State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of Water Resources

NOTICE OF PROPOSED AMENDMENTS TO THE RULES AND REGULATIONS FOR GROUNDWATER QUALITY

The Director of the Department of Environmental Management (DEM) proposes amendments to the Rules and The Regulations for Groundwater Quality and gives notice of intent to receive public comment on the proposed regulations. In accordance with State law and pursuant to the "Administrative Procedures Act", these proposed regulations would, upon adoption, supersede the existing Rules and Regulations for Groundwater Quality. A public hearing on the proposed regulations will be held if DEM receives such request from twenty-five (25) people, a governmental agency or subdivision, or an association having not less than twenty-five (25) members. If a public hearing is held, a public notice will be published announcing the date, time and place of such hearing.

The primary purpose of these amendments is for the periodic update of the state's wellhead protection area delineations for the public wells in RI and to update the groundwater classification delineations. This update reflects the current status of the public wells in RI, the response to recent petitions to DEM for groundwater reclassification, and it incorporates new or revised information on the state's groundwater resources. Regulation language changes have also been made to clarify the intent and the applicability of the regulations.

DEM has complied with the requirements of Rhode Island General Laws Section 42-35-3 by considering alternative approaches to the proposed regulations and has determined that there is no alternative approach that would be as effective and less burdensome. DEM has also determined that the proposed regulations do not overlap or duplicate any other state regulation. DEM has complied with the requirements of Rhode Island General Laws Section 42-35-3.3 by determining that the proposed regulations will not result in a significant adverse economic impact on small business or any city or town, and by submitting copies of the proposed regulations to the Governor's Office and Economic Development Corporation.

The proposed Rules along with a Summary of the Rules can be viewed on the DEM website at http://www.dem.ri.gov/programs/benviron/water/quality/prot/index.htm To view the revised wellhead protection area and groundwater classification delineations, go to the DEM website at http://www.dem.ri.gov/maps/gw.htm For questions about the proposed regulations and maps or to obtain copies of the proposed regulations and summary, contact Theodore Peters at 401-222-4700 x7705, by e-mail at Theodore.Peters@dem.ri.gov or by writing to: Office of Water Resources, Department of Environmental Management, 235 Promenade Street, Providence, RI 02908. Copies of the proposed regulations can also be obtained at this address.

All interested parties are encouraged to submit written comments on the proposed regulations to Ernest Panciera, Supervising Environmental Scientist, Office of Water Resources, Department of Environmental Management, 235 Promenade Street, Providence, RI 02908 by 4:00 p.m. on Friday, June 4, 2010, the close of the comment period.

Signed this 21st day of April 2010.

Russell J. Chateauneuf, P.E., Chief
Groundwater and Wetlands Protection
Office of Water Resources
RI Department of Environmental Management

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of Water Resources

Summary of Proposed Amendments to the
Rules and Regulations for Groundwater Quality

April 2010

The Rhode Island Department of Environmental Management (DEM) Office of Water Resources is proposing amendments to the "Rules and Regulations for Groundwater Quality." The primary reason for these amendments is to update the wellhead protection area and groundwater classification maps that are part of the regulations. Regulation language changes have also been made. The substantive language changes, along with an explanation for the change, and a summary of the map changes are provided herein. The complete text of the Rules can be viewed on the DEM website at http://www.dem.ri.gov/programs/benviron/water/quality/prot/index.htm To view the revised wellhead protection area and groundwater classification delineations, go to the DEM website at http://www.dem.ri.gov/maps/gw.htm

Copies of the complete text showing the proposed deletions and additions are available from the Office of Water Resources at 235 Promenade Street, Providence, RI 02908 or by calling or e-mailing Theodore Peters at 401-222-4700 x7705 or Theodore.Peters@dem.ri.gov.

Text proposed to be deleted: italicized and stricken.
Text proposed to be added: italicized and double underlined.

Rule 5. Applicability

Rule 5.4 This Rule has been deleted because the applicability of the Groundwater Quality Rules to septic systems by means of a groundwater quality certification has been superseded by the DEM Rules for Onsite Wastewater Treatment Systems (OWTSs) (January 1, 2008). The OWTS Rules require an impact analysis for large OWTSs that is the same as that which had been required under a Groundwater Quality Certification. Prior to the OWTS Rule change, a Groundwater Quality Certification and an OWTS permit were both required for large systems. An OWTS permit is the only permit that is now required.

~~*5.4 Individual Sewage Disposal Systems*~~

~~*5.4.1 These Rules and Regulations apply to any application to the Department for an individual sewage disposal system designed to treat five thousand (5,000) or more gallons per day as defined below in Rule 5.4.1(A) (C) where the groundwater is classified GA or GAA. Such systems are subject to the Groundwater Quality Certification requirements of Rule 17. The Director may waive the requirement for a groundwater quality certification for the replacement of an existing system when there is no increase in the design flow to the system or for a system that is designed to remove nitrogen such that the total nitrogen in the effluent does not exceed the standard of 10 mg/l. Individual sewage systems subject to the groundwater quality certification requirements shall include:*~~

~~*(A) Any single individual sewage disposal system designed to treat five thousand (5,000) gallons or more per day;*~~

~~*(B) All individual sewage disposal systems on a single parcel of land, excluding subdivisions, where the total design flow for the parcel is five thousand (5,000) gallons or more per day; and*~~

~~*(C) All individual sewage disposal systems serving a residential or commercial condominium complex where the total design flow for the complex is five thousand (5,000) gallons or more per day.*~~

~~*5.4.2 Individual sewage disposal systems that are designed to treat less than five thousand (5,000) gallons per day, that are used solely for the disposal of sanitary sewage (as defined herein), are exempt from these Rules and Regulations for Groundwater Quality.*~~

Rule 6. Findings

Rule 6.2.3 This finding has been updated in recognition of the US EPA designation of Conanicut Island (Jamestown) as a federal Sole Source Aquifer on August 14, 2008.

6.2.3 Four ~~Three~~ sole source aquifers (Block Island, Pawcatuck Basin, ~~and~~ Hunt-Annaquatucket-Pettaquamscutt, and Conanicut Island (Jamestown) Aquifers) have been designated in Rhode Island by the United States Environmental Protection Agency in accordance with Section 1424(e) of the federal Safe Drinking Water Act of 1974.

Rule 7. Definitions

The following definitions have been added to the Rules:

"Non-aqueous phase liquid" *means any pollutant that is present as a separate phase liquid, including, but not limited to sheens.*

The term "non-aqueous phase liquid" is used in the change to Rule 11.2 and Rule 11.4.

"Petroleum" *means crude oil, any fraction of crude oil, any substance refined or derived from crude oil, or any mixture thereof, including, but not limited to, gasoline, petroleum solvents, kerosene, aviation fuels, diesel oils, fuel oils, waste oils, lubricants, tar and asphalt.*

"Watercourse" *means any river, stream, brook, pond, lake, swamp, marsh, bog, fen, wet meadow, area subject to storm flowage, or any other standing or flowing body of water, including such watercourses that may be affected by the tides.*

"Watercourse" replaces the phrase "surface water body and wetlands" in the following sections of the Rules: 10.7.4(B); 12.3.2(B); 15.6.1(E).

The definition for an "individual sewage disposal system" has been deleted and replaced with "onsite wastewater treatment system" to be consistent with the revised DEM rules for onsite wastewater treatment systems. "Onsite wastewater treatment systems" has replaced "individual sewage disposal systems" in the text of the Rules.

~~*"**Individual sewage disposal system**" means any system of piping, tanks, disposal areas, alternative toilets or other facilities designed to function as a unit to convey, store, treat and/or dispose of sanitary sewage by means other than discharge into a public sewer system.*~~

*"**Onsite Wastewater Treatment System**" means any system of piping, tanks, dispersal areas, alternative toilets or other facilities designed to function as a unit to convey, store, treat or disperse wastewater by means other than discharge into a public sewer system.*

Rule 9. Groundwater Classification

Rule 9.1.1(B) The language deleted below addresses wellhead protection areas for wells that are to be deleted from the wellhead protection area map. This action is best addressed by the revised language in Rule 18.4 (see discussion of Rule 18.4). Since the deletion of a well is now based on a determination by the Director in addition to the Department of Health's cancellation of the well's approval, a rule change will be necessary to provide notice of the Director's determination and therefore the reclassification to GA.

9.1.1 Groundwater classified GAA shall be those groundwater resources which the Director has designated to be suitable for public drinking water use without treatment and which are located within the areas described in A-C below.

(B) Wellhead protection areas for community water supply wells delineated in accordance with Rule 18~~.1~~. Wellhead protection areas for community water supply wells will by definition be considered reclassified to GAA at the time of approval of the community water supply well by the Rhode Island Department of Health. ~~Wellhead protection areas for community water supply wells no longer approved by the Rhode Island Department of Health will by definition be considered reclassified to GA, unless the groundwater meets the criteria in Rule 9.1.1(A) or (C).~~

Rule 9.1.3 The change in Rule 9.1.3(B) clarifies the coordination required between the Office of Water Resources and the Office of Waste Management in designating areas to be classified GB. The change in Rule 9.1.3(C) clarifies the intent by linking actions to classify groundwater GB to specific groundwater classification actions in other sections of the Rules.

9.1.3 Groundwater classified GB shall be those groundwater resources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation. Groundwater located beneath the following areas may be classified GB:

(A) Highly urbanized areas of the state with dense concentrations of historic industrial and commercial activity, wherein a public water supply is readily available;

(B) The permanent waste disposal area ~~at sites of the following facilities~~ as approved by the Director in accordance with the Rhode Island "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" at the sites of ~~(i)~~ historically permitted or approved inactive landfills and inactive land disposal sites for solid waste, hazardous waste, ~~and/~~or sewage sludge;

(C) ~~(ii)~~ Active sites that are permitted for the land disposal of sewage sludge, unless such disposal site is associated with a licensed solid waste landfill; or

(D)~~(C)~~ The area immediately surrounding the ~~permanent waste disposal~~ area classified GB in accordance with Rule 9.1.3(B) and (C) which the Director has determined is not suitable for public or private drinking water use or the area immediately surrounding the area classified GC in accordance with Rule 9.1.4, which the Director has determined is not suitable for public or private drinking water use. ~~at the following inactive and active facilities: landfills, land disposal sites for solid waste, hazardous waste, and sewage sludge~~.

Rule 10. Modification of Groundwater Classification

Rule 10.6 This Rule specifies the criteria for groundwater reclassification to GB. The change to Rule 10.6.3(B) clarifies the coordination required between the Office of Water Resources and the Office of Waste Management in reviewing requests to reclassify groundwater at areas of past waste disposal. The Office of Water Resources will not reclassify such an area until the Office of Waste Management has determined the proper remedial action for the site. As with the change in Rule 9.1.3(B) discussed above, this change in Rule 10.6.3(B) restricts those property owners that operated an illegal facility from the automatic benefit of the GB classification. Facilities that did not have state approval can apply for a variance from this provision pursuant to Rule 19 and will be evaluated for reclassification to GB on a case-by-case basis. The change in Rule 10.6.3(C) was made to be consistent with the change in the description of GB in Rule 9.1.3(D).

10.6.3 The area in question is located within one of the areas described below:

(A) Contiguous with an existing area classified GB pursuant to Rule 9.1.3(A), provided that the land use activities in the area in question represent a similar degree of threat to groundwater quality as the contiguous area classified GB;

(B) Within the permanent waste disposal area as approved by the Director in accordance with the Rhode Island "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" at sites of historically permitted or approved ~~at~~ inactive landfills or inactive disposal sites for solid waste, hazardous waste, or sewage sludge, where the Director has determined that groundwater remediation to drinking water quality is not feasible or practical; or

(C) The area immediately surrounding the ~~waste disposal~~ area classified GB in accordance with Rule 9.1.3(B) or (C) which the Director has determined is not suitable for public or private drinking water use or the area immediately surrounding the area classified GC in accordance with Rule 9.1.4, which the Director has determined is ~~designated~~ not suitable for public or private drinking water use. ~~at the following inactive and active facilities: landfills, land disposal sites for solid waste, hazardous waste, and sewage sludge~~.

Rule 11. Groundwater Quality Standards and Preventive Action Limits

Table 1. Numerical Standards for GAA and GA The following text has been added to the Table heading to clarify that the standards are for unfiltered samples.

Standards and Action Limits are for unfiltered samples.

Rule 11.2 and 11.4 These Rule changes prohibits the presence of non-aqueous phase liquids in groundwater classified GAA and GA (Rule 11.2) and in groundwater classified GB and GC (Rule 11.4). Note that this is consistent with the Office of Waste Management's "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" Rule 8.07 (A) which states that "The presence of non-aqueous phase liquids (NAPL) in any environmental medium shall be considered a condition that exceeds Upper Concentration Limits."

11.2 Class GAA and Class GA Groundwater Quality Standards: …

11.2.4 Groundwater classified GAA and GA shall not have non-aqueous phase liquids present in either a mobile or immobile state at or below the surface of the water table.

11.4 Class GB and GC Groundwater Quality Standards:…Groundwater classified GB and GC shall be of a quality which the Director determines does not:

11.4.5 Have non-aqueous phase liquids present in either a mobile or immobile state at or below the surface of the water table.

Rule 11.5 This Rule change makes a groundwater quality certification in this particular instance necessary only at the Director's discretion, in recognition that other DEM Rules may adequately address the groundwater quality issues that would be addressed by the groundwater quality certification. For example, the DEM Rules for managing dredged material adequately address the impacts to surrounding groundwater as part of that review.

11.5 Proposed activities where the ~~over~~ groundwater is classified GB in accordance with Rule 9.1.3(B) – (D) ~~or (C)~~ that would otherwise be prohibited in the surrounding areas where the groundwater is classified GA or GAA ~~shall~~ may at the Director's discretion be subject to the Department's review by means of a groundwater quality certification in accordance with Rule 17 to ensure that the surrounding groundwater quality is protected.

Rule 17. Groundwater Quality Certification

Rule 17.1 Since the Groundwater Quality Rules were first adopted in 1992, the applicability of the groundwater quality certification has diminished as other Rules in the Department have been promulgated to address groundwater quality. The new OWTS rules for large systems are an example of this (see discussion above regarding Rule 5.4). As a result, this Rule change specifies that the remaining scenarios requiring a groundwater quality certification are at the Director's discretion.

Rule 17.1.1 Rule 11.5 may require a groundwater quality certification for certain activities (see earlier discussion regarding Rule 11.5), however, these activities were not previously identified in Rule 17.1 under applicability of groundwater quality certifications. This rule change makes it clear that a certification may be required.

17.1 Applicability: Groundwater quality certification ~~will~~ may at the Director's discretion be required for the following:

17.1.1 *Proposed activities where the groundwater is classified GB in accordance with Rule 9.1.3(B) – (D) that would otherwise be prohibited in the surrounding areas where the groundwater is classified GA or GAA (See Rule 11.5); and*

Former Rule 17.1.1 This Rule specifying the requirement for a Groundwater Quality Certification for large septic systems has been deleted. See discussion above regarding Rule 5.4.

~~*17.1.1 Individual sewage disposal systems designed to treat five thousand (5,000) gallons or more per day as defined below in Rule 17.1.1(A) (C) (Rhode Island "Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction, and Maintenance of Individual Sewage Disposal Systems", January 2002, and amendments thereto) where the groundwater is classified GA or GAA. The Director may waive the requirement for a groundwater quality certification for the replacement of an existing system when there is no increase in the design flow to the system or for a system that is designed to remove nitrogen such that the total nitrogen in the effluent does not exceed the standard of ten (10) mg/l. Individual sewage systems subject to the groundwater quality certification requirements shall include:*~~

~~*(A) Any single individual sewage disposal system designed to treat five thousand (5,000) gallons or more per day;*~~

~~*(B) All individual sewage disposal systems on a single parcel of land, excluding subdivisions, where the aggregate design flow is five thousand (5,000) gallons or more per day; and*~~

~~*(C) All individual sewage disposal systems serving a residential or commercial condominium complex where the aggregate design flow is five thousand (5,000) gallons or more per day.*~~

Former Rule 17.1.2 This Rule requiring a groundwater quality certification for upland disposal of dredge material from non-marine waters has been deleted since it is no different than other activities that may have a reasonable potential to adversely impact groundwater quality for which a groundwater quality certification is required pursuant to what will now be Rule 17.1.2.

~~*17.1.2 Water quality certification for upland disposal of dredge material taken from non-marine waters of the state (Rhode Island "Water Quality Regulations" for Water Pollution Control" (June 2000), and amendments thereto);*~~

Rule 17.3.2 This Rule specifies the $200.00 fee for a groundwater quality certification application. This fee has already been established pursuant to the DEM "Rules and Regulations Governing the Establishment of Various Fees" (July 2007). It is repeated here so that applicants do not have to refer to different Rules.

17.3.2 The groundwater quality certification application form shall be accompanied by a non-refundable check for two hundred dollars ($200.00) payable to the "General Treasurer, State of Rhode Island."

Rule 18. Wellhead Protection

Rule 18.1.1 The language deleted here was originally included when wellhead protection areas were first delineated by DEM and decisions were made on how to address proposed well sites and inactive wells. This language is no longer necessary now that the map has been established and criteria are specified for deleting and adding wells (Rules 18.4 and 18.5, respectively) to the wellhead protection area map.

18.1.1 Wellhead protection areas for each public well in Rhode Island approved by the Rhode Island Department of Health shall be established by the Department of Environmental Management in accordance with the delineation methods below in (A)–(C), unless a refined delineation pursuant to Rule 18.2 is approved by the Department. (See Appendix 5 for a description of the methodology.) ~~*In addition to wells approved by the Rhode Island Department of Health, wellhead protection areas will be delineated for particular proposed well sites and inactive wells as determined by the Director.*~~

Rule 18.4 This Rule has been modified to specify additional criteria for wells to be removed from the wellhead protection area map. This is in recognition of the importance of prudent long-term water supply management in RI.

18.4 Deletion of Wells from the Wellhead Protection ~~*Program*~~ *Area Map: A public well*~~*s*~~ *and its wellhead protection area delineation will be deleted from the Department's Wellhead Protection* ~~*Program*~~ *Area map and no longer subject to provisions of these* ~~*regulations*~~ *Rules when the Rhode Island Department of Health has determined that the well is no longer an approved public drinking water supply and the Director has determined that maintaining the wellhead protection area no longer serves the public interest. The Director's determination shall be based on the available information, period of disuse, and the absence of any known dispute concerning deleting the well from the Wellhead Protection Area map. Such determination shall be made in a manner consistent with the Rhode Island State Guide Plan.*

Rule 18.5 This Rule has been modified to specify an alternative criteria for a well site to be added to the wellhead protection area map.

> *18.5 Addition of Wells to the Wellhead Protection ~~Program:~~ Area Map: A public well and its wellhead protection area delineation will be added to the Department's Wellhead Protection ~~Program~~ Area map and subject to the provisions of these ~~regulations~~ Rules at the time of approval by the Rhode Island Department of Health as a public drinking water supply or if the Director has determined that it serves the public interest to add a wellhead protection area for a well site not yet approved by the Department of Health, but which will likely be used for public drinking water supply in the future.*

Appendix 1 – Monitoring Well Construction and Abandonment Procedures

> *8.1~~General:~~ Monitoring wells, piezometers and other subsurface borings shall be abandoned in accordance with this Rule or alternate procedures approved in writing by the Director prior to abandonment..~~so that natural migration of groundwater or soil vapor is not significantly influenced.~~ Abandonment shall take place within 60 days after use has been terminated or within a timeframe approved by the Director.*

Appendix 2 – Groundwater Classification Map

The Groundwater Classification map has been changed as follows:

- The Big River-Mishnock groundwater reservoir recharge area was added to GAA;
- The following changes were made regarding wellhead protection areas (WHPAs) for community wells, which are classified GAA: 15 community WHPAs were added to the map, 13 community WHPAs were deleted and 46 existing community WHPAs were revised;
- The area classified GC at the RI Resource Recovery Corporation Landfill in Johnston has been modified to reflect permitted areas for disposal;
- The groundwater classified GB was changed as follows:
    - The GB urban area for Westerly was expanded in the vicinity of the junction of Route 1 (Granite Street) and East Avenue;
    - The GB urban area boundary in the village of Washington in Coventry was adjusted to more accurately reflect property boundaries and land use;
    - A GB area was established at the former Tucker's Industrial Dump Site in Johnston;
    - The GB area has been modified at the Melville Marina Development in Portsmouth; and
    - The GB area at the following landfills was adjusted to more accurately reflect the permanent waste disposal area:
        - Landfill along the Clear River in the Whipple area of Burrillville;
        - Landfill north of Chestnut Hill Road near the Smith and Sayles Reservoir in Glocester;
        - Westerly landfill off of Route 91;
        - Landfill near Stubtown Road in Hopkinton;
        - Landfill off of Dry Bridge Road in North Kingstown;
        - RI Resource Recovery Corporation Landfill in Johnston;
        - Tiverton landfill off of Main Road;
        - Landfill off of Old Oxford Road in North Smithfield;
        - Jamiel Park landfill off of Market Street in Warren;
        - Barrington landfills #1 and #2 on Prince Hill Avenue;

- Charlestown landfill off of Sand Hill Road; and
- Rose Hill landfill in South Kingstown.

Appendix 3 -- Groundwater Reservoirs and the Critical Portion of Their Recharge Areas

A groundwater reservoir and associated recharge area have been mapped for the Big River area in Coventry and West Greenwich. This groundwater reservoir merges with the existing Mishnock groundwater reservoir resulting in the "Big River – Mishnock Groundwater Reservoir."

Appendix 4 – Wellhead Protection Area Map

This is a map of the wellhead protection areas (WHPAs) for the 657 public wells in RI as of April 1, 2010: 179 community wells, 112 non-transient non-community wells, and 366 transient non-community wells. Public wells in RI are regulated by the RI Department of Health. Since the WHPA map was last updated with the Rule change in March 2005, the following changes have been made:

- Wells and their WHPAs added to the map: 74 wells -- 15 community, 20 non-transient non-community, and 39 transient;
- Wells and their WHPAs removed from the map: 76 wells -- 13 community, 8 non-transient non-community, and 55 transient; and
- Revised delineations for existing WHPAs (many are minor revisions): 59 wells -- 46 community, 5 non-transient non-community, and 8 transient.

Appendix 5 -- Wellhead Protection Area Delineation Methodology

The changes presented below are self-explanatory.

Introduction [second and third paragraphs]

The DEM methodology was used to delineate the WHPAs for all of the public wells when the WHPA map was first adopted in the 1993 amendments to the Groundwater Quality Rules and for new public wells that came on line in the 1990s and early 2000s. Most of the new community water supply wells installed in stratified drift over approximately the last five years have WHPAs that meet the definition of a refined WHPA. A refined WHPA is a more advanced delineation based on more complex methodologies (see discussion at end of this document).

DEM relied on technical input from the Wellhead Protection Program Advisory Committee in developing the delineation methodology in the late 1980s. A mapping approach was required that was scientifically defensible, could be applied consistently across the state, and could be applied with the resources available to DEM. The delineations are based on reasonably available information regarding the hydrogeologic environment and the well characteristics. The method does not provide the level of detail necessary to account for potential well interference. The WHPAs were delineated using the US Geological Survey quadrangle maps at a scale of 1:24000.

Refined WHPAs

The WHPAs delineated by DEM ~~provide~~ have provided a suitable basis for state and local protection efforts. When the DEM methodology was developed in the late 1980s, it was anticipated that in the future more site specific data or more complex methods would be used to revise the DEM provided WHPAs or to map the WHPA for new wells. As of April 1, 2010, 49 wells have a WHPA that was delineated using a more advanced approach (refined WHPA) than the standard DEM methodology. DEM reviews the results of each model used by a supplier or other state or federal agency to determine the area to be designated as the WHPA. The Rhode Island Department of Health has been using funds from the Safe Drinking Water Act for the US Geological Survey to delineate refined WHPAs for selected existing DEM WHPAs, which DEM then incorporates into the WHPA map. ~~Ideally, the delineations for the community wells and perhaps some of the larger non-transient non-community wells, will be revised in the future using the same methods described above with more site-specific data or by employing more complex methods. DEM will review the results of the model used in refining the WHPA delineation and determine the area to be designated as the WHPA.~~

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Office of Water Resources

~~Rules and Regulations for~~
GROUNDWATER QUALITY RULES

******************DRAFT******************

*******************DRAFT*****************

~~March 2005~~
~~December 2009~~
April 2010

AUTHORITY: These Rules ~~and Regulations~~ are adopted in accordance with Chapter 42-35 pursuant to Chapters 46-12, 46-13.1, 23-18.9, 23-19.1, 42-17.6 and 42-17.1 of the Rhode Island General Laws of 1956, as amended.

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

~~RULES AND REGULATIONS FOR~~ GROUNDWATER QUALITY RULES

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STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Office of Water Resources

~~RULES AND REGULATIONS FOR~~ GROUNDWATER QUALITY RULES

RULE 1. PURPOSE

It is the purpose of these ~~regulations~~ Rules to protect and restore the quality of the state's groundwater resources for use as drinking water and other beneficial uses, and to assure protection of the public health and welfare and the environment.

RULE 2. LEGAL AUTHORITY

These Rules ~~and Regulations~~ are promulgated pursuant to the requirements and provisions of Chapter 46-12, Water Pollution; Chapter 46-13.1, Groundwater Protection; Chapter 23-18.9, Refuse Disposal; Chapter 23-19.1, Hazardous Waste Management Act: Chapter 42-17.1, Environmental Management; Chapter 42-17.6, Administrative Penalties for Environmental Violations; in accordance with Chapter 42-35, Administrative Procedures, of the Rhode Island General Laws of 1956, as amended.

RULE 3. LIBERAL APPLICATION

The terms and provisions of these Rules ~~and Regulations~~ shall be liberally construed to allow the Department to effectuate the purposes of state and federal laws, goals, and policies.

RULE 4. SEVERABILITY

If any provision of these Rules ~~and Regulations~~, or the application thereof to any person or circumstances, is held invalid by a court of competent jurisdiction, the validity of the remainder of the Rules ~~and Regulations~~ shall not be affected thereby.

RULE 5. APPLICABILITY

5.1 These Rules ~~and Regulations~~ apply to all of the groundwater of the state.

5.2 Persons subject to these Rules ~~and Regulations~~ may also be subject to other regulations of the Department and may also be subject to federal regulations. Obligations of facility owners and facility operators hereunder shall be joint and several.

5.3 These Rules ~~and Regulations~~ shall be construed in harmony with other Department regulations and the regulations of federal agencies. Nothing in these ~~regulations~~ Rules shall affect the Director's power and duty to issue or require any form of groundwater monitoring, groundwater remediation, enforcement action or other action pursuant to any other regulatory program administered or enforced by the Director.

~~5.4 Individual Sewage Disposal Systems~~

~~5.4.1 These Rules and Regulations apply to any application to the Department for an individual sewage disposal system designed to treat five thousand (5,000) or more gallons per day as defined below in Rule 5.4.1(A)-(C) where the groundwater is classified GA or GAA. Such systems are subject to the Groundwater Quality Certification requirements of Rule 17. The Director may waive the requirement for a groundwater quality certification for the replacement of an existing system when there is no increase in the design flow to the system or for a system that is designed to remove nitrogen such that the total nitrogen in the effluent does not exceed the standard of 10 mg/l. Individual sewage systems subject to the groundwater quality certification requirements shall include:~~

~~(A) Any single individual sewage disposal system designed to treat five thousand (5,000) gallons or more per day;~~

~~(B) All individual sewage disposal systems on a single parcel of land, excluding subdivisions, where the total design flow for the parcel is five thousand (5,000) gallons or more per day; and~~

~~(C) All individual sewage disposal systems serving a residential or commercial condominium complex where the total design flow for the complex is five thousand (5,000) gallons or more per day.~~

~~5.4.2 Individual sewage disposal systems that are designed to treat less than five thousand (5,000) gallons per day, that are used solely for the disposal of sanitary sewage (as defined herein), are exempt from these Rules and Regulations for Groundwater Quality.~~

~~5.5~~5.4 Monitoring Wells and Other Subsurface Borings: Monitoring wells installed pursuant to these Rules ~~and Regulations~~ shall be in compliance with the construction standards in Appendix 1. The monitoring well abandonment procedures in Appendix 1 shall apply to all monitoring wells and other subsurface borings, including piezometers.

~~5.6~~5.5 The Director may require any facility owner or operator subject to these Rules ~~and Regulations~~ to provide any information deemed necessary in order to determine compliance with these Rules ~~and Regulations~~. Failure to disclose such information shall be cause for initiating appropriate enforcement action and shall constitute valid cause for denial of any Departmental approvals under these Rules ~~and Regulations~~ or the suspension of any approval issued hereunder.

~~5.7~~5.6 Nothing in these Rules ~~and Regulations~~ shall affect the Director's power and duty to issue an immediate compliance order or take any other action pursuant to the General Laws of Rhode Island, 1956, as amended.

RULE 6. FINDINGS

The legislative findings set forth in the Rhode Island Groundwater Protection Act of 1985, section 46-13.1-2 of the General Laws of Rhode Island, 1956, as amended and which are repeated below in Rule 6.1 and the additional findings of the Department set forth in Rule 6.2 are made a basis for these Rules ~~and Regulations~~.

6.1 Legislative Findings

6.1.1 Water is vital to life and comprises an invaluable natural resource which is not to be abused by any segment of the state's population or its economy. It is the policy of the state to restore, enhance, and maintain the chemical, physical, and biological integrity of its waters, to protect public health, to safeguard fish and aquatic life and scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, and other uses of water.

6.1.2 The groundwaters of the state are a critical renewable resource which must be protected to insure the availability of safe and potable drinking water for present and future needs.

6.1.3 It is a paramount policy of the state to protect the purity of present and future drinking water supplies by protecting aquifers, recharge areas, and watersheds.

6.1.4 It is the policy of the state to restore and maintain the quality of groundwater to a quality consistent with its use for drinking water supplies and other designated beneficial uses without treatment as feasible. All groundwaters of the state shall be restored to the extent practicable to a quality consistent with this policy.

6.1.5 It is the policy of the state not to permit the introduction of pollutants into the groundwaters of the state in concentrations which are known to be toxic, carcinogenic, mutagenic, or teratogenic. To the maximum extent practical, efforts shall be made to require the removal of those pollutants from discharges where such discharges are shown to have already occurred.

6.1.6 Existing and potential sources of groundwater shall be maintained and protected. Where existing quality is inadequate to support certain uses, the quality shall be upgraded if feasible to protect the present and potential uses of the resource.

6.1.7 The groundwaters of the state are to be protected for use as agricultural, industrial, and potable water supplies, and other reasonable uses, and as a supplement to surface waters for recreation, wildlife, fish and other aquatic life, agriculture, industry, and potable water supply.

6.1.8 Discharges to groundwater which subsequently discharge into surface waters and which would cause a contravention of surface water quality or standards shall not be permitted.

6.1.9 No degradation of the state's groundwaters shall be permitted unless the state chooses to allow lower water quality as a result of the essential, desirable and justifiable economic, commercial, industrial, or social development.

6.2 Administrative Findings

6.2.1 Approximately 25% of the population of Rhode Island depends on groundwater for its drinking water supply, and approximately 27 million gallons of groundwater are used every day in Rhode Island.

6.2.2 Approximately two-thirds of the cities and towns in Rhode Island depend on groundwater for all or a significant portion of their public and private drinking water supply needs.

6.2.3 Four ~~Three~~ sole source aquifers (Block Island, Pawcatuck Basin, ~~and~~ Hunt-Annaquatucket-Pettaquamscutt, and Conanicut Island (Jamestown) Aquifers) have been designated in Rhode Island by the United States Environmental Protection Agency in accordance with Section 1424(e) of the federal Safe Drinking Water Act of 1974.

6.2.4 Surface water and groundwater are interconnected parts of the hydrologic cycle. During dry periods between rainfall and snowmelt, surface water in streams and rivers is derived almost entirely from groundwater discharge. Therefore, protection of groundwater quality is necessary to maintain surface water quality.

6.2.5 The groundwater resources of the state with the highest potential yield are located in glacial deposits of stratified drift which underlie about one-third of the state. These groundwater resources are vulnerable to pollution due to the relatively high water table, high permeability, and the absence of a confining subsurface layer that would inhibit movement of pollutants to groundwater.

6.2.6 Most private drinking water supplies and many small public water systems obtain water from fractured bedrock aquifers. Groundwater pollution in bedrock is extremely difficult to monitor and remediate.

6.2.7 Groundwater pollution continues to threaten public and private drinking water supplies. A significant number of public and private wells in Rhode Island have had pollutants in concentrations that have adversely impacted their use.

6.2.8 Groundwater pollution must be prevented wherever possible because of the actual and potential adverse effects on public health and the environment and due to the technical difficulties and economic costs involved in groundwater remediation.

6.2.9 Certain activities that represent a potential threat to groundwater quality are not appropriate in particular areas because of the sensitivity and value to the state of the underlying groundwater resource.

RULE 7. DEFINITIONS

"Annular space seal" means the material placed above the top of the filter pack or the filter pack seal up to the ground surface seal and between the well casing and the adjacent formation.

"Aquifer" means a geologic formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield significant quantities of water to wells and springs.

"Bedrock" means solid rock, commonly called ledge, which forms the earth's crust, including fracture zones within said rock.

"Best management practices" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices designed to prevent or reduce the degradation of the state's groundwater to the maximum extent possible.

"Community water supply well" means a well that serves a community water system.

"Community water system" means a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

"Degradation" means a deterioration or decline in groundwater quality.

"Department" means the Rhode Island Department of Environmental Management or its successor.

“Direct push well” means a well that is advanced into the subsurface without drilling.

"Director" means the director of the Rhode Island Department of Environmental Management or the Director's designee.

"Discharge to groundwater" means the intentional, negligent, accidental, or other release of any pollutant onto the land surface~~,~~ in a location where it may enter the groundwater of the state, or such release of any pollutant beneath the land surface.

"Effluent" means liquid that is discharged from a facility.

"Emergency response" means any action undertaken immediately following the discovery of a release in order to completely or partially contain, clean up or treat the released material to prevent an immediate ~~and/~~or substantial threat or risk of acute or chronic adverse effect on human health or to prevent an immediate ~~and/~~or substantial significant adverse impact to the environment.

"Facility" means any parcel of real estate or a contiguous series or parcels of real estate together with any and all structures, facility components, improvements, fixtures and other appurtenances located therein or thereon which constitutes a distinct geographic unit.

"Filter pack" means the sand, gravel, or both placed in direct contact with the well screen.

"Filter pack seal" means the sealing material placed in the annular space above the filter pack and below the annular space seal to prevent the migration of annular space sealant into the filter pack.

"Groundwater" means water found underground which completely fills the open spaces between particles of sediment and within rock formations.

"Groundwater quality classification" means the categorization of groundwater as usable for particular purposes on the basis of its physical, chemical, and hydrogeologic characteristics; also, the particular class (GAA, GA, GB, or GC) assigned to a particular volume of groundwater within specific geographic boundaries.

"Groundwater quality standards" means concentrations of specific chemical, biological, and radiological constituents and~~/or~~ narrative statements which describe the quality of groundwater which shall be met in a particular groundwater quality classification.

"Groundwater recharge" means the process of adding water to the zone of saturation; or the quantity of water added to the zone of saturation.

"Groundwater reservoirs" means those stratified drift deposits having a saturated thickness greater than or equal to 40 feet and a transmissivity greater than or equal to 4000 feet squared per day which have been designated by the Director to be potentially significant sources of water.

“Grout” means a low permeability material consisting of bentonite, neat cement or a neat cement-bentonite mixture.

"Hazardous material" means any material or combination or mixture of materials containing any hazardous substance in an amount and concentration such that when discharged to groundwater will or may reasonably be expected to cause acute or chronic adverse effects on human health or the environment. Hazardous material shall also include any material that contains a hazardous waste.

"Hazardous substance" means any substance designated as such pursuant to 40 CFR 300.5.

"Hazardous waste" means hazardous waste as defined in the Rhode Island Department of Environmental Management "Rules and Regulations for Hazardous Waste Management" ~~(December 2002) and amendments thereto~~.

"Hydraulic conductivity" means a measure of the ability of an aquifer to transmit a fluid; it is expressed as the volume of water at the existing kinematic viscosity that will move in a unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

~~**"Individual sewage disposal system"** means any system of piping, tanks, disposal areas, alternative toilets or other facilities designed to function as a unit to convey, store, treat and/or dispose of sanitary sewage by means other than discharge into a public sewer system.~~

"Licensed solid waste landfill" means any solid waste disposal facility consisting in whole or in part of a landfill, which facility is operating pursuant to a valid department license issued pursuant to a final action of the Director as to which all applicable appeals periods have expired.

"Monitoring well" means a well that is specifically located, designed, constructed, and emplaced to sample groundwater quality; the monitoring well may also be used to measure water table elevations.

"Monitoring well abandonment" means to remove a monitoring well from service in such a manner that vertical movement of water within the well bore and within the annular space surrounding the well casing is effectively and permanently prevented.

"Neat cement" means a mixture of Portland cement (ASTM C-150 standard) and water in the proportion of 5 to 6 gallons of clean water per bag (94 pounds or one cubic foot).

"Neat cement-bentonite mixture" means a mixture of 6 to 7 gallons of water per 94 pound bag of Portland cement with up to 10% (by dry weight of cement) of unaltered dry bentonite powder added after the initial mixing of cement and water.

"Non-aqueous phase liquid" means any pollutant that is present as a separate phase liquid, including, but not limited to sheens.

"Non-community water supply well" means a well that serves a non-community water system.

"Non-community water system" means a public water system that is not a community water system.

"Non-transient non-community water supply well" means a well that serves a non-transient non-community water system.

"Non-transient non-community water system" means a non-community water system that regularly services at least 25 of the same persons over six months per year.

"Onsite Wastewater Treatment System" means any system of piping, tanks, dispersal areas, alternative toilets or other facilities designed to function as a unit to convey, store, treat or disperse wastewater by means other than discharge into a public sewer system.

"Operator" means any person or persons having control or having legal responsibility for operating or maintaining any facility, which is subject to these Rules ~~and Regulations~~.

"Owner" means any person who holds exclusive or joint title to, or lawful possession of real or personal property, which is subject to these Rules ~~and Regulations~~.

"Person" means an individual, trust, firm, joint stock company, corporation (including a quasi-governmental corporation), partnership, association, syndicate, municipality, municipal or state agency, fire district, club, non-profit agency, or any subdivision, commission, department, bureau, agency or department of state or federal government (including quasi-governmental corporation), or any interstate or international body, or any agent or employee thereof.

"Petroleum" means crude oil, any fraction of crude oil, any substance refined or derived from crude oil, or any mixture thereof, including, but not limited to, gasoline, petroleum solvents, kerosene, aviation fuels, diesel oils, fuel oils, waste oils, lubricants, tar and asphalt.

"Piezometer" means a well with a short screen that allows measurement of the water level at a particular depth in the aquifer.

"Pollutant" means any material or effluent which may alter the chemical, physical, biological, or radiological characteristics and/or integrity of water, including but not limited to, dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, cellar dirt or industrial, municipal, agricultural, or other waste or material, petroleum or petroleum products, including but not limited to oil.

"Pollutant discharge zone" means a departmentally designated, three-dimensional zone within which the pollutant concentrations resulting from an active discharge to groundwater are allowed to be greater than the groundwater quality standards.

"Pollution" means the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.

"Preventive action limit" means a concentration of a substance that is equal to 50% of the numerical groundwater quality standard.

"Private well" means a well established for the purpose of meeting all or part of a person's potable water needs provided said well does not supply a public water system.

"Public water system" means a system for the provision to the public of piped water for human consumption, provided such a system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year; and shall include all sources and facilities involved in collecting, treating, storing, and distributing the water.

"Public well" means a well that serves a public water system.

"Recharge area" means the land surface from which water is added to the zone of saturation. The recharge area for a particular well or aquifer, for instance, is that land surface from which water moves to the well or aquifer or may move to the well or aquifer under certain hydraulic conditions.

"Refined wellhead protection area" means a wellhead protection area approved and designated by the Director based upon a delineation submitted to the Director or prepared by the Director using more ~~sophisticated~~ complex methods ~~and/~~or additional data than that used in the Director's initial delineation.

"Release" means any spilling, leaking, pumping, pouring, emitting, emptying, injecting, escaping, leaching, dumping, or disposing of any pollutant onto or below the land surface. For purposes of these Rules ~~and Regulations~~, release also includes any storage, disposal, or abandonment of any substance or material in a manner that presents a substantial threat of release as herein defined.

"Remediation" means prevention and control of pollutant migration to, within, or from the groundwater ~~and/~~or the removal of a pollutant from the groundwater.

"Residual zone" means a departmentally designated, three-dimensional zone within which the pollutant concentrations remaining in the groundwater after remediation activities are allowed to be greater than the groundwater quality standards.

"Sanitary sewage" means any human or animal excremental liquid or substance, any putrescible animal or vegetable matter ~~and/~~or any garbage and filth, including, but not limited to, any gray water or black water discharged from toilets, washing machines, sinks and dishwashers as well as the content of septic tanks, cesspools, or privies.

"Saturated thickness" means the thickness of an aquifer measured from the water table to an essentially impermeable boundary; such boundary is typically taken to be the top of the bedrock surface.

"Saturated zone" means the subsurface zone in which all open spaces are filled with water.

"Sludge" means residue, whether partially solid or solid, treated or untreated, resulting from the treatment of sewage, including, without limitation, such residues from the cleaning of sewers, by processes, such as settling, flotation, filtration and centrifugation, and shall not meet the criteria for a hazardous waste as found in the Rhode Island Department of Environmental Management "Rules and Regulations for Hazardous Waste~~,~~ Management" ~~(December 2002) and amendments thereto~~.

"Sole source aquifer" means an aquifer designated by the United States Environmental Protection Agency as the sole or principal source of drinking water for the area above the aquifer and including those lands where the population served by the aquifer live; that is, an aquifer which is needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should the aquifer become polluted.

"Solid waste" means solid waste as defined in the Rhode Island Department of Environmental Management "Solid Waste Regulations No.1–No.8" ~~, and amendments thereto~~; and which shall include garbage, refuse and other discarded solid materials generated by residential, institutional, commercial, industrial and agricultural sources but does not include solids or dissolved materials in domestic sewage or sewage sludge, nor does it include hazardous waste. Solid waste shall also include non-hazardous liquid, semi-solid, and containerized gaseous waste.

"Static water table" means the water table under natural, non-pumping conditions.

"Stratified drift" means predominantly sorted sediments deposited in layers by meltwater from a glacier.

"Till" means predominantly unsorted, unstratified sediments deposited directly by a glacier.

"Transient non-community water supply well" means a well that serves a transient non-community water system.

"Transient non-community water system" means a non-community water system that does not regularly serve at least 25 of the same persons over 6 months per year.

"Transmissivity" means a measure of the ability of an aquifer to transmit a fluid through a unit volume of the aquifer. It can be quantified as the hydraulic conductivity multiplied by the saturated thickness.

"Unconfined aquifer" means an aquifer that is not under pressure beneath a relatively impermeable layer. The groundwater in an unconfined aquifer is under atmospheric pressure, and its upper surface is the water table.

"Underground storage tank" means any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of petroleum product or hazardous material, and the volume of which (including the volume of the underground pipes connected thereto) is 10 percent or more beneath the surface of the ground.

"Watercourse" means any river, stream, brook, pond, lake, swamp, marsh, bog, fen, wet meadow, area subject to storm flowage, or any other standing or flowing body of water, including such watercourses that may be affected by the tides.

"Water table" means the upper surface of the saturated zone in an unconfined aquifer.

"Well" means a bored, drilled, or driven shaft or a dug hole, with a depth that is greater than its largest surface dimension, through which groundwater flows, has flowed, or may flow under natural or induced pressure.

"Wellhead protection area" means the critical portion of a three-dimensional zone surrounding a public well or wellfield through which water will move toward and reach such well or wellfield as designated by the Director.

RULE 8. PROHIBITIONS AND OTHER GENERAL REQUIREMENTS

8.1 Groundwater shall be maintained at a quality consistent with its classification. No person shall take actions that violate or cause to violate the standards established in these Rules ~~and Regulations~~.

8.2 No person shall cause or allow a discharge of any pollutant to groundwater without the approval of the Director pursuant to these and other Department rules and regulations.

8.3 No person shall operate or maintain a facility in a manner that may result in a discharge of any pollutant to groundwater without the approval of the Director.

8.4 The establishment of new solid waste landfills is prohibited in areas where the groundwater is classified GAA or within a wellhead protection area designated in accordance with Rule 18~~.1~~.

8.5 The establishment of new facilities that are required to be permitted as treatment, storage or disposal facilities or require Letters of Authorization for temporary storage and/or transfer areas of hazardous waste pursuant to the Rhode Island "Rules and Regulations for Hazardous Waste Management" ~~(December 2002)~~ is prohibited within the areas listed below in 8.5.1 – 8.5.3. This prohibition does not apply to the following: generators of hazardous waste as defined in the Rhode Island "Rules and Regulations for Hazardous Waste Management" ~~(December 2002)~~; emergency permits for the treatment of hazardous waste under section 7 of the Rhode Island "Rules and Regulations for Hazardous Waste Management" ~~(December 2002)~~; and treatment of hazardous waste as part of an emergency permit or a remedial action approved pursuant to the Rhode Island

"Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" ~~(February 2004)~~.

8.5.1 Where the groundwater is classified GAA;

8.5.2 Within a wellhead protection area designated in accordance with Rule 18~~.1~~; and

8.5.3 Within areas where the groundwater is classified GA where public water is not available to all surrounding properties.

8.6 The establishment of new facilities or new locations for the temporary or permanent storage of road salt or salt/sand mixtures ~~after the effective date of these regulations~~ is prohibited where the groundwater is classified GAA or GA unless the storage meets the following conditions:

8.6.1 Within a weatherproof structure if the pile is larger than 100 cubic yards, otherwise a secured, durable, waterproof covering is sufficient;

8.6.2 On an impermeable base; and

8.6.3 Runoff from the operational area around the salt or salt/sand storage is controlled by best management practices.

8.7 At locations where road salt or salt/sand mixtures have been stored over groundwater classified GAA or GA prior to April 17, 2005, ~~the effective date of these regulations,~~ any future storage of road salt or salt/sand mixtures at these locations must, at minimum be covered with a secured, durable, waterproof cover to protect the salt from precipitation. ~~by September 1, 2005.~~

8.8 No person shall install underground storage tanks within the wellhead protection area of community water supply wells designated in accordance with Rule 18~~.1~~. However, underground storage tanks that have been registered prior to October 22, 2002 and have not been abandoned or removed from the ground for more than 180 days shall be permitted to be replaced with a tank(s) of equivalent size or less, and substance stored in accordance with the provisions of the Rhode Island "Rules and Regulations for Underground Storage Facilities Used for Petroleum Products and Hazardous Materials" ~~(October 2002)~~ .

RULE 9. GROUNDWATER CLASSIFICATION

(See Appendix 2 for a small scale Groundwater Classification Map.)

9.1 Definitions: The Director shall classify the groundwater resources of Rhode Island using the four classes established in Chapter 46-13.1 of the General Laws of Rhode Island, 1956, as amended and which are further defined below:

9.1.1 Groundwater classified GAA shall be those groundwater resources which the Director has designated to be suitable for public drinking water use without treatment and which are located within the areas described in A-C below.

(A) Groundwater reservoirs and portions of their recharge areas as delineated by the Department (see Appendix 3), pursuant to the method described in Policies and Procedures for Mapping Recharge Areas to Groundwater Reservoirs for GAA Classification, Rhode Island Department of Environmental Management, March, 1991;

(B) Wellhead protection areas for community water supply wells delineated in accordance with Rule 18~~.1~~. Wellhead protection areas for community water supply wells will by definition be considered reclassified to GAA

at the time of approval of the community water supply well by the Rhode Island Department of Health. ~~Wellhead protection areas for community water supply wells no longer approved by the Rhode Island Department of Health will by definition be considered reclassified to GA, unless the groundwater meets the criteria in Rule 9.1.1(A) or (C).~~

(C) Groundwater dependent areas~~, such as Block Island,~~ that are physically isolated from reasonable alternative water supplies and where the existing groundwater supply warrants the highest level of protection.

9.1.2 Groundwater classified GA shall be those groundwater resources which the Director has designated to be suitable for public or private drinking water use without treatment and which are not described in Rule 9.1.1(A)-(C).

9.1.3 Groundwater classified GB shall be those groundwater resources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation. Groundwater located beneath the following areas may be classified GB:

(A) Highly urbanized areas of the state with dense concentrations of historic industrial and commercial activity, wherein a public water supply is readily available;

(B) The permanent waste disposal area~~ at sites of the following facilities~~ as approved by the Director in accordance with the Rhode Island "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" at the sites of ~~(i)~~ historically permitted or approved inactive landfills and inactive land disposal sites for solid waste, hazardous waste, ~~and/~~or sewage sludge;

(C) ~~(ii)~~ Active sites that are permitted for the land disposal of sewage sludge, unless such disposal site is associated with a licensed solid waste landfill; or

(D)~~(C)~~ The area immediately surrounding the ~~permanent waste disposal~~ area classified GB in accordance with Rule 9.1.3(B) and (C) which the Director has determined is not suitable for public or private drinking water use or the area immediately surrounding the area classified GC in accordance with Rule 9.1.4, which the Director has determined is not suitable for public or private drinking water use. ~~at the following inactive and active facilities: landfills, land disposal sites for solid waste, hazardous waste, and sewage sludge~~.

9.1.4 Groundwater may be classified GC in those areas which, because of present or past land use or hydrogeological conditions, the Director has determined to be more suitable for certain waste disposal practices than for development as a drinking water supply.

(A) Groundwater located beneath the following areas may be classified GC:

(i) At licensed solid waste landfills:

(a) The currently permitted area for waste disposal as established in a valid operating license issued by the Department, including a license issued pursuant to a court order; and

(b) Areas surrounding the permitted area for waste disposal that the Director determines are potentially suitable for waste disposal based on the hydrogeologic environment, groundwater quality, groundwater use off-site, and surrounding surface water quality and use;

(ii) Areas that have been reclassified pursuant to Rule 10.7 for solid waste landfills and facilities for the

disposal of hazardous waste.

(B) At the point in time when a license for a solid waste landfill or facility for the disposal of hazardous waste has lapsed or the facility is no longer being operated, then by definition the site shall be considered reclassified to GB, unless the Director determines that the GC classification is appropriate for the site.

9.2 Classification Boundary Disputes: In the event that the boundaries of the groundwater classification areas shown on groundwater classification maps produced by the Department are in dispute, the burden of proof shall be on the person disputing the boundary locations as shown on such map to show, pursuant to Rule 10, that the boundary locations are incorrect. In determining the accuracy of the Director's delineations, the regional hydrogeologic conditions beyond the boundaries of the specific site in question and the seasonal fluctuations in the water table shall be considered.

9.3 Classification Maps: The Director shall prepare and adopt, simultaneously with the adoption of these Rules ~~and Regulations~~, groundwater classification maps, which designate groundwater classification pursuant to these Rules ~~and Regulations~~. Said groundwater classification maps shall be at a scale of 1:24000, and such maps shall be on file for review at the Rhode Island Department of Environmental Management, 235 Promenade Street, Providence, RI 02908. Smaller scale, statewide maps may be made available from the Department at the above address, and groundwater classifications may be viewed on the DEM website at www.dem.ri.gov

RULE 10. MODIFICATION OF GROUNDWATER CLASSIFICATION

10.1 Groundwater Classification Changes by the Director: The Director may from time to time propose changes in the groundwater classifications as more information becomes available. The changes shall be delineated in a manner consistent with Rule 9. At such time that the Director proposes a change in the groundwater classification, the Director shall initiate rule-making procedures.

10.2 Request for Modification of Groundwater Classification

10.2.1 Any person who may be substantially and specifically affected may petition the Director to modify the classification assigned to particular groundwaters of the state.

10.2.1 The petitioner for a reclassification shall specify the precise boundary in question and prove by clear, convincing and scientifically valid evidence that a reclassification is consistent with Rules 10.4, 10.5, 10.6 or 10.7.

10.3 Reclassification Considerations: In evaluating a reclassification petition in accordance with Rules 10.4, 10.5, 10.6, or 10.7, the Director shall consider the factors below, in addition to other relevant information, provided by the facility owner or operator for the location in question:

10.3.1 Actual or potential threats to public health ~~and/~~or the environment;

10.3.2 Surrounding groundwater and surface water quality;

10.3.3 Surrounding groundwater and surface water quality standards;

10.3.4 Current and potential future uses of surrounding property, groundwater, and surface water;

10.3.5 Local and regional groundwater flow direction; and

10.3.6 Feasibility of groundwater remediation to a quality consistent with the standards in Rule 11.

10.4 Upgrading Groundwater Classification: Where it has been proven by clear, convincing and scientifically valid evidence that the groundwater quality of an area meets the standards of a higher quality groundwater classification than the current classification or that the classification delineation pursuant to Rule 9.1.2 or 9.1.3(B) or (C) is incorrect, the Director shall initiate rule-making procedures to upgrade the groundwater classification.

10.5 Downgrading Groundwater Classified GAA to GA: Where it has been proven by clear, convincing and scientifically valid evidence that groundwater classified GAA is not in an area described in Rule 9.1.1(A) – (C), the Director shall initiate rule-making procedures for reclassification of such groundwater to GA.

10.6 Downgrading Groundwater Classified GAA or GA to GB: The Director may initiate rule-making procedures for reclassification of groundwater to GB, provided that it has been demonstrated by clear, convincing and scientifically valid evidence that the area in question meets the criteria below:

10.6.1 Site conditions are such that the groundwater is known or presumed likely to not meet the standards for groundwater classified GAA or GA;

10.6.2 There is no use of groundwater for drinking water, and public water is readily available to all properties within the area to be reclassified to GB; and

10.6.3 The area in question is located within one of the areas described below:

(A) Contiguous with an existing area classified GB pursuant to Rule 9.1.3(A), provided that the land use activities in the area in question represent a similar degree of threat to groundwater quality as the contiguous area classified GB;

(B) Within the permanent waste disposal area as approved by the Director in accordance with the Rhode Island "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" at sites of historically permitted or approved ~~at~~ inactive landfills or inactive disposal sites for solid waste, hazardous waste, or sewage sludge, where the Director has determined that groundwater remediation to drinking water quality is not feasible or practical; or

(C) The area immediately surrounding the ~~waste disposal~~ area classified GB in accordance with Rule 9.1.3(B) or (C) which the Director has determined is not suitable for public or private drinking water use or the area immediately surrounding the area classified GC in accordance with Rule 9.1.4, which the Director has determined is ~~designated~~ not suitable for public or private drinking water use. ~~at the following inactive and active facilities: landfills, land disposal sites for solid waste, hazardous waste, and sewage sludge~~.

10.7 Downgrading of Groundwater Classification to GC

10.7.1 Groundwater reclassification to GC is required for proposed sites for solid waste landfills and proposed sites for hazardous waste disposal facilities. Such facilities are the only uses for which groundwater will be reclassified to GC.

10.7.2 Groundwater reclassification to GC will not be considered until an application for a solid waste disposal

license has been filed with the Department pursuant to the Solid Waste Regulations No.1 – No.8 and amendments thereto, or until an application for a hazardous waste disposal facility has been filed with the Department pursuant to the "Rules and Regulations for Hazardous Waste Management"~~, (December 2002) and amendments thereto~~.

10.7.3 Groundwater classified GA and GB may be reclassified to GC for proposed sites for solid waste landfills and proposed sites for hazardous waste disposal facilities. Groundwater classified GAA shall not be reclassified to GC.

10.7.4 In order to reclassify groundwater to GC, the applicant must submit to the Department a site-specific study which demonstrates by clear, convincing, and scientifically valid evidence that the groundwater quality standards for GC in Rule 11.4 will be met. The study shall include, but not be limited to, the following:

(A) A locus map using the U.S. Geological Survey 7.5 minute quadrangle map;

(B) Site plan at an appropriate scale (minimum scale of one inch equals fifty feet (1"=50')) to adequately show the location on and immediately surrounding the site of the following: property boundaries, buildings and other structures, roads, surface topography, ~~surface water courses and wetlands~~ watercourses, wells, water lines, sewer lines, ~~individual sewage disposal systems~~ onsite wastewater treatment systems and other waste disposal areas, and any other significant site features;

(C) Depth to groundwater, water table elevations, hydraulic gradient, groundwater flow direction, groundwater flow velocity, and water table map;

(D) Description of the unconsolidated materials (in both the unsaturated and saturated zones), including permeability, porosity, degree of stratification, and the capacity for pollutant attenuation;

(E) Depth to bedrock and bedrock characteristics, to include, but not be limited to, weathering, jointing, faulting, fracture orientation and density;

(F) Aquifer characteristics including saturated thickness, hydraulic conductivity, and transmissivity;

(G) Groundwater quality on-site and surrounding the site;

(H) The hydraulic connection between nearby surface waters and groundwater;

(I) Location and distance off-site of the nearest surface water body that will receive runoff from the site and that surface water body that will receive groundwater flow from the site and the water quality classification of these surface water bodies.

(J) Public and private wells:

(i) Determine the number and location of public wells within three (3) miles of the site and the number and location of private wells within one (1) mile of the site, or the number and location of such wells within alternative distances agreed upon by the Director;

(ii) Determine or estimate the well depths;

(K) Current and most probable future uses of surrounding groundwater and surface water;

(L) History of site ownership and operation;

(M)Volume and characteristics of the waste to be disposed of on the site;

(N) Specific methods and procedures to be utilized in the construction, operation, and maintenance of the facility necessary to contain or prevent migration of pollutants;

(O) Evaluation of the potential for migration of pollutants from the site and identification of potential impacts to groundwater and associated surface waters from the proposal.

RULE 11. GROUNDWATER QUALITY STANDARDS AND PREVENTIVE ACTION LIMITS

11.1 ~~General:~~ The Director shall establish groundwater quality standards to be used in determining compliance with the groundwater classifications, including, but not limited to, compliance of proposed discharges to groundwater, existing discharges to groundwater, groundwater remediation activities, and other facilities and activities that have an actual or potential adverse impact on groundwater quality.

11.2 Class GAA and Class GA Groundwater Quality Standards: Class GAA and class GA groundwater are suitable for drinking water use without treatment, and therefore, both classes are subject to the same groundwater quality standards below in 11.2.1 – 11.2.~~3~~4. Exceedances of the groundwater quality standards that are determined by the Director to be caused by naturally occurring conditions will not be considered a violation of the groundwater quality standards In those areas where the groundwater is classified GAA (or GA) and the groundwater does not meet the groundwater quality standards, the groundwater classification remains GAA (or GA) with the goal to regain compliance with the groundwater quality standards.

11.2.1 Pollutants shall not be in groundwater classified GAA or GA, except within an approved pollutant discharge zone or residual zone (as provided for in Rule~~s~~ 13.2 and 13.3 respectively), in any concentration which will adversely affect the groundwater as a source of potable water or which will adversely affect other beneficial uses of the groundwater, to include but not be limited to recreational, agricultural and industrial uses and the preservation of fish and wildlife habitat through the maintenance of surface water quality.

11.2.2 The numerical groundwater quality standards for specific substances in class GAA and class GA are listed in Table 1, which, except where indicated, shall be the federal maximum contaminant levels for drinking water established by the United States Environmental Protection Agency. For a substance not listed in Table 1, the groundwater quality standard for class GAA and GA groundwater shall be determined by the Director on a case-by-case basis using United States Environmental Protection Agency health advisories and other public health information.

11.2.3 Groundwater classified GAA and GA shall be of a quality which the Director determines does not violate or have any reasonable potential to cause a violation of surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000) and amendments thereto~~.

11.2.4 Groundwater classified GAA and GA shall not have non-aqueous phase liquids present in either a mobile or immobile state at or below the surface of the water table.

11.3 Class GAA and GA Preventive Action Limits: Class GAA and class GA groundwater are subject to the preventive action limits defined below:

11.3.1 The preventive action limits shall be set at 50% of the numerical groundwater quality standards established

pursuant to Rule 11.2.2.

11.3.2 The preventive action limits shall be used in monitoring discharges to groundwater approved by the Director. Preventive action limits are not applicable in determining groundwater remediation objectives.

TABLE 1. Numerical Groundwater Quality Standards and Preventive Action Limits for Class GAA and Class GA. Standards and Action Limits are for unfiltered samples.

Substance	Groundwater Quality Standard (milligrams per liter, except as noted)	Preventive Action Limit
A. Inorganic Chemicals		
Antimony	0.006	0.003
Arsenic	0.010	0.005
Asbestos	7 million fibers/l	3.5 million fibers/l
Barium	2	1
Beryllium	0.004	0.002
Cadmium	0.005	0.0025
Chromium (total)	0.1	0.05
Copper	1.3	0.65
Cyanide	0.2	0.1
Fluoride	4	2
Lead	0.015	0.0075
Mercury	0.002	0.001
Nitrate (as N)	10	5
Nitrite (as N)	1	0.5
Nitrate/Nitrite (total)	10	5
Selenium	0.05	0.025
Thallium	0.002	0.001
B. Organic Chemicals		
Alachlor	0.002	0.001
Atrazine	0.003	0.0015
Benzene	0.005	0.0025
Benzo(a)pyrene	0.0002	0.0001
Carbofuran	0.04	0.02
Carbon tetrachloride	0.005	0.0025
Chlordane	0.002	0.001
Chlorobenzene	0.1	0.05
2,4-D	0.07	0.035
Dalapon	0.2	0.1
Di(2-ethylhexyl)adipate	0.4	0.2
Di(2-ethylhexyl)phthalate	0.006	0.003
Dibromochloropropane (DBCP)	0.0002	0.0001
Dichlorobenzene o-	0.6	0.3

TABLE 1. (continued)		
Substance	Groundwater Quality Standard	Preventive Action Limit
	(milligrams per liter, except as noted)	
Dichlorobenzene p-	0.075	0.0375
Dichloroethane (1,2-)	0.005	0.0025
Dichloroethylene (1,1-)	0.007	0.0035
Dichloroethylene (cis-1,2-)	0.07	0.035
Dichloroethylene(trans-1,2-)	0.1	0.05
Dichloromethane	0.005	0.0025
Dichloropropane (1,2-)	0.005	0.0025
Dinoseb	0.007	0.0035
Diquat	0.02	0.01
Endothall	0.1	0.05
Endrin	0.002	0.001
Ethylbenzene	0.7	0.35
Ethylene dibromide (EDB)	0.00005	0.000025
Glyphosate	0.7	0.35
Heptachlor	0.0004	0.0002
Heptachlor epoxide	0.0002	0.0001
Hexachlorobenzene	0.001	0.0005
Hexachlorocyclopentadiene	0.05	0.025
Lindane	0.0002	0.0001
Methoxychlor	0.04	0.02
Methyl tertiary butyl ether (Note 1)	0.04	0.02
Naphthalene (Note 1)	0.1	0.05
Oxamyl (Vydate)	0.2	0.1
Pentachlorophenol	0.001	0.0005
Picloram	0.5	0.25
Polychlorinated biphenyls	0.0005	0.00025
Simazine	0.004	0.002
Styrene	0.1	0.05
2,3,7,8-TCDD (Dioxin)	3E-08	1.5E-08
Tetrachloroethylene	0.005	0.0025
Toluene	1.0	0.5
Toxaphene	0.003	0.0015
2,4,5-TP (Silvex)	0.05	0.025
Trichlorobenzene (1,2,4)	0.07	0.035
Trichloroethane (1,1,1-)	0.2	0.1
Trichloroethane (1,1,2)	0.005	0.0025
Trichloroethylene (TCE)	0.005	0.0025
Trihalomethanes (total)	0.080	0.040
Vinyl Chloride	0.002	0.001

TABLE 1. (continued)		
Substance	Groundwater Quality Standard	Preventive Action Limit
	(milligrams per liter, except as noted)	
Xylenes	10	5
C. Microbiological		
Total Coliform Bacteria	zero	zero
Viruses	zero	zero
D. Radionuclides		
Gross Alpha Particle Activity	15 pCi/liter	7.5 pCi/liter
Gross Beta Particle Activity	4 mrem/yr	2 mrem/yr
Radium 226 and Radium 228 combined	5 pCi/liter	2.5 pCi/liter
Uranium	0.030 mg/L	0.015 mg/L
Note 1: A federal maximum contaminant level has not been adopted for these chemicals.		

11.4 Class GB and GC Groundwater Quality Standards: Classification of groundwater as GB or GC does not convey the right to degrade groundwater quality. Limited degradation of groundwater quality may occur as a result of legally authorized activities related to siting, permitting and remediation where groundwater is classified GB or GC. In those areas where the groundwater is classified GB (or GC) and the groundwater does not meet the groundwater quality standards, the groundwater classification remains GB (or GC) with the goal to regain compliance with the groundwater quality standards.
Groundwater classified GB and GC shall be of a quality which the Director determines does not:

11.4.1 Threaten public health ~~and/~~or the environment;

11.4.2 Violate or have a reasonable potential to cause a violation of surrounding groundwater quality standards;

11.4.3 Adversely impact or have a reasonable potential to adversely impact current or future uses of property, groundwater, or surface water; ~~and~~

11.4.4 Violate or have any reasonable potential to cause a violation of surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000), and amendments thereto.~~; and

11.4.5 Have non-aqueous phase liquids present in either a mobile or immobile state at or below the surface of the water table.

11.5 Proposed activities where the ~~over~~ groundwater is classified GB in accordance with Rule 9.1.3(B) – (D) ~~or (C)~~ that would otherwise be prohibited in the surrounding areas where the groundwater is classified GA or GAA ~~shall~~ may at the Director's discretion be subject to the Department's review by means of a groundwater quality certification in accordance with Rule 17 to ensure that the surrounding groundwater quality is protected.

11.6 In determining compliance with the groundwater quality standards for class GB and class GC at a facility, the Director may consider the factors below, in addition to other relevant information, provided by the facility owner or operator:

11.6.1 Surrounding groundwater quality;

11.6.2 Groundwater classification surrounding the facility;

11.6.3 Surface water classification within the facility boundaries and surrounding the facility;

11.6.4 Current and proposed future uses of groundwater and surface water at or within the facility boundaries;

11.6.5 Current and proposed future uses of the facility;

11.6.6 Uses of surrounding property, groundwater and surface water;

11.6.7 Hydrogeologic characteristics of the facility and surrounding the facility, including, but not limited to, groundwater flow direction, hydraulic gradient, type of subsurface materials, and depth to bedrock;

11.6.8 Actual and potential routes for human exposure and points of human exposure to the pollutant(s);

11.6.9 Man-made pathways for pollutant movement off-site, e.g., underground utility lines; and

11.6.10 Persistence and mobility of the pollutant(s) in the subsurface and the toxicity of the pollutant(s).

RULE 12. DETERMINATION OF COMPLIANCE WITH GROUNDWATER QUALITY STANDARDS AND PREVENTIVE ACTION LIMITS

12.1 ~~General~~: Compliance with the groundwater quality standards and preventive action limits shall be determined through analytical tests of groundwater quality by the facility owner or operator. Where applicable, the Director may also require analytical tests of the effluent prior to the discharge to the groundwater. The Director may request verification of any test data or collect separate samples if it is deemed necessary.

12.2 Sampling

12.2.1 Groundwater samples and effluent samples shall be collected, stored, transported, and analyzed in accordance with the most recent United States Environmental Protection Agency approved procedures; the most recent "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association, et al.); or alternative methods approved by the Director. The Director has the authority to determine which approved method is applicable for the sampling event.

12.2.2 Groundwater and effluent sampling frequency and the list of parameters to test for shall be proposed to the Director by the facility owner or operator. The Director's determination of sampling frequency and the parameters to test for shall be made, in part, utilizing information provided by the facility owner or operator regarding the type of facility, waste generated, waste disposed of on site, materials stored or utilized on site and any site specific hydrogeologic characteristics that may be required by the Director. Groundwater shall be analyzed for constituents of concern, and this may include constituents that do not have numerical groundwater quality standards. In accordance with approval from the Director, continual groundwater monitoring at a site may be for a specific subset of parameters.

12.3 Groundwater Monitoring

12.3.1 All facilities that are required by the Director to monitor groundwater quality pursuant to these Rules ~~and Regulations~~ shall implement a groundwater monitoring plan approved by the Director that meets the requirements of Rule 12.3.2. Groundwater monitoring plans approved pursuant to other Department of Environmental Management rules and regulations shall be exempt from this requirement.

12.3.2 The groundwater monitoring plan shall include, at minimum, the following:

(A) A locus map using the U.S. Geological Survey 7.5 minute quadrangle map;

(B) Site plan at an appropriate scale (minimum scale of one inch equals fifty feet (1"=50')) to adequately show the monitoring well locations, well casing elevations, and the location on and immediately surrounding the site of the following: property boundaries, buildings and other structures, roads, surface topography, ~~surface water courses and wetlands~~ watercourses, wells, water lines, sewer lines, ~~individual sewage disposal systems~~ onsite wastewater treatment systems and other waste disposal areas, and any other significant site features;

(C) A sufficient number of wells (minimum of three) at the appropriate locations and depths to permit detection of any pollutants in the groundwater;

(D) Well logs with detailed lithologic and well construction information; and

(E) Sampling schedule pursuant to Rule 12.1.2.

12.3.3 Monitoring well construction shall be in compliance with the standards set forth in Appendix 1.

12.3.4 Minimum site monitoring requirements:

(A) The static water table elevation shall be recorded at the time of monitoring; and

(B) A log containing static water table elevations and the sample analyses shall be maintained on-site by the facility owner or operator.

12.3.5 Copies of sample results and water table measurements shall be submitted to the Director within thirty (30) days of the receipt of such information by the facility owner or operator.

12.3.6 An approved groundwater monitoring plan shall be valid for a duration specified by the Director.

12.3.7 There shall be no change in a groundwater monitoring plan without the approval of the Director. The Director may require a change in an approved monitoring plan where such change is necessary to determine compliance with the groundwater quality standards.

12.3.8 Any person transferring ownership or control of a facility having an approved groundwater monitoring plan shall notify the Director of such transfer not less than thirty (30) days prior to the effective date of such transfer.

12.3.9 Groundwater monitoring required by the Director shall not be terminated without the approval of the Director.

12.3.10 When groundwater monitoring has been terminated, the monitoring wells shall be abandoned in accordance with the procedures established in Appendix 1.

RULE 13. POINTS OF COMPLIANCE

13.1 ~~General:~~ Points of compliance with the groundwater quality standards and preventive action limits must be approved by the Director. The Director may designate any point where groundwater is withdrawn for use or monitored as a point of compliance. Points of compliance shall be within the area of known or suspected groundwater pollution unless a pollutant discharge zone or residual zone is designated pursuant to Rule 13.2 and 13.3, respectively. If a pollutant discharge zone or residual zone is designated, the points of compliance shall be at the boundary of such zone.

13.2 Pollutant Discharge Zone: In determining compliance with the groundwater quality standards and preventive action limits in these Rules ~~and Regulations~~ for a discharge to groundwater where the groundwater is classified GAA or GA, the Director may approve, deny, or modify a pollutant discharge zone proposed by a facility owner or operator. Within this pollutant discharge zone, the pollutant concentrations in groundwater are allowed to be greater than the groundwater quality standards. Acceptable pollutant concentrations in groundwater within a pollutant discharge zone shall be determined by the Director on a case-by-case basis.

13.2.1 The facility owner or operator proposing a pollutant discharge zone shall provide the Director with sufficient information on the site's hydrogeology and the characteristics of the discharge to groundwater to support the proposed pollutant discharge zone delineation.

13.2.2 A groundwater monitoring plan prepared pursuant to Rule 12.2 shall be submitted to the Director at the same time that a pollutant discharge zone is proposed, unless the Director determines that groundwater monitoring is not

necessary.

13.2.3 Prior to approval of a pollutant discharge zone, the facility owner or operator shall demonstrate by clear, convincing, and scientifically valid evidence that:

(A) All practical alternatives to a discharge to groundwater have been evaluated and no technically or economically feasible alternative exists;

(B) Every practical effort has been made to limit the pollutant concentrations in the discharge to groundwater by such means as, but not limited to, reducing the quantity of potentially contaminating substances in use, use of alternative substances, changes in the operational procedures at the facility, and pretreatment of the effluent;

(C) The pollutant discharge zone is limited to the smallest area that is technically and economically feasible;

(D) The facility owner or operator has acquired rights to the pollutant discharge zone as evidenced by ownership of the land within the pollutant discharge zone, ownership of an easement to such land, or otherwise controls such land to the Director's satisfaction. Any such easement or other control mechanism shall prohibit use of the groundwater for a drinking water supply and provide the right to enter the pollutant discharge zone for groundwater monitoring and, if necessary, remediation activities.

(E) The discharge to groundwater and the resulting groundwater quality in the pollutant discharge zone do not represent a threat to public health or the environment;

(F) There will be no violation of the groundwater quality standards established in Rule 11 beyond the pollutant discharge zone as a result of the proposed discharge;

(G) There will be no adverse impact on existing public or private wells as a result of the proposed discharge; and

(H) The groundwater within the pollutant discharge zone will not cause a violation of the surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000), and amendments thereto~~ as a result of the proposed discharge.

13.3 Residual Zone: In determining compliance with the groundwater quality standards and preventive action limits in these Rules ~~and Regulations~~ for groundwater remediation activities where the groundwater is classified GAA or GA, the Director may designate or approve, deny, or modify the designation of a residual zone proposed by the facility owner or operator.

13.3.1 Within this residual zone, the pollutant concentrations in groundwater are allowed to be greater than the groundwater quality standards. Acceptable pollutant concentrations in the groundwater within a residual zone shall be determined by the Director on a case-by-case basis. The Director may require that the groundwater quality within the residual zone be monitored.

13.3.2 Prior to approval of a residual zone, the facility owner or operator shall demonstrate by clear, convincing and scientifically valid evidence that:

(A) The source of the pollutants has been removed or controlled to the satisfaction of the Director and every practical effort has been made to decrease the pollutant concentrations in the residual zone;

(B) The residual zone is limited to the smallest area that is technically and economically feasible;

(C) The facility owner or operator has acquired rights to the residual zone as evidenced by ownership of the land within the residual zone, ownership of an easement to such land, or otherwise controls such land to the Director's satisfaction. Any such easement or other control mechanism shall prohibit use of the groundwater for a drinking water supply and provide the right to enter the residual zone for groundwater monitoring and remediation activities;

(D) The pollutant concentrations in the groundwater within the residual zone do not or will not represent a threat to the public health or the environment;

(E) There will be no adverse impact on existing public or private wells as a result of the residual zone;

(F) There will be no violation of the groundwater quality standards established in Rule 11 beyond the residual zone; and

(G) The groundwater within the residual zone will not cause a violation of the surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000), and amendments thereto~~.

RULE 14. NOTIFICATION TO DEM OF VIOLATIONS OF PREVENTIVE ACTION LIMITS AND GROUNDWATER QUALITY STANDARDS

14.1 Exemptions from Provisions of This Rule:

14.1.1 Persons subject to the ~~regulations~~ Rules below shall follow notification and reporting requirements therein and in doing so are exempt from the provisions of Rule 14 provided that the notification documents any violations of the groundwater quality standards in Rule 11:

(A) Rhode Island "Rules and Regulations for Underground Storage Facilities Used for Petroleum Products and Hazardous Materials"~~, October 2002, and amendments thereto~~;

(B) Rhode Island "Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases" ~~(February 2004) and amendments thereto~~; and

(C) Rhode Island "Solid Waste Regulations No.1 through No. 8".

14.1.2 Persons reporting spills of chemical ~~and/~~or petroleum products to the Department pursuant to the immediate notification requirements of other state or federal laws and regulations are exempt from provisions Rule 14.

14.1.3 Owners of property served by private wells used exclusively for residential purposes are exempt from the provisions of Rule 14.

14.2 Notification: Facility owners ~~and/~~or operators that discharge to groundwater or have had a discharge or release to groundwater shall notify the Department within fifteen (15) days of the discovery when any of the following occur:

14.2.1 A preventive action limit has not been met at any point of compliance at a facility that has a discharge to groundwater approved by DEM where the groundwater is classified GAA or GA;

14.2.2 A groundwater quality standard has not been met at any point of compliance at a facility in any groundwater classification;

14.2.3 An alternative notification level established under a groundwater monitoring plan approved by the Director pursuant to Rule 12 or other groundwater monitoring plan approved by the Director pursuant to other rules and regulations of the Department or the federal government has not been met; or

14.2.4 The facility owner or operator has reasonable cause to believe that a discharge or release has occurred that may result in the violation of a preventive action limit ~~and~~/or groundwater quality standard.

14.3 Notification Contents: Notification shall include, but not be limited to, the following:

14.3.1 Name, address, telephone number of person notifying the Department and of the facility owner or operator;

14.3.2 Date and time of the discovery and the circumstances surrounding the discovery of the occurrence requiring notification;

14.3.3 Groundwater classification of the site;

14.3.4 Location of the occurrence and a legal description of the site (plat and lot);

14.3.5 Concentration of the pollutant(s) identified in the groundwater when notification is pursuant to Rule 14.2.1-14.2.3;

14.3.6 Identification of the pollutant(s) in the discharge or release when notification is pursuant to Rule 14.2.4;

14.3.7 Initial determination of the source of the pollutant(s) and an estimate of the extent of pollution; and

14.3.8 Measures taken or proposed to be taken at the time of notification.

14.4 Certification Requirements: The notification shall include a statement signed by the facility owner or operator, or an authorized representative that is responsible for the preparation and submittal of the notification certifying to the best of their knowledge that the notification is complete and accurate.

RULE 15. FACILITY OWNER OR OPERATOR RESPONSES TO VIOLATIONS OF PREVENTIVE ACTION LIMITS AND GROUNDWATER QUALITY STANDARDS

15.1 Violation of a Preventive Action Limit: When a preventive action limit has not been met, the facility owner and operator are responsible for taking actions, which shall be subject to the approval of the Director, to meet the following objectives at the point of compliance:

15.1.1 Minimize the concentration of the pollutant in the groundwater where technically and economically feasible;

15.1.2 Regain and maintain compliance with the preventive action limit, unless the Director determines that it is not technically or economically feasible to attain the preventive action limit concentration, in which case the owner or operator shall achieve compliance with the lowest possible concentration that is technically and economically feasible;

and

15.1.3 Ensure that the groundwater quality standard is met at any point of compliance.

15.2 Violation of a Groundwater Quality Standard: When a groundwater quality standard has not been met, the facility owner and operator are responsible for taking actions, which shall be subject to the approval of the Director, to regain and maintain compliance with the groundwater quality standard at the point of compliance.

15.3 Potential for Violation of Preventive Action Limit ~~and/~~or Groundwater Quality Standard: Where the Director has reason to believe that a discharge or release has occurred which may enter the groundwaters of the state and result in the violation of a preventive action limit ~~and/~~or groundwater quality standard, the Director is authorized to require the facility owner or operator to take action pursuant to Rule 15.4.

15.4 Responses to Violation of a Preventive Action Limit or a Groundwater Quality Standard: When a preventive action limit or groundwater quality standard is not met at a point of compliance or a discharge or release is suspected that may result in the violation of a preventive action limit or groundwater quality standard, the Director may require the facility owner or operator to take any one or more of the responses below:

15.4.1 Resample groundwater quality at the point of compliance.

15.4.2 Collect and submit additional data on groundwater quality on site or surrounding the site, hydrogeologic characteristics, ~~and/~~or facility practices.

15.4.3 Arrange for the sampling of private wells which may be adversely affected. Notify public water systems that may be adversely affected and reimburse the public water systems for the costs of additional water quality monitoring necessary to ensure public health.

15.4.4 Install and sample monitoring wells. Such wells shall be in compliance with the construction standards in Appendix 1, unless otherwise approved by the Director.

15.4.5 Require the establishment of a groundwater monitoring plan pursuant to Rule 12.2 or other groundwater monitoring plan approved by the Director pursuant to other regulations of the Department or the federal government, or require a change in an existing groundwater monitoring plan.

15.4.6 Require a revision of the operational procedures at the facility.

15.4.7 Require a change in the design or construction of the facility.

15.4.8 Require an alternate method of waste treatment or disposal.

15.4.9 Require the facility owner or operator to conduct a groundwater assessment and prepare a report pursuant to Rule 15.6, or another report pursuant to other applicable Department rules and regulations, that is subject to the Director's review and approval. Based on the results of this report, the Director may require further investigation.

15.4.10 Require prohibition of an activity.

15.4.11 Require the facility owner or operator to provide drinking water to those persons that do not have a potable water supply (for violation of groundwater quality standard only).

15.4.12 Require the facility owner or operator to conduct a groundwater investigation and prepare a report pursuant to Rule 15.7, or another report pursuant to other applicable Department rules and regulations, to adequately assess the nature and extent of pollution. Such report shall be subject to the Director's review and approval.

15.4.13 Require remedial action to restore groundwater quality to levels established by the Director pursuant to Rule 16.

15.5 Determination of the Response: In evaluating a violation of a preventive action limit or groundwater quality standard, and in determining the appropriate response required of the facility owner or operator pursuant to Rule 15.4, the Director may consider the following information provided by the facility owner or operator, in addition to all other relevant information:

15.5.1 Surrounding groundwater quality;

15.5.2 Geographic extent of pollutant migration;

15.5.3 Hydrogeologic conditions;

15.5.4 Present and future uses of the groundwater on-site and in the surrounding area;

15.5.5 Reliability of sampling data;

15.5.6 Performance of the activities at the facility;

15.5.7 Water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000), and amendments thereto,~~ for those surface waters receiving groundwater from the site; and

15.5.8 Other known or suspected sources in the area of the substance that is identified as in violation of the preventive action limit or groundwater quality standard.

15.6 Groundwater Assessment Report

15.6.1 A groundwater assessment report required pursuant to Rule 15.4.9 shall be prepared by a person with appropriate qualifications, and it shall include, but not be limited to, the following information, unless otherwise specified by the Director:

(A) All information previously reported to the Director pursuant to Rule 14 and~~/or~~ information reported to the Director in accordance with emergency response procedures of other applicable state and federal laws and regulations. The facility owner or operator may elaborate and expand on any and all information found in previous reports. The facility owner or operator shall correct any incorrect information or interpretations contained in previous reports as part of the site characterization;

(B) A locus map using the U.S. Geological Survey 7.5 minute quadrangle map;

(C) Description of past and present activities on the site, including a list of past owners and operators of the site and approximate time periods of occupancy;

(D) A compliance history of the site including any and all past environmental enforcement actions and documentation of any past discharges or releases;

(E) Site plan at an appropriate scale (minimum scale of one inch equals fifty feet (1"=50')) to adequately show the location on and immediately surrounding the site of the following: property boundaries, buildings and other structures, roads, surface topography, ~~surface water courses and wetlands~~ watercourses, wells, water lines, groundwater monitoring wells, materials storage areas (including underground storage tanks), sewer lines, ~~individual sewage disposal systems~~ onsite wastewater treatment systems and other waste disposal areas;

(F) Names and addresses of the owners and tenants of all properties that abut the site;

(G) Description of the site's hydrogeology, including, but not limited to, depth to groundwater, groundwater flow direction, and a description of the unconsolidated materials, including soil characteristics;

(H) Location and distance off-site of the nearest surface water body that will receive runoff from the site and the water quality classification of this surface water;

(I) Location of public wells within three (3) miles of the site or within an alternative distance of the site agreed upon by the Director;

(J) Information regarding private water supply as follows:

(i) Location of private wells on those properties that are wholly or partially within 500 feet of the site or a greater distance specified by the Director;

(ii) A description of the water supply sources and services available beyond 500 feet from the site and up to one mile from the site. The Director may require more specific detail.

(K) Identification of the pollutant(s) and an estimate of the geographic extent and volume of the affected area;

(L) A description of evidence of possible groundwater pollution, including, but not limited to, free liquids, stained soil, stressed vegetation, and the presence and volume of excavated materials.

(M) Results of any analytical testing of groundwater or soil on the site, including identification of methods used and sampling protocols;

(N) Recommendations for further groundwater investigation, groundwater remediation, or other actions; and

(O) Any other factors that the Director has reason to believe are necessary for an adequate groundwater assessment.

15.6.2 Monitoring wells installed to collect groundwater quality data shall be in compliance with the construction standards in Appendix 1, unless otherwise approved by the Director.

15.6.3 The groundwater assessment report and any associated progress reports shall include the following statements signed by an authorized representative of the party specified:

(A) A statement signed by an authorized representative of the person who prepared the groundwater assessment report certifying, to the best of their knowledge, the accuracy of the information contained in the report; and

(B) A statement signed by the facility owner or operator responsible for the submittal of the groundwater assessment report certifying, to the best of their knowledge, that the report is a complete and accurate representation, and that it includes all known facts about the discharge to groundwater or the release that has, or may result in, the violation of a preventive action limit or groundwater quality standard.

15.7 Groundwater Investigation Report

15.7.1 A groundwater investigation report required pursuant to Rule 15.4.12 shall be prepared by a person with appropriate qualifications, and it shall include all the elements of a groundwater assessment report described in Rule 15.6, and it shall also include, but not be limited to, the following information:

(A) Complete description of the site's hydrogeology, including, but not limited to, the following:

(i) Depth to groundwater, water table elevations, hydraulic gradient, groundwater flow direction, groundwater flow velocity, and water table map;

(ii) Description of the unconsolidated materials (in both the unsaturated and saturated zones), including permeability, porosity, degree of stratification, and the capacity for pollutant attenuation;

(iii) Depth to bedrock and bedrock characteristics;

(iv) Aquifer characteristics including saturated thickness, hydraulic conductivity, and transmissivity;

(v) The presence and effects of both natural and man-made barriers to and conduits for pollutant migration;

(vi) Surrounding groundwater quality;

(B) Description of the pollutant source and the events that caused the pollution;

(C) Extent of soil pollution;

(D) Extent of groundwater pollution;

(E) Map showing lines of equal pollutant concentrations in the groundwater; and

(F) Conclusions based on the site data and recommendations for groundwater remediation.

15.7.2 Monitoring wells installed to collect groundwater quality data shall be in compliance with the construction standards in Appendix 1, unless otherwise approved by the Director.

15.7.3 The groundwater investigation report and any associated progress reports shall include the following statements signed by an authorized representative of the party specified:

(A) A statement signed by an authorized representative of the person who prepared the groundwater investigation report certifying, to the best of their knowledge, the accuracy of the information contained in the report; and

(B) A statement signed by the facility owner or operator responsible for the submittal of the groundwater investigation report certifying, to the best of their knowledge, that the report is a complete and accurate

representation, and that it includes all known facts about the discharge to groundwater or the release that has, or may result in, the violation of a preventive action limit or groundwater quality standard.

RULE 16. GROUNDWATER REMEDIATION

16.1 Exemptions:

16.1.1 Groundwater remediation plans prepared in accordance with other Department regulations or federal laws and regulations are exempt from the provisions of Rules 16.4 and 16.5.

16.1.2 Emergency response procedures at sites of groundwater pollution or the threat of pollution are exempt from the provisions of this Rule, and such procedures shall be conducted in accordance with other applicable state and federal laws and regulations.

16.2 Groundwater Remediation Objectives: When groundwater remediation is required by the Director, the facility owner and operator are jointly and severally responsible for designing and implementing efforts to remediate the groundwater to achieve pollutant concentrations established by the Director. Groundwater remediation activities shall be designed to meet the following objectives:

16.2.1 Protect public health and the environment;

16.2.2 Ensure compliance with the groundwater quality standards for the classification assigned to the groundwater of concern;

16.2.3 Eliminate or contain the source of groundwater pollution and minimize the impacted area;

16.2.4 Achieve pollutant concentrations that are consistent with proposed and anticipated future uses of the site;

16.2.5 Prevent an adverse impact on surrounding uses of property, groundwater and surface water;

16.2.6 Prevent the violation of surrounding groundwater quality standards; and

16.2.7 Prevent the groundwater at the remediation site from causing a violation of the surface water quality standards established by the Rhode Island "Water Quality Regulations"~~ (June 2000), and amendments thereto~~.

16.3 Considerations for Remediation Decisions: The determination by the Director of groundwater remediation actions required of an owner or operator, the suitability of proposed remediation techniques, and the acceptable pollutant concentrations that may remain in groundwater after remediation may be based on, but not limited to, a consideration of:

16.3.1 Relative threat to public health and the environment from the facility;

16.3.2 The physical and chemical characteristics of the pollutant(s), including toxicity, persistence and potential for migration;

16.3.3 Hydrogeologic characteristics of the site and surrounding the site;

16.3.4 Current and potential future uses of groundwater and surface water at the site and surrounding the site;

16.3.5 Groundwater classification at the site and surrounding the site;

16.3.6 Other state and federal program priorities;

16.3.7 Relative potential for adverse impacts on surrounding uses of property, groundwater and surface water;

16.3.8 Relative potential for violation of surrounding groundwater quality standards;

16.3.9 Relative potential for the groundwater at the remediation site to cause a violation of the surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000) and amendments thereto~~; and

16.3.10 Reliability and technical feasibility of the proposed technologies for groundwater remediation.

16.4 Groundwater Remediation Plan: Where required by the Director, a groundwater remediation plan shall be prepared by the facility owner or operator.

16.4.1 The groundwater remediation plan shall consist of, at minimum, the following:

(A) Groundwater assessment report pursuant to Rule 15.6, groundwater investigation report pursuant to Rule 15.7 (if such report was required), and any additional information the Director shall require;

(B) Proposed method for remediation, to include, but not be limited to, the following:

(i) Justification of the ability of the method to meet the remediation objectives;

(ii) Design standards and technical specifications for the design and construction of any equipment necessary for the proposed remediation;

(iii) Diagrams of any piping routes, instrumentation, and process flows; and

(iv) Proposed plans for the disposal of any products or by-products from the remediation activities;

(C) Proposed schedule for implementation of the remediation plan; and

(D) Proposed groundwater monitoring plan pursuant to Rule 12.2.

16.4.2 The groundwater remediation plan and any associated progress reports shall include the following statements signed by an authorized representative of the party specified:

(A) A statement signed by an authorized representative of the person who prepared the groundwater remediation plan certifying, to the best of their knowledge, the accuracy of the information contained in the plan; and

(B) A statement signed by the facility owner or operator responsible for the preparation and submittal of the groundwater remediation plan certifying, to the best of their knowledge, that the plan is complete and accurate.

16.5 Approval of Groundwater Remediation: Groundwater remediation activities shall be proposed and implemented by the facility owner or operator, and they shall be done in a manner approved by the Director through the issuance of an order of approval unless otherwise specified by the Director 16.5.1 Upon review of the groundwater remediation plan, the Director shall approve the plan, approve the plan with conditions, require revisions to the plan, or deny approval of the plan based on a determination of the plan's ability to meet the groundwater remediation objectives in Rule 16.2.

16.5.2 Orders of approval for groundwater remediation shall be valid for a time period specified by the Director.

16.5.3 Any person transferring ownership or control of a facility having an approved groundwater remediation plan shall notify the Director of such transfer not less than thirty (30) days prior to the effective date of such transfer.

16.5.4 Implementation of remedial activities approved by the Director does not discharge or otherwise release the facility owner or operator from responsibility for any adverse impacts to public health and the environment caused by pollutants in the groundwater at the site.

RULE 17. GROUNDWATER QUALITY CERTIFICATION

17.1 Applicability: Groundwater quality certification ~~will~~ may at the Director's discretion be required for the following:

~~17.1.1 Individual sewage disposal systems designed to treat five thousand (5,000) gallons or more per day as defined below in Rule 17.1.1(A)-(C) (Rhode Island "Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction, and Maintenance of Individual Sewage Disposal Systems", January 2002, and amendments thereto) where the groundwater is classified GA or GAA. The Director may waive the requirement for a groundwater quality certification for the replacement of an existing system when there is no increase in the design flow to the system or for a system that is designed to remove nitrogen such that the total nitrogen in the effluent does not exceed the standard of ten (10) mg/l. Individual sewage systems subject to the groundwater quality certification requirements shall include:~~

~~(A) Any single individual sewage disposal system designed to treat five thousand (5,000) gallons or more per day;~~

~~(B) All individual sewage disposal systems on a single parcel of land, excluding subdivisions, where the aggregate design flow is five thousand (5,000) gallons or more per day; and~~

~~(C) All individual sewage disposal systems serving a residential or commercial condominium complex where the aggregate design flow is five thousand (5,000) gallons or more per day.~~

~~17.1.2 Water quality certification for upland disposal of dredge material taken from non-marine waters of the state (Rhode Island "Water Quality Regulations" for Water Pollution Control" (June 2000), and amendments thereto); and~~

17.1.1 Proposed activities where the groundwater is classified GB in accordance with Rule 9.1.3(B) – (D) that would otherwise be prohibited in the surrounding areas where the groundwater is classified GA or GAA (See Rule 11.5); and

~~17.1.3~~ 17.1.2 Any project or activity that the Department has determined has a reasonable potential to adversely impact groundwater quality and there is no other Department regulation that addresses the potential impact on groundwater quality.

17.2 Groundwater quality certifications that have been issued pursuant to these or previously promulgated versions of these ~~regulations~~ Rules shall remain in effect until such time that the Department license or permit that triggered the need for a certification has expired or until the Department specifies otherwise.

17.3 Groundwater Quality Certification Application and Review

17.3.1 All applications for groundwater quality certifications shall be made on forms provided by the Director.

17.3.2 The groundwater quality certification application form shall be accompanied by a non-refundable check for two hundred dollars ($200.00) payable to the "General Treasurer, State of Rhode Island."

~~17.3.2~~17.3.3 The applicant shall be responsible for providing all information required by the Department in a complete and accurate manner.

~~17.3.3~~17.3.4 ~~After reviewing a proposal, the groundwater quality certification shall be approved, denied, or approved with conditions.~~ After review of the groundwater quality certification application, the Director shall approve the application in accordance with Rule 17.4, deny the application, or approve the application with conditions.

17.4 Criteria for Groundwater Quality Certification Approvals: Facility owners or operators that are requesting groundwater quality certification must show by clear, convincing and scientifically valid evidence that:

17.4.1 There is no reasonable potential for violation of the groundwater quality standards in Rule 11, except within a pollutant discharge zone approved pursuant to Rule 13; and

17.4.2 There is no reasonable potential for groundwater impacted by the proposed project to cause a violation of surface water quality standards established by the Rhode Island "Water Quality Regulations" ~~(June 2000), and amendments thereto~~.

RULE 18. WELLHEAD PROTECTION

(See Appendix 4 for a small scale Wellhead Protection Area Map.)

18.1 Delineation of Wellhead Protection Areas

18.1.1 Wellhead protection areas for each public well in Rhode Island approved by the Rhode Island Department of Health shall be established by the Department of Environmental Management in accordance with the delineation methods below in (A)–(C), unless a refined delineation pursuant to Rule 18.2 is approved by the Department. (See Appendix 5 for a description of the methodology.) ~~In addition to wells approved by the Rhode Island Department of Health, wellhead protection areas will be delineated for particular proposed well sites and inactive wells as determined by the Director.~~

(A) The wellhead protection area for community and non-transient non-community wells completed in stratified drift will be determined by application of an analytical model for the delineation in the stratified drift and by using hydrogeologic mapping in the upgradient till deposits. If such delineation is not available at the time of the well's approval by the Rhode Island Department of Health, an interim wellhead protection area shall be designated as a 2000 foot radius circle, until such time that a delineation is completed by the Department of Environmental

Management.

(B) The wellhead protection area for wells completed in bedrock (community and non-community) is a calculated fixed radius based on the well's pump rate with a minimum radius of 1750 feet. See Table 2 for a list of pump rates and corresponding wellhead protection area radii.

(C) The wellhead protection area for any other groundwater source, including springs, wells completed in till deposits, transient non-community wells completed in stratified drift, and any well where the geologic formation supplying the water is unknown, will be a radius of 1750 feet.

18.1.2 Wellhead protection areas in Rhode Island include those portions of wellhead protection areas for public wells in Connecticut and Massachusetts that extend into Rhode Island as a result of delineations done in accordance with a United States Environmental Protection Agency approved Wellhead Protection Program or Source Water Protection Program in Connecticut or Massachusetts.

18.1.3 In the event that the boundary of a wellhead protection area delineated by the Department is in dispute, the burden of proof shall be on the person disputing the boundary to show to the satisfaction of the Department a more accurate delineation. If the wellhead protection area in question is for a community water supply well, the procedure in Rule 10 for Modification of Groundwater Classification must be followed.

Table 2. Wellhead Protection Area Radius for Bedrock Wells

(gpm = gallons per minute; For pumping rates not provided below, the Wellhead Protection Area Radius shall be calculated using the formula in Appendix 5.)

Pumping Rate (gpm)	Radius (ft)	Pumping Rate (gpm)	Radius (ft)
≤10	1750	23	2411
11	1820	24	2440
12	1872	25	2466
13	1920	30	2568
14	1965	35	2638
15	2008	40	2689
16	2087	45	2729
17	2153	50	2760
18	2211	60	2806
19	2261	70	2875
20	2305	80	2985
21	2344	90	3068
22	2380	100	3133

18.2 Refined Wellhead Protection Areas: The Department, water suppliers, or other state or federal agencies may delineate refined wellhead protection areas, which are prepared using more complex methods ~~and/~~or additional data than that used in the Director's initial delineation. Requests for Department approval of refined delineations shall follow the procedure below:

18.2.1 Requests for approval of refined wellhead protection areas shall be submitted in writing to the Director and shall include, at minimum:

(A) A map of the well location and proposed refined wellhead protection area using the United States Geological Survey 7.5 minute quadrangle map (scale of 1:24000);

(B) Detailed description of the mapping methodology;

(C) List of data sources;

(D) Detailed description of field methods and results for such activities as pump tests and water table measurements;

(E) Detailed description of modelling method, assumptions, results, and principal model input and output values; and

(F) Water table map used in the refined wellhead protection area mapping;

18.2.2 Additional information may be required by the Director in order to adequately review a proposed refined wellhead protection area.

18.2.3 After reviewing the proposed refined wellhead protection area, the Director shall accept it, deny it, or accept it with conditions. An accepted refined wellhead protection area delineation will be incorporated into the official wellhead protection area map in accordance with Rule 18.3 and shall supersede the Director's initial wellhead protection area delineation.

18.3 Wellhead Protection Area Maps: The wellhead protection areas shall be delineated on 1:24000 scale maps. The 1:24000 scale maps shall be on file for review at the Rhode Island Department of Environmental Management, 235 Promenade Street, Providence, RI 02908. Smaller scale maps may be made available from the Department at the above address, and the wellhead protection areas may be viewed on the DEM website. ~~at www.state.ri.us/dem.~~ The Director shall periodically initiate rule-making procedures to update the wellhead protection maps, which may involve changing wellhead protection area delineations, incorporating additional wellhead protection areas ~~and/~~or deleting wellhead protection areas.

18.4 Deletion of Wells from the Wellhead Protection ~~Program~~ Area Map: A public well~~s~~ and its wellhead protection area delineation will be deleted from the Department's Wellhead Protection ~~Program~~ Area map and no longer subject to provisions of these ~~regulations~~ Rules when the Rhode Island Department of Health has determined that the well is no longer an approved public drinking water supply and the Director has determined that maintaining the wellhead protection area no longer serves the public interest. The Director's determination shall be based on the available information, period of disuse, and the absence of any known dispute concerning deleting the well from the Wellhead Protection Area map. Such determination shall be made in a manner consistent with the Rhode Island State Guide Plan.

18.5 Addition of Wells to the Wellhead Protection ~~Program:~~ Area Map: A public well and its wellhead protection area delineation will be added to the Department's Wellhead Protection ~~Program~~ Area map and subject to the provisions of these ~~regulations~~ Rules at the time of approval by the Rhode Island Department of Health as a public drinking water supply or if the Director has determined that it serves the public interest to add a wellhead protection area for a well site not yet approved by the Department of Health, but which will likely be used for public drinking water supply in the future.

18.6 Wellhead Protection Planning: The Rhode Island Wellhead Protection Program (February 1990) requirement for municipalities and large water suppliers with a groundwater source(s) of supply to inventory potential pollution threats in the wellhead protection areas and develop a wellhead protection plan will be met by:

18.6.1 Municipal comprehensive plans, prepared pursuant to the Rhode Island Comprehensive Planning and Land Use Act (RIGL Chapter 45-22.1), determined by the Department to be consistent with the Department's Groundwater Protection Program goals and policies. These goals and policies for communities dependent on groundwater for drinking water require, at minimum: a pollution threat assessment; identification of protection strategies, which must at minimum include public education on groundwater protection; coordination, where appropriate, with neighboring states, communities and water suppliers; and a procedure for implementing the chosen strategies; and

18.6.2 Large water suppliers subject to the requirements of the Rhode Island Water Resources Board "Rules and Procedures for Water Supply System Management Planning" ~~(October 2002)~~ that are determined ~~by the Department~~ to be in compliance with ~~Section 8.03 "Requirements of~~ the Water Quality Protection Component of the "Rules and Procedures for Water Supply System Management Planning"~~(October 2002)~~.

RULE 19. VARIANCES

19.1 Variance Requests: A facility owner or operator may submit a written request to the Director for a variance from any of the provisions of these Rules ~~and Regulations~~. Such request for a variance shall include at a minimum:

19.1.1 Name and address of the facility owner or operator, and the name and location of the facility for which the owner or operator seeks a variance;

19.1.2 A list of the names and addresses of the owners and tenants of all properties that abut the facility;

19.1.3 Identification of the specific Rule or Rules from which a variance is requested;

19.1.4 A statement of the reasons for which the facility owner or operator seeks a variance. This statement shall specify the reasons that the facility owner or operator is unable to comply with these Rules ~~and Regulations~~, why a variance is necessary, and the reasons why a hardship is alleged. The person seeking the variance should separately and by number list each reason and any other mitigating factors he believes the Director should consider; and

19.1.5 An explanation that the alternative procedures requested are substantially equivalent to the Rules ~~and Regulations~~ herein in achieving protection of the public health and the environment.

19.2 Variance Decisions

19.2.1 The Director may issue a variance under this Rule when the facility owner or operator proves by clear, convincing and scientifically valid evidence that:

(A) Compliance with these Rules ~~and Regulations~~ would cause unreasonable or undue hardship;

(B) The issuance of the variance will have no adverse effect on public health and the environment; and

(C) The alternative procedures requested are substantially equivalent to the Rules ~~and Regulations~~ herein in achieving protection of the public health and the environment.

19.2.2 If the Director determines that there is widespread public interest or that the variance request raises major issues that could affect other facilities, then the Director may schedule a public hearing to solicit public comment prior to

rendering a decision on the variance request.

19.2.3 The Director's decision to grant or deny a variance shall be in writing and may, as a condition of granting the variance, impose appropriate requirements necessary to protect the public health and the environment.

RULE 20. ENFORCEMENT

20.1 Where the Director has reason to believe that a violation of any part of the Rules ~~and Regulations~~ herein has occurred, the Director may issue a notice of violation ~~and/~~or immediate compliance order pursuant to Chapter 42-17.1 of the Rhode Island General Laws of 1956, as amended.

20.2 For violations that are of a continuing nature, each and every day that the violation exists shall constitute a separate and distinct violation.

RULE 21. APPEALS

Any person affected by a decision of the Director pursuant to these Rules ~~and Regulations~~ may, in accordance with the Rhode Island "Administrative Rules of Practice and Procedure for the Administrative Adjudication Division for Environmental Matters" ~~(January 2001), and amendments thereto~~, file a claim for an adjudicatory hearing to review the decision. All appeals shall be in writing and shall be filed with and received by the Department's Administrative Adjudication Division within thirty (30) days after the effective date of the denial of the subject application. The party appealing a Department decision bears the burden of proving that their application complies with all requirements of the Rules ~~and Regulations~~ herein.

RULE 22. SUPERSEDED REGULATIONS

22.1 Effective June 18, 1992, Rule 9.03 (Monitoring Well Abandonment) of the Rhode Island "Rules and Regulations Governing the Enforcement of Chapter 46-13.2 Relating to the Drilling of Drinking Water Wells", filed with the Secretary of State December 15, 1989, is hereby revoked and superseded by section 8.0 of Appendix 1 of the Rules ~~and Regulations~~ herein.

22.2 On the effective date of these Rules ~~and Regulations~~, all previous Rules and Regulations, and any policies regarding the administration and enforcement of the Groundwater Protection Act (Rhode Island General Laws, Chapter 46-13.1) shall be superseded. However, any enforcement action taken by, or application submitted to, the Department prior to the effective date of these Rules ~~and Regulations~~ shall be governed by the Rules and Regulations in effect at the time the enforcement action was taken, or application filed.

RULE 23. PENALTIES

Penalties will be assessed in accordance with the Department's "Rules and Regulations for the Assessment of Administrative Penalties"~~, May 2000, and amendments thereto~~, for any violation of these Rules ~~and Regulations~~.

APPENDIX 1

Construction Standards for Monitoring Wells and Abandonment Procedures for Monitoring Wells, Piezometers and Other Subsurface Borings

1. Purpose: This Appendix provides minimum standards for the construction of monitoring wells for the procurement of samples representative of groundwater and abandonment procedures for monitoring wells, piezometers and other subsurface borings. These minimum standards are consistent in most instances with the American Society for Testing and Materials (ASTM) standards listed below, which should be consulted for more detailed information. Where the requirements in this Appendix differ from the ASTM standards, the requirements herein govern. ASTM standards:

Standard Practice for Design and Installation of Ground Water Monitoring Wells in Aquifers (D 5092-02);
Standard Guide for Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities (D 5299-99);
Standard Guide for Installation of Direct Push Ground Water Monitoring Wells (D 6724-01); and
Standard Practice for Direct Push Installation of Prepacked Screen Monitoring Wells in Unconsolidated Aquifers (D 6725-01).

2. Applicability:

2.1 The construction standards in this Appendix apply to monitoring wells installed pursuant to these ~~regulations~~ Rules. The construction standards shall not apply to drinking water wells or other subsurface borings that are used for purposes other than monitoring groundwater quality.

2.2 The abandonment procedures in this Appendix apply to monitoring wells, piezometers and other subsurface borings that intersect the seasonal water table at some time of the year.

3. Prevention of Groundwater Pollution: During well construction and abandonment, every appropriate precaution shall be taken to prevent introducing pollutants into the groundwater. This shall include, but not be limited to, steam cleaning and washing of drilling equipment and proper cleaning and storage of well casing. Only unpolluted water shall be used in well construction and abandonment unless otherwise approved by the Director.

4. Deviation from the Standards: The Director may waive the requirements and allow deviation from these procedures where such deviations will result in procurement of representative groundwater samples or, in the case of well abandonment, will not result in a reasonable potential for groundwater pollution. All deviations from the procedures shall be documented and provided to the Director for approval prior to well installation or abandonment. If the Director determines that the deviation from these procedures will not or does not result in the procurement of samples representative of groundwater, the Director may require alternative procedures or the installation of a new monitoring well.

5. Drilled Wells: Monitoring wells constructed using conventional drilling methods shall be installed in accordance with the requirements below (see Figure A1-1). Monitoring wells completed into bedrock without a well screen (open bore hole) are exempt from the requirements of Rules 5.3, 5.4 and 5.5.1, but must comply with all other requirements in Rule 5. Bedrock monitoring wells shall have a well casing extending a minimum of 5 feet into the bedrock.

5.1 Borehole Diameter: The borehole diameter in the overburden shall be a minimum of 4 inches greater than the diameter of the well casing.

5.2 Well Casing (or Riser): The well casing shall be constructed of PVC material. Monitoring wells less than 100 feet in depth shall be constructed using a minimum of schedule 40 PVC. Wells greater than 100 feet deep shall be constructed using a minimum of schedule 80 PVC. The Director may allow alternate well casing material if the pollutant concentrations or geologic setting require an alternative construction. Alternative materials include, but are not limited to: Teflon, stainless steel, or uncoated or galvanized steel.

5.2.1 Assembly and Installation: All casing shall be constructed of flush threaded joints or threaded coupling joints. All joints shall be fitted with an "O" ring or wrapped with teflon tape. Glued or solvent welded joints are not permissible without prior written permission of the Director.

5.2.2 Cap: The well casing shall be fitted with a plug or cap.

5.3 Well Screen: The well screen slot size shall retain at least 90% of the grain size of the filter pack or at least 90% of the grain size of the collapsed formation when no filter pack is used in accordance with Rule 5.4. Well screens shall not exceed the length necessary to collect a representative groundwater sample. Well screens shall be factory slotted or continuous wrapped wire-wound. A bottom cap and sump sediment trap shall be installed.

5.4 Filter Pack: The filter pack shall be clean, chemically inert, well rounded and well sorted glass beads or silica-based sand or gravel of uniform grain size. The filter pack must minimize the amount of fine material entering the well and shall not inhibit the flow of water or movement of pollutants into the well. The filter pack shall be installed by bottom-up tremie methods. The filter pack shall extend from 6 inches beneath the bottom of the well screen to a distance above the well screen equivalent to 20% of the well screen but not less than 2 feet. A collapsed formation may be used as the filter pack if the well screen retention requirement of Rule 5.3 is met and a filter pack can not be installed.

5.5 Sealing Requirements

5.5.1 Filter Pack Seal: All monitoring wells installed with a filter pack shall be constructed with a filter pack seal of bentonite pellets or slurry in a manner that does not disturb the filter pack. The seal shall extend to approximately 3 to 5 feet above the filter pack and shall be properly hydrated and set.

5.5.2 Annular Space Seal: All monitoring wells shall be installed with an annular space seal using neat cement, neat cement-bentonite mixture, bentonite slurry or bentonite that is properly hydrated and set. Granular bentonite in dry form or powdered bentonite in dry form shall not be used in the saturated zone. The annular space seal shall extend to the ground surface seal, except where a road box meeting the requirements of Rule 5.7 of this Appendix is used.

5.5.3 Ground Surface Seal: All monitoring wells shall be constructed with a continuous pour concrete ground surface seal. To avoid frost heaving and to anchor the well, the ground surface seal shall extend to a minimum of 40 inches below the land surface, unless the seal would interfere with proper placement or functioning of the well screen or a road box is installed in accordance with Rule 5.7. The ground surface seal shall be flared such that the diameter at the top is greater than the diameter at the bottom. The top of the ground surface seal shall be sloped away from the well casing and shall be large enough to allow drainage away from the well.

5.6 Protective Casing: The protective casing shall consist of a minimum 4 inch diameter metal casing with locking cap. The protective casing shall extend from the bottom of the ground surface seal to a minimum of 24 inches above the land surface, allowing for 4 to 6 inches clearance between the top of the well casing and the cap of the protective casing. A ¼ inch diameter drain hole shall be drilled into the protective casing 6 inches above the ground level. Dry bentonite

pellets, granules or chips shall then be placed in the annular space below ground level within the protective casing. Coarse sand or washed pea gravel or both shall be placed above the dry bentonite to a depth covering the drain hole. A high visibility guard post may be required. The Director may request additional protective devices as necessary.

5.7 Road Box: Road boxes are acceptable in locations where protective casings installed in accordance with Rule 5.6 are not suitable. All road boxes shall be secured and water tight and shall prevent easy access to the well. The well casing shall be fitted with a locking, watertight cap. The ground surface seal for the road box shall be competent such that vehicle traffic will not cause it to fail. The annular space seal shall extend upward to one foot below the ground surface seal. Permeable material shall be emplaced between the ground surface seal and the annular space seal in order to allow for the drainage of runoff which may leak into the road box from the ground surface. The road box cover plate shall clearly indicate that the well is a groundwater monitoring well.

5.8 Well Development: Development of all monitoring wells shall be performed no earlier than 24 hours after completion and before the initial water quality samples are taken. Well development shall continue until the water has stable pH, temperature, and specific conductivity readings and has turbidity values less than 5 NTUs (nephelometric turbidity units). If a well does not meet the goal of 5 NTUs, it must be demonstrated to the satisfaction of the Director that proper well completion and well development have been employed. Groundwater sampling shall not occur until at least 24 hours after well development, in order to allow natural groundwater flow to be re-established.

5.9 Monitoring Well Designation: Each monitoring well shall be clearly and permanently labeled as a monitoring well with the well number using such techniques as etching in the protective casing or in the cement of the ground surface seal.

6. Single Rod Direct Push Wells: Wells installed using single rod direct push methods shall be installed in accordance with the requirements below:

6.1 Annular space seal -- If the screen and riser are of the same diameter and are advanced such that they remain in contact with the formation during installation (exposed screen wells) no annular space seal is created. If the drive rod is smaller in diameter than the sampler body (protected screen wells) an annular space is created that must be sealed in accordance with Rule 5.5.2 above;

6.2 Ground surface seal shall be constructed in accordance with Rule 5.5.3;

6.3 Protective casing or road box shall be installed in accordance with Rule 5.6 or Rule 5.7, respectively. In order to provide a locking, water-tight cap on a small diameter well casing in a road box as required by Rule 5.7, a 2 inch PVC casing can be placed over the well riser extending 3 to 4 feet below grade;

6.4 Well must be developed in accordance with Rule 5.8; and

6.5 Well shall be properly designated in accordance with Rule 5.9.

7. Two-tube Direct Push Wells: Monitoring wells installed using two-tube direct push methods create an annular space the length of the well, thus requiring a filter pack, seals and other provisions similar to conventional drilled wells. Two-tube direct push wells shall be installed in accordance with the requirements below (see Figure A1-2):

7.1 The outside diameter of the borehole shall be a minimum of one inch greater than the outside diameter of the well casing;

7.2 Well casing (or riser) shall meet the requirements of Rule 5.2;

7.3 Well screen shall meet the requirements of Rule 5.3;

7.4 Filter Pack: The filter pack shall be clean, chemically inert, well rounded and well sorted glass beads or silica-based sand or gravel of uniform grain size. The filter pack must minimize the amount of fine material entering the well and shall not inhibit the flow of water into the well. The filter pack shall be installed by bottom-up tremie methods, or it can be a pre-packed manufactured unit. A collapsed formation may be used as the filter pack if the well screen retention requirement of Rule 5.3 is met and a filter pack can not be installed.

7.5 Grout Barrier: All direct push monitoring wells installed with a filter pack shall be constructed with a grout barrier immediately above the screened interval to prevent annular space sealants from entering the screened interval. The grout barrier shall extend a minimum of 2 feet above the screened interval. The grout barrier may be constructed by gravity or tremie installation of fine sand, or by installation of a modular system. Alternatively, collapse of the natural formation may be used to create a natural barrier when the formation material is of appropriate grain size and cohesion.

7.6 Filter pack seal shall be constructed in accordance with Rule 5.5.1;

7.7 The annular space shall be sealed in accordance with Rule 5.5.2 or a modular system may be used;

7.8 Ground surface seal shall be constructed in accordance with Rule 5.5.3 ;

7.9 Protective casing or road box shall be installed in accordance with Rule 5.6 or Rule 5.7 , respectively;

7.10 Well must be developed in accordance with Rule 5.8; and

7.11 Well shall be properly designated in accordance with Rule 5.9.

8. Abandonment of Monitoring Wells, Piezometers and Other Subsurface Borings

8.1 ~~General:~~ Monitoring wells, piezometers and other subsurface borings shall be abandoned in accordance with this Rule or alternate procedures approved in writing by the Director prior to abandonment.~~so that natural migration of groundwater or soil vapor is not significantly influenced.~~ Abandonment shall take place within 60 days after use has been terminated or within a timeframe approved by the Director.

8.2 Abandonment Procedures for Monitoring Wells and Borings Constructed with an Annular Space:

8.2.1 The borehole shall be inspected from the land surface through its entire depth before it is sealed, to ensure against the presence of any obstructions that will interfere with sealing operations.

8.2.2 The casing shall be removed by pulling or overdrilling. If the casing can not be removed, the screen and casing shall be suitably perforated from top to bottom allowing for the plugging material (see Rule 8.2.3) to penetrate the annular space and formation. If the casing remains, it shall be cut off at least 4 feet below the ground surface where practicable.

8.2.3 The remaining casing or borehole shall be filled with neat cement or neat cement grout applied under pressure.

8.3 Abandonment Procedures for Monitoring Wells and Borings Constructed without an Annular Space:

8.3.1 The borehole shall be inspected from the land surface through its entire depth before it is sealed, to ensure against the presence of any obstructions that will interfere with sealing operations.

8.3.2 If the casing is to be removed, the remaining borehole shall be filled with neat cement or neat cement grout applied under pressure.

8.3.3 If the casing remains in the ground, it shall be cut off at least 4 feet below the ground surface. The remaining casing shall be filled with neat cement or neat cement grout applied by bottom-up tremie methods.

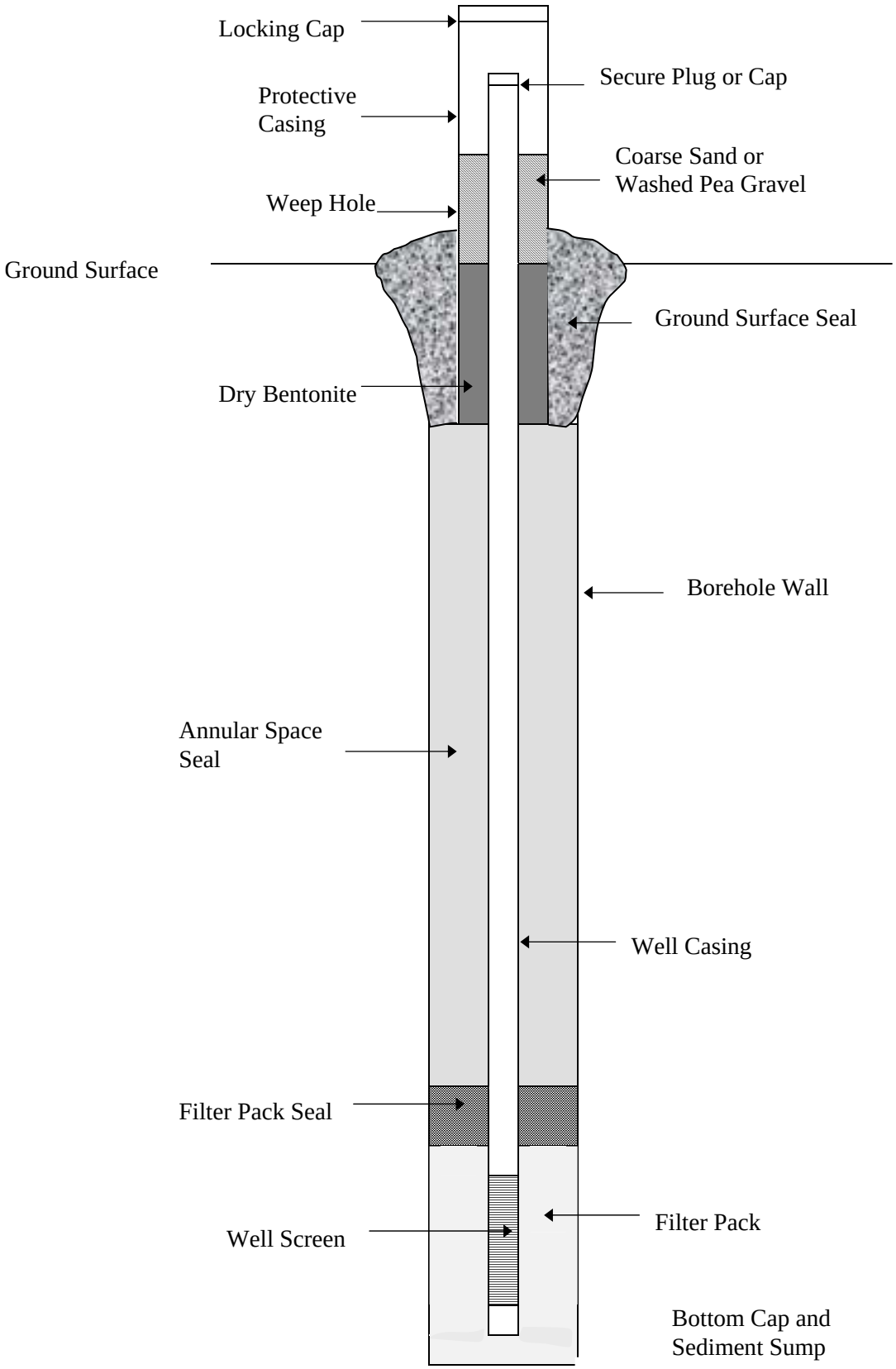


Figure A1-1. Drilled Monitoring Well in Overburden with Protective Casing (not to scale)

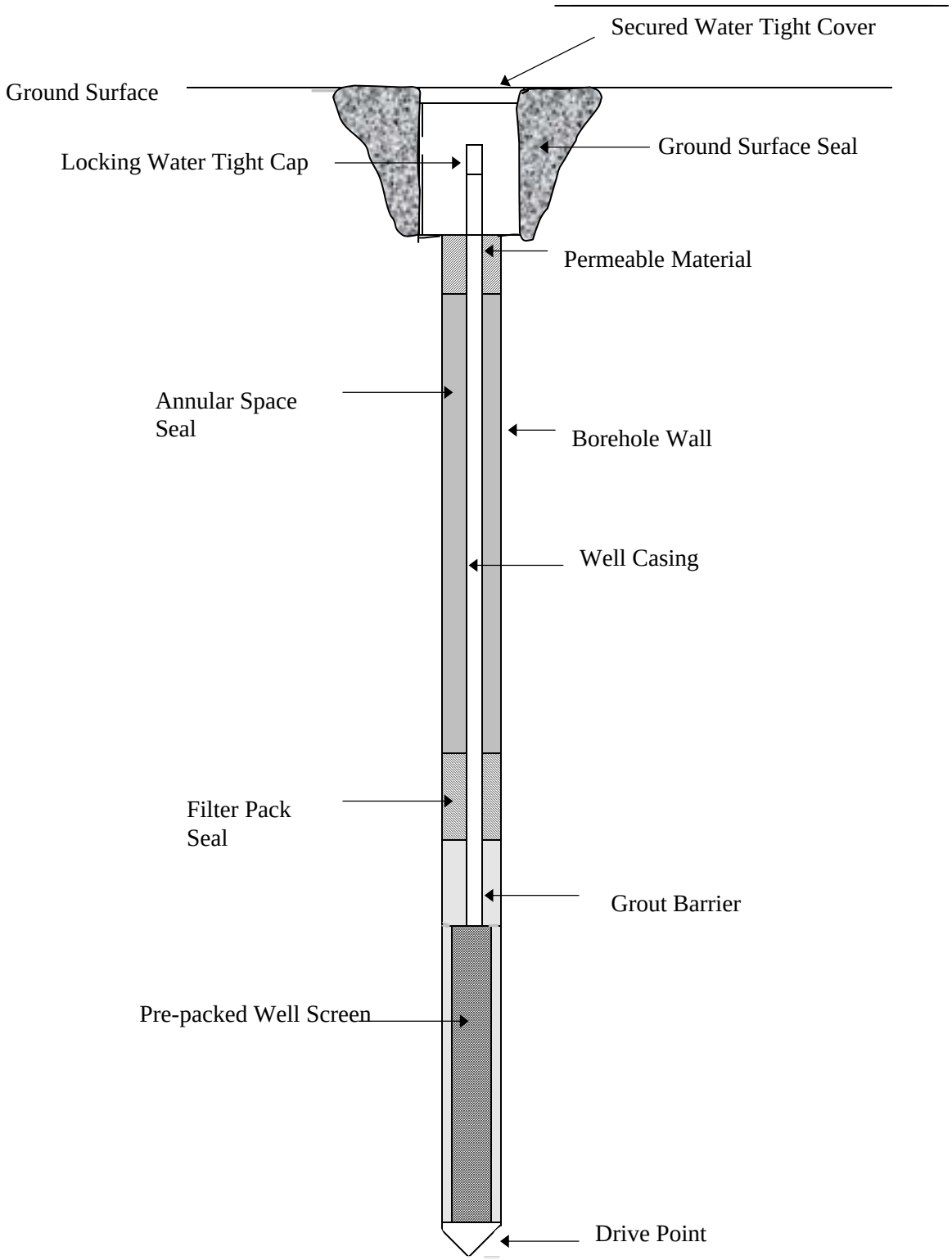


Figure A1-2. Two-tube Direct Push Monitoring Well with Road Box (not to scale)

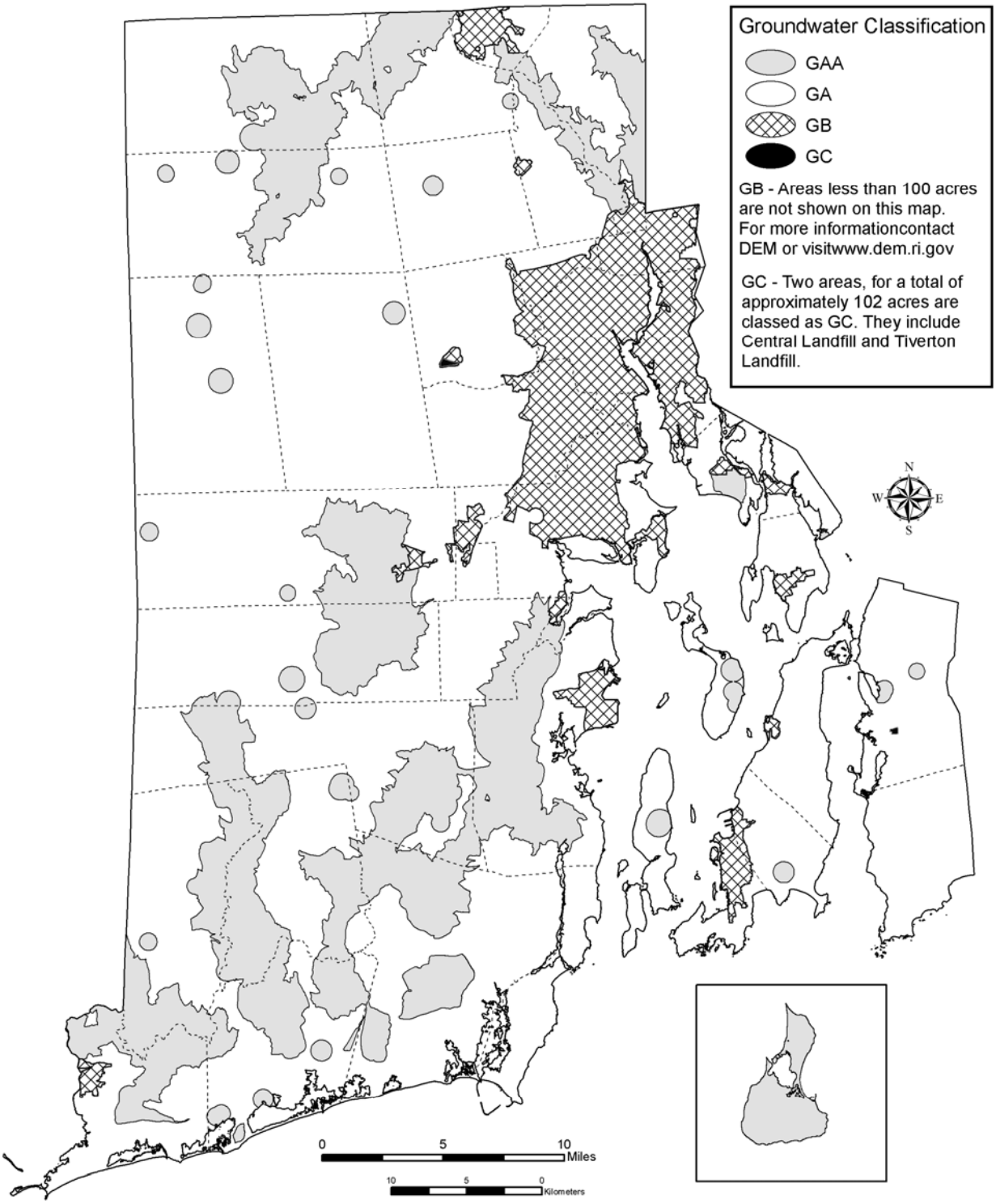
APPENDIX 2

Groundwater Classification Map

(8.5" x 11")

Note: This is an unofficial map of the groundwater classifications. The official delineations were done using the United States Geological Survey 7.5 minute quadrangle maps (1:24,000 scale). These delineations are on file at the Rhode Island Department of Environmental Management, 235 Promenade Street, Providence, RI 02908 ~~Department's Office of Technical and Customer Assistance~~ and available on the Department's website at ~~www. state.ri.us/dem~~ www.dem.ri.gov.

Groundwater Classification

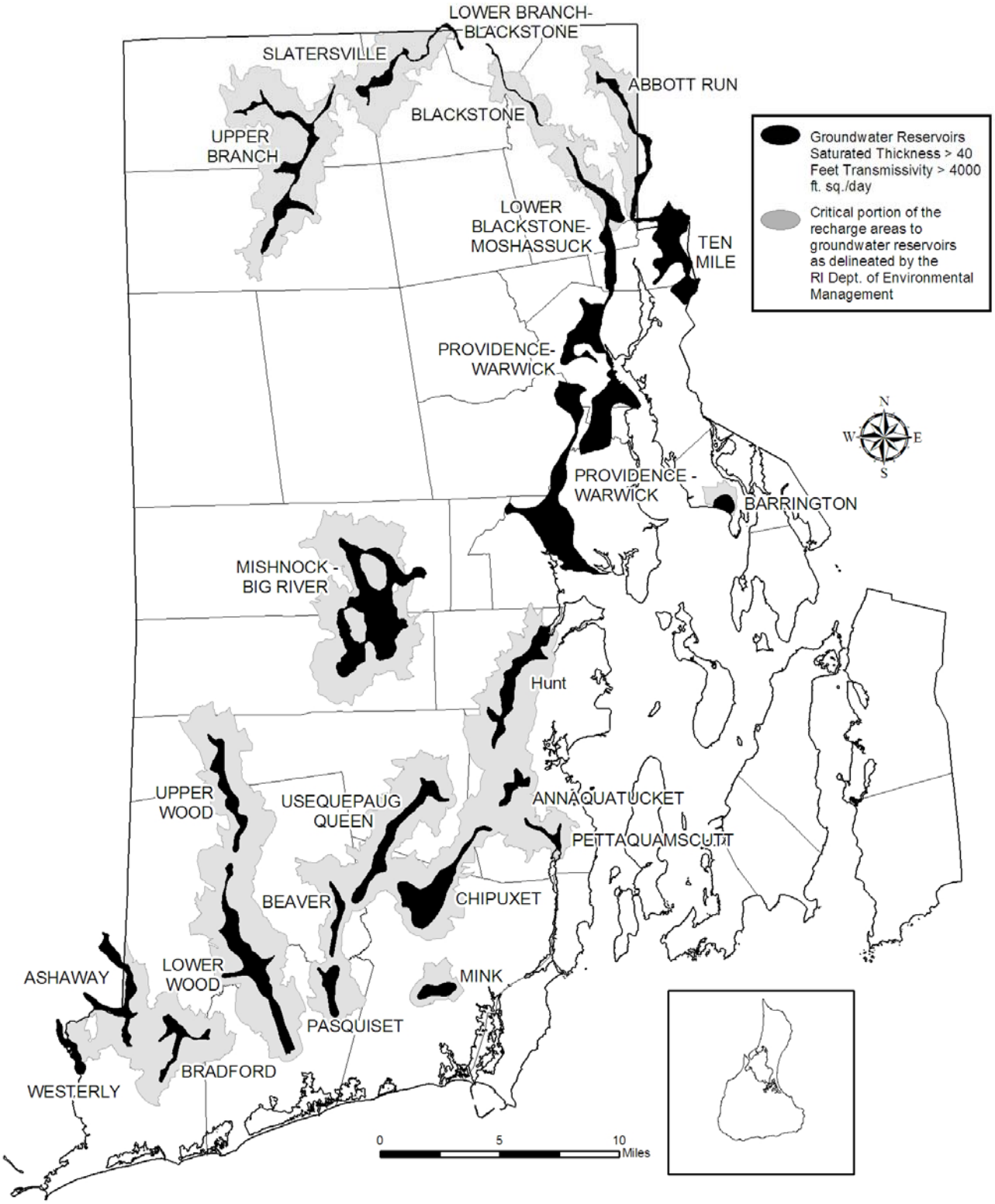


APPENDIX 3

Map of Groundwater Reservoirs and the Critical Portions of Their Recharge Areas

(8.5" x 11")

Groundwater Reservoirs and the Critical Portions of Their Recharge Areas



APPENDIX 4

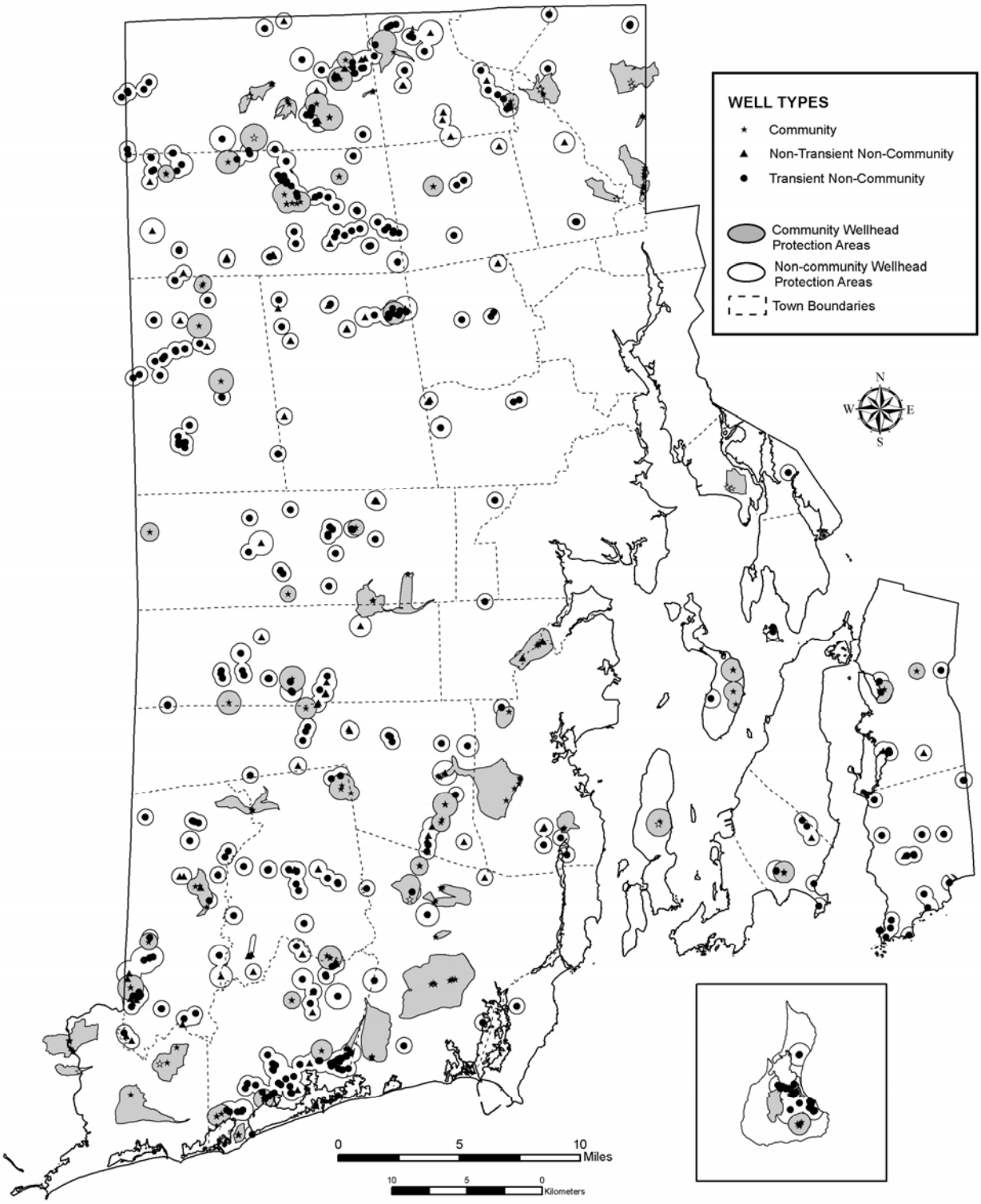
Wellhead Protection Area Map

(8.5" x 11")

Note: This is an unofficial map of the wellhead protection areas. The official wellhead protection area delineations were done using the United States Geological Survey 7.5 minute quadrangle maps (1:24,000 scale). These delineations are on file at the Rhode Island Department of Environmental Management, 235 Promenade Street, Providence, RI 02908 ~~the Department's Office of Technical and Customer Assistance~~ and available on the Department's website at ~~www. state.ri.us/dem~~ www.dem.ri.gov.

Rhode Island Wellhead Protection Areas

Rhode Island Department of Environmental Management



APPENDIX 5

WELLHEAD PROTECTION AREA DELINEATION METHODOLOGY

Introduction

A wellhead protection area (WHPA) is the portion of an aquifer through which groundwater moves to a well. Under the Rhode Island Department of Environmental Management (DEM) Wellhead Protection (WHP) Program approved by the US Environmental Protection Agency in 1990, DEM is responsible for delineating a WHPA for each of the public wells in the state. This document will provide a description of the methodology used for the WHPA delineations. WHPA maps are available for review at the DEM Office of Water Resources and on the DEM website. ~~web page at www.state.ri.us/dem~~.

The DEM methodology was used to delineate the WHPAs for all of the public wells when the WHPA map was first adopted in the 1993 amendments to the Groundwater Quality Rules and for new public wells that came on line in the 1990s and early 2000s. Most of the new community water supply wells installed in stratified drift over approximately the last five years have WHPAs that meet the definition of a refined WHPA. A refined WHPA is a more advanced delineation based on more complex methodologies (see discussion at end of this document).

DEM relied on technical input from the Wellhead Protection Program Advisory Committee in developing the delineation methodology in the late 1980s. A mapping approach was required that was scientifically defensible, could be applied consistently across the state, and could be applied with the resources available to DEM. The delineations are based on reasonably available information regarding the hydrogeologic environment and the well characteristics. The method does not provide the level of detail necessary to account for potential well interference. The WHPAs were delineated using the US Geological Survey quadrangle maps at a scale of 1:24000.

The WHPA delineation methodology differs depending if the well is completed in bedrock or stratified drift. The WHPA for bedrock wells is a circle with the radius dependent on the well's pump rate. The WHPA for stratified drift wells is a curve in the stratified drift generated by an analytical model with hydrogeologic/topographic mapping in the upgradient till. To a lesser extent, the methodology varies depending on the type of public well, i.e., community, non-transient non-community or transient non-community (see public well definition at end of this document). The methodologies are described in more detail below.

Bedrock Wells

Groundwater flow direction in bedrock is extremely difficult to predict without a site-specific study. Since the groundwater flow direction for these wells is unknown, the WHPA is a circle (size is determined by the pump rate) in order to be certain to include areas upgradient of the well. The Theis analytical model was used to delineate the WHPA for all bedrock public wells (community, non-transient non-community and transient non-community). The input parameters for the Theis equation were the

same for each well, except for the pump rate. If the pump rate was unknown or less than 10 gallons per minute, a 10 gallon per minute pump rate was used resulting in a minimum WHPA with a radius of 1750 feet. The following table provides the calculated radius for selected pump rates:

Wellhead Protection Area Radius for Bedrock Wells

Pumping Rate (gpm)	Radius (ft)	Pumping Rate (gpm)	Radius (ft)
≤10	1750	23	2411
11	1820	24	2440
12	1872	25	2466
13	1920	30	2568
14	1965	35	2638
15	2008	40	2689
16	2087	45	2729
17	2153	50	2760
18	2211	60	2806
19	2261	70	2875
20	2305	80	2985
21	2344	90	3068
22	2380	100	3133

The Theis model can be expressed as follows:

$$s = \frac{114.6Q}{T} W(u)$$

$$u = \frac{1.87 r^2 S}{Tt}$$

Where: s = drawdown; 1 foot
Q = well pumping rate
T = transmissivity; 374 gpd/ft
S = storage coefficient; .01 (dimensionless)
t = time; 200 days
W(u) = well function (dimensionless)
r = distance from pumped well
114.6 and 1.87 are coefficients generated for conversion from metric to english units and conducting some simplifying calculations

Note: The original delineation methodology for bedrock wells with a pump rate greater than 10 gpm also included areas beyond the Theis generated circle where groundwater in the overburden flowed into the circle. This aspect of the methodology was re-evaluated in early 2002, and it was concluded that it was inappropriate to include the area beyond the circle in the WHPA delineation. As a result, all bedrock WHPAs delineated by DEM are in the shape of a circle.

Stratified Drift Wells

The WHPA for community and non-transient non-community stratified drift wells was determined by solving the uniform flow equation (UFE) analytical model for the delineation in the stratified drift and by using hydrogeologic mapping in the upgradient till deposits. Site specific input parameters for each well were used in solving the UFE, which can be expressed as follows:

$$-\frac{Y}{X} = \tan\frac{2\pi Kbi}{Q}Y$$

$$X_L = -\frac{Q}{2\pi Kbi} \qquad Y_L = \pm\frac{Q}{2Kbi}$$

Where: Q = well pumping rate (ft^3/day)
K = hydraulic conductivity (ft/day
b = saturated thickness (ft)
Note: K x b = Transmissivity
i = hydraulic gradient (dimensionless)
X_L = distance to downgradient null point (ft)
Y_L = distance to lateral boundary limit (ft)
X,Y = cartesian coordinates of points along the groundwater divide

The UFE was solved with the MWCAP module of the US EPA WHPA model software package. The downgradient null point, X_L, is the location on the UFE curve that represents the distance from which a well is pulling groundwater toward itself that would otherwise flow away from the well. As the UFE curve widens on both sides of the well upgradient, it asymptotically approaches the lateral boundary limits of groundwater flow, which are defined by $\pm Y_L$.

Depending upon the well's hydrogeologic setting, the UFE curve was extended upgradient as far as one of the following: a groundwater divide, the till/stratified drift boundary, or the ten-year time of travel distance from the well. The WHPA was defined by the UFE curve when the curve was terminated by a groundwater divide or the ten-year time of travel distance. However, in most cases, the till/stratified drift boundary was used as the upgradient limit of the UFE curve. In these instances, The WHPA also included the upgradient till areas through which groundwater flows to the curve as determined by water table information or topography (most cases topography).

In solving the UFE, only one value for K, b, and i can be used, and these values should be representative of the entire area of stratified drift that is to be captured by the UFE curve. Published US Geological Survey mapped data was used to determine the average transmissivity (saturated thickness times hydraulic conductivity equals transmissivity) and hydraulic gradient. These average values were calculated over an area referred to as a "clip box" using geographic information system software. The clip box is a mathematically determined estimate of the WHPA in the stratified drift. Where published data was not available, transmissivity was determined from pump tests, lithologic logs, or specific capacity data, and the hydraulic gradient was measured manually.

As new community and non-transient non-community stratified drift wells come into service, an interim WHPA defined by a circle with a 2000 foot radius is assigned until DEM provides a delineation in

accordance with the above methodology or the water supplier provides DEM with an acceptable delineation.

Other Wells

There are several instances that do not fit into the two categories above. These situations apply to a small number of wells, most of which serve transient systems. Wells in the following categories have a circular WHPA with a radius of 1750 feet:

- The geologic formation supplying water to the well is unknown;
- Springs;
- Wells completed in till; and
- Transient non-community wells completed in stratified drift.

Refined WHPAs

The WHPAs delineated by DEM ~~provide~~ have provided a suitable basis for state and local protection efforts. When the DEM methodology was developed in the late 1980s, it was anticipated that in the future more site specific data or more complex methods would be used to revise the DEM provided WHPAs or to map the WHPA for new wells. As of April 1, 2010, 49 wells have a WHPA that was delineated using a more advanced approach (refined WHPA) than the standard DEM methodology. DEM reviews the results of each model used by a supplier or other state or federal agency to determine the area to be designated as the WHPA. The Rhode Island Department of Health has been using funds from the Safe Drinking Water Act for the US Geological Survey to delineate refined WHPAs for selected existing DEM WHPAs, which DEM then incorporates into the WHPA map. ~~Ideally, the delineations for the community wells and perhaps some of the larger non-transient non-community wells, will be revised in the future using the same methods described above with more site-specific data or by employing more complex methods. DEM will review the results of the model used in refining the WHPA delineation and determine the area to be designated as the WHPA.~~

Public Well Definitions:

Community Well – serves year-round residents; at least 15 service connections or at least 25 individuals. Examples include municipal wells and wells serving nursing homes, condominiums, and mobile home parks.

Non-Transient Non-Community Well – regularly serves at least 25 of the same persons (not residents) over 6 months of the year. Examples include wells serving schools and places of employment.

Transient Non-Community Well – does **not** regularly serve the same persons, but does serve at least 25 people at least 60 days of the year. Examples include wells serving restaurants and motels.

~~*A description of the original methodology is available in the DEM report "WHPA Delineation Methodology for Public Drinking Water Wells in Rhode Island" (1993). Contact: DEM Office of Water Resources, 235 Promenade Street, Providence, RI 02908; (401) 222-3961.*~~

RULE 24. EFFECTIVE DATE

The foregoing ~~"Rules and Regulations for Groundwater Quality",~~ "Groundwater Quality Rules after due notice, are hereby adopted and filed with the Secretary of State this _____ day of _____ 2010 to become effective twenty (20) days thereafter, in accordance with the provisions of Chapters 42-35, 42-17.1, 42-17.6, 46-12, 46-13.1, 23-18.9, and 23-19.1 of the General Laws of Rhode Island, 1956, as amended.

_____

W. Michael Sullivan, Ph.D.
Director, Department of Environmental Management

Notice Given On:
Public Hearing Held:
Filing Date:
Effective Date:

State of Rhode Island and Providence Plantations
Department of Administration
Budget Office

Fiscal Note for Proposed Administrative Rules (R.I.G.L. 22-12-1.1)

Name of Administrative Rule: Rules and Regulations for Groundwater Quality

Date of Notice: To be determined, anticipated mid-April 2010
Date of Hearing: To be determined if requested

RIGL: Promulgated pursuant to Chapters 46-12,46-13.1, 23-18.9, 23-19.1, 42-17.6, and 42-17.1

FISCAL IMPACT

Revenues		***State Expenditures***		***City/Town Expenditures***	
FY 2011	$0	FY 2011	$0	FY 2011	$0
FY 2012	$0	FY 2012	$0	FY 2012	$0
FY 2013	$0	FY 2013	$0	FY 2013	$0

Summary of Rule Change:

The primary purpose of these amendments to the Rules and Regulations for Groundwater Quality is for the periodic update of the state's wellhead protection area delineations for the public wells in RI and to update the groundwater classification delineations. This update reflects the current status of the public wells in RI, the response to recent petitions to DEM for groundwater reclassification, and it incorporates new or revised information on the state's groundwater resources. Regulation language changes have also been made to clarify the intent and the applicability of the regulations.

Summary of State Fiscal Impact:

DEM has determined that the proposed amendments will not have any effect on state revenues and expenses.

Summary of City or Town Fiscal Impact:

DEM has determined that the proposed amendments will not have any effect on city or town revenues and expenses.

Approved**:**

Rosemary Booth Gallogly Date
Executive Director/State Budget Officer

RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
235 Promenade Street, Providence, RI 02908-5767 TDD 401-831-5508

April 19, 2010

Economic Impact and Regulatory Flexibility Memo:

"Rules and Regulations for Groundwater Quality"

To: Peter Dennehy, RI Department of Administration
Sherri Lynn Carrera, RI Economic Development Corporation
Kerry King, Office of the Governor

From: Ernest Panciera, Supervising Environmental Scientist
RI DEM Office of Water Resources

Authority

These regulations are adopted pursuant to Chapters 46-12, 46-13.1, 23-18.9, 23-19.1, 42-17.6 and 42-17.1 of the Rhode Island General Laws of 1956 as amended.

Purpose

The primary purpose of amendments to the Rules and Regulations for Groundwater Quality is for the periodic update of the state's wellhead protection area delineations for the public wells in RI and to update the groundwater classification delineations. Changes have also been made to clarify the intent and the applicability of the regulations.

This update reflects the current status of the public wells in RI, the response to recent petitions to DEM for groundwater reclassification, and incorporates new or revised information on the state's groundwater resources. The delineation of the groundwater classifications and the wellhead protection areas are required by the RI Groundwater Protection Act of 1985 (RIGL 46-13.1) and were initially adopted as part of the "Rules and Regulations for Groundwater Quality" in 1992 (classifications) and 1993 (wellhead protection areas). The map changes in these amendments are the latest in a series of amendments over the years to update the maps in accordance with procedures and policies initially adopted in the early 1990s and subsequently modified over the years to reflect advanced science and information on groundwater resources.

Economic Impact (Per RIGL 42-35.1-3)

Whenever a parcel of land is reclassified to a higher classification or is included in a wellhead protection area, more stringent standards may be imposed on this property in order to protect groundwater quality. Conversely, whenever a parcel of land is reclassified to a lower

classification or is no longer determined to be within a wellhead protection area, less stringent environmental protection standards are likely to apply. This classification update involves both scenarios.

No specific type of small business is directly impacted by the amendments. Because the possible impact on a particular small business depends on many factors, including the type of business, business location, existing or proposed, and the specific DEM regulation that may address this business, it is not practical for DEM to make a determination on the number of small businesses subject to the proposed regulation, projected administrative costs for compliance and the probable effect on small businesses. DEM has not been able to identify a less intrusive or less costly alternative method to achieve the purpose of the proposed regulation.

Regulatory Flexibility (per RIGL 42-35.1-4)

DEM has considered, without limitation, each of the following methods of reducing the impact of the proposed regulation on small businesses and determined that there is no alternative approach that would be as effective and less burdensome:

1) The establishment of less stringent compliance or reporting requirements for small businesses;
2) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses;
3) The consolidation or simplification of compliance or reporting requirements for small businesses;
4) The establishment of performance standards for small businesses to replace design or operational standards required in the proposed regulation; and
5) The exemption of small businesses from all or any part of the requirements contained in the proposed regulation.