



*STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL*

7 Del. Admin. C., § 7301

REGULATIONS GOVERNING
THE CONSTRUCTION AND USE OF WELLS

PROPOSED FEBRUARY, 2012

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1.0 General Provisions

1.1 Statutory Authority

The Department of Natural Resources and Environmental Control (Department) establishes and adopts the following Regulations pursuant to the authority granted by §6010(a) of the Delaware Environmental Protection Act, 7 Del. C. Chapter 60.

1.2 Scope and Applicability

- 1.2.1 Minimum requirements are hereby prescribed governing the location, design, installation, use, disinfection, modification, repair, and sealing of all wells and associated pumping equipment as well as certain requirements for the protection of public and private potable water supply wells. These Regulations supersede all other well construction Regulations.
- 1.2.2 No person shall conduct any activity contrary to the provisions of these Regulations. All such activities that are contracted for shall be carried out only by those persons having a valid license pursuant to the provisions of the "Regulations for Licensing Water Well Contractors, Pump Installer Contractors, Well Drillers, Well Drivers and Pump Installers"
- 1.2.3 These Regulations apply to well construction activities from the initial penetration or excavation of the ground through development, equipment installation, disinfection and sealing. Set up of construction equipment before actual penetration or excavation is not considered part of construction.
- 1.2.4 The installation of any well, as defined in Section 2.0 of these Regulations shall receive the prior approval of the Department in the form of a well permit.
- 1.2.5 If any part of these Regulations or the application of any part thereof is held invalid or unconstitutional, the application of such part to other persons or circumstances and the remainder of these Regulations are not affected thereby and shall be deemed valid and effective.
- 1.2.6 The Department shall have the right to require that the well permit and permit conditions be recorded with the Recorder of Deeds office in the county where the well is located.
- 1.2.7 These Regulations shall be liberally construed for the protection and conservation of the water resources of the State, to protect public health.
- 1.2.8 The Department shall have the right to enter at reasonable times upon any private or public property for the purpose of inspecting and investigating conditions relative to the enforcement of these Regulations; upon given verbal notice and after presenting official identification to the owner, occupant, custodian, or agent of the property.

1.3 Enforcement and Penalties

The provisions of these Regulations shall be enforced by the Department as provided in 7 Del. C. Chapter 60. Such enforcement may include revocation of any permit for cause. The failure of the Department to enforce any of the provisions of this Regulation does not constitute a waiver by the Department of any such provisions.

2.0 DEFINITIONS

The following words or phrases, when used in these Regulations, shall have the meaning ascribed to them in this Section unless the text clearly indicates otherwise:

Absorption Facility: A system of open jointed or perforated piping, alternative distribution units or other seepage systems for receiving the flow from septic tanks or other treatment facilities and designed to distribute effluent for oxidation and absorption by the soil within the zone of aeration .

Abandoned Well: A well that is not being used for its intended purpose, or less than the expected frequency as determined by the Department.

Agricultural Well: A non-potable well used for watering livestock, aquaculture, or watering household yards and gardens, or for other purposes related to farming but not for irrigating lands or crops.

Annular Space (Annulus): The space between a bore hole and well casing or between concentric well casings.

Applicant: The owner(s) of the property seeking a well permit, or their legally authorized agent.

Aquifer: A part of a formation, a formation, or a group of hydraulically interconnected formations that contains sufficient saturated permeable material to yield economically useful quantities of water to wells and springs.

Aquifer Interconnection: A condition that exists when a well is screened or gravel packed across multiple aquifers.

Aquifer Storage and Recovery (ASR) Well: A well used for artificial recharge of an aquifer to store water for withdrawal usually during peak demand.

Aquifer Test: A test conducted by influencing and observing changes in hydraulic head in an aquifer.

Beneficial Use: Any use of water that is necessary to the applicant, reasonably non-wasteful, reasonably non-damaging to other users, and in the best interest of the public.

Confined Aquifer: A saturated layer of permeable geologic material bounded above and below by confining layers, and its water pressure is everywhere greater than atmospheric, as determined by the Department.

Confining Layer: A stratum of impermeable or distinctly less permeable material stratigraphically adjacent to one or more aquifers.

Consolidated: Geologic material that is firm and rigid due to the interlocking and/or cementation of its mineral components.

Construction Well: A non-potable temporary well used solely to supply water for well construction.

Contaminant: Any substance, either man-made or natural, that degrades water quality to such a degree it is rendered unusable or harmful to public health and safety, or to the environment.

Contamination: The presence of a contaminant in the environment.

Department: The Department of Natural Resources and Environmental Control (DNREC).

Dewatering System: Mechanical equipment used to remove ground water from an excavation for construction purposes. Equipment consists of a pump, intake and discharge piping, and wells, well points, sumps, or excavations.

Dewatering Well: A well used to remove ground water for construction of footings, sewer lines, building foundations, elevator shafts, underground storage tank installations, etc.

Disinfection: The inactivation of pathogenic organisms in water by chemical oxidants, ozone, ultra violet light or similar treatments.

Disposal Area: The entire area used for the absorption facility.

Domestic Well: A well that may serve no more than three dwellings and is used for potable non-public water supply purposes and may be used for non-potable household purposes.

Drawdown: The extent of lowering of the static water level in a well and of the water table or potentiometric surface adjacent to a well, resulting from the discharge of water from a well.

Drilled Well: A well that is constructed using auger, rotary and/or percussion tools that cut, fracture or abrade.

Drive Shoe: A device fastened to the bottom of a length of casing to aid in driving the well casing.

Driven Well: A well that is constructed by means of pushing or hammering a casing and screen, including direct push methods, and that does not create an annular space.

Dug Well: A well that is constructed by the use of picks, and/or shovels, or an excavator.

Fire Protection Well: A non-potable well used for emergency purposes only and not connected to a public water supply distribution system.

Geophysical Log: A record of various properties of the formation, borehole, or well obtained by electrical, mechanical, electromagnetic, and other devices.

Gravel Pack: Processed gravel or coarse sand placed in the annular space surrounding the well screen to limit the entrance of particulates.

Ground Water: Any water naturally found under the surface of the earth.

Grout (n): Material that is capable of providing a seal in an annular space of a well, or for sealing.

Grout (v): To emplace grout (n) in an annular space of a well.

Heat Pump: A device that transports thermal energy from one environment to another, and in either direction.

Heat Pump Closed Loop Well: A borehole containing a vertical pressurized circuit of pipe that circulates a water-based solution to exchange heat with ground water.

Heat Pump Direct Exchange (DX) Well: A borehole containing a pressurized circuit of tubing that circulates a refrigerant to exchange heat with ground water.

Heat Pump Recharge Well: A non-potable well used to inject ground water heat pump effluent back into the source aquifer.

Heat Pump Supply Well: A well used to withdraw ground water for thermal exchange in a heat pump, and that may also be used for potable supply.

Industrial Well: A non-potable well that is used in the processing, washing, packaging, or manufacturing of a product excluding food and beverages.

Injection Well: A well used to emplace fluid into the subsurface as regulated by the "Regulations Governing Underground Injection Control."

Irrigation Well: A non-potable well that is used for watering land or crops other than household lawns and gardens.

Jetted Well: A well constructed using a high velocity stream of water.

Miscellaneous Well: A non-potable well used for beneficial purposes but not included in any other well categories defined herein, and is not connected to a public water system or a private home.

Monitor Well: A non-potable well used primarily for collecting ground water samples.

Multiple Screens: The use of more than one screen, or a continuous screen, in well construction, connecting multiple water-bearing zones within a single aquifer.

Observation Well: A non-pumping, non-potable well used for measuring ground water levels or potentiometric surface

Operator: The person responsible for the operation of a well or water system.

Person: Any individual, firm, association, organization, partnership, business trust, corporation, company, contractor, supplier, installer, user, or owner, or any Federal, State or local governmental agency or public district or any officer or employee thereof.

Piezometer: An alternative word for an observation well.

Pitless Well Adapter: A device designed for attachment to one or more openings through a well casing, provided with a pitless well cap, and so constructed as to prevent the entry of contamination into the well. The adapter is used to conduct water to or from the well, protect the water from freezing temperatures and provide access to the internal components of the well.

Pitless Well Unit: A pre-assembled device that extends the upper end of a well casing to above grade, provided with a pitless well cap, and so constructed as to prevent the entry of contamination into the well. The unit is used to conduct water to or from the well, protect the water from freezing temperatures and provide access to the internal components of the well.

Pitless Well Cap: A device that encloses the upper termination of the well casing above a pitless well adapter or unit and provides for connections for electrical power lines and a screened well vent.

Potable Water: Any water that is in compliance with all the required drinking water standards specified in the Delaware Regulations Governing Public Drinking Water Systems and the US EPA Safe Drinking Water Act, and is acceptable for human consumption.

Potential Source of Contamination: Anything that may introduce a contaminant that could cause a violation of applicable water quality standards. Examples may include, but are not limited to, underground storage tanks for petroleum products, wastewater disposal areas, landfills, confined animal feed lot operations, and storm water management facilities.

Pressure Grouting: The emplacement of grout materials under positive pressure via a conductor (tremie) pipe.

Public Water System (PWS): A water supply system for the provision to the public of water for human consumption through pipes or other constructed conveyances either directly from the user's free flowing outlet or indirectly by the water being used to manufacture ice, foods and beverages or that supplies water for potable or domestic purposes for consumption in more than three dwelling units, or furnishes water for potable or domestic purposes to employees, tenants, members, guests or the public at large in commercial offices, industrial areas, multiple dwellings or semi-public buildings including, but without limitation, rooming and boarding houses, motels, tourist cabins, mobile home parks, restaurants, hospitals and other institutions, or offers any water for sale for potable domestic purposes. Public water systems are classified as follows:

- **Community Water System (CWS):** A public water system that serves at least fifteen (15) service connections used by year-round residents or regularly serves at least twenty-five (25) year-round residents.
- **Non-Transient Non-Community Water System (NTNCWS):** A public water system that is not a community water system and that regularly serves at least twenty-five (25) of the same persons over six (6) months per year.

- **Transient Non-Community Water System (TNCWS):** A public water system that has at least fifteen (15) service connections or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year.
- **Miscellaneous Public Water System (MPWS):** A public water system that is neither community, transient non-community, nor non-transient non-community.

Public Well: A well that is used to supply water to more than three dwelling units, employees, for the preparation or manufacturing of food or beverages, or to the public at large.

Pump Installer: Any person holding an appropriate license issued by the State of Delaware to act in responsible charge of all on-site work in the installation, modification, and repair of water pumps and related equipment.

Pump Installer Contractor: Any person licensed by the State of Delaware to engage in the business of contracting for the installation, modification, and repair of water well pumps and related equipment.

Pump Pit: An underground enclosure that contains pumping equipment external to the well, and may also contain the well and other water system components.

Recovery Well: A well used to withdraw contamination or contaminated ground water.

Regulations: Delaware Regulations Governing the Construction and Use of Wells.

Sealing: Removal of pumping equipment, if applicable, and emplacing impermeable material (grout) in the entire length of a well so as to make it permanently decommissioned.

Secretary: The Secretary of the Department of Natural Resources and Environmental Control or the Secretary's authorized designee.

Septic Tank: A watertight receptacle that receives the discharge of wastewater from a structure or part thereof and is designed and constructed so as to permit settling of solids from the liquid, digestion of the organic matter by detention, and discharge of the liquid portion into an absorption facility.

Service Connection: A water line from a water supply system to a dwelling or building.

SIRS: The Department's Site Investigation and Restoration Section.

Soil Boring: A bore hole for the purpose of determining the physical and/or chemical characteristics of soil and/or sediments.

Source of Contamination: Anything that is known to have introduced a contaminant that has caused a violation of applicable water quality standards. Examples may include but are not limited to underground storage tanks for petroleum products, wastewater disposal areas, landfills, confined animal feed lot operations, and storm water management facilities.

Static Water Level: The position assumed by water in a well not under the influence of pumping.

Suction Line: A pipe that conveys water from a well by a pump creating negative pressure.

Suction Lysimeter: A device for collecting groundwater from pore spaces in the unsaturated zone.

Test Well: A temporary well installed to ascertain the lithology and water transmission properties of an aquifer or geologic materials and that may be used to determine water quality and that can only be reclassified to an observation well.

Unconfined Aquifer: An aquifer where no relatively impermeable layer exists between the water table and the ground surface, and the water surface is at atmospheric pressure.

Unconsolidated: Not cemented, as in soil, sediment or other geologic material.

Unrecorded Well: An existing well for which the Department has no record.

Water Well Contractor: Any person licensed by the State of Delaware to engage in the business of contracting for the construction and repair of wells, and contracting for the installation and repair of well pumps and related equipment.

Well: Any excavation that intersects the water table, and is installed for the purpose of obtaining geologic or hydrologic information and for locating, testing, measuring, extracting, and/or recharging water and other fluids, and where the depth is greater than the width. Such excavations may have been drilled, augured, cored, bored, driven, dug, jetted, or otherwise constructed. This definition does not include excavations for dewatering trenches, utility poles, construction pilings, building foundations, fence posts, test pits, or horizontal heat pump systems.

Well Casing: Closed-wall pipe used to provide access from the ground surface to a water-bearing unit.

Well Development: The process of removing fine material from the well to improve yield and water quality.

Well Driller/Well Driver: Any person licensed by the State of Delaware to act in responsible charge of all on-site work relating to the construction, development, testing, alteration repair, of wells and the installation, modification, and repair of well pumps and related equipment.

Well Pit: An underground enclosure that contains a well head that is capped below grade.

Well Point: A shallow well that is typically used in series with a manifold and pumped together by suction to dewater an excavation.

Well Screen: An open-wall pipe used as a sediment filter allowing entrance or exit of sub-surface fluids.

Wick Drain: A prefabricated strip that is inserted into the ground for draining pore water and consolidating compressible soils or sediments.

3.0 General Permitting Requirements and Procedures

3.1 Permit Required

3.1.1 A well or suction lysimeter may not be constructed until the Department has issued a well permit and a call-in authorization number unless otherwise authorized under Section 3.13 of these Regulations. A well permit is not required for the construction of hand-augured soil borings or other soil borings that do not intersect the water table (e.g., direct push soil borings).

3.1.2 A permit is required for the use of all wells.

3.2 Well Repair

A well permit is not required for repair or rehabilitation, provided the physical dimensions of the well are not changed, except as provided in Section 10.3 of these regulations. A change in physical dimensions or exceedence of original capacity shall require an application for a well permit as set forth in the remainder of this Section.

3.3 License Required

The construction, repair, modification, or sealing of wells shall be performed by or under the direct on-site supervision of a well driller. The installation of well pumps and pumping equipment shall be performed by or under the direct on-site supervision of a pump installer, plumber or well driller. Except as permitted by 7 **Del. C.** §6023, the above referenced persons shall be licensed under the requirements of the "Regulations for Licensing Water Well Contractors, Pump Installer Contractors, Well Drillers, Well Drivers, and Pump Installers."

3.4 Permit Preparers

All well permit applications (applications) shall be prepared and signed by a Delaware licensed well driller.

3.5 Permit Application Procedures

3.5.1 All applications shall be made on Department-supplied paper or electronic forms.

3.5.2. All applications shall be legible and complete, including such plans, specifications, and other relevant information for review by the Department. In the event an outstanding issue is identified during this review that renders the application incomplete, the Department will return the application to the preparer along with a letter outlining the issue and the preparer will be provided 30 days to cure. At the expiration of the curing period, the Department will render a decision based upon the information in the application.

- 3.5.3 Evidence of property ownership in the form of a zoning verification, settlement agreement, tax assessor's record, or an easement or access agreement showing the applicant's authority to construct shall be submitted with the application.
- 3.5.4 All applications shall be accompanied by an application fee and an advertisement fee as applicable.
- 3.5.5 Wells shall only be used for the purpose(s) designated on the permit.
- 3.5.6 The Department will not consider the issuance of a permit for a potable water supply well on an undeveloped property until the wastewater disposal system permit for the property has been issued, or central sewer service is available to the property.
- 3.5.7 For wells that will be constructed in areas where no tax map numbers are assigned, a utility or safety permit shall be submitted with the application.

3.6 Dewatering System Application Procedures

- 3.6.1 Applications for dewatering systems shall be submitted on special forms supplied by the Department.
- 3.6.2 Applications for dewatering systems shall include:
 - 3.6.2.1 Proof of authorization from the property owner(e.g. easement agreement) for the contractor to construct, and for the operator to operate the proposed dewatering system.
 - 3.6.2.2 Duration of project.
 - 3.6.2.3 Total depth and number of wells or excavations and location of water discharge.
 - 3.6.2.4 Project location map and site map showing well, well point, or excavation layout noting the estimated number of wells, well points, or sumps for the project.
 - 3.6.2.5 Maximum daily quantity of water to be pumped in gallons, and peak rate in gallons per minute.
- 3.6.3 Permits are valid for the duration of the project as described in the application. The operation of the dewatering system authorized by the permit shall cease on or prior to the expiration date of the permit.
- 3.6.4 The Department may require additional information concerning the operation of the dewatering system prior to issuance of any permit.
- 3.6.5 Withdrawals from dewatering systems are subject to the requirements of Section 3.12.11 of these Regulations.

- 3.6.6 Water quality tests may be required as part of the application, at the discretion of the Department, where the Department has reason to believe that ground water contamination may exist at or near the proposed construction site.
- 3.6.7 The owner of the dewatering system may be required to analyze the extent of potential impact to other permitted water users and submit the findings to the Department.
- 3.6.8 The owner of the dewatering system may be required to provide reasonable assurance that the operation will not cause erosion at the point of discharge or introduce unacceptable turbidity into the receiving water body.
- 3.6.9 Applications for well points may be submitted on a single form provided that all well points are located on a single tax parcel and are identical in construction. For deep dewatering wells using submersible pumps, and sumps, separate applications are required for each.

3.7 Injection Well Application Procedures

- 3.7.1 A separate application is required for each well and each application shall show the total number, diameter, and spacing of injection wells for the entire system. The Department may require additional plans or drawings showing the overall operation of the injection system.
- 3.7.2 The well construction permits for all Class I, II and III injection wells, and Class V injection wells not authorized by rule, requiring a permit from the Underground Injection Control (UIC) program, will not be issued until the UIC permit is issued.
- 3.7.3 For Class V injection wells authorized by rule under the Regulations Governing Underground Injection Control, §122.23 (d), the application must identify the category of Class V well proposed and the regulatory citation authorizing the construction without a UIC permit.

3.8 Closed Loop Heat Pump Well Application Procedures

- 3.8.1 The application shall show the total number, diameter, and spacing of vertical loops for one system on one form. The Department may require an additional site plan showing all closed loop locations for commercial-scale projects.

3.9 Monitor and Observation Wells, Piezometer, and Soil Boring Application Procedures

- 3.9.1 Applications for monitor and observation wells and piezometers shall be submitted on special forms provided by the Department.
- 3.9.2 Applications for a maximum of ten (10) monitor or observation wells or piezometers may be submitted on a single form, or an unlimited number may be submitted electronically, provided
 - 3.9.2.1 All wells are proposed with identical construction, and

3.9.2.2 All wells are located on the same tax map parcel number and associated with one project, and

3.9.2.3 All wells are screened in the same aquifer.

3.9.3 Monitor well applications require one fee per project , per time of application.

3.10 Application Procedures to Continue to Use an Existing Well

3.10.1. A Permit to Continue Use is required when the Department has determined that an unrecorded well exists.

3.10.2 Applications for permits to use unrecorded wells shall, to the extent practicable, contain the same information as required in an application for a permit to construct a new well.

3.10.3 Unrecorded wells must meet the requirements contained in these Regulations for the applicable well classification prior to being permitted.

3.11 Application Procedures to Reclassify Wells

3.11.1 Upon receipt of a complete application and the appropriate fee, the Department may consider approving a request to change an existing well from one classification to another, such as in the changing of a domestic well to an agricultural well.

3.11.2 Wells shall only be used for their permitted use.

3.11.3 The use of the well may only be changed by a Department-approved reclassification.

3.11.4 Wells proposed for reclassification must meet the requirements contained in these Regulations for the proposed use.

3.11.5 Test wells may only be reclassified to observation wells.

3.11.6 The Department may specify additional conditions with the reclassification that may include, but are not limited to, the conditions contained in the original well permit.

3.12 Permit Issuance Procedures

3.12.1 Advertising Requirements

3.12.1.1 Any permit application, or combination of applications located on the same tax parcel, where the total estimated withdrawal is greater than 1 million gallons per day, shall be advertised in newspapers of local and statewide circulation with a comment period of fifteen (15) days before issuance of the well permit(s). Fire protection wells are exempt from this requirement.

3.12.1.2 If the well permit has expired, the requested usage rate has increased, or well construction details or source aquifer has changed, then a new

application will be required. If the usage rate has increased to over 1 million gallons per day re-advertisement will be required.

- 3.12.1.3 Under extraordinary circumstances, the Department has the discretion to issue the permit prior to the expiration of the above comment period on a case-by-case basis. In such cases the owner will be proceeding at their own risk with the permit still subject to public hearing requirements.
- 3.12.2 The Department shall take into account the hydrogeology, effect on water levels, sources of contamination, water quality, population density, water use, and other factors as may be relevant in the area of the proposed well to protect the water resources of the State and for the protection of human health.
- 3.12.3 The Department may specify additional permit conditions, including, but not limited to, double casing, specialized grouting, water use or depth restrictions, advance notification prior to construction, and special material requirements, geophysical logging, water-quality sampling, and formation sampling.
- 3.12.4 Where public water supply is legally and reasonably available the Department shall deny an application for a permit for a potable water well. A public water supply is deemed legally and reasonably available when both of the following apply:
 - 3.12.4.1 The site is within a water utility Certificate of Public Convenience and Necessity, or a municipal water service area.
 - 3.12.4.2 A public water distribution line is located within two hundred (200) feet of the structure to be served.
- 3.12.5 Public water supply is deemed not to be reasonably available if physical features make the connection impractical.
- 3.12.6 The Department will not deny a permit for a non-potable well solely on the basis of the availability of public water supply.
- 3.12.7 When a proposed potable , agricultural, heat pump, or miscellaneous well is to be located within the jurisdiction or service area of a municipality serving public water, the application shall include a written statement of approval from said municipality with the permit application.
- 3.12.7 The Department may specify permit conditions including, but not limited to, geophysical logging, water-quality sampling, and formation sampling.
- 3.12.8 The Department may require aquifer tests as a condition of certain well permits. These tests may require the construction and use of one or more observation or monitor wells. Aquifer tests shall be conducted in accordance with published aquifer test procedures (e.g., Driscoll, Fetter)
- 3.12.9 An application that is denied pursuant to Section 3.5.2 of these Regulations will be returned to the preparer along with a letter of explanation, and a copy to the applicant.

- 3.12.10 All wells shall be used for their intended purpose and withdrawn water shall be put to beneficial use. If a well is not used for its intended purpose, the Department may declare it abandoned and order it sealed.
- 3.12.11 All wells and dewatering facilities are subject to 7 **Del. C.**, §6031 and §6037, that mandate responsibilities concerning water-supply depletion or water-quality degradation of any existing use of water caused as a result of any operation authorized under the permit.

3.13 Emergency Well

- 3.13.1 An emergency is deemed to exist when a well is replacing a failed well and when the Department determines that the lack of water poses an immediate danger to the health or welfare of a person, or when the Department has determined that other exceptional circumstances exist.
- 3.13.2 A permit number may be issued verbally during business hours for the installation of an emergency well. If issued, prior to installation the drill must obtain an authorization number to validate the permit. Within seventy-two (72) hours after issuance, the driller shall submit an application ,applicable fee, a completion report, and a sealing report for the replaced well.
- 3.13.3 For an emergency when State offices are closed, a well may be constructed provided that the Department is notified on the first business day following such action. The driller shall submit an application , applicable fee, a completion report, and a sealing report for the replaced well by close of business that day.
- 3.13.4 All emergency wells constructed shall be constructed in conformance with these Regulations.
- 3.13.5 Any well constructed under emergency circumstances will not have been reviewed by the Department pursuant to Section 3.12.2 and the driller is obligated to inform the owner that construction is at the owner's risk. Said review may result in the well being sealed and relocated.

3.14 Relocation During Construction.

- 3.14.1 If it is necessary to relocate an incomplete or newly constructed well to obtain sufficient yield, potable water, overcome a construction problem, to meet a distance requirement or, in the case of monitor wells, to adjust to newly discovered field conditions, the well driller may relocate the well under authority of the original permit provided that:
 - 3.14.1.1 The new location meets the siting requirements of these Regulations.
 - 3.14.1.2 The new location is on the same tax parcel listed on the permit, and
 - 3.14.1.3 The permit does not contain a condition that prohibits relocation.

- 3.14.3 The unsuccessful well, cased or uncased, shall be sealed in accordance with the requirements of Section 11 of these Regulations concurrent with or prior to the construction of the relocated well.
- 3.14.4 A new permit application is required if the drill rig is removed from the site prior to construction of the relocated well.
- 3.14.5 The relocated well location must be clearly shown on the completion report.
- 3.14.6 Monitor, observation, recovery wells or soil borings shall only be relocated within the boundary of the site plan accompanying the permit application(s).

3.15 Relocation Prior to Approval

If it is necessary to relocate a well as a result of the Department's hydrological review, the driller may elect to:

- 3.15.1 Submit a new application showing the revised location, or
- 3.15.2 Resubmit the original application showing the revised location, initialed by the well driller in the presence of the Department's appropriate permitting manager.

3.16 Cancellation of Permits

The Department shall have the right to void any permit for a well that has not yet been constructed for the protection and conservation of the water resources of the State or to protect public health.

3.17 Permit Duration

A permit shall be valid for a period of one (1) year from the date of issuance by the Department, except as noted in Section 3.6.3 of these Regulations.

3.18 Permit Extension

A permit extension request may be approved by the Department not to exceed two (2) years from the date of issuance on a case by case basis.

3.19 Approval for Use

- 3.19.1 Well permits are issued for construction and use, except as noted in Section 3.19.2 and 3.19.3 of these Regulations.
- 3.19.2 Any well, or combination of wells, located on the same tax parcel, where the total estimated yield or use is greater than 50,000 gallons per day are not authorized for use. Prior to putting the well(s) into service, the applicant as defined in the "Regulations Governing the Allocation of Water", shall apply for a Water Allocation Permit. Fire protection wells are exempt from this requirement.
- 3.19.3 Prior to the use of a Public Well, the water supplier shall obtain approval from the Division of Public Health.

- 3.19.4 The Department may consider approving a request to change an existing well from one classification to another, such as changing a test well to an observation well, following conditions established under section 3.11 of these Regulations.

5.20 Water Service Piping

Water service piping from the well to the structure(s) shall be installed in accordance with the requirements of the State of Delaware Regulations Governing a Detailed Plumbing Code administered by the Department of Health and Social Services, Division of Public Health.

4.0 Responsibilities of Parties

4.1 Water Well Contractor and Well Driller Responsibilities

- 4.1.1 The water well contractor and well driller are responsible for assuring the construction of the well in accordance with the conditions of the permit and applicable laws and Regulations.
- 4.1.2 The well driller is required to have a copy of the signed well permit with authorization number on site. In the case of emergency replacement wells approved verbally during office hours, the well driller is required to have the permit number and authorization number on site. In the case of an emergency replacement wells constructed when State offices are closed, a permit and an authorization number are not required. A well driller shall be present to conduct or supervise the well construction.
- 4.1.3 The well driller is responsible for attaching the well identification tag supplied by the Department prior to demobilizing, with the exception of an emergency well in accordance with Section 12.2 of these Regulations.
- 4.1.4 Upon completion of the well, the water well contractor shall submit to the Department a legible well completion report and formation log as set forth in Section 8 of these Regulations.
- 4.1.5 If a driller other than the preparer of the application will construct the well, the preparer shall return the permit and identification tag to the Department.

4.2 Property Owner's Responsibilities

- 4.2.1 The property owner is responsible for maintaining the well in accordance with these Regulations and in compliance with all applicable permit conditions including, but not limited to, maintenance of the upper terminus and identification tag.
- 4.2.2 The property owner is responsible for having any damage to the well repaired by a well driller.

4.2.3 It is the responsibility of the property owner to have a failed or abandoned well properly sealed by a well driller in accordance with Section 11.0 of these Regulations. The well must be sealed within fifteen (15) days of construction of a replacement well. If the well is not sealed at the end of this period the Department may have the well sealed at the well owner's expense. A replaced well may be retained if the Department approves continued use or reclassification of the well in accordance with Sections 3.10 and 3.11 of these Regulations.

4.2.4 At the time of property transfer, the property owner is responsible for providing a copy of the well permit including all permit conditions, to the subsequent property owner and for notifying the Department of the transfer.

4.3 Pump Installer Contractor Responsibilities

The pump installer contractor, or their licensed employee, is responsible for the installation, repair, or replacement of pumps so as to maintain the well in accordance with the conditions of the permit and applicable laws and Regulations.

5.0 Well Construction Standards

5.1 Siting Criteria

5.1.1 All wells, except for monitor, recovery, dewatering, observation wells, and soil borings, shall be sited to achieve maximum separation distance along the entire well, but no less than the distances listed below:

5.1.1.1 One hundred (100) feet from identifiable potential or existing sources of contamination with the exception of public wells. Public wells shall have a minimum separation of 150 feet. Exceptions to this requirement for all wells other than public are addressed in Sections 5.1.1.2, 5.1.1.3, 5.1.1.4, 5.1.1.8, and 5.1.1.6.

5.1.1.2 Fifty (50) feet from identifiable potential or existing sources of contamination for heat pump recharge, heat pump closed loop, and heat pump direct exchange wells as stated in Sections 6.4.2 and 6.5.1 and .2 of these Regulations.

5.1.1.3 Fifty (50) feet from any boundary of an Agricultural Lands Preservation District (as defined in 3 Del. C. Chapter 9) for any parcel, lot, or subdivision. Wells on parcels, lots, or subdivisions created or recorded prior to April 6, 1997 are exempt. The Department recommends that all wells be placed the maximum distance possible from lands where federally regulated chemicals have been applied.

5.1.1.4 Fifty (50) feet from septic tanks, diversion valves or boxes, dosing chambers, holding tanks, or grease traps.

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- 5.1.1.5 Fifty (50) feet from any underground sewer line.
- 5.1.1.6 Fifty (50) feet from the drainfield of a residential septic system that has been decommissioned as documented by the Department's Ground Water Discharges Section.
- 5.1.1.7 Ten (10) feet from a property line (except as required in Section 5.1.10 of these Regulations) to allow access to the well without encroaching on adjoining properties. Wells may be constructed less than ten (10) feet from a property line if approved by the Department through a waiver for the purpose of maximizing other horizontal separation distances as required by this Section (see Section 13 of these Regulations).
- 5.1.1.8 One hundred and fifty (150) feet within the outer most property lines of the housing development for public wells within a housing development recorded on or after April 6, 1997.
- 5.1.2 When any well, with the exception of public, cannot be located at the separation distance required by Section 5.1.1.4 the following shall apply:
 - 5.1.2.1 The separation distance shall be maximized and no less than fifty (50) feet, provided the well is screened in a confined aquifer and pressure grouted from either the top of the gravel pack to the ground surface, or from the bottom of the casing to the ground surface (e.g., crystalline rock, consolidated open-borehole wells), except those wells specifically exempted in Section 5.8.7 of these regulations.
- 5.1.3 No wells shall be located within any dedicated State of Delaware right-of-way unless a utility or safety permit is submitted with the application.
- 5.1.4 The Department may approve a lesser separation distance for an agricultural well through a waiver. The separation distance shall be maximized, and shall be no less than fifty (50) feet. (see Section 13 of these Regulations).
- 5.1.5 Water Supply Lines
 - 5.1.5.1 Pressure lines shall be least 10 feet from all identifiable potential or existing sources of contamination
 - 5.1.5.2 Suction lines shall be at least 50 feet from all identifiable potential or existing sources of contamination.
 - 5.1.5.3 Double-cased suction lines shall be at least 10 feet from all identifiable potential or existing sources of contamination.
 - 5.1.5.4 A well may not be constructed within or under any building other than a structure constructed specifically for the housing of the well and related equipment, unless otherwise approved in writing by the Department. Such structures shall be identified on the exterior with the permit number of the well contained therein.

- 5.1.6 All wells shall be located so as to be accessible for cleaning, treatment, repair, testing, inspection, and any other such work as may be necessary.
- 5.1.7 All wells shall be protected from surface water run-off and flooding, as stated in Section 5.11 of these Regulations.
- 5.1.8 The Department may require special location and depth requirements for a proposed water supply well to minimize its exposure to identifiable potential or existing sources of contamination or interference with other water supply wells. The submission of drawdown data and capture zone analyses may also be required to justify the location and depth of the well.
- 5.1.9 Wells subject to flooding, as defined in Section 6.2.1 of these Regulations, are subject to the additional siting requirements contained in Section 6.2.2 of these Regulations.

5.2 Water Quality Protection During Well Construction

- 5.2.1 During construction the well and all aquifers shall be protected against contamination.
- 5.2.2 Whenever construction stops prior to well completion, the open annular space or open bore hole shall be covered and protected from surface water drainage. The well casing shall be capped in accordance with the requirements of Section 5.11 of these Regulations.
- 5.2.3 Whenever contamination is detected during drilling, and the contamination was not anticipated by the Department and addressed in the permit conditions, the well driller shall cease work and notify the Department at (800) 662-8802 before continuation of drilling.
- 5.2.4 If contaminants are encountered during drilling, the well driller shall decontaminate the drilling equipment to prevent the transfer of contaminants into uncontaminated aquifers or from the site.

5.3 Water and Wells for Well Construction

- 5.3.1 Water for well construction from sources other than those listed in Section 5.3.2 below is prohibited.
- 5.3.2 The order of preference in selecting a water source for construction purposes is:
 - 5.3.2.1 A public water supply system meeting the requirements of the Delaware Regulations Governing Public Drinking Water Systems.
 - 5.3.2.2 Any other potable water supply.
 - 5.3.2.3 Other non-potable water supply wells such an irrigation well or construction well.
- 5.3.3 Water used for well construction shall be disinfected as follows:

- 5.3.3.1 Water from a potable source shall be maintained with a free chlorine residual of two (2) milligrams per liter (mg/L).
- 5.3.3.2 Water from a non-potable well shall be disinfected with one pound of calcium hypochlorite per one thousand (1000) gallons of water. At least thirty (30) minutes contact time shall elapse between addition of the disinfectant and use of the water. Sodium hypochlorite in the form of laundry bleach (5.25 percent available chlorine), may be used in lieu of calcium hypochlorite. One and seven tenths (1.7) gallons of laundry bleach are equivalent to one (1) pound of dry calcium hypochlorite.
- 5.3.4 All water used for well construction shall be treated with soda ash (sodium carbonate (Na_2CO_3)) to achieve a minimum pH of 8.
- 5.3.5 Well Construction Wells
 - 5.3.5.1 The Department may issue a permit for a construction well to supply water for a new well installation. The application for a construction well should be submitted in conjunction with the application for a new well.
 - 5.3.5.2 All construction wells shall be sealed in accordance with Section 11 of these Regulations, prior to the demobilization of the drill rig.

5.4 Drilling Fluids

- 5.4.1 Drilling fluids shall consist of water- or air-based fluids containing only additives manufactured for water well drilling.
- 5.4.2 Lost circulation during drilling: If rapid loss of drilling fluid occurs, clean fill material such as sand, gravel, crushed stone, or drilling fluid additives manufactured for lost circulation may be used in the zone or zones where the loss is occurring.
- 5.4.3 The Department may set drilling fluid specifications for fluid viscosity and specific gravity. The Department may require a report of drilling fluid characteristics be submitted with the Completion Report.
- 5.4.4 Use of polymers is permitted to increase viscosity and filtration control in drilling fluids.

5.5 Well Casing

- 5.5.1 Casing shall be strong enough to resist the forces imposed on it during and after installation, following applicable specifications established by the American Petroleum Institute, American National Standards Institute, and the American Society for Testing and Materials.
- 5.5.2 Casing must not cause the delivered water to be toxic or violate state or federal drinking water standards, following the specifications established by the National Sanitation Foundation.
- 5.5.3 Casing other than polyvinyl chloride (PVC) or steel shall only be used with the written approval of the Department.

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- 5.5.4 Polyvinyl chloride (PVC) casing shall be a minimum of Schedule 40 unless otherwise approved by the Department.
- 5.5.5 For wells with a diameter greater than 6 inches, the water well contractor shall account for conditions such as installation depth that may require heavier-weight well casing.
- 5.5.6 Steel casing shall be used for wells constructed in crystalline rock.
- 5.5.7 Steel casing shall be a minimum of Schedule 40 unless otherwise approved by the Department.
- 5.5.8 The Department may require that casing used for water supply wells be at least 4 inches in diameter. The Department may require that casing used for public supply wells be at least 6 inches in diameter.
- 5.5.9 Well Casing Lengths
 - 5.5.9.1 Casing length shall be no less than 20 feet. Monitor, observation, recovery, wick drains, dewatering, and large-diameter bored wells are excluded from this requirement. Required casing heights above ground surface are specified in Section 5.11 of these Regulations.
 - 5.5.9.2 Wells (except monitor, observation, dewatering and recovery) located on tax parcels less than one-half acre in size and where an on-site wastewater treatment and disposal system is or will be utilized, shall be cased to a minimum depth of 42 feet.
 - 5.5.9.3 Wells completed in a confined aquifer shall be cased to the top of or into the source aquifer.
 - 5.5.9.4 Wells sited in accordance with Section 5.1.1.6 of these Regulations shall be cased no less than forty-two (42) feet.
- 5.5.10 Other Well Casing Requirements
 - 5.5.10.1 Joints for all well casing shall be water tight and joined in accordance with the manufacturer's recommendations. Joints for steel well casing shall be electrically welded or threaded. Joints for polyvinyl chloride (PVC) well casing shall be solvent welded or threaded. All couplings and solvents shall meet ANSI/NSF Standard 14, ASTM F480 or similar requirements.
 - 5.5.10.2 Casing must not be cut off below ground except as provided for in Section 5.11.4 of these Regulations, or
 - 5.5.10.2.1 To install a pitless unit or pitless adapter, or
 - 5.5.10.2.2 To install a standard plumbing "Tee", or
 - 5.5.10.2.3 To install an outer casing to terminate just below a pitless adapter or standard plumbing "Tee" connection, that is on the inner casing, or

5.5.10.2.4 For sealing purposes.

5.5.10.3 Where steel casing is required, the casing shall be equipped with a drive shoe that shall be firmly seated by driving it into the rock prior to continuation of drilling or grouting.

5.6 Well Screens

- 5.6.1 All wells that obtain water from unconsolidated aquifers shall be equipped with a well screen that will limit the entrance of sediments.
- 5.6.2 Wells finished in consolidated aquifers are not required to be screened.
- 5.6.3 Well screens shall have sufficient structural strength appropriate for the installation.
- 5.6.4 The screen should be sized to permit a maximum entrance velocity of 0.5 feet per second.
- 5.6.5 Only commercially manufactured well screens, constructed of materials resistant to damage by chemical action of ground water or cleaning agents, shall be used in the construction of a well, unless otherwise approved by the Department.
- 5.6.6 Lead packers and lead swedges are prohibited.
- 5.6.7 The bottom of screened wells shall be closed.
- 5.6.8 Aquifer interconnection, as determined by the Department, is prohibited.

5.7 Gravel-Packed Wells

- 5.7.1 Gravel shall be free of foreign matter, well sorted properly sized, and washed and disinfected immediately prior to packing, and placed in one continuous operation.
- 5.7.2 Bulk gravel shall be stored out of direct contact with the ground and covered.
- 5.7.3 For wells 40 feet or less in depth constructed in unconfined aquifers I may be gravel packed by pouring down the annulus. Wells deeper than 40 feet shall be gravel packed by tremie pipe .
- 5.7.4 Placement of gravel that causes interconnection of aquifers , as determined by the Department, is prohibited.
- 5.7.5 Gravel must not extend more than five feet above the top of the screen in single-cased wells
- 5.7.6 Gravel may be used to fill the annulus of geothermal closed loop wells from the bottom of the borehole to the bottom of the overburden only in the Piedmont physiographic province.

5.8 Well Grouting

- 5.8.1 All wells shall be grouted unless specifically exempted in Section 5.8.7 or otherwise approved by the Department.
- 5.8.2 The annulus shall be a minimum of 1.5 inches wide (diameter of bore hole = outside diameter of casing plus 3 inches).
- 5.8.3 All wells shall be grouted within twenty four (24) hours after the casing has been set.
- 5.8.4 An acceptable grouting method for wells 40 feet or less in depth that are constructed in unconfined aquifers, may be grouted by pouring chipped, or pelletized bentonite into the annulus. For wells deeper than 40 feet in depth, the annulus shall be pressure grouted from top of the gravel pack to ground surface. For exceptions, see Section 5.8.13.2 of these Regulations.
- 5.8.5 For single-cased wells constructed in confined aquifers, the casing shall be pressure grouted from the top of the gravel pack to ground surface..
- 5.8.6 Geothermal closed loop and direct exchange wells shall be pressure grouted from the bottom of the bore hole to the ground surface.
- 5.8.7 Wells with casing depths of twenty (20) feet or less are not required to be grouted, except monitor, observation, recovery wells, and wick drains less than 20 feet in depth may be required to be grouted.
- 5.8.8 The use of native formation material (i.e., drill cuttings) between the gravel pack and the required grout depth is prohibited.
- 5.8.9. The water well contractor may be required to notify the Department in advance of grouting. If the Department has scheduled a grouting inspection, the driller is not permitted to proceed with grouting before Department personnel arrive.
- 5.8.10 Cement grout shall be allowed to cure for a minimum of 24 hours before any well construction activity, including development, can be resumed.
- 5.8.11 The Department may specify additional conditions pertaining to the grouting of any well.
- 5.8.12 Grout
 - 5.8.12.1 Cement grout may be neat Portland or quick setting (hi-early) cement in a ratio of no more than 6 gallons of water per each 94 pound sack of cement. Sodium-based bentonite may be added to the cement grout in an amount not to exceed 5 pounds per 94 pound sack of cement.
 - 5.8.12.2 Bentonite grout is a sodium-based bentonite mixture with a ratio of not less than 2 pounds of bentonite per gallon of water. Bentonite clay without additives must not be used where it comes in contact with ground waters with a pH below 5 or having a total dissolved solids content

greater than 1000 milligrams per liter (mg/L) without Department approval.

5.8.12.3 Thermally enhanced bentonite grout is a sodium-based bentonite silica sand mixture with a ratio of not less than 1.5 pounds of bentonite per gallon of water containing no more than 300 pounds of sand per 50 pounds of bentonite. Sand shall be "000" well gravel or range between 50 and 70 mesh containing a minimum of 95% silica having a uniformity coefficient not greater than 1.7.

5.8.12.4 If rapid loss of grout material occurs during emplacement, clean fill material such as sand, gravel, crushed stone, or cement additives manufactured for lost circulation may be used in the zone where the loss is occurring.

5.8.12.5 Use of polymers is permitted to retard hydration of bentonite.

5.8.13 Standards for Grouting

5.8.13.1 Grouting shall be performed to provide a water-tight seal that prevents fluid migration in the annulus of the well.

5.8.13.2 All single-cased wells shall be grouted from either the top of the gravel pack to the ground surface, or from the bottom of the casing to the ground surface (e.g., crystalline rock, consolidated open-borehole wells), except those wells specifically exempted in Section 5.8.7 of these regulations.

5.8.13.3 If the annulus cannot be grouted in accordance with these regulations, the well shall be sealed in accordance with Section 11 of these regulations.

5.8.13.4 The top of grout shall be at the base of the well's discharge line for wells equipped with pitless adapters, pitless well unit, or plumbing "tees".

5.8.13.5 Grouting requirements for multiple-cased wells shall be determined on an individual basis.

5.9 Well Development

5.9.1 Development shall be performed until formation cuttings, mud, and drilling fluid or other additives are completely removed from the well and surrounding aquifer.

5.9.2 All potable wells shall be developed such that the water meets the following requirements:

5.9.2.1 Contains less than 1 milligram of sand or larger particles per liter of water (particles with a diameter larger than 0.0625 millimeters).

5.9.2.2 Has a turbidity of less than ten (10) NTU (Nephelometric Turbidity Units), except when the turbidity is due to the oxidation of naturally occurring dissolved iron or manganese.

5.10 Pitless Well Adapters, Pitless Well Units, and Plumbing "Tees"

- 5.10.1 A pitless well adapter or pitless well unit shall be installed on all wells having a submersible pump or a deep well ejector jet pump.
- 5.10.2 For suction lift systems where the well casing is used as a suction line and for heat pump recharge wells, a standard plumbing "Tee" connector and extension pipe with cap may be used in place of a pitless well adapter or pitless well unit, providing the extension meets the requirements of Section of 5.11 of these Regulations.
- 5.10.3 All pitless well adapters or pitless well units shall be of a type approved by the National Sanitation Foundation, the Water Systems Council, or the Department.
- 5.10.4 Connections of the pitless well adapter, pitless well unit, or plumbing "Tee" to the well casing and lateral connections of piping shall be watertight.
- 5.10.5 A pitless well adapter, pitless well unit or plumbing "Tee" shall be installed in conformance with depth of water service piping requirements referenced in Section of 5.14 of these Regulations.

5.11 Well Caps and Well Heads

- 5.11.1 For flood-prone wells the top of the well head or pitless well unit shall be no less than 24 inches above ground surface, or the highest known flood level, whichever is greater.
- 5.11.2 For domestic and agricultural wells, the top of the well head, or pitless well unit shall be no less than eight inches above the finished ground surface or pump house floor unless otherwise approved by the Department.
- 5.11.3 For monitor and observation wells, the top of the well head except as provided by Section 5.11.5 of these regulations shall be no less than 24 inches above the finished ground surface. The casing shall be protected from entry by contaminants, vandalism, accidental damage, etc. The required protection devices are:
 - 5.11.3.1 A locking well cap.
 - 5.11.3.2 For PVC casing – a concentric, protective steel casing firmly set in concrete. The Department may waive this requirement for specific projects (e.g., small on-site septic systems.)
- 5.11.4 For public, irrigation and industrial wells, the top of the well head or pitless well unit, shall be no less than 18 inches above the finished ground surface .
- 5.11.5 For wells and well points used for dewatering, the top of the well head or takeout, shall be no less than 12 inches above the finished ground surface

- 5.11.6 Upon approval by the Department, monitor and observation wells may be terminated below finished ground surface.
- 5.11.7 The Department may require additional protective devices such as bollards in high traffic areas.
- 5.11.8 Well pits, pump pits and buried well seals are prohibited. Upon approval by the Department, potable wells may be terminated below finished ground surface if above grade completion is not feasible. The engineered design of the enclosure must be included with the application or submitted prior to modification of an existing well.
- 5.11.9 All wells shall be securely covered except during construction and testing. Caps shall be lockable or removable only with tools. If a cap cannot be used, an alternative method for securely covering the well shall be employed.
- 5.11.10 Any time an existing well is identified as not meeting the requirements of this Section, the well head shall be brought into compliance unless otherwise approved by the Department. Wells permitted prior to the effective date of these Regulations are exempt. Upon reclassification, the Department may impose these requirements.

5.12 Water Level Access Ports and Tubes

- 5.12.1 All wells with a pumping capacity greater than 50,000 gallons per day shall be constructed with access port and tube.
- 5.12.2 All public wells that supply a community water system and all industrial wells shall have a capped access port and tube. A transducer may be installed in addition to the access port and tube.
- 5.12.3 If the pump motor is not installed directly over the well, the access port shall be located directly on top of the well.
- 5.12.4 If the pump motor is installed directly over the well, an access port pipe shall be installed through the pump base or outside the well casing at some accessible point below the base of the pump.
- 5.12.5 The access port and tube shall have a minimum inside diameter of three quarter (0.75) inch.
- 5.12.6 The access port shall be constructed to prevent the entrance of water, dust, insects, or other foreign material and allow access for water level measurements.
- 5.12.7 Airline gauges are not acceptable water level measurement devices.

5.13 Meters, Pumping Equipment, and Vents

- 5.13.1 All wells with a design capacity greater than 50,000 gallons per day shall be permanently equipped with a meter(s) capable of acquiring instantaneous flow rate and totalized flow measurements accurate to within ± 5 percent of the actual flow

rate, unless otherwise approved by the Department. Flow rate indicators may consist of any combination of test dials and direct reading indicators.

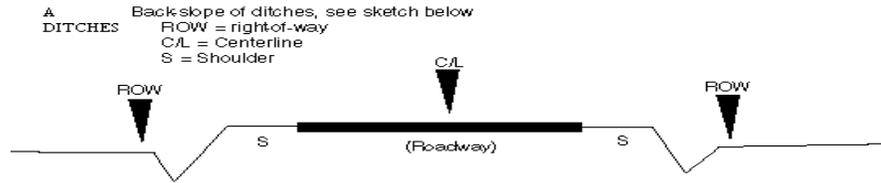
- 5.13.2 All public and industrial wells shall be permanently equipped with a meter capable of acquiring instantaneous flow rate and totalized flow measurements accurate to within ± 5 percent of the actual flow rate, unless otherwise approved by the Department.
- 5.13.3 A backflow prevention device shall be installed in a pumping system containing a well, where the system is also connected to a treatment system, is used to convey wastewater, fertilizers, chemicals, or provides fire protection
- 5.13.4 Water systems that draw from more than one aquifer shall have a backflow prevention device on the discharge line of each well to prevent the introduction of water that is not native to the source aquifer.
- 5.13.5 The proposed withdrawal rate shall be consistent with the pump capacity and well design and the intended use of the well.
- 5.13.6 Well vents shall be covered with corrosion-resistant mesh screen and down- turned to prevent the entrance of surface water, insects, or other foreign material.
- 5.13.7 Upon completion of the pump installation, the driller or pump installer shall disinfect the well and pump in accordance with Section 7 of these regulations.

6.0 Special Construction Requirements

6.1 Monitor and Observation Wells

- 6.1.1 Well construction materials and methods must be compatible with the monitoring program objectives.
- 6.1.2 Wells must be constructed to allow for characterization of geologic materials and sampling. Wells that are used as part of a specific environmental program may have additional requirements.
- 6.1.3 Wells located within a Delaware Department of Transportation (DelDOT) right-of-way must be enclosed in a curb box, flush mounted with the ground surface with a six-inch wide cement apron around the perimeter of the curb box. No well shall be placed on highway travel lanes, on auxiliary travel lanes or on roadway shoulders. The well owner is responsible for having these wells sealed upon notification from either the Department or DelDOT.
- 6.1.4 Applications for wells in areas described in this Section must have the words "Zone of Interest" clearly marked on the application.

6.1.4.1 Ditches:



6.1.4.2 Telephone poles and DelDOT fence lines.

6.1.4.3 Two feet between the sidewalk and road from the roadside edge of the sidewalk.

6.1.4.4 Highway signs

6.1.5 PVC screens for monitoring petroleum hydrocarbons must have a slot width no less than .020 inches. Screens for all other applications must have a slot width no less than .010 inches.

6.1.6 Monitor wells must not be disinfected without prior written approval from the Department, except for monitor wells used for bacterial sampling.

6.1.7 In the event that contaminants are encountered during the drilling process, the water well contractor shall decontaminate the drilling rig and related apparatus to prevent the transfer of contaminants from the site.

6.1.8 Contaminated fluids and drill cuttings derived from drilling, developing, or sampling of monitor wells shall be contained in 55-gallon steel drums and properly disposed of by the water well contractor.

6.1.9 The elevations of the tops of monitor and observation well casings, excluding the caps, should be established with reference to mean sea level datum or a common datum, as appropriate, to determine the direction of ground water flow and relate ground water elevations to other available elevation points. The surface used for this measurement must be permanently marked.

6.2 Flood-Zone Wells

6.2.1 Standards set forth in this Section are for wells in areas prone to wave action or flooding. These coastal areas are shown on Flood Insurance Rate Maps published by the Federal Emergency Management Agency and are designated as "A" or "V" zones.

6.2.2 Wells constructed in flood-prone or coastal areas shall be completed as required in Section 5.11.1 of these Regulations.

6.2.3 Wells constructed on waterfront properties shall be constructed on the landward side of the property, unless otherwise approved by the Department.

- 6.2.4 Well construction beyond the Department's coastal building restriction line is prohibited.

6.3 Public and Industrial Wells

- 6.3.1 The well owner shall be responsible for posting the Department well identification number on the exterior of the well enclosure.
- 6.3.2 All public wells for community water systems and all industrial wells must be logged by a qualified geophysical logging operator. The suite of logs shall include, at minimum, natural gamma, SP, and resistivity, and any other log that may be specified by the Department.
- 6.3.3 Public wells shall be equipped on the discharge line of each well with a backflow preventer, raw water sample tap, and a pump-to-waste valve, prior to the pre-storage isolation valve.

6.4 Heat Pump Recharge Wells

- 6.4.1 All water obtained from wells supplying a heat pump system shall be injected into the source aquifer. The Department may issue a waiver from this requirement where the requirements of Sections 6.4.4 and 6.4.5 of these Regulations have been met and the aquifer will not accept the water from the supply well.
- 6.4.2 No heat pump recharge well may be constructed within 50 feet of any identifiable potential or existing source of contamination.
- 6.4.3 Other than thermal alteration, ground water recharged to the aquifer shall be in its natural condition.
- 6.4.4 The diameter and screen length of all heat pump recharge wells shall be equal to or greater than the diameter and screen length of the heat pump supply well, unless otherwise approved by the Department.
- 6.4.5 Where a heat pump recharge well meets the requirements of Section 6.4.4 above, and all other requirements of these Regulations, and the receiving aquifer will not readily accept the return flow, another well will be required.
- 6.4.6 The driller for a heat pump recharge permit must also comply with the requirements of the Underground Injection Control Program.

6.5 Heat Pump Closed Loop/ Direct Exchange (DX) Wells

- 6.5.1 No heat pump closed loop or direct exchange well shall be constructed within 50 feet of any identifiable potential or existing source of contamination.
- 6.5.2 The solution contained in the heat pump closed loop well piping system shall be free of characteristic hazardous substances with the exception of ethanol-based

antifreeze solutions designed for such systems. The use of non-toxic propylene-glycol-based antifreeze solutions is recommended.

- 6.5.3 No refrigerant prohibited by the Environmental Protection Agency shall be used in direct exchange wells.
- 6.5.5 Closed loop heat pump well piping systems are not required to terminate above the finished ground surface. Prior to being connected to a manifold, the ends of the loop shall be temporarily sealed by fusion or capping. The use of tape is prohibited.
- 6.5.6 All buried pipe shall be marked with underground warning tape at a depth of twenty-four (24) inches.
- 6.5.7 Pressure testing of the closed loop heat pump system network shall be conducted prior to putting the system into operation.

6.6 Miscellaneous Wells

- 6.6.1 Miscellaneous wells will be subject to construction conditions as determined by the Department.

6.7 Agricultural Wells

- 6.7.1 Agricultural wells in an area for which a Certificate of Public Convenience and Necessity has been issued shall adhere to the following requirements.
 - 6.7.1.1 The well is not permitted to be used for human consumption,
 - 6.7.1.2 The well is not permitted at any time be interconnected with any portion of any building's plumbing or any water utility's service connection, and
 - 6.7.1.3 The well must be available at any reasonable time for inspection by personnel of the Department and the water utility serving the certificated area to insure there are not interconnections.
- 6.7.2 The well permit shall be subject to revocation upon any violation of the above requirements and, upon revocation, the Secretary shall order the well sealed.

7.0 Well Disinfection

7.1 General Requirements

- 7.1.1 Disinfection of all newly constructed or repaired wells, in accordance with Section 7.2 is required except as noted in Sections 7.1.6 and 7.1.7 of these Regulations.
 - 7.1.1.1 After disinfection of each new, modified, or reconditioned public well, one or more water samples shall be submitted to certified laboratory for microbiological analysis with satisfactory results reported to the DHSS Office of Drinking Water prior to placing the well into service.

- 7.1.2 After any repair or maintenance to the well, pumping equipment or piping, or other system components, those components shall be disinfected. For domestic wells, the entire plumbing system shall be disinfected.
- 7.1.3 Bacteriological sampling and testing after the repair or maintenance of potable wells is required. Disinfection shall be repeated until bacteriological results meet applicable standards.
- 7.1.4 Calcium hypochlorite (NSF/ANSI Standard 60 Drinking Water grade or equivalent) shall be used for disinfection unless otherwise approved by the Department.
- 7.1.5 Continuous disinfection directly into a well while in service is prohibited.
- 7.1.6 No monitor well shall be disinfected without prior written approval of the Department, except for monitor wells used for bacterial sampling.
- 7.1.7 Dewatering wells must not be disinfected unless specifically required as a condition of the permit.
- 7.1.8 The Department shall have the right to require specific disinfection procedures such as for deep wells with a higher pH, turbidity, lower temperatures, iron, organic matter, ammonia, or other chemical constituents that interfere with disinfection.
- 7.1.9 No new public wells shall be put into service until they are tested and approved for use by the Office of Drinking Water.

7.2 Disinfection Procedures

- 7.2.1 The following procedures shall be followed when disinfecting wells, unless otherwise approved by the Department.
- 7.2.2 Calcium hypochlorite (NSF/ANSI Standard 60 Drinking Water grade or equivalent) sufficient for a dosage of at least one hundred (100) milligrams per liter (mg/L) free available chlorine shall be emplaced into the well screen.
- 7.2.3 After the pump has been installed, the chlorine solution shall be fed through the entire supply line to waste until chlorine is detected. If the concentration is less than 100 milligrams per liter (mg/L), more calcium hypochlorite (NSF/ANSI Standard 60 Drinking Water grade) shall be added to the well until such concentration is reached.
- 7.2.4 The inside of the well above the static water level shall be disinfected with the chlorine solution for thirty (30) minutes. If granular disinfectant was used, the interior metal surfaces of the well casing above the static water level shall be inspected, and any granules shall be rinsed prior to closing the well.
- 7.2.5 If the well is connected to a public distribution system, the chlorinated water shall be pumped to the permanent disinfection unit, if present, or to the end of the water main where it is isolated from the remainder of the distribution system and can be blown off. The well contractor shall coordinate public distribution system disinfection with the Office of Drinking Water (ODW).

- 7.2.6 If the well is connected to a residential system, the chlorinated water shall be pumped until chlorine is detected at each tap, unless otherwise approved by the Department.
- 7.2.7 Disinfectant shall be in contact with the well components and any distribution system components, as required in Section 7.2.5 and 7.2.6 of these Regulations, a minimum of 24 hours, and not to exceed 48 hours.
- 7.2.8 If the free chlorine residual is less than 5 milligrams per liter (mg/L) after 24 hours the above procedure shall be repeated. When the free chlorine residual is at least five milligrams per liter (mg/L) after 24 hours, the well and distribution system shall be pumped to waste.
- 7.2.9 Total chlorine must be absent from the system before collecting the bacteria sample.
- 7.2.10 Should the well fail to be disinfected as determined by the Department, the Department may require other measures such as re-disinfection, repair, or sealing.
- 7.2.11 The amount of calcium hypochlorite needed to produce a dosage of 100 milligrams per liter (mg/L) free available chlorine per one hundred 100 feet of water column is given in the following table:

Calcium Hypochlorite Needed to Dose 100 Feet of Casing Water at 100 mg/L

Casing Diameter (Inches)	Volume/100 Feet (Gallons)	* Calcium Hypochlorite (Weight)
2	16.3	1/2 oz.
4	65.3	2 oz.
6	146.9	4 oz.
8	261.1	6 oz.
10	408.0	8 oz.
12	587.5	12 oz.
16	1,044.5	20 oz.
20	1,632.0	2 lb.
24	2,350.1	3 lb.

**65 percent available chlorine. The higher the pH, the higher the dosing must be to achieve disinfection*

7.2.12 Notes

7.2.12.1 Read the calcium hypochlorite label carefully and follow all safety and storage instructions. Calcium hypochlorite should always be added to water. Never add water to calcium hypochlorite.

7.2.12.2 The use of calcium hypochlorite warrants strict adherence to all applicable safety measures and utilization of proper protective equipment. The Department assumes no liability attendant to the handling, use and storage of calcium hypochlorite.

8.0 Well Completion Reports

8.1 General Requirements

- 8.1.1 A well completion report and formation log shall be submitted to the Department in a format provided by the Department, not later than fifteen (15) days after the construction of any well, except as required in Section 3.13.3 of these Regulations.
- 8.1.2 Each completion report shall be signed by the well driller in direct on-site supervision of the well construction.
- 8.1.3 Failure to submit well completion reports as required by this Section shall result in the denial of additional well permits.
- 8.1.4 The completion report shall include the results of all testing required in the permit.
- 8.1.5 If geophysical logs were generated, the completion report shall include two copies of each log.
- 8.1.6 An illegible or incomplete completion report will be returned to the preparer.
- 8.1.7 If the well location is different from that proposed on the application, the new location shall be drawn and noted on the completion report.
- 8.1.8 For wells constructed in unconsolidated sand and gravel aquifers, the formation log shall include notation of the sediment type, grain size color, texture, accessory minerals, thickness and depth of individual layers or lenses, and all other distinctive features.
- 8.1.9 For wells constructed in crystalline rock, the formation log shall include the rock type (e.g., schist, gneiss, marble) color, hardness, texture, veining, and all other distinctive features, including depth, interval and estimation of flow rate of all water-bearing zones as encountered during drilling.
- 8.1.10 For non-vertical wells, the angle and direction of drilling shall be noted on the completion report, and a site plan showing the top and bottom of the well included in the report.

9.0 Domestic Well Water Quality Testing

9.1 General Requirements

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- 9.1.1 Sections 9.2 and 9.4 shall be effective as of the effective date of these Regulations.
- 9.1.2 Section 9.3 shall become effective one (1) year after the date of these Regulations.
- 9.1.3 Section 9.5 shall become effective on January 1, 2015.
- 9.1.4 Sampling shall be performed by an Approved Sample Tester (AST) certified by the Delaware Division of Public Health.
- 9.1.5 Testing shall be performed by an accredited laboratory certified for drinking water analyses by the US EPA, the Delaware Division of Public Health or other approved certifying authority.
- 9.1.6 Test results shall be provided by the well owner to the Division of Public Health and the Division of Water within 15 days of receipt.
- 9.1.7 If testing is in conjunction with the transfer of a property the results shall be disclosed as a condition of sale.
- 9.1.8 The Department does not guarantee or otherwise certify the suitability of the water quality for drinking purposes. The well owner, or parties to a property transaction, shall be responsible for any treatment, well replacement, or public water supply connection, including any associated monitoring, that may be necessary to attain a desired quality, unless otherwise determined by the Department. This may include performing an investigation to determine the source and extent of contamination.

9.2 New and Replacement Domestic Wells

- 9.2.1 Prior to use of the well for domestic water supply, the water quality shall be sampled and tested for the following parameters:
 - 9.2.1.1 Alkalinity, Chloride, Hardness, pH, Iron, Nitrate, Nitrite, Sodium, Sulfate, Total Coliform plus E coli or other fecal indicator

9.3 Existing Domestic Wells

- 9.3.1 Prior to transfer of ownership of the well in conjunction with a property transaction, the water quality shall be sampled and tested for the following parameters:
 - 9.3.1.1 Alkalinity, Chloride, Hardness, pH, Iron, Nitrate, Nitrite, Sodium, Sulfate, Total Coliform plus E coli or other fecal indicator.

9.4 Domestic Wells Installed in the Piney Point or Rancocas Aquifers

- 9.4.1 Wells installed (screened) in the Piney Point or Rancocas aquifers shall be sampled and tested for the following parameters for new installations, or existing installations prior to transfer of ownership of the well in conjunction with a property transaction:

- 9.4.1.1 Alkalinity, Chloride, Hardness, pH, Iron, Nitrate, Nitrite, Sodium, Sulfate, Total Coliform plus E coli or other fecal indicator, Arsenic, and Fluoride.

9.5 Extended Testing

- 9.5.1 In addition to the requirements listed in this Section wells shall be sampled and tested for Volatile Organic Compounds (VOCs) and methyl tert-butyl ether (MTBE) in accordance with EPA method 524a or equivalent, and reported similarly.
- 9.5.2 The Department may require, after reasonable notice, that any well may be inspected, sampled, and tested, whether permitted or unpermitted, in order to protect public health and the environment.

10.0 Well And Pump Repair

- 10.1 All repairs of the internal components of a well shall be performed by or under the direct supervision of, a Delaware-licensed well driller. Repair of pumps, may be performed by a Delaware-licensed pump installer or plumber, except as provided in Section 10.2.
- 10.2 A person owning or leasing land with an agricultural or irrigation well may perform their own pump repair on those wells only.
- 10.3 The repair of any well must not modify the original construction specifications, except relining well screens.
- 10.4 Repair of any well having a buried well head shall include the extension of the casing above ground as required in Section 5.11 of these regulations, unless otherwise approved by the Department.
- 10.5 The repair of any industrial, public, or irrigation well shall include the installation of a water level access port and tube as required in Section 5.12 of these regulations, if applicable.
- 10.6 Well screen relining or changing capacity of the pump requires the submission of a new completion report.

11.0 Well Sealing

- 11.1 General Requirements
- 11.1.1 The sealing of a well shall be performed only by a well driller.
- 11.1.2 Within fifteen (15) days of sealing of a well the water well contractor shall submit a well sealing report to the Department, in a format provided by the Department. The report shall be completed and signed by the well driller supervising the site work.

11.1.3 The Department may require any well owner to have a well sealed if the Department determines that any of the following conditions apply:

11.1.3.1 The well has been abandoned or has no beneficial use,

11.1.3.2 The well interferes with the withdrawal of a prior water user unless compensation for such injury is provided to the satisfaction of the Department,

11.1.3.3 The well is causing or is a potential source of contamination to waters of the state,

11.1.3.4 The well is producing water that is contaminated,

11.1.3.5 The well is having an adverse influence on waters of the state,

11.1.3.6 The well is deemed a potential safety hazard to the health and welfare of humans or animals,

11.1.3.7 The well is not constructed in accordance with the permit conditions or these Regulations, or

11.1.3.8 The well was installed illegally

11.1.4 A well that interconnects aquifers shall be sealed.

11.1.5 The Department may require or approve specific sealing procedures.

11.1.7 The Department may require prior notification of the date of sealing.

11.1.8 All wells being replaced shall be sealed within fifteen (15) days of completion of the replacement well unless approval for retaining the replaced well is granted by the Department in accordance with Section 3.11 of these Regulations.

11.1.9 Wells that are unsuitable for their intended use shall be sealed or converted to another classification in accordance with Section 3.11 of these Regulations.

11.1.10 A well will not be considered sealed if only the supply line is sealed.

11.2 Sealing and Fill Materials

11.2.1. Only concrete, Portland cement, sodium-based bentonite clay, or combinations of these materials, or other materials approved by the Department shall be used to seal a well.

11.2.2 Only drill cuttings, clay, silt, sand, gravel, and crusher run are considered acceptable fill material and may only be used in accordance with Section 11.3.6, 11.3.7, or 11.3.8 of these Regulations.

11.2.3 Portland cement grout and sodium-based bentonite clay grout shall meet the requirements of Section 5.8.12.1 or 5.8.12.2 of these Regulations.

11.3 Sealing Procedures

- 11.3.1 Prior to sealing, the well driller shall determine the condition of the well, its construction, and obstructions that may interfere with sealing. Obstructions shall either be removed or eliminated through the process of over-drilling if necessary.
- 11.3.2 Well casing not to be removed shall be cut off at or below grade.
- 11.3.3 The Department may require that the well casing be ripped, perforated, or removed entirely to assure that any previously un-grouted annular space or voids are filled with sealing materials.
- 11.3.4 All wells shall be sealed with the appropriate sealing materials by pressure grouting through a tremie pipe from the bottom of the well upward to the ground surface, except as noted in Sections 11.3.6, 11.3.7, or 11.3.8 of these Regulations unless otherwise approved by the Department.
- 11.3.5 When Portland cement or concrete is used as a sealing material, it shall be placed in one continuous operation until grout returns to the surface.
- 11.3.6 A dug well larger than 24 inches in diameter shall be filled and sealed by placing fill material in the well to a level approximately five feet below land surface, and placing sealing material above the fill. The top one foot of the well may be covered with fill material.
- 11.3.7 For wells penetrating fractured or cavernous rock, coarse fill materials may be used to fill the cavernous portions of the well. The well shall be sealed from the bottom of the well to the cavernous zone and from the top of the cavernous zone to the land surface.
- 11.3.8 Dewatering wells and shallow monitoring or observation wells less than 20 feet deep and two inches or less in diameter shall have the entire casing removed unless otherwise approved by the Department. After removal of the casing, the wells may be sealed or filled.

12.0 Well Identification Tag

- 12.1 Upon completion of the well and before leaving the site, the well driller or pump installer shall be responsible for fastening the well identification tag. The tag shall be permanently fastened to the well casing above finished grade by means of a one half or three-eighths inch stainless steel band or other device or method approved by the Department. The tag for a flush-mount installation shall be permanently fastened to the top of the vault lid. The tag for an irrigation well with a concrete pad may be fastened to the pad.
- 12.2 The tag for a well permit issued via fax or under emergency circumstances shall be fastened to the well casing within five (5) working days of the well driller's receipt of the tag.

- 12.3 Well tags shall be returned to the Department within thirty (30) days of cancellation or expiration of an unused permit or the sealing of a tagged well.

13.0 Waivers

Applications for waivers to these Regulations, except those that concern a source of water for three or fewer families, shall be advertised in newspapers of local and statewide circulation with a comment period of fifteen (15) days. A public hearing will be held if a meritorious request is received within the fifteen (15) day period. A public hearing request shall be deemed meritorious if it exhibits a familiarity with the application and a reasonable statement of the waiver's probable impact.

- 13.1 The Department may grant waivers only to the following provisions of these Regulations:

- 13.1.1 Setbacks from property lines
- 13.1.2 Separation distances for agricultural wells
- 13.1.3 Separation distances for vertical closed-loop and direct-exchange heat pump wells.

- 13.2 Waivers cannot be granted for public wells.

- 13.3 A waiver application shall consist of:

- 13.3.1 A complete well permit application.
- 13.3.2 A separate scaled plot plan of the area depicting distances from all potential or existing sources of contamination as defined in Section 2.0 of these Regulations, within a 100 foot radius of the proposed well location. The plot plan shall also include all buildings and property lines, and all other physically limiting barriers such as overhead power lines.
- 13.3.3 The appropriate well permit application fee, if applicable, and
- 13.3.4 A notarized letter executed by the property owner providing explicit documentation supporting the waiver request.

14.0 Variances

Applications for variances to any Section of these Regulations, except those that concern a source of water for three or fewer families, shall be advertised in newspapers of local and statewide circulation with a comment period of fifteen (15) days. A public hearing will be held if a meritorious request is received within the fifteen (15) day period. A public hearing request shall be deemed meritorious if it exhibits a familiarity with the application and a reasonable statement of the variance's probable impact.

- 14.1 Applicable Delaware Law

No variance may be granted unless the Secretary, Hearing Officer or the Environmental Appeals Board finds that the following have been satisfied pursuant to the requirements of 7 Del. C., §6011.

- 14.1.1 Good faith efforts have been made to comply with the requirements of 7 Del. C. Chapter 60.
- 14.1.2 The applicant is unable to comply with the requirements of 7 Del. C. Chapter 60 and these Regulations because the necessary technology or other alternative methods are not or have not been available for a sufficient period of time or the financial cost of compliance by using available technology is disproportionately high with respect to the benefits continued operation would bestow on the lives, health, safety and welfare of the occupants of this State and the effects of the variance would not substantially and adversely affect the policy and purposes of this chapter.
- 14.1.3 Any available alternative is being or will be used to reduce the impact of granting of the subject variance on the lives, safety, or welfare of the occupants of this State, and
- 14.1.4 The continuing operation of the proposed well is necessary to national security or to the lives, health, safety or welfare of the occupants of this State.

14.2 Application Procedures

A separate variance application shall be made to the Department for each individual well permit desired. Each variance application shall consist of:

- 14.2.1 A complete well permit application
- 14.2.2 A separate scaled plot plan of the area depicting distances from all potential or existing sources of contamination as defined in Section 2.0 of these Regulations, within a 150 foot radius of all proposed public and industrial wells, and within a 100 foot radius of all other proposed wells. The plot plan shall also include all buildings and property lines, and all other physically limiting barriers such as overhead power lines.
- 14.2.3 The appropriate well permit application fee, if applicable.
- 14.2.4 Written documentation showing compliance with Section 14.1 of these Regulations, and
- 14.2.5 The property owner's signature on a written request that specifies the applicable Section(s) of these Regulations.

15.0 Public Hearings and Appeals

- 15.1 Public hearings shall be held in conformance with the requirements of 7 Del. C. Section 6006.

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15.2 Decisions of the Secretary may be appealed to the Environmental Appeals Board pursuant to 7 Del. C. Section 6008.

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