

3745-9-09 **Well development and pumping test.**

- (A) A public water system well shall be developed upon completion until turbidity or sand content in the well is minimal and until the maximum specific capacity is obtained to remove the native silts and clays, drilling mud or finer fraction of the filter pack.
- (1) Mechanical development shall be performed so as not to cause damage to the components of the well. Mechanical development techniques include: mechanical surging; air surging or air lifting; overpumping and backwashing; high velocity jetting; bailing; and hydrofracturing.
 - (2) With prior consultation with the district office, chemical development procedures may be used in conjunction with mechanical procedures. Chemical development techniques include using an acid or dispersant that has standard ANSI/NSF 60 certification. The director may require submission of chemical development procedures with specifications for the method, equipment, chemicals, and testing for residual chemicals.
 - (a) Dispersant may be used to disaggregate clay particles to enhance removal. Dispersant shall be immediately flushed from the well and aquifer to prevent bacterial growth in the aquifer.
 - (b) Dispersant shall be premixed and used according to the manufacturer's recommendations.
 - (c) Acid shall be used according to the manufacturer's recommendations. Proper pH shall be maintained in the borehole to ensure the effective action of the acid.
- (B) Upon completion of development of the public water system well, a pumping or aquifer test shall be conducted to determine the sustainable yield and drawdown of the well. The flow rate shall be measured using an orifice weir with manometer, or equivalent method acceptable to the director.
- (1) The pumping test classification is determined from the estimated average daily water demand of the well and type of water system. Estimated average daily water demand may be determined by the director from the design pumping rate of the well. With prior consultation, the director may accept an alternative constant rate pumping test that is conducted under the supervision of a hydrogeologist or person with demonstrated competency in performing pumping or aquifer tests.

Classification	Estimated Average Daily Demand of the Well (gallons per day)
Low use	0 to 10000
Medium use	10001 to 100000
High use	greater than 100000

An acceptable pumping test for low, medium, or high use classifications is:

- (a) For low use community water system wells and low or medium use noncommunity water system wells, the pumping test shall be conducted at a constant rate for a period of at least normal operation either at the peak hourly demand, or at least 1.5 times the pump design rate if the well cannot sustain peak hourly flow;
- (b) For medium use community water system wells, the pumping test shall be conducted at a constant rate for at least twenty-four hours either at the peak hourly demand, or at least 1.5 times the pump design rate if the well cannot sustain peak hourly flow;
- (c) For all high use wells, an aquifer test shall be conducted. A step-drawdown test shall be conducted with at least three progressively increasing pumping rates. Then, a constant rate pumping test shall be conducted at least twenty-four hours for at least 1.5 times the pump design rate.

When hydrogeologic conditions or physical constraints are such that it is not possible to achieve a sustainable yield of the well at 1.5 times the pump design rate, a constant rate pumping test may be conducted at a lower pumping test rate if the following criteria are met:

- (i) The constant rate pumping test is conducted at no less than 1.2 times the pump design rate; and
- (ii) A demonstration is provided documenting the hydrogeologic conditions and well construction design criteria that supports the lower pumping test rate.

[Comment: It is recommended that a person with demonstrated competency perform the respective pumping test or aquifer test.]

- (2) The pumping/aquifer test report shall include, without limitation:
 - (a) Date and times of starting through ending pumping test;
 - (b) Pumping rate and pump setting depth;
 - (c) Water level measurements from the well of the static water level and

drawdown to the nearest 0.1 foot, as measured from an identified datum;

(i) Water level measurements shall be at these time intervals:

Time After Pump Test Started (minute)	Time Interval Between Measurements (minute)
0-15	1
15-60	5
60-120	10
120-180	20
180-300	30
300-1440	60

(ii) An aquifer test shall include water level measurements from observation or surrounding wells.

(d) Specific capacity;

(e) Graphic evaluation on semilogarithmic graph paper by plotting the drawdown measurements on the arithmetic scale and time on the logarithmic scale;

(f) Water level measurements immediately after termination of the constant rate pump test for a period of time until the water level is essentially unchanged at time intervals of five minutes for the first hour and every thirty minutes thereafter.

(C) Samples shall be collected and analyzed from a public water system well for contaminants at the conclusion of the pumping test performed accordance with paragraph (B) of this rule.

(1) A public water system well shall be sampled and analyzed for the contaminants that are listed in the appendix to this rule, "Required Analyses for Wells." The director may reduce or add to the contaminants that are listed in the appendix to this rule because of well siting, well construction, treatment, promulgated drinking water standards, or other criteria to assess whether the ground water is acceptable for human consumption.

(2) Samples that are collected from a public water system well in accordance to this rule shall be analyzed in a laboratory certified to analyze drinking water for contaminants in accordance with Chapter 3745-89 of the Administrative Code. The analytical methods shall be the same as required by the entry point to the distribution system monitoring in accordance with rule 3745-81-27 of the Administrative Code and shall include all the volatile organic and synthetic organic analytes that are quantified by the laboratory for the organic

analytical method.

[Comment: "Standard ANSI/NSF 60, Drinking Water Treatment Chemicals - Health Effects, December 11, 2009, Document Number NSF/ANSI 60-2009a." This rule incorporates this standard or specification by reference. At the effective date of this rule, a copy may be obtained from "NSF International, 789 N Dixboro Road, PO Box 130140, Ann Arbor, MI 48113-0140," (734)769-8010, www.nsf.org. This document is available for review at "Ohio EPA, Lazarus Government Center, 50 West Town Street, Suite 700, Columbus, OH, 43215-3425."]

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Rule Amplifies: 6109.04

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Appendix

Required Analyses for Wells

Inorganic

Alkalinity, total (as CaCO ₃)	Cyanide	Nitrite-(as N)
Antimony, total	Fluoride, total	pH
Arsenic, total	Iron, total	Total Dissolved Solids
Barium, total	Lead, total	Selenium, total
Beryllium, total	Magnesium, total	Silver, total
Cadmium, total	Manganese, total	Sodium, total
Calcium, total	Mercury, total	Sulfate
Chloride	Nickel, total	Thallium, total
Chromium, total	Nitrate-(as N)	Zinc, total
Copper, total	Nitrate-nitrite-(as N)	

Radiological

Gross Alpha	
Radium-228	
Radium-226	(if either gross alpha analysis exceeds 5pCi/L or radium-228 analysis exceeds 1 pCi/L)
Uranium	(if gross alpha analysis exceeds 15 pCi/L)
Gross Beta	

Synthetic Organic Chemicals (SOC)

Atrazine
Alachlor
Simazine

Appendix

Volatile Organic Chemicals (VOC)

Benzene
Carbon Tetrachloride
Monochlorobenzene
1,2-Dichlorobenzene
1,4-Dichlorobenzene
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
Dichloromethane
1,2-Dichloropropane
Ethylbenzene
Styrene
Tetrachloroethene
Toluene
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Vinyl Chloride
Xylenes, total