



Wisconsin Department of Natural Resources
Drinking Water & Groundwater Program

WISCONSIN PUMP INSTALLER LICENSE EXAM STUDY GUIDE



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Wisconsin Pump Installer License Exam Study Guide

Preface

This study guide is provided by the Wisconsin Department of Natural Resources (department) to assist individuals in preparing for the Pump Installer License Examination, as required by section 280.15, Wisconsin Statutes. Each section consists of objectives to study and understand in order to demonstrate competency in pump installing, and to achieve a passing grade on the license exam.

Preparing for the exam:

1. Study the material! Knowledge of objectives will be tested using a multiple-choice and true/false format. Exam questions are taken directly from Part 1 & Part 2 study guide objectives.
2. Part 1 "Administrative Code" sections list code related objectives that should be reviewed. What is in code and why it is important is provided. Use of administrative code with Part 1 of the study guide is all that is needed to prepare for code related exam questions.
3. Part 2 "General Knowledge" sections list "key knowledge" objectives that a Wisconsin licensed pump installer is expected to know. These objectives are not code related and should be committed to memory for general knowledge related exam questions.

Taking the exam:

1. **Due to the pandemic, regularly scheduled license exams are not being held and exam applications are not being accepted. Those with an urgent need can submit a request for license exam consideration. Urgent Exam Request Forms are available online for download from the department "[Licenses and Registrations](#)" page.**
2. **Urgent exam requests are reviewed weekly by the department and exam requests are granted according to need.**
3. Use of Wisconsin Administrative Code as a reference during the exam is allowed. You may bring your own copies of code to the exam with highlights and margin notes, but you will not be allowed to take these copies with you when you leave. If you do not bring copies of code with you, they will be provided at request before the exam. No other reference will be allowed during the exam.
4. You will need to bring a handheld calculator and number 2 pencils.
5. There are 100 true/false and multiple-choice exam questions.
6. Time allowed for exam completion is 3 hours.
7. A score of 75 percent or higher is needed to pass the exam.

Acknowledgements

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Part 1 - Administrative Codes

Chapter 1 - NR 146: Licensing and registration

Section 1.1 - NR 146.01: Purpose and applicability

1.1.1 Purpose and applicability

NR 146 establishes licensing and registration requirements that apply to pump installers. Specific activities are listed to which license and registration requirements apply.

Section 1.2 - NR 146.02: Definitions

1.2.1 Definitions

This section provides important definitions that are necessary to understand license and registration requirements and how requirements are administered by the department.

Section 1.3 - NR 146.03(2)(c): Exceptions to pump installer license requirements

1.3.1 Exceptions to license requirements

A license is required to engage in the business of pump installing under NR 146.03(1). NR 146.03(2)(c) lists the exceptions to this requirement.

Section 1.4 - NR 146.04(5): Pump installer business registration requirements

1.4.1 Pump installer business registration

A business registration is required for persons to engage in the business of pump installing. The terms “persons” and “engaging in the business of” as defined in NR 146.02 need to be understood in order to grasp NR 146.04(5) intent. This section lists conditions required for pump installer business registration eligibility.

1.4.2 Exceptions to pump installer business registration requirements

NR 146.03(2)(d) provides exceptions to business registration requirements of 146.04(5). It lists the individuals who do not need a business registration in order to engage in the business of pump installing.

Section 1.5 - NR 146.04(6): Supervisory responsibilities

1.5.1 Supervisory pump installer responsibilities

Areas of responsibility carried by a supervisory pump installer are laid out in this section. The extent of a supervisor’s legal and financial responsibility includes corrections to noncomplying work done by the business or employees of the business. A supervisor must also be aware of all work-related activity done by pump installers that are under their supervision.

Section 1.6 – NR 146.04(7): Engaging in the business of well filling and sealing

1.6.1 Well filling and sealing license and registration requirements

Licenses and registrations required to engage in the business of well filling and sealing are listed here.

Section 1.7 – NR 146.05(1): License and registration conditions

1.7.1 Conditions

Experience, qualifications and equipment are taken into consideration when a license, registration or renewal is issued. There are conditions that may be imposed on a license or registration to restrict activity if it is deemed necessary by the department.

Section 1.8 – NR 146.07: Renewals and continuing education requirements

1.8.1 NR 146.07(1): License and registration renewal application process

License and registration renewal application processes are described here. Details are included on deadlines, fees, late penalties and required signatures. This section provides information on when a signature is required and who needs to sign the renewal application.

1.8.2 NR 146.07(2): License and registration renewal eligibility

Individuals who hold a valid license or registration on December 31st and have met continuing education requirements for the calendar year are eligible for renewal in the following year. This section lists reasons why a license or registration may not be in effect on December 31st. An individual whose license or registration is not renewed for the reasons listed must take and pass the appropriate exam to become licensed again.

1.8.3 NR 146.07(3): Continuing education requirements

This section discusses continuing education attendance and contains information on how many continuing education hours must be earned each year to renew a license or registration.

Section 1.9 – NR 146.08: Licensee and registrant responsibilities

1.9.1 Responsibilities

Responsibilities required of pump installer licensees and registrants are discussed here. Responsibilities include corrections to noncompliant work, advertising and business-related documents, contracts, leases, upgrades to noncomplying well components or systems and more. It is important to understand each as it applies to a specific license or registration.

Section 1.10 – NR 146.09: Suspension and revocation

1.10.1 Basis for suspension or revocation of a license or registration

Licensee or registrant actions that may result in suspension or revocation are listed under NR 146.09(1).

1.10.2 Limitations placed on suspended or revoked licenses and registrations

Following suspension or revocation, limitations are placed on individuals or persons who engage in the business of pump installing. The requirements listed under NR146.09(2) must be met in order to engage in the business of pump installing.

1.10.3 Reinstatement following suspension or revocation

Requirements for reinstatement are laid out in detail in NR 146.09(3). The steps required to reinstate a license or registration following suspension or revocation may include passing the license exam, reapplying after one year of revocation or demonstrating competency to the department under specific conditions.

Section 1.11 – NR 146.10: Well filling and sealing

1.11.1 Licensing and registration requirements for well filling and sealing

NR 146.04(7) states that a license or registration is required in order to engage in the business of well filling and sealing. NR 146.10 provides further detail on who can do well filling and sealing and under what conditions.

Section 1.12 – NR 146.11: Property transfer well inspections

1.12.1 Requirements

NR 146.11 and NR 812.44(1) provide information on who can inspect a well at time of a property transfer and what they may report regarding the well and its pressure system.

Section 1.13 – NR 146.12: Citations

1.13.1 Appropriate action and stepped enforcement.

The enforcement process includes steps that are taken by the department prior to issuing a citation. These steps include a written warning that outlines the violation and provides opportunity to meet with the department in an enforcement conference. This section includes specific violations that may result in a citation.

Chapter 2 – NR 811

Section 2.1 – NR 811.01: Applicability

2.1.1 When a water system is a community well

NR 811.01 explains when a well and water system is a community well, based on the number of dwelling units the water system serves. Community wells must meet the standards in NR 811 and require department approval before construction.

Section 2.2 – NR 811.35: Pitless units

2.2.1 Community well pitless units

NR 811 contains specific requirements for pitless units used for community wells that can be more strict than an NR 812 compliant pitless unit. For example, NR 811.35(5) requires a second check valve to be installed within the well above the top of a submersible pump (submersible pumps are manufactured with a check valve incorporated in the top of the pump). This second check valve is not required for NR 812 compliant wells.

Section 2.3 – NR 811.37: Pump discharge lines

2.3.1 Community well discharge lines

Some pump discharge line configurations are unique to community wells. For example, NR 811.37(3) requires that any valves, sampling faucets, water meters and other equipment shall be located above the ground surface.

Chapter 3 – NR 812: Well construction and pump installation

Section 3.1 – NR 812.02: Applicability

This section outlines the relevant drilling, well construction and pump installing activities that are regulated under NR 812.

3.1.1 NR 812.02(1) to NR 812.02(2): Applicability to water systems and drillholes

Most new and existing water systems and drillholes are regulated by NR 812 with some listed exceptions.

Section 3.2 – NR 812.03: Cooperation with the department

This section specifies the expectations of pump installers for cooperating with the department.

3.2.1 NR812.03: Pump installer expectations for cooperation with the department.

When requested by the department, pump installers shall give notice to the department at least one day prior to doing the work.

Section 3.3 – NR 812.04: Contracts for noncomplying installations

This section specifies that well and heat exchange drillers, pump installers and well constructors must ensure that their work complies with NR 812, and bring noncomplying features of wells or water systems into compliance, and/or notify the owner and the Department in writing of any known or apparent noncomplying features (even if no work was performed on them).

3.3.1 NR 812.04(1) to NR 812.04(2): Ensure work is conforming and exceptions

Licensed individuals must ensure that the construction and reconstruction of wells and water system conforms to NR 812 and may not agree to do noncomplying work and must inform the owner and the department in writing of any noncomplying features of the system that are apparent or known.

Section 3.4 – NR 812.07: Definitions

This section contains all the relevant definitions for terms used in NR 812.

3.4.1 NR 812.07(1) to NR 812.01(127): Well and water systems definitions

This section provides important definitions that are necessary to understand well construction and pump installation requirements and how requirements are administered by the department.

Section 3.5 – NR 812.08: Water well, reservoir and spring location

This section contains location requirements for wells reservoirs and spring developments, especially separation distances from contamination sources.

3.5.1 NR 812.08(1) to NR 812.08(4) and Table A: Location requirements for water wells, reservoirs and spring developments

A well must be located so that it and its surroundings can be kept in a sanitary condition, and the well is protected from surface water, flooding and as far away from contaminant sources as possible.

It is important to understand the definitions relating to floodplains (found in NR 812.07) and be able to determine restrictions and prohibitions of constructing wells in floodplains.

Minimum separation distances from contaminant sources can be found in Table A. Wells may not be constructed less than the minimum separation distance from a contaminant source.

Section 3.6 – NR 812.09: Department approvals

Certain well construction and pump installation activities require approvals. This section provides a framework for determining which activities require approvals and the procedures for obtaining them.

3.6.1 NR 812.09(4): Activities requiring department approvals

Certain types of wells and drillholes require an approval by the department prior to construction. Examples include (but are not limited to) high capacity wells and wells constructed in a designated special well casing depth areas (SWCDA). Other approvals are required for water system features, such as well pits, spring development and a variance to a provision of NR 812.

3.6.2 NR 812.09(2) to NR 812.09(8): Application submission and approval

A well driller or well constructor must obtain written approval from the department in advance for activities requiring approval and must also give advance notification prior to starting construction under any approval. Modification of any approval must also be obtained in writing prior to starting construction. Noncomplying construction may result in denial or rescinding of an approval.

Section 3.7 – NR 812.091: Product and component approvals

Certain products used to construct, develop, or treat a well or drillhole require prior approval from the department. This section provides an overview on Product and Component approvals and where to find the approved product and component lists.

3.7.1 812.091: General product and component approval information.

Many products or components used to construct, develop, or treat a well or drillhole require department approval. 812.091 outlines the specific product categories requiring approvals, examples include well rehabilitation materials and grouting and sealing materials. The department may approve a product or component with additional conditions for use, which will be specified on the department-managed lists. The department may also prohibit the use of any product or component if there is evidence that the product poses a threat to groundwater. Additionally, there are situations in which an approval is not required by the department. These situations are specific to NSF/ANSI certified products and are dependent upon additional requirements as outlined in 812.091(3). The department maintains categorized lists of all approved products which can be found here: <https://dnr.wi.gov/topic/Wells/drillerPumpInstall.html>

Section 3.8 – NR 812.15: Flowing wells

This section provides requirements for wells constructed in areas where the hydraulic pressure of the aquifer would make the water flow out of the well or drillhole without needing to be pumped.

3.8.1 NR 812.15(1): Control of flow

When constructing a flowing well, the well driller or well constructor must confine the flow to the interior of the casing. If flow is not contained to the interior of the casing using the planned construction methods the well driller or well constructor must notify the department and do one of the following:

- *Reconstruct the well to contain the flow to the interior of the casing*
- *Reconstruct the well according to the requirements of NR 812.15(2) – (4)*
- *Fill and seal the well*

Section 3.9 – NR 812.23: Driven point wells

In unconsolidated formations with shallow potable groundwater, driven point wells can be a less expensive alternative to a drilled well. This section describes the requirements for constructing a driven point well.

3.9.1 NR 812.23(1) to NR 812.23(11): Requirements for construction of a driven point well.

Location requirements, materials, final casing height, pump installation and construction of flowing wells for driven point wells follow the same requirements and sections as for drilled wells.

The minimum casing size for driven point wells is 1 ¼ inches. Minimum casing depth (not including the screen) may depend on static water level in addition to standard minimum casing depth.

Adequate and compliant protection of driven point wells from frost/freezing is important, and requirements can be found in this section.

Pulling out the well casing pipe and replacing the well screen is considered new construction and must meet all the requirements of new well construction in NR 812. Shallow starter drillholes may be constructed to facilitate driving pipe.

Section 3.10 – NR 812.24: Dug type well design and construction

Wells constructed by simply digging down to groundwater are increasingly rare. If approved, a dug well must meet specific requirements due to the increased risk for contamination.

3.10.1 NR 812.24(1) to NR 812.24(3): Requirements for construction of a dug type well

The requirements for constructing a dug well are very specific and can be found in this section. Due to the risks to drinking and groundwater associated with dug wells, the DNR discourages their construction.

Section 3.11 – NR 812.25 Springs

Springs may also be developed as a potable water source, although the department discourages this practice. If approved, the spring must meet specific requirements.

3.11.1 NR 812.25(1) to NR 812.25(3): The use of a spring as a source of potable water.

Placement or driving of a casing pipe into an undeveloped spring accessible to the public is not allowed.

The department discourages the use of springs as a source of potable water due to wide fluctuations in water quality and susceptibility to contamination.

Obtaining approval for using a spring as a source of potable water shall follow the specific location, construction and water quality requirements in this section.

Section 3.12 – NR 812.26: Well and drillhole filling and sealing

Filling and sealing is sometimes referred to as “abandonment.” When a well is no longer being used, is contaminated, cannot be rehabilitated or reconstructed, or is otherwise noncompliant, it must be filled and sealed to prevent it from becoming a possible risk to human health and groundwater.

3.12.1 NR 812.26(1) to NR 812.26(4): Well and drillhole filling and sealing

Filling and sealing of wells may be performed only by a licensed well driller or pump installer, and heat exchange drillholes may only be sealed by a licensed heat exchange driller with only a few specific exceptions.

This portion of the code explains the situations in which well sealing is required. There are certain situations which require the well owner to hire a licensed individual to fill and seal a well. An example is a well which is not being used. For most well types, a well that has not been used for any water supply purpose for more than 90 days must be filled and sealed. Seasonal or high capacity irrigation wells must be filled and sealed if they have not been used for more than 3 consecutive years. This portion of code also outlines the situations in which the department may require a well to be filled and sealed and the specific responsibilities of the pump installer when they receive notice from the department to fill and seal a well.

3.12.2 NR 812.26(5) to NR 812.26(6): General requirements for filling and sealing wells and drillholes

Obstructions must be removed prior to filling and sealing. Sodium bentonite drilling mud may be circulated prior to filling and sealing in fractured or highly permeable formations. Filling and sealing material for any well or drillhole larger than 3 inches in diameter must be placed through a tremie pipe or dump bailer except when bentonite chips or bentonite pellets are used.

Liners with ungrouted annular spaces that cannot be removed must be perforated or ripped in place prior to filling and sealing according to requirements in this section.

In certain cases, the well casing may be removed and reused. Pits may be filled and sealed with clean native soil after all the equipment has been removed and the pit floor and at least one wall perforated or removed.

Neat cement, sand-cement, concrete, bentonite chips, bentonite pellets, drilling mud and cuttings and chlorinated pea gravel may be used in specific cases, and subject to certain restrictions specified in this section.

Wells and drillholes must be filled from the bottom up with a tremie pipe except where use of a tremie pipe is specifically exempted. Allowable filling and sealing materials are dependent on either well or drillhole is being sealed, diameter, and formation.

3.12.3 NR 812.26(7): Filling and Sealing Reports

Filling and sealing reports must be filed with the department electronically by the person performing the filling and sealing work.

Section 3.13 – NR 812.27: Pump installer requirements

This section describes requirements of pump installers. It includes licensing, disinfection and water sample collection, analysis and reporting requirements as well as other key requirements.

3.13.1 Pump installer Requirements

NR 812.27 describes twelve general requirements that pump installers are expected to meet.

Section 3.14 – NR 812.28: Pump installation equipment and supply pipe

3.14.1 Equipment and Supply Pipe

This section describes the department approval requirement and standards to be met for pipe used for drop-pipe and discharge lines.

Section 3.15 – NR 812.29: Height of finished well

3.15.1 Finished Well Heights

Well casing height requirements are defined in this section. The height requirement depends on when the well was installed and where the well is located. Some of the alternative locations with different height requirements include; outdoors, in a driveway, in a pit or alcove, in a walkout basement, in a floodplain or in a pump house.

Section 3.16 – NR 812.30: Vermin-proof well caps and seals

3.16.1 Requirements for well caps, seals and the conduit that encloses electrical wiring.

Well caps must be approved under NR 812.091 and meet the requirements of this section for seal, venting, conduit, as well as requirements for preparing the top of the casing for the cap. The details of seal types, well vents, hold-down devices, materials used, and installation of electrical conduit are discussed.

Section 3.17 – NR 812.31: Pitless adapters and pitless units

3.17.1 Pitless adapters and pitless units

This section describes the approval requirement, where different pitless adapter types are used and the specific requirements for steel and thermoplastic pipe installations.

Section 3.18 – NR 812.32: Pumps

3.18.1 Pump Installation

Both general and specific requirements for installing pumps are provided in this section. There are specific requirements for off-set pumps, what level in the well the pump intake should be set at, buried discharge lines, shallow and deep suction pumps and lineshaft turbine pumps.

Section 3.19 – NR 812.33: Water storage vessels

3.19.1 Water Storage Vessels

Requirements for both pressurized and nonpressurized storage vessels are described in this section. The requirements for pressurized tanks are further subdivided into tanks with capacities greater than 500 and greater than 1000-gallon capacities. A nonpressurized storage vessel may not be installed without prior approval from the department under s. NR 812.09.

Section 3.20 – NR 812.34: Sample faucets

3.20.1 Sample faucets

Sample faucet installation requirements are covered in this section. This includes both where to install the faucet within the water system and the configuration of the faucet itself.

Section 3.21 – NR 812.35: Yard hydrants

3.21.1 Yard hydrants

This section describes where to install a yard hydrant within the water supply system and provides the requirements for a yard hydrant. Yard hydrants and backflow prevention devices are also regulated under plumbing code. Yard hydrants installed downstream of the pressure tank are regulated under the plumbing code. When installing yard hydrants and backflow prevention devices, also refer to the appropriate plumbing codes. All alcoves are pits. Valve pits are exempt from this section.

Section 3.22 – NR 812.36: Pits

3.22.1 Pits

New well pits require approval under NR 812.09 prior to construction. This section describes the requirements for new well pits including conventional, alcoves and driveway ramps.

Section 3.23 – NR 812.37: Water treatment

3.23.1 Water treatment

This section describes the requirements for the treatment of potable private and noncommunity wells and water systems. It covers water treatment devices, but not disinfection or acidification which may be considered water treatment processes. General standards such as the requirement that treatment devices have plumbing product approval in accordance with chs, SPS 382 and 384, a coliform free water supply must be present prior to treatment unless the department determines a coliform free water source is not available, requirements about how the equipment is installed and who can install it and specific technical requirements about the installation of treatment devices are covered in this section.

Section 3.24 – NR 812.38: Injection of fertilizers or pesticides for agricultural purposes

3.24.1 Injection of Fertilizers or Pesticides for Agricultural Purposes

The injection of fertilizers or pesticides into a potable well or water system is prohibited. This section describes the injection of fertilizers and pesticides into nonpotable wells and water systems.

Section 3.25 – NR 812.39: High capacity well water and water usage measurement

3.25.1 High capacity well water and water usage measurement

The department may require measuring and recording of water levels and/or total water usage for the operation of a high capacity well or water system. This section describes the requirements for installing the equipment to measure water levels and water usage.

Section 3.26 – NR 812.40: Above ground pumphouses

3.26.1 Above ground pumphouses

This section describes the minimum features required to construct a pump house.

Section 3.27 – NR 812.41: Disinfection flushing and sampling

3.27.1 Disinfection flushing and sampling

When a well is entered to install, replace or repair equipment, the well must be disinfected. This section describes how to prepare, distribute and flush the disinfectant. Requirements for water sample collection, analysis and reporting following disinfection and flushing are also explained.

Section 3.28 – NR 812.42: Criteria for evaluation

NR 812.42 describes the specific requirements for evaluating existing wells for compliance. Construction details, construction date, water quality, discharge piping arrangement, and sanitary condition determine compliance.

3.28.1 NR 812.42(1): Location and well construction

A complying location depends on the requirements at the time of construction. Table E organizes separation distance requirements based on the date of installation. Well construction details also depend upon the date of construction. Other construction details include the casing depth and the requirements based on geology and the material, condition, and thickness of the well casing.

3.28.2 NR 812.42(1): Water quality

Existing wells need to meet water quality standards for bacteria and other regulated contaminants. The department may require water system upgrades or filling and sealing of wells that do not meet water quality standards.

3.28.3 NR 812.42(2) through (3) & NR 812.42(9): Pits and alcoves and basement wells

This section describes the difference between an alcove, a pit, and a valve pit. It also describes the difference between basements, crawl spaces, and walkout basements. Existing wells in pits and alcoves and basements and walkout basements have different sets of requirements depending on the construction and installation date. Requirements specific to evaluating pre 1953 wells installed in a pit, alcove, basement, or walkout basement can be found in this section. These requirements are related to construction materials, sanitary condition, drainage, access, potential for flooding, and more. Newer pits and alcoves are subject to strict requirements as described in NR 812.36(2). This section also describes the requirements for filling and sealing noncomplying pits and alcoves. Basement wells (other than walkout basement wells) could not be installed after April 1, 1953.

3.28.4 NR 812.42(4): Reservoirs

This section goes into detail on determining compliance of existing reservoirs. Compliance depends on construction materials, access, sanitary condition and more. There are different requirements based on whether the discharge is pressurized or not. Requirements for abandonment of reservoirs are also specified in this section.

3.28.5 NR 812.42(5): Dug wells

Dug wells are more susceptible to contamination. The department discourages the use of dug wells. This section describes the requirements for allowing the continued operation of dug wells. Compliance depends on curbing material, depth, cover specifications, and equipment placement.

3.28.6 NR 812.42(6): Pump and discharge piping evaluation

Pre-February 1, 1991 pump installations are subject to the evaluation criteria described in this section. The requirements will differ depending on type of well and how many families are served by the well. Criteria that need to be evaluated to determine compliance include pressurized and nonpressurized conduits, pitless units and adapters, check valve placement, pump type, and discharge location.

3.28.7 NR 812.42(7) & NR 812.42(8): Casing height, existing well caps and seals

Required casing height is determined by factors such as the date of construction and the location of the well (pit/alcove, flood plain, pump room, basement, etc.). Well caps and seals need to be replaced under certain situations.

3.28.8 NR 812.42(9) & NR 812.42(10): Wells in basements, walkout basements and driveway ramps.

Requirements for wells in basements and walkout basements and specifications for compliant driveway ramps are presented in this section.

3.28.9 NR 812.42(11) through (12): Work on existing installations, reconstruction, and casing height extensions

These sections describe the requirements for reconstruction or extending the casing on existing wells. The casing may only be extended out of a pit or alcove if the casing depth meets the requirements at the time of construction. When working on existing installations; noncomplying well caps, sample faucets, and casing height all need to be considered and potentially brought into compliance depending on the extent of the work being completed, rather than just noting the noncompliance. Reconstruction (deepening, lining, screen replacement) may only be completed if the well meets current code requirements. Additionally, sample faucets must be installed when completing specific types of work.

Section 3.29 - NR 812.43: Variances

When strict compliance with the requirements of NR812 are not feasible, a variance can be requested. This section goes into detail on the requirements that must be met by both the applicant and the Department.

3.29.1 NR 812.43(1): Responsibilities of the applicant

The applicant must clearly show why compliance with the code is not feasible. Additionally, this section lays out specific pieces of information needed with the variance request for the department to complete a review. The variance request must be signed by either the owner or an agent of the owner. Additionally, the variance request must be submitted in writing, though a verbal request may be acceptable in situations requiring an immediate response as determined by the department.

3.29.2 NR 812.43(1): Responsibilities and authority of the department

The department may grant a variance if the department determines the variance is justified. To determine this, the department has the authority to require additional information. The department may also require additional construction requirements or installation features as a condition of a variance approval to protect the well from contamination and to preserve the aquifer.

3.29.3 NR 812.43(1) (a) and (b): Landfill variances

Landfill variances may be requested by either the well owner or landfill owner, and both parties may appeal the variance approval. Landfill variances may be approved under the concept of comparable protection, which may be provided through additional construction and installation requirements. Additionally, the department is required to notify the owner of the landfill if the variance is approved.

3.29.4 NR 812.43(2): Variances in special well casing depth areas

A variance to the casing depth requirement may be granted in these areas if the well constructor can prove that the water quantity or quality is not sufficient below the required casing depth. The department may require additional conditions.

Section 3.30 – NR 812.44: Property transfer well inspections

The buyer or seller of property with a private well may be interested in the condition of the well and the quality of water used for drinking. If an inspection is requested as part of a real estate transaction, there are requirements that apply.

3.30.1 NR 812.44 Scope and applicability

Well inspections at the time of property transfer are not required by law. However, NR 146.11 and this section of NR 812 list requirements that apply if inspection of a well and pressure system is requested.

3.30.2 NR 812.44(1) Licensing requirements

NR 812.44(1) and NR 146.11 provide information on who can inspect a well at time of a property transfer and what they may report regarding the well and its pressure system. Specific inspection tasks that require a license are listed.

3.30.3 NR 812.44(2) through (4) Well pressure system inspection requirements

NR 812.44 subsections 2 thru 4 list inspection requirements pertaining to equipment, report forms and sample collection, analysis and reporting, and who shall receive the inspection report. Guidance is provided on what may accompany the required forms. Sample collection, analysis and reporting requirements are listed NR 812.46.

3.30.4 NR 812.44(5) Well and pressure system evaluation criteria

NR 812.44(5) lists features that are to be inspected for property transfer well inspections. There are specific requirements that may apply depending on when the well was constructed and how it was used. A property transfer well inspection is a visual inspection that evaluates the listed criteria. When there are indications of potential violations, the inspector may identify the need for a more comprehensive search or additional research. This section lists examples of potential violations. All wells and pressure systems on a property are to be inspected when a property transfer well inspection is conducted.

Section 3.31 – NR 812.45: Citations

The use of citations is described in NR 812.45. Citations may be issued by the department for certain violations of NR 812. This section describes the process for issuing citations, and the violations that are subject to their issuance.

3.31.1 NR 812.45(1) to NR 812.45(3): Issuance of citations for noncompliance

Prior to issuing citations for noncompliance, the department must issue a written warning describing the violation and schedule an enforcement conference. Citations may be issued if the alleged violator declines or fails to attend the enforcement conference. Citations may be issued for violations of license and registration requirements, sampling and reporting requirements, noncomplying systems installed before February 1, 1991, and well or drillhole filling and sealing requirements.

Section 3.32 – NR 812.46: Water sampling, analysis and reporting requirements

NR 812.46 summarizes water sampling, analysis and reporting requirements. It is important to know what circumstances require a water sample to be collected and the proper procedures for collecting a water sample and documenting the test results. Repeatedly failing to take water samples when they are required can result in receiving a citation and creates a risk to human health and groundwater.

3.32.1 NR 812.46: Water sampling, analysis and reporting requirements

This section identifies when a pump installer is required to collect water samples for various activities regulated in NR 812. The section includes details on where to collect water samples, what contaminants to test for, sample collection and handling practices, which laboratories are allowed to do testing, and the pump installer's responsibility to provide the test results to the well owner. The section explains when a pump installer can delegate the sample collection responsibility to someone else and indicates that collection of property transfer inspection water samples cannot be delegated. The section includes a list of laboratory responsibilities and explains the specific instances where water sample test results cannot be used for more than one purpose.

Part 2: General Knowledge

Chapter 4.0 - Hydrogeology

Section 4.1 - Aquifers

4.1.1 Four aquifer types in Wisconsin

An aquifer is a water bearing geologic formation. The water resides in the pore space between grains in sand and gravel and sandstone formations and in the fractures of granite and dolomite formations. Wisconsin is home to four main aquifers. <https://wgnhs.wisc.edu/water-environment/wisconsin-aquifers/>

- 1. Sand and Gravel- The sand and gravel aquifers of Wisconsin were formed mainly from glacial outwash. They are not uniform throughout the state, but they can be found in nearly all the Wisconsin counties, especially in river valleys.*
- 2. Eastern dolomite aquifer- This aquifer is on the eastern side of the state and is formed of the upper most and youngest dolomite rocks in the state. It is also known as the Silurian aquifer or the Niagaran aquifer. This aquifer extends from Door county in the north all the way to the Illinois/Wisconsin state line.*
- 3. Sandstone and dolomite: This aquifer is also known as the Cambrian aquifer or the Cambrian-Ordovician aquifer. This aquifer underlies the sand and gravel and Silurian aquifers described above. This aquifer is made up of both sandstone and dolomite and is the target formation for most municipal wells throughout the state. This aquifer is absent in the north-central part of the state.*
- 4. Crystalline Bedrock- This aquifer is also known as the Precambrian aquifer. This formation underlies the entire state, though it is only used as an aquifer in the northern part of the state where it is sometimes the only available aquifer. This aquifer is comprised of the oldest rock in Wisconsin and is comprised of igneous and metamorphic rocks. It is typically low yielding as the rocks are fine grained and less fractured than dolomite aquifers. Sometime hydrofracturing is necessary to enlarge the fractures enough to produce enough water.*

4.1.2 - Specific capacity and well yield

Specific capacity is a required field on the well construction reports. Specific capacity is the quantity of water a well can produce per unit of drawdown. It gives a general idea of how much water a well can produce. To calculate specific capacity, the yield (gpm) will be divided by the drawdown (in feet). For example, a well is pumping at 10 gallons per minute and has a drawdown of 20 feet during a pump test. The specific capacity of this well would be 0.5 gpm/ft. Specific capacity can be calculated regardless of the duration of the pump test, but a longer pump test will provide more accurate results. A pump test should run long enough for the drawdown to reach steady-state conditions (a point at which drawdown stabilizes).

Chapter 5.0 – Disinfection

Section 5.1 – Disinfection

5.1.1 - Disinfection

New wells and wells that produce bacteriologically unsafe water should be disinfected. Disinfection is usually performed using a chlorine solution to kill any bacteria in the well and system. Mechanical methods may also be required to ensure the well is adequately disinfected.

For severe bacterial infestations perhaps involving a biofilm, like an iron or sulfate reducing bacterial slime, more aggressive approaches may be necessary. These approaches include a more concentrated chlorine solution, measures to control the pH of the solution, or the addition of salt (NaCl) or other department approved products. Sometimes it is also necessary to revert to physical rehabilitation methods such as scrubbing the inside of the well with a brush or using a surge block to help remove slime or mineral buildup that can harbor the bacteria.

Section 5.2 - Sanitary condition

5.2.1 Definition and common use

All well work is to be done in a manner that prevents the introduction of contamination into the well or water supply system. This is the generally understood use of the phrase “sanitary condition”. Sanitary condition is a term that is also formally described in NR 812.07(93). This phrase is referred to often in NR 812. The definition in code is; construction that protects a water source from surface contamination and the area surrounding the water source are free of debris and filth and the water source must not be subject to flooding. Both the general and the code definition are standard practice for pump installation activities. An example of an unsanitary condition is a pumphouse that contains rodent droppings and nesting debris. Another is dirt picked up on a well pump and riser pipe caused by lying the components directly on the ground prior to installing them in the well. An example of a sanitary alternative to lying the pump and riser pipe directly on the ground is to lie down plastic sheeting to prevent collecting dirt on the pump/riser pipe assembly. An example of a sanitary pumphouse is one that has no storage items, is painted with a washable surface paint in clean condition and has watertight crack -free clean flooring. Develop work practices that promote a sanitary condition in your daily work.

Section 5.3 - Actions to address bacteria-positive water test results

5.3.1 Mechanical scrubbing, acidification and purging of Wells

Many factors can contribute to an unsuccessful attempt to disinfect a well or water system. One factor is the presence of sludge, mineral incrustations and other material building up in a well. When an initial attempt at disinfection results in a bacteria-positive water test, consider removing debris from the well by removing the pump and mechanically scrubbing or acid-treating the pump, riser pipe, electric lines, well interior and any other interior components. Remove all freed materials settled in the well bottom by bailing or air-purging the well. Do another disinfection and purge cycle once the scrubbing, acidification and bailing or air-purging processes are complete.

5.3.2 Cross-connections with sumps, dead ends, water softener resin.

Any part of the water system that promotes stagnant water or the introduction of water from sources other than the well may also be a source of bacterial contamination. A cross-connection between the water system and water in a sump can be a source of contamination. To minimize this risk to the drinking water system, the cross-connection can be disconnected to prevent this potential source of contamination. In other cases, pipes that end in a pipe cap or other infrequently used dead ends in the plumbing system promote stagnant zones that can prevent access of the disinfectant solution and facilitate bacteria surviving the disinfection process. Disinfection and flushing attempts may not reach dead ends in the water supply system. These areas may need to be removed or rerouted to allow disinfectant solutions to pass through them. A third possible source is the resin bed in a water softener. Water softener resin can become contaminated as this area can be bypassed during standard disinfection and flushing. Consider disposing of the old resin, disinfecting the empty softener and replacing the softener with new resin.

In some commercial applications, large pressurized water storage tanks may be present. When calculating the volume of disinfection solution required, be sure to include the volume of the pressure tank or tanks in the plumbing system along with the volume of the well.

5.3.3 Bleach concentration and controlling pH of disinfection solutions

Another factor that may be contributing to persistent bacteria positive water test results when attempting to disinfect a water system is the pH of the solution. Additional details about this subject are available in [a department document](#). Chlorine solutions like bleach are basic (higher pH than 7). The effectiveness of bleach to disinfect a well or water system is highly influenced by the pH of the disinfectant solution. Even when very high bleach concentrations are used, their effectiveness to kill bacteria is limited by the pH of the solution. Disinfectant solutions with higher bleach concentrations will have higher pH values.

The best pH to strive for is a value of about 7 (Neutral). There are many inexpensive meters or test papers that can be used in the field to monitor the pH of disinfection solutions. Simple acids like vinegar or phosphoric acid can be used to lower the pH of a disinfection solution when it becomes too high. Introducing the acid solution will lower the pH of disinfection solutions that have pH numbers that are too high (above 8).

Chapter 6.0 - Reporting requirements

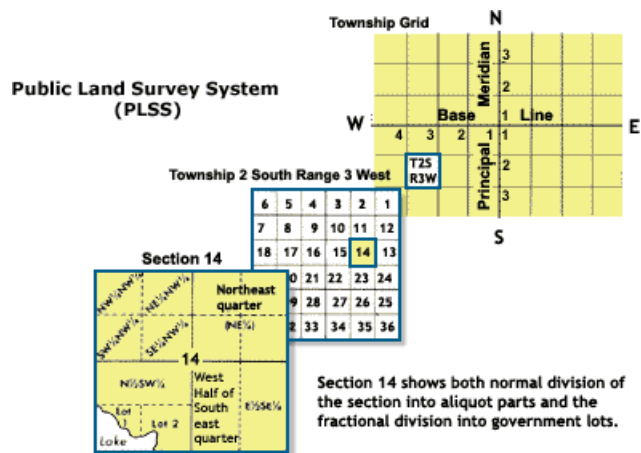
Section 6.1 – Locating a well using the Public Land Survey System

6.1.1 Description of the PLSS

Department forms require the Public Land Survey System (PLSS) location of a well to be reported. When Wisconsin was first surveyed, it was divided into a grid of boxes that are each 36 square miles. This grid system is known as the Public Land Survey System (PLSS). The PLSS is one standardized method that can be used to describe a well location. An example of a legal description using the PLSS is given below.

NE 1/4 NE 1/4, S14, T2S, R3W

The descriptions are generally read from front to back. For example, the description above would be read "The northeast quarter of the northeast quarter of section 14, township 2 south, range 3 west." Refer to the figure below for the derivation of the naming. Note that all townships in Wisconsin are N (north).



TOWNSHIPS OF THE PUBLIC LAND SURVEY SYSTEM. SOURCE: NATIONAL ATLAS OF THE UNITED STATES.

For a more detailed explanation of using the PLSS, refer to [a department Tutorial on Public Land Survey System Description](#).

Section 6.2 - Locating a well using Global Positioning System and the Well Driller Viewer

6.2.1 Description of using GPS to report a well location

Department forms also require the latitude and longitude coordinates of a well to be reported. Determining the latitude and longitude requires information from devices that locate using the Global Positioning System (GPS). Devices that can be used to gather GPS coordinates include commercial GPS units, Internet search engines, smart phones or department map viewers such as DNR's Well Driller Viewer. The department requires GPS coordinates to be reported in "decimal degrees" format rounded to four digits after the decimal point. Be sure your device is set to record in decimal degrees.

An example of correct reporting of GPS data is Latitude 43.4526 and Longitude 89.3805. In Wisconsin, correct GPS coordinates will have a latitude number between 42 and 47 degrees with a longitude value between 86 and 93 degrees. Any numbers outside of that range are incorrect. The longitude number is technically a negative value, but reporting exists as positive or negative in practice. For more detail, refer to a department web page on [Accurately locating wells and drillholes for applications and reports](#).

6.2.2 Well driller viewer

The well driller viewer was created by the DNR to help contractors. There are tools in the viewer to plot GPS coordinates, measure distances, draw shapes, locate DNR landfill buffers, locate contaminated properties, special well casing depth areas, etc. Another key feature of the well driller viewer is the ability to view surrounding well construction reports to determine geology. The department recommends that any contractor planning a well or heat exchange drillhole to review the area on the driller viewer for potential sources of contamination or special casing depth area requirements. The department also suggests verifying PLSS and GPS coordinates to ensure the reported location is accurate on the well construction report. The link to the well driller viewer is found here: https://dnrmaps.wi.gov/H5/?viewer=Well_Driller_Viewer

Section 6.3 – General reporting requirements

6.3.1 Well construction reporting

A well construction report (Form 3300-077A) must be submitted to both the department and the well owner within 30 days of any of the following activities:

- *Well construction*
- *Well reconstruction*
- *Constructing or replacing a driven point well*
- *Construction of a dry drillhole or unsuccessful well if not immediately filled and sealed*
- *Replacing a screen if set more than 5 feet above or below the depth of the original screen*
- *Replacing the screen of a driven point well, regardless of depth.*

Starting January 1, 2023, all Well Construction Reports must be submitted to the department electronically.

If a Well Construction Report is returned for correction by the department, it must be corrected and re-submitted within 15 days.

6.3.2 Well filling and sealing reporting

A well and drillhole filling and sealing report must be submitted to the department within 30 days after filling and sealing the well or drillhole. This report must be submitted electronically.

6.3.3 Sampling reporting

Well drillers and well constructors must submit samples to laboratories that are certified under chs. ATCP 77 and NR 149 for the following contaminants and activities:

- *Coliform bacteria only – pump installing in a new well (if the pump installer is different than the well driller), replacing a pump or pressure tank on an existing system when no entry into the well is required, pump installing activities involving entry into the well when arsenic and nitrate samples have been collected within the last 6 months by the same pump installer, entering the well to diagnose a well feature or problem, property transfer well inspections (nonpotable only), or after corrective action for a bacteria-positive test.*
- *Coliform bacteria and nitrate – Initial well construction, reconstruction, redevelopment or physical conditioning.*
- *Coliform bacteria, nitrate and arsenic – entering the well to perform pump installation activities, chemical conditioning and property transfer well inspection (potable wells only)*

Forms 3300-077 for first water quality test and 3300-265 Water Quality - Pump Work test are the forms used.

6.3.4 Well compliance inspection report

A well compliance inspection report (Form 3300-305) must be submitted to the well owner whenever a well or system is inspected prior to any construction, reconstruction, or equipment installation on a system with any noncomplying features that are apparent or known, within 10 days of the evaluation. In addition, the form must be completed and provided to the well owner prior to adding treatment and when required to measure casing depth.

6.3.5 Property transfer well inspection report

Form 3300-221 must be used by the inspector to report the results to the person who requested the inspection. The form lists all potential noncomplying features that an inspector is responsible for checking. The inspection form is provided to the person requesting the inspection. The form is not submitted to the department and use of the form does not imply department approval of the well and pressure system.

Chapter 7.0 - Water sampling

Section 7.1 - Residual chlorine

7.1.1 Removing residual chlorine

Water samples collected and sent to a laboratory for bacteria analysis must be free of any residual chlorine remaining from the disinfection process. All drinking water samples are screened for the presence of chlorine upon arrival at the laboratory and will be rejected if residual chlorine is detected. Proper system flushing for a sufficient time is essential when purging the disinfectant solution from a water supply system. If your sense of smell can detect any odor of chlorine in the water you intend to sample or the

water sample tests positive with a chlorine test strip, the well system should be purged for a longer time before collecting a sample for bacteria analysis.

Section 7.2 – Arsenic and metals sampling

7.2.1 Arsenic and Metals Sampling

A water sample collected for arsenic analysis can produce high arsenic test results that do not reflect the groundwater levels of arsenic, depending on how the water sample is collected. Particulate matter included in a water sample collected for arsenic analysis can increase the arsenic test results. Two causes of particulate matter are; 1) disturbing the water sampling tap when sampling and 2) not purging the water system enough or not allowing sufficient time to pass following the disinfection and purging before collecting a sample.

Well water that is oxygenated through the disinfection process, high rate of purging at, or disturbance of, the sample faucet or from recent well drilling activities may also produce a higher arsenic sample result. Avoid over chlorinating and allow the well water to stabilize for several days to a week or more may result in a lower arsenic result than a sample that is collected immediately following drilling or disinfection.

In addition, Wisconsin has sulfide deposits in certain bedrock formations that have been economically important in the past. Although it is uncommon, these mineralized zones can inadvertently be drilled into for the construction of drinking water wells. When these deposits become oxidized from well installation or well use, arsenic and other potentially harmful metals can be introduced to groundwater at levels that exceed Federal drinking water health standards. Water supply specialists at the department can help determine what formation a well is constructed in. This metals screening analysis is available from many certified laboratories.

Chapter 8.0 - Calculations

Section 8.1 - Calculating bentonite chip volume

8.1.1 Chip volume

Calculating the volume of material required to fill and seal a well or drillhole is important because it can identify when bridging, a downhole obstruction or some other unknown condition is present that may need to be addressed. A table like the one below can be used to estimate the number of bags of bentonite chips that are required to fill and seal a well or drillhole. For example, to calculate the number of bags of chips required to fill a 6-inch diameter well that is 150 feet deep, run down the first column on the left until the 6-inch diameter hole is located, then run across the row to the right until the column for the number of feet filled by one bag is found. This number (3.5) is the number of feet filled by one bag. Dividing 150 feet by this number results in $150/3.5 = \sim 43$ bags.

Number of 50 lb. Bags of Bentonite Chips to Fill a Well

Hole Dia (Inches)	Hole Volume (Ft ³ /Ft)	Pounds of Bentonite Chips to Fill 1 Ft	Feet Filled by One Bag of Bentonite Chips	Bags of Bentonite Chips to Fill 100 Ft
4	0.087	6.3	7.9	12.6
4 1/2	0.11	7.9	6.3	15.8
5	0.136	9.8	5.1	19.6
5 1/2	0.165	11.9	4.2	23.8
6	0.196	14.1	3.5	28.2
6 1/2	0.23	16.6	3	33.2
7	0.267	19.2	2.6	38.4
7 1/2	0.307	22.1	2.3	44.2
8	0.349	25.1	2	50.2
8 1/2	0.394	28.4	1.8	56.8
9	0.442	31.8	1.6	63.6
9 1/2	0.492	35.4	1.4	70.8
10	0.545	39.2	1.3	78.4
11	0.66	47.5	1.1	95
12	0.785	56.5	0.89	113
15	1.227	88.3	0.57	176.6
18	1.767	127.2	0.39	254.4
20	2.182	157.1	0.32	314.2
25	3.409	245.4	0.2	490.8
30	4.909	353.4	0.14	706.8

Chapter 9.0 - Filling and sealing

Section 9.1– Why filling and sealing is important

9.1.1 Why filling and sealing is important

Wells and drillholes require filling and sealing for a number of reasons. Wells that cannot be adequately decontaminated, cannot be brought into regulatory compliance, or have been unused for a long period of time all need to be filled and sealed. Among the issues filling and sealing addresses are:

- *The well is a vertical conduit that can allow shallow contaminants to migrate into a deeper aquifer.*
- *Surface drainage, vermin and debris could gain direct access to an unsealed well and contaminate groundwater.*
- *It can be a physical safety hazard (e.g., small animals or children could fall into it).*

Section 9.2 - Removal of a stuck pump

9.2.1 Stuck pump removal

NR 812.26(5)(b) discusses the removal of obstructions prior to filling and sealing. When a pump is stuck in a well the code states “a reasonable attempt shall be made using the best available technology to pull it out.” As a recommendation, this can be interpreted as using a hydraulic jack, winch or other mechanical device to attempt to free the stuck pump. This applies to pumps that have some practicable way to attach a wire cable, chain or other pulling attachment.

Wisconsin Pump Installer License Practice Exam

1. "Pump installation" does not include which of the following:
 - a. A water treatment device installed downstream from the water storage or pressure vessel.
 - b. Check valves installed upstream of the water storage or pressure vessel.
 - c. Installation of a pitless adapter.
 - d. Installation of a well cap or seal.

2. Engaging in the business of pump installing includes which of the following:
 - a. Advertising and bidding on pump installation projects.
 - b. Receiving payment for property transfer well inspection activities.
 - c. Supervising a pump installation project.
 - d. All of the above.

3. A pump installer or water well driller license is not required for which of the following:
 - a. Well filling and sealing.
 - b. Property transfer well inspections.
 - c. Obtaining a water sample when not for a property transfer inspection.
 - d. All of the above.

4. A licensed pump installer is legally and financially responsible for correcting noncomplying work done by them or done by anyone under their supervision.
 - a. True
 - b. False

5. Which of the following is accurate with respect to renewal of an individual pump installer license each year?
 - a. The licensee must earn six continuing education hours by attending department approved continuing education sessions between January 1st and December 31st.
 - b. The licensee must submit a renewal application on a form specified by the department on or before December 31st.
 - c. Only one renewal fee of \$25.00 is paid if the licensee holds both a pump installer license and water well driller license.
 - d. Both a & b are accurate.

6. Holding a pump installer license allows an individual to install a water treatment device upstream of a pressure tank.
 - a. True
 - b. False

7. A property owner decides to develop a mobile home park. The mobile home park will have 9 mobile homes with 18 permanent residents total. A proposed well serving the mobile home park will be a low capacity well. Which of the following statements is true?
 - a. The well and water system must be constructed to meet the standards of NR 812, and no advance approval is required from the department.
 - b. The well and water system must be constructed to meet the standards of NR 812, and requires advance written approval from the department.
 - c. The well and water system must be constructed to meet the standards of NR 811, and requires engineering plan approval from the department.
 - d. The well and water system must be constructed to meet the standards of NR 811, and no engineering plan approval is required from the department.

8. A pump installer is contacted by a developer to plan and conduct a pump installation for a new 30-unit condominium with year-round residents. The plan and installation must meet the following requirements:
 - a. The pump installer may install a factory-assembled and pressure-tested pitless adapter unit if it is pressure tested in the field.
 - b. The department must review and approve design plans before the pump installation can be done.
 - c. The pump installer may not install an above-ground discharge unit.
 - d. a and b.
 - e. a, b and c.

9. A pump installer may replace a pump in a well that has a noncomplying well cap without informing the owner of the noncompliance or installing a complying well cap.
 - a. True
 - b. False

10. Which of the following **is not** true when a pump installer is filling and sealing a well with bentonite chips?
- The chips must be poured across a coarse-mesh screen so that fine particles and dust can be prevented from entering the well.
 - The depth of filling must be monitored every 20 bags in order to ensure that bridging has not occurred.
 - The bags must be poured at a rate no faster than 3 minutes per bag.
 - Clean water must be poured into the well until it reaches the top, in order to hydrate the chips.
 - The pump installer must check that the well will not accept any additional water at the time he leaves the site.
11. An approved vermin-proof well cap or seal is not required to be installed on a well if the well is located in a substantial permanent weather-proof shelter.
- True
 - False
12. Which of the following methods/equipment is allowed for attaching the beveled lower end of a factory-assembled and pressure-tested pitless unit to steel well casing pipe:
- A compressible joint.
 - Welding the threaded ends of the pitless unit to the cut-off well casing pipe.
 - Welding the beveled end of the pitless unit to the top of the well casing pipe, as long as the top of the well casing pipe has been beveled.
 - Joining the pitless unit to the well casing pipe using a welding collar or sleeve.
13. Granite bedrock wells approved for installation of 25 feet or less of well casing pipe must have an above-ground discharge installed.
- True
 - False
14. If fertilizer will be injected into the discharge line of a high-capacity irrigation well, then:
- A reduced pressure principle backflow preventor must be installed on the pump discharge line upstream of the injection point.
 - A double check valve must be installed on the pump discharge line upstream of the injection point.
 - An Underwriter's Laboratory (UL) approved check valve must be installed on the pump discharge line upstream of the injection point.
 - a or c.
 - b or c.

15. A pump installer is installing a submersible pump in a 6-inch diameter drilled low capacity private well. The submersible pump contains a check valve at its discharge end. The pump installer decides to install an additional check valve in the water system. Where may the second check valve be located?
- In the basement, upstream of the pressure tank.
 - In the buried portion of the water line between the well and the basement.
 - In the pump discharge line within the well.
 - None of the above.
16. Which of the following statements are correct regarding yard hydrants?
- A yard hydrant may be installed in or on the well.
 - A yard hydrant installed downstream of the pressure tank falls under the jurisdiction of the department of Safety and Professional Services (DSPS).
 - A yard hydrant having a hose threaded outlet shall have either a hose connection vacuum breaker or backflow preventor installed.
 - A yard hydrant having a hose threaded outlet is not required to have backflow protection if the outlet complies with the airgap requirements of DSPS.
 - b, c, and d.
17. A pump installer has arrived at a customer's residence to install a replacement pump. The well and pump are located in what appears to be a properly constructed concrete pit. Upon closer examination the pump installer notices water marks on the walls of the pit. In addition, the pit contains a working sump pump in the pit's sump. The pump installer should:
- Disconnect the worn-out pump and install a new one, being sure to include a sample faucet.
 - Inform the owner that the installation appears to have flooding problems, does not meet NR 812, and must be upgraded by extending the well casing pipe above grade and eliminating the pit.
 - Tell the owner a gravity drain must be installed to eliminate the flooding problem.
 - Tell the owner that you can construct a replacement pit without a variance or approval from the department.
18. A property owner had a new well drilled to replace her failing old well located in a noncomplying well pit. The well driller properly filled and sealed the old well with neat cement. The owner wants you to connect her old jet pump to the new well with a pitless adapter. She wants the pump and pressure tank to remain in the old pit. You inform the owner:
- The installation would be noncomplying because offset jet pumps cannot be used with pitless adapters.
 - The installation could be allowed because the well driller properly filled and sealed the old well.
 - The installation would be noncomplying because pumps and pressure tanks may not be located in noncomplying pits.

19. If an initial disinfection following pump work results in a bacteria-positive water sample test result, what additional code compliant actions can be taken so that the well produces water free from coliform bacteria?
- Make sure the well water sample has a slight odor of or test positive for bleach using colorimetric test strips when you collect the follow-up sample.
 - After removing the pump, use an approved acid solution to dissolve mineral incrustations within the well.
 - Remove and scrub the pump, discharge line and drop-pipe then mechanically scrub and purge the interior of the well.
 - b and c.
20. You have disinfected and purged a well following a pump replacement. You collect a water sample for laboratory analysis for bacteria. The sample has a slight odor of chlorine and tests positive for chlorine using a colorimetric test strip. Which of the following promotes a representative bacteria sample result?
- The odor is so slight that you can submit the water sample to the laboratory as-is since the odor will be gone by the time it reaches the lab.
 - You continue to purge the well until no chlorine odor is present. You dispose of the first sample and collect a replacement water sample to send to the lab.
 - The remaining chlorine will keep the sample from being contaminated during shipping. You submit the water sample to the laboratory as-is.

Practice Exam Answer Key

1. a

2. d

3. c

4. a

5. a

6. a

7. a

8. d

9. b

10. b

11. b

12. c

13. a

14. d

15. c

16. e

17. b

18. c

19. d

20. b