

# STANDARD MONITORING WELL DESIGN

## WELL HEAD PROTECTOR

Steel or PVC cover with water tight cap, set in the concrete pad, and equipped with a locking device to prevent tampering. Cover should provide adequate space to allow access to the well.

## SANITARY WELL SEAL

Top of casing shall be sealed by installing a waterproof sanitary well seal when the well is completed.

## CONCRETE PAD

Should be a minimum of 2' x 2' x 6" thick to secure the protective cover, prevent pooling of water and vegetative growth around the well, and allow for placement of a surveyor pin.

## GROUT MATERIAL & MINIMUM GROUT INTERVAL

Seal the well annulus with approved impervious grout material from ground surface to at least 20 feet or to at least 5 feet into the first clay or shale layer if present, whichever is greater. The diameter of the borehole shall be at least 3-in greater than the maximum outside diameter of the casing. Water from two or more separate aquifers shall be separated by sealing the annulus between aquifers with grout. If groundwater is encountered less than the minimum grouting requirement, it may be modified to meet local conditions (K.A.R. 28-30-2(p) & 28-30-6(b) & (c)). If used, dry sodium bentonite products should be hydrated in accordance with manufacturer specifications.

## SCREEN SEAL

A 2' layer of bentonite chips or pellets should be placed on the gravel pack to prevent infiltration of grout into the gravel pack.

## GRAVEL PACK

The gravel pack should be sized to prevent infiltration of fines into the well. The source of the gravel pack material should be carefully determined to eliminate the possibility of contamination of the well.

## WELL CASING

Well casing shall terminate one foot or more above ground surface (28-30-6(f)), unless located in high a traffic area according to 28-30-6(s), then follow requirements. The following well casings are acceptable for monitoring well use: 2" PVC Schedule 40 or thicker, 4" PVC SDR 26 or thicker, and 5" PVC SDR 26 or thicker. Steel casing must be 10 gauge or thicker (K.A.R. 28-30-6(f)(4)).

All casing materials must be connected without use of solvents, glues, or materials which would introduce contamination into the well. Some other casings are approved for well construction but are not as commonly used. All casing materials must be compatible with groundwater conditions.

## SCREEN

Wells must be equipped with manufactured well screen which provides adequate communication with the aquifer to provide a representative sample without allowing fines to enter the well.

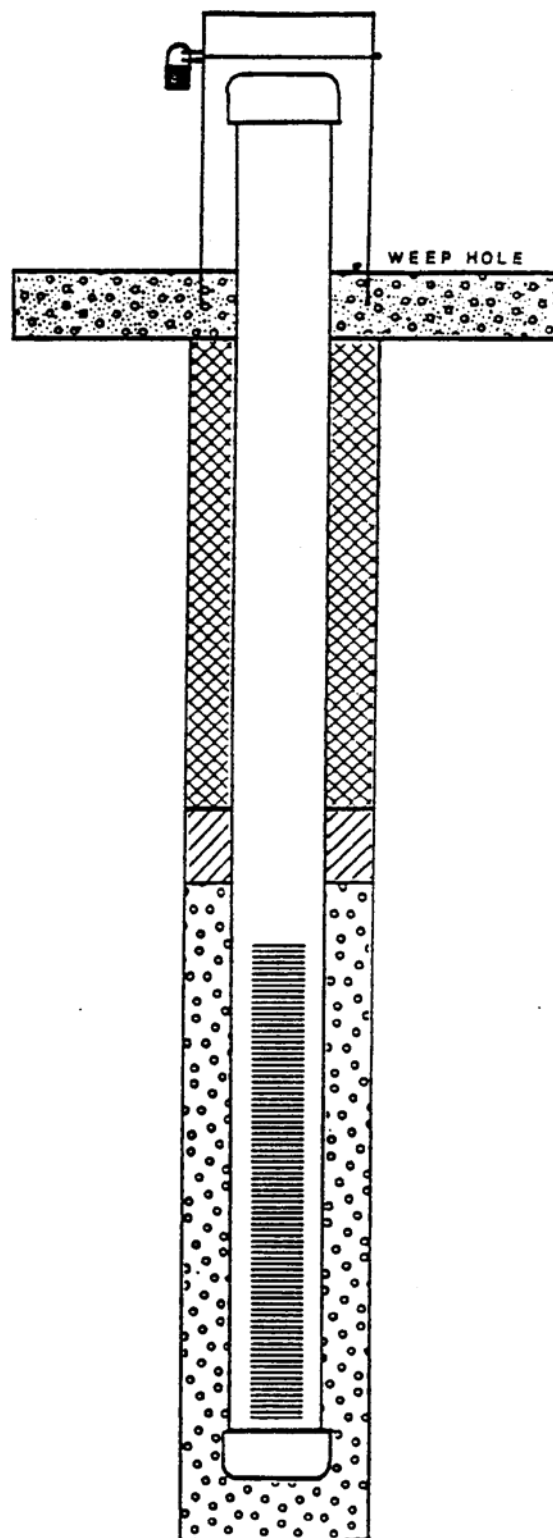
## GROUNDWATER ZONE PROTECTION

Unless targeted by the well, each groundwater-producing zone with known or suspected natural or manmade pollution shall be cased and grouted according to 28-30-6(b) during construction to prevent movement upward or downward to other zones.

## CONTRACTOR LICENSING

All monitoring wells must be constructed by a licensed water well contractor as specified in Article 12 and Article 30.

Statutes in Article 12 and regulations in Article 30 (K.A.R. 28-30-2 et seq.), can be viewed at the KDHE/BOW/Geology & Well Technology Section's Water Well Program website at: <http://www.kdheks.gov/waterwell/index.html>.



DRAWING NOT TO SCALE

### K.A.R. 28-30-2 (p) Grout

Grout means bentonite clay grout, cement grout, neat cement grout, or other material approved by KDHE used to create a permanent impervious, watertight bond between the casing and the undisturbed formation surrounding the casing or between two or more strings of casing.

- (1) "Bentonite clay grout" means a mixture of water and either commercial grouting or plugging sodium bentonite clay, including sodium bentonite clay manufactured under the trade name of "volclay grout," or an equivalent as approved by KDHE according to the following:
  - (A) The mixture shall be as per the manufacturer's recommendations to achieve a weight of at least 9.4 pounds per gallon of mix. Weighing agents may be added as per the manufacturer's recommendations.
  - (B) Sodium bentonite pellets, tablets or granular sodium bentonite may also be used if these additives or materials meet the specifications listed in paragraph (p)(1) above.
  - (C) Sodium bentonite products that are designed for drilling purposes or contain organic polymers shall not be used.
- (2) "Cement grout" means a mixture of one 94-pound bag of portland cement, an equal volume of sand having a diameter no larger than two millimeters, and five to six gallons of clean water.
- (3) "Neat cement grout" means a mixture consisting of one 94-pound bag of portland cement and five to six gallons of clean water.

### K.A.R. 28-30-6 (b) Grouting Requirements

- (1) Constructed and reconstructed wells shall be sealed by grouting the annulus between the casing and the boring from ground level to at least 20 feet or to at least five feet into the first clay or shale layer if one is present, whichever is greater. If a pitless well adapter or unit is being installed, the grouting shall start below the point at which the pitless well adapter or unit attaches to the casing and shall continue at least 20 feet below this point or to at least five feet into the first clay or shale layer, whichever is greater.
- (2) The diameter of the drilled boring shall be at least three inches greater than the maximum outside diameter of the casing.
- (3) Water from two or more separate aquifers shall be separated from each other in the boring by sealing the annulus between the aquifers with grout.

### K.A.R. 28-30-6 (c) Grouting Requirements – Shallow Groundwater

If groundwater is encountered at a depth less than the minimum grouting requirement, the grouting requirement may be modified by KDHE to meet local conditions.

### K.A.R. 28-30-6(s) At-Grade Surface Completion

A monitoring well may be completed at-grade (or flush-mount) without requesting a waiver if it is to be located in a heavily-trafficked area. Otherwise, submission of a waiver request and preapproval from KDHE/BOW is required. Requirements of 28-30-6(s)(1)-(2) must be met for all flush-mount well completions. Refer to the documents [Flush-Mount Well Construction Detail](#) and [Procedure for Requesting a Waiver to Allow Installation of a Flush-Mount Monitoring Well \(WWP-5\)](#).

### K.A.R. 28-30-7 Plugging Requirements

Monitoring wells must be plugged in accordance with applicable requirements in 28-30-7(a), (b), and (c), unless other regulations exist locally. Plugging and associated regulations for wells in the Equus Beds Groundwater Management District #2 are included in Article 30 as 28-30-200 through 28-30-207. Refer to the document [Procedure for Plugging a Groundwater Monitoring Well \(WWP-10\)](#).

### ADDITIONAL REQUIREMENTS

Additional requirements for monitoring well construction and plugging established in KDHE environmental programs must be followed, where appropriate. Check with the KDHE project manager for this information.

Regulations in Article 30 (K.A.R. 28-30-2 through 28-30-207) and documents referenced above can be found on the KDHE/BOW/Geology & Well Technology Section's Water Well Program website at: <http://www.kdheks.gov/waterwell/index.html>.