

(3) **FINISHING OPERATIONS.** Upon completing well construction or reconstruction operations or pump installation or repair work requiring removal of the pump or pump piping from the well, the well driller and pump installer shall carry out finishing operations as follows:

(a) *Disinfection.* The well shall be disinfected in the manner prescribed by the department. In addition, the pump installer shall disinfect the pump and discharge piping, the pressure vessel or reservoir.

(b) *Flushing.* The well shall be flushed sufficiently to remove all traces of the disinfectant and to condition the well for use. In addition the pump installer shall flush out the discharge piping and the pressure vessel or reservoir.

(c) *Testing.* The well shall be tested by pumping, except when flowing in excess of requirements, to determine the amount of drawdown and the quantity and stability of the yield within the requirements of NR 112.17(1)(b), NR 112.03(2), and NR 112.08(1)(c), or if in excess thereof, as specified by agreement with the purchaser. With flowing wells, the static water level in a stilling pipe or artesian pressure under static conditions shall be measured as shall be the drawdown or reduction in artesian pressure.

(d) *Sealing.* The well shall be sealed or covered with an approved type well seal or well cap. (Note: See NR 112.17(1), (2) and (3).)

(4) **BLASTING.** The use of explosives for increasing or recovering yield of any well developed into limestone, shale, granite or quartzite formations, or of any sandstone well in which casings and liners are not grouted or in which the diameter of the drillhole is larger than that of casings or liners above the point of shooting, shall be undertaken only under permit from the department. (Note: See NR 112.16(3).)

(5) **CHEMICAL CONDITIONING.** (a) *Noncontinuous treatment of wells and pumps.* The use of dry ice, detergents, chlorine, acids, or other chemicals in wells for the purpose of increasing or restoring yield; the use of chemicals, other than chlorine, to combat iron bacteria and sulfur bacteria well infestations and the use of chemicals, other than chlorine, for treatment of pumps for removal of scale or chemical depositions shall be undertaken only under permit from the department. No permit is required for batch chlorination of wells and pumps for disinfection purposes. Chemical treatment of wells requiring a permit shall be done under supervision of a registered well driller or Wisconsin registered professional engineer. Chemical treatment of pumps requiring a permit as established in this subsection shall be done under supervision of a registered pump installer or Wisconsin registered professional engineer. All chemicals other than dry ice or chlorine shall be compounds determined to be acceptable by the department. (Note: See NR 112.16(3).)

(b) *Continuous water treatment of well and water system.* 1. Potability control. Continuous treatment of water in the well or in the water system for disinfection for potability control shall be undertaken only under a permit obtained by the water supply owner from the department. No permit will be granted for continuous disinfection of a well or water system producing bacteriologically unsafe samples until efforts to construct a new well and reconstruct the well or to reconstruct an

existing well in conformance with this chapter fail to result in a well that will continuously produce bacteriologically safe water.

2. **Quality control.** Chemical treatment of a well or the total water supply pumped from the well to a point including the pressure tank, reservoir or reservoir and pressure tank when booster pumps are installed, shall be done with chemical compounds and methods approved by the department. Approval of methods of injection of chemicals will be based on adequacy of control of rates of feed against a range of pressures and of the anti-backsiphon provisions of the equipment planned for use.

3. **Equipment installation.** Installation of treatment equipment requiring plumbing connections to the water system shall be made by a licensed plumber, except that when such equipment is installed prior to the pressure tank, the installation may also be made by a registered pump installer.

(6) **OTHER TREATMENT.** Nonchemical type mechanical equipment or devices for continuous water treatment shall be installed in the water system only under permit of the department. All nonchemical treatment of water in the system when permitted by the department shall be done with equipment and methods or processes approved by the department. No permit will be granted for the purpose of continuous nonchemical disinfection of a water supply unless efforts to construct a new well and reconstruct the well or to reconstruct an existing well in conformance with the code have failed to result in a well that will continuously produce bacteriologically safe water. Installation of nonchemical treatment equipment requiring plumbing connections to the water system shall be made by a licensed plumber, except that if such equipment is installed prior to the pressure tank, the installation may also be made by a registered pump installer. Approval of the equipment and method or processes is based on their specific ability to perform effectively over a range of conditions and their having adequate controls, and warning devices when necessary, to prevent accidental supplying of polluted water to points of use.

(7) **DRILLING AIDS.** Materials used as drilling aids such as drilling muds and foam or other aids, shall be compounds or materials approved by the department. Approval of drilling aids is based on toxicity, ground water contaminant possibility and expected effectiveness of the materials.

(8) **INJECTION OF FERTILIZERS OR OTHER CHEMICALS FOR AGRICULTURAL PURPOSES.** (a) *Potable water supplies or systems.* The injection of fertilizers and pesticides into the discharge pipe or water system is prohibited. Use of such chemicals shall be accomplished by repumping from a steel reservoir tank or a watertight pond. The discharge from the well pump into such reservoir or pond shall have a free fall from a point at least 2 feet above the established reservoir or pond overflow elevation.

(b) *Non-potable water supplies.* 1. Injection of fertilizers. a. Injection of fertilizers into a well or well pump suction pipe is prohibited.

b. The injection of fertilizers should preferably be done in the discharge pipe of a booster pump delivering water from a concrete or steel tank or sealed pond into which the well pump discharges with a free air-break from a point at least 2 discharge pipe diameters above the over-

flow level of the tank or pond, rather than into the discharge pipe of a well pump connected directly to the water system.

c. Injection of fertilizer into the well pump discharge pipe is acceptable, providing it is done with an approved positive displacement type of chemical feed pump at a point following a barometric pipe loop extending at least 30 feet above the highest part of the irrigation system; or a reduced pressure backflow preventer made to and meeting AWWA C506-78 or ASSE 1013 standards; or an underwriters laboratories (UL) approved check valve and preferably a double UL check valve installed in the well pump discharge pipe at the well site. The chemical feed pump shall be shut off at least 5 minutes prior to shutting off of the well pump so as to purge the chemical from the water system. Injection of pesticides into the well pump discharge line is prohibited.

2. Injection of pesticides. a. The injection of pesticides into a well or well pump suction is prohibited.

b. The injection of pesticides into a water system should preferably be done in the discharge pipe of a booster pump delivering water from a concrete or steel tank or sealed pond into which the well pump discharges with a free air-break from a point at least 2 discharge pipe diameters above the overflow level of the tank or pond.

c. Injection of pesticides into the well pump discharge pipe is prohibited, unless the injection is done with an approved positive displacement type of chemical feed pump at a point following a barometric pipe loop extending to a minimum height of 30 feet above the highest point in the irrigation system or an approved reduced pressure backflow preventer made to and meeting AWWA C506-78 or ASSE 1013 standards, installed in the well pump discharge pipe at the well site but subject to the following conditions:

1) That the department of natural resources shall be notified by the owner of an irrigation system of the installation of a reduced pressure backflow preventer in such system.

2) The backflow preventer shall be installed above flood level and the location shall be accessible for testing, inspection and maintenance.

3) The reduced pressure backflow preventer shall not be bypassed or made inoperative nor shall it be removed from an irrigation system in which pesticides continue to be injected into the pump discharge pipe.

4) An annual testing of the reduced pressure backflow preventer shall be conducted with a differential pressure gauge testing method for reduced pressure backflow preventers by the local plumbing inspector or a person certified by the state department of health and social services, and the owner of the system shall supply a report of the test results to the department before each irrigation season.

5) Pesticide application and use done in compliance with this section must also conform to rules concerning application and use of pesticides contained in section Ag 29.10, Wis. Adm. Code.

3. Standards and tests. a. Copies of the above mentioned ASTM, ASSE and UL standards are available for inspection at the office of the department of natural resources, the secretary of state, or the office of

the revisor of statutes, and respective copies may be obtained for personal use from the American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103; the American Society of Sanitary Engineers, 960 Illumination Building, Cleveland, Ohio 44113 and Underwriters Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611.

b. Lists of approved reduced pressure backflow preventers, check valves and positive displacement feed pumps are available for inspection at the offices of the department of natural resources.

c. Certification as a tester may be obtained from the Wisconsin Department of Health and Social Services, Washington Square Building, 1414 E. Washington Avenue, Madison, Wisconsin following successful completion of one of the training courses provided by the University of Wisconsin Extension, Madison, Wisconsin or the University of Southern California School of Engineering, University Park, Los Angeles, California 90007.

History: Cr. Register, June, 1975, No. 234, eff. 10-1-75; cr. (8), Register, April, 1978, No. 263, eff. 5-1-78; am. (8) (b), Register, April, 1980, No. 292, eff. 5-1-80.

NR 112.16 Samples and reports. (1) **WATER SAMPLES.** Upon completion of the well construction, except those not intended as a source of water supply for drinking or food processing purposes, the well driller shall collect a water sample from the well, by use of a pump, for bacteriological analysis. Likewise, upon completion of the installation of pumping equipment and disinfection and flushing of the well and water system, except those not intended as a source of water supply for drinking or food processing purposes, the pump installer shall collect a sample from the well for bacteriological analysis. Exceptions to these procedures will be permitted when the well driller also installs the pump, in which case submission of the required sample upon completion of the pump installation will be considered satisfactory compliance. Where unforeseeable contamination is encountered, the initial construction of a well will be considered complete if the construction conforms to provisions of this chapter. The water samples shall be submitted either to the state laboratory of hygiene or to an independent laboratory certified under the state laboratory certification program to do bacteriological examination of water; provided that such certified laboratory will file the water sample data sheet and a copy of the water sample analysis report with the department within 20 days following completion of the analysis.

(2) **WELL CONSTRUCTION REPORTS TO DEPARTMENT.** Within 20 days after completing the construction or reconstruction of a well the constructor thereof shall submit a construction report to the department upon a form prescribed and furnished by the department.

(3) **WELL CONDITIONING REPORT TO DEPARTMENT.** Within 20 days after completing any well blasting or chemical treatment operation the well driller, pump installer or other supervisor shall submit a complete report as to methods used and the results achieved for cases covered by the section. (Note: See NR 112.15 (4) and NR 112.15 (5) (a).)

(4) **REPORTS TO OWNERS.** The well driller and pump installer shall supply the owner or his agent with a copy of the laboratory analyses report for the sample submitted to the laboratory at completion of their respec-

tive work. The well driller shall also supply to the owner or his agent a copy of the well construction report at the time the report is made to the department.

History: Cr. Register, June, 1975, No. 284, eff. 10-1-75; am. (1), Register, April, 1978, No. 268, eff. 5-1-78.

NR 112.17 Pump installation and construction. (1) **GENERAL.** The installation of every pump shall be so planned and carried out so that the pump will be:

(a) Installed in such manner that the pump and its surroundings can be kept in a sanitary condition.

(b) Properly sized so as to produce the volume of water necessary to meet the requirement of an adequate water supply. (Note: See NR 112.03 (2).)

(c) Designed to meet the well characteristics, durable in character and installed in such manner that continued operation without priming is assured at the time of installation.

(d) Installed in such manner as to provide adequate protection against contamination of any character from any surface or subsurface source.

(2) **UPPER WELL TERMINAL.** (a) For all low capacity water supplies other than for schools, and sewage treatment plants, the casing pipe of any drilled, bored or driven type well or of a dug well having a casing pipe reduction shall project not less than 8 inches above the permanent established ground surface at the well, or 8 inches above a pump house or building floor or platform installed above such established ground surface unless a permit for a subsurface terminal has been obtained. The well casing pipe shall be sealed or covered with an approved type well seal or cap, except that a nonwatertight cap shall not be used in pit installations. Seals for wells terminating outside of buildings shall have a one-piece top plate. (Note: See NR 112.14 (1) and (2) and (3).)

(b) For all school water systems, high capacity water systems and sewage treatment plant water systems, the casing pipe of any well shall project not less than 12 inches above the permanent established ground surface at the well, or 12 inches above a pump house or building floor or platform installed above such established ground surface. The well casing pipe shall be sealed or covered with an approved type well seal or cap. Seals for wells terminating outside of buildings shall have a one-piece top plate. (Note: See NR 112.14 (3).)

(3) **HAND PUMP.** (a) Every shallow well type hand pump and every deep well type hand pump head, shall be so designed and fabricated that no unprotected opening connecting with the interior of the pump exists. The spout shall be of the closed type. (Note: See NR 112.17 (4).)

(b) A hand pump shall be connected firmly to the well casing pipe by threading in case of small diameter well pipe or by bolting the pump flange to a well casing pipe flange with gasket separation so as to effectively seal the top of the casing, except that when a well is located so that the top is at least 2 feet above flood level, a hand pump may be installed by bolting a structured base with recesses to the casing. (Note: See figures 4 & 5.)

(4) **POWER DRIVEN PUMP.** (a) *Pump setting.* 1. Any deep well vertical centrifugal pump shall be so mounted on or over the well casing pipe or on a pump foundation or a pump stand as to permit effective sealing of the top of the well. Any power-driven shallow well suction pump, deep-well piston pump or deep-well jet pump located over the well shall be installed in such manner as to permit installation and removal of an approved type seal at the top of the well, such as an approved type unit with expandable rubber gasket.

2. In case the pump unit is not located over the well, and the shallow well pump suction pipe, submersible pump discharge pipe or jet pump piping emerges from the top thereof, an approved type seal with expandable rubber gasket or approved equivalent seal shall be provided between the well casing and the piping. A similar type seal with expandable rubber gasket shall be provided at the terminal of a nonpressure conduit containing suction, submersible or jet pump piping.

3. On above-ground pump installations, provided the elevation of the top of the well is at least 2 feet above the regional flood water level at the site and provided the discharge head base of a vertical centrifugal pump will be mounted on a base plate or foundation in such manner as to exclude entrance of insects into the well, the discharge head shall preferably be set on a concrete pump support base with protective well casing pipe projecting at least one inch above the concrete pump support base and into the base of the discharge head or the discharge head shall be installed with its base flange set with gasket onto a pipe flange attached to the top of the protective well casing by threaded or welded joint and with the discharge head flange bolted to the pipe flange. (Note: See sections NR 112.14(1), (2) and (3) and NR 112.17(8).)

4. If the pump base of a deep well vertical centrifugal pump discharge head is not of a recessed type or if the pump support flange for the pump column is of larger diameter than the protective well casing, the extension of the well casing one inch above the bottom of a pump discharge head subbase also will be considered an effective seal, subject to the same restrictions as stipulated in subparagraph 3. and provided that:

a. The top of the subbase and the bottom of the pump discharge head base are secured together as an integral unit by bolts, and

b. If either the top surface of the subbase or the bottom of the pump discharge head base is not a machined surface, a gasket is provided between the 2 surfaces prior to joining them permanently together.

(b) *Above-ground pumphouse or well house or shelter.* The structure housing a power driven pump shall be constructed having the following minimum features:

1. Reinforced poured-concrete floor with top of the floor at least 4 inches above the established grade.

2. Walk-in door opening outward when the pumphouse is large enough.

3. Trapped floor drain discharging to the ground surface when a door is not installed.

4. Thermostatically controlled electrical heating unit.

5. Removable or hinged roof.

6. Insulated walls and roof.

7. Walls firmly secured to floor.

8. Dimensions and actual details of wall and roof design are optional. The dimensions in table 4, figure 12 are recommendations. (Note: See section NR 112.14 (2) and figures 12 and 13.)

(c) *Lubrication of vertical centrifugal pumps.* 1. Oil lubricated vertical centrifugal pumps are limited to those cases where they are necessary to provide positive lubrication at deep pump settings but in no case shall they be approved for wells in unconsolidated formations or where the pump operation is expected to lower the water level in the well during pumping to a point less than 5 feet above the bottom of the protective well casing pipe.

2. Normally water lubricated vertical centrifugal pumps are required. For water levels deeper than 50 feet, provision shall be made for prelubricating the column bearings prior to pump startup. The necessity of lubrication during pump backspin when allowed to occur shall be determined and provided if necessary. Water for lubrication of pumps shall be supplied by piping connected to the water pressure system.

(d) *Protection from freezing.* Unless an approved-type above ground discharge unit is installed or the discharge pipe is installed above grade and drains back above grade into the well between pumping cycles, the pump discharge line and accessory equipment installed above grade shall be protected against freezing by insulation of structure and piping and installation of dependable heating facilities, preferably a thermostatically controlled type.

(e) *Pressure tank accessibility.* Hydropneumatic tanks in sizes of 1,000 gallons or greater preferably shall be installed above ground but if buried shall have the head end cradled in a basement wall or in the wall of an access pit constructed to the specifications for well pits. A permit shall be obtained for the construction of the access pit. Such large tanks shall have other additional support cradles. (Note: See NR 112.14 (4) and (5).)

(f) *Installation of meters.* Water meters shall be installed at a point in the pump discharge pipe prior to its connection to the hydropneumatic tank and prior to any branch service line.