

STATE OF MINNESOTA

Office Memorandum

DEPARTMENT : Health

DATE : July 28, 1992

TO : Legislative Commission to Review Administrative Rules
Room 55 State Office Building
100 Constitution Avenue, St. Paul, Minnesota

FROM : Jane A. Nelson, Rules Coordinator
Environmental Health Division
Minnesota Department of Health JN

PHONE : 627-5038

SUBJECT : Submission of Statement of Need and Reasonableness pursuant
to Minnesota Statutes, sections 14.131 and 14.23

In accordance with the above matter, the Minnesota Department of Health is submitting to you the Statement of Need and Reasonableness on proposed rules governing wells and borings, Minnesota Rules, parts 4625.3901, 4630.0600 and Chapter 4725. These rules are scheduled for publication in the State Register August 3, 1992 and would go to hearing, if necessary, October 1, 1992.

JAN:rlk

Enclosure

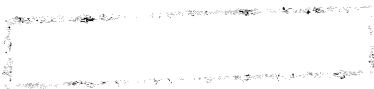
The Legislative Commission to
Review Administrative Rules

AUG -4 1992



2025-01-01 00:00:00
2025-01-01 00:00:00

2025-01-01



7/31/92 (rev)

**STATE OF MINNESOTA
MINNESOTA DEPARTMENT OF HEALTH**

In the Matter of Proposed Rules
of the Minnesota Department of
Health Relating to Wells and Borings,
Minnesota Rules, parts 4625.3901, 4630.0600,
4630.1801, 4717.7000 and Chapter 4725

Statement of Need
and Reasonableness

The proposed new rule parts and amendments to adopted rule parts within Minnesota Rules, chapter 4725 govern wells, borings and underground uses that relate to the protection of groundwater. This rule proceeding is the fourth stage of permanent rules proposed by the Minnesota Department of Health to implement Minnesota Statutes, chapter 103I "Wells, Borings, and Underground Uses" initially adopted in 1989 (Laws of Minnesota 1989, chapter 326, article 3) as the Minnesota Groundwater Protection Act. Chapter 103I was subsequently amended in Laws of Minnesota 1990 and again in 1991.

The proposed rules in Chapter 4725 revise standards for the construction, repair, and maintenance of wells and borings; revise isolation distances for water supply wells; propose new provisions on grouting, maintenance and sealing; streamline requirements for notices, permits, and records; address standards for vertical heat exchangers and groundwater thermal exchange devices; and clarify and reorganize provisions relating to licensure and registration. Many of the proposed amendments to the rule are designed to consolidate standards and eliminate duplicate rule language or paraphrasing of statute.

Amendments to part 4625.3901 update the cross references for water supply requirements for food and beverage establishments. Amendments to part 4630.0600 revise outdated language applicable to manufactured home parks and recreational camping areas for consistency with applicable well and public water supply laws and regulations.

Statutory authority to adopt rules

The legislative intent of Minnesota Statutes, chapter 103I is to "protect the health and general welfare by providing a means for the development and protection of the natural resource of groundwater in an orderly, healthful and reasonable manner" (Minnesota Statutes, section 103I.001).

In Minnesota Statutes, section 103I.101, subdivision 2, the commissioner of health is mandated to:

(1) regulate the drilling, construction, modification, repair, and sealing of wells and borings;

(2) examine and license well contractors, persons modifying or repairing well casings, well screens, or well diameters; constructing, repairing, and sealing unconventional wells such as drive point wells or dug wells; constructing, repairing, and sealing dewatering wells; sealing wells; installing well pumps or pumping equipment; and excavating or drilling holes for the installation of elevator shafts, or hydraulic cylinders;

(3) register and examine monitoring well contractors;

(4) license explorers engaged in exploratory boring and examine individuals who supervise or oversee exploratory boring;

(5) after consultation with the commissioner of natural resources and the pollution control agency, establish standards for the design, location, construction, repair and sealing of wells, elevator shafts, and borings within the state; and

(6) issue permits for wells, groundwater thermal devices, vertical heat exchangers, and excavation for holes to install elevator shafts or hydraulic cylinders.

Minnesota Statutes, section 103I.101, subdivision 5 mandates that the commissioner adopt rules on the:

(1) issuance of licenses for:

(i) qualified well contractors, persons modifying or repairing well casings, well screens, or well diameters;

(ii) persons constructing, repairing, and sealing unconventional wells such as drive points or dug wells;

(iii) persons constructing, repairing, and sealing dewatering wells;

(iv) persons sealing wells; and

(v) persons installing well pumps or pumping equipment and excavating holes for installing elevator shafts or hydraulic cylinders;

(2) issuance of registration for monitoring well contractors;

(3) establishment of conditions for examination and review of applications for license and registration;

(4) establishment of conditions for revocation and suspension of license and registration;

(5) establishment of minimum standards for design, location, construction, repair, and sealing of wells to implement the purpose and intent of this chapter;

(6) establishment of a system for reporting on wells drilled and sealed;

(7) modification of fees prescribed in this chapter, according to the procedures for setting fees in section 16A.128;

(8) establishment of standards for the

construction, maintenance, sealing, and water quality monitoring of wells in areas of known or suspected contamination, for which the commissioner may adopt emergency rules;

(9) establishment of wellhead protection measures for wells serving public water supplies;

(10) establishment of procedures to coordinate collection of well data with other state and local governmental agencies;

(11) establishment of criteria and procedures for submission of well logs, formation samples or well cuttings, water samples, or other special information required for geologic and water resource mapping; and

(12) establishment of minimum standards for design, location, construction, maintenance, repair, sealing, safety, and resource conservation related to borings, including exploratory borings as defined in section 103I.005, subdivision 9.

Minnesota Statutes, section 103I.221, subdivision 2 provides that "the commissioner may adopt rules relating to the installation of plastic well casing."

Minnesota Statutes, section 103I.301, subdivision 4 states, "Wells, monitoring wells, and dewatering wells must be sealed according to rules adopted by the commissioner."

Minnesota Statutes, section 103I.501 stipulates that:

- (a) The commissioner shall regulate and license:
- (1) drilling, constructing, and repair of wells;
 - (2) sealing of wells;
 - (3) installing of well pumps and pumping equipment;
 - (4) excavating, drilling, and sealing of holes for the installation of elevator shafts and hydraulic cylinders; and
 - (5) construction and sealing of environmental boreholes.

In Minnesota Statutes, section 103I.621, PERMITS FOR GROUNDWATER THERMAL EXCHANGE DEVICES, subdivision 4 states that, "the commissioner may adopt rules to administer this section."

Authority to regulate public water supplies is found in Minnesota Statutes, section 144.383.

With respect to amendments to existing part 4625.3901, authority to regulate food and beverage establishments is found in Minnesota Statutes, sections 144.05, clause 1, (b) and (c); 157.04, 157.08, 157.09 and 157.13.

With respect to amendments to part 4620.0600 governing water supplies for manufactured home parks and recreational camping areas, in addition to the general applicability of the provisions

authorized by Minnesota Statutes, chapter 103I, and Minnesota Rules, chapter 4725, most mobile home park or recreational camping areas are also governed by federal and state rules adopted under Minnesota Statutes, section 144.383 (Safe Drinking Water Act) which impact community and public water supply systems and are protected under the general regulatory authority of the commissioner found in Minnesota Statutes, section 144.12, subdivision 1, (13).

Rulemaking procedures

Minnesota Statutes, chapter 14 sets out procedures that must be followed when an agency proposes to adopt a rule. Section 14.10 requires an agency to seek information or opinions from persons outside the agency for adoption of a rule to publish notice of such action in the State Register. Notices of Solicitation of Outside Opinion were published July 22, 1991 at 16 S.R. 138 and on June 15, 1992.

A copy of this Statement of Need and Reasonableness was sent to the Legislative Commissioner to Review Administrative Rules as required by Minnesota Statutes, section 14.131.

The department provided notice of its intent to adopt the proposed rules and a copy of the proposed rules to all persons who have placed their names on the department's certified rulemaking list. A certificate attesting to the list, and an affidavit of mailing the rule and notice to persons on the certified list and to persons on the department's discretionary mailing list were prepared and will be submitted into the rule record. The department provided discretionary mailing of the proposed rule and notice to all licensed and registered well contractors, counties with delegation agreements with MDH, engineering firms, testing firms and laboratories, manufacturers, the Minnesota Department of Transportation, Minnesota Geological Society, county health departments, the Minnesota Water Well Association, Minnesota Office of Waste Management, Minnesota Department of Agriculture, Minnesota Pollution Control Agency, Minnesota Department of Natural Resources and United States Army Corps of Engineers. The department also provided notice to and discussed proposed amendment to parts 4625.3901 and 4630.0600 with representatives of the Minnesota Manufactured Home Park Association and Minnesota Campground and hospitality industries.

The department met with and discussed policy and draft rule provisions with members of the Advisory Council on Wells and Borings which includes representatives from the Minnesota Pollution Control Agency, Minnesota Department of Natural Resources, Minnesota Department of Agriculture, Minnesota Department of Transportation, Board of Water and Soil Resources and Minnesota Geological Survey (Minnesota Statutes, section 103I.105). The Council initially discussed and was ready to recommend revisions to the construction code as far back as 1988. The revision was

postponed because of major revisions to the statute adopted in 1989 on groundwater protection which was subsequently revised in 1990, 1991 and 1992. The council met to discuss issues on isolation distances, casing, grouting and well depth (December 12, 1990); contractor issues (January 23, 1991); grouting and construction in limestone (March 20, 1991); changes in the statutes (June 20, 1991); casing, grout, centering guides and casing connections (September 25, 1991); flush joint casing (December 11, 1991); and plastic casing and leader pipes (June 9, 1992).

Eight meetings on potential code revisions were held in 1991 with well contractors, drillers and any other interested parties including county sanitarians and well equipment manufacturers. These meetings were held in the metro area (August 6, 1991), St. Cloud and Mankato, (August 8, 1991), Duluth (August 12, 1991), Rochester (August 13, 1991), Bemidji (August 14, 1991), Fergus Falls and Marshall (August 15, 1991). Over 300 persons attended.

Separate meetings were convened to discuss agricultural issues (August 8, 1991), monitoring wells (August 1, 1991), and dewatering wells (August 7, 1991 and March 1992). Department staff met August 6, 1991 with counties that have delegation agreements with the department to license, register and inspect wells or were considering delegation of licensing and registration functions and with community health service representatives on August 7, 1991.

Department staff met with a task force representing various well drilling industry interests from throughout the state on September 30, 1991 to review and comment on a rule draft and discuss policy directions.

Persons interested in wells and borings from the Minnesota Pollution Control Agency (Michael P. Convery, CPG, Ground Water Unit, Program Development Section, Ground Water and Solid Waste Division); the Department of Natural Resources (Dan Zwilling, hydrologist, Division of Water's Ground Unit); and the Minnesota Department of Transportation (Dennis Larson) reviewed and commented on rule drafts.

Fiscal impact

The department estimates no net fiscal impact on state and local public bodies in the two years following adoption of the proposed rules. The rules clarify existing requirements and procedures, such as requirements for notices, permits, construction and sealing. Activities of the Minnesota Department of Transportation, Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, and local municipalities have been and continue to be impacted by Minnesota Statutes, Chapter 103I.

Small business considerations

Minnesota Statutes, section 14.115, requires that an agency consider five factors for reducing the impact of proposed rules on small businesses, these being:

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

Small business is defined as "...a business entity, including its affiliates that (a) is independently owned and operated; (b) is not dominant in its field; and (c) employs fewer than 50 full time employees or has gross annual sales of less than four million dollars..." The small businesses affected by the proposed rules are primarily well drilling firms and some environmental, engineering or testing firms; any small business that has or wants to have a well or boring such as an elevator shaft constructed; and laboratories. Many of the parties on the department's certified list and receiving the department's discretionary mailing of the proposed notice and rule meet the definition of a small business. Owners and employees of small businesses are represented on the Well and Boring Advisory Council and were represented at informal task force meetings. The department licenses or registers about 385 persons under chapter 4725. Over 300 individuals attended various meetings held by the department on the revision of this regulation.

1. The proposed rules amend requirements for reporting, notifications and permits. The basic requirements are mandated by statute; the rule clarifies data needed and procedures to be followed. Minnesota Statutes, section 103I.205 requires notice of well construction and sealing. Any exceptions are specifically delineated in law. Reporting requirements are also necessary in conjunction with licensure or registration.

In parts 4725.1300 and 4725.1650 on license or registration renewal and continuing education requirements, the department proposes to eliminate the requirement to submit written proof of completion of continuing education courses. On well construction notices, the department proposes to eliminate the requirement for the business address and phone number of the contractor, a legal description and scale map of the area, and to increase the time period for notice validity from 12 to 18 months. The department proposes to allow the faxing of notices and the electronic payment of fees. And proposed part 4725.1837 exempts from notice and permit requirements the installation of pumps, pumping equipment,

pitless units, pitless adapters and screens and the repair of an existing well or boring if the repair does not involve deepening the well or boring through a confining layer or having the casing installed or removed through the frostline.

For monitoring well permits, dewatering well permits and elevator shaft permits, the business address of the contractor, and scale map are eliminated; the permit validity extended to 18 months from date of issue and a copy of the permit would no longer be required at the construction site.

Permit requirements for vertical heat exchangers, heat loops (thermal exchange devices), and well sealing notice requirements have been added that are consistent with other permitting and notice requirements in chapter 4725.

The department has proposed numerous less stringent, alternative or reduced isolation distances including those from power lines and agricultural chemicals. Hopefully the number of variance requests will also then be reduced. And the department is proposing to allow less costly materials to be used in drilling such as flush joint casing and some sealing materials.

2. As noted above, the proposed amendments to the notice and permitting rule parts extend the deadlines for which notices and permits are valid. This extension should reduce the burden on the regulated industry, including small businesses, by eliminating the need for renewal.

3. The department is proposing amendments to simplify requirements for notices, permits and well records. The data elements have been reduced or consolidated. Requirements for well construction have been reorganized to assist those who must comply with the proposed rules. Additional options for compliance have been added where public health or groundwater protection is not compromised. For example, additional options for kinds of grouting and sealing materials have been added. Engineering controls have been added as an option to separation distances from contamination sources.

4. The rules specify performance criteria whenever possible in the construction and use sections of the proposed rules. The department has attempted to recognize acceptable materials to provide a variety of options for compliance. This approach maintains minimum material and design standards to ensure material integrity, public health and groundwater protection. The department will continue to monitor the adequacy of incorporated standards as they relate to the protection of human health and groundwater supplies.

5. Small businesses and customers of small businesses should be afforded the same public health protection as other individuals. It is not appropriate to exempt a business on the basis of size from any or all of the rule requirements nor did the Legislature make provision in Minnesota Statutes, chapter 103I for an exemption

for small business with respect to groundwater protection.

Impact on agricultural land

Minnesota Statutes, section 14.11 states:

If the agency proposing the adoption of the rule determines that the rule may have a direct and substantial adverse impact on agricultural land in the state, the agency shall comply with the requirements of sections 17.80 to 17.84.

This referenced statute known as the state agricultural land preservation and conservation policy, indicates that the intent of the policy is "to preserve agricultural land and conserve its long-term use for the production of food and other agricultural products."

Within the meaning of "action which adversely effects" in section 17.81, subdivision 2, the department determines that the proposed rules will not have a direct and substantial adverse impact on agricultural land. It is the department's intent that the policy contained within the proposed rules would promote the maintenance of uncontaminated water resources for agricultural use.

Need for and Reasonableness of proposed rule provisions

4625.3901 PHYSICAL FACILITIES AND SANITATION.

The proposed amendments to this provision which is part of existing standards regulating food and beverage establishments, are intended to update applicable cross references. The public water supply standards were amended in 1991 and are included in chapter 4720. They are applicable to public water supplies and community public water supply systems as defined in federal code and subsequently incorporated into state rules. Reference to the existing standards governing wells and borings are amended to include the entire range of rules within chapter 4725 as amended by these proceedings.

4630.0600 WATER SUPPLY.

The provisions within subpart 1 with respect to a "satisfactory public water supply" are clarified to identify the specific standards that the commissioner will apply to water supplies serving manufactured home parks and recreational camping areas. The applicable standards that the commissioner has applied are either those governing public water supplies, chapter 4720 or wells, chapter 4725.

Within subparts 3 and 4 the department proposes to strike provisions which are already addressed within chapters 4720 or 4725. It is not necessary to duplicate language already in those

existing or proposed rules. It is necessary to delete provisions which are inconsistent with existing or proposed rules. The construction and design standards in subparts 3 and 4 which are in addition to provisions contained in chapters 4720 and 4725 are being retained because they address design considerations applicable only to manufactured home parks and recreational camping areas. Finally the existing waiver provision has been updated to cross reference existing variance standards of the commissioner. It is reasonable to cross reference existing variance standards so the procedures and criteria for requesting and granting a variance are specified in rule. Variance provisions governing subpart 1 are addressed in chapters 4720 and 4725.

4725.0050 GENERAL.

This provision is proposed for addition to chapter 4725 to alert persons who are reading the rules, that they are to be read and understood together with the adopted Minnesota Groundwater Protection Act, chapter 103I on wells and borings. In the past the department has frequently paraphrased or repeated statutory language in rules. While this practice may have facilitated finding pertinent definitions or statutory policy, it has proven difficult to maintain a rule consistent with changing law, and at times raised questions over small discrepancies.

The department recognizes the public need to know what is applicable in a regulatory area and the difficulty some parties may have accessing both rule and statute. Extracts of applicable rules and law can be prepared and made available. In the long run, the department hopes eliminating duplicate statutory language in rule will not only reduce confusion, but also reduce the length of rules.

4725.0100 DEFINITIONS.

Subpart 1. Scope. The purpose of the amendments to this subpart are to use definitions in Minnesota Statutes, chapter 103I into the rule and repeal definitions in rule which duplicate those in statute. The statutory definitions will be used in interpreting and applying the proposed rules unless there is further clarification of the statutory definition contained in this part.

Subp. 4. APA. This subpart is proposed for repeal because the term is no longer used within the proposed chapter.

Subp. 5. Applicant. This subpart is proposed for repeal because the department has revised parts applicable to licensees, registrants, representatives and individuals, to distinguish and clarify responsibility.

Subp. 8. Commissioner. This term is proposed for repeal within rule because it is already defined within Minnesota

Statutes, section 103I.005, subdivision 3.

Subp. 9. Council. This term is repealed as subpart 9 and is proposed without change and renumbered as Subpart 24c.

Subp. 10. Licensee. This term is repealed as subpart 9 and is proposed without change as subpart 30f.

Subp. 11. Person. This term is proposed for repeal within rule because it is already defined in Minnesota Statutes, section 103I.005, subdivision 16.

Subp. 12. Representative. This subpart is proposed for repeal as subpart 12 because it has been redrafted and is now proposed as subpart 41c.

Subp. 13. Upper termination. This term is proposed for repeal because it is no longer repeatedly used in chapter 4725.

Subp. 14. Drilling machine. This subpart is proposed for repeal as subpart 12 because it has been redrafted and renumbered as subpart 26b.

Subparts 15 and 16. (Repealed in 1978.)

Subp. 17. Abandoned well. This term is proposed for repeal because it was replaced by the term "well that is in use" in Minnesota Statutes, section 103I.005, subdivision 23a (Laws of Minnesota 1991, chapter 355, sections 6-8.) The department believes it reasonable to use the statutorily defined term in rule.

Subp 18. (Repealed 1978)

Subp. 19. Annular space. The amendment to this definition changes the term "drillhole" to "borehole." This change is reasonable because the annular space in wells and borings may be augured or developed in a manner other than drilling.

Subp. 20. Approved basement. This term is necessary to repeal because it no longer is used in the revised rules.

Subp. 21. Aquifer. The term "aquifer" is amended to reflect the hydrogeologic definition of an earth material capable of providing water to supply a well. The term "unconsolidated material" is a better description of geologic materials which are not rock, than the term "soil". The references to "formations" and "soil or rock horizon" have been replaced with "unconsolidated material or rock" as defined because these terms were based on the formal geologic division into formations that are based on age, fossil assemblages and lithology, not on water transmission properties. The boundaries of an aquifer may not coincide with the boundaries of a formal geological formation. The broader terms

"unconsolidated material" and "rock" are consistently used throughout the rules and include all geologic materials.

Subp 21a. At-grade. The term "at-grade " is necessary to define to provide a common meaning to a term used throughout chapter 4725. Minnesota Statutes, section 103I.205, subdivision 5 uses the term without definition. The statute allows termination of a monitoring well casing "flush with the ground surface." This is designed to prevent vehicular damage when a monitoring well is placed in traffic areas commonly encountered at locations such as gas stations. Chapter 4725 otherwise requires termination of the casing a minimum of 12 inches above the established ground surface to reduce the introduction of contaminated runoff into the well and groundwater. Since wells, other than monitoring wells, such as remedial wells at gas stations, may be faced with similar difficulties in placement, the definition is not limited to monitoring wells. The definition as applied does prohibit termination of the casing below ground level. This is necessary to prevent surface water, petroleum spills, or other surface contaminants from entering the well and groundwater.

Subp. 21b. Bentonite. Bentonite is a clay formed by the decomposition of volcanic ash. The physical and chemical properties of the clay allow it to adsorb and absorb water which makes the material useful as a drilling fluid and a grout. The term "bentonite" is frequently used in the rule parts pertaining to grouting and well sealing. The Dictionary of Geological Terms, published by the National Academy of Sciences for the American Geological Institute, provides a lengthy definition of "bentonite" in terms of mineralogy, parent material, color, weathering, and physical properties. For this rule, such a detailed definition is not needed since the product is commonly used in the industry and because a widely accepted industry standard is available. A definition is needed because of the variability of the product and the need to reference a consistent standard. The proposed language provides a simple mineralogical definition, references the American Petroleum Standard 13A, and includes the requirement that the bentonite contain 85 percent of the mineral montmorillonite. The API standard is the commonly accepted and available specification. The API standard and the 85 percent montmorillonite standard have been a requirement of part 4725.3800, subpart 4 pertaining to drilling fluids, since the well code was adopted in 1974. The API 13A specification and 85 percent montmorillonite content are also used by Michigan in the Department of Public Health Well Construction Code, R 325.1633, Rule 133 (5).

Subp. 21c. Bentonite grout. Existing rule part 4725.0110, subpart 30, part 4725.2700, and part 4725.3800, subpart 1 use the terms "heavy drilling fluid", "heavy drilling mud", "heavy bentonite water slurry", "bentonite slurry" and "puddled clay" synonymously. The proposed rules eliminate these multiple, undefined or poorly defined terms and use the defined terms

"bentonite" (defined in subpart 21b), "bentonite grout" , and "high solids bentonite grout." Bentonite is the base grouting material. How much of this substance is added to various grouting mixtures determines whether the result is bentonite grout or high solids bentonite grout. The intent of delineating two different bentonite-based grouting mixtures is to ensure that there is a sufficient amount of solids in the mixture and an adequate seal of the well is attained. The proposed definition of "bentonite grout" requires a 10 percent bentonite mixture with water and prohibits the use of additives to temporarily increase viscosity. It provides that an equal volume of washed sand and cuttings taken from the bore hole or granular bentonite be used in conjunction with the bentonite and water mixture. These materials are needed to ensure that there is enough solid material in the grouting slurry. The 10 percent bentonite content allows for a relatively impermeable grout while still allowing the product to be pumped into conventionally constructed wells using available pumps.

Viscosity is the ability of a fluid to resist flow. The prohibition of additives which temporarily increase viscosity is to assure that the grout, whose function it is to permanently resist movement of fluids, will not thin with time. Since products other than saline, acid or alkaline substances can cause a temporary increase in viscosity, the prohibition has been extended to all additives which cause a temporary increase.

Subp. 22. Casing. The term "casing" is amended to include borings in addition to wells. Casing is installed in a boring to serve the same function as in a well; to prevent unconsolidated material from caving into the bore hole, and prevent unwanted or undesirable water or contaminants from entering the groundwater. The modifier "impervious" is being deleted since rule part 4725.2250, subpart 2 requires watertight casing and provides more specific details as to connections and requirements to assure water tightness or imperviousness. The modifier "durable" is being deleted since the term is subjective and part 4725.2250 establishes the standards for durability by requiring adherence to performance standards or nationally recognized material standards. The term "curbing" is being added to acknowledge that concrete curbing used in the construction of dug wells serves the same casing function as steel, stainless steel or plastic pipe. The term "temporary casing" is being deleted here because it is further explained in part 4725.2250, subpart 7, pertaining to casing. The definition of "protective casing" is being deleted because the term is outdated, ambiguous, and no longer used in chapter 4725.

Subp. 22a. Casing vent. The term "well vent" is proposed for repeal (subpart 53) and is proposed for replacement with the term "casing vent." The content of the definition is the same. The defined term itself is changed because the vent is on the casing of a well or boring. The term "casing vent" is more precise.

Subp. 23. Cesspool. The term "cesspool" is amended to delete the phrase "or is otherwise removed." A definition is needed so the well installer has a clear understanding of the difference between a cesspool, holding tank or sump which have different separation distances. A cesspool is a large tank or pit with holes or perforations into which untreated sewage discharges and then enters the soil. Since the tank affords little sewage treatment and discharges into an area much smaller than a subsurface disposal field, the rules require a greater well separation (part 4725.4450). The existing definition could confuse a cesspool with a septic tank or holding tank. Cesspools discharge directly into the soil. Septic tanks discharge into a drainfield or seepage bed. Holding tanks store sewage and must be pumped. Eliminating the phrase "or is otherwise removed" will clarify the proper function of a cesspool. The proposed definition is also the same as the definition of a cesspool in the Individual Sewage Treatment Systems Standards, Minnesota Rules, part 7080.0020, subpart 11.

Subp. 23a. Concrete grout. "Concrete grout" has been defined as a type of "grout" in existing and amended rule part 4725.0100, subpart 30. The existing rule part 4725.3800, subpart 2 requires concrete grout to be a mixture of Portland cement, sand and water in a proportion of 94 pounds of Portland cement, and not more than an equal volume of dry sand, and not more than six gallons of water. This definition is moved to the proposed definition of "concrete grout." The ASTM C150-85 standard of existing part 4725.3800, subpart 2 is moved to the definition of "Portland cement" (subpart 34a). The requirement for addition of gravel is moved to part 4725.3050, subpart 7 and part 4725.3850, subpart 5. The prohibition as to use below the water level has been moved to part 4725.3050, subpart 1 and part 4725.3850, subpart 4. The cement/sand/water ratio has been in the rules since 1974. Higher water content will lead to settling, cracking, shrinkage and possible formation of a gap between the grout and casing. The ratio is the same ratio as that required by the Michigan Public Health Department. Viscosity is the ability of a fluid to resist flow. The prohibition of additives which temporarily increase viscosity is to assure that the grout, whose function it is to resist movement of fluids, will not thin with time. Since products other than saline, acid or alkaline substances can cause a temporary increase in viscosity, the prohibition has been extended to all additives which cause a temporary increase.

Subp. 24. Coliform group. This part is proposed for repeal as subpart 24 and is replaced by the term "total coliform bacteria," (subpart 49b).

Subp. 24a. Confining layer. The term "confining layer" is proposed for amendment to make the definition more geologically precise, eliminate interpretation, adopt quantifiable standards, and exclude small or insignificant zones of rock or sediment with

minor permeability differences.

Confining layers are comprised of rock or unconsolidated geologic materials such as clay, shale, non-fractured igneous rocks or cemented rocks which restrict water movement and separate aquifers. Aquifers are comprised of geologic materials such as sand, gravel, sandstone, or limestone which have interconnected openings or pore spaces.

The existing rules have used the term "confining layer" and "impervious material" synonymously. The proposed rule deletes use of the term "impervious layer" and consistently uses the term "confining layer". The definition of "confining bed" in the Dictionary of Geological Terms, National Academy of Sciences for the American Geological Institute (1984) is essentially the same as the existing rule definition of "confining layer". The definition of "impervious" in the same publication provides examples of geologic materials such as shale and clay.

Common methods used to classify geologic materials as to their ability to transmit water, or their degree of imperviousness, include the use of textural classification, or more precisely, a field or laboratory test of hydraulic conductivity.

The measurement of at least 10 feet thick has been added to provide a standard for drillers who must apply other portions of the proposed rules with respect to isolation distances and casing which are dependent on the presence or absence of a confining layer. A ten foot minimum confining layer is consistent with the definition of an impervious layer in existing part 4725.2000, subpart 1, item F. Ten feet is a number with lateral extent and provides a measurable standard that may be applied by contractors and drillers in the field.

The proposed definition recognizes two methods to determine whether a confining layer exists:

- 1) description of the geologic material as clay as defined by the United States Department of Agriculture in Handbook 18 which is incorporated by reference. This publication provides a standard reference commonly used in describing test borings, soil surveys, or soil percolation tests.

- 2) measurement of an hydraulic conductivity of less than 10^{-6} centimeters per second (cm/sec). Hydraulic conductivity is a physical measurement of the ability of a porous media to transmit water and can be used to distinguish confining layers from aquifers. Davis and Dewiest in their book "Hydrogeology" ascribe good aquifers as having hydraulic conductivities between 10^{-3} and 1 cm/sec, and poor aquifers as having hydraulic conductivities between 10^{-6} and 10^{-3} cm/sec. Discroll, in the book "Groundwater and

Wells", indicates that the general range for the hydraulic conductivity of aquifer material is from 10^{-3} to 5×10^3 cm/sec.

Hydraulic conductivity values of regional sedimentary confining layers published by the United States Geological Survey in Water-Resources Investigations Reports 90-4001 and 90-4081 indicate numbers from 7×10^{-5} for the St. Lawrence confining layer to 1.2×10^{-9} for the Decorah shale confining layer.

The Pollution Control Agency and Department of Agriculture have established permeability (conductivity) values for clay or soil liners used to confine the movement of contaminants. Department of Agriculture rules, part 1505.3080, subpart 5 require a minimum 10^{-6} permeability for soil liners to prevent leakage of pesticides in a containment facility. The Pollution Control Agency has established a 10^{-7} permeability requirement for landfill barrier liners in Minnesota Rules, part 7035.2815, subpart 6.

The 10^{-6} cm/sec hydraulic conductivity number is typical of clay and shales encountered in Minnesota, represents a number used in other state programs to confine movement of fluids through the subsurface, and is consistent with minimum conductivities measured in layers considered in the literature to be confining units.

Subp. 24c. Council. This part is the same as the definition of council in subpart 9 which is proposed for repeal. The term has just been moved and renumbered.

Subp. 24d. Dewatering well. This part is revised to reference the term as defined in Minnesota Statutes, section 103I.005, subdivision 4a.

Subp. 26. Drawdown. This term is proposed for repeal because it is no longer used in the rule.

Subp. 26b. Drilling machine. Adopted subpart 14 defining this term is proposed for repeal and replacement by the definition in this subpart. The new definition has been modified to refer to large equipment used to excavate a well or borehole rather than broadly encompassing any device used to construct a well or boring. The new definition is necessary to clarify drilling machine registration responsibilities and enforcement actions. This change eliminates the requirement to register small machines including hand held devices such as sledge hammers.

Subp. 27. Dug well. The proposed definition is modified to distinguish a dug well from a drilled or driven well constructed with plastic or steel casing. Without the proposed amendment, plastic or steel cased wells could be interpreted to be dug wells. The construction techniques are different and different standards are required to ensure public health protection.

Subp. 27a. Environmental bore hole. The term "environmental bore hole" is defined in statute. The statute indicates that the bore hole enters or goes through a water bearing layer, is deeper than 25 feet, or penetrates a confining layer, and is used to monitor or measure physical, chemical, radiological, or biological parameters without extracting water. The statutory definition does not specify the details as to application or use, nor include examples of the types of monitoring or measurement. Holes are drilled in the ground for numerous reasons including cathodic protection, electrical grounding, or other purposes where measurements may be made but where the measurements do not directly relate to environmental properties. The rule proposes examples of monitoring and measurement activities commonly associated with excavations conducted for environmental purposes that would fall within the definition of an environmental bore hole and are thus regulated under chapter 4725 because they impact groundwater.

Subp. 28. Established ground surface. The amendments to this definition are necessary to make the term applicable to borings as well as to wells. This applicability is reasonable because chapter 4725 applies to both wells and borings and there are provisions within the chapter that address the termination of a well or boring at, below, or above the established ground surface.

Subp. 29. Geological material. The department proposes to repeal this definition because it was long and cumbersome. The department has consolidated geological materials into part 4725.1851 WELL AND BORING RECORDS indicating the common geological materials encountered in well and boring construction in the state so the delineating terms can be consistently used on reporting forms and drilling logs.

Subpart 29a. Groundwater. This definition is necessary to add to chapter 4725 because it is a term used in both this chapter and in Minnesota Statutes, chapter 103I. It is a reasonable definition because Minnesota Statutes, chapter 103I was adopted in 1989 as part of the Groundwater Protection Act, Laws of Minnesota 1989, chapter 326. Within Laws of Minnesota 1989, chapter 326, groundwater is defined in Chapter 103H to mean groundwater as defined in Minnesota Statutes, section 115.01, subdivision 21.

Subp. 30. Grout. The term "grout" is proposed for amendment. The amendment summarizes language in existing rule parts 4725.3800, subpart 1 and 4725.2700 to explain the purpose or use of grout. The synonymous terms "heavy drilling mud" and "heavy bentonite water slurry" have been replaced with the term "bentonite grout." The requirement of existing part 4725.3800, subpart 4 for heavy bentonite water slurry to be a mixture of 10 percent bentonite and water has been moved to the definition of "bentonite grout." The requirement for heavy drilling mud to be approximately five percent bentonite added to drilling mud (4725.3800, subpart 4) is deleted since the mixture meets or exceed 10 percent bentonite because

drilling mud typically contains from five to seven percent bentonite. The modifier "grout" has been added after the type of material used within the mixture. The marsh funnel viscosity measurement is proposed for deletion. The viscosity measurement does not provide a direct quantification of the sealing properties of a grout. While the measurement provides some limited information, the bentonite weight percentage requirement of proposed part 4725.0100, subpart 21c, and the material standard for bentonite in part 4725.0100, subpart 21b, provide a direct measure of the grout's properties.

Subp. 30a. High solids bentonite grout. "High solids bentonite grout" is a mixture of bentonite and water. Existing rule part 4725.0110, subpart 30, part 4725.2700, and part 4725.3800, subpart 1 use the terms "heavy drilling fluid", "heavy drilling mud", "heavy bentonite water slurry", "bentonite slurry" and "puddled clay" synonymously. The proposed rules eliminate these multiple, undefined or poorly defined terms and use the defined terms "bentonite" (defined in subpart 21b), "bentonite grout" (defined in subpart 21c), and "high solids bentonite grout." Bentonite is the base grouting material. How much of this substance is added to various grouting mixtures determines whether the result is bentonite grout or high solids bentonite grout. The intent of delineating two different bentonite-based grouting mixtures is to allow some flexibility and discretion while at the same time ensuring that there is a sufficient amount of solids in the mixture to prevent shrinking and produce a seal around the well casing. High solids bentonite grout is a relatively new product developed by the industry in response to concerns about the use of conventional drilling fluid bentonite. Concerns include settlement of 10% bentonite (90% of the mixture is water), inadequate permeability, inability of pumping high viscosity (drilling fluid) bentonite, and shrinkage and cracking of the grout. In response to these concerns, manufacturers have developed bentonite specifically for use as a grout, and have developed high solids bentonite grouts capable of attaining 30% solids. The proposed rule establishes a minimum 15% bentonite content. Contractors have reported that this mixture can be pumped with conventional equipment and provides a solid yet flexible seal. The proposed definition of "high solids bentonite grout" requires a 15 percent bentonite mixture with water and prohibits the use of additives to temporarily increase viscosity. Fifteen percent bentonite content allows for an impermeable grout while still allowing the product to be pumped into conventionally constructed wells using available pumps. Viscosity is the ability of a fluid to resist flow. The prohibition of additives which temporarily increase viscosity is to assure that the grout, whose function it is to resist movement of fluids, will not thin with time. Since products other than saline, acid or alkaline substances can cause a temporary increase in viscosity, the prohibition has been extended to all additives which cause a temporary increase.

Subp. 30b. Monitoring well. This term is proposed for repeal because it has been moved and renumbered as subpart 30g.

Subp. 30c. Hoist. The proposed amendments to this subpart are necessary for clear drafting and consistent use of terms. It is necessary and reasonable that a hoist be used to remove obstructions not only from wells but also from borings. The department has used the term "tremie" pipe and "grout" pipe interchangeably in adopted rule. "Tremie" is an accepted term within the regulated industry. For consistent use of terms and to reduce duplicate language, the term "tremie" is used throughout the proposed construction standards.

Subp. 30d. Holding tank. This term is used in parts of the rule addressing separations from contamination sources. The term as defined is the same as the term in adopted part 7080.0020, subpart 19 governing individual sewage treatment systems. The defined term is needed to distinguish between a holding tank, cesspool and other holding devices which have different separations due to their function and design.

Subp. 30e. Individual well contractor. The term "individual well contractor" is used in rule parts pertaining to licensure, registration, qualifications, and bonding. The "individual" is distinct from the "representative" who acts on behalf of a firm, sole proprietorship, partnership or corporation.

Subp. 30f. Licensee. The subpart is the same as existing subpart 10. It has been moved and renumbered.

Subp.30g. Monitoring well. This subpart is the same as existing subpart 30b. It has been moved and renumbered.

Subp. 30h. Neat cement grout. The definition of "neat cement grout" has been moved from existing part 4725.3800, subpart 3 to the definition section of chapter 4725. The ASTM C150 reference has been moved to the definition of Portland cement, since the standard applies to Portland cement, not neat cement grout.

Bentonite is used in neat cement to aid in pumping and reduce the amount of shrinkage. A maximum of two percent bentonite is currently allowed in part 4725.3800, subpart 3. The proposed rule increases the maximum amount allowed from two percent to five percent. The maximum bentonite content is restricted because too much bentonite in a cement mixture results in the undesirable characteristics of lower strength and higher permeability. The State of Michigan has established a maximum five percent bentonite content in its well construction codes, R 325.1633 (3), and details the cement/bentonite rationale in the Michigan Water Well Grouting Manual, Michigan Department of Health, January 1988.

Various chemicals are in common use which modify the properties of

cement, such as accelerating set time, retarding set time, or changing physical properties such as compressive strength or permeability. An accepted national standard for additives or admixtures is ASTM Standard C494-86. The existing rules cite the 1968 standard. The proposed rule cites to the most recent standard adopted in 1986.

Subp. 31b. Piezometer. This term is proposed for repeal because it is no longer used within chapter 4725.

Subparts 32 and 33. Pitless adapter. Pitless unit. The definitions of the terms "pitless adapter" and "pitless unit" are being amended to reflect the fact that in some types of borings, a pitless unit or pitless adapter may be used. The pitless device functions to discharge fluid (typically water) from the well or boring, usually below the frost line, and allows above ground service to the casing. The pitless device is attached to the casing either by cutting the casing off and replacing a section of casing with the pitless unit, or cutting a hole in the side of the casing and attaching the pitless adapter to the casing. In either case it is important that the attachment to the casing be watertight to prevent debris and contaminants from entering the well or boring and to prevent leakage of fluid out of the well or boring. The phrase concerning "construction to prevent the entrance of contaminants into the well" has been deleted. Substitution of the word "watertight" provides that the connection prevents transfer of fluids, and is a clearer and more measurable definition. The term "established ground surface" has been substituted for the term "grade" which is no longer used.

Subp. 34a. Portland cement. The existing rule part 4725.3800, subparts 2 and 3 reference the ASTM C150 standard for Portland cement in the definition of neat cement grout and concrete grout. The standard has been removed from these individual rule parts and included as a definition. The 1969 standard in existing rule is updated to incorporate the 1985 standard. It is reasonable to use the most current acceptable national standard.

Subp. 37a. Public water supply. It is necessary to amend the definition of a public water supply because part 4720.0100 has been repealed. The federal code definition of a public water supply is incorporated into chapter 4720.

Subp. 38. Pump house. This term is proposed for repeal because it is no longer used within the revised standards for well construction. The definition of a pump house has been replaced by requirements for a well of boring when located in a building (part 4725.2175).

Subp. 39. Pump room or well room. This term is proposed for repeal because it is no longer used within the revised rules.

Subp. 40a. Rapid setting cement. The amount of time necessary for Portland cement to reach final strength can be reduced by special processing of the cement or by the addition of small quantities of various chemicals such as calcium chloride. These cement products are variously referred to as "hi-early cement", "high-early cement", Type III, Type C, Type E, and "accelerated cement." The existing rule part 4725.3800, subpart 1 refers to these products as "hi-early" cement. The proposed rule definition and proposed part 4725.3050, subpart 2 require a minimum time between cement or concrete grouting and drilling or other activities. This set time, or what is referred to by the industry as WOC (wait on cement) time, is designed to prevent cracking or other damage to cement if drilling is conducted on cement which is not strong enough. The rule reduces the WOC time if rapid setting cement is used, since the product sets quickly.

The proposed rule establishes a definition for "rapid setting cement". The use of the term "hi-early" is replaced with "rapid setting cement" to include all of the admixtures which accelerate cement set. The specific ASTM C150 type III cement standard is referenced because it is the commonly used Portland cement standard for commercially produced cement.

Subp. 40b. Regional flood. The definition is necessary to defined to ensure consistent use throughout the revised rules. The defined term is reasonable because it references the general chapter governing water laws in the state. Minnesota Statutes, section 103F.111, subdivision 10, defines regional flood as:

a flood that is representative of the large floods known to have occurred generally in the state and reasonably characteristic of what can be expected to occur on an average frequency in the magnitude of a 100-year recurrence interval.

This definition of a regional flood is reasonable to use because it is the term most commonly understood and used by counties when preparing their water plans. Regional flood data is readily available at the county level.

Subp. 41b. Remedial well. The proposed definition of "remedial well" is necessary to distinguish this kind of well from a monitoring well as defined in Minnesota Statutes, section 103I.005, subdivision 14 and eliminate construction requirement confusion. The function of a monitoring well is limited to "extracting groundwater for physical, chemical, or biological testing." A monitoring well is installed to test for contamination of groundwater. The monitoring well definition does not include the function of lowering or removing contaminated groundwater. It is important to distinguish between a monitoring well and a remedial well because a monitoring well may be constructed by a person meeting the qualifications of a registrant rather than a

well contractor. Also, because a remedial well's function is different from a monitoring well's function, it is appropriate for a remedial well to have construction standards that differ from those for a monitoring well.

Subp. 41c. Representative. This proposed subpart is a revision of the term "representative" currently defined in subpart 12. Subpart 12 is proposed for repeal. The revised definition is necessary to clarify that the representative who is referenced within chapter 4725 is acting on behalf of the person to whom the license or registration is issued. "Person" as statutorily defined may be a firm, partnership, state agency or political subdivision. These entities must have a qualified and experienced human being representing them and acting on their behalf. The department must be able to test and determine the qualifications of the human being who personally performs or supervises construction, repair and sealing activities.

Subp. 41d. Rock. The term "rock" is necessary to define so there is consistent understanding of all the geological materials that are not unconsolidated material like sand and gravel. The requirements for well construction differ for rock and unconsolidated materials.

Subp. 41e. Sealing. The definition of sealing is proposed for amendment to shorten the definition and eliminate the distinction between temporary and permanent sealing. The concept of temporary sealing has been eliminated in the proposed rule revisions so the distinction in definition is no longer necessary. Confusion is lessened by having sealing mean only the act of preparing and permanently filling a well or boring with grout. The term is also clarified to distinguish sealing from the act of capping the top of a well or boring or making casing watertight.

Subp. 42. Sewage. The department proposes to amend the existing definition of sewage to cross reference the following definition contained in Minnesota Statutes, section 115.01.

"Sewage" means the water-carried waste products from residences, public buildings, institutions or other buildings, or any mobile source, including the excrementitious or other discharge from the bodies of human beings or animals, together with such ground water infiltration and surface water as may be present.

The definition in statute is reasonable to cross reference because it is the common definition used for water pollution control, municipal sewage control, regional sanitary sewers and wastewater treatment. It is reasonable to cross reference existing laws and rules to ensure consistency among state programs whenever possible.

Subp. 43. Seepage pit, leaching pit, or dry well. The

modifications to this definition are necessary to make the definition in rule consistent with the terms as defined and used in chapter 7080 which pertains to individual sewage treatment systems. It is reasonable to make definitions used by state agencies consistent whenever possible.

Subp. 45. Sewer. The proposed amendments to this existing definition are necessary to clarify that the floor drain and any traps are part of the sewer. Clarification is necessary to ensure that proper separations and other precautions are taken with respect to sewers when constructing water supply wells.

Subp. 46. Subsurface disposal system. The proposed revision to this part is not substantive but is a redraft of the existing definition to reduce verbiage and clarify meaning.

Subp. 49a. Unconventional well. This term is proposed for repeal because it is no longer used in chapter 4725.

Subp. 49b. Total coliform bacteria. This definition revises the term "coliform bacteria" in subpart 24 which is proposed for repeal. Revision is necessary to accurately reflect current practice and ensure proper sampling and testing. "Coliform bacteria" is a general term that may be subject to multiple interpretation. The term "total coliform bacteria" is the term used by accredited testing laboratories, (part 4740.2040, subpart 3) to describe specific testing methods that differ from those specifically for fecal coliform bacteria, fecal streptococci bacteria or *Escherichia coli*. The definition is consistent with the "Standard Methods for the Examination of Water and Wastewater Treatment" of the American Water Works Association.

Subp. 49c. Tremie pipe. This term is necessary to define to ensure consistent understanding of commonly used terms throughout chapter 4725. A tremie pipe is used in well construction. It is used synonymously with "grout pipe." Tremie pipe is used throughout the rules as the preferred term because the term is used more commonly throughout the state.

Subp 49d. Unconsolidated materials. The term "unconsolidated materials" is necessary to define to provide a common understanding of a term used throughout the proposed rules. The separate definitions of "alluvium", "glacial drift (unconsolidated)", and "glacial outwash" contained within the definition of "geological materials," have been repealed. These are all types of unconsolidated materials. Detailed geological distinction is not necessary for understanding and compliance with the rules. The definition references the definition of "rock" in 41d and lists some common types of unconsolidated materials with which the reader may be familiar.

Subp. 50. Water varieties. This term is proposed for repeal

because it is not used in the revised rule. Groundwater is defined in statute. The term "near surface water" is not used in the revised rule and "surface water" is commonly understood.

Subp. 50a. Water supply well. It is necessary to defined a water supply well to ensure the application of certain protective construction standards within the chapter and to distinguish this type of well from other specialized well types such as monitoring wells and dewatering wells which require a permit. Minnesota Statutes, section 103I,005, subdivision 21 contains a general definition of a "well." It states that a "well" includes monitoring wells, drive point wells and dewatering wells which are separately defined in statute.

For purposes of chapter 4725, dewatering and monitoring wells are separately addressed. The definition of a drive point well refers to its method of construction, rather than its use. This definition presumes, that, unless a well is a dewatering well or a monitoring well, it is a water supply well. Items A to E delineate examples of the types of wells that are used to supply water. Portions of the proposed construction standards and uses pertain exclusively to water supply wells to ensure that the water extracted from those wells is safe.

Water used for drinking must be safe for human consumption. Therefore potable water systems are included. Wells used to extract water for irrigation, agricultural, commercial or industrial uses must be protected. Water used for irrigation, agricultural, commercial or industrial uses is usually piped and people usually presume that piped water is safe. The inclusion of wells used for heating and cooling is consistent with the inclusion of groundwater thermal exchange devices within the regulated uses in Minnesota Statute, section 103I.101, subdivision 2 (6). Remedial wells not only lower the groundwater (as does a dewatering well) but do so to control contamination or pollution. They must be addressed also within the proposed rules and subject to special construction conditions.

Subp. 50b. Water table. This term is necessary to define because it is necessary to distinguish the water table from static water level. The water table is the level of the water outside of the well where it is subject to atmospheric pressure. It is reasonable to reference to this term as defined and adopted in rules of the Minnesota Pollution Control Agency that pertain to groundwater. The static water level is the level of water inside the well casing which may be subject to water pressure and be different from the water table level.

Subp. 51. Well. The part is proposed for revision for consistency with the term as defined in statute.

Subp. 51a. Well pump or pumping equipment. The term "well

pump or pumping equipment" has been revised to remove the term "primary water storage tanks" because the department does not regulate these devices under the authority in Minnesota Statutes, chapter 103I. The exceptions to the definitions were revised to improve clarity.

Subp. 52. Well seal. The term "well seal" is proposed for repeal. Minnesota Statutes, chapter 103I uses the term "seal" to mean the process of filling an unused well or boring with grout. The existing rules use the term in different contexts to mean filling an abandoned well with grout, temporarily covering a well, grouting the annular space surrounding a casing, and providing a watertight connection. The proposed rules limit the use of the term to the statutory meaning to avoid confusion.

Subp. 53. Well vent. This term is proposed for repeal because the term, as used in the revised rule, has been changed to "casing vent." The substance of the defined term has not changed.

Subp. 54. Yield or production. These terms are proposed for repeal because they are no longer repeatedly used in chapter 4725. The requirement to conduct a yield or production test is also proposed for repeal.

4725.0150 INCORPORATIONS BY REFERENCE.

In reorganizing the proposed rules, the department is consolidating various documents, specifications and standards into a single rule part to ease reference and shorten the overall length of the revised rules. The individual specifications and standards incorporated are justified as to their applicability, need and reasonableness in the rule part where they are referenced. Most are currently referenced in existing rule. The documents referenced are not subject to frequent change, are readily available from the source listed such as the American National Standards Institute (ANSI), available through the department's Barr Library, or through the Minitex interlibrary loan system.

4725.0200 APPLICATION TO ALL WELLS AND BORINGS.

Subpart 1. Applicability. This part is necessary to specify to whom and to what conditions chapter 4725 applies. The standards specified in chapter 4725 apply to all wells and borings as defined in Minnesota Statutes, chapter 103I, except those wells and borings exempted from regulation by law, and exploratory borings currently regulated under chapter 4727.

Subp. 2. Owner responsibility. The proposed revision to this subpart is editorial.

4725.0410 VARIANCE.

Subparts 2 and 3. Additional standards for construction, repair or sealing variance requests; variance from isolation distances. The proposed changes to subparts 2 and 3 are necessary to cross reference the new construction standard numbers for wells and borings and for isolation distances in part 4725.4450.

LICENSING AND REGISTRATION

The department is proposing a number of revisions to rule parts governing licensing, registration, permits, notifications and bonds, parts 4725.0475 to 4725.1855. These revisions do three things.

- * Eliminate duplication or paraphrasing of statutory language and requirements in rule. Duplication and paraphrasing of statute unnecessarily adds to the length of state regulations and provides for possible confusion and conflicting interpretation. While it is nice to have all requirements pertaining to wells and borings in a single document, this can be accomplished through the subsequent development of extracts or handbooks which contain copies of the applicable rules, statutes and forms.

- * Reduce unnecessary or duplicate reporting requirements and data. Experience with the adopted standards; monitoring of inspections; enforcement actions; subsequent discussion with the regulated industry, counties, and the well and borings advisory council; and the continued computerization of data provides impetus and justification for further simplification, consolidation or elimination of some records and data fields.

- * Clarify the requirements applicable to the "person" licensed or registered, the individual well contractor, and the representative who must meet examination and experience standards.

4725.0475 ACTIVITIES REQUIRING LICENSING AND REGISTRATION.

Subpart 1. Activity requiring licensure or registration. Within the conditions for licensure and registration specified in law, this subpart clarifies situations which require licensure or registration and special circumstances which relate to well and boring use and construction but are exempt from licensure or registration or are not regulated within chapter 4725.

This part revises existing part 4725.0450 which is proposed for repeal. Item F clarifies that alterations to the casing, bore hole or screen must be made by a licensed contractor. This clarification is consistent with the authority to license and regulate the repair and modification of wells and borings given in Minnesota Statutes, section 103I.101, subdivision 2:

The commissioner shall:

- (1) regulate the drilling, construction, modification, repair, and sealing of wells and borings;
- (2) examine and license well contractors, persons modifying or repairing well casing, well screens, or well diameters; constructing, repairing, and sealing unconventional wells such as drive point wells or dug wells; constructing, repairing, and sealing dewatering wells; sealing wells, installing well pumps or pumping equipment; and excavating or drilling holes for the installation of elevator shafts, or hydraulic cylinders;

The clarification in item F is necessary because the areas delineated require experience consistent with the licensing requirements currently specified. The department has regularly been asked by persons if they need to be licensed to conduct the work delineated in item F and the department has consistently indicated that the work specified requires licensure under Minnesota Statutes, chapter 103I and Minnesota Rules, chapter 4725. The activities indicated in item F can have a serious effect on groundwater, the performance and integrity of the well or boring, and the resultant quality of the water. Improperly installed treatment devices can introduce dangerous chemicals into a well, or create holes or openings into the casing. Chemical treatment with acids or caustic solutions can negatively affect the water quality or integrity of the casing. Improper development may create structural damage or affect the quality of grout seals.

Subp. 2. Exceptions to licensure or registration. Item A expands the exemption to licensure or registration that is currently available to monitoring well contractors to all persons as defined. A license or registration is not required to collect water samples from a monitoring well. Water samples are commonly collected by persons from laboratories or environmental consultants. The condition "to obtain a water sample" is necessary to clarify the limited activity allowed. Water sampling devices used to collect a single water sample routinely do not materially alter the casing or construction of a well. Water is sampled with a bailer or suctioned out. The installation of a permanent sampling device would require alteration of the casing and thus require the person to be licensed or registered.

Items B and C redraft existing part 4725.0450, subpart 3. The plumber or plumbing contractor is allowed to work on the water service line or on water treatment equipment in accordance with chapter 4715. The system from the well casing to the water tank is commonly installed and repaired by either well contractors or plumbing contractors. Water conditioning devices installed in a building in accordance with the plumbing code are exempt from regulation under chapter 4725 unless the water conditioning device requires alteration of the casing or well cap. Item D redrafts subpart 3 of part 4725.0450 to make the exception applicable to all contractors with a limited license within the scope of the limited

license.

Subp. 3. Well contractor license. The provisions in this part redraft the requirements in existing part 4725.0500, subpart 2 and add a reference to proposed subpart 1, item F to clarify the applicability of the requirement for licensure when repairing or modifying a well or boring.

Subp. 4. Limited well contractor licenses. This part consolidates the existing requirements for a limited well contractor license in part 4725.0500, subparts 4, 5, 6, 7, 7a, 7b, 7c, and 7d.

Subp. 5. Elevator shaft contractor license. This provision is redrafted from existing part 4725.0500, subpart 8.

Subp. 6. Monitoring well contractor registration. This subpart is redrafted from existing part 4725.0500, subpart 3.

Subp. 7. Individual well contractor license. This subpart redrafts existing part 4725.0500, subpart 2a. It is revised to clarify that the person applying for licensure as an individual well contractor must meet the requirements for licensure for a well contractor, except the requirements for a bond.

4725.0550 REPRESENTATIVE OR INDIVIDUAL WELL CONTRACTOR.

The provisions in this part consolidate existing qualifications to be a representative of a licensed or registered contractor or to be an individual well contractor. A "person" as defined by Minnesota Statutes, section 103I.005, subdivision 16 means:

an individual, firm, partnership, association, or corporation or other entity including the United States government, any interstate body, the state, and any agency, department, or political subdivision of the state.

A commonly licensed or registered entity is a company or corporation. Yet it is a human being that must personally direct or supervise construction, repair and sealing operations, qualify and take an examination. The licensure, registration and qualification provisions in chapter 4725 have been redrafted to distinguish between licensure and registration requirements applicable to the licensee and registrant and those qualification, examination and continuing education requirements applicable to the representative or individual well contractor.

Subpart 1. Application to represent a licensee, registrant, or to be an individual well contractor. The provisions in this subpart are taken from existing part 4725.0500, subpart 1 and 4725.0700, subpart 1.

Subp. 2. Application fee. This provision is taken from existing part 4725.0700, subpart 1.

Subp. 3. Ongoing qualifications. The provisions in this subpart are taken from existing part 4725.0500, subpart 1 and part 4725.1400 which is being repealed.

4725.0650 EXPERIENCE REQUIREMENTS.

Subpart 1. Well contractor. The requirements in this part are taken from existing part 4725.0500, subpart 2. Item B has been amended from a single depth well of 500 feet to multiple cased wells with 700 cumulative feet. Construction of multiple cased deep wells require a high level of experience. Drilling multiple cased wells with a cumulative depth of 700 feet is equivalent experience to drilling five wells since the average cumulative depth of five wells for an applicant is 500 to 700 feet. The existing provision to allow one 500 foot well was overly restrictive and seldom used since very few wells in Minnesota are greater than 500 feet. This allows persons to qualify with experience drilling large diameter wells such as municipal wells. Otherwise they would not meet the five well per year requirement since a single multiple cased municipal well may take three to six months to complete.

Subp. 2. Monitoring well contractor. Item D has been added to the provisions in this part which were taken from existing part 4725.0500, subpart 3. Item D allows a representative without a professional engineer's registration or American Institute of Professional Geologists or American Institute of Hydrology certification to qualify for registration with additional experience. This change implements the 1991 amendment to Minnesota Statutes, section 103I.205, subdivision 4 (b) which gives the commissioner authority to write rules for qualifications. The statutory change was compelled by requests from drillers who argued that the existing rule did not allow an individual who has gained experience under a licensed monitoring well contractor to apply for a license or registration unless the monitoring well contractor was an engineer or geologist. The proposed experience requirements are reasonable since a person without the academic qualifications would need twice as much experience as a registered or certified engineer or hydrogeologist to qualify for registration. Supervisory and design experience would not be recognized as part of the 1,000 hours of experience actually drilling or sealing wells. The proposed experience requirements are consistent with the requirement for a full well contractor's license. The difference is that a full well contractor's license requires one more year of experience and fewer wells drilled per year. The number of wells drilled per year required for a monitoring well contractor registration is greater because most monitoring wells are relatively shallow and monitoring well drillers typically install three to ten monitoring wells on a single site. It is important

that a monitoring well contractor have experience with many different sites with varying geologic conditions and contaminants.

Subp. 3. Limited well contractor. The provisions in this subpart are taken from existing part 4725.0500, subpart 5.

Subp. 4. Limited well contractor; well screens, pitless adapters, and pitless units. The provisions in this subpart are taken from existing part 4725.0500, subpart 6.

Subp. 5. Limited well contractor; pumps and pumping equipment. The provisions in this subpart are taken from existing part 4725.0500, subpart 7.

Subp. 6. Limited well contractor; well sealing. The provisions in this subpart are taken from existing part 4725.0500, subpart 7a.

Subp. 7. Limited well contractor; dewatering wells. The provisions in this subpart are taken from existing part 4725.0500, subpart 7d.

Subp. 8. Elevator shaft contractor. The provisions in this subpart are taken from existing part 4725.0500, subpart 8.

Subp. 9. Experience outside state. The department proposes to change the requirement that at least one year of experience must be in Minnesota because it was overly restrictive. The department is aware of persons from other states who would like to be licensed in Minnesota. The geology of the state is diverse and drilling experience gained in formations in other states is comparable to experience within this state. The restriction imposed by this provision did not improve the quality of the well program and in some cases may cause an unreasonable burden on persons applying for licensure or registration.

4725.1000 EXAMINATION.

The revisions to this part are necessary to clarify who must apply for and take the examination to be a representative or individual well contractor. The revision is consistent with ongoing department practice. It is reasonable that the party taking the examination be a human being who will be personally constructing, repairing or sealing or personally or directly supervising the construction, repair or sealing of a well or boring. The person responsible must demonstrate knowledge in the area of responsibility. Passing the examination within one year of notice that the applicant is qualified to take the examination is reasonable because conditions may change within the year that were not reflected on the initial application. The examination is available numerous times during the year. One year is consistent with the reapplication provisions in existing part 4725.1600 as

proposed for amendment. It is reasonable to set some limit for the expiration of the application form. The department does not want to keep inactive files indefinitely.

4725.1075 APPLICATION FOR LICENSURE; FEES.

The revisions to this part are necessary to clarify who must apply for licensure or registration and pay the fees for licensure or registration. It is reasonable that this entity be the "person" as defined in Minnesota Statutes, section 103I.005 because that is the entity authorized to be licensed or registered and required to pay the licensing and registration fee. An officer or other legally authorized representative of the person making application for licensure or registration must sign the application. It is necessary to further stipulate that, at the time the application for licensure or registration is filed, the form include not only the name, address and phone number of the licensee or registrant, but because this is often a company, corporation or political subdivision, that all the representatives who will be acting on behalf of the "person" be indicated.

4725.1250 BONDING.

Minnesota Statutes, section 103I.525, subdivision 5, requires all licensees or registrants, except individual well contractors, to hold a corporate surety bond. The bond requirements in this part have been clarified to be consistent with the definition of a licensee or registrant. Under the proposed revisions to this part, the bond would cover work undertaken by the licensee or registrant and those employees working for the licensee or registrant. The words "copy of" the bond are not accurate and are removed because the statute requires the commissioner to receive the original bond. A licensee or registrant may have more than one license or registration. If this is the case, the bond of the licensee or registrant may cover all licenses and registrations. The bond must be signed by an official of the company legally authorized to represent the company to clarify to whom the bond applies. A continuous bond is also accepted by the department since this reduces the number of forms the bond companies and department must process.

4725.1300 LICENSE OR REGISTRATION RENEWAL.

The specification of license or registration renewal fees in rule is not necessary because they are specified in statute. The word "approved" is added to modify continuing education courses to emphasize that all continuing education courses must be approved by the commissioner. The department regularly communicates with the regulated industry through newsletters about courses which would meet the continuing education requirements in part 4725.1675. Finally language that is redundant or overly prescriptive with respect to internal processing has been deleted.

4725.1350 FAILURE TO RENEW LICENSURE OR REGISTRATION.

This part is proposed for repeal. It duplicates statutory requirements that a person who performs certain functions that require licensure or registration must have a current license or registration.

4725.1500 DISCIPLINARY ACTION AGAINST LICENSEE OR REGISTRANT;
RETURN OF DOCUMENTS.

Subpart 1. Commissioner action. The department is proposing certain conditions which may prompt disciplinary action by the commissioner. In the past the department has encountered falsified well samples, records and qualifications for examination. The provisions proposed are necessary so those persons to whom the rules apply are aware of activities and actions which are grounds for disciplinary action. The activities and actions enumerated are consistent with those specified for other occupations, including those in Minnesota Statutes, section 147.091, and rule parts 3100.6200, 3900.4700, 6800.2250, and 7200.5100. In some cases it may not be necessary to revoke or suspend a license or registration. The department proposes that in some cases limitations or conditions be imposed. This allowance provides additional flexibility to deal with negative situations and negotiated alternatives which are less imposing.

Subparts 2 and 3 are repealed. The procedures specified in these subparts are included in Minnesota Statutes, section 103I.701.

The proposed changes in subpart 4 are necessary to simplify the revocation process, reduce paperwork, and make the rule consistent with statute.

4725.1600 REAPPLICATION AFTER LICENSE OR REGISTRATION REVOCATION.

The changes proposed in subpart 1 eliminate regulatory language that duplicates statute, reorganizes the provision to decrease verbiage, and clarifies when reapplication can be made and what examination is required.

4725.1650 CONTINUING EDUCATION REQUIREMENTS.

The proposed amendments to part 4725.1650 clarify who must take the continuing education required by rule. Because a contractor can be a "person" as defined in statute, which includes companies, corporations, partnerships, and political subdivisions, it is reasonable to apply the continuing education requirements to the individual contractor or the representative acting on behalf of the licensee or registrant. The requirement for the mandatory submission of continuing education certificates is deleted to reduce paperwork. Finally, there have been editorial changes

designed to reduce verbiage.

4725.1700 PLACEMENT OF DECALS AND LICENSE OR REGISTRATION NUMBER.

The modifications proposed to this part clarify that the decals to be placed on drilling machines must be those issued by the commissioner. The specific language on the decal is deleted as unnecessarily long and prescriptive.

4725.1820 NOTIFICATION FOR CONSTRUCTION OF WATER SUPPLY WELLS.

Item A clarifies those conditions which require notice of construction to the commissioner. The conditions include any additional deepening of the well through confining layers and the installation or removal of casing below the frost line. These changes to the well are major structural changes. A poorly reconstructed well can result in the interconnection of aquifers with dissimilar water quality. It is critical that construction is in accordance with law and rules and that the department is notified prior to reconstruction to allow for inspection of the work.

Existing item B is no longer necessary. A public water supply well is already included within the definition of a water supply well and the plan requirements for public water supply wells are addressed in parts 4725.5850 and 4720.0010. The changes in proposed item B are necessary to reduce verbiage. In item D the department is proposing to reduce the number of data elements required on the notice and simplify what is meant by a legal description. Duplicate statutory language in item E is deleted. The time period for which the notice is valid is proposed for extension from 12 to 18 months to make the notice valid into the next drilling season and hopefully reduce the need for an extension request.

4725.1825 DEWATERING WELL CONSTRUCTION PERMITS.

The language in the first paragraph is proposed for deletion because it duplicates statute. The provisions in this part have been moved and simplified from existing part 4725.3200, subparts 2 and 3 which are proposed for repeal. The requirement for an indication of the effect of the dewatering project on potable water wells is necessary to ensure review of the continued availability of a potable water supply to persons who may be adversely affected by the dewatering project.

In item D the department proposes to reduce the number of data elements required on the permit and simplify what is meant by a legal description. The time period that the permit is valid is proposed for extension from 12 to 18 months to make the permit valid into the next drilling season and hopefully reduce the likelihood that an extension request will be necessary. Item H is

amended to avoid duplication of statutory requirements. And item I is proposed for repeal to reduce the burden on the industry.

4725.1830 MONITORING WELL CONSTRUCTION PERMITS.

Item A clarifies those conditions which require a permit request to the commissioner. The conditions include any additional deepening of the well through confining layers, the installation or removal of casing below the frost line, or the conversion to an at-grade well. These changes to the well are major structural changes. A poorly reconstructed well can result in the interconnection of aquifers with dissimilar water quality, or an improper use of an at-grade well. At-grade wells may be constructed only where necessary for monitoring purposes and there is the likelihood of vehicular traffic. The upper termination of an at-grade well must be watertight. It is critical that construction is in accordance with law and rules and that the department is notified prior to reconstruction to allow for inspection of the work.

Item B. The permit exemption for monitoring wells sampled during drilling in an uncased hole is proposed for deletion.

Monitoring wells are frequently constructed at hazardous waste sites, spills, or through other contaminated areas. It is critical that construction and sealing be in accordance with adopted rules. The exemption as written in existing rule does not provide for the ability to inspect, and is not directly in conformance with Minnesota Statutes, sections 103I.005, subdivision 14 and 103I.205 subdivision 1, paragraph (e) which requires a permit prior to the construction of any monitoring well. Amendments to this item also clarify who is responsible for submitting the permit application.

Item C. This item is essentially the same as existing part 4725.1830, item D. The term site is further clarified because there has been some confusion. The clarification limits the site to a continuous piece of property. This is reasonable because the department or other state agencies may need to be involved when monitoring wells are installed on property beyond the site or outlet.

In item E the department proposes to reduce the number of data elements required on the permit request and simplify what is meant by a legal description. The amendment to item G is necessary to ensure the use of consistently defined terms and reduce the burden for establishing the well location. The time period that the permit is valid is proposed for extension from 12 to 18 months in item I to make the permit valid into the next drilling season and hopefully reduce the likelihood that an extension request will be necessary. Item J is amended to avoid duplication of statutory requirements. Item L is proposed for repeal to reduce the burden on the industry.

4725.1831 GROUNDWATER THERMAL EXCHANGE DEVICE PERMITS.

This part further delineates the procedures and criteria for issuing a permit for a groundwater thermal exchange device as required by Minnesota Statutes, section 103I.621.

A groundwater thermal exchange device is often referred to as a heat pump. As defined in Minnesota Statutes, section 103I.005, subdivision 11, a groundwater thermal exchange device is a heating or cooling device that depends on extraction and reinjection of groundwater from an independent aquifer to operate. As stipulated in Minnesota Statutes, section 103I.621, subdivision 3, the water used in the thermal exchange device must not have contact with or commingle with water from other sources or with polluting material or substances. Not more than 200 permits for devices pumping 20 gallons per minute and not more than 10 permits for devices pumping up to 50 gallons per minute are to be issued by the commissioner. Regular inspection is mandated, depending on the capacity of the device.

Item A is necessary to ensure that the property owner obtain a permit from the department prior to construction. This requirement is consistent with Minnesota Statutes, sections 103I.101, subdivision 2 (6) and 103I.621, subdivision 1. The commissioner reviews permit requests to ensure compliance with the provisions in section 103I.621 and this rule part.

Item B specifies the information to be contained on the permit application form. The department needs to know the name and license number of the well contractor constructing the wells used in conjunction with the device and information on the method of construction. This is reasonable to ensure that the wells used in conjunction with the device have been constructed by a properly licensed party and in accordance with adopted standards. The name and address of the property owner on which the device is installed as well as the property location is reasonable information so the commissioner may communicate with the owner and inspect the construction of the device. The description of the heat pump, flow rate and water withdrawal information is necessary for the commissioner to evaluate whether the device meets the maximum flow capacity specified in law, to ensure that inspections are made in a timely manner, and to ensure that there are proper separations or protections between the groundwater source and any polluting materials or substances. Additional permits from the Minnesota Department of Natural Resources may be necessary. The specifications for materials used to construct the device, flow valves, provision for pressure testing and disinfection are all designed to allow for evaluation of the system with respect to contamination of groundwater sources. Flow valves and pressure tests are necessary to monitor performance and efficiency. Provision for disinfection allows for sanitization of the system after repair or construction.

The department needs a diagram of the proposed piping system (Item C) to ensure that the system is closed, does not commingle with potential contamination sources, and operates in an efficient manner. The system must operate within the maximum capacity limits established in statute and the system must not operate under conditions of negative pressure which could draw contamination into the system. The valves, gauges and other devices requested are necessary to protect against cross contamination, ensure proper performance and positive pressure. A 15 psi pressure valve, for example, is necessary to ensure that constant pressure is kept on the discharge line from the heat pump to the valve in the bottom of the discharge line. A pressure valve indicates if pumping is occurring or the system is static. A solenoid valve on the discharge side of the heat pump unit is a control feature necessary to ensure proper operation. If the pump is not operating properly, it may cause other problems internally within the system. An automatic shut off device is required if the discharge line pressure falls below 15 psi. In-line thermometers are necessary to monitor pump efficiency. No minimum or maximum temperatures for the water within the system is stipulated, however, a drop in water temperature may precipitate iron and calcium buildup. A check valve from the supply well prevents backflow into the supply. Unthreaded taps and valves preclude the attachment of outside hoses which could provide a source of contamination into the system and violate the stipulation that the system be closed. Shut off valves enable the system to be shut off for sampling or malfunction. A filter on the discharge line prevents the screen and heat pump from getting plugged. A flow control valve and meter measure system efficiency and performance. And air release valves and pressure tanks are used to maintain constant pressure on the system.

Item D. It is reasonable that the construction of the device comply with applicable provisions of the Minnesota Plumbing Code contained chapter 4715. Compliance is necessary to prevent cross contamination between sewage, contaminants, discharge systems and drinking water supplies.

An 18 month limit (Item E) on the validity of the permit is necessary to ensure that the system is constructed in accordance with the plans, specifications, materials and conditions in existence at the time the permit was issued.

The requirement in item F for payment of the permit and notification fees by the property owner is consistent with Minnesota Statutes, section 103I.621, subdivision 1 and section 103I.205 (5).

4725.1832 NOTIFICATION FOR WELL SEALING.

This part clarifies the well sealing requirements in Minnesota Statutes, section 103I.301. Item A clarifies that any well to be sealed requires notification. The rule allows flexibility in

reporting by mail, phone or fax machine. The information on the notice is minimal and consistent with that requested on notices for well construction. Item B is necessary to ensure that the department has a complete record of all persons responsible for the sealing of the well. The time period that the notice is valid is proposed for 18 months in item C to make the notice valid into the next construction season and hopefully reduce the likelihood that an extension request or variance will be necessary.

4725.1833 VERTICAL HEAT EXCHANGER CONSTRUCTION PERMITS.

A vertical heat exchanger, sometimes called a heat loop, is defined in Minnesota Statutes, section 103I.005, subdivision 20 as an earth-coupled heating or cooling device consisting of a sealed piping system installed vertically in the ground to transfer heat to or from the surrounding earth. Section 103I.641 requires construction by a well contractor, construction in accordance with law and rule, that a permit be obtained prior to construction, and inspection by the department. The vertical loops sometimes permeate the earth for up to 700 feet and go through a number of aquifers.

Item A. Requiring a permit to construct a device is consistent with the permit requirement in statute. A requirement that a permit is required for construction, other than normal maintenance, is necessary to ensure that any changes to the device parameters specified in item C, subitems (5) to (9) are consistent with law and rule requirements and the system continues to function in a manner protective of groundwater and public health.

Item B clarifies what information on the vertical heat exchanger construction permit is required. The purpose of the permit for a vertical heat exchanger is to provide the department with advance knowledge that the device will be constructed; allow for inspection during construction; and provide the department with the opportunity to review plans before construction begins.

The application information in item C is necessary so the department can maintain an accurate record of the permit and evaluate the design with respect to contamination of groundwater sources. The department needs a diagram of the proposed piping system to ensure that the system does not commingle with potential contamination sources. The system must not operate under conditions of negative pressure which could draw contamination into the system. An 18 month limit (Item E) on the validity of the permit is necessary to ensure that the system is constructed in accordance with the plans, specifications, materials and conditions in existence at the time the permit was issued. Item F clarifies responsibility for payment of the fee in accordance with statute.

4725.1835 ELEVATOR SHAFT CONSTRUCTION PERMITS.

The amendment to item A eliminates unnecessary language. The amendment to item B reduces the number of parties who must sign the permit. In item C the department proposes to reduce the number of data elements required on the permit request and simplify what is meant by a legal description. The time period that the permit is valid is proposed for extension from 12 to 18 months in item F to make the permit valid into the next drilling season and hopefully reduce the likelihood that an extension request will be necessary. Item G is amended to avoid duplication of statute. And item H is proposed for repeal to reduce the burden on the industry.

4725.1836 NOTIFICATION AND PERMIT FEES.

The revisions to this part are necessary to clarify that a fee may be paid electronically and the permit or notification application may be faxed to the department. The department also proposes to delete the provision compelling a refund of the permit or notice application fee if a request for the fee was incorrect or the well or boring is not completed. It should go without saying that if there is an overpayment of a statutorily required fee, the department will refund that amount which is an overpayment and conversely, will require payment of any shortage. However, the department cannot continue the policy of refunding permit and notice application fees within one year if the well or boring is not completed. The purpose of the permit and notice fee is to cover agency processing costs for all permits and notices. Those costs are incurred even if the well or boring is not completed.

4725.1837 EXCEPTION TO NOTICE AND PERMIT REQUIREMENTS.

The revisions to existing part 4725.1837 are necessary to clarify when notifications and permits are required with respect to routine maintenance and repairs related to well use. The department wants to ensure that well construction, repair and sealing is performed by qualified persons, but not all routine well repairs must be noticed or permitted. Pumps, pumping equipment, pitless units and pitless adapters and screens are well parts that are replaced during the normal lifetime of a well. If a repair does not involve deepening the well through a confining layer or having casing installed or removed through the frostline, but may involve flushing out or cleaning a well, a permit is not required.

4725.1848 WELL MAINTENANCE PERMITS.

Subp. 3. The revision to this subpart deletes item D. A well is subject to the provisions for well sealing and a maintenance permit established by Minnesota Statutes, sections 103I.205, subdivision 3 and 103I.301. A well is subject to the conditions and standards in existence at the time the well was constructed. A maintenance permit will be issued to maintain a well, provided it

does not pose an immediate threat to public health or groundwater or violate other conditions stipulated in statute and this part.

Subp. 4. Water supply well maintenance permits. "Water supply" language is added to clarify which type of wells are required to have a maintenance permit if not in use. Monitoring wells and dewatering wells are routinely in use. The phrase "or from which the power supply has been disconnected" is proposed for deletion because is statutory language contained in Minnesota Statutes chapter 103I. A well that is not in use or is inoperable must have a maintenance permit.

Specification of the fee in subparts 4, 5 and 6 is deleted because it duplicates statute.

4725.1851 WELL AND BORING RECORDS.

Part 4725.1851 is a revision of existing part 4725.6700 WATER WELL RECORDS. The general applicability has been extended to the construction and sealing of all wells and borings. Borings have been added because the construction or sealing record is the only mechanism available to assure that the borings are constructed and sealed in accordance with the statute and rule. Chapter 4725 specifies construction standards, particularly for grout and casing, that are dependent on the presence of certain geological conditions. The records are reviewed to ensure that materials used are in accordance with the geological conditions indicated. Other information may be necessary in the future to contain spills, analyze water flow differences. The geological materials data is also used by other agencies including the Minnesota Geological Survey and Minnesota Pollution Control Agency. The department was mandated in 1977 to collect this information for other agencies. To reduce the amount of paperwork for this requirement, the department is providing a form that allows a contractor to group several wells or borings of similar depth, geology and construction together for purposes of reporting. The department has moved the geological terms contained in existing part 4725.0100, subpart 29 to this part on records. This movement is proposed because the terms are used on the well log reporting form.

4725.1855 WELL CUTTING FORMATION SAMPLES.

The provisions of this part are a redraft of existing part 4725.6800. The requirements have not been substantially changed. Terminology and responsibility has been made consistent with the duties of the commissioner specified in Minnesota Statutes, chapter 103I.

**WELL AND BORING GENERAL CONSTRUCTION
AND USE REQUIREMENTS**

4725.2010 APPLICABILITY.

This part specifies that the provisions contained within parts 4725.2010 to 4725.3950 apply to all wells and borings. Parts pertaining to water supply wells, monitoring and remedial wells, dewatering wells and elevator shaft hydraulic cylinder excavations may, within those parts, add to or delete from the general provisions. Chapter 4725 does not apply to exploratory borings, which fall within the statutory definition of a boring, but are separately regulated under chapter 4727.

4725.2020 INTERCONNECTION OF AQUIFERS PROHIBITED.

Aquifers are separated from each other by confining layers. The interconnection of aquifers is presently prohibited by part 4725.4300, subpart 4. Rule part 4725.4300, subpart 4 applies only to wells encountering cavernous limestone or dolomite and is proposed for repeal.

Proposed part 4725.2020 is intended to extend the prohibition of wells interconnecting aquifers to all wells and borings and to additional geologic formations. The reasons for prohibiting interconnections are basically the same as those which justify prohibiting cavernous rock multi-aquifer wells: to prevent contaminated water from spreading to otherwise safe, protected aquifers; to preserve existing distinct water chemistry and pressures within aquifers; and to prevent bore hole collapse due to cascading water falling from the surface or overlying aquifers.

Subpart 1. Aquifer interconnections. The proposed rule prohibits extension of an open hole or screen through more than 10 feet of a confining layer. This assures that substantial confining layers are not breached, while allowing a practical distance for the installer to verify that a confining layer has in fact been entered.

Subp. 2. Aquifers in unconsolidated materials. Confining layers between unconsolidated aquifers have not been extensively mapped or described and the horizontal extent and hydraulic properties vary to a much greater degree as compared to rock formations. Therefore, while it is possible to name individual confining rock layers as has been proposed in Subpart 3, it is not possible to name confining layers in unconsolidated formations. Instead, the rule provides a relatively simple method for the contractor to determine if a confining layer exists on-site by the use of geologic logs, geophysical logging or sample identification.

Ten feet or more of geologic material which meets the definition of "confining layer" as described in part 4725.0100, subpart 24a is

relatively easily identifiable, and constitutes a layer of material which will separate aquifers. The 10 foot thickness is consistent with the requirement of part 4725.4450, subpart 2, item A. Ten feet or more of a confining layer can be identified during the drilling process or after the hole has been drilled and is a minimally restrictive requirement in that it excludes confining layers which do not extend for distances beyond the zone of influence of the well.

Subp. 3. Aquifers in rock. Confining layers in paleozoic sedimentary rock have been well described, named and mapped. The confining layers have considerable horizontal extent and the hydraulic conductivity remains fairly constant across tens or hundreds of miles. The rule references an accessible and available document which describes the occurrence and characteristics of the confining layers.

4725.2050 USE OF WELLS OR BORINGS FOR DISPOSAL PROHIBITED.

Two-thirds of Minnesota's residents use groundwater obtained from wells as a source of drinking water. Domestic water supply is granted the highest priority of water use under Minnesota Statutes, section 103G.261. Groundwater is protected as a source of drinking water. Direct injection of wastes into the groundwater is prohibited by Minnesota Rules chapter 7060.

Existing rule part 4725.2300 prohibits use of a well for disposal of surface water, groundwater or any other liquid, gas or chemical. Proposed part 4725.2050 prohibits the return of water to the potable water system if it has been used for cooling parts of engines, air compressors, or other equipment, or used for air conditioning.

Injection of wastes or storm water into a well or boring bypasses the natural filtration afforded by percolating through layers of soils, subsoils and deeper strata if the contaminants were otherwise placed on the surface. Injection into a well or boring rapidly transports the contaminants deeper into the ground. The exception is groundwater thermal exchange devices with reinjection permitted in accordance with the requirements in Minnesota Statutes, section 103I.621 and this chapter. Slug tests are commonly conducted to evaluate the effectiveness of a well and evaluate groundwater conditions. The injection of small quantities of water into a well from which it was taken creates no significant contamination potential. Water in contact with engines, compressors or air conditioners may be contaminated with oil, petroleum products, refrigerants or treatment chemicals and could constitute a public health threat if injected into a well or used for human consumption.

4725.2150 REQUIRED DISTANCE FROM GAS PIPES, LIQUID PROPANE TANKS, ELECTRIC TRANSMISSION LINES.

Subpart 1. General distance. This subpart proposes to reduce the separation distance horizontally from an overhead or underground electric transmission line of less than 50 kilovolts and liquid gas pipes from the 15 feet stipulated in adopted part 4725.2100, to ten feet.

The proposed separation distance of 10 feet for electric transmission lines of less than 50 kilovolts is consistent with the Occupational Safety and Health standard contained in 29 CFR Chapter XVII, sections 1910.180 and 1926.550 which apply to the safe operation of cranes, derricks, crawler locomotives and truck cranes - devices similar to drilling machines.

A 10 foot separation to a buried electric transmission line has been added as a reasonable distance to prevent contact with the line during drilling or trenching yet allow for some margin of error for both the utility company and driller. The separation distance of 25 feet for lines in excess of 50 kilovolts is the same as that contained in existing part 4725.2100. A separation distance from electric transmission lines is needed to prevent electrocution of individuals constructing a well and individuals performing service on the well in the future.

The distance required from a buried flammable or volatile gas pipe has also been reduced from 15 feet (as required in existing rule part 4725.2100, item B) to 10 feet to bring this requirement into conformance with utility company guidelines. A 10 foot separation distance has been added to address separation from liquid propane tanks. This is consistent with OSHA separation requirements for separation from flammable gases. A separation distance from liquid propane and natural gas lines is necessary because of the potential for fire and explosion due to the use of masts, derricks and metal drilling and casing materials and the use of welding torches which spark or emit flame.

Subp. 2. Exception. The proposed provisions in this part allow a contractor to further reduce the separation distances specified in subpart 1 if the conditions in this part are met. It is reasonable that the distance be reduced if the electric power lines are deenergized and visibly grounded or insulating barriers are provided. The danger from electrocution is reduced. This provision is only allowed, however, if the location of the power source is indicated. The provision to allow for an exception to the distances indicated is consistent with the exceptions provided in 29 CFR Chapter XVII, sections 1910.180 and 1926.550 by OSHA for a reduction in the safety distance for cranes and derricks.

It is also reasonable that if a gas pipe or tank does not, at the time of well construction, contain flammable or volatile material,

that the well could be constructed closer than indicated. Again, however, it is necessary that the well be marked with a sign warning of the location of a gas pipe to alert anyone subsequently servicing the well, so caution may be used.

4725.2175 LOCATION OF WELL OR BORING WITHIN BUILDING.

This part replaces portions of existing parts 4725.1900, 4725.2100, 4725.5700 and 4725.5800.

Subpart 1. Location in a building. This subpart prohibits locating a well or boring within a building unless the building is constructed in accordance with this part. Locating wells or borings within buildings in general is not acceptable because this limits access when repairs are necessary and can compromise the sanitary protection of a well by holding contaminants near the well without proper drainage.

Subp. 2. Access. This subpart, formerly parts 4725.5700 and 4725.5800, establishes minimum requirements for building access, drains, and the storage of chemicals. Access is necessary to maintain, repair and seal the well or boring or repair the pump and water treatment equipment. The building must be constructed above the established ground surface to prevent drainage of surrounding surface water and perhaps contaminants into the well. Floor drains must be constructed to prevent the accumulation of contaminated surface water or sewage near the well. Storage of chemicals within the building is prohibited to prevent accidental contamination of the well, boring or groundwater.

Subp. 3. Protection. This subpart amends the existing part 4725.5800 to require that casings extend at least 12 inches above the floor to protect from flooding. It eliminates the requirement that the slab surrounding the casing be at least four inches thick.

4725.2185 DISTANCE FROM BUILDINGS.

This part contains provisions in existing part 4725.2100, item A. A three foot distance is needed between a well and building or building projection to allow for drilling, service, repair and sealing of the well or boring. It is necessary to maintain the distance in order to allow for access to remove or perforate casing or to seal the well or boring at a later time. Placement of a drill hole within three feet of a building presents the potential for injury to workers being pinned against the machine and the building. The requirements of part 4725.1900 are repealed. The requirement that a well be located at least five feet from a property line does not relate to the intent of Minnesota Statutes, chapter 103I. The requirement that a well constructed for a community water supply system be at least 50 feet from a property line is not necessary to specify within this chapter because it is addressed within the plan review process for community public water

supplies in accordance with chapter 4720.

4725.2250 GENERAL CASING REQUIREMENTS.

Subpart 1. Casing types. It remains necessary to specify casing requirements to ensure that the materials used meet the minimum standards for intended use, the casing is of reasonable strength and corrosion resistance, and the materials will not impart contaminants or impurities which adversely affect the sanitary quality of drinking water or groundwater. The types of casing specified, steel, stainless steel, and plastic, are in existing rule parts 4725.3400 and 4725.6900. The need for and reasonableness of the specifications for each casing type is addressed in the individual rule part that speaks to that type of casing.

Subp. 2. Watertight casing required. The revision of this subpart is based on standards in existing part 4725.3400, subpart 2. The requirement that casing be watertight has been made applicable to all casing, not just plastic and steel. This subpart clarifies the criteria to be applied by the department to casing joints. Watertight casing and joints are necessary to prevent surface contaminants from seeping into the well. Concrete curbing is frequently used in dug or bored wells, but is not necessarily watertight. Wells constructed with such curbing must be grouted between the casing and bore hole with cement to provide a watertight barrier to surface contaminants.

Subp. 3. New casing required. The requirement that permanent casing be new is required in existing part 4725.3400, subpart 3. The allowed use of salvaged pipe has been extended from 30 days to 120 days to allow salvaged pipe, in good condition, to be used within a drilling season. The requirement that a potable water well not be cased with salvaged casing from a nonpotable well or boring is a new requirement needed to eliminate the introduction of contaminants from salvaged pipe into a well used for drinking water. Without this restriction, pipe salvaged from oil or gas drilling, sewer construction or a remedial well could be used for potable well construction. Chemicals or substances not naturally found in groundwater may coat or leach into salvaged pipe or casing and then leach out into the water supply.

Subp. 4. Casing markings required. This subpart redrafts existing part 4725.3400, subpart 4 to clarify what standards the department requires on casing. Markings are necessary to ensure that the casing meets the specifications indicated. The department has experienced multiple interpretations of the existing standard and enforcement problems. Stamping, rolling or stenciling of the marking ensures that the mark is permanent. In some instances casing has been marked with a sticker, which may not remain on the casing. It is necessary that the casing be marked by the manufacturer to ensure that the casing is made to the minimum

specifications.

Subp. 5. Casing testing, and Subp 6. Casing rejection. These subparts redraft existing part 4725.3400, subparts 4 and 5 and clarify the circumstances by which casing may be tested and the criteria for rejection. It is reasonable that casing that lacks markings, has illegible or altered markings or no mill papers, be tested (or not used) to ensure that the material meets the standards specified. Casing with pits, cracks, patches or partial welds, may leak, collapse or corrode and may not meet the standards specified. Item C of subpart 6 is the standard in existing code and has not been changed. Casing is generally marketed in 10 to 20 foot lengths.

Subp. 7. Temporary casing. This provision is based on existing part 4725.3400, subpart 6. Minimum wall thicknesses have been removed. As long as the casing use is temporary, the department will not require a minimum casing thickness because the temporary casing is only used to hold the bore hole open during construction and grouting.

Subp. 8. Inner and outer casing. This provision redrafts existing part 4725.3400, subpart 6. The proposed revision eliminates the specific inner and outer casing dimensions in part 4725.3400, subpart 11 and reduces the minimum annular space required from four inches to 3.25 inches between the inside diameter of the outer casing and the outside diameter of the inner casing. The industry in rule revision meetings with the department pointed out consistent problems with the diameter distances in existing rule. Larger diameter outer casing and additional grouting material adds costs to well construction. Comment from well drillers at meetings indicated that 3.25 inches is large enough to provide for the entrance of a tremie pipe and grout. The standard of 3.25 inches does not preclude drillers from using a larger space should they choose. The proposed provision clarifies that the minimum space includes the space between the borehole and any couplings or bell ends. The revised diameter standard will hopefully provide the industry with more flexibility in the use of inner and outer casing and reduce costs.

The requirement for centering guides has been deleted. Some industry representatives commented that the guides have interfered with the grouting process.

Subp. 9. Outer casing in unconsolidated materials. An outer casing that meets the standards specified in parts 4725.2350 to 4725.2550 is not required in geological material which is not rock, such as sand and gravel. The department proposes to allow for more discretion by the driller to determine the kind of casing to use in these conditions provided that the space between the inner and outer casing is filled with neat cement.

Subp. 10. Casing inside diameter. The proposed subpart changes the existing two inch standard mandated inside diameter of well casing and provides that a well or boring less than 100 feet in depth may have a casing with a minimum 1.25 inches inside diameter. The existing specified diameter was required to accommodate a well pump. The reduced inside diameter allows for the use of smaller, less expensive material. A minimum casing size is needed to allow for repair, installation and operation of pumping equipment, and to provide adequate clearance to inset a tremie pipe when the well or boring is sealed. One hundred feet is the practical maximum depth where 1 and 1/4 inch casing can be successfully grouted with a tremie pipe.

Subp. 11. Casing height. This subpart does not change the existing standard that the casing must extend at least 12 inches above the established ground surface. The provision to allow termination of the outer casing below the pitless is necessary because the pitless is installed on the inner casing which extends into the water bearing formation. Termination of the outer casing at the surface would not allow for the installation and operation of the pitless.

Subp. 12. Casing offsets. This provision repeats the existing standard.

4725.2350 STEEL CASING REQUIREMENTS.

The standards specified in rule for steel casing are proposed for revision. ASTM Standard A120 is omitted. The American Society for Testing and Materials discontinued this specification in 1988 in preference to ASTM Standard A53-90b which mandates chemical, tensile and mechanical requirements which A120 did not. Standard A120 only required hydrostatic testing. The AWWA C201-60 standards has been deleted because this standard has been discontinued by the American Water Works Association.

Standard A53-90b requires certain nondestructive tests and more extensive chemical requirements than Standard A53-69 which is referenced in current rule. For example, the weld seam of each length of Electric Resistance Welded pipe must be tested with a nondestructive electric test using ultrasonic or electromagnetic principles. The nondestructive test shows hidden flaws in the pipe such as micro-cracks which could adversely affect the strength of the casing causing collapse or leaks and thus allowing contaminants to enter the casing and affect the sanitary quality of the water. Chemical requirements in ASTM Standard A53-90b set a maximum percent composition requirement for carbon, manganese, phosphorus, sulfur, copper, nickel, molybdenum and vanadium. The last five substances assure proper hardness and tensile strength, thus assuring the structural integrity of the casing.

The table for minimum weights and thicknesses in subpart 2 is essentially the same. It has been reformatted to ease use and an error in the internal diameter for 24 inch pipe is corrected for consistence with the source schedules.

4725.2450 STAINLESS STEEL CASING REQUIREMENTS.

This rule part is revised to allow for the use of stainless steel casing in all wells and borings. Present code allows use only in monitoring wells which may be installed in highly corrosive environments. Stainless steel casing is very expensive and not commonly used in other wells. However, it is an acceptable casing material. Reference to ASTM Standard A312-86a is necessary to assure that proper stainless steel is used and threading requirements are met. Schedule 5 stainless steel casing may not be threaded because it is too thin. Schedules 5S and 10S wall thicknesses do not permit threading according to the American National Standard for Pipe Threads (ANSI) Standard B1.20.1, therefore the pipe must be at least Schedule 40 if it is to have threaded joints.

The ASTM 300 series of austenitic stainless steel, which includes Standard A312-86a, is widely used for monitoring well casing. This series contains 16 to 20 percent chromium and 8 to 14 percent nickel and is generally resistant to corrosion.

4725.2550 PLASTIC CASING AND COUPLING REQUIREMENTS.

Subpart 1. General requirements. Additional approved couplings. The standards specified in this part are found in existing rule part 4725.7100. The standards specification has been updated from the 1976 standards to 1988 for consistency with current ASTM recommendations.

Subp. 2. Additional approved couplings. The market for plastic well casing is very small compared to the market for plastic pipe manufactured for other purposes. Couplings for well casing are infrequently needed, therefore because of the small market, manufactures are hesitant to make couplings specifically rated for well casing. Plastic water pressure pipe constitutes a large market, and couplings are made by a number of manufacturers. The rule amendment proposes to allow use of other couplings, such as NSF approved water pressure fittings, for well casing couplings if the couplings meet the performance standards of ASTM F 480.

Subp. 3. NSF standard. The specification of National Sanitation Foundation (NSF) Standard 14-1990 and 61-1991 is necessary to clarify what criteria have been used by the department in determining the safety of plastic piping components and related materials such as solvents, cements or primers. The National Sanitation Foundation is a nationally-recognized standards testing organization which evaluates the impact on public health of various

materials or components.

4725.2650 PLASTIC CASING INSTALLATION.

The provisions in this rule part are based on those currently contained in existing part 4725.2650. Requirements governing the installation of plastic casing remain necessary because of its unique properties. Welding or threading joints together is not a method commonly used. Instead, this casing material is joined with solvent cements.

Subpart 1. General. Subpart 1 clarifies language in existing part 4725.7400, items B, C, D, E and F and repeals item A which was a provision which is not quantifiable or enforced. It is necessary to ensure that pieces used are designed to fit snugly together. This is necessary to prevent leakage.

The provisions in subpart 2, Cutting, subpart 3, Cleaning, subpart 4, Primer, and subpart 5, cementing are consistent with the standards contained in existing rule. Subpart 6 on assembling is the same as existing subpart 5.

Subp. 7. This provision expands part 4725.7600, subpart 7. The provision is necessary because the use of screws to fasten casing together or other devices to the casing damages the durability and integrity of the plastic material. Plastic breaks more readily than metal casing; the use of screws enhances the likelihood of leakage or breakage and compromises the integrity of the barrier.

Subp. 8. Drilling inside casing. Because plastic casing is a soft material, drilling inside the casing with metal tools readily damages the plastic casing. Metal augering devices can easily slice or puncture plastic casing. Prohibition is necessary to preserve the integrity of the casing and prevent seepage and leaks. The provisions in this subpart are contained in existing part 4725.7600, subpart 2.

Subp. 9. Limestone, dolomite restriction. Plastic casing in limestone and dolomite cannot be properly sealed and is subject to damage and leakage. Plastic is a soft casing material compared to steel and iron casing used as outer casing material. Even though limestone and dolomite are not hard rocks, they have sufficient strength to damage plastic casing if it is used as the outer protective casing and is damaged from the heat of cement grout. The standards in this part clarify those contained in existing part 4725.7600, subpart 6.

Subp. 10. Driving prohibition. Driving plastic casing is a method of pounding on it to drive it into the ground. Driving casing is prohibited. Plastic casing is subject to fracture or damage on impact with a harder material.

Subp. 11. Sealing, removal, or replacement. Because plastic casing is a fragile material, it must not be installed if it must be driven, the screen or pump must be forcefully installed or the casing breaks during constructing. The purpose of casing is to prevent leakage and potential contamination. Casing subjected to the factors specified in items A, B and C is of questionable integrity.

4725.2750 SCREENS.

This proposed rule part replaces part 4725.4500 which is proposed for repeal. Proposed part 4725.2750 specifies how a screen must be fitted to well casing. Failure of a well or boring can occur if the screen is not properly attached to the casing. The proposed rule part specifies commonly used methods. Screens are used in all types of geological materials and are not limited to only sand and gravel aquifers.

Recent studies have linked lead components in water supply systems to high lead concentrations in water. Minnesota Statutes, section 326.371, part 4715.0820 in the Minnesota Plumbing Code, the Safe Drinking Water Act and the United States Environmental Protection Agency regulations, (42 USC 300f, section 1417, October 1987 and Title 40, Code of Federal Regulation, section 141.1417) prohibit the use of lead components in potable water systems, including wells. The prohibition against lead packers is reasonable because satisfactory alternatives to lead material exist.

Blank screens or risers provide for settlement of gravel packs or the natural formation, and exclude thin fine sediments. Limiting the leader or blank screen to 10 feet allows settling of the gravel in the natural formation without blank screen to be used as casing. Ten feet eliminates crossing confining layers. The leader is the weakest part of a well. The shorter the leader, the better.

4725.2850 GRAVEL PACKS.

Gravel packs, filter sand or stabilizer materials consist of mineral particles placed around a screen and serve to provide sand-free water and stabilize a formation. The proposed rule requires that the materials used be properly graded, clean and washed particles with less than five percent calcareous material. The gravel pack may extend no more than 10 feet above the top of the well screen.

Graded material is necessary to specify to assure that the material is matched to the well screen and formation size. The use of clean, washed material is necessary to assure that surface contaminants, bacteria or extraneous material are not introduced into the well or groundwater. A five percent limit on calcareous material is necessary to prevent formation collapse, a breach of the annular seal, and sand pumping due to dissolution of the

material from acid treatment. These requirements are referenced in the American Water Works Association standard for water wells, A 100-84. Existing rule part 4725.3800, subpart 1, prohibits extension of the gravel pack above the well screen. A casing must be grouted from the lower termination of the casing. Gravel is not an approved grout material. Extension of the gravel pack to 10 feet above the screen is reasonable to allow for subsequent settling. Settling will occur. Under the existing rule proposed for repeal, the settling would place the gravel pack below the top of the screen and thus allow sand or fine material to enter the well or boring. Ten feet allows room for settling. If the gravel pack extends too far above the screen, water from another aquifer, or surface contaminants may enter the well or boring.

4725.2950 DRILLING FLUIDS.

The requirements for drilling mud additives in adopted part 4725.3900 have been combined with requirements for drilling water (adopted part 4725.4900) into a single rule part on drilling fluids. As was noted in the justification for adopted part 4725.3900, additives are used in developing wells drilled by methods other than rotary, boring or auguring. Regulation of fluids used in the drilling process is necessary to ensure that the fluids used do not adversely impact groundwater or well water quality.

Subpart 1. Water. If water used for drilling comes from a source other than the well or boring being drilled the source must be a potable water system, be a well or boring of similar use and construction, contain a free chlorine residual at all times and be conveyed in clean, sanitary tanks and water lines. The use of chlorinated water reduces the chance for pathogenic microorganisms to enter the well, boring or groundwater. Chlorinated water reduces the ability of nuisance organisms such as iron bacteria to affect the use and operation of the well or boring. The term "clear" has been changed to the defined term "potable." The color or clarity of water does not necessarily indicate it is free of harmful impurities and safe for human consumption.

Subp. 2. Drilling additives. Drilling additives are materials or chemicals used to aid in the drilling of a well by suspending the ground up rock chips or "cuttings", cooling the drill bit, and stabilizing the hole to prevent collapse. Historically, mixtures of clay and water have been used. Increasingly, chemical additives have been developed for specific drilling applications. Numerous products are marketed for the development of water wells, borings, exploratory borings, and petroleum wells. Some drilling additives contain petroleum products or other harmful substances which should not be used in applications that contact aquifers used for drinking water. The National Sanitation Foundation (NSF) has established Standard 60-1988 which evaluates the health effects of drinking water treatment

chemicals including drilling fluid additives. This standard is the only nationally recognized standard of general applicability available. It has been used by the department in the past and is used by other states. The standard is based on health related concerns and serves as a nationally recognized, consistent standard. The American National Standards Institute (ANSI) has developed an accreditation program under Standard Z34.1-1987 which assures that laboratories and other organizations are credentialed to perform the evaluations required by the standard.

4725.2975 DISPOSAL OF MATERIALS.

This part restates the provisions in adopted part 4725.5200. This part is needed and reasonable to remind persons constructing wells and borings of the need to check for and comply with other applicable state and local regulations. The requirement to dispose in a manner that does not create a health hazard is reasonable because it is consistent with the intent of Minnesota Statutes, chapter 103I and with the responsibility of the Commissioner to protect public health. The requirement on test pumping is existing language.

4725.3050 GROUTING.

Subpart 1. Grouting materials. This subpart, formerly part 4725.3800, has been amended to move the definitions of "concrete grout," "neat concrete grout," and "heavy drilling fluid" to part 4725.0100 DEFINITIONS. The definition of "concrete grout" has been moved unchanged to part 4725.0100, subpart 23a. The term "neat concrete grout" has been changed to "neat cement grout" in part 4725.0100, subpart 30e. The term "heavy drilling fluid" has been defined in terms of "bentonite", "bentonite grout" and "high solids bentonite grout" in part 4725.0100.

This subpart incorporates the current prohibition on the use of rapid-setting cement with plastic casing contained in part 4725.7600, subpart 3, and removes the requirement that only neat cement grout be used with plastic casing. The provision of other grouting options is reasonable since bentonite grout and high solids bentonite grout also provide an adequate grout barrier as has been demonstrated with steel-cased wells.

Subp. 2. Grouting methods. This subpart revises part 4725.3800, subpart 1, to require that grouting be completed before placing a well or boring in service. This assures prompt grouting, prevents collapse of the borehole and assures that the well or boring is grouted before use. The term "grout pipe" has been changed to "tremie pipe" for consistent use of terms throughout the chapter. The subpart requires that the bottom of the tremie pipe remain submerged in grout during the grouting operation. This requirement protects against separation or dilution of the grout mixture, as well as the possibility of "bridging" in the annular

space, during the grouting operation. The shoveling of an equal volume of washed sand, cuttings taken from the bore hole, or granular bentonite while pumping the mixture in part 4725.0100, subpart 21c, item A is necessary and reasonable to increase the quantity of solids in the annular space and reduce grout shrinkage.

This subpart amends existing part 4725.3800 which now requires grouting in one continuous operation. The intent of the sealing or grouting procedure is to accomplish a total and complete seal or filling of the space between the borehole and casing. In cases where grout pipe diameters are large or water levels are low, grout will siphon (negative pressure) even with the use of a pump. In cases of deep wells or wells with large voids, the weight of the grout column may force the grout needlessly far into the formation. Allowing the well to be grouted in stages will allow the grout to partially set, thereby reducing the cost and time required to grout. It allows grouting stoppages due to delays in Redi-mix delivery, material breakdown or other delays.

This subpart clarifies that subsequent work on a well must not be resumed until grout has had time to set. This is necessary so the grout seal is not compromised.

Subp. 3. Grouting depth requirement. This subpart combines the requirements in part 4725.3800, subpart 1, part 4725.3900 and 4725.7600, subpart 3 and requires all wells constructed with an open annular space to be grouted to a depth of 30 feet or to the bottom of the casing, whichever is greater. This subpart replaces part 4725.4100 which permitted the washing of fine-grained caving material into the top 30 feet of the annular space. The proposed changes are needed to assure that the well is sealed at the surface. Pressure-grouting the top 30 feet of the annular space minimizes the "bridging" of sealing materials and eliminates some of the current problems of open annular spaces due to washing cuttings poorly. Contaminants come from the surface. Previously plastic cased wells were grouted for 30 feet. The top 30 feet is typically the zone of highest contaminant concentration. Grouting with a tremie pipe assures a seal through this zone of contamination. The required addition of an equal volume of clear sand, cuttings taken from the borehole, or granular bentonite add solids to the annular space and reduces shrinkage with time. This subpart clarifies that the grout must extend to the top of the gravel pack in gravel packed wells, which has been department interpretation of existing rule.

Subp. 4. Grouting between casings. This subpart, formerly part 4725.3800, subpart 1, contains the same requirements as in the current rule.

Subp. 5. Driving casing. This subpart, formerly part 4725.4000, simplifies and clarifies the requirement to place bentonite grout, bentonite powder, granular bentonite, or high

solids bentonite grout around a casing when the casing is being driven. This requirement continues to assure the best possible surface seal when constructing a well by driving casing. This subpart also simplifies the language requiring a drive shoe on the bottom of driven well casing.

Subp. 6. Grouting near screen. This subpart relaxes the current requirement in part 4725.3800, subpart 1 to only require grouting in the open hole beneath a well screen to within ten feet of the well screen. Grouting to this distance minimizes the unwanted vertical migration of water (and possibly contaminants) below the well screen.

Subp. 7. Grouting in rock. This subpart simplifies, reduces and consolidates existing requirements presently contained in parts 4725.3800, 4725.3900, 4725.4200, and 4725.4300.

Item A requires that casing be equipped with a drive shoe and driven firmly into stable rock or that the casing be grouted into rock with neat cement whenever rock is encountered in the construction of a well or boring. This eliminates the requirement for a grouted, enlarged drill hole when rock is encountered within 25 feet of the ground surface and replaces it with a requirement for a grouted enlarged drill hole any time that a casing of a well or boring extends more than 10 feet into rock.

Item B reduces requirements currently found in part 4725.4300, but changes the requirement for the diameter of the enlarged drill hole from 4 inches to 3.25 inches. This change to a drill hole 3.25 inches larger than the casing or coupling is being standardized throughout the revised code as the minimum allowable space to provide for casing clearance and grouting. Experience from department inspectors and input from the drilling community indicate that this number provides enough room to get a tremie pipe into the annular space between the borehole and casing without requiring an excessively large casing or borehole which adds expense. Item B requires a grouted, enlarged bore hole when the casing of a well or boring extends more than 10 feet into any rock, but permits the driving of casing in sandstone or dolomite if specific criteria are met. This provision acknowledges that a casing seal can usually be obtained by driving through sandstone and eliminates the expense of constructing and grouting an enlarged drill hole in those conditions.

Item C is a reorganization with minor amendment of existing rule part 4725.4300. Limestone or dolomite transmits water through fractures, solution cavities and in some cases, caves. Water can move very quickly and without the natural filtration of water movement through sands or sandstones where the water moves slowly between the individual sand grains. Because of the rapid water movement special protection is needed for limestone or dolomite wells.

Subitem 1 repeats the requirements of part 4725.4300, subpart 1. Casing and grouting below the pumping level is needed to insure that the well does not collapse or erode the annular space seal. Drawdown by pumping causes water movement at the interface of the bottom of the casing and the rock. Alternate wetting and drying of the rock can cause erosion of the formation, corrosion of the casing, and possible collapse of the well. Cement or concrete grout is needed because the grout seal must be hard and durable. Bentonite grout which remains soft, may wash away in cavernous limestone or dolomite.

Subitem 2 repeats the requirements of part 4725.4300, subpart 2 with minor amendments. The distance required to be cased into the limestone or dolomite is reduced from 15 feet to 10 feet. This is reasonable to ensure that the casing is solidly seated into the underlying formation and to allow for a minimum amount of filtration should the limestone or dolomite be bacteriologically contaminated. The drill hole size is reduced from four inches larger than the casing size to 3.25 inches, to be consistent with the other portions of the rules.

Subitem 3 repeats the requirements of part 4725.4300, subpart 1. Fifty feet of an insoluble geological material is needed to provide for filtration of contaminants because the limestone or dolomite is generally unable to attenuate contaminants.

Item D specifies alternative grouting procedures where the existence of caverns prevents normal grouting. This assures sealing without undue waste of time or material. Field experience has demonstrated that the loss of one cubic yard of grout material usually indicates a problem and warrants use of alternative procedures.

4725.3150 CASING CONNECTIONS.

Proposed part 4725.3150 modifies the requirements presently contained in part 4725.5400 to address above and below ground connections. Those above ground must be weatherproof and insect proof. Those below the established ground surface must also be watertight. Non-gasketed well caps have been shown to be vulnerable to entry by insects and foreign matter. The industry has been moving toward the use of well caps with gaskets.

4725.3250 PUMPS AND PUMPING EQUIPMENT.

This part, presently part 4725.5900, simplifies the general requirements for pumps and pumping equipment installed on all wells and borings, and moves the language pertaining to the priming of pumps to proposed part 4725.5050 which recognizes the applicability of part 4725.5500 only for water supply wells. The existing rule parts 4725.5800 and 4725.5900 are deleted and portions of the requirements moved to this rule part.

Item A. The requirements for the hand pump downturned spout, concrete slab and watertight connection are existing rule requirements designed to prevent the entry of contaminants into the well or groundwater. The requirement in existing part 4725.5800 to have a concrete slab for every well except where a pitless is used is deleted to only require a slab where a hand pump is used or where the well is in a building (part 4725.2175). Slabs are only needed where water is discharging at the well head to prevent ponding around the well and seepage along the well.

Item B is amended from part 4725.5900, subpart 1 to require a pump rod on a hand pump to operate through a stuffing box. The proposed rule requires a stuffing box only where a reciprocating pump rod is used. Hand pumps may be designed with rotating pump rods which can be protected with devices other than a stuffing box.

Item C is new language which prohibits oil lubricated turbine pumps. Turbine pumps can be lubricated with water taken from the well or with oil. The water or oil is circulated down the pump column, below the water level. Pumps employ seals or packing materials to prevent leakage of the oil into the well. These seals fail with normal use and leak oil into the well and groundwater. Since replacement of the oil is easy and less expensive than repair of the well, the common practice is for the well owner to add additional oil. The department has observed instances of ten or more feet of oil floating on the water surface of wells which were equipped with oil lubricated turbine pumps. Since reasonable alternatives exist to oil lubricated pumps, and since the oil represents a public health threat, the rule proposes to prohibit oil lubricated turbine pumps.

4725.3350 INTERCONNECTIONS AND CROSS CONNECTIONS.

The existing rule part 4725.3300 subp. 3 is repealed and replaced with this part. Interconnections and cross connections are piping systems or devices which can allow unsafe water to flow into safe water sources. Water will always flow from an area of high elevation or pressure to an area of low elevation or pressure. The water supply to toilets, chemical processing tanks, and slaughtering houses is the same as the water supplying drinking faucets and kitchen sinks. To prevent backflow or siphonage of wastes, chemicals or unsafe water into the potable system, the systems must be physically separated, or devices installed to prevent backflow. The Minnesota Plumbing Code specifies backflow prevention devices appropriate for different types of contaminants and piping arrangements. The chemigation rules of the Minnesota Department of Agriculture specify in detail the requirements for backflow prevention for chemigation. It is reasonable to allow interconnection between two wells or borings of the same use and quality without backflow prevention because the hazards should not exist or be comparable.

4725.3450 FLOWING WELL OR BORING.

Flowing wells or borings occur where a confining layer overlays an aquifer and pressures are sufficient to force water in a bore hole above the land surface. Flowing wells or borings occur generally in ground water discharge areas near lakes or rivers. Flow rates vary from less than a gallon a minute to hundreds or even thousands of gallons a minute. Flowing wells or borings present unique problems including; backflow and cross-connection control, pump connections, freeze protection, preservation of artisan pressures, conservation of groundwater, prevention of erosion and ground subsidence, and prevention of structural damage to nearby buildings.

The existing rule part 4725.4400 requires construction of wells to prevent erosion of the aquifer and overlying materials, requires flow control, and prohibits a direct connection between the discharge pipe and a receiving tank. The existing rule establishes the general goal of flowing well construction, but does not clearly prescribe construction details. Further detail and more comprehensive standards are needed because of problems observed with flowing wells as recently experienced in the Lake Minnewaska area of Pope County, the Lynd area of Lyon County and the Le Roy area of Mower county where common construction practices were inadequate to control flows resulting in casing washouts, thousands of dollars of sealing costs, erosion damage and potential foundation and building damage.

Subpart 1. General construction. Subpart 1 of the proposed rule expands the existing requirement in part 4725.4400 to prevent erosion of the aquifer and confining layer. The proposed language requires casing to be installed into the flowing aquifer and to cement grout the space between the casing and the bore hole. Numerous problems with flowing wells have resulted from inadequately grouted casings where water flows up the annular space between the casing and the bore hole, or where the casing of older wells has corroded and allowed leaks into aquifers. To prevent water from flowing up the outside of the casing and ultimately eroding a large hole, it is necessary to place a durable, solid grout seal. Neat cement will consistently seal the annular space and not wash out. Bentonite remains too fluid in the hole and has insufficient weight to hold the artisan pressure. Water has a weight of approximately 8.4 pounds per gallon, bentonite grout weighs approximately 9.2 pounds per gallon, and neat cement grout weighs in excess of 15 pounds per gallon. Cement has the added advantage of providing corrosion protection for the casing. Contractors experienced with construction of flowing water wells, and oil field experts such as Halliburton Services Inc., recommend the use of cement grout. The requirement to install casing into the aquifer and seal the bore hole with neat cement grout is adequate for low pressures and flow rates and is needed to successfully control the flow.

Subp. 2. Special construction required. This subpart establishes that special construction standards must be employed for flowing wells in areas with a high flow rate, high artisan pressure, or unique conditions. These are conditions where a single casing and cement grout are inadequate to control flows.

Item A. Wisconsin uses a 70 gallons per minute limit as the point where the use of a special flow pipe (inner casing) is recommended. Flows above this rate present unique problems for conventional construction if casing is not cemented in due to the rapid bore hole erosion and the dilution of cement in the high flows. The second criteria is where artisan pressures exceed 10 pounds per square inch (psi) (Item B). Pounds per square inch can be converted into feet of head by multiplying the pressure by 2.3. This means that water will reach a level of 23 feet above land surface in a well with 10 psi of pressure. This is above the height that contractors can safely work. 10 psi is also the point where methods of shutting in the pressure with conventional devices such as inflatable packers often fail. Item C allows the commissioner to designate a geographic area where routine well construction has failed to confine the flow or where well or property damage has occurred due to flows out of control. Unique flowing hydrogeologic conditions can be identified and maps prepared. The special designated areas with maps will alert property owners, local officials and contractors of the special needs.

Subp. 3. Special construction standards, details the construction requirements for wells or borings located in the areas or conditions delineated in subpart 2. In these areas it is necessary to stabilize the drill hole into the durable confining layer before penetrating the flowing aquifer. This is accomplished by grouting casing into the confining layer. Failure to provide a solid conduit for water to flow to the surface often results in erosion of the bore hole to many times it's original size, erosion of the aquifer and confining layer make it difficult and expensive to ultimately control the flow, and result in increased flows as the hole enlarges. In some instances, the flow from a deeper aquifer enters an aquifer or formation nearer the surface, or begins seeping from the ground surface some distance from the bore hole. The State of Wisconsin Well Construction and Pump Installation Rules, NR 112.15, require double casing and grouting for flows in aquifers confined by unconsolidated materials. Double casing and cement grouting assures that the flow can be contained.

Subpart 4 repeats the flow control device requirements of existing rule, adds a fourth option, that of a pitless device designed by the manufacturer for flowing wells, and adds a performance requirement that the flow control be capable of stopping the flow. The purpose of this subpart is to equip the well or boring with adequately designed plumbing fixtures in order to stop the water flow. The backflow prevention requirements of the existing rule have been combined with the backflow requirements of part

4725.3350.

4725.3550 WELL LABEL.

Part 4725.3550 restates requirements currently in adopted rule part 4725.6750 and eliminates the date, depth and contractor name.

Subpart 1 repeats the requirement to attach a label with one exception - if the well is sealed within 90 days of construction. These requirements are consistent with those in existing part 4725.6750, subparts 1 and 2. The requirements in existing part 4725.6750, subpart 3 are eliminated because Minnesota Statutes, section 103I.205, subdivision 7 was amended in Laws of Minnesota 1991, chapter 355, sections 18-23 to remove all information from the well label except for the unique well number. The unique well number is supplied on a label obtained from the department and is used to reference the well construction permit, well notification, and record of well construction. The previously required information is available from other referenced sources making it now unnecessary for the person constructing the well to include the information on the label.

Subpart 2, as proposed, addresses attachment of the label and is the same as existing part 4725.6750, subpart 4 except that another attachment option is provided. The attachment of the label to a monitoring well does not appear in this rule part but has been placed in the part on at-grade monitoring wells.

Proposed new subpart 3 requires the property owner to maintain the label. This is necessary because disfigurement or carelessness makes it difficult to trace the well.

Subpart 4 clarifies the provisions contained in existing part 4725.6750, subpart 5 to specify that the well label must remain attached to the well at all times except during periods of work. The proposed subpart allows a person, other than a licensee or registrant, for example a property owner, to remove the label if work is needed on the well.

Part 4625.6750, subpart 6 in the existing rule is eliminated because a new label is not necessary.

4725.3650 REQUIREMENTS FOR DESIGNATED SPECIAL WELL CONSTRUCTION AREAS.

Minnesota Statutes, section 103I.101, subdivision 5, paragraph (5) mandates that the commissioner establish "minimum standards for the design, location, construction, repair and sealing of wells to implement the purpose and intent of this chapter." Minnesota Statutes, section 103I.001 states the intent of chapter 103I is "to protect the health and general welfare by providing a means for the development and protection of the natural resource of groundwater

in an orderly, healthful and reasonable manner." Minnesota Statutes, section 103I.101, subdivision 5, paragraph (8) requires the commissioner to adopt rules for the "establishment of standards for the construction, maintenance, sealing, and water quality monitoring of wells in areas of known or suspected contamination..."

From the above authority, it is reasonable to conclude that the legislature was concerned that wells in areas of known or suspected contamination pose a special concern to public health as well as to the natural resource of groundwater and that the commissioner should adopt standards to address that concern.

Review of plans for well construction, sealing and location is necessary in areas of known contamination to protect public health and prevent the further spread of contamination. The plan for a well in a designated contamination area must include the depth of the proposed well. This is necessary so the department can determine if the proposed well is in a contaminated aquifer or if deeper drilling may be necessary. The location of the well is necessary to determine whether the well is inside the contaminant plume or in the direction of the flow of contamination. Casing type, diameter and depth, construction methods, grout materials and methods are factors to consider. The contamination, for example, may be shallow surface contamination. Casing and grouting to a particular depth may avoid seepage of contaminants into the proposed well. The pumping rate of the well and diameter of the well are factors that impact whether or how fast contaminants may be drawn into or toward a well. Finally, it is necessary to know how the well will be used. Protections for a water supply well, a potable well or a remedial well may differ.

Water quality monitoring, as specified in subpart 2, is a method that provides data to evaluate what risks might exist to public health. Monitoring may be the only special condition necessary to determine the degree of contamination. Monitoring will be case specific with evaluation based on existing standards. Community public water supply wells are routinely monitored; private water supply wells are not. Monitoring in a known contamination area is a means of assessing the degree of human exposure and plume direction.

It may be necessary for the commissioner to impose additional construction or location requirements more stringent than those contained within chapter 4725 if monitoring data indicate the presence of contaminants or the potential for contamination that endangers public health.

4725.3750 REPAIR OF WELLS AND BORINGS.

This part rewrites existing part 4725.2400 for clarity and organization.

Subpart 1. Repair or seal. It remains necessary to repair a well in use in accordance with this chapter. This provision clarifies that a well that is not serviceable, and is not repaired, must be sealed. Sealing wells that are in disrepair and thus not useable, is consistent with the purpose of Minnesota Statutes, chapter 103I to safeguard public health and protect the groundwater.

Minnesota Statutes, section 103I.301, subdivision 1 (3) (b) provides that a well not in use need not be sealed if the property owner obtains a maintenance permit. Section 103I.205, subdivision 3 adopted in 1990 provides that a well that is not in use must be sealed or have a maintenance permit. "Well that is in use" was defined as "a well that operates on a daily, regular, or seasonal basis. A well in use includes a well that operates for the purpose of irrigation, fire protection, or emergency pumping." A well that is not repaired and not in use must be sealed or have a maintenance permit.

Subp. 2. Materials. This subpart is essentially the same as part 4725.2400, subpart 2 except that the word "all" has been struck to clarify and simplify the rule. This deletion does not alter the intent of the rule.

Subp. 3. Casing removal. This part requires that removal of all casing constitutes a major reconstruction of the well. It is reasonable to presume that once all the casing is removed from a well, the well no longer exists. The reinstallation of new casing must be done in accordance with the standards for a new well.

Subp. 4. Acid treatment. This subpart redrafts existing part 4725.2400, subpart 4 that addresses precautions needed for acid treating a well. The provision suggesting that pits should not be entered without lifting apparatus has been deleted because it is a recommendation.

4725.3850 SEALING WELL OR BORING.

Subpart 1. Sealing with grout. Grout prevents the flow of contaminants and water into the well or boring or flow between formations. An unsealed space may result in a contaminated groundwater. The provision requiring that the tremie pipe remain submerged in the grout allows the pipe to be withdrawn as grouting proceeds while assuring that the grout will not drop through water diluting or causing the grout to separate. The department is relaxing the standard that the top of the casing end at the ground surface.

Subp. 2. Removal of obstruction; debris. The provisions in this subpart are the same as those in existing part 4725.2700, subpart 1, second paragraph.

Subp. 3. Casing. The provisions in this subpart are necessary so a well does not act as a conduit or channel for the transport of contamination into the groundwater. It specifies procedures to seal a well or boring. Sealing a well by grouting the casing in place, removing the casing or perforating the casing ensures that grout is placed behind the casing in the annular space. Perforation of the casing is a method used to seal the open annulus behind the casing when the casing cannot be removed. Grouting through perforations in the casing seal the open annulus outside the casing. Grouting from the bottom of casing that is being removed is necessary so the grout is not bridged by a collapsing formation and a proper seal is maintained.

Subp. 4. Additional sealing requirements for wells or borings in unconsolidated materials.

Item A rewrites existing part 4725.2700, subparts 1 and 2, items A and C. It also clarifies that bentonite grout with cuttings may be used to fill wells in unconsolidated material. The term "heavy drilling mud" has been used in the existing rule. It has been interpreted by the department to mean and is used by industry representatives to mean bentonite grout.

Item B provides an exemption for the sealing of dug wells. Existing rule part 4725.2700 subpart 1 allows the use of alternate materials if the well is so large that conventional grouts are not practical. The existing rule requires that the materials restore natural conditions as nearly as possible. The existing provision is deleted because it does not identify the conditions where the alternate materials may be used, nor specify the materials to be used. This provision has been used in the sealing of dug wells which are typically 16 to 36 inch diameter, and cased with concrete, brick, stone or wood and completed in unconsolidated formations. The proposed rule specifies conditions and materials. The selection of the filling materials is based on field experience of use, ability to successfully dump the materials in the well, lack of separation or bridging, availability and cost, bearing strength, and impermeability. The diameter, depth, and water depth limitations are based on experience in placement of the materials by pouring without separation or bridging.

Subp. 5. Additional sealing requirements for well or boring in rock. This subpart approves the use of materials to fill large caverns, bailed sections, or when the grout level fails to rise after the insertion of more than one cubic foot of grout. This provision balances the need to seal areas surrounding a well where there may be large underground voids, caverns, or large fractures in the rock, and the prohibitive cost of sealing up a large existing underground void.

Subp. 6. Sealing well or boring not in use. This part clarifies requirements established in Minnesota Statutes, chapter

103I.

Subp. 7. Sealing flowing well. This part is necessary to ensure that a flowing well that is not in use is sealed to conserve groundwater and prevent erosion of the confining layer. Flowing wells that are unsealed also create a safety hazard.

4725.3875 RESPONSIBILITY FOR SEALING.

This part rewrites existing parts 4725.2800 and 4725.2900. Subpart 1 is reasonable because it is consistent with Minnesota Statutes, section 103I.205, subdivision 4, paragraph (a) which states that a person may not seal a well unless the person is licensed or registered by the department to perform sealing. Subpart 2 is reasonable because Minnesota Statutes, section 103I.701 provides that the commissioner may issue corrective orders. If the commissioner determines that a licensee has violated a provision of chapter 4725, it is reasonable that the licensee correct the violation rather than the property owner. Subpart 3 is reasonable because it is a restatement of existing obligation.

WATER SUPPLY WELLS

4725.4050 APPLICABILITY.

Parts 4725.4050 to 4725.5850 apply to water supply wells. Parts 4725.4050 to 4725.5850 apply in addition to the general requirements for well use and construction.

4725.4350 DISTANCE FROM WATER BODIES; PROTECTIONS IN FLOOD AREAS.

This part replaces part 4725.2200. The part has been revised to distinguish between ordinary high water levels of a stream, river, pond or lake and areas of regional flooding. The reference to the "highest known flood of record" has been changed to "regional flood level," because the "regional flood level" is the term used by counties in county water plans and regional flood level data is readily available. The new language also contains a provision for the installation of a water-tight seal on a well in an area subject to flooding if the regional flood level is more than five feet above the ground surface at the site of the well. Sealing is necessary to prevent waterborne contaminants from entering the well. Casing ten feet above the ground surface provides protection to the wellhead from flood events without mandating ridiculous casing heights that might be necessary if the highest known flood level, for example, were used as the minimum casing height standard. This part also deletes subparts 2. (B. and C.) and 3 of existing part 4725.2200 because such criteria are better handled during the community water system plan review process.

4725.4450 DISTANCES FROM CONTAMINATION SOURCE.

This part lists the minimum distances that must be maintained between a water supply well and a source of contamination. The minimum distances are needed to avoid a contamination plume or area of contamination; and allow for contaminant dilution or attenuation by filtration, bacterial die-off or soil adsorption. The minimum separation distances vary based on the volumes of contaminants, the likelihood of contaminant release, the standards or quality of the installation, the soil mobility of the contaminant and the toxicity of the contaminant.

Parts 4725.1900 and 4725.2000 are repealed and replaced by this part. Extraneous and nonregulatory language has been removed.

Subpart 1. Isolation distances. This proposed subpart requires that a water supply well be located at the highest practical elevation on a property, thereby amending existing part 4725.1900, which has required that a well always be located at a higher elevation than a variety of contaminant sources. This proposed change is reasonable because experience has shown that the highest elevation on the property may place the well in the direct line of a plume of contaminants. Rigidity must be reduced to make the rule applicable in a variety of situations.

Isolation distances are not new. Separation between a water source and a contaminant source are necessary because the distance provides time for absorption, attenuation and particulate breakdown. Prevention of fecal contamination of water sources and waterborne disease transmission are fundamental to public health protection. Specific modifications to current separation distances are as follows:

Item A. The 150-foot separation distance between a well and a chemical preparation or storage area in existing part 4725.2000, subpart 1, item A, are revised to clarify the definition of "preparation or storage area" as "one used to prepare or store more than 25 gallons or 100 pounds dry weight", and to specify the types of contaminants covered. Specific cites to defined substances in Minnesota Statutes are used for "agricultural chemical," "hazardous substance," and "petroleum." The 150 foot separation distance for hazardous and petroleum substances is reasonable because these substances frequently contain chemicals such as benzene that move in groundwater and pose a threat similar to the agricultural chemicals defined in Minnesota Statutes, section 18D.01. The proposed 150 foot separation distance may be reduced to 100 feet (Item B) if the storage or preparation area is provided with specified secondary containment in accordance with subpart A. Containment means an engineered berm or dike to contain a leak or spill, prevent overland flow to a well or infiltration to the soil. The distance may be reduced to 50 feet if provided with containment and covered with a roof. These revisions acknowledge the benefits

of the protective facilities now required by the Department of Agriculture.

Item B. The provisions in this item are based on existing part 4725.2000, subpart 2. Further specification of 150 feet is necessary because the present rule had no measureable distance and the department had cases of drinking water wells being drilled directly through landfills. The 150 foot distance will provide a measure of protection for wells drilled upgrade or to the side of a sanitary landfill or waste stabilization pond. Language prohibiting use of a well intercepting leachates is proposed for repeal in deference to adopted standards for injection and consumption. It is necessary to retain additional cautionary language, however, so those persons considering well location are aware that potential hazards may vary from site to site.

Item C. Minnesota Pollution Control Agency rule SW 52 is an outdated reference which that agency has repealed. This reference has been replaced by "manure storage area" as defined in Minnesota Pollution Control Agency rule part 7020.0300, subpart 14.

The distances specified in item C repeat existing rule part 4725.2000, subpart 1, item C.

Item D of existing part 4725.2000 has been expanded. A 50-foot separation distance between a well and the items in subitems (1) to (12), including a holding tank, sewage lift station, non-watertight sewage sump, sediment interceptor, collector sewer, municipal sewer, or pressurized sewer, is proposed for addition because they are potential fecal or contaminant sources which present a risk similar to the fecal sources which are already regulated in item D (septic tanks and soil absorption systems). A 50-foot separation distance between a well and an underground petroleum storage tank of 1,100 gallons or less [subitem (9)] is proposed to provide a minimum level of protection for the well from the failure of buried household fuel storage tanks. A 50-foot separation distance is proposed between a well and any unused, unsealed well or boring [subitem (10)]. Unused, unsealed wells or borings are potential conduits for the transportation of surface contaminants into the ground. A 50-foot separation distance provides a measure of protection to the well from contaminants which may enter the ground through unsealed wells or borings.

The 20 foot separations proposed in item F between a water supply well, below ground surface excavation that may collect liquid, and an above-ground petroleum storage tank of 1,100 gallons or less is proposed to provide a minimum level of protection to the well. The distance for an above-ground tank is proposed to be less than the distance for a buried tank (20 feet versus 50 feet) because leakage from an above-ground tank is far more noticeable and usually fixed rapidly. A 20-foot separation distance between a water supply well and below ground excavation such as a swimming pool is consistent

with similar conditions in existing part 4725.2000, item E. The separation distance of 20 feet between a well and a pressurized sewer serving a single-family residence is reasonable because such a sewer typically carries lower volumes and pressures than other pressurized sewers. Such sewers must conform to the construction requirements of part 4715.0530 and 4715.2820 which mandate specific materials, construction methods and pressure testing. A 20 foot separation distance between a water supply well and a storm water drain pipe 12 inches or greater is necessary because large storm drain pipes can transport high volumes of water with a broad range of surface contaminants. The separation distance provides for attenuation of contaminants that may leak out of storm drain pipes. A separation distance of 10 feet to a frost proof yard hydrant (item F) is necessary because these hydrants have a weep hole to allow surface water to drain back into the hydrant.

Subp. 2. Exceptions to isolation distances. Item A clarifies and modifies the existing requirement in part 4725.2000, subpart 1, Item F, and adds in a 200-foot separation distance between a well and a manure storage area. The revision is necessary to assure that a well with less than 50-feet of watertight casing or not cased through 10 feet of impervious material will be separated from potential sources of fecal contamination. Shallow wells or wells not minimally cased do not have as much filtration material between the water supply and the fecal contamination source. Item B amends the current requirement in part 4725.2000, subpart 1, item A, to allow a 20-foot separation distance between an agricultural chemical supply tank and an irrigation well, rather than the present requirement of a 150-foot separation distance. While the existing separation distance of 150 feet did provide for more distance to the irrigation well, testimony from the regulated industry and the department's own evaluation indicate that the 150 foot separation is largely unworkable and carried some of its own risks. A 150 foot supply line presented hazards from puncture, and leaks at joints. The reduced separation applies to tanks used in the field. The tank must be protected with safeguards that comply with proposed part 1505.2300, subpart 2 of the Minnesota Department of Agriculture. The 20-foot separation distance with protection provides a margin of safety for the well from a catastrophic rupture which can be absorbed within that radius and still permit a practical configuration for the tank and the irrigation well under normal installation and use.

4725.4550 MINIMUM PROTECTIVE DEPTH.

This is a new part that requires all potable water supply wells to be cased to a depth of 15 feet from the established ground surface. Under most soil conditions encountered in Minnesota, the "septic zone" or zone which may reasonably be expected to be contaminated from disease microorganisms will extend no deeper than 10 or 12 feet. The proposed rule is necessary to provide a minimum base-level of protection for every potable well under most circumstances

encountered.

4725.4650 OTHER WATER SUPPLY WELL CONSTRUCTION REQUIREMENTS.

This part incorporates requirements formerly contained in part 4725.4800, part 4725.5100, and part 4725.5300, the last of which is amended to eliminate the requirement for a minimum diameter threaded plug for measuring static and pumping water levels.

Item C addresses the issue of sand in water supplies. While small amounts of sand in water do not pose a public health threat, it usually is an indication that the integrity of the well may be suspect or may be compromised. Continual pumping of sandy water can compromise well components and erode the support around the casing. The presence of sand is often an indication of poor general construction practices and deficiencies. The quantities specified are consistent with the American Water Works Standard A-100 and the recommendations in their water well manual section 57019-75-001.

4725.4750 LEAD PROHIBITION IN WATER SUPPLY WELL.

This part contains language prohibiting lead-containing materials and is consistent with the language in the Federal Safe Drinking Water Act for public water systems, (Title 40 Code of Federal Regulations, section 141.1417.) This provision is necessary to reduce overall exposure of the population to lead which is no longer needed to construct water supply wells.

4725.4850 PITLESS ADAPTER OR PITLESS UNIT.

This part replaces part 4725.5500 of the current rule. The proposed rule requires that a pitless adapter or pitless unit provide unobstructed clearance inside a casing. Some pitless adapters and units are designed so a portion of the device projects into the well casing after the pump and pump drop pipe are removed. This obstruction interferes with well maintenance and well inspection procedures and prevents removal of the well screen. The proposed criterion of unobstructed clearance or "clear way" has been used in guidelines for pitless adapters and pitless unit approval by the Minnesota Department of Health. This proposed amendment places the "clear way" requirement in rule. Items B, C, D, and E clarify the general criteria that a pitless adapter or pitless unit must meet and are consistent with current policy on pitless adapters. This part specifies minimum criteria for attaching a pitless unit to a well casing. This is necessary to ensure that the installation will not typically separate under forces exerted on the casing and pitless unit below ground.

4725.4950 CAPPING WATER SUPPLY WELLS.

This part establishes minimum criteria for the types of covers for

the upper terminus of the well casing in water supply wells. The provision has been redrafted to distinguish between sealing a well and capping the well casing to make the well watertight. The types of well caps listed are consistent with current technology and provide sanitary protection from contaminated surface water, insects, and animals.

4725.5050 PRIMING WATER SUPPLY WELL PUMPS.

This part clarifies the requirements presently contained in part 4725.5900, subpart 2; no substantive changes are proposed.

4725.5150 WATER SUPPLY WELL SUCTION LINE.

This part replaces current part 4725.6000 and contains no substantive modifications.

4725.5250 PUMP DISCHARGE LINES.

This part contains requirements currently found in part 4725.6100 and contains no substantive changes. The distance between a well and a frost-proof yard hydrant has been moved to part 4725.4450.

4725.5350 PRESSURE TANKS.

Subpart 1. Venting. This subpart is a restatement of existing part 4725.6200.

Subp. 2. Buried tanks. This subpart modifies existing part 4725.6200 which requires approval from the commissioner. The guidelines used by the commissioner to approve buried tanks are being proposed in rule.

Item A requires the manufacturer's name, serial number, the allowable working pressure, and the year fabricated. This information provides a means for evaluating the specifications for the tank. The requirement in item B that the interior coating of a buried pressure tank comply with NSF Standard 61 is consistent past department practice of using National Sanitation Foundation Standards for drinking water system additives and coatings. The requirement in Item C for a 1/4 inch wall for a steel pitless adapter tank attached directly to the well casing assures that the tank will not fail significantly earlier than the casing will fail. The requirement in Item D to have all connections to the pressure tank welded or threaded is consistent with good practice and assures that the potential for leakage is minimized. The requirement that any buried pressure tank be installed above the static water level assures that any contamination of the well caused by failure of the pressure tank or threaded or welded joints will also be minimized.

4725.5450 VENTING WATER SUPPLY WELLS.

Subpart 1. Venting exceptions. This part replaces current part 4725.6300 with a revised rule that clarifies the types of wells which are not required to be vented. Venting of a well is required for two major reasons. First, to prevent creating a vacuum in the casing when the pump lowers the water level. A vacuum could draw in contaminants through loose connections, pinholes or openings such as that created by the electrical cable. The second reason for venting is to prevent the accumulation of toxic or flammable gas in the well, in a building with a well or boring, in a basement or water system. It is not uncommon for wells to produce methane or hydrogen sulfide gas. Venting helps prevent explosion or asphyxiation. While as a general rule venting is desirable, some wells do not need venting because of the unique conditions, pumping arrangements or use. Flowing wells cannot be vented and prevent the well from flowing. The positive pressure of the water flow prevents creation of a vacuum. If the casing is used as a suction pipe the well cannot be vented and still work, and in this pumping arrangement, all openings must be leak proof. Packer jets cannot be vented and still operate and again all openings must be leak proof or the pump will fail. Venting of remedial wells is addressed in part 4725.6050. Wells in flood plains with a watertight seal cannot be vented or flood waters could enter the well through the vent.

Subp. 2. Vent construction. This subpart requires minimum construction materials for vents to assure that vent pipe materials and methods of joining are equivalent to other well construction piping in strength and durability.

Subp. 3. Screened vents. This subpart allows for the use of a screened vent incorporated into the underside of a well cap. This new provision is necessary to permit the use of a new and acceptable well cap design.

Subp. 4. Gas. This provision is necessary because the accumulation of toxic or flammable gas could cause fire, explosion or asphyxiation.

4725.5550 WATER SUPPLY WELL DISINFECTION.

This part revises adopted part 4725.6500 to clarify the meaning of "adequate disinfection". Clarification of procedures and quantities is necessary to assure that disinfection procedures are thorough and repeated when necessary.

Item A. Pumping three volumes of water contained in the well is necessary rather than specifying that the well be pumped until clear because clear water may occur rapidly and not indicate thorough flushing. Pumping three volumes completely displaces the well volume. Displacement removes drilling mud and cuttings which

can interfere with disinfection. A chlorine concentration of 50 parts per million is the same standard as existing rule.

Item B repeats the standard in existing part 4725.6500.

Item C prohibits the use of chlorine compounds which contain additives. These additives, such as perfumes in laundry bleach and antifungal agents in swimming pool chlorine, are not appropriate for introduction into drinking water systems because of the risk to human health that they may pose.

4725.5650 WATER QUALITY SAMPLES FROM NEWLY CONSTRUCTED POTABLE WATER SUPPLY WELL.

This part revises part 4725.6600 to simplify and clarify the requirements for sampling potable water supply wells. The department used to have a requirement applicable to all wells, but since all wells are not potable, the requirement for bacteria sampling in nonpotable wells is moot. As revised, this part requires that the person constructing a water supply well inform the well owner not to drink the water until the results of a test are received indicating the absence of total coliform bacteria. Under existing rule, the requirement is just to collect a sample. A percent of new wells constructed contain bacteria introduced into the water supply as a result of construction. A positive test result puts persons ingesting water at risk from pathogens. Until a sample indicates the absence of total coliform bacteria, the well owner must be warned that the water should not be ingested.

The department has required testing for nitrate and total coliform bacteria since 1974 in new wells. This policy is now being formally proposed in rule. Routine nitrate testing of newly constructed private wells is necessary so a well owner may be informed of the nitrate-nitrogen level and determine whether it exceeds the levels recommended by public health experts for susceptible newborn infants who may reside in the household or use the water source. Since 1945, over 2,000 infant deaths in the United States and Europe have been attributed to high nitrate levels in drinking water. Through public education and the increased household use of public water supplies which are regulated and have a minimum standard for nitrate-nitrogen content, infant deaths attributed to high nitrate are now rare.

The person constructing the well is responsible for taking necessary actions, including re-disinfection, when a well sample tests positive for total coliform bacteria. This is necessary to assure that an adequate disinfection procedure is ultimately performed. Virtually all microbiological contamination of new wells is caused by bacteria introduced into the well during construction.

4725.5675 CASING EXTENSION ON REPAIRED WELLS.

This part clarifies existing language in part 4725.2400, subparts 2 and 3 to ensure that when a water supply well is repaired any casing extension is at least 12 inches above the established ground surface. The proposed provisions remain consistent with well construction practice which is designed to provide sanitary water supplies and protect the groundwater from infiltration from the surface.

4725.5750 DUG OR BORED WATER SUPPLY WELL.

Subpart 1. Construction. This subpart revises existing part 4725.5000 to require that casing for dug or bored water supply wells be concrete curbing at least 2.5 inches in thickness, reinforced with 6-inch by 6-inch steel wire mesh. The curbing specification is necessary to establish minimum criteria and assure a durable installation. The curbing specification is consistent with currently-marketed products. The revised rule part reduces the size of the bore hole from 6 inches larger to 3.25 inches larger in diameter than the outside diameter of the curbing. This is adequate to allow grouting of the casing without causing undue expense to the well owner.

Item B revises the existing standard to require that the dug or bored well be constructed with poured concrete at least four inches in thickness, poured in one operation. Pouring sometimes creates variable wall thickness because there are variables attributable to pouring. Poured concrete also does not have the mesh reinforcement of cast concrete. Grouting to a minimum depth of 15 feet is required to seal the well from surface contaminants. This type of construction is considered by the department to be equivalent to the requirements for precast concrete curbing.

Subp. 2. Cover. The first sentence of this subpart redrafts, but essentially does not substantively change the requirements for covers in existing rule part 4725.5000. The second sentence requires that the junction of the well cover with the well casing be made with a watertight gasket and provided with a well vent. A watertight gasket assures proper sanitary protection of the well and prevents the intrusion of animals, insects, or contaminated surface water. The well vent prevents negative pressure within the well, a factor that would encourage the seepage of contaminants into the water supply.

Subp. 3. Watertight openings. This subpart repeats the requirements found in existing part 4725.5000.

Subp. 4. Location. This subpart restates the requirements in proposed part 4725.4450, subpart 2, item A. The requirement is in the code twice to assure that someone who constructs a dug well or bored water supply well is aware of this very important location

requirement. It otherwise may be easily overlooked by someone not familiar with the installation of a dug well.

4725.5850 PUBLIC WATER SUPPLY WELLS.

This part revises adopted part 4725.0300 to clarify that a well may not be constructed for a public water supply system until plans and specifications have been approved according to part 4720.0010. The provisions contained in this rule part are found in existing parts 4725.1900, 4725.2000 and 4725.2200 and have been clarified to reference current federal code definitions.

4725.6050 REMEDIAL WELLS.

Subpart 1. Additional requirements. Remedial wells are used to remove contaminated groundwater by pumping water and contaminants from the well.

Item A. Virtually all pumps, sensors and control mechanisms are electrically operated. The majority of remedial wells are used to remove petroleum products, typically gasoline, which are flammable and explosive. The requirement to provide spark arresters for these electrical and mechanical devices follows common safety precautions to avoid fire and explosion.

Item B. As indicated in item A, remedial wells are used to remove contaminants. Explosive gasses including methane or petroleum products, or an asphyxiant such as hydrogen sulfide may be present. Venting of the gasses prevents the fire, explosion and asphyxiation hazard which can occur particularly when the well is located within a confined space such as a well house or building.

Item C. Remedial wells remove contamination, sometimes along with great quantities of water. The water must be disposed of, often to a sewer. If a direct connection is made between the well and the sewer, sewage or other wastes may back up into the well. The rule requires back-flow prevention as prescribed in the Minnesota Plumbing Code, in a matter similar to the requirements for other wells and borings prescribed in part 4725.3350.

Item D. It is not always practical to extend the casing of remedial wells above ground since remediation of spills or leaks is often best done at the spill site. Remedial wells are common in driveways of gas stations, where termination of the casing above ground level would cause damage to the well or to vehicles. The rule allows construction of at-grade remedial wells in accordance with the installation requirements established for at-grade monitoring wells. The requirements are needed to protect the well from damage and prevent contaminants from entering the well.

Item E. Remedial wells must not be constructed below grade. Below grade wells are a potential source of contaminant seepage

into groundwater sources.

Subp. 2. Exemptions. It is necessary to exempt remedial wells from the distance from contamination source requirements specified in part 4725.4450 because the purpose of the wells is usually to remediate contaminants from a site, hence the wells must often be located near or in area of contamination. Remedial wells often require unique discharge piping connections below the established ground surface which are not compatible with current pitless adapter or unit materials or design. Remedial wells are exempted from the minimum protective depth standards in part 4725.4550 for this reason.

DEWATERING WELLS

4725.6150 DEWATERING WELL.

Rule provisions governing dewatering wells have been moved from existing part 4725.3200 to proposed part 4725.6150. The existing dewatering provisions in part 4725.3200 regulate all dewatering wells with the same construction requirements as other types of water supply wells. The proposed dewatering well construction rules divide dewatering rules into two categories - shallow dewatering wells used for less than 18 months - and deep dewatering wells installed and used for more than 18 months.

Subpart 1. Scope. The provisions in this part is necessary to delineate to what type of wells the specified standards apply and to reference the statutory definition of a dewatering well.

Subp. 2. General construction requirements. The provisions in this part are taken from existing rule part 4725.3200.

Subp. 3. At-grade dewatering wells. Dewatering wells may need to be constructed at-grade. It is reasonable that the precautions to prevent surface contamination for monitoring wells terminating at grade also be applied to dewatering wells terminating at grade.

Subp. 4. Loss of potable supply. This provision is in existing rule part 4725.3200, subpart 2.

Subp. 5. Sealing. This requirement is a clarification of Minnesota Statutes, section 103I.301, subdivision 3.

Subp. 6. Exceptions. Even though a dewatering well may be installed for less than 18 months, during that period it does present a conduit for contamination into groundwater. Item A. A dewatering well is exempt from the requirement to use new casing and casing that meets minimum standards for strength and integrity. While the department will allow for contractor discretion with respect to type of casing, thickness and tolerance, the department

does not want casing used which will come into contact with water sources that has been exposed to petroleum or contaminants. Contaminants or petroleum products may leach out of the pipe and into the groundwater supply. Though the well is temporary, provision for capping the casing and termination above grade is necessary to prevent surface contamination from flowing into the groundwater and to protect the well against vandalism (Item B). Item C prevents the gravel pack from rising to the surface and thus allowing surface contamination to run down the sides of the casing. Sealing the open annulus around the well with cuttings, bentonite grout, high solids bentonite grout, concrete grout or neat cement grout to 30 feet or the top of the water table prevents surface run off into the well. Item E provides standards for sealing a dewatering well that are consistent with those for environmental boreholes.

MONITORING WELLS

4725.6450 APPLICABILITY AND USE.

This part is necessary to clarify what construction standards apply to a monitoring well and how a monitoring well may be used. The sealing requirements for a monitoring well are consistent with Minnesota Statutes, section 103I.301, subdivision 3,

4725.6650 CONSTRUCTION OF MONITORING WELL.

Subpart 1. PVC materials. The provisions in this part are the same as those contained within existing rule part 4725.7605 except application is expanded from petroleum storage site to all monitoring well sites. This expansion is reasonable because the same situations are encountered.

Item A. The screen must intersect the surface of the water table at the time of installation to prevent casing joints from being submerged below the water table due to concerns that the joints are not water tight. The threaded area of the joints are thin and likely to fracture if overly stressed by cold temperatures or tightening. This may result in the pipe leaking at the joints. To prevent leaking through the casing joints, the joints must not be submerged below the water table. This remains a reasonable requirement because monitoring wells are commonly designed so the screen will intersect the water table. Allowing the water table to rise to the first casing joint is reasonable since it is common practice to attach a 10 to 20 foot casing length to the screen. This would allow for eight to 20 feet of water table fluctuation. A water table rise of greater than eight feet would be a rare occurrence.

Item B is necessary to limit the total depth of the well to 50 feet because flush threaded joints of PVC are not strong enough to consistently withstand the increase stress associated with

installation at greater depths. This requirement is reasonable because the water table in Minnesota is generally less than 50 feet from the surface.

Item C is necessary to limit flush and threaded casing to use in unconsolidated materials because installation in rock would require that the casing be cement grouted. Although cement grout is one of the best materials available for achieving a good seal, the amount of cement grout required in rock may be significantly greater due to large cavities resulting from drilling. The heat of hydration when cement is curing may cause the casing to collapse.

Item D. The department is allowing broad discretion in the type of pipe used for flush and threaded PVC casing. A minimum casing standard of schedule 40 PVC was chosen to provide structural strength to prevent bore hole collapse. Although the department would prefer to adopt a more specific casing standard, consistent with the requirements for other types of casing, the department does not find the existing ASTM casing standard for flush and threaded PVC to be adequate. The ASTM F480-90 PVC casing standard is not considered to be adequate by the commissioner because the standard does not include thread tolerances for the new thread configuration and the standard requires the use of Acme screws which are generally not used by the industry. The department adopted this standard in emergency rules on November 25, 1991. Permanent rules (part 4725.7605) were proposed March 1, 1992. The department will continue to monitor the development of the ASTM F480 standard.

Subp. 2. Grouting of annular space. The annular space from the top of the screen to ten feet above the screen is a transition zone between the screen which is open to the aquifer to the annular space around the casing that is filled with grout. This is necessary to prevent water from moving down along the casing to a greater depth in the aquifer. Part 4725.2850 requires the sand pack to be limited to ten feet. This subpart extends the type of materials to be used and to allow bentonite to be used in this transition zone. Bentonite pellets are commonly used in constructing monitoring wells to prevent the cement grout from seeping into the well screen. The use of bentonite pellets is limited to wells with less than 80 feet of casing to be grouted, and a column of water less than 50 feet because the bentonite pellets swell as they hydrate and commonly bridge in the annular space above the area where the pellets were intended for use. When the pellets bridge, it may make it difficult to grout the annular space. Over 90 percent of monitoring wells are less than 80 feet in depth and completed near the top of the water table.

Subp. 3. Exception to drilling fluids. Water in drilling fluids used to construct monitoring wells is exempt from the requirement of the free chlorine residual since chlorine may react with the contaminants in the groundwater. Water must be taken from

a known source of water quality so any contaminants in the drilling fluid can be distinguished from contaminants in the water sample from the well.

4725.6750 PROTECTION OF MONITORING WELLS.

Subpart 1. Capping. A monitoring well is required to be capped. The cap must be a watertight cap if the monitoring well casing is less than five feet above the top of the regional flood level. Watertight capping is necessary to protect groundwater from contamination during a flood. The existing rule requires that inner plastic casing be covered with a watertight cap.

Subp. 2. Protection. Two additional methods to protect monitoring well casing above the established ground surface have been added to the proposed rules to provide contractors with more flexibility. Protection of casing above the established ground surface with three posts (item C) has not changed. The department has removed the option that a well in an area inaccessible to vehicles does not need protection. There are very few sites inaccessible to vehicles or machinery and the provision is rarely used. The department has deleted the 4 by 4 foot slab because contractors were not using that method. The department has provided additional methods of protection that are reasonable to install in traffic areas. The department proposes protection with outer steel casing grouted with concrete or neat cement (item B) and use of a concrete cone or pyramid (Item A). These protections are reasonable in cost and less obtrusive than three posts.

4725.6775 REPAIR; SEALING.

This provision restates the standards in existing part 4725.1860, subpart 5, item E.

4725.6850 AT-GRADE MONITORING WELLS.

Subpart 1. At-grade termination. In response to the requirement in Minnesota Statutes, section 103I.205, subdivision 5, the department is developing rules for the installation of at-grade monitoring wells. The need to allow monitoring wells to be installed at-grade instead of one foot above the established ground surface (required by part 4725.3400, subpart 8) results from the need to monitor for groundwater contamination at gasoline service stations and other sites where much of the site is used by vehicular traffic. Monitoring wells located in parking areas and driveways may be at risk of damage from automobiles and trucks and the converse is true as well. The movement of cars and trucks may endanger the integrity of the monitoring well. At gasoline service stations and similar sites, much of the area is covered by driveway and parking area so the locations available for monitoring for groundwater contamination is limited. This results in the placement of the well in the driveway, parking area or sidewalk.

If the well terminates no lower than the established ground surface and the well casing is sealed and enclosed in a water-proof vault with a sealed manhole cover that is at least two inches above the established ground surface, the danger of contaminants entering the well and further contaminating the aquifer is minimized.

Subp. 2. Termination location; map. This subpart specifies the cases where a monitoring well may terminate at-grade. It is reasonable that termination not only include places frequented by cars, trucks and buses, but also sidewalks where heavy equipment such as snow blowers could endanger the integrity of the well. The requirement for a map showing the exact location of the at-grade well is especially important because there is the chance that a repaving job or other circumstance might make the well difficult to locate when it is time to seal it.

Subp. 3. Construction. While a monitoring well must meet the general construction standards specified in parts 4725.2010 to 4725.3950, its use as a device to monitor or measure contamination, its potential location within a contaminant site, and its potential termination at-grade or within areas frequented by vehicles require special construction considerations.

A. The well casing needs to terminate at-grade or above to minimize the danger of spills or other surface contamination entering the well. At-grade termination is necessary to allow traffic to continue to move over the site.

B. Having a protective manhole cover two inches above the established ground surface is necessary to allow for clearance for a lock on the top of the casing and two inches provides a reasonable slope to divert surface water runoff away from the well without interfering with the movement of traffic.

C. The slope of the surface of the concrete pad is needed to divert spills away from the opening of the well to prevent contaminated surface water from entering the vault and eventually leaking into the well.

D. The size of the concrete pad aides in diverting spills a reasonable distance from the well. The minimum four-inch thickness for the concrete is necessary to support the weight of the heavy trucks expected at many of the sites where at-grade installations are needed.

E. The need to label the monitoring well manhole cover is required by Minnesota Statutes, section 103I.205, subdivision 5. It remains necessary because of the several times gasoline delivery trucks have discharged hundreds of gallons of petroleum products into monitoring wells or vents when they thought they were filling underground storage tanks. Letters one centimeter or one half inch in height are of sufficient size to be easily legible.

F. and G. To protect the well from contamination, it is necessary that the manhole cover, vault, and the compression o-ring or gasket be constructed of material impervious to water to prevent contaminants from seeping into the well and groundwater. The material must be resistant to chemical reactions to prevent deterioration of the seals which may result in allowing contaminants to seep into the well and groundwater.

H. Standards have been set for manhole covers and vaults by the American Association of State Highway Transportation Officials. These standards are also referenced by the Minnesota Department of Transportation and other local agencies for manhole covers in areas that will experience vehicular traffic. It is reasonable to rely on the standards used on roadways in areas that will also encounter vehicular traffic.

I. Locks and tamper resistant bolts on a monitoring well are required by statute. They add protection against vandalism or careless product delivery persons who may not notice the "Monitoring Well" label. The consultant responsible for sampling and the well owner should be the only persons needing access to the well, and they can both have keys available with minimum inconvenience.

J. Part 4725.6750 requires an identification label for wells. The design of at-grade wells changes the available locations for the label. Attaching the label to the well casing or vault is not complicated, and stamping the unique well number into the vault prior to installation would also provide a convenient permanent label to identify the well. The well label must not be attached to the manhole cover due to concern that methods of attaching the label may reduce the strength of the manhole cover or allow leaks into the well.

4750.7050 VERTICAL HEAT EXCHANGERS.

The provisions in this part are necessary because the department is mandated to issue construction permits for vertical heat exchangers. This part specifies criteria for the construction of these devices.

Subpart 1. Construction. Polyethylene or polybutylene pipe capable of withstanding 160 psi is a high density material that has been shown to be durable in existing permitted devices. Connections that require heat fusion are the only ones allowed because pressure testing has shown that metallic connections may leak. Pressure testing the entire system is necessary to ensure that there are no leaks before it is placed into operation. Grouting between the casing pipe and the borehole is necessary to provide a watertight barrier that will protect against leakage and the seepage of contaminants into or out of the system. Though the heat exchanger is a self contained unit, because of the close

proximity of heat transfer fluids to the groundwater source and the potential for contamination only propylene glycol that is food-grade or United States Pharmacopeia-grade, or calcium chloride are permitted in addition to potable water. At the concentrations used, these transfer fluids are not toxic to humans. A flow meter is necessary to ensure that the pumps and system are working and appropriate pressure maintained. Backflow devices installed in accordance with the plumbing code are necessary in the event of refill to preclude sewage from entering the water supply system.

Subp. 2. Notice of loss or leak. This notice is necessary so the department can evaluate the continued safety to public health and the water supply. These devices are new and permitted. The loss of pressure and possible creation of negative pressure within the system may cause contaminants to leak into the water supply. Sudden loss of water or pressure may signal a problem with the system that requires adjustment or a reevaluation of the conditions and specifications under which the permit was issued.

4725.7250 ELEVATOR SHAFT HYDRAULIC CYLINDERS.

Subpart 1. General. Minnesota Statutes, section 103I.101, subdivision 2, paragraph (5) mandates that the commissioner shall, after consultation with the commissioner of the Department of Natural Resources and the Minnesota Pollution Control Agency, establish standards for the design, location, construction, repair and sealing of elevator shafts.

The provisions within chapter 4725 apply to the construction of elevator shaft hydraulic cylinders. However, these borings have characteristics which are specifically addressed within this rule part, in addition to the specifications and requirements presented elsewhere within chapter 4725. The standards in this part are necessary to protect the groundwater from the infiltration of surface contaminants and from leaking hydraulic oil associated with the operation of elevator hydraulic cylinders.

Subp. 2. Casing. The bore hole or jack hole must be cased to the bottom of the elevator shaft. This construction method facilitates sealing the hole and prevents contaminants from filtering into the shaft hole. Cased holes are sealed by driving the casing through glacial drift or by sealing rotary drilled holes. Rock holes are sealed by cement grouting around the casing.

Subp. 3. Exemption. Elevator shaft borings are exempted from the isolation distances from gas pipes, from electrical lines and from completion above grade because the location of an elevator is within a building where gas lines and electrical lines may be in close proximity. Hydraulic cylinders of necessity must be completed below grade to serve the building. Proper grouting and sealing of the casing should provide a barrier against the infiltration of contaminants into the shaft from adjacent sewer

connections.

Subp. 4. Hydraulic fluid leakage protection. The provisions in items A, B and C are necessary to prevent oil leakage out of the elevator hydraulic unit and protect groundwater from the infiltration of contaminants around the casing. The provisions are designed to seal the bottom and sides of the boring and are consistent with observed practice.

4725.7450 ENVIRONMENTAL BORE HOLE.

Subp. 1. Construction. Environmental bore holes serve purposes similar to monitoring wells. Monitoring wells obtain groundwater quality information by extracting groundwater samples for testing. Environmental bore holes obtain soil, groundwater or other earth properties information by testing in the borehole without extracting water. Many environmental bore holes such as piezometers, are constructed in concert with monitoring wells for containment investigation. Environmental bore holes which are cased should follow the same standards and be given the same exemptions as monitoring wells.

Subp. 2. At-grade bore holes. It is appropriate that environmental bore holes be allowed to terminate at-grade under the same conditions as monitoring wells since environmental bore holes are often part of a contamination investigation and may face the same access, location, and traffic damage potentials as monitoring wells.

Subp. 3. Sealing. Environmental bore holes which are not sealed with impervious materials when no longer in use or when the construction or condition constitutes a threat to the groundwater constitute the same threat of contamination as an unsealed well. The proposed rule requires sealing in accordance with the same materials and procedures as other wells and borings.

Subp 4. Exception to sealing requirements. An exemption to the sealing requirements in subpart 3 is proposed for environmental bore holes drilled in an unconsolidated formation, 50 feet or less in depth which do not penetrate a confining layer. Unconsolidated formations without confining layers are typically loose sand and gravel which naturally collapse. It is an unnecessary burden to require low permeability cement or bentonite in a high permeability formation. Collapse of the relatively homogenous sandy material provides for a reasonable seal compared to the surrounding formation. If the formation is contaminated or may reasonably be expected to be contaminated the bore hole must be grouted with a low permeability material to ensure that the bore hole is not a pathway for contaminants. It is important to limit the exemption to those formations that are loose and naturally cave in, and not to allow artificial means simply as a cost saving. It is necessary to fill any portion of the remaining hole with grout to prevent

surface contaminants from entering the hole, and to prevent accidents resulting from open excavations. The department does not want the exception to apply when contamination may be present or is anticipated in the area of the hole. Sealing of the hole in cases of actual or potential contamination is necessary to inhibit the movement of contaminants. The department also does not want the exception to apply if the bore hole is more than 10 feet into confining materials. These materials provide natural resistance to the vertical movement of water and contaminants. A 10 foot breach into this confining material must be sealed.

REFERENCES

American Water Works Association. Standard Methods for the Examination of Water and Wastewater Treatment 16th Edition.

Davis, Stanley N. and DeWiest, Roger J. M. Hydrogeology John Wiley and Sons. New York. 1966.

Driscoll, Fletcher G., Ph.d. Groundwater and Wells Second Edition. Johnson Division, St. Paul, Minnesota. 1986.

Michigan Department of Public Health.

Well Construction Code, R 325.1633 Rule 133 (5).

Michigan Water Well Grouting Manual, Michigan Department of Health, January 1988.

United States Department of Agriculture. Agricultural Handbook Number 18, Soil Survey Manual, August 1951.

United States Geological Survey.

Delin, Geoffrey N. "Hydrogeology and Simulation of the Wround-Water Flow in the Rochester Area, Southeastern Minnesota, 1987-88." Water Resources Investigations Report 90-4081. St. Paul, Minnesota, 1991.

Schoenberg, M. E. "Effects of Present and Projected Ground-water Withdrawals of the Twin Cities Aquifer System, Minnesota." Water Resources Investigations Report 90-4001. St. Paul, Minnesota, 1990.

Wisconsin Code. Well Construction and Pump Installation. NR112.15.

