Division of Drinking and Ground Waters
Response to Comments

Draft Revisions to Well Standards and Plan Approval Rules
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Draft revisions to "Guidelines for Design of Small Ground Water Systems" (the Greenbook)
Draft guidance on nonpotable well standards

Agency Contact for this Package
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Ohio EPA issued public notice and requested interested party comments for the period of August 29, 2014 to September 30, 2014 on draft revisions to rules in the Ohio Administrative Code (OAC). This document summarizes the comments and questions received during the interested party public comment period.

Ohio EPA reviewed and considered all comments received during the interested party comment period. By law, Ohio EPA has authority to consider specific issues related to protection of the environment and public health.

In an effort to help you review this document, the questions are grouped by topic and organized in a consistent format. The name of the commenter follows the comment in parentheses.

General Comments

Comment 1: It was recommended DDAGW incorporate ANSI/NGWA 01-14, Water Well Construction Standard, as an alternative to ANSI/AWWA A-100 and other specific AWWA standards (e.g., those used for well disinfection). (Stuart Smith, Ground Water Science Appalachian Plateau Office or GWS)

Response 1: Chapter 3745-9 of the Administrative Code does not currently reference a universal standard or set of standards applicable to all regulations within the chapter. We will review the applicable sections of ANSI/NGWA 01-14, Water Well Construction Standard, as an alternative to Appendix D of ANSI/AWWA A-100, Water Wells, and ANSI/AWWA C-645-13, Disinfection of Wells.

Comments 2: A recommendation was made for DDAGW to work with the Ohio Department of Natural Resources (ODNR) and Ohio Department of Agriculture (ODA) to develop material (rules, guidance and so forth) prohibiting raw manure land-spreading, oil and gas production, and injection wellheads "out of some larger fraction of ground water source water protection or SWAP areas, and with legal authorities to provide systems with protection against resource takings lawsuits for trying to improve protection of their water supply sources." (Stuart Smith, GWS)

Response 2: Ohio EPA, ODNR and ODA, along with the Ohio Department of Health (ODH), are all members Ohio Water Resource Council and the State Coordinating Committee on Ground Water. As such, staff from these and other state agencies routinely interact on issues relating to most aspects of water resources. These include development of recommendations or guidance covering human and animal waste management, well construction and well sealing. State agencies do not have the authority to shield public water systems from resource takings lawsuits.

Comment 3: The following comment was received, "Licensing of hydrogeologists and water well drillers (with public water supply endorsement) with technical and ethical standards and continuing education requirements and personal responsibility for performance could greatly streamline these elaborate rules." (Stuart Smith, GWS)

Response 3: If a licensing program were developed for water well drillers, it would likely be headed up by ODH because they have an existing registration program.

DDAGW would need to take several things into consideration in order to develop a licensing program for hydrogeologists. For example, DDAGW will need to investigate the applicable statutes and existing programs, benchmark against similar programs in other states and coordinate with multiple agencies to determine how such programs would be operated. Additionally, items such as the cost involved and benefits to various regulated communities would need to be considered.

<u>3745-9-01, Well standards definitions</u>

Comment 4: The division received a comment that the rules do not define what a hydrogeologist should do and it is mentioned throughout the rules and draft policy. (Steve Champa, Eagon & Associates, Inc.)

Response 4: The proposed definition of "hydrogeologic investigation" will be removed.

Since hydrogeologist is not defined, DDAGW recommends replacing "hydrogeologist" with "qualified ground water professional" using the following definition adapted from Ohio's solid waste rules:

"Qualified ground water professional" means a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has at least five years relevant experience in ground water hydrology and related fields to enable that individual to make sound professional judgments regarding ground water resources; water well construction, testing and development; and identification and migration of contaminants.

Comment 5: A question was asked about whether the definition of a nonpotable well includes temporary dewatering wells? It was recommended that "wells installed for temporary construction dewatering should be exempt from this rule." (Steve Champa, Eagon & Associates, Inc.)

Response 5: DDAGW agrees and will strike the reference in the definition of nonpotable well. We also propose the following addition to the proposed "Nonpotable Well Standard Guidance":

Dewatering Wells

Dewatering wells are used to lower the ground water level to a specified depth to facilitate below ground construction or prevent unwanted ground water intrusion into a facility or structure. Dewatering wells can be either of the following: temporary, with their use usually lasting no more than 12 months, as in structural construction projects; or permanent, as in maintaining the ground water below a certain level for a structure.

Although these wells are considered nonpotable wells it is impractical to construct temporary dewatering wells in a manner that meets all of the standards required by OAC Chapter 3745-9. At minimum, temporary dewatering wells must be adequately protected from physical damage and located so they are accessible for cleaning, maintenance, repair and such other actions as may be necessary. Well casing height above finished grade must be at least twelve inches and the finished grade shall be sloped for surface water runoff away from the well. The well must have a well cap or seal to prevent the entrance of water, dirt, animals, insects, or other foreign matter. Upon removal, the well must be properly sealed.

Permanent dewatering wells should be constructed in a manner that meets as much of OAC Chapter 3745-9 as is practical without impeding the function of the well. This includes a grout seal in the annular space above the filter pack.

A dewatering well cannot be connected to a potable water system until it is brought into compliance with the appropriate standards.

DDAGW will also clarify OAC rule 3745-9-05 to read (part of the language revision addresses a comment made by a different interested party):

Applicability. This rule applies to nonpotable wells, public water system wells and radial collector wells, all of which are defined in rule 3745-9-01 of the Administrative Code. Paragraph (A) of this rule applies to both public water system and nonpotable wells excluding monitoring wells regulated under rule 3745-9-03 of the Administrative Code. A nonpotable well shall be constructed in accordance with this rule and "Nonpotable Well Standard Guidance (2015)". Paragraph (B) of this rule only applies to public water system wells. Paragraph (C) of this rule applies only to radial collector wells.

Comment 6: It was recommended 'stabilized' be removed from the definition for specific capacity. "Stabilization is not a criterion for defining specific capacity. Specific capacity can be determined for drawdown at any time and pumping rate. The duration of pumping should always be specified when discussing specific capacity and, as acknowledged in the definition, specific capacity will decrease with duration of pumping (unless drawdown in the pumping well is influenced by a significant recharge boundary). Stabilization is significant if the specific capacity is to be used to estimate the potential yield of a well or the transmissivity of an aquifer, but is not important if specific capacity variation during a stepped-rate test is being used to evaluate changes in well performance over time or variations in specific capacity with depth that may be of particular importance in bedrock wells when water levels are within the open rock borehole."

"In OAC 3745-9-09 (B)(4)(b)(i)(d) stabilization for a stepped-rate test seems to be defined as time-drawdown data that plot as a straight line on a semi-logarithmic graph. This is potentially inconsistent with the definition of stabilization used in the draft Ohio EPA 'Policy on When the Constant Rate Test Should Exceed 24 Hours' where stabilization is defined as an average change in drawdown of no more than 0.2 feet per hour based on four consecutive data points collected at time intervals as specified by the rule." (Steve Champa, Eagon & Associates, Inc.)

Response 6: DDAGW agrees with the recommendation and will remove the last sentence of the definition.

Comment 7: Comments were made about the definition of a "Liner" and more specifically, that the private water system rules (Chapter 3701-28 of the OAC) further defines it as being "removable." It is important to be able to "functionally remove the liner for cleaning, disinfecting and maintenance," preventing "costly rehabilitation measures or the out-right loss of the well before it is truly necessary to replace it."

"In addition, the private water system rules expand the definition of casing to include not just primary casing, but secondary casing."

Lastly, OAC rule "3701-28-01 (PPPP) additionally defines a well screen to be manufactured so as to prevent the practice of ripping the screen to 'install' a screen." (Ohio Department of Health or ODH, Rebecca Fugitt)

Response 7: Ohio EPA recognizes there are situations where a removable liner is preferable as well as situations where a permanently attached liner is preferable. As a major modification to the well, installation of a liner - either removable or permanent - requires plan approval. In addition, specifying one method of attachment would require the public water system to meet the additional step of requesting a variance should the other method be the most applicable to the situation. Retaining the current language provides the public water system and agency the flexibility to select the liner installation method most appropriate to the situation.

The uses of primary and secondary casing in well construction are not discussed in OAC rule 3745-9-05. As such the terms are not included in our definition of casing. Although primary and secondary casing are used in public water well construction, the practice is not common and therefore, is addressed through our plan approval process. In recognition of the use of secondary casing we propose changing the definition of casing to read:

"Casing" means an impervious durable pipe that is placed in a well and is used to prevent the walls from caving, and to exclude surface drainage, undesirable water or other fluids, or unwanted or harmful materials from a well. "Casing" includes pipe used for both primary, or production, casing and secondary, or surface, casing.

The definition of a well screen will be revised to include the specification for a manufactured well screen:

"Well screen" or "screen" means a manufactured intake structure with uniform openings designed to retain the aquifer formation, prevent collapse of the borehole adjacent to the screen, and accommodate a yield adequate for the intended use of the well.

3745-9-02, Scope and exemptions

Comment 8: DDAGW received comments that paragraph (D)(1) as drafted would limit a public water system's in-house work, such as performing their own maintenance because they do not hold a registration with the Ohio Department of Health. Specifically, the word "repair" should be removed or replaced. (Matt Steele, City of Columbus Department of Public Utilities or CDPU; Bruce Whitteberry, Greater Cincinnati Water Works or GCWW)

Response 8: The division agrees with the comments and has made the following revisions to this paragraph:

(D) After April 1, 2016, only private water system contractors holding a valid registration with the Ohio department of health, in accordance with Chapter 3701-28 of the Administrative Code, may do or oversee any of the following except as noted in paragraph (E) of this rule:

(1) Drill, construct, alter, repair or seal a public water system well.

(2) Install a pitless adapter or pitless unit in a public water system well.

(E) After April 1, 2016, a community water system that is owned by, operated by or serves a public entity may perform repairs on wells owned and operated by the public water system. Any contractor hired by a public entity must meet the requirements of paragraph (D) of this rule.

Comment 9: It was recommended the division reconsider the wording of paragraph (D)(1) and specifically, the use of "oversee". This terminology limits who can oversee the work the contractor is doing and some systems may hire qualified engineers or hydrogeologists. (Stuart Smith, GWS)

Response 9: The provision as drafted does not limit who can oversee the work. It was written to allow for a registered private water system installer to either perform the work or be the person overseeing the work.

Comment 10: It was asked about why the rules in this chapter of the Administrative Code (Chapter 3745-9 of the OAC) apply to private nonpotable wells since they do not apply to private water system wells per paragraph (A) of this rule. (Steve Champa, Eagon & Associates, Inc.)

Response 10: These rules do apply because a private nonpotable well is not a private water system well. A private water system is used specifically for the provision of water for human consumption. The regulations applicable to private water system wells do not extend to any nonpotable well.

Comment 11: DDAGW received a comment about ensuring any issues covering bond violations in the Ohio Department of Health's (ODH) rules in OAC Chapter 3701-28 and public water system inspection requirements in Ohio EPA's rules in Chapter 3745-9 are addressed. (ODH, Rebecca Fugitt)

Response 11: Ohio EPA looks forward to working with ODH on these issues when rule revisions to OAC Chapter 3701-28 are being drafted.

3745-9-04, Well siting

Comment 12: The division received the comment in reference to paragraph (B)(2), "without reducing due caution and safety, there should be a well-defined hydrogeological pathway for allowing simple well isolation radii of <300 ft. under certain circumstances. Indiana and Michigan, with similar hydrogeologic settings, allow

200 to 250 ft. … As noted in the rules, at times 300 ft. is not enough. The 300 ft. isolation radius becomes an issue with existing wells with <300 ft. isolation radius when they are upgraded. If such wells have a history of water quality safety and demonstrated structural integrity, a hydrogeologic case can be made that they are safe. We would contend the same for some hydrogeologic settings with thick glacial till overburden or thick shale layers, for which a 3-dimensional safe isolation case could be made." (Stuart Smith, GWS)

Response 12: The 300 foot isolation radius provides necessary protection for wells. However, it is possible a shorter isolation radius may be okay provided conditions protective of the well exist. The division provides a variance provision to address these circumstances. A variance may be granted if a shorter isolation radius is justified and includes conditions appropriate for maintaining adequate protection of the well.

Comment 13: The following recommendations were made. (Stuart Smith, GWS)

a) Regarding paragraph (B)(4), no land application of manure or other biosolids or siting of oil and gas production or Class II injection facilities be permitted within a minimum 1-year time of travel SWAP zones… as an alternative, appropriate groundwater monitoring should be required for such activities within a 1-year time of travel but outside of an isolation radius (for these, at least 300 feet, with a pathway to make a hydrogeologic case for more, should be maintained).

b) Add paragraph (C)(4) to rule to cover oil and gas production or injection facilities, which would not be allowed in the inner management zone of proposed well for a community or nontransient noncommunity public water system.

c) Add paragraph (B)(2), which refers to the sanitary isolation radius, to paragraph (D), as a condition where a variance could be granted.

d) Define hydrogeologist.

Response 13: The following responses are in sequential order to the comments and recommendations made by Stuart Smith, GWS.

a) In general, the recommended regulatory changes cannot be addressed in the water well standards in Chapter 3745-9. As mentioned, prohibitions such as those requested are best addressed by the programs responsible for developing and implementing the regulations governing those activities.

   Setbacks for human and animal waste management, including land application of biosolids (OAC Chapter 3745-40) and manure (OAC Chapter 3745-901:10-2) are based on recommendations made by a muti-agency workgroup commissioned by the Ohio Water Resource Council. The workgroup evaluated regulations and management practices to develop a uniform set of setbacks for the portion of drinking water supply wells and intakes. The Ohio Water Resource

Council may request these recommendations to be reviewed, revised and updated.

The Ohio Department of Natural Resources, Division of Oil and Gas Resources Management (ODNR) reviews applications for a number of factors as part its program for permitting oil and gas extraction wells. These include not only the geology of the affected area of the operation but also include proximity to the PWS. ODNR has the ability to impose specific permit conditions based on these factors; these conditions include drilling within a "municipal wellhead protection area" and are applicable to wells drilled anywhere within the five-year time of travel area determined for the PWS. These special permit conditions have been developed in consultation with Ohio EPA.

b) The isolation standards established in this rule are based on recommendations made by a multi-agency workgroup commissioned by the Ohio Water Resource Council. The workgroup evaluated regulations and management practices to develop a uniform set of setbacks for drinking water supply wells and intakes. These recommendations relate only to human and animal waste management. Setbacks for oil and gas production or injection facilities would require interagency discussions and an agreed upon approach before these isolation standards could be required in rule.

c) The conditions listed in paragraph (D) of this rule - site hydrogeology, engineering controls, or other physical barriers - are conditions which will allow the agency permitting the listed operations or facilities to be sited in a location otherwise prohibited by the applicable rule. A public water system may require a variance from the sanitary isolation requirements for reasons other than the criteria listed. Adding (B)(2) to this paragraph may be construed as meaning that only those conditions that can be addressed through site hydrogeology, engineering controls, or other physical barriers are eligible for being addressed through a variance. We believe adding (B)(2) to this paragraph may limit a public water system's ability to request a variance under 3745-9-02(E).

d) DDAGW proposed to adopt the definition for a "qualified ground water professional" as found in the solid waste regulations. (See response 14 in this response summary for the definition.)

Comment 14: It was recommended since hydrogeologist in paragraph (E) of this rule is not defined, DDAGW replace it with "qualified ground water scientist" which is defined in Ohio's solid waste regulations. (Steve Champa, Eagon & Associates, Inc.)

Response 14: DDAGW agrees with the recommendation and the following definition has been adapted from the solid waste regulations:

"Qualified ground water professional" means a scientist or engineer who has received a baccalaureate or post-graduate degree in the natural sciences or engineering and has at least five years relevant experience in ground water hydrology and related fields to enable that individual to make sound professional judgments regarding ground water resources; water well construction, testing and development; and identification and migration of contaminants.

Comment 15: Several comments and questions were asked about the draft revisions to this rule. (Steve Champa, Eagon & Associates, Inc.)

a) "There are no conditions where a hydrogeologic investigation is required by existing rule." [Referred to OAC 3745-9-04 (A)(15)]

b) The statement in paragraph (E)(1)(a) is "extremely vague in as much as any hydrogeologic setting may allow transport of contaminants." This statement could cause investigations even though there may be no contaminants and the transport of them may be very low.

c) "Expansion is not defined" in paragraph (E)(1)(b). "Does the addition of a new well to an existing well field constitute expansion? Does an increase in pumping rate of an existing well constitute expansion? Does purchase or lease of land adjacent to an existing well field constitute expansion?"

d) Paragraph (E)(1)(c) is grammatically incorrect. "Interference drawdown between wells in a well field is a common occurrence and its effect on production from existing and/or a new well or well needs to be understood to maximize production and manage well field operation without overshooting available recharge. How does this rule apply to existing wells?"

e) Is paragraph (E)(1)(d) "referring to other private, i.e. residential wells or other high capacity wells? It is in the best interest of a PWS to understand the potential impacts that pumping from a well or well field may have on adjacent ground water users. However, it seems that Ohio EPA may be going beyond their authority by requiring a hydrogeologic investigation to assess the potential impacts of pumping on surrounding wells. Moreover, it may not be practical to make such determinations in advance of well siting."

Response 15: DDAGW's responses to comment 15 are as follows:

a) The new rule language would require a hydrogeologic investigation where none is currently required except by determination of the Director. The proposed changes to the new rule requiring hydrogeologic investigations in specific circumstances are being withdrawn.

b) Although the new rule language mirrors language in the existing rule, we agree that it is too vague to serve as a condition for requiring a

hydrogeologic investigation in all situations where the condition exists. The proposed changes to the new rule requiring hydrogeologic investigations in specific circumstances are being withdrawn.

c) We agree that the new rule language in paragraph (E) is too vague to serve as a condition for requiring a hydrogeologic investigation in all situations where the condition exists. The proposed changes to the new rule requiring hydrogeologic investigations in specific circumstances are being withdrawn.

d) We agree that the new rule language is too vague to serve as a condition for requiring a hydrogeologic investigation in all situations where the condition exists. The proposed changes to the new rule requiring hydrogeologic investigations in specific circumstances are being withdrawn.

e) The proposed changes to the new rule requiring hydrogeologic investigations in specific circumstances are being withdrawn.

Comment 16: A comment was made about paragraph (E) that "since a hydrogeologic investigation would be required when a new well is proposed, the implication is that the investigation would need to be completed prior to well site approval for the new well(s). In addition to imposing an additional financial burden on PWSs for the hydrogeologic investigation, it seems likely that the review of the results of hydrogeologic investigation would delay well site approval… It is in the best interests of a PWS to understand how installation of a new well might affect their overall well-field capacity and to understand the potential effects on other nearby wells that could result in additional costs due to the need for residential well replacements or lowering of pumps."

It was recommended that existing language in paragraph (E)(15) of this rule, "The director may require a hydrogeologic investigation to select the location of a well…" be maintained. It was also recommended that paragraphs (E)(1)(c) and (E)(1)(d) be removed from the draft new rule. (Steve Champa, Eagon & Associates, Inc.)

Response 16: The proposed changes to the new rule language requiring hydrogeologic investigations in specific circumstances are being withdrawn.

Comment 17: A comment was made about the business impact analysis (BIA) for this rule. More specifically, the description is confusing and the language in the rule is not consistent with what is in the BIA regarding the provision that the division may require a community water system pumping 100,000 gallons of water per day to consult with and/or hire a hydrogeologist to perform an investigation if specific conditions exist (i.e., an existing or proposed well with the capacity of pumping 100,000 or more gallons per day has the potential to influence the performance of the proposed well). It was suggested that based on the BIA, the rule may not convey DDAGW's intent, in which case it needs revised.

"It should also be noted that the assessment of potential drawdown from a well prior to well siting can only be based on available data. The available data may be sufficient for accurate prediction of drawdown around an existing well field, where previous test results or monitoring data can be used. In the case of a new well field, however, drawdown due to pumping can only be accurately predicted after analysis of pumping test data. (Steve Champa, Eagon & Associates, Inc.)

Response 17: DDAGW agrees with the comments and the proposed new rule language requiring hydrogeologic investigations in specific circumstances will be withdrawn. Additionally, the proposed "Policy on When the Constant Rate Pumping Test Should Exceed 24-Hours" will be withdrawn.

3745-9-05, Well construction

Comment 18: It was suggested that paragraph (A) state that the provisions of the rule exclude monitoring wells, which are regulated under rule 3745-9-03 of the OAC. It's believed that even though it is understood upon careful reading that it could very easily be mistaken that monitoring wells are also regulated by rule 3745-9-05. (Bruce Whitteberry, GCWW)

Response 18: DDAGW agrees with the comment and will revise paragraph (A) to reflect the exclusion of monitoring wells in this rule.

Comment 19: The division received a suggestion to either remove the terminology "dewatering wells" from the nonpotable well definition or exempt them from the well construction standards because these wells are temporary and abandoned within a short time frame after installation. "Moreover, they are often designed such that the filter pack is purposely extended further above the screen to drain perched zones. Thinner well casing and screen may be used, and are often reused, and grouting requirements may not be applicable as it may preclude readily pulling the casing and screen. Contractors need to have the flexibility to tailor the installation details to the site-specific conditions and job requirements. (Steve Champa, Eagon & Associates, Inc.)

Response 19: The division agrees with the comment. Temporary and permanent dewatering wells and exemptions will be addressed in guidance, as rule by reference.

Comment 20: OAC rule 3701-28-09 paragraph (B)(1) "has the following steel well casing minimum wall thickness requirements:

- 0.188 inch if the nominal pipe size is 5 to 10 inches;
- 0.375 inches if the nominal pipe size is 12 to 20 inches; and,
- Be standard weight, as set forth in ASTM specifications A53, A106, A589, API specification 5L and 5C, if the nominal pipe size is twenty-one inches or greater."

The steel casing requirements outlined in the table of draft rule 3745-9-05 are somewhat different. (ODH, Rebecca Fugitt)

Response 20: The "The Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers' Recommended Standards for Water Works" (10 State Standards) is the source material for these specifications. The most current version of "10 State Standards" (2012) lists a minimum wall thickness of 0.28 inches for nominal pipe sizes of less than 8 inches. Revisions will be made to reflect the 2012 version.

Comment 21: "ODH has had construction issues occur in private wells with the word formation being plural in 3701-28-10(C)(4). There are some contractors who are constructing wells where there is shallow bedrock in an area with a minimum amount of casing seated into the bedrock and then an open rock hole is drilled through multiple consolidated formations before the aquifer is encountered and the well's final completion depth is reached. In some areas this has allowed for the collapse in portions of the open rock holes. This also leads to the potential for shallow contamination to be conducted to depth and into an aquifer which was previously protected by the formations above." (ODH, Rebecca Fugitt)

Response 21: DDAGW addresses these issues through our well site acceptance and plan approval processes.

This issue can be addressed by specifying additional requirements for wells constructed in sensitive geologic conditions. For this situation, if there are multiple formations, the casing would need to be extended to the consolidated formation directly overlying the topmost producing aquifer. The plan approval process should also address these types of issues. For wells that are drilled through multiple layers, most are cased through the upper aquifers and just the highest producing aquifer is used, not multiple aquifers. This issue could be related to the differences between the ODH and DDAGW well approval processes. The division has a plan approval process that specifies what can be done to address these types of issues. DDAGW would not approve low volume wells if the necessary production could not be maintained. However, some older wells drilled through shallow aquifers have occasionally had the wells collapse and these situations would need to be addressed on a case by case basis.

Comment 22: ODH asked the following question:

"Is there need to add language about the filter packs or formation stabilizers not connecting:

- Zones of differing hydraulic conductivity to minimize the production of fines and sediment through turbulent flow; and,
- Multiple separate aquifers to minimize the potential for contaminant transport from one aquifer to another,

or is this concept adequately addressed by 3745-9-06(A)(3)?" (ODH, Rebecca Fugitt)

Response 22: Adding additional language requiring that filter packs or formation stabilizers must not connect zones of differing hydraulic conductivity would not improve the rule and would be impossible to enforce. The production zones of wells completed in sand and gravel aquifers may include several zones with differing hydraulic conductivity. This makes isolating each zone difficult and would add considerable expense to completing a public water system's well. We believe that this issue is adequately addressed by 3745-9-06(A)(3).

3745-9-06, Well construction, specific geologic conditions

Comment 23: DDAGW received a question about whether paragraph (A)(5) of this draft rule should apply to highly fractured formations. (ODH, Rebecca Fugitt)

Response 23: ODH staff clarified that this comment on "highly fractured formations" is in reference to formations which demonstrate solution features and voids. The dissolution of limestone evaporates and, to a lesser extent, dolostone creates a continuum of features from networks of small interconnected features to large voids that above ground would be recognized as caves. In some cases, several zones with solution features may be accessed by a single well to provide the quantity of water required by a public system. Ohio EPA believes it is not realistic to expect a well driller to identify each zone with solution features and seal each from other zones of increased porosity. Such a requirement would, in theory, require a separate well cased in each discrete unit. Therefore, formations exhibiting fractures, joints and bedding plane porosity will not be addressed in draft rule 3745-9-06.

Comment 24: ODH asked the following questions about draft paragraph (A)(6) this draft rule: "Is there a numerical value that defines brine for the purposes of this rule? 3701-28-01 (VVV) defines saline water and further provides numerical values which define slightly saline, moderately saline, highly saline, and brine waters. Is this rule only intended to address formations producing water with a TDS greater than thirty-five thousand milligrams per liter?" (ODH, Rebecca Fugitt)

Response 24: DDAGW proposes adopting the following definition of brine:

"Brine" means water that has a total dissolved solids concentration of greater than thirty-five thousand milligrams per liter or greater than thirty-five thousand milligrams per liter multiplied by one and five tenths for micro siemens per centimeter. [NOTE: 35,000 ppm TDS = seawater]

3745-9-07, Well grouting for construction or sealing

Comment 25: The division was advised there are differences in cement grout mixing and curing specifications in paragraph (B)(1) of this rule and those listed in OAC rule 3701-28-09(F)(2):

- "3701-28-09(F)(2)(a)(i) specifies 5.2 gallons of water per ninety-four pounds of these types of cement with a minimum density of fifteen pounds per gallon
- 3701-28-09(F)(2)(a)(v) allows for the addition of bentonite to the cement, up to five percent of the total grout volume required. Is this allowed or prohibited under 3745-9?" (ODH, Rebecca Fugitt)

Response 25: The 6.0 gallon number in paragraph (B)(1) of the rule is outdated. The number will be revised to 5.2 gallons. Regarding 3701-28-09(F)(2)(a)(v), grout and bentonite could not be mixed previously because effects were seen that countered the setting process. It is possible that smaller amounts of bentonite can be added. If a rationale can be provided for adding bentonite, it can be allowed.

3745-9-08, Well disinfection

Comment 26: A comment was made that a district consultation would not be needed for the use of ANSI/NSF 60-listed chlorine pH buffers for hypochlorite solutions. Additionally, DDAGW should permit the use of a 5% acetic acid solution to buffer alkaline hypochlorite solutions (recommended in industry practice documents). "Both buffers and modest acidification favor hypochlorous acid in solution. Such micromanagement of products used would not be as necessary if specifiers and applicators were licensed as being qualified to make such judgements." (Stuart Smith, GWS)

Response 26: DDAGW agrees that district consultation is not necessary and revised paragraph (C) to remove this language. In addition, it was determined a 5% acetic acid solution to buffer alkaline hypochlorite solutions would be allowed for use in disinfecting a well, provided all of the materials are ANSI/NSF 60 certified. The division will consider the use of specific alternatives.

Lastly, DDAGW will consider the recommendation to license the appropriate people making judgments as to products used. In order to develop a licensing program for applicators, the division would need to investigate the applicable statutes and existing programs, review other state programs and coordinate with multiple agencies to determine how such programs would be operated. Cost and benefits to various regulated communities would also need to be considered.

3745-9-09, Well development and pumping test

Comment 27: It was recommended to revise paragraph (A) because the word 'minimal' in regard to turbidity or sand content in the well is vague and not measurable. It was recommended the division reference the ANSI/NGWA 01-14 standard. In addition, the use of 'maximum specific capacity' in this paragraph "may be too

difficult to judge where there is not enough hydrogeologic information to define a theoretical drawdown at a given flow rate."

Also, it was recommended that pump tests per paragraph (B) "should be designed, conducted under the supervision of, and interpreted by a qualified hydrogeologist, following the intent of 3745-9-04 (E) for well siting, and extending the logic to a core hydrogeologic analysis test: the well pumping test." (Stuart Smith, GWS)

Response 27: DDAGW believes calculating the specific capacity at the anticipated permanent design pumping rate to be a crucial piece of information for the PWS as a base measure of the performance of the well. The language in paragraph (A) of this rule will be revised to the following:

(A) A public water system well shall be developed upon completion to remove the native silts and clays, drilling mud or finer fraction of the filter pack until turbidity or sand content in the well are minimal.

The previously proposed language covering hydrogeologic investigations has been withdrawn and existing language retained because more research is needed on what would require an investigation. Your recommendation for paragraph (B) will be considered as part of this process.

Comment 28: DDAGW received a comment that the rationale for paragraph (B)(1) is unclear. The specific capacity at the anticipated permanent design pumping rate should be determined by "proportional reduction of the drawdown based on the equivalent proportional reduction in pumping rate and consideration of well losses." Also, the specific capacity at the time of the pump test will be valid "only at that specific point in time and for the pumping test duration." (Steve Champa, Eagon & Associates, Inc.)

Response 28: The comment is correct in its technical discussion of specific capacity. Calculating the specific capacity at the anticipated permanent design pumping rate is a crucial piece of information for the public water system as a base measure of the performance of the well. DDAGW suggests the following change:

Be used to estimate the specific capacity of the well at the anticipated permanent design pumping rate.

Comment 29: Below are several comments and recommendations regarding the draft new rule. (Steve Champa, Eagon & Associates, Inc.)

a) Paragraph (B)(2): the "addition of a new well cannot decrease the operational capacity of a well field" and worst case scenario, a new well may only supply a modest or no increase in operational capacity of a well field, or "it may provide for a permitted capacity increase as a redundant source of supply."

b) Paragraph (B)(3): Suggested revising the language to read, "The determination of a permanent design pumping rate for a new PWS well shall include analysis of the effects of interference drawdown from other wells owned by the PWS as well as other high capacity wells not owned by the PWS. Operational practices and the potential to cause degradation of water quality at the well field should also be considered when establishing a permanent design pumping rate for a new PWS well." A comment was made that the permanent design pumping rate should be based on analysis of interference drawdown from other wells in conjunction with operational considerations. It was also suggested the division be careful in how the rule is applied, not making determinations about reasonable use of ground water.

c) Last sentence of paragraph (B)(4): revise the sentence leading into paragraph (B)(4)(a) to make it plural, "Acceptable pumping tests…" rather than "An acceptable pumping test…"

d) Paragraph (B)(4)(a): for many small community water systems, the period of normal operation is "significantly less than 24 hours. Suggest revising the last sentence to read, 'For a community water system well, the duration of the constant-rate pumping test will be at least 24 hours.' Alternatively, constant-rate tests of shorter duration could be allowed for small community water systems that only pump for short periods of time and have no expectation of a significant capacity increase in the foreseeable future."

e) Paragraph (B)(4)(b)(i)(*c*): Recommend changing the constant pumping rate to a minimum of 45 minutes for each step.

f) Paragraph (B)(4)(b)(i)(*d*): Recommend removing from draft rule because it is "vague in that it does not specify how many points need to fall on a straight line… if the goal is to have consistent data from step tests, particularly when tests are performed by well drillers, it would be better to specify one-hour long steps. The expectation that well drillers would be plotting data in the field on semi-logarithmic graphs is not realistic."

g) Paragraph (B)(4)(b)(ii): See comment on the 'Policy on When the Constant-Rate Pumping Test Should Exceed 24 Hours.'

h) Paragraph (B)(6)(b)(ii): Suggest replacing the "step drawdown test" in the last sentence with "pumping tests," and remove recovery measurements from this paragraph because it should be plotted "against recovery time or total time divided by recovery time" and not "against time elapsed since the pumping test started." It was suggested the report include an "arithmetic graph showing all water-level data collected during the pumping test and recovery period from the pumping well and all observation wells."

i) Paragraph (B)(6)(c): this paragraph requires the report to include documentation that the well meets the demonstration requirements in paragraph (B)(2) and (B)(3). "See previous comments on (B)(2) and (B)(3).

Response 29:

a) DDAGW agrees that the requirement is not clearly stated and proposes to revise the paragraph to read:

Be used to demonstrate the well can supply water at the anticipated permanent design pumping rate while at minimum maintaining the operational capacity and without degrading the water quality of any well.

b) The language recommended in the comment will be made.

c) The language recommended in the comment will be made.

d) The language recommended in the comment will be made.

e) The suggested timeframe of 45 minutes will be adopted.

f) DDAGW agrees with the comment and will remove the language.

g) DDAGW agrees that, for most of the conditions cited, the public water system, its consultant, the well driller or Ohio EPA will be aware of conditions that may require a pumping test be extended beyond 24 hours, or may have concerns that such conditions may exist. We also agree that it is in the best interest of all parties to address these concerns as early in the plan approval process as possible. The exception to this, "unusual conditions, such as a sudden drop in water level, are observed during the pumping test", are situations best handled on a case-by-case basis. DDAGW is recommending the following changes to the proposed language in paragraph (B)(4)(c):

(c) *The public water system shall consult with the Ohio environmental protection agency to determine if the constant rate pumping test will need to extend beyond twenty-four hours if any of the following conditions exist at the time a new well site is proposed or can be expected to result from the well's operation:*

i) Pumping at the new well may cause interference with existing wells.
ii) Pumping at new well may cause changes in water quality during prolonged pumping.
iii) The well will have special design criteria such as a radial collector well.
iv) Information about the aquifer's response to pumping is needed for ground water modeling.

h) The recommendation to replace language will be made.

i) See responses to this comment in paragraphs "a" and "b".

3745-9-10, Abandoned well sealing

Comment 30: There is an update to the document "The State of Ohio Technical Guidance For Sealing Unused Wells (1996)" soon to be finalized. Is there a way to indicate that when the new sealing guidance is released that it will supersede the 1996 version of the document? (ODH, Rebecca Fugitt)

Response 30: Ohio EPA cannot add the reference until after the Ohio Water Resources Council has formally adopted the document.

Guidelines for Design of Small Public Ground Water Systems (Greenbook)

Comment 31: The division received a comment regarding Section 3.4.E, which repeats comment #12 under rule 3745-9-12 (B)(2), "without reducing due caution and safety, there should be a well-defined hydrogeological pathway for allowing simple well isolation radii of <300 ft. under certain circumstances. Indiana and Michigan, with similar hydrogeologic settings, allow 200 to 250 ft. … As noted in the rules, at times 300 ft. is not enough. The 300 ft. isolation radius becomes an issue with existing wells with <300 ft. isolation radius when they are upgraded. If such wells have a history of water quality safety and demonstrated structural integrity, a hydrogeologic case can be made that they are safe. We would contend the same for some hydrogeologic settings with thick glacial till overburden or thick shale layers, for which a 3-dimensional safe isolation case could be made." (Stuart Smith, GWS)

Response 31: See response to comment # 12 under rule 3745-9-04.

Comment 32: Several general comments were received and are captured below. (Stuart Smith, GWS)

a) Section 3.8 - Simplify requirements by having hydrogelogist conduct general supervision of hydrogeologic matters. Also, the ANSI/NGWA 01-14 standard is an alternative standard on well construction, development and disinfection.

b) Section 3.8.A.1 – "A step-drawdown test is recommended for wells under 100,000 gal/day where hydrogeologic information is generally lacking and where the test will improve a choice of a constant-rate test pumping rate, and ultimately, the operational pumping rate."

c) Section 3.8.B – "Reduction to 1.2x design flow rate should also be available (on approval) for some systems < 100,000 gal/day, as many are in tight aquifers (sandstone or carbonates, for example) where wells have high nonlinear well losses (resulting in steep in-well drawdowns)."

d) Section 3.9.B – "Reports should be prepared by a qualified hydrogeologist (reporting on tests describing hydrogeologic functions). It seems as if, in Ohio, any biped can perform hydrogeologic functions for state purposes."

e) Section 3.9.B.3 etc. - "A resolution of 0.1 ft. is not nearly enough to define rates of decline, even in step-drawdown tests. We recommend 0.01 ft. Water level tapes are commonly marked in 0.1 and 0.01 ft. intervals."

f) Section 3.9.B.5 and elsewhere – "Reference to hand graphical calculations alone seems antiquated. While often appropriate, software-based analysis (AQTESOLV etc.) should be given equal weight. Any such analysis should be prepared by a qualified hydrogeologist."

Response 32: The following are the corresponding responses to comments from Stuart Smith, GWS:

a) The division has included a definition in rule 3745-9 for a "Qualified ground water professional" and recommends that they be utilized.

b) DDAGW believes to require this for small systems would create an undue burden on the water system, both financially and in the time required to complete the test.

c) DDAGW agrees with the suggestion and it will be included.

d) The division recommends qualified ground water professionals be involved, but at this time we cannot require it because no registration process exists for them.

e) Using a resolution of 0.1 ft. is a reasonable expectation.

f) This section has been revised to include the following, which is consistent with Chapter 3745-9:

Graphs plotted on semi-logarithmic graph paper showing the drawdown and recovery measurements on the arithmetic scale and time on the logarithmic scale. Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the step drawdown pumping test.

Graphs plotted on semi-logarithmic graph paper showing the recovery measurements on the arithmetic scale and time on the logarithmic scale. Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the pumping test.

Arithmetic graphs showing all water-level data collected during the pumping test and recovery period from the pumping well and all observation wells.

Comment 33: The division received several comments and questions on the draft revisions. (Ladies First, Marietta)

a) Section 3.6.D.1 – Description should be 'plain-end' rather than 'straight-end'. "Do we want to refer to this standard as AWWA C219-11? Do we want to use the term 'most recent effective version' preceding the name of the standard? No, see the first correction on pg. 27. The date of 1/23/11 is the approval date, you may want to consider using the effective date of 3/1/11. If available, a list of approved couplings would be helpful."

b) Section 3.7.C – "Sometimes the district office will offer the use of a casing depth indicator to determine at least 25' of casing length exists. Sometimes the Ohio Department of Health (ODH) will be able to offer the use of their downhole camera. Are these two scenarios able to be approved under this section? Will the PWS still need the services of a contractor registered with ODH? What if an existing and acceptable well log already exists for the site, would the well still need inspected by a registered contractor? Besides a downhole camera to check #4 (Length & Depth of Well Screens), would an acceptable well log completed by the driller during well construction be adequate? Regarding #5, you may want to indicate that a completed well log/worksheet will be 'submitted' as opposed to 'completed'."

c) Section 4.4.D.4 – There is an internal document link error.

Response 33: The following are the corresponding responses to comment from Ladies First, Marietta:

a) The language has been revised as suggested. Regarding the comment about the most recent effective version, DDAGW is not permitted to use the suggested language. The most recent version has to properly be adopted through proposed revisions to the rules. Lastly, the division does not maintain a list of approved couplings.

b) Yes, the two scenarios described above for determining casing depth are approved under Section 3.7.C.

An existing well log would be the preferred resource in reference to the questions about an inspection by a registered contractor, and the length and depth of well screens.

It is understood that the completed log/worksheet must be submitted to Ohio EPA for further action to occur.

c) The internal document link will be corrected.

Comment 34: Several comments and questions were made on the draft revisions to this guidance document and are summarized below. (Steve Champa, Eagon & Associates, Inc.)

a) Section 3.3.A and 3.10.B.6 – Remove the requirement to note the results of chlorine testing on the sample submission form because it is not included in rule 3745-9-08 (D).

b) Section 3.3.C – "What constitutes a high level of sodium?" There is no secondary MCL for sodium and if there is nothing in rule, it should not be in this document.

c) Section 3.4.F.1 – "Revise this sentence to clarify that sanitary sewer manholes are not permitted within the sanitary isolation radius."

d) Section 3.6.C.6 - Suggest revising new sentence to read, "When vertical turbine pumps are used, access for water-level measurements must be provided."

e) Section 3.6.C.11 – Suggest revising new text to read, "…and shall allow for collection of a representative ground water sample from each well."

f) Section 3.7.B.1 – "What is the rationale for the exemption time frames in Parts a and b?"

g) Section 3.7.B.2 – Is the intent of this section (in context with part 1, has been inactive for as much as 3 to 5 years) to allow a newly discovered / reopened PWS well with a known construction deficiency to be repaired /upgraded within 6 months of Ohio EPA notification to be placed into service without a complete well analysis? "If a well has been sitting idle for 3 years in a pit with insufficient grouting it seems that some sort of baseline water quality analysis should be required. It is also likely that the casing repair itself would require plan approval." It was suggested the only exemption from obtaining plan approve be for a temporarily closed system (closed less than a year) and has previously obtained plan approval and the well meets all applicable well siting and construction standards.

h) Section 3.8 – "Since the pumping test is to be performed at a rate higher than the anticipated permanent design pumping rate, the specific capacity at the anticipated permanent design pumping rate will need to be determined by proportional reduction of the drawdown based on the equivalent proportional reduction in pumping rate and consideration of well losses. In addition, the specific capacity at the time of the pumping test will be valid only at that specific point in time and for the pumping test duration."

i) Section 3.9.B.6 – "Items 1, 2, 3 (a, b) should be reassigned as a, b, and c, (i, ii) to avoid confusion with the parts 1, 2 and 3 that already exist in

this section."

j) Section 3.9.B.6.2 (now 3.9.B.6.b) – Remove recovery measurements and include an arithmetic graph showing all water-level data collected during the pumping test and recovery period from the pumping well and all observation wells.

k) Section 3.9.B.6.3.a (now 3.9.B.6.c.1) – "Addition of a new well cannot decrease the operational capacity of a well field.

l) Section 3.9.B.6.3.b. (now 3.9.B.6.c.2) – "The determination of the permanent design pumping rate for a well should be based on an analysis that includes interference drawdown from other wells (belonging to the PWS or otherwise) in conjunction with operational considerations." Suggest revising language.

m) Section 3.11.C – "The word 'hole' should be removed from the proposed language as it is redundant with the word 'bore' as used in this sentence."

Response 34: The following are the corresponding responses to the comments from Eagon & Associates, Inc.:

a) It is a requirement of the American Water Works Association (AWWA), standards C-654, section 5.1, which is referenced by rule to ensure that there is no detectable chlorine residual at the time of bacteriological testing.

b) The section was revised to remove the special conditions language and instead state, "High level s of sodium is a concern when serving communities with sodium restricted diets.

c) The title of the section will be changed from, "Gravity Sewers in Well Field Areas" to "Sanitary Sewers in Well Field Areas" to emphasize that force mains and sanitary sewer manholes are not permitted within the sanitary isolation radius.

d) The paragraph will be revised to reflect the suggested language.

e) The paragraph will be revised to reflect the suggested language.

f) It was decided that the timeframes were reasonable and a complete well analysis was not warranted since the systems had previously completed necessary sampling.

g) The well deficiencies are required to be corrected and samples (total coliform and nitrate) to confirm the success of the repairs are required. A complete well analysis is not warranted.

h) The comment is correct in its technical description of specific capacity. Calculating the specific capacity at the anticipated permanent design pumping rate is a crucial piece of information for the public water system as a base measure of the performance of the well.

i) The numbering scheme will be corrected.

j) The language will be revised to 3.9.B.6.2 (now 3.9.B.6.b):

(1) Graphs plotted on semi-logarithmic graph paper showing the drawdown and recovery measurements on the arithmetic scale and time on the logarithmic scale.

Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the step drawdown pumping test.

(2) Graphs plotted on semi-logarithmic graph paper showing the recovery measurements on the arithmetic scale and time on the logarithmic scale.

Graphs must be submitted for the pumping well and any other wells used to observe drawdown and recovery during the pumping test.

(3) Arithmetic graphs showing all water-level data collected during the pumping test and recovery period from the pumping well and all observation wells.

k) DDAGW agrees the requirement is not clearly stated and proposes to revise the paragraph to read as follows:

The well can supply water at the anticipated permanent design pumping rate while at minimum maintaining the operational capacity and without degrading the water quality of any well.

l) The wording will be revised to reflect the suggested language.

m) The language will remain as drafted since “borehole” is a commonly accepted term.

Policy on When the Constant Rate Pumping Test Should Exceed 24 Hours

Comment 35: The following are several comments and recommendations from Steve Champa, Eagon & Associates, Inc.

- A question was raised about whether DDAGW meant to use "recommend" or "may require" in several places within this policy.

- A comment was made that the volume of water produced from pumping at the peak hourly flow for the normal hours of operation usually exceeds the volume of water these systems will eve use on a daily basis (for most low use community wells and low to medium use noncommunity wells), is also true for many small community water systems.

- DDAGW received a comment about the section, conceptual model for constant rate pumping test stating "dynamic equilibrium is achieved when recharge to the aquifer within the area of pumping influence is sufficient to balance pumping withdrawals… recharge is not to the well itself." It was also suggested that in point 2 of this section, the division should revise it to say the last four hours of the test as the interval rather than referencing the rule.

- The following comments were made about the division's approach to determining stabilization of drawdown.

  "There are several problems with this approach to determining stabilization of drawdown.

1) Drawdown during a pumping test can be affected by several factors that can result in apparent lack of stabilization, or apparent lack stabilization, as defined in this policy. Depending on the hydrogeologic setting, these factors can include the influence of other nearby wells, changes in surface-water elevation, changes in barometric pressure, and recharge from precipitation. Does a pumping test need to continue until 72 hours if the drawdown does not appear to stabilize due to these conditions?

    a) If the well being tested is completed in an aquifer near a surface-water body that has a good hydraulic connection with the aquifer, changes in elevation of the surface-water body during the pumping test will cause changes in drawdown as measured in the field. The true drawdown is not known unless the data can be corrected to remove the influence of the changes in the surface-water elevation. In such a hydrogeologic setting, it is common for stabilization to occur in a relatively short time after pumping begins. If the stage of the surface-water body drops during the pumping test, the pumping test may need to be extended to achieve stabilized drawdown as defined in this policy document, even though the additional data may provide no significant additional knowledge about the response of the aquifer to pumping or the potential capacity of the well.

b) It is often the case that well being tested is an existing well field and other wells in the well field may come on or go during the constant-rate test. We strive to have stable conditions during the constant-rate test, at least for the first several hours of the test, because the early time-drawdown data is frequently the most significant in the determination of aquifer properties. Having other wells go on or off in the later part of a test is not necessarily a bad thing as it provides data that can be used to understand interference drawdown between wells during normal well-field operation. This policy would seem to require that a test continue beyond 24 hours due to the apparent lack of stabilization cause by pumping of other wells. It is not often the case, but the pumping test may also be affected by pumping that is not under the control of the PWS.

c) Water levels in a confined aquifer can be affected by changes in barometric pressure. These changes can be gradual or relatively rapid depending on the magnitude of barometric change and the nature of the associated weather system. The true drawdown is not known unless the data are corrected to remove the effects of the barometric pressure changes. Barometric pressure in Ohio can range from less than 28.5 inches Hg to over 30.5 inches Hg. A change in barometric pressure of two inches of mercury is equivalent to approximately 2.26 feet of water. So depending on the barometric efficiency of a well, the change in ground-water level due to change in barometric pressure could exceed two feet.

2) This requirement will result in the need for PWSs to bid all pumping tests as 72-hour pumping tests.

3) Extending a pumping test from 24 to 72 hours will create additional expense for the PWS that will total several thousand dollars.

4) The assumption that drillers will be plotting data in the field is not realistic.

5) Stabilization should not be used as the criteria for determining when a test should be extended. In a nonleaky confined aquifer (or even leaky confined) stabilization may never occur in any reasonable time length. That does not mean that the well yield cannot be determined from the test data. A competent ground-water professional has the analytical tools to properly evaluate the data and make such determinations."

- A question was asked about the section, conduct and duration of constant rate pumping tests. More specifically, "can a test be ended

after 24 hours if stabilization as defined in this policy is achieved for four consecutive readings at a time less than 24 hours if the drawdown is later influenced by other factors such as other wells pumping, surface-water elevation change, or barometric change?"

- The division received a comment about the research DDAGW gathered on regulatory requirements regarding the duration of constant rate pumping test. "In Indiana, it is possible to get a variance from the 24 hour pumping test requirement for a new well in an existing well field or for a replacement well. Ohio EPA should consider allowing for constant-rate pumping test of shorter duration in these cases."

- It was asked who will make the determination that a constant-rate test longer than 72 hours may be required and whether this is Ohio EPA's intent based on the research they conducted. In addition, "72 hours is three times the currently required duration of 24 hours and the additional cost will be thousands of dollars. This additional cost is not acknowledged in the adverse impact to the business section of the BIA."

- A general comment was received about this policy. "Whether rule or guidance, we have another concern about detailed/descriptive criteria that dictates procedures that may not always be appropriate. It is not possible to establish a one-size fits all simple criteria for pumping-test design and data collection that will fit all of the complex situations that may be encountered. Competent ground-water professional must be allowed the flexibility to apply sound judgment as to what data is critical to the application of analytical methods of analysis. For example, until data is fully analyzed and corrected for background trend and other influences, the true drawdowns may not be known. For the same reason it is not always possible to run a pumping test at 1.5 times the design pumping rate as the test analysis is needed to make that determination.

Response 35: DDAGW has reviewed the comments and determined the draft policy does not accomplish what was originally intended and needs more discussion and revision. Therefore, the draft "Policy on When the Constant-Rate Pumping Test Should Exceed 24-Hours" did not adequately address a previous comment on when a pumping test should be run for more than 24 hours and will be withdrawn. DDAGW is recommending the following language by added to paragraph 3745-9-09(B)(4)(c):

The constant rate pumping test may be extended beyond twenty-four hours when conditions include, but are not limited to the following:
i) concerns about interference with existing wells.
ii) concerns about changes in water quality during prolonged pumping.
iii) installation of a well or wells with special design criteria such as a radial collector well.
iv) information on the aquifer's response to pumping is needed for

ground water modeling.

[Comment: If any of these conditions exist, the public water system should consult with a qualified ground water professional to design and implement a pumping test or tests which will address the noted condition.]

End of Response to Comments