling must be conducted in accordance with the requirements listed in Nevada Administrative Code (NAC) Sections 533 and 534.

1. Well Placement

- a. A minimum of one (1) up-gradient groundwater monitoring well shall be located at the most distant point up-gradient of the facility property, but not more than 250 feet from the treatment facility.
- b. A minimum of two (2) down-gradient groundwater monitoring wells shall be located no further than 250 feet from the outer edge of the disposal system. These wells shall be placed in the direction of the underground flow at the site.
- c. A map showing the location of the proposed monitoring wells with distances marked between the wells and the treatment facility and land disposal systems.
- d. GPS coordinates for the well site shall be provided.

2. Monitoring Well Casing

- a. Casing shall have an inside diameter no larger than 4-inches. The inside diameter shall be large enough to accommodate any sampling equipment or sounding probes.
- b. Casing material shall be chosen based upon groundwater geochemistry and parameters to be monitored.

- c. The well shall be capped at both ends.
- d. All additional regulations listed in NAC Section 534 shall be satisfied.

3. Monitoring Well Screen

- a. The screen in a ground water monitoring well shall extend a minimum of five (5) feet above the maximum seasonal high-water table.
- b. The perforations shall be of a width and length that will allow the strata to be observed while not permitting the infiltration of the gravel pack through the casing or allowing the contaminants or water from separate strata to commingle.
- c. Well screen shall extend into the groundwater table a determined depth based upon the hydrogeology at the site and parameters to be monitored, but a minimum of 15 feet below the static water level.
- d. All additional regulations listed in NAC Section 534 shall be satisfied.

4. Monitoring Well Filter Pack

- a. All additional regulations listed in NAC Section 534 shall be satisfied.

5. Well Seals including the Filter Pack Seal and the Annular Seal

- a. There shall be a seal surrounding the well casing to prevent the flow of surface water in and along the edge of the bore hole. A bentonite plug of no less than two (2) foot thickness shall be placed directly above the gravel pack. The annulus must be sealed from the bentonite plug to the surface with a cement/bentonite mixture. The well cap shall be water-tight.
- b. All additional regulations listed in NAC Section 534 shall be satisfied after consultation with NDEP.

6. Surface Pad and Additional Protection

- a. Unless the area surrounding a monitoring well is paved with asphalt or concrete, a surface pad shall be installed around the casing at the surface.
- b. A surface pad means a formation of concrete or cement grout with a diameter of not less than one (1) foot and a thickness of not less than 3½ inches which is set around a monitoring well at a slope to ensure that water flows away from the well.
- c. The well head must be protected from damage and vandalism. Where subject to traffic, there must be an appropriate box which is traffic rated or bollards must be installed

around the well. If subject to flooding, the top of the well should extend a minimum of twelve (12) inches above the ground surface with an appropriate cover.

- d. In all locations, the monitoring well shall be clearly marked and a locking device shall be provided to prevent unauthorized access.

7. Monitoring Well Development

- a. All monitoring wells shall be developed prior to sampling in order to reduce the amount of fines entering the well casing during sampling. Examples of acceptable well development include overpumping and backwashing & bailing and mechanical surging.
- b. Where applicable, all requirements for well development listed in NAC Section 534 shall be followed. Care must be taken to allow at least 72 hours for the seals to set before mechanically developing the well.

8. Well Log

- a. The well log of the drilling shall accompany the as-built drawings for the new monitoring well. A copy of the well log shall be submitted to the Compliance Coordinator at BWPC within thirty (30) days after the completion of the monitoring well.
- b. All additional regulations listed in NAC Section 534 shall be satisfied.

9. Abandonment and Plugging

- a. Abandonment and plugging of a monitoring well shall be done in accordance with the regulations listed in NAC Section 534.

Additional information about monitoring wells can be found at:

NRS Section 534: <http://leg.state.nv.us/NRS/NRS-534.html>.

NAC Section 445A: <http://leg.state.nv.us/NAC/NAC-445A.html>.

NAC Section 533: <http://leg.state.nv.us/NAC/NAC-533.html>.

NAC Section 534: <http://leg.state.nv.us/NAC/NAC-534.html>.

Groundwater and Wells, Second Edition, Fletcher G. Driscoll, Ph.D., Johnson Filtration Systems, Inc., St. Paul, MN, 1989

Subsurface Characterization and Monitoring Techniques, EPA/625/R-93/003a, 1993

Design and Construction of Water Wells, National Water Well Association, Van Nostrand Reinhold, New York, N.Y., 1988