

Minnesota Attorney General: Administrative Rules Proceedings

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MINNESOTA STATE REGULATIONS

Notice of filing by the Commissioner of Administration

We have received on this date, stamped and filed 2 copies of Rules and Regulations pertaining to the Department of Health
(Agency or Board)

Regulation No. MHD 210 thru 223 (new)

Subject: Water Well Construction

Department of Administration
Publication, Central Services Division
Documents Section
140 Centennial Office Building
St. Paul, Minnesota 55155
Telephone: (612) 296-2874

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RICHARD L. BRUBACHER
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Rev. 9-72

Proposed Amendments

Minnesota State Board of Health Regulations

Relating to the Licensing of Water Well Contractors

Chapter 1 - Definitions and Policies Relating to the Licensing and Examination of Water Well Contractors and the Water Well Construction Code.

MHD 166 is amended by adding and deleting the indicated provisions as follows.

MHD 166 - Definitions and Policies

(a) For the purposes of these regulations promulgated pursuant to Minnesota Statutes, Chapter 156A, as amended, the terms defined in this section have the meanings given them, except where the context clearly indicates otherwise.

(b) The following terms apply primarily to the licensing regulation, MHD 167-168, but are also applicable to the Water Well Construction Code, MHD 169-178, when used therein.

(1) "Board" means the Minnesota Board of Health, or its authorized representative.

(2) "Council" means the Water Well Contractors Advisory Council created pursuant to the provisions of Minnesota Statutes § 156A.06 (1971).

(3) "Act" means ~~Chapter 29, Extra Session Laws 1971 codified as~~ Minnesota Statutes §§ 156A.01 - 156A.08, ~~(1971)~~, as amended, under which these rules and regulations are promulgated.

(4) "APA" means the Administrative Procedure Act, Chapter 15, Minnesota Statutes.

(5) "Person" means any natural person, corporation, partnership, or other business association.

(6) "Applicant" means any person who applies for a water well contractor's license pursuant to the Act.

(7) "Application for examination" means the application submitted by an applicant, ~~other than one eligible for licensure pursuant to Minnesota Statutes § 156A.07, Subd. 3 (1971)~~, from which the Board determines whether the applicant is eligible to take the examination.

(8) ~~"Application for qualification" means the application submitted by an applicant from which the Board determines whether the applicant is eligible for licensure pursuant to Minnesota Statutes § 156A.07, Subd. 3 (1971).~~

* Changes or additions indicated by underline, deletions by ~~strikeout~~.

~~(9)~~(8) "Application for licensure" means the application submitted by an applicant upon his successful completion of the examination, or at the end of each calendar year for license renewal. ~~or upon the determination by the Board that he is eligible for licensure pursuant to Minnesota Statutes § 156A.07, subd. 3 (1971).~~

~~(10)~~(9) "Year of experience" means a year during which the applicant personally drilled five (5) water wells.

(aa) Supervision of a drilling operation shall not be considered as an equivalent to personally drilling a well; however, supervision may be considered by the Board as experience meeting the requirements of these regulations on a case by case basis depending upon:

(aa1) The number of well drilling operations supervised during a year,

(aa2) The percentage of time spent at the site of a drilling operation,

(aa3) The type of activity performed as part of the applicant's supervisory responsibilities, and

(aa4) Other factors as may be relevant in each particular case.

(bb) The experience must have been gained in Minnesota except that an applicant may provide the Board with information demonstrating that his experience was gained in an area with the same or similar geological and other well drilling conditions as in the applicant's proposed well drilling operations territory in Minnesota. Such experience may be considered as meeting the experience requirement of these regulations.

~~(11)~~(10) "Licensee" means a person who is licensed as a water well contractor pursuant to the provisions of the Act and these rules and regulations.

~~(12)~~(11) "Representative" means an individual who qualifies for licensure on behalf of a partnership, corporation, or other business association rather than on his own behalf.

~~(13)~~(12) "Upper termination of the well casing" ~~shall~~ means a point twelve (12) inches above the ~~finished grade level~~ established ground surface.

~~(14) "Service vehicle" shall mean a vehicle used in well drilling or repair of a well for the purpose of modification to the casing, screen, depth, or diameter of the well.~~

(13) "A water well drilling machine" means any machine or device such as a cable tool, hollow rod or auger used for construction of a water well including drive point wells or a hoist or machine used in the well repair service which involves the modification to the well casing, screen depth or diameter below the upper termination of the well casing.

MHD 166 C and D - all new material; will not be underlined.

(c) The following terms apply to the Water Well Construction Code, MHD 169-178:

(1) "Abandoned water well" means a well whose use has been permanently discontinued, or which is in such disrepair that its continued use for the purpose of obtaining ground water is impracticable or may be a health hazard.

(2) "Administrative authority" means the Board. When this code is adopted by any municipality of the State, such municipality may apply to the Board for authorization to act as an enforcement agent of the administrative authority to enforce the provisions of the Act and these regulations. The Board may grant such authority if the municipality demonstrates that at least one of its employees is qualified and familiar with well drilling operations in that municipality. Such authorization may be revoked without cause by the Board or released by the municipality on ten days written notice.

(3) "Annular space" means the space between two cylindrical objects one of which surrounds the other, such as the space between a drillhole and a casing pipe, or between a casing pipe and a liner pipe.

(4) "Approved basement" means a private home basement with walls and floor constructed of concrete or equivalent which is not subject to flooding and not located within a flood plain.

(5) "Aquifer" means a water-bearing formation (soil or rock horizon)that transmits water in sufficient quantities to supply a well.

(6) "Casing" means an impervious durable pipe placed in a well to prevent the walls from caving and to seal off surface drainage or undesirable water, gas or other fluids to prevent their entering the well and includes specifically but not limited to:

(aa) "Surface or temporary casing" means a temporary casing placed in soft, sandy or caving surface formation to prevent the hole from caving during drilling.

(bb) "Protective casing" means the permanent casing of the well.

(cc) "Liner pipe" means a well casing installed without driving within a protective casing or open drillhole.

(7) "Coliform group" means all of the aerobic and facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35° centigrade.

(8) "Director" means the director of the Division of Environmental Health of the Department, or his authorized representative, who shall carry out the administrative functions of these regulations on behalf of the Board.

(9) "Drawdown" means the extent of lowering of the water surface in a well and aquifer resulting from the discharge of water from the well.

(10) "Dug well" means a well excavated into a generally shallow aquifer in which the side walls may be supported by material other than standard weight steel casing. Water enters a dug well by seepage through the side walls and bottom.

(11) "Established ground surface" means the intended or actual finished grade (elevation) of the surface of the ground at the site of the well.

(12) "Geological material" means all materials penetrated in drilling a well.

(aa) The following table lists materials other than consolidated rock classified according to average particle size: (Wentworth 1922)

	Particle Diameters		Screen Slot No.	
Material	Millimeters	Inches	From	To
Clay	Up to 0.005	Up to - 0.0002	-----	-----
Silt	0.005 - 0.062	0.0002 - 0.0025	-----	-----
Fine Sand	0.062 - 0.250	0.0025 - 0.010	2	10
Medium Sand	0.250 - 0.50	0.010 - 0.020	10	20
Coarse Sand	0.50 - 1.00	0.020 - 0.040	20	40
Very Coarse Sand	1.00 - 2.00	0.040 - 0.080	40	80
Fine Gravel	2.00 - 4.00	0.080 - 0.160	80	160
Coarse Gravel	4.00 - 62.5	0.160 - 2.50	160 and larger	
Cobbles	62.5 -250.	2.50 -10.0	-----	-----
Boulders	250 and larger	10.0 and larger		

(bb) "Alluvium" is a general term for clay, silt, sand, gravel or similar unconsolidated material deposited during comparative recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment.

(cc) "Glacial drift (unconsolidated)" means a general term applied to all rock material (clay, sand, gravel and boulders) transported by a glacier and deposited directly by or from the ice or by running water eminating from the glacier.

(dd) "Glacial outwash" means a stratified sand and gravel removed or washed out from a glacier by meltwater streams and deposited in front of or beyond the terminal moraine or the margin of an active glacier.

(ee) "Hardpan" is a term to be avoided if possible, but when used means a hard impervious layer composed chiefly of clay, cemented by relatively insoluble materials, which does not become plastic when mixed with water and definitely limits the downward movement of water and roots.

(ff) "Shale" means rock consisting of hardened silts and clays.

(gg) "Sandstone" means cemented or otherwise compacted sediment composed predominately of sand.

(hh) "Limestone" means rock which contains at least 80% of carbonates of calcium and has strong reaction with HCl (muriatic acid).

(ii) "Dolomite" means rock which contains at least 80% of carbonates of magnesium and has a weak reaction with HCl (muriatic acid).

(jj) "Gypsum" means a soft light colored formation of calcium sulfate crystals and may be found as streaks in a shale formation.

(13) "Grout" means neat cement, concrete, heavy drilling mud or heavy bentonite water slurry. Heavy drilling mud or heavy bentonite water slurry when used as grout shall be of sufficient viscosity to require a time of at least 70 seconds to discharge 1 quart of the material through an API (American Petroleum Institute) marsh funnel viscometer.

(14) "Municipality" means a city, village, township, borough, county, district or other political subdivision of the State created by or pursuant to State law or any combination of such units acting cooperatively or jointly.

(15) "Pitless adapter" means a device or assembly of parts which will permit water to pass through the wall of the well casing or extension thereof, and which provides access to the well and to the parts of the water system within the well in a manner to prevent entrance of pollution into the well and the water produced.

(16) "Pollution" means the presence or addition of any substance to water which is or may become injurious to the health, safety or welfare of the general public or private individuals using the well; which is or may become injurious to domestic, commercial, industrial, agricultural or other uses which are being made of such water.

(17) "Potable water" means water which is safe for human consumption in that it is free from impurities that may cause disease or harmful physiological effects.

(18) "Pressure tank" or "hydropneumatic tank" means a closed water storage container constructed to operate under a designed pressure rating to modulate the water system pressure within a selected pressure range.

(19) "Priming" means the first filling of a pump with water and the action of starting the flow in a pump.

(20) "Pump house" means a building constructed over a well exclusively to protect the well, pump, and water treatment equipment.

(21) "Pump room" or "well room" means an enclosed structure, either above or in a below grade approved basement housing the pump, top of the well, a suction line or any combination thereof.

(22) "Pumping water level" means the distance measured from the established ground surface to the water surface in a well being pumped at a specified rate for a specified period of time.

(23) "Pumps and pumping equipment" means materials used or intended for use in withdrawing or obtaining ground water for any use, including without limitation, seals and other safeguards to protect the water from pollution and together with fittings, and controls to provide sanitary water storage facilities. "Installation of pumps and pumping equipment" means the selection of, and procedure employed in the placement and preparation for operation of, pumps and pumping equipment, including construction involved in making entrance to the well and establishing proper seals and other safeguards to protect ground water from pollution, including repairs to existing installations.

(24) "Sewage" means the water carried waste products from residences, public buildings, including the excrementious or other discharges from the bodies of human beings or animals together with such ground water infiltration and surface water as may be present.

(25) "Cesspool" means an underground pit into which raw household sewage or other untreated liquid waste is discharged and from which the liquid seeps into the surrounding soil or is otherwise removed.

(26) "Seepage pit" or "dry well" means an underground pit into which a septic tank discharges household sewage or other liquid waste and from which the liquid seeps into the surrounding soil through the bottom and openings in the side of the pit.

(27) "Septic tank" means a watertight tank of durable materials through which sewage flows very slowly and in which solids separate from the liquid to be decomposed or broken down by bacterial action.

(28) "Sewer" means a pipe or conduit carrying sewage or into which sewage may back up.

(29) "Subsurface disposal field", "seepage bed", "drainfield", "percolation system", or "tile absorption field" means a system composed of open-jointed tile lines buried in stones and shallow trenches or beds for final disposal into the ground of sewage effluent from a septic tank. The septic tank effluent is applied to land by distribution beneath the surface through the open jointed lines.

(30) "Static water level" means the distance measured from the established ground surface to the water surface in a well neither being pumped, nor under the influence of pumping nor flowing under artesian pressure.

(31) "Subterranean gas" means a gas occurring below the land surface. It may be flammable such as methane or highly toxic as hydrogen sulfide and may be associated with ground water.

(32) "Suction line" means a pipe or line connected to the inlet side of a pump or pumping equipment.

(33) Water varieties mean:

(aa) "Ground water" means the water in the zone of saturation in which all of the pore spaces of the subsurface material are filled with water. The water that supplies springs and wells is ground water.

(bb) "Near surface water" means water in the zone immediately below the ground surface. It may include seepage from barnyards, disposal beds or leakage from sewers, drains and similar sources of pollution.

(cc) "Surface water" means water that rests or flows on the surface of the ground.

(34) "Well" means water well as defined in Minnesota Statutes, 156A.02, Subd. 1.

(35) "Well seal" means a device or method used to protect a well casing or water system from the entrance of any external pollutant at the point of entrance into the casing of a pipe, electric conduit or water level measuring device.

(36) "Well vent" means an outlet at the upper terminal of a well casing to allow equalization of air pressure in the well and escape of toxic or flammable gases when present.

(37) "Yield"or "production" means the quantity of water per unit of time which may flow or be pumped from a well under specified conditions.

(d) Policies

(1) The rules and regulations, MHD 166-178 shall apply to all water wells in the State of Minnesota except those specifically exempted by the Act. Those aspects covered are the construction of new wells, the repair and maintenance of wells where specified, and the proper abandonment of wells to protect the quality of ground water aquifers for providing safe drinking water supplies.

(2) Public Water Supply

In accordance with MHD 111(a), formerly Reg. No. 10873 no system of water supply, where such system is for public use, shall be installed by any public agency or by any person or corporation, nor shall any such existing system be materially altered or extended, until complete plans and specifications for the installation, alternation, or extension, together with such information as the State Board of Health may require shall have been submitted in duplicate and approved by the Director insofar as any features thereof affect or tend to affect the public health. No construction shall take place except in accordance with the approved plans. The plans for the well shall conform as specified by this well code. No municipal well may be drilled without approval of the site by the Director.

(3) Modification by the Board

(aa) When the strict applicability of any provision of these regulations present practical difficulties or unusual hardships, the Board, in a specific instance, may modify the application of such provision consistent with the general purpose of these regulations and the Act and upon such conditions as are necessary, in the opinion of the Board, to protect the ground water of the State and the health, safety and general well-being of persons using or potential users of the ground water supply.

(bb) The licensee shall state the specific exceptions requested plus explain in detail the reasons for such request. Whether or not the requests are granted, the Board shall state in detail the reasons for its decision.

Chapter 2 - Requirements for the Examination and Licensing of Water Well Contractors

MHD 167 is amended by adding or deleting the indicated provisions as follows.*

(a) Qualifications

(1) All applicants shall meet the following requirements:

(aa) A minimum of three (3) years' experience in water well drilling. ~~provided; however, that all applicants who desire to be licensed pursuant to the provisions of Minnesota Statutes §-156A.07, subd. 3 (1971) must have received such experience prior to August 5, 1971.~~

(bb) Honesty, integrity, and an ability to perform the work of a water well drilling contractor.

(cc) Submission to the Board of properly completed applications.

(2) ~~In addition~~ All applicants ~~who do not qualify for licensure pursuant to Minnesota Statutes §-156A.07, subd. 3 (1971)~~ must successfully complete the examination provided for in the Act and in these rules and regulations.

(b) Applications and Fees

(1) All applicants shall submit two (2) applications. The first one shall be ~~either~~ an application for examination ~~or an application for qualification~~. If the applicant qualifies ~~in either instance~~, then he shall submit an application for licensure.

(2) Application for Examination or Qualification

(aa) An application for examination ~~or qualification~~ shall be submitted to the Board on forms provided by it. The application shall be accompanied by the filing fee prescribed by the Act. The fee shall be paid using only a money order, bank draft, or certified check made payable to the Minnesota State Treasurer.

(bb) The Board shall not act upon the application until it has received reference letters from individuals who are familiar with the applicant's work experience, honesty, integrity, and ability to perform the work of a water well drilling contractor. ~~This requirement shall not pertain to those applicants who apply pursuant to Minnesota Statutes §-156A.07 subd. 3 (1971), unless otherwise required by the Board or Council. MHD 167(e) shall apply to such applicants.~~

(cc) The filing fee for an application for examination or qualification shall not be refunded for any reason except when an applicant is not found to be qualified to take the written examination. ~~or to be qualified for licensure pursuant to Minnesota Statutes §-156A.07, subd. 3 (1971).~~

(3) Application for Licensure

(aa) Upon satisfactory completion of the examination ~~or determination of qualification~~, the applicant may apply for a license upon forms provided by the Board.

*Changes or additions indicated by underline, deletions by ~~strikeout~~.

(bb) The application shall be accompanied with the license fee prescribed by the Act. The fee shall be paid using only a money order, bank draft, or certified check made payable to the Minnesota State Treasurer. This fee shall not be refunded for any reason.

(4) If an applicant passes the examination or qualifies for licensure ~~pursuant to Minnesota Statutes § 156A.07, subd. 3 (1971)~~ but the Board does not receive his application for licensure within one year from the date of the letter from the Board notifying him of his eligibility for licensure, then no license may be issued. Such an applicant, in order to become licensed at some later date, shall requalify by submitting a new application for examination and the prescribed fee.

(5) An individual may apply for examination as many times as he desires. Each application must be accompanied by the filing fee as prescribed by the Act.

(c) Council Evaluation of Applicants

(1) The Council shall evaluate each applicant and forward its recommendations to the Board.

(2) The Board or Council may conduct oral interviews and require sworn affidavits and other supporting evidence to determine qualifications of the applicant.

(d) Examination

(1) No applicant shall be permitted to take the examination unless he has submitted an application for examination, the accompanying filing fee, and been determined to be qualified by the Council.

(2) The applicant~~, other than those qualifying under Minnesota Statutes § 156A.07, subd. 3 (1971),~~ shall take an examination which may be any combination of written, oral, or practical work as determined by the Board with the advice of the Council. Satisfactory completion of the examination is a mandatory prerequisite for licensure.

(3) An applicant which is a partnership, corporation, or other business association, shall designate one partner, officer, or other responsible full-time employee who shall be its representative to take the examination on its behalf. Upon licensure of the applicant, the representative shall be responsible for the supervision of all operations required of water well contractors by the Act and the rules and regulations adopted thereunder.

(e) Denial of Application

An application for examination, ~~qualification,~~ or license may be denied for any of the following reasons:

(1) Failure of the applicant to complete the application.

(2) Failure of the applicant to submit the application with the prescribed fee.

(3) Failure of the applicant to meet the experience, reference, examination, and other qualifications required by the Act and these rules and regulations.

(4) Other sufficient causes as determined after notice and hearing in accordance with APA.

(f) License and Renewal

(1) No person shall drill, ~~or~~ construct, or repair a water well within this State unless in possession of a valid license to do so issued by the Board; provided, however, that persons installing or repairing pumps on a well shall not be licensed as water well contractors provided their work does not involve modifications to the well casing, screen, depth, or diameter below the upper termination of the well casing.

(2) ~~An applicant who is otherwise qualified but who does not have practical field experience in the operation of conventional drilling machines, such as a cable tool, rotary, hollow rod, auger, or similar drilling machine, but who does install wells such as drive point or other unconventional wells shall have his license limited to such water well drilling work.~~

~~(3)~~(2) The issued license shall not be transferable. It shall contain the name of the licensee; the licensee's representative, if applicable; the date of issue; and the license number.

~~(4)~~(3) Each ~~year by the 1st day of November, commencing in 1973~~ licensee shall submit an application for license renewal as provided for in the Act, on forms provided by the Board. ~~shall mail to each licensee a questionnaire. The questionnaire shall be completed by the licensee and returned to the Board not later than December 15 of each year.~~ Upon receipt of the ~~questionnaire~~ application answered in a manner acceptable to the Board, a licensee shall be sent a renewal ~~certificate.~~ license. The renewal license ~~certificate~~ shall consist of a card in duplicate and contain the name of the licensee; the licensee's representative, if applicable; expiration date; and license number. One card shall be kept posted with the original license. The other shall be carried by the licensee or his representative.

~~(5)~~(4) Any licensee who does not renew his license within one year may have his license renewed only upon the recommendation of the Council and only after showing sufficient cause for not renewing. Until such showing is made and the renewal ~~certificate~~ license issued, the licensee shall not work as a water well contractor.

~~(6)~~(5) A person who acts as a representative may not be in the employ of any water well contractor other than the one he represents.

~~(7)~~(6) In the case of those applicants who are subject to MHD 167(d)(3), the licensee shall be the partnership, corporation, or other business association who that individual represents and not the representative.

(aa) When the representative leaves the licensee or is otherwise incapable of performing his responsibilities, the licensee shall inform the Board within (5) days of such fact and give the name of a qualified individual acceptable to the Board, who shall be responsible for the acts of the licensee during the interim period while a new representative is being qualified. Although the licensee shall retain the same numbered license upon the licensing of the new representative, all applications, examinations, fees, and other requirements must be satisfied in order to qualify the new representative who must qualify within 90 days. If he does not do so, the water well contractor shall be without a license and must cease operations.

(bb) If an individual has his own license and desires to act as a representative, or if a representative desires to ~~get~~ obtain a license in his own name, the business association or the individual, as the case may be, need only submit an application for licensure and fee. The examination need not be retaken.

(g) Suspension or Revocation of License; Reinstatement

(1) Suspension or Revocation

(aa) The Board may suspend or revoke the license of a water well contractor upon finding that the licensee has violated the provisions of the Act or the rules and regulations adopted thereunder. The Board may initiate such proceedings upon its own motion or upon the recommendation of the Council.

(bb) The Board or Council may cause an investigation to be made in any case in order to determine whether there has been a violation of the Act or of these rules and regulations, and, in so doing, may request the licensee to appear before them to determine the merits of the situation in question. In each case the Council shall make a recommendation to the Board as to whether proceedings under the Act and the APA would be appropriate.

(cc) Any disciplinary action taken under this section shall comply with the provisions of the APA.

(dd) A license may be suspended until certain conditions are fulfilled and/or for a specified period of time as determined to be most appropriate by the Board. The suspended or revoked license along with the current renewal certificates shall be returned to the Board by the licensee.

(ee) When the license of a water well contractor who is subject to the provisions of MHD 167(d)(3) is revoked or suspended, the disciplinary action shall apply to both the licensee and its representative.

(2) Reinstatement

(aa) A revoked license may not be reinstated. The licensee who has had his license revoked may be relicensed by filing the usual applications and fees, and by taking the examination. The Board shall require an investigation or hearing to determine whether the person should be issued a new license; provided, however, that in no case shall a new license be issued prior to one (1) year after the revocation has taken effect.

(bb) A licensee suspended for a specified period of time shall be automatically reinstated at the end of that time. Nothing herein shall be interpreted to prevent the making of such reinstatement conditional upon terms established by the Board in its Order of Suspension.

(cc) A licensee suspended for an indefinite period of time may be reinstated at the Board's own motion after due investigation to determine that the conditions upon which the suspension was based have been corrected or upon the Board receiving reasonable assurance to its satisfaction that such conditions will not reoccur.

(dd) The person whose license has been revoked or indefinitely suspended may petition the Board for a hearing for reinstatement of his license. Such hearing shall be granted only upon a showing by the petitioner that reasonable grounds exist for such hearing.

(h) Placement of Decals and License Number

(1) A licensee shall place in a conspicuous location on both sides of each well drilling machine his license number in figures not less than three (3) inches high and one and a half (1½) inches wide. The number shall be in a contrasting color to the background.

(2) Decals designating the year for which the license was issued or renewed and the words "MINNESOTA LICENSED WATER WELL CONTRACTOR" shall be affixed directly adjacent to and below the license number on each well drilling machine. Water well contractors using a rope spool or other devices for well installation shall attach their decal on a portable display to be shown at the wellsite. The decals shall be issued by the Board upon licensure and renewal.

(3) ~~The licensee shall place in a conspicuous location on both sides of each service vehicle his license number in figures not less than three (3) inches high and one and a half (1½) inches wide. The number shall be in a contrasting color to the background.~~

(i) Well Drilling Machine Registration

(1) Upon receipt of the required fee and information, a water well drilling machine registration card shall be issued for identification purposes for each drilling machine registered by the well drilling contractor. The card shall be carried on the water well drilling machine at all times where it may be inspected by the director. The card expires on December 31 each year.

(2) The registration card and duplicate decals furnished for a water well drilling machine are not transferable. The card and decals shall be returned to the director when a water well drilling machine is sold, traded, or otherwise disposed of. A registration card and two (2) new decals for a drilling machine so transferred will be provided upon receipt of the water well drilling machine registration fee, the old card, the two (2) old decals and application for the new drilling machine.

Chapter 3 - Water Well Construction Code

MHD 169 Location of Wells

(a) General Considerations

A well shall be located consistent with general layout and surrounding area giving due consideration of the size of the lot, contour of the land, slope of the water table, rock formation, porosity and absorbency of the soil, local ground water conditions, and other factors necessary to implement the basic policies that follow.

(b) A well or spring or buried reservoir shall be:

(1) Located on a site which has good surface drainage, at a higher elevation than, and at a sufficient distance from, cesspools, buried sewers, septic tanks, privies, barnyards and feedlots, or other possible sources of contamination so that the supply cannot be affected thereby, either underground or from the surface of the ground.

(2) Located so that the well and its surrounding area can be kept in a sanitary condition.

(3) Adequate in size, design and development for the intended use.

(4) Constructed so as to maintain existing natural protection against pollution of water bearing formations and to exclude all known sources of pollution from entering the well.

(5) A well should be located at least 15 feet from a property line. A well constructed to meet municipal water supply standards shall be located at least 50 feet from a property line.

(c) Distance from Pollution or Contamination Sources

(1) A well shall be at least:

(aa) One hundred fifty feet (150 ft.) from a preparation area or storage area of spray materials, fertilizers or chemicals that may result in pollution of the soil or ground water.

(bb) Seventy-five feet (75 ft.) from cesspools, leaching pits and dry wells.

(cc) Fifty feet (50 ft.) from a buried sewer, septic tank, subsurface disposal field, graveyard, animal or poultry yard, outhouse, petroleum storage tank, or any other sewage or liquid wastes that may drain into the soil.

(dd) Twenty feet (20 ft.) from a buried sewer constructed of cast iron pipe with tested watertight joints or other material acceptable to the Board; or a pit or unfilled space below ground surface, except an approved basement.

(ee) Wells less than 50 feet in depth and not encountering at least 10 feet of impervious material shall be located at least 150 feet from cesspools, leaching pits, or dry wells and at least 100 feet from a subsurface disposal field.

(2) The safe distance that a well should be located from a waste landfill or waste stabilization pond (lagoon) cannot be assigned a fixed number because of the varieties of hydrologic and geologic parameters associated with the undetermined types and amounts of materials that may be carried by ground water from leachates discharged from the waste landfill or waste stabilization ponds (lagoons). It is recommended that wells not be located in an area between the landfill or waste stabilization ponds (lagoons) sites and the point of ground water discharge to a surface water source.

(3) Any well that may intercept leachates from a waste landfill or waste stabilization pond (lagoon) by water withdrawal from the well shall not be used for potable water.

(4) Wells installed for ground water quality monitoring purposes are exempt from provisions related to safe depths and isolation distances from sources of contamination; however, their construction shall otherwise be in accordance with MSA 156A and rules adopted thereunder.

(5) The administrative authority may modify the isolation distances in this rule for individual well installations. The modifications shall be made in writing to the owner, with a copy to the Board, either increasing or decreasing the minimum isolation distance and shall state the reason for the modification based on overburden, depth of well, character of aquifer, maximum pumping rate, or other factors affecting the movement of pollution.

(d) Wells Adjacent to Buildings

(1) A well shall be located:

(aa) At least 3 feet horizontally from a building or any projection thereof, except for a pumphouse, unless modified in writing by the administrative authority.

(bb) Accessible for cleaning, treatment, repair, test inspection, and other attention as may be necessary.

(2) No well shall be located within the footing of any building or room beneath the floor under which there are buried sewers.

(e) Areas Subject to Flooding

(1) A well shall not be located in areas subject to flooding unless the casing extends at least 2 feet above the level of the highest known flood of record or otherwise protected as prescribed in writing by the administrative authority.

(2) The ground surface immediately adjacent to the well casing shall be graded so that surface water is diverted away from the casing.

(3) The well shall be located at least 50 feet horizontally from the normal high water mark of a stream, river or lake and at a higher established ground surface elevation than the soil absorption system, septic tank, or other source of contamination.

MHD 170 General Protection of Ground Water Quality and Resources

(a) Re-use of Water, Disposal, Recharge or Gas Storage Wells

(1) A well for the storage of gas or liquid under pressure may not be drilled without first having secured a permit therefor from the Commissioner of Natural Resources in accordance with Minnesota Statutes, Sections 84.57-58.

(2) Water used for cooling parts of engines, air compressors, or other equipment, or water used for air conditioning, shall not be returned to any part of the potable water system.

(3) A well shall not be used for disposal of surface water, near surface water, or ground water or any other liquid gas or chemical.

(b) Maintenance and Repair of Wells

(1) Every well shall be maintained in a condition whereby it will conserve and protect the ground water resources, and whereby it will not be a source or channel of contamination or pollution to the water supply of that well or any aquifer.

(2) All materials used in maintenance, replacement, or repair of any well shall meet the requirement of these regulations for new installation.

(3) Broken, punctured, or otherwise defective or unserviceable casing, screens, fixtures, seals, or any part of the well head shall be repaired or replaced. The well shall be abandoned in accordance with the requirements of these regulations if such repair or replacement is not performed.

(4) Repairs to wells completed with the well head terminating below ground (buried seal) where practicable, shall include extending the well casing above the land surface. Extension of the casing above grade shall be accomplished in accordance with rules and standards for new wells.

(5) Before acid treating a well, MHD 170(b)(4) shall be complied with to prevent a hazardous condition caused by release of H_2S (hydrogen sulfide) or other toxic gases in a pit or confined space. All confined spaces shall be blown out with fresh air before entry and a supply of fresh air provided during occupancy. Pits or chambers should not be entered without a life-line and adequate lifting power on the surface to quickly haul up a worker. Where there is any question whether the air supply procedure has provided a safe atmosphere, a self-contained breathing apparatus shall be worn (ordinary canister-type gas masks do not protect against atmospheres low in oxygen).

(c) Abandonment of Wells

(1) Temporary

(aa) Prior to placement into service or when temporarily removed from service, the well shall be sealed with a water-tight steel cap.

(bb) The well shall be maintained whereby it is not a source or channel of contamination when not in service.

(cc) Until a well is permanently abandoned by sealing procedures, all provisions for protection of the water against contamination and pollution and for maintaining satisfactory sanitary conditions around the well should be carried out to the same extent as though the well were in routine use.

(2) Permanent

(aa) General

A well that is to be permanently abandoned shall be disconnected from the system and the hole filled to prevent contaminating materials from entering the water-bearing ground formations through it. Concrete or cement grout shall be used for sealing material; however, if the well is so large that the use of these materials is not practical, the filling materials should be selected so as to restore natural conditions as far as possible. Neat cement grout or concrete as defined in MHD 172(c) (grouting) and MHD 166(c)(13) are satisfactory for filling parts of wells in rock formations. Sand and heavy drilling fluid may be used in sand and gravel sections of wells.

(bb) All materials, debris and obstructions that may interfere with sealing operations shall be removed from the well. Liner pipe shall be removed or perforated when necessary to assure placement of an effective seal. The administrative authority will be consulted for instruction in case of abandonment of a contaminated well or where there is a question of proper procedure.

(cc) All casing and screen may be salvaged except casing that has been cemented in place. The well shall be filled with appropriate sealing materials as described in MHD 170(c)(2)(aa) prior to removal of the casing.

(dd) The top of the hole shall be filled with 10 feet of cement or concrete grout to within 2 feet of the land surface. Casing remaining in the hole shall be cut off at least 2 feet below land surface. The remaining top 2 feet of hole shall be filled with native top soil.

(ee) An abandoned well shall be filled and sealed by one of the following methods in accordance with the materials penetrated, in such a manner as to prevent it from acting as a channel for pollution. A report of the method of sealing shall be filed with the Board on water well record forms provided:

(ee1) A well in unconsolidated deposits shall be filled with clean sand and puddled clay, neat cement grout or concrete grout to provide a permeability no greater than the natural condition.

(ee2) The section of a well in a cavernous or creviced rock (such as cavernous limestone or basalt lava rock, creviced granite, etc.) shall be filled with concrete or neat cement grout or alternate layers of concrete or neat cement grout, gravel or stone aggregate. The filling shall be completed at the top by a layer of neat cement grout or concrete grout extending from the top of the cavernous or creviced rock to within two (2) feet of the ground surface and finished as provided in MHD 170(c)(2)(dd).

(ee3) When concrete, cement grout, puddled clay or heavy drilling fluid is used for sealing an abandoned well, it shall be inserted in the well through a grout pipe from the bottom of the well upward to the surface under pressure and in one continuous operation.

(ee4) Test wells shall be sealed to prevent the well from being a channel for the vertical movement of water and a source of contamination to the ground water supply in accordance with well abandonment provisions of MHD 170(c).

(ee5) The flow in a flowing well shall be confined and the well filled in accordance with well abandonment provisions of MHD 170(c).

(ff) The owner shall be responsible for the permanent sealing of an abandoned well except:

(ff1) as mutually agreed upon in a written contract between the owner and licensee and in accordance with these rules and regulations to protect the ground water aquifer.

(ff2) When the licensee improperly locates, constructs, or completes the well or fails to meet the conditions of his contract; in which case the licensee shall be responsible for the sealing of the well.

(gg) A licensee shall report to the Board any unsealed abandoned water wells of which he becomes aware.

(d) Observation Wells

(1) Observation wells installed for a temporary (not to exceed a period of six (6) months) purpose of obtaining hydrologic or other data shall be constructed by such methods and of such materials that they are not a source or channel of pollution or contamination to any ground water supply or aquifer. All observation wells shall be abandoned in accordance with procedure described in rule MHD 170(c).

(2) Permanent observation wells (exceeding a period of six (6) months) constructed for the purpose of obtaining hydrologic or other data shall meet the standards of construction for water supply wells except when prior permission has been obtained in writing from the Board exempting the well from meeting specified standards established by these regulations.

(e) Test Holes and Borings

Test holes shall be permanently abandoned and sealed by the well contractor after the drilling, logging and testing have been completed unless:

(1) The owner or his agent has submitted a request to the director and obtained his written permission to extend the time limit, or

(2) The well is being completed as a water supply or other approved type well.

(f) Dewatering and Depressurizing Wells

(1) Dewatering and depressurizing wells shall be constructed in a manner and with such materials to prevent the contamination of the ground water system. Discharges from the dewatering system shall not be cross connected to a potable water supply.

(2) Temporary Water Supply

There may be incidents during construction where nearby residences with private water supplies will lose their source of supply during dewatering operations. If such a situation occurs, the licensee shall cooperate with the homeowner as may be required to provide a temporary supply of water during construction operations, including, but not necessarily limited to, supplying bottled water for drinking and cooking purposes and potable bulk water for other uses.

(3) The Board shall be notified prior to commencement of a ground water dewatering operation by the licensee. The licensee shall report the approximate area to be dewatered, the maximum depth to be dewatered, the number of wells to be affected, and the measures that will be taken to provide potable water to persons adversely affected by the dewatering operation. This may be reported by phone. The licensee shall retain the name of the Board's staff member taking the information and shall report this information in writing to the Board within three days of commencement of the ground water dewatering operation.

(4) The licensee shall comply with any orders issued by the Board which may include but not be limited to the collection of water samples from wells in the dewatered area for analysis to determine any health hazards prior to the Board relieving the licensee of responsibility for furnishing a safe water supply to well owners in the area affected by the dewatering operation. If the licensee has been released of his responsibility but thereafter difficulties develop in the water supply of well owners in the area affected by the dewatering operation as a result of such operation, the licensee may again be required to comply with MHD 170(f)(2).

(g) Elevator Shafts

Wells constructed or holes drilled for the installation of elevator shafts or hydraulic cylinders shall be cased, sealed, and maintained in a manner to prevent the vertical movement of water and a source of contamination to the ground water or any aquifer and as approved by the Board.

(h) All Other Wells

All wells except those specifically exempted by the Act shall be constructed and maintained in accordance with standards for water supply wells except when prior exemption has been obtained from the Board.

MHD 171 Other Water Sources, Cross Connections and Storage Reservoirs

(a) Storage Reservoirs

If a storage reservoir, excluding a pressure tank is used, plans shall be submitted to the administrative authority for approval. The plans shall meet the standards specified in the Manual of Water Supply Sanitation, Section VII, paragraph 715, published in 1969 by the Department.

(b) Other Water Sources

In cases where a potable water supply cannot be obtained by well drilling, permission may be granted by the administrative authority to use springs, infiltration tile lines, or other similar sources as a water supply, or to install water treatment facilities. Plans and specifications for such facilities, together with operating procedures, shall be approved by the administrative authority. The plans shall meet the standards of the Manual of Water Supply Sanitation, Section VI, published in 1962 by the Department.

(c) Cross Connections

A physical connection is not permitted between a well meeting the requirements of these rules and another water supply which does not meet such requirements.

MHD 172 Standards for Construction of Wells

(a) Casing for Permanent Wells

(1) A permanent well casing used for the protective or outside casing shall be of at least standard weight (schedule 40) steel or iron pipe through 8 inches inside diameter. Larger diameter casing shall have minimum weights and thicknesses as specified in Table 1. Dimensions and weights of schedule 40 pipe are given in Standard B36.10-1959 of the American Standards Association, 29 West 39th Street, New York, New York and standards A53-69a or A120-69 of the American Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103. The latest revision of these standards shall apply. Such revision shall become a part of these regulations upon their effective date unless the Board receives a request for a hearing on or an objection to the new standards within 30 days after their effective date. In addition, the Board may, on its own motion without any time limitation, hold a hearing on whether or not to adopt the new standards.

(2) A protective well casing shall be watertight throughout its length, with threaded or welded joints or other types of joints given written approval by the Director. Recessed or reamed and drifted couplings shall be used on threaded casing, or, as an alternate, other couplings can be used but the design, taper and type of the thread of the coupling shall match that of the pipe. No thread shall be exposed on the pipe when the pipe is joined to the coupling. Other casing design or materials shall be approved only by official written order of the Board.

(3) Pipe used as the protective casing in the permanent construction of a well shall be new pipe produced to recognized standards of the American Society for Testing Materials, No. 5L of the American Petroleum Institute, 1271 Avenue of the Americas, New York, New York, or No. C202-6202 of the American Water Works Association, 2 Park Avenue, New York, New York, or other grade weldable new pipe having a quality equal to or greater than those heretofore specified. New standards shall be applicable under the same procedures as specified in MHD 172(a)(1).

(4) New pipe, when salvaged within 30 days of the drilling of a water well test hole or dry hole only, may be used as new pipe if still in new condition.

(5) Pipe shall be marked with the specification designation or marked "Meets Minnesota Well Construction Code Standards." Such markings shall include wall thickness, weight per foot and identification of supplier. The Board may require that such pipe be submitted to an independent testing laboratory for evaluation and verification that the pipe will equal or exceed minimum standards. Failure of the pipe supplier to submit the pipe for evaluation and verification or failure of the pipe to meet minimum standards specified in MHD 172(a)(1) and (3) shall be sufficient cause for automatic rejection of such pipe for use in well construction in Minnesota.

(6) Pipe intended for water well use that is sold within this State, regardless of specification designation, is subject to random examination by the administrative authority who may require any lot of pipe or part thereof containing defective lengths to be rejected. Defective lengths or lots shall include, but not be limited to:

(aa) Pipe with girth welded joints

(bb) Pipe with welded patches

(cc) Lots having more than 5% of the pipe with lengths less than 5 feet

(7) Outer surface casings or temporary casings and liners installed without driving may be standard weight pipe or lighter pipe, but lightweight material shall be of such minimum thickness as is required to withstand the structural load imposed by conditions both inside and outside the well. In no case shall a liner of 3 inches or larger in diameter have a wall thickness of less than 0.216 inches. A liner which is lighter than the pipe specified in Table 1, or installed within an open drillhole, shall be surrounded by 2 inches of neat cement grout, concrete grout or other materials given written approval by the Director or as provided in MHD 172(f). The annular space between a lightweight liner and a casing shall be grouted with neat cement. A liner shall be grouted for the entire length of the liner pipe with the grout material being added from the bottom upward in one continuous operation. Liners to be grouted shall be provided with sufficient centering guides, welded to the liner, to permit unobstructed flow and deposition of the grout.

(8) A well drilled for irrigation purposes in glacial outwash material penetrating non-artesian water may be constructed of schedule 30 pipe as above described. The annular space shall be closed by washing the fine grained caving material around the casing.

(9) Under no conditions shall the casing inside diameter be less than 2 inches except for a driven well point which shall be equipped with a casing pipe of at least 1¼ inches inside diameter. The well shall also be of sufficient diameter to receive a pump or pumping apparatus of sufficient size to discharge the design capacity including anticipated decline in water levels.

(10) Minimum Casing Depth

(aa) The casing for a potable water supply shall extend at least 25 feet below the established ground surface or to a depth sufficient to provide a potable water supply. A well obtaining water from a depth of less than 25 feet shall not be used for a potable water supply without approval of the administrative authority. The acceptability of the formation for well development shall be based on the satisfactory results of analysis of the water. Any water-bearing formation yielding water which is contaminated, as evidenced by the presence of chemicals or bacterial of sewage origin, shall be regarded as unsatisfactory for well development unless adequate treatment is provided.

TABLE 1

CASING PIPE WEIGHT AND DIMENSIONS

Size in Inches	Wgt. Lbs. Per Ft. Plain End	Wgt. Lbs. Per Ft. Thrds. & Cplgs.*	Wgt. Lbs. Per Ft. Thrds. R&D Cplgs.	Thickness in Inches	Diameter - Inches External	Diameter - Inches Internal	Thrds. per Inch	Couplings Minimum External Diameter Inches	Couplings Minimum Length Inches
1	1.68	1.68	1.70	.133	1.315	1.049	11½	1.576	2-5/8
1¼	2.27	2.28	2.30	.140	1.660	1.380	11½	1.900	2-3/4
1½	2.72	2.73	2.75	.145	1.900	1.610	11½	2.200	2-3/4
2	3.65	3.68	3.75	.154	2.375	2.067	11½	2.750	2-7/8
2½	5.79	5.82	5.90	.203	2.875	2.469	8	3.250	3-15/16
3	7.58	7.62	7.70	.216	3.500	3.068	8	4.000	4-1/16
3½	9.11	9.20	9.25	.226	4.000	3.548	8	4.625	4-3/16
4	10.79	10.89	11.00	.237	4.500	4.026	8	5.200	4-5/16
5	14.62	14.81	15.00	.258	5.563	5.047	8	6.296	4-1/2
6	18.97	19.18	19.45	.280	6.625	6.065	8	7.390	4-11/16
8	28.55	29.35		.322	8.625	7.981	8	9.625	5-1/16
10	40.48	41.85		.365	10.750	10.020	8	11.750	5-9/16
12	49.56	51.15		.375	12.750	12.000	8	14.000	5-15/16
14	54.57	57.00		.375	14.000	13.250	8	15.000	6-3/8
16	62.58	65.30		.375	16.000	15.250	8	17.000	6-3/4
18	70.59	73.00		.375	18.000	17.250	8	19.000	7-1/8
20	78.60	81.00		.375	20.000	19.250	8	21.000	7-5/8
22	86.61			.375	22.000	21.250			
24	94.62			.375	24.000	23.376			
26	102.63			.375	26.000	25.250			
30	118.65			.375	30.000	29.250			
32	126.66			.375	32.000	31.250			
34	134.67			.375	34.000	33.250			
36	142.68			.375	36.000	35.250			

*Nominal weight based on length of 20 feet including coupling.

(bb) The casing of any well for a potable water supply constructed entirely in glacial outwash or alluvium earth formations shall extend to a depth of 50 feet below established ground level or through at least 10 feet of impervious soil formation and at least 5 feet below the pumping water level and in accordance with MHD 169(c)(1)(ee).

(11) A well casing or extension thereof shall extend vertically at least 12 inches above ground surface or above the floor of an approved basement offset, pump room or well room. However, in an above grade installation the casing shall extend at least 6 inches above the floor or slab. When venting is required in such an installation, an offset may be used if the vent connection meets the requirements for well casing seals and connections (see MHD 173) and the vent construction meets the requirements for vents (see MHD 174(g)).

(12) Well casing offsets are prohibited.

(b) Upper Casing

A well casing used for a potable water supply shall not be used as a suction line unless protected by a standard weight outer casing to a depth of at least 10 feet. The top of both casings shall be finished in accordance with MHD 174.

(c) Grouting

(1) A well having an open annular space around the casing or between the surface casing and protective casing or a liner and protective casing shall be grouted from the lower termination of the casing th the ground surface. Grouting shall be commenced without delay upon completion of drilling of the well or any portion of a well which must be grouted. Grouting shall be performed by adding the mixture through the casing or a grout pipe from the bottom of the space to be grouted upward to the surface in one continuous operation. Concrete grout may be used in the dry portion of a hole. Neat cement grout or concrete grout shall be allowed to set a minimum of 12 hours when hi-early cement is used or a minimum of 48 hours when regular cement is used, before drilling operations are resumed. Heavy drilling mud or heavy bentonite water slurry may be used as grout in wells developed in glacial drift. Other materials of equivalent sealing properties shall have the written approval of the Director prior to their use.

(2) Concrete grout is a mixture of cement, sand and water, in the same proportion of 1 bag Portland cement (94 pounds ASTM C150) and an equal volume of dry sand to not more than 6 gallons of clean water. Where large volumes are required to fill annular openings, gravel not larger than ½ inch in size may be added.

(3) Neat cement grout is a mixture of 1 bag (94 pounds) of Portland cement (ASTM C150) to not more than 6 gallons of clean water. Bentonite up to 2% by weight of cement to reduce shrinkage or other admixtures (ASTM C494) to reduce permeability and/or control time of set may be used.

(4) Heavy drilling fluid when used as grout in a rotary drilled well shall contain a high percentage of clay or bentonite to minimize shrinkage of the slurry within the annular space. Heavy bentonite water slurry is a mixture of 10% by weight of bentonite added to clean water or approximately 5% bentonite added to drilling mud. Bentonite shall contain 85% of the mineral montmorillinite and shall meet API specification standard 13A (March 1966). Saline, acid or alkaline substances or other additives to cause a temporary increase in viscosity of the bentonite slurry are not permitted.

(d) Rotary Bored or Augered Wells

(1) Rotary bored or augered type wells shall be constructed with a water-tight casing of 2" diameter or larger installed in an open hole having a diameter of at least 2" larger than the maximum outside diameter of the casing. The annular space around the casing shall be tightly sealed in accordance with material and procedures described in rule 172(c). A rotary, bored, or augered well completed in a drift formation may be sealed by pumping the well to collapse the formation; however, the top 20 feet below the land surface shall be sealed in accordance with rule 172(c) or 172(f).

(2) Drilling mud additives shall be stored in clean containers and shall be free of material that may adversely affect the well, aquifer, or quality of the water to be pumped from the well.

(e) Driven Casing Wells

(1) Where the upper drillhole is clay or similar material of 10 feet or more in thickness, the annular space between the drillhole and casing shall be kept filled with clay slurry or equivalent material when driving the protective casing. In lieu of this, a starting casing should be used and sealed with 20 feet of concrete grout.

(2) The bottom of the protective well casing shall be equipped with a drive shoe or otherwise protected from damage during construction of the well as dictated by drilling procedures and conditions of each particular well.

(f) Unconsolidated Glacial Drift Wells

A well drilled into unconsolidated glacial drift may be completed with a tight seal made around the protective casing if the annular space is closed by washing the fine-grained caving material around the casing prior to disinfection of the well. Wells shall be pumped promptly after setting the casing until clear, and native materials shall be washed immediately into the annular space.

(g) Rock Wells

(1) Where rock is encountered, i.e., consolidated as opposed to unconsolidated geological material, at a depth greater than 25 feet from the surface the protective casing shall be equipped with a drive shoe which shall be driven firmly into stable rock to provide a tight joint that will prevent pollution or sand from entering the well. A drive shoe is not required on a casing installed without driving and which is to be grouted with neat cement or concrete in an oversized hole.

(2) Where rock is encountered within 25 feet of the surface, an oversized hole 4 inches larger in diameter than the casing shall be drilled and the casing sealed with neat cement grout for a minimum depth of 25 feet

(3) In an area where a well can be developed only in fractured, jointed, but non-cavernous rock, the casing may terminate in the formation if there is at least 25 feet of sand or clay material above the rock, there is no record of this rock containing contaminated or polluted water, and geologic conditions offer no natural direct surface or near surface water inlets into the rock aquifer. Where there is less overburden or deeper strata will not produce potable water, the administrative authority shall be consulted and its written approval obtained by the well owner for water treatment and well construction features necessary to provide a safe supply.

(h) Cavernous Rock Wells

(1) Geological formations which are creviced, cavernous, shattered, fractured, or otherwise faulty should not be used as a source of ground water unless overlain by a mantle of drift or by a firm insoluble rock formation of sufficient depth and extending for a sufficient horizontal distance from the well in all directions to render the movement of contaminated water in the formation to the well improbable. The acceptability from a sanitary standpoint of water obtained from a well developed in such a protected faulty geological formation will be dependent upon treatment of the water if the need for such is indicated by analytical studies of the water.

(2) Where an adequate and safe water supply is available in a geological formation overlain by one or more faulty rock formations, all faulty rock formations should be completely cased off. The casing should extend at least 15 feet into the safe aquifer if such exists, or at least 15 feet into a stable, insoluble, fault-free geological formation beneath the lowest faulty rock formation and above the aquifer.

(3) The drill hole extending through the creviced rock formation and 15 feet into the firm rock formation or aquifer should be at least 4 inches larger in diameter than the casing if welded construction is used, and 4 inches larger in diameter than the couplings if threaded joints are used. The annular space shall be filled with cement grout; provided that where any faulty rock formation which overlies a safe aquifer is itself overlain by a protective mantle of drift, or by a firm insoluble consolidated formation of sufficient depth and for a sufficient radius as described herein above, the casing need not extend throughtthe protected faulty rock formation. The acceptability of water taken from a well so constructed will be dependent upon treatment of the water, if the need for treatment is indicated by analytical studies of the water.

(4) The area of the State where the above construction procedures shall be used shall include Hennepin(east of the 5th principal meridian, County Road 18), Ramsey, Washington(generally north of the northern boundary of township 30N), Rice, Dakota, Goodhue, Wabasha, Olmsted, Winona, Fillmore, and Houston counties, areas of northern Scott County where limestone is near the surface or where these conditions prevail in the State (see the map attached as Exhibit I). For specific exception to this rule the Board should be consulted.

(5) In some areas of southeastern Minnesota the acceptability of the cavernous limestone for producing a safe water supply may not be known until a well is drilled and the water analyzed. In this case Exhibit I designates the areas of the State where an oversized hole may be drilled into cavernous rock for later use in drilling to a deeper sandstone or other acceptable aquifer. An oversized hole shall be 4 inches larger in diameter than the casing liner and couplings to be inserted for reaching the deeper aquifer. The smaller casing shall be of sufficient diameter to insert a pump of sufficient capacity to lift water to the surface for the required supply.

(6) Wells terminating in cavernous rock for withdrawal of water for purposes other than domestic or community water supply shall be grouted in accordance with rule 172(c) to prevent vertical transfer of polluted or contaminated water between formations.

(i) Flowing Artesian Wells

(1) Flowing artesian wells shall be constructed to prevent erosion of the aquifer or the overlying confining mantel.

(2) Flow control from a flowing artesian well shall be provided, consisting of valved pipe connections, water-tight pump connections or a receiving tank set at an altitude corresponding to that of the artesian head. A direct connection between the discharge pipe and a receiving tank or a sewer or other source of pollution or contamination shall be prohibited.

(j) Well Screens

A well installed in unconsolidated sand and gravel aquifers shall ordinarily be fitted with a screen of the nominal inner diameter of the well casing properly sized so the aquifer can be properly developed to produce sand-free water at the pumping rate of the permanent pump. Wells shall provide sand-free water to the extent that the sand will not interfere with the intended use and operation of the water supply system.

(k) Capping

Temporary capping of a well until the pumping equipment is installed shall be such that no pollution or foreign objects can enter the well.

(l) Yield Test

Every well shall be test pumped to produce a minimum initial supply of 600 gallons of sand-free water per hour if geological conditions permit. A well in which a pump of a capacity of 20 gallons per minute or more is to be installed shall be tested for yield and drawdown with periodic water level measurements being made where possible, during the drawdown and subsequent recovery periods. The well shall be test pumped at rates greater than is expected from the well during its normal usage as follows: up to 400 gpm - 1.5 times; 400 to 600 gpm - 1.4 times; 600 to 800 gpm - 1.3 times; 800 to 1,000 gpm - 1.2 times; 1,000 gpm and over - 1.1 times. Shallow non-artesian wells used for irrigation purposes may be test pumped at a rate equivalent to the yield of the aquifer and for a period of at least 12 hours.

(m) Alignment

A well shall not vary from the vertical or alignment so as to interfere with installation and operation of the pump.

(n) Drilling Water

Water used for drilling, development or rehabilitation purposes, other than from the well itself, shall be chlorinated clear water containing a free chlorine residual at the time of use and be conveyed in clean sanitary containers or water lines.

(o) Dug Wells

A dug well is not recommended; however, where water can be obtained only by a dug well, the administrative authority shall be contacted for approval of the details of construction procedures to be followed. The isolation distances for dug wells from sources of contamination shall be the same as rule MHD 169 (c)(1)(ee). The plans shall meet the standards of the Manual of Water Supply Sanitation Section IV paragraph 417 published in 1950 by the Department.

(p) Well Development

The well shall be developed to remove (1) native silts and clays deposited on the aquifer face during the drilling, (2) drilling fluid and (3) the predetermined finer fraction of the gravel pack, all of which shall be done to insure that the maximum possible specific capacity will be obtained from the completed well.

(q) Disposal of Material

Drilling mud, cuttings and discharged water shall not be disposed in a manner so as to create damage to public or private property. During the test pumping discharged water shall be piped to a point of overland drainage.

MHD 173 Well Casing Seals and Connections

(a) Water level measurement design:

Provisions shall be made in the well seal with a minimum 1-inch diameter threaded plug for future measurements of static and pumping water levels.

(b) Above-Grade Connections

An above grade connection into the top or side of a well casing shall be at least 12 inches above the established ground surface or 2 feet above the regional flood level whichever is higher, and constructed so as to exclude dirt or other foreign matter by one or more of the following methods, as may be applicable:

(1) Threaded connection.

(2) Welded connection.

(3) Rubber expansion sealer.

(4) Bolted flanges with rubber gaskets.

(5) Overlapping well cap.

(6) Extension of the casing at least 1 inch into the base of a power pump mounted and sealed on a concrete pedestal and at least 12 inches above the established ground surface or the floor of an approved basement, pump room, or well room.

(c) Below-Grade Connection

(1) A connection to a well casing made below ground, or less than 12 inches above the established ground surface, shall be protected by threaded or welded joints or by pitless adapter. The threaded or welded joints or pitless adapter shall be approved by the Board on the basis of design and materials. A below-ground connection shall not be submerged in water at the time of installation. The Director will furnish a list of approved pitless adapters that meet the requirements of these rules. Native materials shall be packed tightly around the casing and pitless adapter after installation.

(2) A connection to a well casing located at least 12 inches above the floor of an approved basement offset is considered equal to an above-grade installation for residential use only. An approved basement offset shall be a room with a floor 12 inches above the floor of an approved basement, shall extend beyond the footings of the building. The well shall extend 3 feet beyond any roof projection. Any basement located in a regional flood zone shall not be considered an approved basement.

(d) Other Methods

Any other method of connection to a well casing shall be specifically approved in writing by the Director before installation.

(a) Pump and Well Rooms

A room housing pumping equipment or the top of a well casing shall be constructed above the established ground surface permitting access to the pump for maintenance or repair,or may be located below-grade if the containing room is located in or attached to an approved basement.

(b) Slabs, Platform and Floors

A well, exdept where an approved pitless adapter is used, shall be protected by a durable watertight concrete or equal slab, platform or floor, at least 4 inches thick, extending horizontally at least 1 foot in every direction from the well casing, and sloped to divert water away from the casing. A watertight seal, which may be asphalt or similar material to provide resiliency, shall be provided between the casing and the platform, pump room or approved basement floor or slab.

(c) Pumps and Pumping Equipment

(1) A pump shall be constructed so that no unprotected openings into the interior of the pump or well casing exist.

(2) A hand pump, hand pump head, stand or similar device shall have a closed spout, directed downward, and a pump rod that operates through a stuffing box.

(3) A power driven pump shall be attached to the casing or approved suction or discharge line by a watertight connection, including flange connections, hose clamp type connections, or other flexible couplings, or shall have a base plate meeting the requirements of MHD 173(a).

(4) A pump shall be designed, installed and maintained so that priming is not required for ordinary use. Pumps installed for use only on a well water irrigation system are excepted but priming water shall be clear water free of contamination and carrying a chlorine residual.

(d) Water Suction Lines

(1) A water suction line shall be constructed of copper, galvanized iron or steel,cast iron, or plastic pipe as approved by the Director, or other material given written approval by the Director. Aluminum pipe is acceptable for well water irrigation systems.

(2) A water suction line extending outside the well casing shall not be used unless protected by one or more of the following methods:

(aa) Fully exposed in an approved basement offset, pump room or well room and at least 12 inches above the floor of an approved below-grade structure.

(bb) Fully exposed above grade.

(cc) Lying within an outer casing with the annular space filled with water from the system and maintained at system pressure.

(dd) Surrounded by air space in a conduit which has positive drainage by gravity to the ground surface or to an approved basement. Such conduit shall be directly connected to the well casing by a threaded or welded watertight joint. The openings into the casing shall be welded watertight or sealed in accordance with MHD 173. The total length of the suction line protected by the gravity-drained conduit shall not exceed 20 feet.

(e) Pump Discharge Lines

The discharge line between the well casing and the pressure tank in any installation, including a deepwwell turbine or a submersible pump, shall be under positive pressure at all times. If a check valve is installed in the water line between the well casing and the pressure tank, the water line between the well casing and the check valve shall meet the requirements for a suction line. Pump discharge lines shall be materials as approved for suction lines in MHD 174(d)(1). A hydrant shall be located at least 10 feet from the well.

(f) Pressure Tanks

It is recommended that a pressure tank be installed in an approved pump room or well room. However, partially buried pressuretanks shall project horizontally above the ground or into an approved basement, or into a room or pit drained by gravity to the ground surface. A totally buried pressure tank may be used if the manufacturer's unit has been approved in writing by the Board as to its design, type of material and specification for its installation. A pressure relief or air release valve on a pressure tank which may contain subterranean gases and which is located within a building shall be vented to theoutside.

(g) Vents

(1) All wells shall be vented. A casing vent shall be of materials complying with MHD 174(d)(1) with watertight joints terminating at least 2 feet above the regional flood level or the established ground surface or the floor of a pump room, well room or approved basement, whichever is higher. The casing vent shall be screened and point downward. Vents may be offset provided they meet the provision of these rule. Any submersible pump shall be installed with a vented cap on the pitless adapter to prevent drawing near surface water, mud, sand, etc., into the well through shielding around the electric cable.

(2) If toxic or flammable gases are present, they shall be vented from the well. The vent shall extend to the outside atmosphere above the roof level at a point where the gases will not produce a hazard. Openings in pump bases shall be sealed watertight. If the type of gas is not knownOand is to be carried through the water supply, the administrative authority shall be consulted for proper identification and treatment.

(h) Sampling Faucet

In a pressure water system provision shallbbe made for collection of water samples by installation of a faucet or sampling device in a convenient location as near to the well as possible.

(i) Disinfection

(1) A new, repaired, or reconditioned well or pump installation shall be thoroughly pumped to waste until the water is as clear as is reasonably possible, dependent upon ground water conditions in the area. Thereafter the well and pumping equipment shall be disinfected with chlorine so applied that a concentration of at least 50 parts per million of chlorine shall be obtained in all parts of the well. The chlorine solution shall be introduced into the well in a manner to flush the well surfaces above the static level with chlorine solution. A minimum contact period of 2 hours shall be provided before pumping the well to waste and flushing the chlorine solution from the distribution system.

(2) A licensee shall be responsible for chlorinating the work he performs on the well, pump or pumping equipment.

MHD 175 Records and Samples

(a) Water Sample

Prior to placing the supply from a new or reconditioned well into service, the contractor will be responsible for collecting one or more water samples from the installation for water quality analysis. Such samples shall be submitted to the Minnesota Department of Health in containers and in accordance with procedures issued by the Director. The results of the data will be stored in a ground water quality information system. The sample must be received within 30 hours of collection. Results of water sample analysis for a domestic supply not acceptable for drinking water will be reported to the well owner and the licensee along with recommendations for corrective actions. The results of the sample analysis is not intended to provide a basis of water quality for a transaction involving the sale or purchase of property.

(b) Water Well Records

(1) A water well record shall be completed and submitted to the Board by the licensee within 30 days after completion of any well. The licensee shall furnish the well owner one copy, the Director three copies and retain one copy in his files, of a well record containing such available information as required on the form furnished by the Director. Terms when used for describing formations on the well log form shall conform to definitions set forth in these rules.

(2) A water well record shall be submitted for a dry hole. Information on several dry holes within a small area may be submitted on a single well record form if the geologic materials are similar.

(3) A well record shall be submitted after an abandoned well has been sealed showing the method of sealing.

(c) Water Well Cutting Formation Samples

In order to improve the State's water information system, more detailed geologic and hydrologic information is needed about the rocks and sediments which contain the State's groundwater resources. Water well cuttings provide the least expensive source of this kind of information. The information derived from such a program is essential to the better understanding and protection of the State's groundwater resources. The following rules and procedures set forth the means by which such information shall be obtained.

(1) The Board in consultation with the Minnesota Geological Survey (hereinafter referred to as the Survey) shall determine areas where water well cutting samples are needed to provide subsurface geological and hydrological information required by the Board, the Survey, and other State agencies for development of the State water information system. The general standards to be used in making such a determination are:

(aa) To obtain the minimum amount of detailed geologic and hydrologic information needed for the State water information system, at least one set of water well cutting samples per township in rural areas and at least one set of water well cutting samples per section in urban areas are required. The latest State Planning Agency Land-Use Map will be used for determining rural and urban areas for collection of well cutting formation samples.

(bb) The Board in consultation with the Survey may determine that more information is required from specific areas for accuracy and detail in the State water information system.

(cc) Water well cutting samples will be required only where there is reason to believe that a well will encounter bedrock materials below glacial sediments or from a well which the licensee estimates will reach a depth of at least 200 feet. The Board may require water well cutting samples from areas other than as specified in this subsection where needed for accuracy and detail in the State water information system.*

(2) The Board through the Survey shall notify licensees of the general areas from which water well cutting samples are required and provide the licensees most frequently operating within such areas with maps or lists indicating counties, townships, sections, or other designated areas where cutting samples are required. In addition, the Board shall specify the approximate number and depths of wells from which cutting samples are needed in the designated areas.

(3) The Survey shall furnish all licensees so notified with well-cutting sample bags, labels, and return postage cards for collecting and reporting water well cutting samples.

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*Any licensee who has reason to believe that a well may be of exceptional geologic or hydrologic interest is encouraged to call collect the Survey to inform that agency of the opportunity to obtain samples, even if the well is not within the area currently designated for collection of samples.

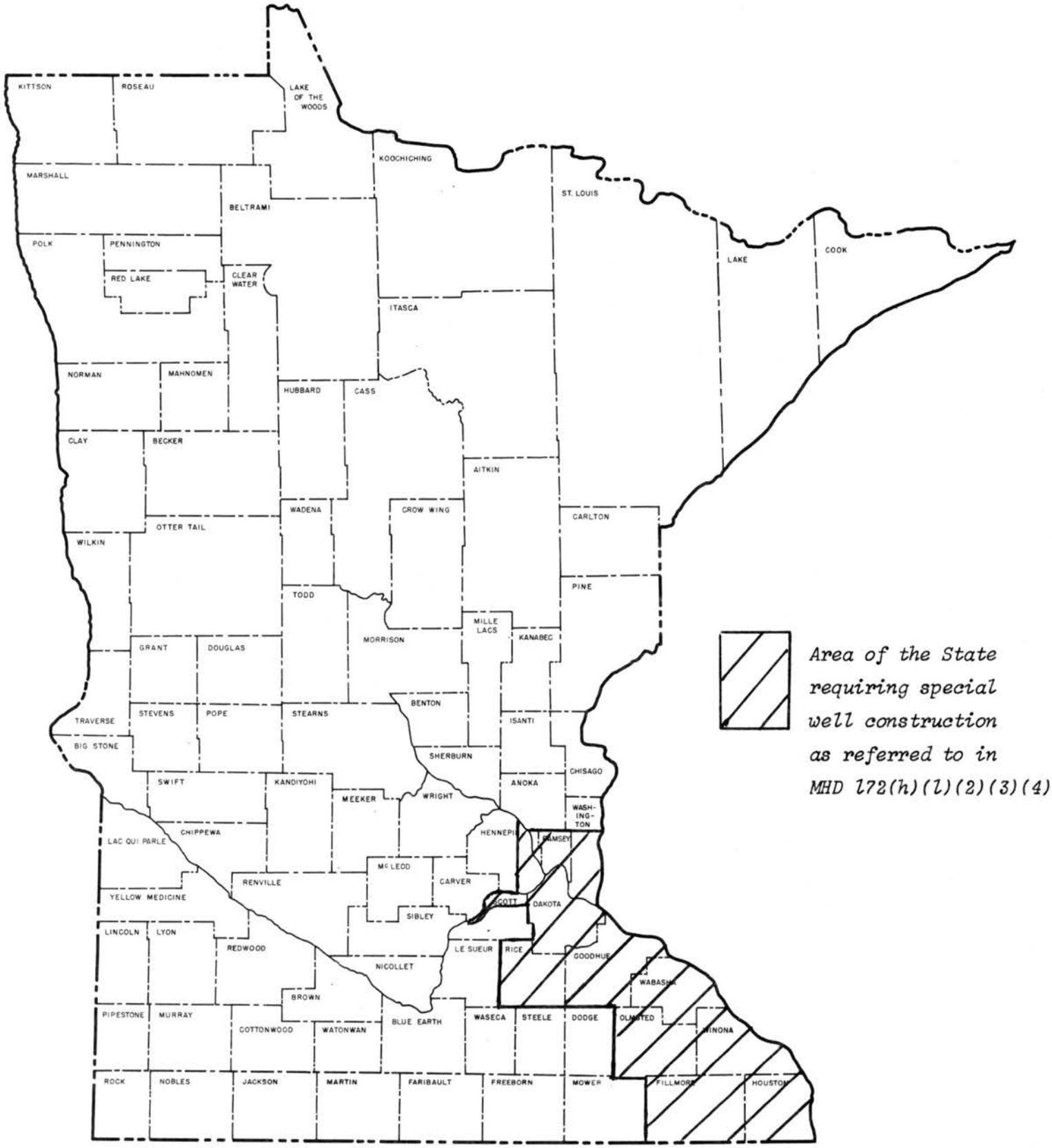
(4) Licensees so notified and supplied with sample collecting materials shall collect cutting samples during the course of drilling wells in the designated areas according to the requirements specified in the notification. Licensees not supplied with sample collecting materials but who shall have occasion to drill a well in an area designated for sampling shall notify the Survey.

(5) Licensees shall collect the cutting samples in an accurate manner so as to insure that they are representative of the materials encountered. Samples shall be taken at 5-foot intervals and at every change in rock or sediment type. The cuttings shall be placed in the sample bags provided by the Survey which shall have an attached tag on which the Board's recording form well-record number of the well, the well owner's name, the well location, and the sample depth (example: 5ft.) must be written.

(6) Licensees shall notify the Survey within 30 days after the well's completion so that the cutting samples can be collected. Pending collection, the contractor shall store the samples in a proper manner, so that they are protected from weather and disturbance and segregated in such a way that all samples may be properly identified with respect to the Board's recording form well-record number and depth interval.

(7) The Survey, upon notification by the licensee, shall collect the samples from the contractor. The cutting samples shall be described and a geologic log prepared. The geologic log will be retained in the files of the Minnesota Geological Survey, with a copy being sent to the contractor.

MHD 176-178. Reserved for future use.



Area of the State requiring special well construction as referred to in MHD 172(h)(1)(2)(3)(4)

ADMIN 1000

STATE OF MINNESOTA

DEPARTMENT ATTORNEY GENERAL

Office Memorandum

TO : Mike Miller
Special Assistant Attorney General
Department of Administration

DATE: May 22, 1974

FROM : Richard A. Wexler RAW
Special Assistant Attorney General
Department of Health

SUBJECT: Submission of Regulations Relating to Water Well Contractors

Mike, attached and hereby submitted to the Attorney General's Office, on behalf of the Minnesota State Board of Health, are the above subject regulations and all supporting documents.

The regulations contain amendments of basically housekeeping nature to the licensing regulations pertaining to water well contractors. In addition, the Board has adopted by these regulations a construction code. This, of course, was of great interest to the well drillers but I do not think that there is anything that can be considered a "burning" issue. The main concerns are summarized in the Statement of Need, Findings of Fact, and Statement of Compliance with Manual of Rule Making Procedures. The latter explains a minor problem that developed around the Notice of Hearing. The matter should be inconsequential.

The only other concern that I should bring to your attention relates to MHD 220 (a)(1) and 220 (a)(3). See pages 36 and 37. Those two provisions adopt by reference pipe standards which have been developed by nationally recognized testing laboratories. The Board desired to have the latest edition of the standards apply as they were adopted. Since I realized the difficulty with this, a procedure was developed which hopefully will remove the legal problem. See the last two sentences of MHD 220 (a)(1) and last sentence of MHD 220 (a)(3). If you do not believe that this proposed procedure will sufficiently remove legal objections, please consider approving the regulations in toto, assuming no other problems are found, except for the above noted sentences.

You will note that one copy of all items that are adopted by reference is included in the submitted material. These are for filing with the Secretary of State.

If you have any questions, please call me at 5294. Thanks.

RAW:cs
Attachment
cc: Fred Heisel
Ed Ross

RECEIVED

MAY 23 1974

Dept. of Administration
Office of Commissioner

~~(e)~~(5) "Person" means any natural person, corporation, partnership, or other business association.

~~(f)~~(6) "Applicant" means any person who applies for a water well contractor's license pursuant to the Act.

~~(g)~~(7) "Application for examination" means the application submitted by an applicant, ~~other than one eligible for licensure pursuant to Minnesota Statutes § 156A.07, Subd. 3 (1971)~~, from which the Board determines whether the applicant is eligible to take the examination.

~~(h) "Application for qualification" means the application submitted by an applicant from which the Board determines whether the applicant is eligible for licensure pursuant to Minnesota Statutes § 156A.07, Subd. 3 (1971).~~

~~(i)~~(8) "Application for licensure" means the application submitted by an applicant upon his successful completion of the examination, or at the end of each calendar year for license renewal. ~~or upon the determination by the Board that he is eligible for licensure pursuant to Minnesota Statutes § 156A.07, subd. 3 (1971).~~

~~(j)~~(9) "Year of experience" means a year during which the applicant personally drilled five (5) water wells.

(aa) Supervision of a drilling operation shall not be considered as an equivalent to personally drilling a well; however, supervision may be considered by the Board as experience meeting the requirements of these regulations on a case by case basis depending upon:

(aa1) The number of well drilling operations supervised during a year,

(aa2) The percentage of time spent at the site of a drilling operation,

(aa3) The type of activity performed as part of the applicant's supervisory responsibilities, and

(aa4) Other factors as may be relevant in each particular case.

(bb) The experience must have been gained in Minnesota except that an applicant may provide the Board with information demonstrating that his experience was gained in an area with the same or similar geological and other well drilling conditions as in the applicant's proposed well drilling operations territory in Minnesota. Such experience may be considered as meeting the experience requirement of these regulations.

~~(k)~~(10) "Licensee" means a person who is licensed as a water well contractor pursuant to the provisions of the Act and these rules and regulations.

~~(l)~~(11) "Representative" means an individual who qualifies for licensure on behalf of a partnership, corporation, or other business association rather than on his own behalf.

~~(m)~~(12) "Upper termination of the well casing" ~~shall~~ means a point twelve (12) inches above the ~~finished grade level~~ established ground surface.

~~(n) "Service vehicle" shall mean a vehicle used in well drilling or repair of a well for the purpose of modification to the casing, screen, depth, or diameter of the well.~~

(13) "A water well drilling machine" means any machine or device such as a cable tool, hollow rod or auger used for construction of a water well including drive point wells or a hoist or machine used in the well repair service which involves the modification to the well casing, screen depth or diameter below the upper termination of the well casing.

MHD 210(c)and (d)- all new material; will not be underlined.

(c) The following terms apply to the Water Well Construction Code, MHD 217-230:

(1) "Abandoned water well" means a well whose use has been permanently discontinued, or which is in such disrepair that its continued use for the purpose of obtaining ground water is impracticable or may be a health hazard.

(2) "Administrative authority" means the Board. When this code (MHD 217-230) is adopted by any municipality of the State, such municipality may apply to the Board for authorization to act as an inspection agent of the administrative authority to enforce the provisions of the Act and these regulations. The inspection agent's authority shall be limited to inspections to determine compliance by licensees with the provisions of these regulations (MHD 210-230) and to exercise any other powers specifically given the administrative authority by these regulations. The Board may grant such authority if the municipality demonstrates that at least one of its employees is qualified and familiar with well drilling operations in that municipality. Such authorization may be revoked without cause by the Board or released by the municipality on ten days written notice. This section shall not preclude the Board or any municipality from reaching an agreement authorized by Minnesota Stat. § 471.59 (1973 Supp.).

(3) "Annular space" means the space between two cylindrical objects one of which surrounds the other, such as the space between a drillhole and a casing pipe, or between a casing pipe and a liner pipe.

(4) "Approved basement" means a private home basement with walls and floor constructed of concrete or equivalent which is not subject to flooding and not located within a flood plain.

(5) "Aquifer" means a water-bearing formation (soil or rock horizon) that transmits water in sufficient quantities to supply a well.

(6) "Casing" means an impervious durable pipe placed in a well to prevent the walls from caving and to seal off surface drainage or undesirable water, gas or other fluids to prevent their entering the well and includes specifically but not limited to:

(aa) "Temporary casing" means a temporary casing placed in soft, sandy or caving surface formation to prevent the hole from caving during drilling.

(bb) "Protective casing" means the permanent casing of the well.

(cc) "Liner pipe" means a well casing installed without driving within a protective casing or open drillhole.

(7) "Coliform group" means all of the aerobic and facultative anaerobic, gram-negative, nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35° centigrade.

(8) "Director" means the director of the Division of Environmental Health of the Department, or his authorized representative, who shall carry out the administrative functions of these regulations on behalf of the Board.

(9) "Drawdown" means the extent of lowering of the water surface in a well and aquifer resulting from the discharge of water from the well.

(10) "Dug well" means a well in which the side walls may be supported by material other than standard weight steel casing. Water enters a dug well through the side walls and bottom.

(11) "Established ground surface" means the intended or actual finished grade (elevation) of the surface of the ground at the site of the well.

(12) "Geological material" means all materials penetrated in drilling a well.

(aa) The following table lists materials other than consolidated rock classified according to average particle size: (Wentworth 1922)

	Particle Diameters		Screen Slot No.	
Material	Millimeters	Inches	From	To
Clay	Up to 0.005	Up to - 0.0002	-----	-----
Silt	0.005 - 0.062	0.0002 - 0.0025	-----	-----
Fine Sand	0.062 - 0.250	0.0025 - 0.010	2	10
Medium Sand	0.250 - 0.50	0.010 - 0.020	10	20
Coarse Sand	0.50 - 1.00	0.020 - 0.040	20	40
Very Coarse Sand	1.00 - 2.00	0.040 - 0.080	40	80
Fine Gravel	2.00 - 4.00	0.080 - 0.160	80	160
Coarse Gravel	4.00 - 62.5	0.160 - 2.50	160 and larger	
Cobbles	62.5 -250.	2.50 -10.0	-----	-----
Boulders	250 and larger	10.0 and larger		

(bb) "Alluvium" is a general term for clay, silt, sand, gravel or similar unconsolidated material deposited during comparative recent geologic time by a stream or other body of running water as a sorted or semi-sorted sediment.

(cc) "Glacial drift (unconsolidated)" means a general term applied to all rock material (clay, sand, gravel and boulders) transported by a glacier and deposited directly by or from the ice or by running water eminating from the glacier.

(dd) "Glacial outwash" means a stratified sand and gravel removed or washed out from a glacier by meltwater streams and deposited in front of or beyond the terminal moraine or the margin of an active glacier.

(ee) "Hardpan" is a term to be avoided if possible, but when used means a hard impervious layer composed chiefly of clay, cemented by relatively insoluble materials, which does not become plastic when mixed with water and definitely limits the downward movement of water and roots.

(ff) "Shale" means rock consisting of hardened silts and clays.

(gg) "Sandstone" means cemented or otherwise compacted sediment composed predominately of sand.

(hh) "Limestone" means rock which contains at least 80% of carbonates of calcium and has strong reaction with HCl (muriatic acid).

(ii) "Dolomite" means rock which contains at least 80% of carbonates of magnesium and has a weak reaction with HCl (muriatic acid).

(jj) "Gypsum" means a soft light colored formation of calcium sulfate crystals and may be found as streaks in a shale formation.

(13) "Grout" means neat cement, concrete, heavy drilling mud or heavy bentonite water slurry. Heavy drilling mud or heavy bentonite water slurry when used as grout shall be of sufficient viscosity to require a time of at least 70 seconds to discharge 1 quart of the material through an API (American Petroleum Institute) marsh funnel viscometer.

(14) "Municipality" means a city, village, township, borough, county, district or other political subdivision of the State created by or pursuant to State law or any combination of such units acting cooperatively or jointly.

(15) "Pitless adapter" means a device or assembly of parts which will permit water to pass through the wall of the well casing or extension thereof, and which provides access to the well and to the parts of the water system within the well in a manner to prevent entrance of pollution into the well and the water produced.

(16) "Pollution" or "contamination" means the presence or addition of any substance to water which is or may become injurious to the health, safety or welfare of the general public or private individuals using the well; which is or may become injurious to domestic, commercial, industrial, agricultural or other uses which are being made of such water.

(17) "Potable water" means water which is safe for human consumption in that it is free from impurities in amounts sufficient to cause disease or harmful physiological effects.

(18) "Pressure tank" or "hydropneumatic tank" means a closed water storage container constructed to operate under a designed pressure rating to modulate the water system pressure within a selected pressure range.

(19) "Priming" means the first filling of a pump with water and the action of starting the flow in a pump.

(20) "Pump house" means a building constructed over a well exclusively to protect the well, pump, and water treatment equipment.

(21) "Pump room" or "well room" means an enclosed structure, either above or in a below grade approved basement housing the pump, top of the well, a suction line or any combination thereof.

(22) "Pumping water level" means the distance measured from the established ground surface to the water surface in a well being pumped at a specified rate for a specified period of time.

(23) "Pumps and pumping equipment" means materials used or intended for use in withdrawing or obtaining ground water for any use, including without limitation, seals and other safeguards to protect the water from pollution and together with fittings, and controls to provide sanitary water storage facilities. "Installation of pumps and pumping equipment" means the selection of, and procedure employed in the placement and preparation for operation of, pumps and pumping equipment, including construction involved in making entrance to the well and establishing proper seals and other safeguards to protect ground water from pollution, including repairs to existing installations.

(24) "Sewage" means the water carried waste products from residences, public buildings, including the excrementious or other discharges from the bodies of human beings or animals together with such ground water infiltration and surface water as may be present.

(25) "Cesspool" means an underground pit into which raw household sewage or other untreated liquid waste is discharged and from which the liquid seeps into the surrounding soil or is otherwise removed.

(26) "Seepage pit" or "dry well" means an underground pit into which a septic tank discharges household sewage or other liquid waste and

from which the liquid seeps into the surrounding soil through the bottom and openings in the side of the pit.

(27) "Septic tank" means a watertight tank of durable materials through which sewage flows very slowly and in which solids separate from the liquid to be decomposed or broken down by bacterial action.

(28) "Sewer" means a pipe or conduit carrying sewage or into which sewage may back up.

(29) "Subsurface disposal field," "seepage bed," "drainfield," "percolation system," or "tile absorption field" means a system composed of open-jointed tile lines buried in stones and shallow trenches or beds for final disposal into the ground of sewage effluent from a septic tank. The septic tank effluent is applied to land by distribution beneath the surface through the open jointed lines.

(30) "Static water level" means the distance measured from the established ground surface to the water surface in a well neither being pumped, nor under the influence of pumping nor flowing under artesian pressure.

(31) "Subterranean gas" means a gas occurring below the land surface. It may be flammable such as methane or highly toxic as hydrogen sulfide and may be associated with ground water.

(32) "Suction line" means a pipe or line connected to the inlet side of a pump or pumping equipment.

(33) Water varieties mean:

(aa) "Ground water" means the water in the zone of saturation in which

all of the pore spaces of the subsurface material are filled with water. The water that supplies springs and wells is ground water.

(bb) "Near surface water" means water in the zone immediately below the ground surface. It may include seepage from barnyards, disposal beds or leakage from sewers, drains and similar sources of pollution.

(cc) "Surface water" means water that rests or flows on the surface of the ground.

(34) "Well" means water well as defined in Minnesota Statutes, 156A.02, Subd. 1.

(35) "Well seal" means a device or method used to protect a well casing or water system from the entrance of any external pollutant at the point of entrance into the casing of a pipe, electric conduit or water level measuring device.

(36) "Well vent" means an outlet at the upper terminal of a well casing to allow equalization of air pressure in the well and escape of toxic or flammable gases when present.

(37) "Yield" or "production" means the quantity of water per unit of time which may flow or be pumped from a well under specified conditions.

(d) Policies

(1) The rules and regulations, MHD 210-230 shall apply to all water wells in the State of Minnesota except those specifically exempted by the Act. Those aspects covered are the construction of new wells, the repair and

maintenance of wells where specified, and the proper abandonment of wells to protect the quality of ground water aquifers for providing safe drinking water supplies.

(2) Public Water Supply

In accordance with MHD 136 (formerly Reg. No. 10873), no system of water supply, where such system is for public use, shall be installed by any public agency or by any person or corporation, nor shall any such existing system be materially altered or extended, until complete plans and specifications for the installation, alternation, or extension, together with such information as the State Board of Health may require shall have been submitted in duplicate and approved by the Director insofar as any features thereof affect or tend to affect the public health. No construction shall take place except in accordance with the approved plans. The plans for the well shall conform as specified by this well code. No municipal well may be drilled without approval of the site by the Director.

(3) Modification by the Board

(aa) When the strict applicability of any provision of these regulations present practical difficulties or unusual hardships, the Board, in a specific instance, may modify the application of such provision consistent with the general purpose of these regulations and the Act and upon such conditions as are necessary, in the opinion of the Board, to protect the ground water of the State and the health, safety and general well-being of persons using or potential users of the ground water supply.

(bb) The licensee shall state the specific exceptions requested plus explain in detail the reasons for such request. Whether or not the requests are granted, the Board shall state in detail the reasons for its decision.

MHD 211 (Licensing) is amended by adding or deleting the indicated provisions as follows.*

(a) Qualifications

(1) All applicants shall meet the following requirements:

(aa) A minimum of three (3) years' experience in water well drilling. ~~provided, however, that all applicants who desire to be licensed pursuant to the provisions of Minnesota Statutes § 156A.07, subd. 3 (1971) must have received such experience prior to August 5, 1971.~~

(bb) Honesty, integrity, and an ability to perform the work of a water well drilling contractor.

(cc) Submission to the Board of properly completed applications.

(2) ~~In addition~~ All applicants ~~who do not qualify for licensure pursuant to Minnesota Statutes § 156A.07, subd. 3 (1971)~~ must successfully complete the examination provided for in the Act and in these rules and regulations.

(b) Applications and Fees

(1) All applicants shall submit two (2) applications. The first one shall be ~~either~~ an application for examination ~~or an application for qualification.~~ If the applicant qualifies ~~in either instance~~, then he shall submit an application for licensure.

(2) Application for Examination or Qualification

(aa) An application for examination ~~or qualification~~ shall be submitted to

*Changes or additions indicated by underline, deletions by ~~strikeout~~.

the Board on forms provided by it. The application shall be accompanied by the filing fee prescribed by the Act. The fee shall be paid using only a money order, bank draft, or certified check made payable to the Minnesota State Treasurer.

(bb) The Board Shall not act upon the application until it has received reference letters from individuals who are familiar with the applicant's work experience, honesty, integrity, and ability to perform the work of a water well drilling contractor. ~~This requirement shall not pertain to those applicants who apply pursuant to Minnesota Statutes § 156A.07 subd. 3 (1971), unless otherwise required by the Board or Council. MHD 167(e) shall apply to such applicants.~~

(cc) The filing fee for an application for examination or qualification shall not be refunded for any reason except when an applicant is not found to be qualified to take the written examination. ~~or to be qualified for licensure pursuant to Minnesota Statutes § 156A.07, subd. 3 (1971).~~

(3) Application for Licensure

(aa) Upon satisfactory completion of the examination ~~or determination of qualification~~, the applicant may apply for a license upon forms provided by the Board.

(bb) The application shall be accompanied with the license fee prescribed by the Act. The fee shall be paid using only a money order, bank draft, or certified check made payable to the Minnesota State Treasurer. This fee shall not be refunded for any reason.

(4) If an applicant passes the examination or qualifies for licensure ~~pursuant~~

~~to Minnesota Statutes s 156A.07, subd. 3 (1971)~~ but the Board does not receive his application for licensure within one year from the date of the letter from the Board notifying him of his eligibility for licensure, then no license may be issued. Such an applicant, in order to become licensed at some later date, shall requalify by submitting a new application for examination and the prescribed fee.

(5) An individual may apply for examination as many times as he desires. Each application must be accompanied by the filing fee as prescribed by the Act.

(c) Council Evaluation of Applicants

(1) The Council shall evaluate each applicant and forward its recommendations to the Board.

(2) The Board or Council may conduct oral interviews and require sworn affidavits and other supporting evidence to determine qualifications of the applicant.

(d) Examination

(1) No applicant shall be permitted to take the examination unless he has submitted an application for examination, the accompanying filing fee, and been determined to be qualified by the Council.

(2) The applicant, ~~other than those qualifying under Minnesota Statutes § 156A.07, subd. 3 (1971)~~, shall take an examination which may be any combination of written, oral, or practical work as determined by the Board with the advice of the Council. Satisfactory completion of the examination is a mandatory prerequisite for licensure.

(3) An applicant which is a partnership, corporation, or other business association, shall designate one partner, officer, or other responsible full-time employee who shall be its representative to take the examination on its behalf. Upon licensure of the applicant, the representative shall be responsible for the supervision of all operations required of water well contractors by the Act and the rules and regulations adopted thereunder.

(e) Denial of Application

An application for examination, ~~qualification~~, or license may be denied for any of the following reasons:

(1) Failure of the applicant to complete the application.

(2) Failure of the applicant to submit the application with the prescribed fee.

(3) Failure of the applicant to meet the experience, reference, examination, and other qualifications required by the Act and these rules and regulations.

(4) Other sufficient causes as determined after notice and hearing in accordance with APA.

(f) License and Renewal

(1) No person shall drill, ~~or~~ construct, or repair a water well within this State unless in possession of a valid license to do so issued by the Board; provided, however, that persons installing or repairing pumps on a well shall not be licensed as water well contractors provided their work does not involve modifications to the well casing, screen, depth, or diameter below the upper termination of the well casing.

(2) ~~An applicant who is otherwise qualified but who does not have practical~~

~~field-experience-in-the-operation-of-conventional-drilling-machines,-such as-a-cable-tool,-rotary,-hollow-rod,-auger,-or-similar-drilling-machine, but-who-does-install-wells-such-as-drive-point-or-other-unconventional wells-shall-have-his-license-limited-to-such-water-well-drilling-work.~~

~~(3)~~(2) The issued license shall not be transferable. It shall contain the name of the licensee; the licensee's representative, if applicable; the date of issue; and the license number.

~~(4)~~(3) Each ~~year-by-the-1st-day-of-November,-commencing-in-1973~~ licensee shall submit an application for license renewal as provided for in the Act, on forms provided by the Board. ~~shall-mail-to-each-licensee-a-questionnaire. The-questionnaire-shall-be-completed-by-the-licensee-and-returned-to-the Board-not-later-than-December-15-of-each-year.~~ Upon receipt of the ~~questionnaire~~ application answered in a manner acceptable to the Board, a licensee shall be sent a renewal ~~certificate.~~ license. The renewal license ~~certificate~~ shall consist of a card in duplicate and contain the name of the licensee; the licensee's representative, if applicable; expiration date; and license number. One card shall be kept posted with the original license. The other shall be carried by the licensee or his representative.

~~(5)~~(4) Any licensee who does not renew his license within one year may have his license renewed only upon the recommendation of the Council and only after showing sufficient cause for not renewing. Until such showing is made and the renewal ~~certificate~~ license issued, the licensee shall not work as a water well contractor.

~~(6)~~(5) A person who acts as a representative may not be in the employ of any water well contractor other than the one he represents.

~~(7)~~(6) In the case of those applicants who are subject to MHD 211 ~~167~~(d)(3), the licensee shall be the partnership, corporation, or other business association who that individual represents and not the representative.

(aa) When the representative leaves the licensee or is otherwise incapable of performing his responsibilities, the licensee shall inform the Board within (5) days of such fact and give the name of a qualified individual acceptable to the Board, who shall be responsible for the acts of the licensee during the interim period while a new representative is being qualified. Although the licensee shall retain the same numbered license upon the licensing of the new representative, all applications, examinations, fees, and other requirements must be satisfied in order to qualify the new representative who must qualify within 90 days. If he does not do so, the water well contractor shall be without a license and must cease operations.

(bb) If an individual has his own license and desires to act as a representative, or if a representative desires to ~~get~~ obtain a license in his own name, the business association or the individual, as the case may be, need only submit an application for licensure and fee. The examination need not be retaken.

(g) Suspension or Revocation of License; Reinstatement

(1) Suspension or Revocation

(aa) The Board may suspend or revoke the license of a water well contractor upon finding that the licensee has violated the provisions of the Act

or the rules and regulations adopted thereunder. The Board may initiate such proceedings upon its own motion or upon the recommendation of the Council.

(bb) The Board or Council may cause an investigation to be made in any case in order to determine whether there has been a violation of the Act or of these rules and regulations, and, in so doing, may request the licensee to appear before them to determine the merits of the situation in question. In each case the Council shall make a recommendation to the Board as to whether proceedings under the Act and the APA would be appropriate.

(cc) Any disciplinary action taken under this section shall comply with the provisions of the APA.

(dd) A license may be suspended until certain conditions are fulfilled and/or for a specified period of time as determined to be most appropriate by the Board. The suspended or revoked license along with the current renewal certificates shall be returned to the Board by the licensee.

(ee) When the license of a water well contractor who is subject to the provisions of MHD ~~167~~ 211(d)(3) is revoked or suspended, the disciplinary action shall apply to both the licensee and its representative.

(2) Reinstatement

(aa) A revoked license may not be reinstated. The licensee who has had his license revoked may be relicensed by filing the usual applications and fees, and by taking the examination. The Board shall require an investigation or hearing to determine whether the person should be

issued a new license; provided, however, that in no case shall a new license be issued prior to one (1) year after the revocation has taken effect.

(bb) A licensee suspended for a specified period of time shall be automatically reinstated at the end of that time. Nothing herein shall be interpreted to prevent the making of such reinstatement conditional upon terms established by the Board in its Order of Suspension.

(cc) A licensee suspended for an indefinite period of time may be reinstated at the Board's own motion after due investigation to determine that the conditions upon which the suspension was based have been corrected or upon the Board receiving reasonable assurance to its satisfaction that such conditions will not reoccur.

(dd) The person whose license has been revoked or indefinitely suspended may petition the Board for a hearing for reinstatement of his license. Such hearing shall be granted only upon a showing by the petitioner that reasonable grounds exist for such hearing.

(h) Placement of Decals and License Number

(1) A licensee shall place in a conspicuous location on both sides of each well drilling machine his license number in figures not less than three (3) inches high and one and a half (1½) inches wide. The number shall be in a contrasting color to the background.

(2) Decals designating the year for which the license was issued or renewed and the words "MINNESOTA LICENSED WATER WELL CONTRACTOR" shall be affixed directly adjacent to and below the license number on each well drilling

machine. Water well contractors using a rope spool or other devices for well installation shall attach their decal on a portable display to be shown at the wellsite. The decals shall be issued by the Board upon licensure and renewal.

~~(3) The licensee shall place in a conspicuous location on both sides of each service vehicle his license number in figures not less than three (3) inches high and one and a half (1½) inches wide. The number shall be in a contrasting color to the background.~~

(i) Well Drilling Machine Registration

(1) Upon receipt of the required fee and information, a water well drilling machine registration card shall be issued for identification purposes for each drilling machine registered by the well drilling contractor. The card shall be carried on the water well drilling machine at all times where it may be inspected by the director. The card expires on December 31 each year.

(2) The registration card and duplicate decals furnished for a water well drilling machine are not transferable. The card and decals shall be returned to the director when a water well drilling machine is sold, traded, or otherwise disposed of. A registration card and two (2) new decals for a drilling machine so transferred will be provided upon receipt of the water well drilling machine registration fee, the old card, the two (2) old decals and application for the new drilling machine.

212-216
MHD ~~168~~ Reserved for future use.

WATER WELL CONSTRUCTION CODE

(None of this material will be underlined as it is all new)

MHD 217 Location of Wells

(a) General Considerations

A well shall be located consistent with the general layout and surrounding area giving due consideration of the size of the lot, contour of the land, slope of the water table, rock formation, porosity and absorbency of the soil, local ground water conditions, and other factors necessary to implement the basic policies that follow.

(b) A well or spring or buried reservoir shall be:

(1) Located on a site which has good surface drainage, at a higher elevation than, and at a sufficient distance from, cesspools, buried sewers, septic tanks, privies, barnyards and feedlots, or other possible sources of contamination so that the supply cannot be affected thereby, either underground or from the surface of the ground.

(2) Located so that the well and its surrounding area can be kept in a sanitary condition.

(3) Adequate in size, design and development for the intended use.

(4) Constructed so as to maintain existing natural protection against pollution of water bearing formations and to exclude all known sources of pollution from entering the well.

(5) A well should be located at least 5 feet from a property line. A well constructed to meet municipal water supply standards shall be located at

least 50 feet from a property line. In locating the well consideration shall be given to source of contamination from adjacent property.

(c) Distance from Pollution or Contamination Sources

(1) A well shall be at least:

(aa) One hundred fifty feet (150 ft.) from a preparation area or storage area of spray materials, commercial fertilizers or chemicals that may result in pollution of the soil or ground water.

(bb) One hundred feet (100 ft.) from a below grade manure storage area if in conformance with Minnesota Pollution Control Regulation SW52(2)(e).[1]

(cc) Seventy-five feet (75 ft.) from cesspools, leaching pits and dry wells.

(dd) Fifty feet (50 ft.) from a buried sewer, septic tank, subsurface disposal field, grave, animal or poultry yard or building, privy, petroleum storage tank, or any other sewage or liquid wastes that may drain into the soil.

(ee) Twenty feet (20 ft.) from a buried sewer constructed of cast iron pipe with tested watertight joints or other material acceptable to the Board; or a pit or unfilled space below ground surface, except an approved basement.

(ff) Wells less than 50 feet in depth and not encountering at least 10 feet of impervious material shall be located at least 150 feet from cesspools, leaching pits, or dry wells and at least 100 feet from a subsurface disposal field, manure storage pile or other source of

[1] A below grade manure storage area may present a special hazard to ground water quality which may require a greater isolation distance than provided for in this rule depending upon hydrologic and geologic conditions.

contamination.[2]

(2) The safe distance that a well should be located from a waste landfill or waste stabilization pond (lagoon) cannot be assigned a fixed number because of the varieties of hydrologic and geologic parameters associated with the undetermined types and amounts of materials that may be carried by ground water from leachates discharged from the waste landfill or waste stabilization ponds (lagoons). It is recommended that wells not be located in an area between the landfill or waste stabilization ponds (lagoons) sites and the point of ground water discharge to a surface water source.

(3) Any well that may intercept leachates from a waste landfill or waste stabilization pond (lagoon) by water withdrawal from the well shall not be used for potable water.

(4) Wells installed for ground water quality monitoring purposes are exempt from provisions related to safe depths and isolation distances from sources of contamination; however, their construction shall otherwise be in accordance with Minnesota Statutes Chapter 156A and rules adopted thereunder.

(5) The administrative authority may modify the isolation distances in this rule for individual well installations. The modifications shall be made in writing to the owner, with a copy to the Board, either increasing or decreasing the minimum isolation distance and shall state the reason for the modification based on overburden, depth of well, character of aquifer, maximum pumping rate, or other factors affecting the movement of pollution.

[2]For example, a manure storage pile would be considered as a potential source of contamination to the well; however, the presence of animals in open pasture in an area would not necessarily concentrate contaminants to the degree that would cause contamination to enter the ground water.

(d) Wells Adjacent to Buildings, Gas Lines or Overhead Electric Power Lines

(1) A well shall be located:

(aa) At least 3 feet horizontally from a building or any projection thereof, except for a pumphouse, unless modified in writing by the administrative authority.

(bb) Accessible for cleaning, treatment, repair, test inspection, and other attention as may be necessary.

(2) No well shall be located within the footing of any building or room beneath the floor under which there are buried sewers.

(3) A well shall not be located within fifteen feet (15 ft.) of a gas line or overhead electric distribution line or twenty-five feet (25 ft.) from an electric transmission line which is in excess of 50 kV except for the underground electrical service line to the well. These distances should be observed when locating a gas line or overhead electric line in the vicinity of an existing well or known proposed well. Where there is a question of the voltage in an electrical line the 25 foot distance should be observed or where less distance is required the utility company should be consulted for their recommendation for safe distances.

(e) Areas Subject to Flooding

(1) A well shall not be located in areas subject to flooding unless the casing extends at least 2 feet above the level of the highest known flood of record or otherwise protected as prescribed in writing by the administrative authority.

(2) The ground surface immediately adjacent to the well casing shall be graded so that surface water is diverted away from the casing.

(3) The well shall be located at least 50 feet horizontally from the normal high water mark of a stream, river or lake and at a higher established ground surface elevation than the soil absorption system, septic tank, or other source of contamination.

(4) Radial Water Collector

Projection of collectors shall be in areas and at depths approved by the Director. The exact location of all caisson construction joints and porthole assemblies shall be indicated. The caisson wall shall be substantially reinforced. Procedures shall be employed which will assure minimum vertical rise of the collectors. The top of the caisson shall be covered with a watertight floor and pump openings shall be curbed. Pump discharge piping shall not be placed through the caisson walls. There shall be no construction joint within 10 feet of the original ground surface.

MHD 218 General Protection of Ground Water Quality and Resources

(a) Re-use of Water, Disposal, Recharge or Gas Storage Wells

(1) A well for the storage of gas or liquid under pressure may not be drilled without first having secured a permit therefor from the Commissioner of Natural Resources in accordance with Minnesota Statutes, Sections 84.57-58.

(2) Water used for cooling parts of engines, air compressors, or other equipment or water used for air conditioning, shall not be returned to any part of the potable water system.

(3) A well shall not be used for disposal of surface water, near surface water, or ground water or any other liquid gas or chemical.

(b) Maintenance and Repair of Wells

(1) Every well shall be maintained in a condition whereby it will conserve and protect the ground water resources, and whereby it will not be a source or channel of contamination or pollution to the water supply of that well or any aquifer.

(2) All materials used in maintenance, replacement, or repair of any well shall meet the requirement of these regulations for new installation.

(3) Broken, punctured, or otherwise defective or unserviceable casing, screens, fixtures, seals, or any part of the well head shall be repaired or replaced. The well shall be abandoned in accordance with the requirements of these regulations if such repair or replacement is not performed.

(4) Repairs to wells completed with the well head terminating below ground (buried seal) where practicable, should include extending the well casing (pitless adapter) above the land surface. Extension of the casing above grade shall be accomplished in accordance with rules and standards for new wells.

(5) Before acid treating a well, MHD 218(b)(4) shall be complied with to prevent a hazardous condition caused by release of H_2S (hydrogen sulfide) or other toxic gases in a pit or confined space. All confined spaces shall be blown out with fresh air before entry and a supply of fresh air provided during occupancy. Pits or chambers should not be entered without a life-line and adequate lifting power on the surface to quickly haul up a worker.

Where there is any question whether the air supply procedure has provided a safe atmosphere, a self-contained breathing apparatus shall be worn (ordinary canister-type gas masks do not protect against atmospheres low in oxygen).

(c) Abandonment of Wells

(1) Temporary

(aa) Prior to placement into service or when temporarily removed from service, the well shall be sealed with a water-tight steel cap.

(bb) The well shall be maintained whereby it is not a source or channel of contamination when not in service.

(cc) Until a well is permanently abandoned by sealing procedures, all provisions for protection of the water against contamination and pollution and for maintaining satisfactory sanitary conditions around the well shall be carried out to the same extent as though the well were in routine use.

(2) Permanent

(aa) General

A well that is to be permanently abandoned shall be disconnected from the system and the hole filled to prevent contaminating materials from entering the water-bearing ground formations. Concrete or cement grout shall be used for sealing material; however, if the well is so large that the use of these materials is not practical, the filling materials should be selected so as to restore natural conditions as nearly as possible. Neat cement grout or concrete as defined

in MHD 220(c) (grouting) and MHD 210(c)(13) are satisfactory for filling parts of wells in rock formations. Sand and heavy drilling fluid may be used in sand and gravel sections of wells.

(bb) All materials, debris and obstructions that may interfere with sealing operations shall be removed from the well. Liner pipe shall be removed or perforated when necessary to assure placement of an effective seal. The administrative authority will be consulted for instruction in case of abandonment of a contaminated well or where there is a question of proper procedure.

(cc) All casing and screen may be salvaged except casing that has been cemented in place. The well shall be filled with appropriate sealing materials as described in MHD 218(c)(2)(aa) prior to removal of the casing.

(dd) The top of the hole shall be filled with 10 feet of cement or concrete grout to within 2 feet of the land surface. Casing remaining in the hole shall be cut off at least 2 feet below land surface. The remaining top 2 feet of hole shall be filled with native top soil.

(ee) An abandoned well shall be filled and sealed by one of the following methods in accordance with the materials penetrated, in such a manner as to prevent it from acting as a channel for pollution. A report of the method of sealing shall be filed with the Board on water well record forms provided:

(eel) A well in unconsolidated deposits shall be filled with clean sand and puddled clay, neat cement grout or concrete grout to provide a permeability no greater than the natural condition.

(ee2) The section of a well in a cavernous or creviced rock (such as cavernous limestone or basalt lava rock, creviced granite, etc.) shall be filled with concrete or neat cement grout or alternate layers of concrete or neat cement grout, gravel or stone aggregate. The filling shall be completed at the top by a layer of neat cement grout or concrete grout extending at least ten feet (10 ft.) into the above overlying formation and finished as provided in MHD 218(c)(2).

(ee3) When concrete, cement grout, puddled clay or heavy drilling fluid is used for sealing an abandoned well, it shall be inserted in the well through a grout pipe from the bottom of the well upward to the surface under pressure and in one continuous operation.

(ee4) Test wells shall be sealed to prevent the well from being a channel for the vertical movement of water and a source of contamination to the ground water supply in accordance with well abandonment provisions of MHD 218(c).

(ee5) The flow in a flowing well shall be confined, if possible,[3] and the well filled in accordance with well abandonment provisions of MHD 218(c).

[3] Proper judgment shall be exercised in the feasibility and practicability of sealing flowing wells. In some cases the confining formation may have been so badly disturbed that sealing may only cause the flow to discharge in a less appropriate location. In other situations, the flow may have eroded so much material that the landscape has taken on the appearance of a natural spring. The sealing in this case may be impracticable, if not impossible.

(ff) The owner shall be responsible for the permanent sealing of an abandoned well except:

(ff1) as mutually agreed upon in a written contract between the owner and licensee and in accordance with these rules and regulations to protect the ground water aquifer.

(ff2) When the licensee improperly locates, constructs, or completes the well or fails to meet the conditions of his contract; in which case the licensee shall be responsible for the sealing of the well.

(gg) A licensee shall report to the Board any unsealed abandoned water wells of which he becomes aware.

(d) Observation Wells

(1) Observation wells installed for a temporary (not to exceed a period of six (6) months) purpose of obtaining hydrologic or other data shall be constructed by such methods and of such materials that they are not a source or channel of pollution or contamination to any ground water supply or aquifer. All observation wells shall be abandoned in accordance with procedure described in rule MHD 218(c).

(2) Permanent observation wells (exceeding a period of six (6) months) constructed for the purpose of obtaining hydrologic or other data shall meet the standards of construction for water supply wells except when prior permission has been obtained in writing from the Board exempting the well from meeting specified standards established by these regulations.

(e) Test Holes and Borings

Test holes shall be permanently abandoned and sealed by the well contractor after the drilling, logging and testing have been completed unless:

(1) The owner or his agent has submitted a request to the director and obtained his written permission to extend the time limit, or

(2) The well is being completed as a water supply or other approved type well.

(f) Dewatering and Depressurizing Wells

(1) Dewatering and depressurizing wells shall be constructed in a manner and with such materials to prevent the contamination of the ground water system. Discharges from the dewatering system shall not be cross connected to a potable water supply.

(2) Temporary Water Supply

There may be incidents during construction where nearby residences with private water supplies will lose their source of supply during dewatering operations. If such a situation occurs, the licensee shall cooperate with the homeowner as may be required to provide a temporary supply of water during construction operations, including, but not necessarily limited to, supplying bottled water for drinking and cooking purposes and potable bulk water for other uses.

(3) The Board shall be notified prior to commencement of a ground water dewatering operation by the licensee. The licensee shall report the approximate area to be dewatered, the maximum depth to be dewatered, the number of wells

to be affected, and the measures that will be taken to provide potable water to persons adversely affected by the dewatering operation. This may be reported by phone. The licensee shall retain the name of the Board's staff member taking the information and shall report this information in writing to the Board within three days of commencement of the ground water dewatering operation.

(4) The licensee shall comply with any orders issued by the Board which may include but not be limited to the collection of water samples from wells in the dewatered area for analysis to determine any health hazards prior to the Board relieving the licensee of responsibility for furnishing a safe water supply to well owners in the area affected by the dewatering operation. If the licensee has been released of his responsibility but thereafter difficulties develop in the water supply of well owners in the area affected by the dewatering operation as a result of such operation, the licensee may again by required to comply with MHD 218(f)(2).

(g) Elevator Shafts

Wells constructed or holes drilled for the installation of elevator shafts or hydraulic cylinders shall be cased, sealed, and maintained in a manner to prevent the vertical movement of water as a source of contamination to the ground water or any aquifer and as approved by the Board.

(h) All Other Wells

All wells except those specifically exempted by the Act shall be constructed and maintained in accordance with standards for water supply wells except when prior exemption has been obtained from the Board.

MHD 219 Other Water Sources, Cross Connections and Storage Reservoirs

(a) Storage Reservoirs

If a storage reservoir, excluding a pressure tank,is used, plans shall be submitted to the administrative authority for approval. The plans shall meet the standards specified in the Manual of Water Supply Sanitation, Section VII, paragraph 715, published in 1969 by the Department.

(b) Other Water Sources

In cases where a potable water supply cannot be obtained by well drilling, permission may be granted by the administrative authority to use springs, infiltration tile lines, or other similar sources as a water supply, or to install water treatment facilities. Plans and specifications for such facilities, together with operating procedures, shall be approved by the administrative authority. The plans shall meet the standards of the Manual of Water Supply Sanitation, Section VI, published in 1962 by the Department.

(c) Cross Connections

A physical connection is not permitted between a well meeting the requirements of these rules and another water supply which does not meet such requirements.

MHD 220 Standards for Construction of Wells

(a) Casing for Permanent Wells

(1) A permanent well casing used for the protective or outside casing shall be of at least standard weight (schedule 40) steel or iron pipe through 8 inches inside diameter. Larger diameter casing shall have minimum weights and thicknesses as specified in Table 1. Dimensions and weights of schedule 40 pipe are given in Standard B36.10-1959 of the American Standards Association, 29 West 39th Street, New York, New York and standards A53-69a or A120-69 of the American Society for Testing Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

(2) A protective well casing shall be watertight throughout its length, with threaded or welded joints or other types of joints given written approval by the Director. Recessed or reamed and drifted couplings shall be used on threaded casing, or, as an alternate, other couplings can be used but the design, taper and type of the thread of the coupling shall match that of the pipe. No thread shall be exposed on the pipe when the pipe is joined to the coupling. Other casing design or materials shall be approved only by official written order of the Board.

(3) Pipe used as the protective casing in the permanent construction of a well shall be new pipe produced to recognized standards of the American

Society for Testing Materials, No. 5L (1970) of the American Petroleum Institute, 1271 Avenue of the Americas, New York, New York, or No. C201-66 and C202-64 of the American Water Works Association, 2 Park Avenue, New York, New York, or other grade weldable new pipe having a quality equal to or greater than those heretofore specified.

(4) New pipe, when salvaged within 30 days of the drilling of a water well test hole or dry hole only, may be used as new pipe if still in new condition.

(5) Pipe shall be marked with the specification designation or marked "Meets Minnesota Well Construction Code Standards." Such markings shall include wall thickness, weight per foot and identification of supplier. The Board may require that such pipe be submitted to an independent testing laboratory for evaluation and verification that the pipe will equal or exceed minimum standards. Failure of the pipe supplier to submit the pipe for evaluation and verification or failure of the pipe to meet minimum standards specified in MHD 220(a)(1) and (3) shall be sufficient cause for automatic rejection of such pipe for use in well construction in Minnesota.

(6) Pipe intended for water well use that is sold within this State, regardless of specification designation, is subject to random examination by the administrative authority who may require any lot of pipe or part thereof containing defective lengths to be rejected. Defective lengths or lots shall include, but not be limited to:

(aa) Pipe with girth welded joints

(bb) Pipe with welded patches

(cc) Lots having more than 5% of the pipe with lengths less than 5 feet

(7) Temporary, Inner, and Protective Casing; Liner

(aa) Temporary casings may be standard weight pipe or lighter pipe, but lightweight material shall be of such minimum thickness as is required to withstand the structural load imposed by conditions both inside and outside the well.

(bb) In no case shall the inner casing or protective casing have a wall thickness of less than specified in Table 1. The inner casing shall be surrounded by 2 nominal inches of neat cement grout. The annular space between the casing and open hole shall be grouted with neat cement or other materials given written approval by the Director or as provided in MHD 220(f).

(cc) A liner shall be grouted for its entire length with the grout material being added from the bottom upward in one continuous operation or as provided in MHD 220(f).

(dd) Casings to be grouted shall be provided with sufficient centering guides, welded to the casing, to permit unobstructed flow and deposition of the grout.

(8) A well drilled for irrigation purposes in shallow continuous glacial outwash material penetrating non-artesian water may be constructed of pipe as specified in Table 2. The annular space shall be closed by washing the fine grained caving material around the casing.

Table 2. Gauges for Steel or Galvanized Steel Casing Irrigation Wells in Shallow Continous Glacial Outwash Material Penetrating Non-artesian Water

Diameter of Plain and Perforated Casing (inches)				Diameter of Corrugated Metal Pipe (inches)		
12	14	16	18	12	15	18
Gauge				Gauge		
12	10	10	10	12	12	12

Well casing in Table 2 shall be new pipe, however, salvaged pipe may be used if the condition of the salvaged pipe is yet of new pipe quality.

(9) Under no conditions shall the casing inside diameter be less than 2 inches except for a driven well point which shall be equipped with a casing pipe of at least 1¼ inches inside diameter. The well shall also be of sufficient diameter to receive a pump or pumping apparatus of sufficient size to discharge the design capacity including anticipated decline in water levels.

(10) Minimum Protective Depths of Wells

(aa) All wells shall be watertight to such depth as may be necessary to exclude pollution. Ground water structures shall be so designed as to seal off formations that are, or may be, contaminated or undesirable. Requirements will be fulfilled to the minimum extent when the protective casing has been installed in conformity with the applicable construction set forth in MHD 220. Where it is not feasible to follow the standards contained in this section, the licensee shall obtain approval of the administrative authority as to the design of the well before proceeding. The acceptability of the formation for well development shall be based on the satisfactory results of analysis of the water. Any water-bearing formation yielding water which is contaminated, as evidenced by the presence of chemicals or bacteria of sewage origin, shall be regarded as unsatisfactory for well development unless adequate treatment is provided.

(bb) The casing of any well for a potable water supply constructed entirely in glacial outwash or alluvium earth formations shall extend to a depth of 50 feet below established ground level or through at least

TABLE 1

CASING PIPE WEIGHT AND DIMENSIONS

Size in Inches	Wgt. Lbs. Per Ft. Plain End	Wgt. Lbs. Per Ft. Thrds. & Cplgs.*	Wgt. Lbs. Per Ft. Thrds. R&D Cplgs.	Thickness in Inches	Diameter - Inches External	Diameter - Inches Internal	Thrds. per Inch	Couplings Minimum External Diameter Inches	Couplings Minimum Length Inches
1	1.68	1.68	1.70	.133	1.315	1.049	11½	1.576	2-5/8
1¼	2.27	2.28	2.30	.140	1.660	1.380	11½	1.900	2-3/4
1½	2.72	2.73	2.75	.145	1.900	1.610	11½	2.200	2-3/4
2	3.65	3.68	3.75	.154	2.375	2.067	11½	2.750	2-7/8
2½	5.79	5.82	5.90	.203	2.875	2.469	8	3.250	3-15/16
3	7.58	7.62	7.70	.216	3.500	3.068	8	4.000	4-1/16
3½	9.11	9.20	9.25	.226	4.000	3.548	8	4.625	4-3/16
4	10.79	10.89	11.00	.237	4.500	4.026	8	5.200	4-5/16
5	14.62	14.81	15.00	.258	5.563	5.047	8	6.296	4-1/2
6	18.97	19.18	19.45	.280	6.625	6.065	8	7.390	4-11/16
8	28.55	29.35		.322	8.625	7.981	8	9.625	5-1/16
10	40.48	41.85		.365	10.750	10.020	8	11.750	5-9/16
12	49.56	51.15		.375	12.750	12.000	8	14.000	5-15/16
14	54.57	57.00		.375	14.000	13.250	8	15.000	6-3/8
16	62.58	65.30		.375	16.000	15.250	8	17.000	6-3/4
18	70.59	73.00		.375	18.000	17.250	8	19.000	7-1/8
20	78.60	81.00		.375	20.000	19.250	8	21.000	7-5/8
22	86.61			.375	22.000	21.250			
24	94.62			.375	24.000	23.376			
26	102.63			.375	26.000	25.250			
30	118.65			.375	30.000	29.250			
32	126.66			.375	32.000	31.250			
34	134.67			.375	34.000	33.250			
36	142.68			.375	36.000	35.250			

*Nominal weight based on length of 20 feet including coupling.

10 feet of impervious soil formation and at least 5 feet below the pumping water level and in accordance with MHD 217(c)(1)(ee).

(11) A well casing or extension thereof shall extend vertically at least 12 inches above ground surface or above the floor of an approved basement offset, pump room or well room. However, in an above grade installation the casing shall extend at least 6 inches above the floor or slab.

(12) Well casing offsets are prohibited.

(b) Upper Casing

A well casing used for a potable water supply shall not be used as a suction line unless protected by a standard weight outer casing to a depth of at least 10 feet. The top of both casings shall be finished in accordance with MHD 222.

(c) Grouting

(1) A well having an open annular space around the casing or between the surface casing and protective casing or a liner and protective casing shall be grouted from the lower termination of the casing to the ground surface or to the base of the pitless adapter. Grouting shall be commenced without delay upon completion of drilling of the well or any portion of a well which must be grouted. Grouting shall be performed by adding the mixture through the casing or a grout pipe from the bottom of the space to be grouted upward to the surface in one continuous operation. Concrete grout may be used in the dry portion of a hole. Neat cement grout or concrete grout shall be allowed to set a minimum of 12 hours when hi-early cement is used or a minimum of 48 hours when regular cement is used.

before drilling operations are resumed. Heavy drilling mud or heavy bentonite water slurry may be used as grout in wells developed in glacial drift. Other materials of equivalent sealing properties shall have the written approval of the Director prior to their use.

(2) Concrete grout is a mixture of cement, sand and water, in the same proportion of 1 bag Portland cement (94 pounds ASTM C150-69a) and an equal volume of dry sand to not more than 6 gallons of clean water. Where large volumes are required to fill annular openings, gravel not larger than ½ inch in size may be added. Concrete grout shall not be used as grout below the water level in the well.

(3) Neat cement grout is a mixture of 1 bag (94 pounds) of Portland cement (ASTM C150-69a) to not more than 6 gallons of clean water. Bentonite up to 2% by weight of cement to reduce shrinkage or other admixtures (ASTM C494-68) to reduce permeability and/or control time of set may be used.

(4) Heavy drilling fluid when used as grout in a rotary drilled well shall contain a high percentage of clay or bentonite to minimize shrinkage of the slurry within the annular space. Heavy bentonite water slurry is a mixture of 10% by weight of bentonite added to clean water or approximately 5% bentonite added to drilling mud. Bentonite shall contain 85% of the mineral montmorillinite and shall meet American Petroleum Institute specification standard 13A (March 1966). Saline, acid or alkaline substances or other additives to cause a temporary increase in viscosity of the bentonite slurry are not permitted.

(d) Rotary, Bored or Augered Wells

(1) Rotary bored or augered type wells shall be constructed with a water-tight casing of 2" diameter or larger installed in an open hole having a diameter of at least 2" larger than the maximum outside diameter of the casing. The annular space around the casing shall be tightly sealed in accordance with material and procedures described in rule 220(c). A rotary, bored, or augered well completed in a drift formation may be sealed by pumping the well to collapse the formation; however, the top 20 feet below the land surface shall be sealed in accordance with rule 220(c) or 220(f).

(2) Drilling mud additives shall be stored in clean containers and shall be free of material that may adversely affect the well, aquifer, or quality of the water to be pumped from the well.

(e) Driven Casing Wells

(1) Where the upper drillhole is clay or similar material of 10 feet or more in thickness, the annular space between the drillhole and casing shall be kept filled with clay slurry or equivalent material when driving the protective casing. In lieu of this, a starting casing should be used and sealed with 20 feet of concrete grout. (When a pitless adapter is used, see MHD 221(c)(1)).

(2) The bottom of the protective well casing shall be equipped with a drive shoe or otherwise protected from damage during construction of the well as dictated by drilling procedures and conditions of each particular well.

(f) Unconsolidated Glacial Drift Wells

A well drilled into unconsolidated glacial drift may be completed with a

tight seal made around the protective casing if the annular space is closed by washing the fine-grained caving material around the casing prior to disinfection of the well. Wells shall be pumped promptly after setting the casing until clear, and native materials shall be washed immediately into the annular space.

(g) Rock Wells

(1) Where rock is encountered, i.e., consolidated as opposed to unconsolidated geological material, at a depth greater than 25 feet from the surface the protective casing shall be equipped with a drive shoe which shall be driven firmly into stable rock to provide a tight joint that will prevent pollution or sand from entering the well. A drive shoe is not required on a casing installed without driving and which is to be grouted with neat cement or concrete in an oversized hole.

(2) Where rock is encountered within 25 feet of the surface, an oversized hole 4 nominal inches larger in diameter than the casing shall be drilled and the casing sealed with neat cement grout to a sufficient depth to exclude water which is contaminated.

(3) In an area where a well can be developed only in fractured, jointed, but non-cavernous rock, the casing may terminate in the formation if there is at least 25 feet of sand or clay material above the rock, there is no record of this rock containing contaminated or polluted water, and geologic conditions offer no natural direct surface or near surface water inlets into the rock aquifer. Where there is less overburden or deeper strata will not produce potable water, the administrative authority shall be consulted

and its written approval obtained by the well owner for water treatment and well construction features necessary to provide a safe water supply.

(h) Cavernous Rock Wells

(1) Geological formations which are creviced or cavernous should not be used as a source of ground water unless overlain by at least 50 feet of drift material and/or by a firm insoluble rock material extending for at least one mile horizontal distance from the well in all directions to render the movement of contaminated water in the formation to the well improbable. The casing shall extend at least 10 feet below the pumping level. The acceptability from a sanitary standpoint of water obtained from a well developed in such a protected faulty geological formation will be dependent upon treatment of the water if the need for such is indicated by analytical studies of the water.

(2) Wells Underlying Cavernous Rock

Where an adequate and safe water supply is available in a geological formation overlain by one or more faulty rock formations, all faulty rock formations should be completely cased off. The casing should extend at least 15 feet into the safe aquifer if such exists, or at least 15 feet into a stable, insoluble, noncavernous or noncreviced geological formation beneath the lowest faulty rock formation and above the aquifer and at least 10 feet below the pumping level. The drill hole extending through the creviced rock formation and 15 feet into the firm rock formation or aquifer should be at least 4 nominal inches larger in diameter than the casing if welded construction is used, and 4 nominal inches larger in diameter than the couplings if threaded joints are used. The annular space shall be filled with cement grout as provided in MHD 220(c).

(3) Protective Mantel Over Cavernous and Noncavernous Aquifer

Where any faulty rock formation which overlies a safe aquifer is itself overlain by a protective mantle of drift, or by a firm insoluble consolidated formation of sufficient depth and for a sufficient radius as described herein above (MHD 220(h)(1)), the casing need not extend through the protected faulty rock formation. The casing shall also extend 10 feet below the pumping level. The acceptability of water taken from a well so constructed will be dependent upon treatment of the water, if the need for treatment is indicated by analytical studies of the water.

(4) The acceptability of the cavernous limestone for producing a safe water supply may not be known until a well is drilled and the water analyzed. In this case an oversized hole may be drilled into cavernous rock for later use in drilling to a deeper sandstone or other acceptable aquifer. An oversized hole shall be 4 nominal inches larger in diameter than the casing liner and couplings to be inserted for reaching the deeper aquifer. The smaller casing shall be of sufficient diameter to insert a pump of sufficient capacity to lift water to the surface for the required supply. The casing shall also extend at least 10 feet below pumping level.

(5) Wells terminating in cavernous rock for withdrawal of water for purposes other than domestic or community water supply shall be grouted in accordance with rule 220(c) to prevent vertical transfer of polluted or contaminated water between aquifers.

(i) Flowing Artesian Wells

(1) Flowing artesian wells should be constructed to prevent erosion of the aquifer or the overlying confining mantel.[4]

[4]This provision will not be interpreted so as to preclude licensees from attempting to drill a well in a flowing artesian area, when it is likely that a water well can be safely installed if proper precautionary measures are followed.

(2) Flow control from a flowing artesian well shall be provided, consisting of valved pipe connections, water-tight pump connections or a receiving tank set at an altitude corresponding to that of the artesian head. A direct connection between the discharge pipe and a receiving tank or a sewer or other source of pollution or contamination shall be prohibited.

(j) Well Screens

A well installed in unconsolidated sand and gravel aquifers shall ordinarily be fitted with a screen properly sized so the aquifer can be properly developed to produce sand-free water at the pumping rate of the permanent pump. Wells shall provide sand-free water to the extent that the sand will not interfere with the intended use and operation of the water supply system.

(k) Capping

Temporary capping of a well until the pumping equipment is installed shall be such that no pollution or foreign objects can enter the well.

(l) Yield Test

Every well shall be test pumped to produce a minimum initial supply of 600 gallons of sand-free water per hour if geological conditions permit. A well in which a pump of a capacity of 20 gallons per minute or more is to be installed shall be tested for yield and drawdown with periodic water level measurements being made where possible, during the drawdown and

subsequent recovery periods. The well shall be test pumped at rates greater than is expected from the well during its normal usage as follows: up to 400 gpm - 1.5 times; 400 to 600 gpm - 1.4 times; 600 to 800 gpm - 1.3 times; 800 to 1,000 gpm - 1.2 times; 1,000 gpm and over - 1.1 times. Shallow non-artesian wells used for irrigation purposes may be test pumped at a rate equivalent to the yield of the aquifer and for a period of at least 12 hours. Wells shall be test pumped for a minimum of one hour or more if more is required by the well owner or as prescribed by the consulting engineer or hydrologist.

(m) Alignment

A well shall not vary from the vertical or alignment so as to interfere with installation and operation of the pump.

(n) Drilling Water

Water used for drilling, development or rehabilitation purposes, other than from the well itself, shall be chlorinated clear water containing a free chlorine residual at the time of use and be conveyed in clean sanitary containers or water lines.

(o) Dug or Bored Wells

This type of well is authorized where geological conditions preclude the possibility of developing a satisfactory drilled well. The wells shall contain a watertight cover. Pump openings shall be curbed. The isolation distances for dug wells from sources of contamination shall be the same as rule MHD 217(c)(1)(ee).

(1) Concrete Wall or Curbing - The upper 10 feet of the wall or curbing shall be at least 6 inches thick and be poured in one operation. There shall be

no construction joint within 10 feet of the original ground surface.

(2) Pre-cast Curbing - Concrete well pipe, vitrified pipe, and similar forms of pre-cast curbing have construction joints that cannot be depended upon to be watertight. Where used, such pre-cast curbing shall be encased in a 6-inch thick neat cement or concrete grout placed in one operation to a depth of at least 20 feet.

(p) Well Development

The well shall be developed to remove (1) native silts and clays deposited on the aquifer face during the drilling, (2) drilling fluid and (3) the predetermined finer fraction of the gravel pack, all of which shall be done to insure that the maximum practical specific capacity will be obtained from the completed well.

(q) Disposal of Material

Drilling mud, cuttings and discharged water shall not be disposed in a manner so as to create damage to public or private property. During the test pumping discharged water shall be piped to a point of overland drainage.

MHD 221 Well Casing Seals and Connections

(a) Water level measurement design:

Provisions shall be made in the well seal with a minimum ½-inch diameter threaded plug for future measurements of static and pumping water levels. A minimum 1-inch diameter threaded plug is preferred where feasible.

(b) Above-Grade Connections

An above grade connection into the top or side of a well casing shall be at least 12 inches above the established ground surface or 2 feet above the regional flood level whichever is higher, and constructed so as to exclude dirt or other foreign matter by one or more of the following methods, as may be applicable:

(1) Threaded connection.

(2) Welded connection.

(3) Rubber expansion sealer.

(4) Bolted flanges with rubber gaskets.

(5) Overlapping well cap.

(6) Extension of the casing at least 1 inch into the base of a power pump mounted and sealed on a concrete pedestal and at least 12 inches above the established ground surface or the floor of an approved basement, pump room, or well room.

(c) Below-Grade Connection

(1) A connection to a well casing made below ground, or less than 12

inches above the established ground surface, shall be protected by threaded or welded joints or by pitless adapter. The threaded or welded joints or pitless adapter shall be approved by the Board on the basis of design and materials. A below-ground connection shall not be submerged in water at the time of installation. The Director will furnish a list of approved pitless adapters that meet the requirements of these rules. Native materials shall be packed tightly around the casing and pitless adapter after installation.

(2) A connection to a well casing located at least 12 inches above the floor of an approved basement offset is considered equal to an above-grade installation for residential use only. An approved basement offset shall be a room with a floor 12 inches above the floor of an approved basement, shall extend beyond the footings of the building. The well shall extend 3 feet beyond any roof projection. Any basement located in a regional flood zone shall not be considered an approved basement. Water from a well located within a basement offset of a farm home may be piped for use in other farm buildings.

(d) Other Methods

Any other method of connection to a well casing shall be specifically approved in writing by the Director before installation.

MHD 222 Pump Installation

(a) Pump and Well Rooms

A room housing pumping equipment or the top of a well casing shall be constructed above the established ground surface permitting access to the pump and well for maintenance or repair, or may be located below-grade if the containing room is located in or attached to an approved basement.

(b) Slabs, Platform and Floors

A well, except where an approved pitless adapter is used, shall be protected by a durable watertight concrete or equal slab, platform or floor, at least 4 inches thick, extending horizontally at least 1 foot in every direction from the well casing, and sloped to divert water away from the casing. A watertight seal, which may be asphalt or similar material to provide resiliency, shall be provided between the casing and the platform, pump room or approved basement floor or slab.

(c) Pumps and Pumping Equipment

(1) A pump shall be constructed so that no unprotected openings into the interior of the pump or well casing exist.

(2) A hand pump, hand pump head, stand or similar device shall have a closed spout, directed downward, and a pump rod that operates through a stuffing box.

(3) A power driven pump shall be attached to the casing or approved suction or discharge line by a watertight connection, including flange connections, hose clamp type connections, or other flexible couplings, or shall have a base plate meeting the requirements of MHD 221(a).

(4) A pump shall be designed, installed and maintained so that priming is not required for ordinary use. Pumps installed for use only on a well water irrigation system are exempted but priming water shall be clear water free of contamination and carrying a chlorine residual. An irrigation well equipped with a centrifugal pump may be primed without chlorination when the pump is filled with water taken directly from the well.

(d) Water Suction Lines

(1) A water suction line shall be constructed of copper, galvanized iron or steel, cast iron, or plastic pipe as approved by the Director, or other material given written approval by the Director. Aluminum pipe is acceptable for well water irrigation systems in addition to the above materials.

(2) A water suction line extending outside the well casing shall not be used unless protected by one or more of the following methods:

(aa) Fully exposed in an approved basement offset, pump room or well room and at least 12 inches above the floor of an approved below-grade structure.

(bb) Fully Exposed above grade.

(cc) Lying within an outer casing with the annular space filled with water from the system and maintained at system pressure.

(dd) Surrounded by air space in a conduit which has a positive drainage by gravity to the ground surface or to an approved basement. Such conduit shall be directly connected to the well casing

by a threaded or welded watertight joint. The openings into the casing shall be welded watertight or sealed in accordance with MHD 221. The total length of the suction line protected by the gravity-drained conduit shall not exceed 20 feet.

(3) An unprotected water suction line may be installed below grade only for non-potable irrigation wells located in agricultural fields and installed in shallow glacial outwash material penetrating non-artesian aquifers for manifold collection systems under negative pressures provided the area is sufficiently isolated from potable water wells.

(e) Pump Discharge Lines

A buried discharge line between the well casing and the pressure tank in any installation, including a deepwell turbine or a submersible pump, shall not be under negative pressure at any time. If a check valve is installed in a buried water line between the well casing and the pressure tank, the water line between the well casing and the check valve shall meet the requirements for a suction line unless equipped with an air release valve. Pump discharge lines shall be materials as approved for suction lines in MHD 222(d)(1). A frost proof yard hydrant shall be located at least 10 feet from the well.

(f) Pressure Tanks

It is recommended that a pressure tank be installed in an approved pump room or well room. However, partially buried pressure tanks shall project horizontally above the ground or into an approved basement. A totally buried pressure tank may be used if the manufacturer's unit has been approved in writing by the Board as to its design, type of material and specification for its installation. A pressure relief or air release valve on a pressure

tank which may contain subterranean gases and which is located within a building shall be vented to the outside.

(g) Vents

(1) All wells shall be vented. A casing vent shall be of materials complying with MHD 222(d)(1) with watertight joints terminating at least 2 feet above the regional flood level or the established ground surface or the floor of a pump room, well room or approved basement, whichever is higher. The casing vent shall be screened and point downward. Vents may be offset provided they meet the provision of this rule. Any submersible pump shall be installed with a vented cap on the pitless adapter to prevent drawing near surface water, mud, sand, etc., into the well through shielding around the electric cable. Flowing artesian wells may be exempted if protected by a specially designed pitless adapter or if the casing is protected as provided in 220(b). For wells of an inch and one quarter diameter casing or as otherwise protected to insure that contaminated water will not enter the well not using a drop pipe venting is not required when equipped with a suction pump provided the casing is protected in accordance with MHD 220(b).

(2) If toxic or flammable gases are present, they shall be vented from the well. The vent shall extend to the outside atmosphere above the roof level at a point where the gases will not produce a hazard. Openings in pump bases shall be sealed watertight. If the type of gas is not known and is to be carried through the water supply, the administrative authority shall be consulted for proper identification and treatment.

(h) Sampling Faucet

In a pressure water system provision shall be made for collection of water

samples by installation of a faucet or sampling device in a convenient location as near to the well as possible.

(i) Disinfection

(1) A new, repaired, or reconditioned well or pump installation shall be thoroughly pumped to waste until the water is as clear as is reasonably possible, dependent upon ground water conditions in the area. Thereafter the well and pumping equipment shall be disinfected with chlorine so applied that a concentration of at least 50 parts per million of chlorine shall be obtained in all parts of the well. The chlorine solution shall be introduced into the well in a manner to flush the well surfaces above the static level with chlorine solution. A minimum contact period of 2 hours shall be provided before pumping the well to waste and flushing the chlorine solution from the distribution system.

(2) A licensee shall be responsible for chlorinating the work he performs on the well, pump or pumping equipment.

(3) Disinfection in a well repair operation may be accomplished at the beginning of the operation with chlorine applied to obtain a concentration of 200 parts per million for the period of the well repair operation. The water shall be pumped to waste prior to taking of water samples or use being made of the water.

MHD 223 Records and Samples

(a) Water Sample

Prior to placing the supply from a new or reconditioned well into service, the licensee will be responsible for collecting one or more water samples from the installation for water quality analysis. Such samples shall be submitted to the Minnesota Department of Health in containers and in accordance with procedures issued by the Director. The results of the data will be stored in a ground water quality information system. The sample must be received within 30 hours of collection. Results of water sample analysis for a domestic supply not acceptable for drinking water will be reported to the well owner and the licensee along with recommendations for corrective actions. The results of the sample analysis is not intended to provide a basis of water quality for a transaction involving the sale or purchase of property.

(b) Water Well Records

(1) A water well record shall be completed and submitted to the Board by the licensee within 30 days after completion of any well. The licensee shall furnish the well owner one copy, the Director three copies and retain one copy in his files, of a well record containing such available information as required on the form furnished by the Director. Terms when used for describing formations on the well log form shall conform to definitions set forth in these rules.

(2) A water well record shall be submitted for a dry hole. Information on several dry holes within a small area may be submitted on a single well record form if the geologic materials are similar.

(3) A well record shall be submitted after an abandoned well has been sealed showing the method of sealing.

(c) Water Well Cutting Formation Samples

In order to improve the State's water information system, more detailed geologic and hydrologic information is needed about the rocks and sediments which contain the State's groundwater resources. Water well cuttings provide the least expensive source of this kind of information. The information derived from such a program is essential to the better understanding and protection of the State's groundwater resources. The following rules and procedures set forth the means by which such information shall be obtained.

(1) The Board in consultation with the Minnesota Geological Survey (hereinafter referred to as the Survey) shall determine areas where water well cutting samples are needed to provide subsurface geological and hydrological information required by the Board, the Survey, and other State agencies for development of the State water information system. The general standards to be used in making such a determination are:

(aa) To obtain the minimum amount of detailed geologic and hydrologic information needed for the State water information system, at least one set of water well cutting samples per township in rural areas and at least one set of water well cutting samples per section in urban areas are required. The latest State Planning Agency Land-Use Map will be used for determining rural and urban areas for collection of well cutting formation samples.

(bb) The Board in consultation with the Survey may determine that more information is required from specific areas for accuracy and detail in the State water information system.

(cc) Water well cutting samples will be required only where there is reason to believe that a well will encounter bedrock materials below glacial sediments or from a well which the licensee estimates will reach a depth of at least 200 feet. The Board may require water well cutting samples from areas other than as specified in this subsection where needed for accuracy and detail in the State water information system.*

(2) The Board through the Survey shall notify licensees of the general areas from which water well cutting samples are required and provide the licensees most frequently operating within such areas with maps or lists indicating counties, townships, sections, or other designated areas where cutting samples are required. In addition, the Board shall specify the approximate number and depths of wells from which cutting samples are needed in the designated areas.

(3) The Survey shall furnish all licensees so notified with well-cutting sample bags, labels, and return postage cards for collecting and reporting water well cutting samples.

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*Any licensee who has reason to believe that a well may be of exceptional geologic or hydrologic interest is encouraged to call collect the Survey to inform that agency of the opportunity to obtain samples, even if the well is not within the area currently designated for collection of samples.

(4) Licensees so notified and supplied with sample collecting materials shall collect cutting samples during the course of drilling wells in the designated areas according to the requirements specified in the notification. Licensees not supplied with sample collecting materials but who shall have occasion to drill a well in an area designated for sampling shall notify the Survey.

(5) Licensees shall collect the cutting samples in an accurate manner so as to insure that they are representative of the materials encountered. Samples shall be taken at 5-foot intervals and at every change in rock or sediment type. The cuttings shall be placed in the sample bags provided by the Survey which shall have an attached tag on which the Board's recording form well-record number of the well, the well owner's name, the well location, and the sample depth (example: 5 ft.) must be written.

(6) Licensees shall notify the Survey within 30 days after the well's completion so that the cutting samples can be collected. Pending collection, the contractor shall store the samples in a proper manner, so that they are protected from weather and disturbance and segregated in such a way that all samples may be properly identified with respect to the Board's recording form well-record number and depth interval.

(7) The Survey, upon notification by the licensee, shall collect the samples from the contractor. The cutting samples shall be described and a geologic log prepared. The geologic log will be retained in the files of the Minnesota Geological Survey, with a copy being sent to the contractor.

MHD 224-230. Reserved for future use.

FILED
RICHARD L. BRUBACHER
Commissioner of Administration

JUN 14 1974 2:55 pm

BY Lola Standenmaier
AUTH. SIGNATURE

APPROVED AS TO FORM AND LEGALITY

JUN 14 1974 19

WARREN SPANNAUS, ATTORNEY GENERAL

BY Michael B Miller

SPECIAL ASSISTANT ATTORNEY GENERAL

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED

JUN 14 1974 2:30 pm

Arlen I. Erdahl
Secretary of State

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of the Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

ORDER ADOPTING RULES

The above-entitled matter came on for hearing before the Minnesota State Board of Health on the 9th day of January, 1974, at 9:30 A.M. in the Board Room, Minnesota Department of Health Building, 717 Delaware Street S.E., Minneapolis, Minnesota 55440, after proper notice required by Minn. Stat. § 15.0412 (1971) was served upon all persons, associations and other interested groups registered with the Secretary of State for that purpose.

After affording interested persons an opportunity to present written and oral data, statements and arguments, and having heard and considered all of the testimony and evidence adduced and upon the records, files and proceedings herein, and applicable statutory standards or criteria, and having confirmed the need for the above-captioned rules.

NOW, THEREFORE, IT IS ORDERED that the amendments to and new rules identified as MHD 210-230, relating to the examination and licensing of water well contractors governing the design, location, drilling, construction, repair, maintenance, and abandonment of water wells, and establishing

a system of reporting on wells drilled, are adopted this 30th day of April, 1974, pursuant to authority vested in me by Minn. Stat. §§ 156A.03, 156A.05, 156A.07 (1973 Supp.), and by resolution of the Minnesota State Board of Health duly adopted at a meeting of the said Board on the 11th day of April, 1974.

STATE OF MINNESOTA

BOARD OF HEALTH

Warren R. Lawson

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

ORDER FOR HEARING

To effectively implement Minn. Stat. ch. 156A (1971) as amended by Minn. Laws 1973, ch. 747, and Minn. Stat. § 144.12 (1971), the Minnesota State Board of Health deems it necessary to consider adoption of the proposed rules captioned above pursuant to the authority vested in it by the above-referenced statutes.

NOW, THEREFORE, IT IS ORDERED this 30 day of November, 1973, that a public hearing on the proposed rules captioned above be held in the Board Room, Minnesota Health Department, 717 Delaware Street S.E., Minneapolis, Minnesota, on January 9, 1973, commencing at 9:30 A.M., and continuing until all representatives of associations or other interested groups or persons have had an opportunity to be heard.

IT IS FURTHER ORDERED, that notice of said hearing be given to all representatives of associations or other interested groups or persons who have registered their names with the Secretary of State for that purpose and all persons who are presently members of the Minnesota Legislature.

STATE OF MINNESOTA

BOARD OF HEALTH

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

AMENDED NOTICE OF HEARING

NOTICE IS HEREBY GIVEN that the first paragraph of the Notice of Hearing in the above-entitled matter dated November 30, 1973, is amended to read as follows:

> Notice is hereby given that a public hearing will be held pursuant to Minn. Stat. § 15.0412 subd. 4 (1971) in the above-entitled matter, in the Board Room, Minnesota Department of Health Building, 717 Delaware Street S.E., Minneapolis, Minnesota, on Wednesday, January 9, 1974, commencing at 9:30 A.M., and continuing until all representatives or other interested groups of persons have had an opportunity to be heard concerning adoption of the proposed rules captioned above by submitting either oral or written data, statements, or arguments. Statements or briefs may be submitted without appearing at the hearing.

The time and day remain unchanged from the original Notice. The year, however, was inadvertantly listed as 1973 in the original Notice rather than 1974. It is not expected that this has caused any misunderstanding; however, if anyone claims to have been misled as to the date of the hearing by the initial Notice of Hearing and as a result will not have sufficient time to prepare for the hearing on the date scheduled (January 9, 1974), please write the Minnesota Department of Health at

717 Delaware Street S.E., Minneapolis, Minnesota 55440,

Attention: Ed Ross. Appropriate adjustments will be made.

Dated: December 26, 1973.

STATE OF MINNESOTA

BOARD OF HEALTH

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

NOTICE OF HEARING

Notice is hereby given that a public hearing will be held pursuant to Minn. Stat. § 15.0412 subd. 4 (1971) in the above-entitled matter, in the Board Room, Minnesota Department of Health Building, 717 Delaware Street S.E., Minneapolis, Minnesota, on Wednesday, January 9, 1973, commencing at 9:30 A.M., and continuing until all representatives or other interested groups of persons have had an opportunity to be heard concerning adoption of the proposed rules captioned above by submitting either oral or written data, statements, or arguments. Statements or briefs may be submitted without appearing at the hearing.

The Board proposes to amend and adopt rules relating to the following matters:

(1) The regulations relating to the licensing and examination of water well contractors will be amended to conform with the changes made by the 1973 Minnesota Legislature to Minn. Stat. ch. 156A (Water Well Contractors). The primary regulatory amendments delete the provisions relating to the licensing of water well contractors who had been in business for at least three years prior to the effective date of the

Act, i.e., August 5, 1971, and add the procedures for the registration of well drilling machines.

(2) The major portion of the proposed rules relate to the adoption of a construction code for water wells. This code governs the design, location, drilling, construction, repair, maintenance, and abandonment of water wells, establishes a system of reporting on wells drilled, requires the submission of well logs, formation samples or well cuttings, water samples or other special information, and establishes well water safety and health standards.

Copies of the proposed rules are now available and may be obtained by writing to the Minnesota Department of Health, Division of Environmental Health, Attention: Ed Ross, 717 Delaware Street S.E., Minneapolis, Minnesota 55440. Additional copies will be available at the door on the date of the hearing. The proposed rules include an adoption by reference of the following items: Manual of Water Supply Sanitation of the Minnesota Department of Health, section VII, paragraph 715 (1969); Manual of Water Supply Sanitation of the Minnesota Department of Health, section VI (1962); standard B36.10-1959 of the American Standards Association; standards A53-69a and A120-69 of the American Society for Testing Materials; standard No. 5L of the American Petroleum Institute; and standard No. C202-6202 of the American Water Works Association. These will not be sent with the regulations except if specifically requested. They are available for inspection and review at the Minnesota Department of Health Building, address as above.

A copy of the procedural rules for the hearing is attached and made a part hereof.

Testimony or other evidence to be submitted for consideration should be pertinent to the matter at hand and may be presented either orally or in writing at the public hearing or by mailing a statement to the Secretary and Executive Officer of the Board at the Department of Health Building, address as above. If the person submitting a statement cannot be present to read his statement at the time of the hearing, the statement will be entered into the record. For those desiring to submit written statements or exhibits, it is requested that at least three (3) copies of such statement, exhibit or summary be furnished at the hearing. The record will remain open for receipt of briefs or other written material relative to the proposed rules for twenty (20) days subsequent to the hearing.

It is suggested that to save time and avoid duplication, those organizations or associations having a common viewpoint or interest in these proceedings join together where possible and present a single statement in behalf of such interests.

Date: November 30, 1973. STATE OF MINNESOTA

BOARD OF HEALTH

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

MINNESOTA STATE BOARD OF HEALTH

PROCEDURAL RULES FOR HEARING

The purpose of the hearing is to allow interested parties to express their views and present facts bearing upon the proposed regulations. So as to provide for an orderly presentation of evidence, the following rules will be in effect during the hearing specified in the attached Notice of Hearing:

1. Anyone wishing to be heard should indicate by signing the speaking sheet, listing his name, address, and the group which he represents. The speaking sheet will be available at the main entrance to the hearing room. It is requested that each group select one speaker only to present its views.

2. The first time the witness makes a statement he should spell his name and identify the group he is representing. Prior to making any subsequent statements he should state his name and the group which he represents. He may be sworn upon his request but it is not required. If he elects not to be sworn, that may be considered in determining the weight to be given to his testimony.

3. By giving testimony, a witness, including one who may also be a member of the panel, subjects himself to questioning by the panel. However, he is subject to cross-examination by non-members of the panel only if he affirmatively consents to being so examined. A refusal to be cross-examined may be considered in determining the weight to be given to his testimony.

4. All parties interested in introducing any written matter may do so by having it marked as an exhibit and then introduced for the record. Unsworn written matter may be received, but the fact that it is unsworn may be considered in determining the weight to be given it.

CERTIFICATE OF BOARD'S

AUTHORIZING RESOLUTION

I, Warren R. Lawson, M.D., do hereby certify that I am the Secretary and Executive Officer of the Minnesota State Board of Health, a board duly authorized under the laws of the State of Minnesota, and that the following is a true, complete, and correct copy of a resolution adopted at a meeting of the said Board of Health duly and properly called and held on the 13 day of September, 1973, that a quorum was present at said meeting; that a majority of those present voted for the resolution; that said resolution is set forth in the minutes of said meeting and has not been rescinded or modified.

> "RESOLVED, that Warren R. Lawson, M.D., Secretary and Executive Officer of the Minnesota State Board of Health, be and he hereby is granted the authority and directed to call a hearing for the purpose of amending the regulations of the Board governing the examination and licensing of water well contractors as well as for the purpose of promulgating regulations of the Board governing the design, location, drilling, construction, repair, maintenance, and abandonment of water wells and for establishing a system of reporting on wells drilled, as well as to perform any and all acts incidental thereto, including but without being limited thereto signing an order for hearing and notice of hearing, as well as appointing a hearing officer."

IN WITNESS WHEREOF, I have hereunto subscribed my name this 30th day of April, 1974.

STATE OF MINNESOTA

BOARD OF HEALTH

Warren R. Lawson

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATE OF MINNESOTA

COUNTY OF HENNEPIN

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

AFFIDAVIT OF MAILING
AMENDED NOTICE OF HEARING

Cheryl Norton, being first duly sworn, deposes and says:

That on the 28th day of December, 1973, at the City of Minneapolis, County of Hennepin, State of Minnesota, she served the attached Amended Notice of Hearing by depositing in the United States mail at said City of Minneapolis, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations who received the original Notice of Hearing at the addresses listed on the attachments to the Affidavit of Mailing for the original Notice of Hearing.

Cheryl Norton

Subscribed and sworn to before me this 9th day of January, 1974.

Mary E. Lyman

MARY E. LYMAN
Notary Public, Hennepin County, Minn.
My Comm. Exp. Aug. 7, 1974

STATE OF MINNESOTA

COUNTY OF HENNEPIN

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

AFFIDAVIT OF MAILING

Cheryl Nartan, being first duly sworn, deposes and says:

That on the 7 day of December, 1973, at the City of Minneapolis, County of Hennepin, State of Minnesota, She served the attached Notice of Hearing by depositing in the United States mail at said City of Minneapolis, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations at the addresses listed on the attached Certificate of the Secretary of State, Attachment 1, as well as to all members of the Minnesota Legislature as of the date of mailing, and to all persons and associations at the addresses listed on Attachment 2.

Cheryl Nartan

Subscribed and sworn to before me this 7th day of December, 1973.

Mary E. Lyman

MARY E. LYMAN
Notary Public, Hennepin County, Minn.
My Commission Expires [illegible] 1974.

ATTACHMENT #1

STATE OF MINNESOTA

COUNTY OF HENNEPIN

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

CERTIFICATE

I hereby certify that the attached 319 general labels and list for the Health Department constitute the complete lists of persons, associations, and other interested groups who as of 11:30 o'clock A.M., this 5th day of December, 1973, have requested pursuant to Minn. Stat. § 15.0412 subd. 4 (1971), that their names be placed on file with the Secretary of State for the purpose of receiving notice of public hearing on proposed rules on the subject captioned above.

Arlen I. Erdahl

SECRETARY OF STATE

ARLEN I. ERDAHL

By Gail Dion

ALBERT,AA CALDER CORP
3[redacted] JACKSON ST
S[redacted] PAUL MN
55101

AM CAMPING ASSN MRS LEACOCK
1235 BRIGHTON SQ
NEW BRIGHTON MN
55112

AM INST PROF GEOLOGISTS
2201 PRINCETON AVE
ST PAUL MN
55105

ANDERSON JAMES
7703 NORMANDALE RD
MPLS MN
55435

ANTHONY R.S. E.L.M.
1222 FOURTH ST. S.E.
MINNEAPOLIS MN
55414

ASMUSSEN,DENNIS,MPIRG
3036 UNIV AVE SE
MPLS MN
55414

ASSOCIATED INDUST OF MPLS
NATIONAL BLDG
MPLS MN
55402

BADALICH JOHN P
2025 THOMPSON AVE
SO ST PAUL MN
55075

BARTHOLOW HAROLD E FIRE CHF
2600 109 AVE N W
COON RAPIDS MN
55433

BECKLIN ROBERT C
447 N W 4TH
CAMBRIDGE MN
55008

BENSONI PETER USW OF AM.
609 PROVIDENCE BLDG.
DULUTH MN

BERGERUD ALF
300 ROANOKE BLDG
MPLS MN
55402

BREHL JAMES W
332 HAMM BLDG
ST PAUL MN
55102

BRIGGS & MORGAN - B F FRIEL
2200 W 1ST NATL BK BLDG
ST PAUL MN
55101

BROWN D M GOODRIDGE PUB SCH
IND DIST #561
GOODRIDGE MN
56725

BRUBACHER RICHARD COMM ADM
208 ADM BLDG
ST PAUL MN
55101

BUR.ENGR.IND.DIV. MR.KIBIGER
219 N. 2ND ST.
MPLS. MN

BUR NATL AFFAIRS INC
1231 25TH ST NW
WASHINGTON DC
20037

CARPENTER MRS MARY LEE
DOW CHEMICAL 47 BLDG
MIDLAND MICH.
48640

CARRISON DALE K
MANKATO STATE COLLEGE
MANKATO MN
56001

ALLEN CLAUDE H
1200 N W BK BLDG
ST PAUL MN
55101

ALTMAN MILTON H
707 DEGREE OF HONOR BLD
ST PAUL MN
55101

ANCHOR BLOCK COMPANY
PO BOX 3360
ST PAUL MN
55165

ANDERSON HERBERT
418 8TH ST. SO.
VIRGINIA MN
55792

ARMOUR AND COMPANY
UNION STOCK YARDS
SO ST PAUL MN
55075

ARVER JOHN A
2467 COHANCY
ST PAUL MN
55113

ASSN OF MINN COUNTIES
55 SHERBURNE AVE #203
ST PAUL MN
55103

AUTOMOBILE MFRS ASSN INC
55 SHERBURNE AVE
ST PAUL MN
55103

BARRETT FRED
ST LOUIS CO COURT HOUSE
DULUTH MN

BARKER KENT
8100 34TH AVE SO
MPLS MN
55420

BEECHER EVERETT
10 10 1ST ST SO
HOPKINS MN

BEMIDJI STATE COLLEGE
PLACEMENT BUR.J.C.BRADY
BEMIDJI MN
56601

BEST FLANAGAN ET AL
1ST NATL BANK BLDG
MPLS MN
55402

BEUTEL ROBERT
BOX 1205
ST CLOUD MN
56301

BROEKER JOHN M
2850 METRO DR SUITE 513
BLOOMINGTON MN
55420

BROOKS WILLIAM F JR
854 MIDLAND BK BLDG
MPLS MN
55401

BRUNING C.R.DEPT.CLINIC.EXP.
BURTON HALL
MPLS. MN
55455

BURGER ALBERT
600 DEGREE OF HONOR BLD
ST PAUL MN
55101

CARLSON CARL L
7516 80TH ST S
COTTAGE GROVE MN
55016

CENTRAL BUSINESS DATA
BENSON RADIO ARCADE BLD
BENSON MN
56215

CHAMBER OF COMMERCE
30 SO 1ST AVE EAST
ELY MN
55731

CHAMBERLAIN JOHN L
PO BOX 24[redacted]
MPLS MN
55440

CHAMBERLAIN WARREN D
88[redacted] SW 4TH AVE
F[redacted]IBAULT MN
55021

CITY CLERK
386 CITY HALL
ST PAUL MN
55102

CLARKSON J.B.
2350 I.D.S. CENTER
MINNEAPOLIS MN
55402

CONCORDIA COLLEGE
DEAN
MOORHEAD MN
56560

CONSUMER SERVICES DEPT COMM
230 STATE OFF BLDG
ST PAUL MN
55101

CUSHMAN J S DAYTON HUDSON
700 NICOLLET MALL
MPLS MN
55402

DANIELSON RODNEY L
418 AUDITORIUM
ST PAUL MN
55102

DAVIS HENRY
6301 SHINGLE CREEK
BROOKLYN CTR MN
55429

DISPATCH PIONEER PRESS
PRESS RM STATE CAPITOL
ST PAUL MN
55101

DORSEY MARQUART
2400 1ST NATL BANK BLDG
MPLS MN
55402

DUDLEY E H
RT 7 BOX 122
EXCELSIOR MN
55331

DUNN OLIVER PLUMBERS LOC 15
708 SO 10TH ST
MPLS MN
55404

EDINA FIRE D JAMES MCNELLIS
4801 W 50TH ST
EDINA MN
55424

ELDER DR JAMES B
11140 WASHBURN AVE SO
BLOOMINGTON MN
55431

EMERICK RICHARD A
1908 IDS CENTER
MPLS MN
55402

EMP HANDICAPPED PERSONS COMM
527 JACKSON RM 227
ST PAUL MN
55101

EVANS CHAS.L. PRENTICE-HALL
ENGELWOOD CLIFFS
NEW JERSEY

EVERETT JERRY NW PETRO ASSN
512 NICOLLET MALL RM917
MPLS MN
55402

FAEGRE & BENSON ATTN LIBR
1260 NW BANK BLDG
MPLS MN
55402

CHERCHES CHRIS CITY MGR
5005 MTKA BLVD
ST LOUIS PARK MN
55416

CHRISTIAN SCI COMM ON PUB
1821 UNIV AVE SUITE 271
ST PAUL MN
55104

COLEMAN NICHOLAS D
700 LINWOOD AVE
ST PAUL MN
55105

COLLIN LAURENCE
RT 2
ISANTI MN
55040

COX AND KING
600 BUILDERS EXCH
MPLS MN
55402

CROW WING CO PLANNING & A
COURT HOUSE
BRAINERD MN
56401

DANFORTH & ALLEN
731 NW BANK BLDG
MPLS MN
55402

DANKERS, KENNETH
1200 WEST FOURTH STREET
RED WING MN
55066

DAYTON CHAS SIERRA CLUB
400 ROANOKE
MPLS MN
55402

DIEHL JOHN 26 Kenwood PKWY
~~1100 1ST NATL BK BLDG~~
~~MPLS~~ ST PAUL MN
~~55402~~ 55105

DOUGLASS BELL
525 OSBORN BLDG
ST PAUL MN
55102

DOYTON MAURICE, MET SEWER
350 METRO SQ BLDG
ST PAUL MN
55101

EBELING EDWARD H.
161 W. MAIN
PERHAM MN
56573

ELDRED R W ARMOUR & CO
UNION STOCK YARDS
SO ST PAUL MN
55075

ELMER EDWIN W
2901 PLEASANT AVE
MPLS MN
55408

ERNEST K LEHMANN & ASSOC.
1409 WILLOW ST.
MPLS MN
55403

ESSE KENNETH
4801 W 50TH ST
EDINA MN
55424

EWALD DOUGLAS MINN HOSP ASSN
2333 UNIV AVE SE
MPLS MN
55414

EWING MRS WM
42 ASTAR RD
BABBITT MN
55706

FELHABER R S
W 1ST NATL BANK BLDG
ST PAUL MN
55101

FINLEY JAMES F
920 MINN BLDG
ST PAUL MN
55101

FINNEGAN J.R.
55 E. 4T[redacted]
ST.PAUL MN
55101

FLEMING FREDERICK A
[redacted]0 HIGHLAND PARKWAY
[redacted] PAUL MN
55116

FORBES GORDON MINN RRS ASSN
207 UNION DEPOT
ST PAUL MN
55101

FOX w.E. LINDQUIST & VENNUM
4200 IDSCTR 80 S.8TH ST
MINNEAPOLIS MN
55402

F W WOOLWORTH CO
3316 w 66TH ST
EDINA MN
55424

GIEL DAVID
RM 6-28 STATE CAPITOL
ST PAUL MN
55155

GLEN. HILLS HOSP.R.VAN HAUER
3901 GOLDEN VALLEY RD.
MPLS. MN
55422

GREEN DEL CITY MGR
BLOOMINGTON CITY HALL
BLOOMINGTON MN
55431

GUSTAFSON MRS D MINN VET MED
24 S 6TH ST
MPLS MN
55402

HARVEY MICHAEL
1390 w M HAHA PKWY
MPLS MN
55409

HALLBERG LEE & MCCABE
4927 34TH AVE S
MPLS MN
55417

HARTFELDT WILL
415 HAMM BLDG 6TH ST
ST PAUL MN
55102

HEAD & TRUHN
1007 SOO LINE BLDG
MPLS MN
55402

HOPKINS WM.B. DIR.MISCCA
3915 GOLDEN VALLEY ROAD
GOLDEN VALLEY MN
55422

HOULE MELVIN
881 w HWY 96
SHOREVIEW MN
55112

HULSTRAND ANDERSON & LARSON
PO BOX 130
WILLMAR MN
56201

HUMAN RIGHTS DEPT
60 STATE OFF BLDG
ST PAUL MN
55101

HUTCHISON R.M. ANOKA CO.COMP
COURT HOUSE
ANOKA MN
55303

INS FED OF MINN
902 SOO LINE BLDG
MPLS MN
55402

IUOE LOC 49 CHAS SWENSON
2580 UNIV AVE
ST PAUL MN
55101

FLETCHER RONALD
7900 XERXES AVE
MPLS MN
55431

FITZGERALD DR BOB
3007 LYNDALE AVE SO
MPLS MN
55408

FRANKLIN ROBERT B MPLS TRIB
426 PORTLAND
MPLS MN
55415

FURLONG DR JOHN
RT 1
BOVEY MN
55709

GALVIN M J JR
W2162 1ST NATL BK BLDG
ST PAUL MN
55101

GAS HUT INC
4940 VIKING DR
MINNEAPOLIS MN
55435

GODIN RALPH J
3824 47TH AVE SO
MPLS MN
55406

GRANATH MARVIN -HONEYWELL
2701 4TH AVE SO
MPLS MN
55408

GUSTAFSON WALLACE
BOX 567
WILLMAR MN
56201

HAYES, THOMAS W
700 SELLWOOD BLG
DULUTH MN
55812

HESS DONALD MIDWEST PLANN
2101 HENN BLDG
MPLS MN
55405

HENN CO WELFARE BRD RM 26
COURT HOUSE
MPLS MN
55415

HILL JIM ASSOC. MILK PROD
7850 METRO PARKWAY
MINNEAPOLIS MN
55420

HOUSE APPROPRIATIONS COMM
RM 109 STATE CAPITOL
ST PAUL MN
55101

HOUSE ED STANDING SUB COM
RM 109 STATE CAPITOL
ST PAUL MN
55101

HUNT MRS CHAS L MECCA
26 E EXCH CENTRAL MANOR
ST PAUL MN
55101

HUNT JAMES P JR
11470 GALTIER DR
BURNSVILLE MN
55378

INGEBRIGTSEN DR K H
23 SE 4TH ST
MPLS MN
55414

INGVALSON VERN MN. FARM BU
3110 WOODDALE DR PO 337
OST PAUL MN
55165

IVERSON DR JOS DEPT ED
ST OLAF COLLEGE
NORTHFIELD MN
55057

JACKMAN DONALD G
4023 E LAKE ST
MPLS MN
55406

JENOS INC
506 LAKE AVE SO
DULUTH MN
55801

KABLE RICHARD W

BETHEL MN
55006

KING,TIMOTHY
3333 OAKLAND AVE S
MPLS MN
55407

KLUZ STEVEN J
1910 1ST NATL BK BLDG
MPLS MN
55402

KOLLER MR & MRS ERWIN A
1568 DULUTH ST
ST PAUL MN
55108

KOPP MRS VERNON
2050 65TH ST E
INVER GR HGHT MN
55075

LAPP LAZAR LAURIE ET AL
1200 BUILDERS EXCHANGE
MINNEAPOLIS MN
55402

LARSON C L
3800 MINNEHAHA AVE SO
MPLS MN
55406

LINDALL & JONATHAN DEVELOP.
VILLAGE ONE CENTER
CHASKA MN
55318

MCKIBBON MRS SHIRLEY
11 EVERGREEN LN
BABBITT MN
55706

MALONE E I COMM LABOR & INDU
444 LAFAYETTE RD 5TH FL
ST PAUL MN
55101

MANKATO STAT STUDENT SENATE
CENTENNIAL STUDENT UN
MANKATO MN
56001

MAUL WARREN E
320 S 4TH ST
MPLS MN
55415

MECCA R.F. NELSON
26 E EXCHANGE ST
ST PAUL MN
55101

MET OPEN SPACE INFOR PROJ
111 E FRANKLIN AVE SO
MPLS MN
55404

MET TFR MEN ASSN A ROSENTHAL
1821 UNIV AVE
ST PAUL MN
55104

MPLS TRIBUNE CITY DESK
425 PORTLAND AVE
MPLS MN
55415

MINN APT ASSN
GRIGGS-MIDWAY BLDG
ST PAUL MN
55104

JENSEN CARL A
127 E MAIN ST
SLEEPY EYE MN
56085

JOHNSON M.D. FRUNDT & FRU
BLUE EAR MN
56013

KANE ANTHONY
176 E FIFTH ST
ST PAUL MN
55101

KIMBALL ROBERT
647 CAPITOL SQ BLDG
ST PAUL MN
55101

KNOWLES, LARRY D
8025 33RD AVE N
CRYSTAL MN
55427

KNUTSON DR KEITH,BIOLOGY
ST CLOUD STATE
ST CLOUD MN
56301

LAKE SUPERIOR INDUSTRIAL
828 FIRST AM. BK. BLDG.
DULUTH MN
55802

LARSON HANS P DIV HOSP SERV
717 DELAWARE ST SE
MPLS MN
55440

LAUNDERERS&DRY CLEANERS A
W 1ST NATL BK BLDG
ST PAUL MN
55101

LOCKNER GARY
R R 1 BOX 23
BAUDETTE MN
56623

LOOS CALVIN J
6809 LYNDALE AVE SO
MPLS MN
55423

MCLELLAN LARKIN
215 ADM BLDG ST CAPITOL
ST PAUL MN
55101

MANTHEY T J PICKANDS MATHER
2000 UNION COMM BLDG
CLEVELAND OH
44115

MASTOR MATTSON HART ET AL
414 ROANOKE BLDG
MPLS MN
55402

MEIEROTTO, JOAN
1794 SO LEXINGTON
ST PAUL MN
55118

MERRITT GRANT POLLUTION C
OAK & DELAWARE
MPLS MN
55440

MILLER TOM
2311 PILLSBURY AVE S
MPLS MN
55404

MPLS STAR PRESS ROOM
STATE CAPITOL
ST PAUL MN
55101

MN. ASN.C&IND H.D.PETERSON
480 CEDAR ST.
ST.PAUL MN
55101

MINN AFL-CIO, L O LA SHO
414 AUDITORIUM ST
ST PAUL MN
55102

MINN BD PODIATRY EXAM & REG.
1111 W 2N[redacted]ST.
CROOKSTON MN
56716

MINN COUNCIL STATE EMP MC &
47[redacted]RICE ST
ST[redacted]AUL MN
55103

MINN ELECTRICAL ASSN INC
525 SO 7TH
MPLS MN
55415

MINN ENV CONTROL CITIZEN ASN
CENTRAL MANOR 26 E EXCH
ST PAUL MN
55101

MINN FOOD RETAILERS ASSN
555 WABASHA
ST PAUL MN
55101

MINN. HOTEL & MTR. ASSN
2001 UNIVERSITY AVE
ST PAUL MN

MINN LP GAS ASSN
7515 WAYZATA BLVD 106
MPLS MN
55426

MINN.MTR.TRANSP. •J.N.DENN
1821 UNIV.
ST.PAUL MN
55104

MINN PUB INT RES DAYTON
2416 UNIV AVE SE
MPLS MN
55414

MINN REP STATE CEN COMM
~~4900 VIKING DR~~ 555 WABASHA
~~MPLS~~ ST PAUL MN AVE
~~55435~~ 55102

MINN RETAIL HARDWARE ASSN
3033 EXCELSIOR BLVD 313
MPLS MN
55416

MINN SCH BUS OPERATORS ASSN

FARIBAULT MN
55021

MINN STATE BAR ASSN
100 MINN FED BLDG
MPLS MN
55402

MINN ST BD PHAR P G GRUSSING
1965 FORD PKWY
ST PAUL MN
55116

MINN STATE OPTOMETRIC ASSN
333 E HENNEPIN AVE
MPLS MN
55414

MINN STATE RETIREMENT SYSTEM
529 JACKSON ST
ST PAUL MN
55101

MINN WATER RESOURCES BD
RM 206 555 WABASHA ST
ST PAUL MN
55102

MINN-WISC BOUNDARY AREA COMM
600 2ND ST
HUDSON WI
54016

MOONEY, MICHAEL A.
BOX 903, ST.JOHN'S UNIV
COLLEGEVILLE MN
56321

NATL COUNCIL JEWISH WOMEN
4330 CEDAR LK RD
MPLS MN
55416

NATL FAMILY INS CO
2147 UNIV AVE
ST PAUL MN
55114

MINN DEPT HEALTH J C MCKASY
717 DELAWARE S E
MPLS MN
55440

MINN DENTAL HYGIENISTS
5041 YVONNE TERRACE
MPLS MN
55436

MINN ENV LAW INST INC
PO BOX 15076 COMM STA
MPLS MN
55415

MINN FARMERS UNION PRES O
1275 UNIV AVE
ST PAUL MN
55104

MINN HWYS MANAGEMENT SERVICE
410 HWY BLDG
ST PAUL MN
55101

MINN HOUSING INST N T CAR
7801 METRO PKWY
MPLS MN
55420

MINN PETROLEUM COUNCIL
446 BUILDERS EXCH BLDG
MPLS MN
55402

MINN POULTRY & HATCHERY A
BOX 158
MADELIA MN
56062

MINN RESTAURANT ASSN
2001 UNIVERSITY AVE.
ST PAUL MN 55
104

MINN RETAIL FEDERATION
7600 PARKLAWN STE 457
MPLS MN
55435

MINN SOCIETY ARCHITECTS AIA
NW NATL BK BLDG
ST PAUL MN
55101

MINN SOC CERTIFIED PUB AC
1102 WESLEY TEMPLE BLDG
MPLS MN
55403

MINN STATE CAPITOL EMP UNION
PO BOX 3215
ST PAUL MN
55165

MINN STATE MED ASSN
375 JACKSON ST
ST PAUL MN
55101

MINN.TURKEY GROWERS ASSN
2383 UNIV AVE
ST PAUL MN
55114

MINN ASSN WATERSHED DIST'

ADA MN
56510

MOFFITT R.C. DIR.ENV.CONTROL
MPLS.CITY HALL RM 301M
MPLS MN
55415

MOOD R BLOOMINGTON HLTH D
10200 PENN SO
BLOOMINGTON MN
55431

NASS GEO V HENN CO GEN HOSP
5TH AND PORTLAND AVE
MPLS MN
55415

NATL CAR RENTAL ATT D MIT
5501 GREEN VALLEY DR
MPLS MN
55437

NAT'L SOLID WASTES-R. GRASSO
1730 RHODE ISLAND AV.NW
WASHINGTON DC
20036

NCEC INC C/O DR DAHLBERG
CONCORDIA COLLEGE
MOORHEAD MN
56560

NELSON DONALD E NSP CO
414 NICOLLET AVE
MPLS MN
55401

NEUMAN RALPH W
RT 2 BOX 125
E[redacted]ARRASS MN
55732

NW COUNTRY ELEVATOR ASSN
802 GRAIN EXCH BLDG
MPLS MN
55415

NURSING HOME ADMRS BD EXAMRS
277 W UNIV AVE
ST PAUL MN
55103

O'BRIEN J.DENNIS
1200 1ST NATL.BANK BLDG
MINNEAPOLIS MN
55402

OFFICE OF THE GOVERNOR
130 STATE CAPITOL
ST PAUL MN
55101

OHMAN W C NATL ELEC CONTRS
608 AM NATL BK
ST PAUL MN
55101

PATTISON ORVIS
BOX 645
WILLMAR MN
56201

PETERSEN JOHN W
525 OSBORN BLDG
ST PAUL MN
55102

PHAR MFGRS ASSN WM D PATTON
1155 15TH ST NW
WASHINGTON DC DC
20005

PORTER LYLE O

TRACY MN
56175

PORT AUTH CITY OF ST PAUL
330 MINNESOTA BLDG
ST PAUL MN
55101

RACHNER MARY JANE
1917 PINEHURST AVE
ST PAUL MN
55116

RENNER R.H. ST PAUL AREA CC
300 OSBORN BLDG.
ST PAUL MN
55102

RAMSEY CO MEDICAL SOCIETY
1500 LOWRY MEDICAL BLDG
ST PAUL MN
55102

ROBBIE JOSEPH
904 CARGILL BLDG NO CTR
MPLS MN
55402

ROBERTS DAVID E
1260 NW NATL BK BLDG
ST PAUL MN
55101

SAN SIMEON DEVELOP CORP
OLD 1ST STATE BK BLDG
PAYNESVILLE MN

NIELSEN STOCK & BLACKBURN
415 730 BLDG
MPLS MN

NORTH CENTRAL ELEC ASSN
PO BOX 2[illegible]
BATTLE L[illegible]E MN
56515

NW BELL TEL CO LEGAL DEPT
224 S 5TH ST RM 2000
MPLS MN
55402

NYQUIST DEAN A
3707 53RD PL N
BROOKLYN CTR MN
55429

OCONNELL THOMAS
941 LAUREL
ST PAUL MN
55104

OCONNOR GREEN THOMAS ET A
845 NW BANK BLDG
MPLS MN
55402

OLD COLONY GAS & OIL COMPANY
17TH AVE N AT 2ND ST
MPLS MN
55411

OTTER TAIL POWER CO.
215 S. CASCADE ST.
FERGUS FALLS MN
56537

PAYNE COL ALVIN

DEGRAFF MN
56233

PAYNE WM B
2400 FIRST NATL BK BLDG
MPLS MN
55402

PHILLIPS LEGISLATIVE SERVICE
113 W UNIV AVE
ST PAUL MN
55103

POPOVICH PETER S
314 MINN BLDG
ST PAUL MN
55101

PRAUSE JOS.C.
2220 105TH AVE.N.W.
COON RAPIDS MN
55433

PULSCHER RBT SPRINGSTED I
813 OSBORN BLDG
ST PAUL MN
55102

RANALLO CLARENCE
800 CENTRAL AVE N E
MPLS MN
55413

RED OWL STORES INC
215 E EXCELSIOR AVE
HOPKINS MN
55343

RICHARDSON THOS
7851 METRO PKWY S 103
MPLS MN
55420

RICHARDS MONTGOMERY ET AL
1430 RAND TOWER
MPLS MN
55402

ROCHE T E
5007 FREMONT AVE S
MPLS MN
55419

ROSS ALFRED
6356 WARE RD
LINO LAKES MN
55014

SATHRE, HARVEY
77 SHERBURNE
ST PAUL MN
55103

ST PAUL ASSN PLBG HTG MEC
614 AM NATL BK
ST PAUL MN

ST PAUL BUR HLTH DR P COX
555 CEDAR ST
ST PAUL MN
55101

ST PAUL FOOD RETAILERS ASSN
[illegible]C ARCADE
[illegible] PAUL MN
55106

SCHMIDT H W TCHRS RETIREMENT
302 CAPITOL SQ BLDG
ST PAUL MN
55101

SCHMIDT LARRY WCCO-TV NEWS
50 S 9TH ST
MPLS MN
55402

SCHNEIDER & NEESER
706 1ST ST SO PO BX 876
WILLMAR MN
56201

SCHROEDER ALFRED H
2172 CARROLL AVE
ST PAUL MN
55104

SENATE FINANCE COMMITTEE
113 STATE CAPITOL
ST PAUL MN
55101

SHABATURA EUGENE H
2833 LAKE AVE SO
DULUTH MN
55811

SHINER JOHN T.
297 GOODRICH AVE
ST PAUL MN
55102

SKELLY OIL CO R R WELLINGTON
PO BOX 436
KANSAS CITY MO

STATE BD. BARBER EXAMINERS
555 WABASHA
ST PAUL MN
55102

STATE BD VETERINARY EXAMINER
C/O DR A C SPANNAUS DVM
WACONIA MN

STUPKA & MOREM
MIDTOWN BLDG
AUSTIN MN
55912

SUMMIT NATL BANK D L MORRILL
205 AURORA AVE
ST PAUL MN
55103

SWANSON GERALD H
212 CITY HALL
ROCHESTER MN
55901

UNION STOCK YARDS
ATTN PRES
SO ST PAUL MN
55075

VERRILL JOHN E
DEPT SECONDARY ED UOF M
DULUTH MN
55812

VILLAGE OF WOODBURY-F.STRONG
561 TOWER DRIVE
NEWPORT MN
55055

WELK G V NORTHERN STATES
414 NICOLLET MALL
MPLS MN
55401

SCARBOROUGH WILLIAM
DIV.ED. U.M.
MORRIS MN
56267

SCHAPS NICHOLAS
100 DAIN TOWER
MPLS MN
55402

SCHNEIDER MAHLON
GREEN GIANT
LESUEUR MN
56058

SCHWINN ROBT.P.
1400 SOO LINE BLDG.
MPLS. MN
55402

SEARS ROEBUCK & CO
2929 ELLIOT AVE D 703MW
MPLS MN
55401

SENATE COUN OFF J ST MARI
STATE CAPITOL
ST PAUL MN
55101

SHAW ROBERT M
616 MOBIL OIL BLDG
MPLS MN
55402

SHELL OIL CO. W.A. ROQUET
ONE SHELL PLAZA BX 2463
HOUSTON TX
77001

SMERIKA WN.
BOISE CASCADE PAPERS
INTL FALLS MN
56649

STANSFIELD ARLENE LAND O
PO BOX 116
MPLS MN
55440

STD AM LIFE & ANNUITY CO
3801 W 50TH ST
MPLS MN
55410

STENSLAND M.E. PRES. MVMA
203 NW 22ND ST.
AUSTIN MN
55912

SUSSEL CO.ATTN: TED SCHWENKER
1850 COMO AVE.
ST PAUL MN
55108

SWANSON BURT E
w-2162 1ST NATL BK BLDG
ST PAUL MN
55101

TIMESAVERS INC ATT R S VOLD
5270 HANSON COURT
MPLS MN
55422

TWIN CITY RETAIL DRUGGIST
2388 UNIV AVE
ST PAUL MN
55104

VAN CLEVE JOHN H
2101 HENN AVE
MPLS MN
55405

VOGEL HOWARD G
814 FLOUR EXCH BLDG
MPLS MN
55415

VOLDNESS PERRY
IDS 8TH & MARQUETTE
MPLS MN
55402

WELLS G W INS FED OF MINN
~~RT 4 BOX 194~~ 19280 LAKE AVE
WAYZATA MN
55391

WEST & GOWAN
ATTORNEYS AT LAW
PINE ISLAND MN
55963

MINN ASSN COOPERATIVES
55 SHERBORNE AVE
ST PAUL MN
55103

MINN ASSN ELEC COOPERATIVES
4901 w 77TH ST
MPLS MN
55435

MINN. ASSN. PET RETAILERS
1115 2ND AVE. SO.
MINNEAPOLIS MN
55403

MINN AUTOMOBILE DEALERS A
GRIGGS MIDWAY BLDG
ST PAUL MN
55104

WEST MIDWAY-SO.ST ANTH.PK.AS
898 RAYMOND AVE.
ST PAUL MN
55114

WHITLOCK A G
ECON LAB OSBORN BLDG
ST PAUL MN
55102

WOLKERSTORTER THEODORE
676 17TH AVE NW
NEW BRIGHTON MN
55112

WOZNIAK D D
~~820 RIAM BLDG~~ 401 First Fed. Bldg
ST PAUL MN
55101

ZATARGA A E CPA
1800 MIDWEST PLAZA BLDG
MPLS MN
55402

WM.MITCHEL COLLEGE LAW LIB.
2100 SUMMIT AVE.
ST.PAUL MN
55105

WIS FEEDER PIG MARKET CO-

FRANCIS CREEK WI

WYANT CLINTON W ATTY

ATKIN MN
56431

STATE OF MINNESOTA
OFFICE of SECRETARY of STATE

NOTICE of HEARINGS MAILING LABEL SYSTEM

NAME	ADDRESS STREET	CITY	STATE	ZIP CODE
BELISLE JON	2010 WILSON #28	ST PAUL	MN	55119
BRIGHAM E M III	RR4	RED WING	MN	55066
GEORGE K GRANSE CO	1472 SELBY AVE	ST PAUL	MN	55104
LOWE DOUG	2701 N LEXINGTON AVE	ROSEVILLE	MN	55113
THOMPSON HESSIAN ET AL	1500 MIDWEST PLAZA BLDG	MPLS	MN	55402
LEAGUE MN MUNIC MC ADDICKS	3300 UNIV AVE SE	MPLS	MN	55414

STATE OF MINNESOTA
OFFICE of SECRETARY of STATE

NOTICE of HEARINGS MAILING LABEL SYSTEM

NAME	ADDRESS STREET	CITY	STATE	ZIP CODE
COMMUNITY DESIGN CENTER	113 S. 6th St.	MPLS	MN	55401
ENV. SERV. & GEN. RESOURCE COMM.	6320 INDUSTRIAL DR.	MORRIS	MN	56267
JOHNSON LANGE & J	265 S. LEXINGTON PKWY	ST. PAUL	MN	55107
L. B. FULLER CO.	2400 KASOTA AVE.	ST. PAUL	MN	55108
BRYAN ROGER TENNANT CO.	201 N. 1st AVE.	MPLS	MN	55401
BERNARD D. R. MINNESOTA REALTOR	1821 MINNESOTA CLUB	MPLS	MN	55414
SWEITZER R. L. HONEYWELL INC.	2701 4th AVE. S.	MPLS	MN	55408

STATE OF MINNESOTA
OFFICE of SECRETARY of STATE

NOTICE of HEARINGS MAILING LABEL SYSTEM

NAME	ADDRESS STREET	CITY	ST	ZIP CODE
CITIZENS LEAGUE	530 SYNDICATE BLDG	MPLS	MN	55402
ZIVERSON GARY L	1210 PIONEER BLDG	ST PAUL	MN	55101
KORDA MRS LOUISE	1064 FOREST HILLS DR SW	ROCHESTER	MN	55901
MILLER RICHARD A	1020 PLYMOUTH BLDG	MPLS	MN	55402
[redacted]				
ANDREWS MASBURG et al-NICHOLS	MIDLAND CENTER	OKLAHOMA CITY	OK	73102
PETERSON GARY	85% MIDLAND BK BLDG	MPLS	MN	55401
SCHWARTAU NEAL METH[redacted]HOSP	201 W CENTER ST	ROCHESTER	MN	55901
SCHWERMAN EARL JR	1535 8th AVE SE	ROCHESTER	MN	55901
SODERMAN ANTHONY	152 S PLAZA BLDG	MPLS	MN	55416
THOMPSON CONRAD	1107 23rd ST NW	ROCHESTER	MN	55901

HEALTH

Abrahamson, Dr. Dean E., 243 Space Science Center, Minneapolis 55455

Beutel, Robert, P. O. Box 1205, 103 3rd Ave S., St. Cloud 56301

Booth Cold Storage Co., St. Peter & Kellogg, St. Paul

Bush, John T., Box 611, Mayo Bldg., U of M, Mpls. 55455

Cassel, Dr. Carl V.E., Minn. State Dental Ass'n., 2236 Marshall Ave., St. Paul

Diversified Piping, Inc., Attn: W. C. Schultz, 1710 West #7, Hopkins 55343

Environment Reporter, 1231 25th St., N.W., Washington D. C.

Hawley, Lyle, Graco, PO Box 1441, Minneapolis 55440

Health Dept., Attn: Dir. Cleon LeMont, 111 4th Ave. S., St. Cloud 56301

Higgins, J.C., Brotherhood Rwy. Clerks, 2317 W. 7th St., Duluth

Hurtz, Mrs. Kirsten, Minn. Nurses Assn., 1821 Univ. Ave., St. Paul 55104

Merck & Co., Inc. Rahway, N.J., Attn: Off of Gen. Counsel

Minneapolis & Hennepin County Mental Health Clinic, 619 S. 5th St., Minneapolis 15

Minn. Dairy Queen Trade Ass'n., c/o Claude H. Allen, E-1405 1st Nat'l Bk.Bldg.,St.P

Minn. Nurses Assn.,Attn: Geraldine Wedel, 1821 Univ. Ave.Rm.152, St. Paul 55104

Minn. State Pharmaceutical Ass'n., 2388 University Ave., St. Paul 55104

Parke, Davis & Company, P. O. Box 118, Detroit 32, Michigan

Patrick, Peter, 101 Central Ave., S.E., Minneapolis

Planning and Advisory Comm. of Crow Wing County, Court House, Brainerd 56401

Roesler, Immanuel F., 6700 Portland Ave. S., Richfield 55423

Sanford, S. M., 7000 Portland Ave., Richfield, Minneapolis, Minn. 55423

Schneider, Dorothy, St. Paul Bur.Health, 555 Cedar St., St. Paul 55101

DIV. OF ENVIRONMENTAL SANITATION

U. S. Soil Conservation Serv., 517 Red. Courts Bldg., St. Paul (Swimming pools)

HOTELS, RESORTS, RESTAURANTS

U. S. Soil Conservation Serv., 517 Red. Courts Bldg., St. Paul (trailer parks,etc)

MINN. PLUMBING CODE only

Hendricks, Manley, c/o Tyler Pipe Industries, Box 2027, Tyler, Texas 50701

Higgins, Robert G. - Room 300B, 1409 Willow St., Minneapolis 55403

Sharp, Richard H., 964 W. Cecil St., Neenah, Wisconsin 54956

CEMETERIES

Fox, Howard - 244 Dayton Ave., St. Paul 55102

ATTACHMENT #2

MISCELLANEOUS

Ralph Verdun, Chief
Bureau of Environmental Health
Dept. of Public Health
State of Illinois
Springfield, Illinois 62706

Perry Miller, Asst. Com.
Indiana Board of Health
1330 West Michigan St.
Indianapolis, Indiana 46206

W. Van Heuvelen, P.E.
State of North Dakota
Department of Health
Bismarck, North Dakota 58501

Steve Ladd
Marine-on-St. Croix
Minnesota 55047

John Bromer, Chairman
Bonanza Valley Steering Com.
Brooten, Minnesota 56316

Jay H. Lehr, Exec. Dir.
National Water Well Assn.
88 East Broad Street
Columbus, Ohio 43215

Richard Sverson
Div. of Sanitary Engineering
State of New York
Department of Health
845 Central Avenue
Albany, New York 12206

Jean Gilligan
Popham, Haik, Schnobrich,
Kaufman, and Doty
4344 IDS Center
Minneapolis, Minnesota 55402

Durward Humes, Exec. Secy.
221 North LaSalle Street
Water Systems Council
Chicago, Illinois 60601

Thomas Calabresa
Private Water Supply Section
State of Wisconsin
Box 450
Madison, Wisconsin 53701

Maurice Roth
Chairman of the Board
Central Minnesota Irrigation Corp.
Staples, Minnesota 56479

Leonard Waldock
Department of Agriculture
St. Paul, Minnesota 55155

Al Lapora
211 Edith Drive
West St. Paul, MN 55118

A. J. Strubel, Vice President
Valley Steel Products Co.
P.O. Box 503
St. Louis, Missouri 63166

Gerald Ramsdell, Exec. Secy.
Minnesota Water Well Assn.
4949 Diane Drive
Minnetonka, Minnesota 55347

Gene Ulbrich
Central Minnesota Demonstration
Research Irrigation Farm
Irrig. Tech. II Instructor
Area Vocational-Technical School
Staples, Minnesota 56479

John Vogt
Michigan Department of Public Health
3500 North Logan
Lansing, Michigan 48914

University of Minnesota
Dept. of Agricultural Engineering
St. Paul, Minnesota 55101

Earl Getschel
Bonanza Valley Irrigation
Brooten, Minnesota 56316

Central Drillers, Inc.
William E. O'Connor
Star Route
Onamia, Minnesota 56359

Kouba Well Drilling
L. Lawrence Kouba
578 Water Avenue
Hillsboro, Wisconsin 54634

Kargel Plumbing and Appliance
Leonard L. Kargel
Pequot Lakes, Minnesota 56472

Steffl Well Company
Sylvester J. Steffl
DeGraff, Minnesota 56233

Willard Peterson
Public Works Director
City of Staples
102 Sixth Street N.
Staples, Minnesota 56479

Aqua Analysis Laboratories
6231 Trinity Drive N.E.
Fridley, Minnesota 55432

Dennis Ferche
Senate Research Committee
Room 121, Capitol Building
St. Paul, Minnesota 55155

Terry Courneya
Pennington County Extension Office
P.O. Box 576
Thief River Falls, Minnesota 56701

Leonard Sinton
Minneapolis Health Department
250 South Fourth St.
Minneapolis, Minnesota 55415

MORRISON WELL CO
24001
CHARLES R MORRIS
BOX 184
FREEBORN MINN 56032

OELFKES WELL DRILLING
03002
WILLIAM H OELFKE
ROUTE 1
FRAZEE MINN 56544

NAJMON CHARLES WELL DRILLING
58003
CHARLES NAJMON
ROUTE 1
PINE CITY MINN 55063

BUEGE GERALD WELL DRILLING COMPANY
85004
GERALD R BUEGE

LAMOILLE MINN 55948

JOHNSON VERNON E WELL DRILLING COMPANY
53005
VERNON E JOHNSON
BOX 132
BIGELOW MINN 56117

SALVERDA WILLIAM WELL CO
62006
WILLIAM E SALVERDA
3083 NO VICTORIA
ST PAUL MINN 55113

MACDONELL-MEAD DRILLING CO
31007
ALAN J MACDONELL
RTE 4 BOX 271
GRAND RAPIDS MINN 55744

GESS HENRY WELL CO
27008
HENRY E GESS
14510 TREE ST
MINNETONKA MINN 55343

BENES WELL DRILLING
31009
EDWARD G BENES
2214 5TH ST N W
GRAND RAPIDS MINN 55744

LAYNE MINNESOTA COMPANY
27010
D C VRY
3147 CALIF ST N E
MINNEAPOLIS MINN 55418

HOYHTYA WELL DRILLING
86011
WILMER HOYHTYA
BOX 66
COKATO MINN 55321

KEYS WELL DRILLING COMPANY
62012
GEORGE H KEYS
413 N LEXINGTON AV
ST PAUL MINN 55104

THEIN WELL CO INC-CLARA CITY
12013
STANLEY E THEIN
P O BOX 429
CLARA CITY MINN 56222

ROGERS DON WELL CO
27014
DONALD A ROGERS
17555 DUCK LAKE TR
EDEN PRAIRIE MINN 55343

RENNER E H + SONS INC
27015
THOMAS T RENNER
5465 CO RD 19
MINNEAPOLIS MINN 55442

MCKEEVER WELL DRILLING
16016
ROGER W MCKEEVER

LITTLE MARAIS MINN 55611

BARRICK WELL CO
43017
LEROY C BARRICK
ROUTE 1 BOX 44
HUTCHINSON MINN 55350

ALLAN JOHN WELL DRILLING
82018
JOHN M ALLAN

SCANDIA MINN 55073

RASMUSSEN, JOHN J
38019
JOHN J RASMUSSEN
E STAR ROUTE
TWO HARBORS MINN 55616

HUKEE WELL DRILLING CO
31020
OLE A HUKEE
2215 5TH ST W
GRAND RAPIDS MINN 55744

OLSON ALVIN F
61021
ALVIN F OLSON

GLENWOOD MINN 55447

MC CARTHY WELL COMPANY
27022
MILAN MCCARTHY
2700 E 80TH ST
BLOOMINGTON MINN 55420

PUMARLO WELL CO
31023
FRANCIS M PUMARLO
RT 2 BOX 170D
HAMEL MINN 55340

HOSMER EUGENE WELL
DRILLING + REPAIRING 03024
EUGENE HOSMER
1606 WEST AVE
DETROIT LAKES MINN 56501

ATKINSON WELL DRILLING
73025
ARNOLD C ATKINSON
BOX 156
FREEPORT MINN 56331

OJARD WELL DRILLING
38026
WILLIAM H OJARD

KNIFE RIVER MINN 55609

GEIB WELL CO
72027
ERWIN J GEIB
409 E ADAMS BOX 48
ARLINGTON MINN 55307

ZUERCHER AL WELL DRILLING
62028
ALFRED A ZUERCHER
2483 NO HWY 61
ST PAUL MINN 55109

HALVORSON TED WELL
DRILLING 22029
TILMER L HALVORSON
1108 S GALBRAITH
BLUE EARTH MINN 56013

HEILS WELL SERVICE
74030
RONALD W HEIL SR.
436 CHERRY ST
OWATONNA MINN 55060

MILLER WELL DRILLING
21031
WILFORD F MILLER
ROUTE 1
OSAKIS MINN 56360

DAVIDSON WELL CO
57032
ROBERT J DAVIDSON
RT 3
THIEF RVR FLS MINN 56701

RAY CHESTER WELL DRILLING
34033
CHESTER L RAY
ROUTE 6 BOX 260
BEMIDJI MINN 56601

KRUEGER WELL DRILLING
03034
ROBERT L KRUEGER

AUDUBON MINN 56511

ERICKSON WES WELL CO
10035
WESLEY E ERICKSON
RT 4 BOX 891
EXCELSIOR MINN 55331

HANSMANN-WELL COMPANY
27036
LAUREL E HANSMANN
P O BOX 1253
MINNETONKA MINN 55343

NELSON WELL DRILLING CO
30037
E A NELSON
RT 2 BOX 5
CAMBRIDGE MINN 55008

NORTH STAR WELL DRILLING
48038
HARVEY P EXSTED
BOX 23
ISLE MINN 56342

TERNES WELL DRILLING
69039
ROGUS TERNES
3810 W SUPERIOR ST
DULUTH MINN 55807

LABORE WELL COMPANY
62040
LAWRENCE N LABORE
3284 W OWASSO BLVD
ST PAUL MINN 55112

ERICKSON JIM WELL
DRILLING 17041
JAMES H ERICKSON

WESTBROOK MINN 56183

MENDOTA WELL COMPANY
19043
CARL F GOERS

MENDOTA MINN 55150

STEFFL CRYIL T WELL CO
38044
CYRIL T STEFFL

SPRINGFIELD MINN 56087

VANHERCKE WELL DRILLING
49045
RAY J VANHERCKE
ROUTE 1 BOX 239
LITTLE FALLS MINN 56345

BAKER EARL WELL COMPANY
86046
EARL W BAKER
RT 1
ANNANDALE MINN 55302

BOERNER WELL CO
47047
FRED P BOERNER
417 E 5TH ST
LITCHFIELD MINN 55355

RASMUSSEN + MADISON WELL
DRILLING 38049
JAMES W MADISON
EAST STAR ROUTE
TWO HARBORS MINN 55616

THEIN WELL CO INC-NEW
LONDON 12050
PETER J THEIN
P O BOX 429
CLARA CITY MINN 56222

LAHMAN WELL DRILLING
04051
FRED C LAHMAN

HINES MINN 56647

JOHNSON LEON WELL CO
73052
LEON A JOHNSON
1011 GETTY
SAUK CENTER MINN 56378

REIMER WELL COMPANY
72053
EDWARD C REIMER
230 LINCOLN AVE E
GAYLORD MINN 55334

MCCULLOUGH + SONS INC
82054
LEROY MCCULLOUGH
15597 HWY 61
HUGO MINN 55038

HEEGARD WELL DRILLING
COMPANY 61055
GILMAN R HEEGARD
508 WOLLAN
STARBUCK MINN 56381

TORGERSON WELL CO
27056
WOODROW J TORGERSON
BOX 57
ROCKFORD MINN 55373

MEYER WELL DRILLING
92057
RALPH E MEYER
P O BOX 248
NEW ALBIN IOWA 52160

BERGERSON-CASWELL INC
27058
EDWARD P HENRICH
13120 WAYZATA BLVD
MINNETONKA MINN 55343

SCHAEFER WELL COMPANY
52059
LEONARD H SCHAEFER
ROUTE 3
NEW ULM MINN 56073

DONABAUER WELL + PUMP CO
73061
ALPHONSE J DONABAUER
ROUTE 2
ST JOSEPH MINN 56374

AAMOT WELL CO INC
27062
SIDNEY L BERG
8528 PILLSBURY AVE
BLOOMINGTON MINN 55420

RYAN WELL COMPANY
19063
JOHN F RYAN
14745 S ROBERT TRL
ROSEMOUNT MINN 55068

FREEMAN WELL DRILLING
11064
MAURICE R FREEMAN

WALKER MINN 56484

CHRISTENSON WELL SERVICE
21065
ROBERT A CHRISTENSON

DODGE CENTER MINN 55927

SPARTZ + SONS WELL CO
51066
FRANK P SPARTZ

IONA MINN 56141

MINNESOTA DRILLERS
37067
WALTER P ERVIN
P O BOX 68
MADISON MINN 56256

WACONIA WELL CO
10068
HENRY M BRAUNWARTH
233 SO PINE ST
WACONIA MINN 55387

ROSGA WELL DRILLING
58069
ALOYSIUS P ROSGA

HINCKLEY MINN 55037

MARCUS STANLEY
34070
STANLEY C MARCUS
WILLMAR MINN 56201

MARCUS WELL COMPANY
34071
DONALD L MARCUS
PRINSBURG MINN 56281

ST PETER WELL CO INC
52072
EDMUND P FLOWERS
P O BOX 334
ST PETER MINN 56082

JACOBS + GRANT WELL
DRILLING 12073
ARLOW H GRANT JR.
R R 1
MILAN MINN 56262

GOPHER STATE WELL + PUMP
CO INC 72074
DONALD T MUELLER
BOX 154
GAYLORD MINN 55334

SCHWICH WELL CO
72075
HAROLD C SCHWICH
BOX 115
GREEN ISLE MINN 55338

BENGTSON WELL WORKS
56076
MERLIN E BENGTSON
ROUTE 1
ERHARD MINN 56574

GIBS WELL DRILLING
73077
GILBERT F DONABAUER
142 11TH AVE NO
WAITE PARK MINN 56387

WILKINS IKE WELL DRILLER
58078
ISAAC E WILKINS
P O BOX 87
FINLAYSON MINN 55735

THEIN WELL CO
INC-ROCHESTER 55079
DENNIS J THEIN
7025 N HWY 63
ROCHESTER MINN 55901

SMITH BUD WELL DRILLING
86080
MAURICE L SMITH
206 SO 4TH AVE
BUFFALO MINN 55313

MONSONS WELL DRILLING
32081
ALV M MONSON
LAKEFIELD MINN 56150

ROBERT W LINT WELL
DRILLING 62082
ROBERT W LINT
3875 CLOVER AVE
ST PAUL MINN 55110

WHALEY WELL DRILLING
78083
DON D WHALEY
207 2ND AVE SO
WHEATON MINN 56296

MANTYLA WELL DRILLING INC
82084
ALBERT J THRON
16633 UPPER 4TH ST
LAKELAND MINN 55043

HEIL WELL CO.
43085
ROBERT F HEIL
RT 1
BROWNTON MINN 55312

RUPPERT HAROLD + SON WELL
COMPANY 27086
ANTHONY J RUPPERT
RTE 1 BOX 191A
HAMEL MINN 55340

BILLS WELL DRILLING
33087
WILLIAM W JAPP
BOX 122
OGILVIE MINN 56358

TAYLOR + SAMPSON WELL CO
32088
DAVID A SAMPSON
ROUTE 2
FOREST LAKE MINN 55025

CRANDALL WELL DRILLING
19089
ROBERT CRANDALL
ROUTE 2
HASTINGS MINN 55033

GRAVES WELL DRILLING
69090
LAWRENCE E GRAVES
550 SO UGSTAD RD
PROCTOR MINN 55810

EVERSON JOHN E WELL
DRILLER 18091
JOHN E EVERSON
DEERWOOD MINN 56444

VORWERK PHIL WELL CONTRACTOR 84092
A P VORWERK
115 SO PARK AVE
BRECKENRIDGE MINN 56520

ANDERSON WELL DRILLING 13093
ANTON C ANDERSON

SHAFER MINN 55074

KIRK WELL DRILLING 13094
RAY W KIRK
310 ELM STREET
LINDSTROM MINN 55045

SANFORD IRRIGATION COMPANY 26095
RICHARD W SANFORD

ELBOW LAKE MINN 56531

ERNIE LUDWIG WELL DRILLING 30096
ERNEST C LUDWIG
ROUTE 2
ISANTI MINN 55040

ROWLES WELL CO. 75098
JOHN P ROWLES
631 3RD ST
HANCOCK MINN 56244

FREDERICKSONS INC 43099
RICHARD I FREDERICKSON
P O BOX 231
HUTCHINSON MINN 55350

ANDERSON WELL DRILLING INC 69100
ARTHUR C ANDERSON
4290 MILLER TRUNK
DULUTH MINN 55811

ECKSTROM WELL DRILLING 49101
DONALD W ECKSTROM

UPSALA MINN 56384

MINNEHAHA WATERS INC 92102
JOHN H GREENFIELD
P O BOX 1011
SIOUX FALLS S.D. 57101

MARCUS RICHARD A WELL DRILLING 65103
RICHARD A MARCUS

RENVILLE MINN 56284

KADERLIK WELL CO 66104
GEORGE J KADERLIK
R R 1
LONSDALE MINN 55046

KADERLIK GEORGE C 66105
GEORGE C KADERLIK
R R 1
LONSDALE MINN 55046

ROSICKY WELL DRILLING 39106
RONALD W ROSICKY
RT 1 BOX 13
CROMWELL MINN 55726

UNDERWOOD WELL DRILLING 73107
AUBREY L UNDERWOOD
P O BOX 245
BROOTEN MINN 56316

MATTSON WELL COMPANY 86108
CLAYTON M MATTSON

HOWARD LAKE MINN 55349

MARTIN WELL DRILLING 22109
GORDON C MARTIN
433 4TH AVE S E
WELLS MINN 56097

CAMPBELL WELL COMPANY 58110
ERVIN D CAMPBELL
RT 1
GRASSTON MINN 55030

KOLSTAD, ROBERT K. 69111
ROBERT K KOLSTAD
300 1ST AVE
PARKVILLE MINN 57733

O K MACHINE COMPANY 58112
JACK W GRAHN
114 CENTER ST W
ROSEAU MINN 56751

RUNYANS WELL DRILLING 11113
MARTIN N RUNYAN

HACKENSACK MINN 56452

JOHNSON BROS WELL DRILLING 62114
GEORGE W JOHNSON
2750 NOEL DRIVE
ST PAUL MINN 55117

SCHWOCH WELL DRILLING
09116
ED W SCHWOCH
BARNUM MINN 55707

JOHNSON WELL COMPANY
53117
JOHN H JOHNSON
ROUTE 1
BIGELOW MINN 56117

TRI-STATE DRILLING +
EQUIPMENT CO 27118
HAROLD W RIETHMILLER
P O BOX 548
WAYZATA MINN 55391

SCHROEPFER WELL + WATER
CONDITIONING 62119
THEODORE J SCHROEPFER
1920 E LARPENTEUR
ST PAUL MINN 55119

DENN LOREN WELL DRILLING
07120
LOREN J DENN
ROUTE 1
MAPLETON MINN 56065

NELSON WELL DRILLING AND
REPAIR 04121
LOREN R NELSON
ROUTE 1
TENSTRIKE MINN 56683

CHRISTENSON WELL DRILLING
02122
ARLO CHRISTENSEN
963 85TH LANE N W
MINNEAPOLIS MINN 55433

JOHNSON JOHN R WELL CO
86123
JOHN R JOHNSON
ROUTE 3 BOX 73
BUFFALO MINN 55313

ROWLAND WELL CO INC
23124
ARLO D ROWLAND
909 SO MAIN ST
CHATFIELD MINN 55923

LEUTHNER WELL CO
10125
MAURICE J LEUTHNER
VICTORIA MINN 55386

LEUTHNER ROGER
10126
ROGER N LEUTHNER
VICTORIA MINN 55386

STAN HASSIG WELL DRILLING
CO 79127
CARLTON T SHEFVELAND
222 SO WASHINGTON
LAKE CITY MINN 55041

RAY SALVERDA
58128
RAY H SALVERDA
FINLAYSON MINN 55735

JOHNSON WELL DRILLING AND
SERVICE 80129
ALFRED D JOHNSON
SEBEKA MINN 56477

WASKOSKY + SONS WELL
COMPANY 26130
THEODORE J WASKOSKY
R R 2
ELBOW LAKE MINN 56531

HANSONS WELL DRILLING
32131
HARLAN C HANSON
BOX 114
HERON LAKE MINN 56137

ANTONSEN WELL DRILLING
56132
DAVID E ANTONSEN
VERGAS MINN 56587

MORK WELL CO
02133
ROGER A DANIELSON
RT 2 BOX 220
ANOKA MINN 55303

OLSON WELL SERVICE
54134
DONALD W OLSON
HALSTAD MINN 56548

FISCHER WELL + PUMP CO
73135
DANIEL M DONABAUER
2001 FOREST DRIVE
ST CLOUD MINN 56301

GANGL WELL DRILLING INC
62136
WILLIAM O GANGL
211 E OWASSO LANE
ST PAUL MINN 55112

GANGL WILLIAM J
62137
WILLIAM J GANGL
211 E OWASSO LANE
ST PAUL MINN 55112

ENZENAUER WELL DRILLING
69138
RUEBEN A ENZENAUER
300 1ST AVE
PARKVILLE MINN 55773

RIVERS VIC + SONS WELL DRILLING
86139
VICTOR J RIVERS
RT 1 BOX 87
ST MICHAEL MINN 55376

MCGOWAN GEORGE
36140
GEORGE E MCGOWAN
MIZPAH MINN 56660

DAVIDSON MILTON WELL DRILLING
45141
MILTON P DAVIDSON
NEWFOLDEN
NEWFOLDEN MINN 56738

DEPENDABLE WELL CO
27143
CHARLES A ADELMANN
1411 WEST 97TH ST
BLOOMINGTON MINN 55431

ROBERTSON WELL DRILLING
26144
DONAVIN G ROBERTSON
ASHBY MINN 56309

FOLGERO WELL CO
50145
CLARENCE FOLGERO
LEROY MINN 55951

FIDELDY BROS DRILLING
31146
WILLIAM C FIDELDY
ROUTE 1
BOVEY MINN 55709

ELSNER ELMER WELL CO
77147
ELMER ELSNER
CARLOS MINN 56319

WHITNEY WELL DRILLING
18148
RAYMOND W SIMENSTAD
BOX 161
NISSWA MINN 56468

BLOCKS PLUMBING HEATING + WELL CO
40149
BURTON J BLOCK
R R 2
LECENTER MINN 56057

LARSON WELL DRILLING CO
23150
RICHARD G LARSON
RURAL ROUTE 2
MABEL MINN 55954

FRAUENKRON WELL DRILLING
28151
DUANE E FRAUENKRON
ROUTE 2
HOUSTON MINN 55943

CICHY ANTON E WELL DRILLING
56153
ANTON E CICHY
RT 3 BOX 176
NEW YORK MILLS MINN 56567

CICHY RAYMOND WELL COMPANY
56154
RAYMOND M CICHY
BOX 173
NEW YORK MILLS MINN 56567

HICKS WELL CO
14155
MARVIN W HICKS
COMSTOCK MINN 56525

TRAUT INC-BRAINERD
18156
MELVIN E TRAUT
214 SOUTH 8TH ST
BRAINERD MINN 56401

TRAUT WELL DRILLING INC-ST CLOUD
73157
MARVIN R TRAUT
18 LINCOLN AVE NE
ST CLOUD MINN 56301

CARROLL LOUIS J WELL DRILLING
82158
LOUIS J CARROLL
7089 N SHORE TRAIL
FOREST LAKE MINN 55025

SEPPMANN WELL DRILLING
07160
ALFRED B SEPPMANN
ROUTE 1 BOX 111
MANKATO MINN 56001

SEPPMANN LYLE
07161
LYLE A SEPPMANN
RTE 1 BOX 111
MANKATO MINN 56001

BORN WELL DRILLING
81162
STANLEY L BORN
R R 2
WASECA MINN 56093

CORCORAN WELL COMPANY DIV
OF CORCORAN HARD + IMP 19163
MARVIN R SCHWANZ
2975 145TH ST W
ROSEMOUNT MINN 55068

HADDEN WELL COMPANY
02164
ROBERT B HADDEN
21315 CEDAR DRIVE
CEDAR MINN 55011

[redacted]

HASSKAMP WELL DRILLING
INC 18166
NOEL E HASSKAMP

AITKIN MINN 56431

DUCHARME ARCHIE J WELL CO
52168
ARCHIE J DUCHARME
743 E COUNTY RD B2
ST PAUL MINN 55117

ENGLER WELL CO
62169
PHILLIP J ENGLER
2310 CO RD D
ST PAUL MINN 55112

LLOYDS WELL DRILLING +
PUMP SERVICE 02170
LLOYD G BARKULOO
5225 153RD AVE NW
ANOKA MINN 55303

PEARSON WELL CO
37171
WILLIAM PEARSON
1283 PINE ST
DAWSON MINN 56232

STODOLAS DON WELL
DRILLING CO INC 27172
DONALD F STODOLA
15306 HWY 7
MINNETONKA MINN 55343

OSTLUND WELL CO
04173
ERBERT M OSTLUND

HINES MINN 56647

HARTMANN WELL CO
40174
ROGER L HARTMANN
308 E MAIN ST
NEW PRAGUE MINN 56071

HARTMANN DONALD S
40175
DONALD S HARTMANN
306 E MAIN
NEW PRAGUE MINN 56071

CICHY LEO WELL CO
56176
LEO M CICHY
RFD 3
NEW YORK MILLS MINN 56567

MALENKE WALLY WELL CO
27177
WALDO H MALENKE
18620 191ST AVE NO
OSSEO MINN 55369

ANDERSON BROS WELL CO
56178
JOHN A ANDERSON
ROUTE 4
FERGUS FALLS MINN 56537

PETERSON WELL CO
29179
ROY L PETERSON

NEVIS MINN 56467

NELSON BROS DRILLING
CONTRACTORS 90180
JOHN E JENNEJOHN
BOX 41
DECORAH IOWA 52101

GREGGS PLBG + HTG
04181
ELVIN W BURNHAM
BOX 804
BEMIDJI MINN 56601

FERGUS WELL CO
56182
KENNETH N AUSETH
ROUTE 3
FERGUS FALLS MINN 56537

PETERSEN WELL DRILLING
69183
NORVILLE D PETERSEN
929 W 22ND AVE
VIRGINIA MINN 55792

MCKEEVER, ROGER C 16184
ROGER C MCKEEVER
LITTLE MARAIS MINN 55611

LOHSE DRILLING CO 10185
VERNON P LOHSE
BOX 363
CHANHASSEN MINN 55317

MCALPINES WELL DRILLING 27186
GENE P MCALPINE
RT 6
ANOKA MINN 55303

BISSONS WELL + PUMP CO 19189
DURWOOD L BISSON
1955 SHAWNEE RD
ST PAUL MINN 55122

BLACKWOOD WELL DRILLING 30190
KENNETH G BLACKWOOD
R 1 BOX 64
ZIMMERMAN MINN 55398

BEEMER WELL DRILLING 90191
ROBERT G BEEMER
LAKOTA IOWA 50451

MINETT BROS WATER WELL DRILLING 42192
VIRGIL C MINETT
RUSSELL MINN 56169

STEVENS WELL DRILLING CO INC 27194
THOMAS L STEVENS
BOX 96
MAPLE PLAIN MINN 55359

BIWABIK WELL DRILLING SERVICE 53195
JOHN S FULGHAM
BOX 461
BIWABIK MINN 55708

CLAUSON WELL CO 51196
RICHARD B CLAUSON
HADLEY MINN 56133

ELLINGSON WELL DRILLING 21197
OBED J ELLINGSON
EVANSVILLE MINN 56326

BEMIS WELL DRILLING 40198
HERBERT H BEMIS
RT 2
WATERVILLE MINN 56096

KENT WELL DRILLING 09199
BOB W KENT
CROMWELL MINN 55726

SCHLEICHER PAUL WATER WELL CO 27200
PAUL T SCHLEICHER
3817 36TH AVE SO
MINNEAPOLIS MINN 55406

ANDERSON WELL DRILLING 77201
NEAL R ANDERSON
ROUTE 1
CLARISSA MINN 56440

MIDDENDORFF WELL COMPANY 90202
ART T MIDDENDORFF
201 LAKE STREET
SIOUX RAPIDS IOWA 50585

TORGERSON ART AND SON WELL CO 02203
ARTHUR P TORGERSON
4817 4TH ST NE
COLUMBIA HTS MINN 55421

FALK BROTHERS WELL DRILLING 91204
JAMES M FALK
R R 1
HANKINSON N.D. 58041

FALK CHARLES P WELL DRILLING 91205
CHARLES P FALK
R R 1
HANKINSON N.D. 58041

TOGSTAD WELLWORKS 56207
TYLER S TOGSTAD
PELICAN RAPIDS MINN 56572

JAPP RICHARD WELL DRILLING 49208
RICHARD H JAPP
R R 1
CUSHING MINN 56443

HANSON WELL DRILLING + REPAIR 56209
IVER A HANSON
ASHBY MINN 56309

NELSON WELL CO 18210
CARL L NELSON
RT 1 BOX 25A
DEERWOOD MINN 56444

BURR EUGENE D WELL DRILLING 73211
EUGENE BURR
R R 3
PAYNESVILLE MINN 56362

PAASCH WELL DRILLING 14212
ALBERT T PAASCH
BOX 102
SABIN MINN 56580

DURYEA WELL AND PUMP SERVICE 55213
VIRGIL M DURYEA
5105 COLLEGE VIEW
ROCHESTER MINN 55901

LEWIS WELL DRILLING 50214
VIRGIL B LEWIS
105 14TH ST S E
AUSTIN MINN 55912

DUCHARME GERALD A WELL DRILLING CO 62216
GERALD A DUCHARME
738 E CO RD 32
ST PAUL MINN 55117

KAML WELL CO 68218
OTTO KAML

BADGER MINN 56714

KOPKA WELL DRILLING AND SONS 87219
TONY F KOPKA
ROUTE 1
MINNEOTA MINN 56264

DRUSSELL EUGENE 85220
EUGENE W DRUSSELL
673 E MARK ST
WINONA MINN 55987

DRUSSELL WELL DRILLING 85221
EARL M DRUSSELL
673 E MARK ST
WINONA MINN 55987

YERGENS WELL DRILLING 60222
FRANCIS L YERGENS

FOSSTON MINN 56542

BUCHHOLZ WELL DRILLING 48223
ARNOLD BUCHHOLZ

ISLE MINN 56342

RONO WELL DRILLING 18224
ADOLPH RONO

DEERWOOD MINN 56444

DENNIS BJORKLUND WELL DRILLING 18225
DENNIS E BJORKLUND
R.R. 1
FT RIPLEY MINN 56449

BJORKLUND CARL WELL DRILLING 18226
CARL O BJORKLUND
R R 5
BRAINERD MINN 56401

MOSE LEE + SON WELL CO 18227
LEROY V MOSE
R R 6
BRAINERD MINN 56401

CORPIAN KENNETH AND SONS WELL DRILLING 26228
KENNETH CORPIAN
R 3 BOX 84
BOSCOBEL WISC 53805

OLSON WELL CO 14229
PAUL J OLSON

LAKE PARK MINN 56554

SCHULTZ WELL DRILLING 93230
CARL F SCHULTZ
R R I
COCHRANE MINN 54622

JORGENSON WELL DRILLING 12231
LEONARD R JORGENSON
1613 NO 5TH ST
MONTEVIDEO MINN 56265

MEVISSEN WELL COMPANY 71232
JAMES L MEVISSEN
ROUTE 1
ELK RIVER MINN 55330

HOYER BROS WELL DRILLING
79233
ALBERT L HOYER
BAY CITY WISC 54723

JERRY MINETT WELL
DRILLING 59234
JERRY H MINETT
RUTHTON MINN 56170

SAVAGE PHILIP WELL
DRILLING 25235
PHILIP L SAVAGE
331 1/2 E 5TH ST
REDWING MINN 55066

SCHMITZ WELL DRILLING
29236
JULIAN F SCHMITZ
R R 2
MENAHGA MINN 56464

CANNING WELL CO
27237
STUART W CANNING
RT 2
OSSEO MINN 55369

MATHEWS WELL CO
43238
HILLARD M MATHEWS
LESTER PRAIRIE MINN 55354

LITZAU DONALD R
43239
DONALD R LITZAU
R R 1
LESTER PRAIRIE MINN 55354

COLE WELL CO
74240
VERNON S COLE
BOX 188
ELLENDALE MINN 56026

MINNESOTA VALLEY WELL
DRILLERS INC 72241
KENNETH W JACOBSEN
RTE 3 BOX 131A
PRIOR LAKE MINN 55372

KASTET WELL DRILLING
84242
JUSTIN KASTET
ROTHSAY MINN 56579

HUFFMAN WELL CO.
72244
JOH T HUFFMAN
R.R. 1
GAYLORD MINN 55334

BLOOMING PRAIRIE WELL CO
74245
JEROME S SEVERTSON
BOX 593
BLOOMING PR MINN 55917

RENNER MAX WELL CO INC
27246
ARDEN R ENGEBRETSON
601 13TH AVE SO
HOPKINS MINN 55343

STEUART PLUMBING AND
HEATING PLUMBING AND REF56248
RICHARD B LENNING
BOX 21
HENNING MINN 56551

CANNON WELL COMPANY
25249
ROBERT M VAUGHT
R R 2 BOX 266A
CANNON FALLS MINN 55009

MARG EUGENE
85250
EUGENE MARG
ROUTE =1
WINONA MINN 55987

BAER WELL DRILLING CO
07251
RAYMOND C BAER
PEMBERTON MINN 56078

BEN ERVIN WELL COMPANY
65252
BEN F ERVIN
402 13TH ST SO
OLIVIA MINN 56277

L. A. FROST WELL SERVICE
07253
LEROY A FROST
205 LILLY ST
MANKATO MINN 56001

JULSEN HAROLD F
27254
HAROLD F JULSEN
5307 DOMINICK DR
HOPKINS MINN 55343

OLSON WELL CO
46255
GORDON G OLSON
314 E 10TH ST
FAIRMONT MINN 56031

PAULSON WELL COMPANY
59256
ARNOLD P PAULSON

JASPER MINN 56144

RAMBERG WELL SERVICE
60257
LLOYD RAMBERG

MENTOR MINN 56736

ASSOCIATED WELL DRILLERS
INC 27259
WILLIAM J SCHULTZ
13160 PIONEER TRL
EDEN PRAIRIE MINN 55343

CARLTON WELL COMPANY
34260
HERMAN D CARLTON

PENNOCK MINN 56279

ERICKSON DENNIS WELL
DRILLING COMPANY 57261
DENNIS W ERICKSON
ROUTE 4 BOX 274
THIEF RVR FLS MINN 56701

FLETCHERS WELL DRILLING
18262
GERALD A FLETCHER

EMILY MINN 56431

THOMAS WELL DRILLING
71263
LLOYD W THOMAS

ELK RIVER MINN 55330

DRILLCO
27264
JOHN D URAN
20525 PARK PLACE
EXCELSIOR MINN 55331

WISHARD WELL DRILLING
93265
WILLIAM A WISHARD
RT 3
NEW RICHMOND WISC 54017

MOORE TOM WELL CO
32266
THOM H MOORE
ROUTE 2 BOX 108
JACKSON MINN 56143

FOREMAN FRED WELL
DRILLING 73267
FRED J FOREMAN

KIMBALL MINN 55353

MARTELL STEPHEN J
93268
STEPHEN J MARTELL
BOX 247-B
SOMERSET WISC 54025

MARTELL WELL DRILLING INC
93269
GEORGE E SOLSVIG
BOX 247A
SOMERSET WISC 54025

MCALPINE BROS INC
86270
CLARENCE A MCALPINE
BOX 215
ROGERS MINN 55374

WEISEL WELL CO
21271
WILLIAM J WEISEL
RT 2 BOX 26
ALEXANDRIA MINN 56308

MINNEOTA DRILLING
42272
HILLER A HOLIEN
115 CENTURY DRIVE
MINNEOTA MINN 56264

THRON, RICHARD A.
82273
RICHARD A THRON
16633 UPPER 4TH ST
LAKELAND MINN 55043

SIMAR WELL CO
27274
HOWARD SIMAR
ROUTE 1 BOX 616
MOUND MINN 55364

MATHEWS WELL COMPANY
43275
ELDOR T MATHEWS
ROUTE 3
GLENCOE MINN 55336

STODOLA ROBERT E WELL
DRILLING + PUMP REPAIR 27276
ROBERT E STODOLA
4530 HIGHLAND RD
MINNETONKA MINN 55343

STOLLS WELL REPAIR 86277
MARTIN C STOLL
HOWARD LAKE MINN 55349

MIDWEST VALLEY INC 71278
BRIAN T VANBEUSEKOM
RT 1 BOX 28?
BIG LAKE MINN 55309

TAYLOR + SAMPSON WELL DRILLING CO 02280
CURTIS P SAMPSON
R 2
FOREST LAKE MINN 55025

FIDELDY, JAMES A. 31281
JAMES A FIDELDY
ROUTE 1
BOVEY MINN 55709

SACHS LEE WELL CO 70282
LEE W SACHS
613 BRDYS
JORDAN MINN 55352

BLAKE DRILLING CO 27283
WILLARD R BLAKE
6200 78TH AVE N
BROOKLYN PARK MINN 55443

NELSON WELL CO 34284
HOWARD C NELSON
ATWATER MINN 56209

THOMPSON PUMP AND WELL SERVICE 09285
JOHN C THOMPSON
1633 AIRPORT ROAD
CLOQUET MINN 55720

SCHUELER WELL DRILLING 85287
JERRY L SCHUELER
R 2
WINONA MINN 55987

JOHNSON WELL CO 60288
WARREN H JOHNSON
GULLY MINN 56646

WEMPNER CLAIR WELL SERVICE 60289
CLAIR M WEMPNER
230 1ST AVE S W
PLAINVIEW MINN 55964

LUNDON BROS WELL DRILLING 44290
WILLIAM J LUNDON
BOX 109
MAHNOMEN MINN 56557

LUNDON FRANCIS L 44291
FRANCIS L LUNDON
BOX 109
MAHNOMEN MINN 56557

MARTIN LAKE GARAGE 12292
MURTON MULVIHILL
RTE 2 BOX 637
STACY MINN 55079

BERG WELL DRILLING 67293
ELMER C BERG
GULLY MINN 56646

CONROY WELL DRILLING 75294
JOHN CONROY
HANCOCK MINN 56244

CCW CONSTRUCTION COMPANY 80297
CLARK C WINGARD
BOX 278
MENAHGA MINN 56464

BARRY BROS WELL COMPANY 75298
JOHN E BARRY
413 PACIFIC
MORRIS MINN 56267

HUNSINGER E J WELL DRILLING 10299
ELMER J HUNSINGER
RT 1 BOX 822
EXCELSIOR MINN 55331

BROWN PUMP SERVICE 46300
THEODORE L LUETGERS
BOX 148 R R 3
FAIRMONT MINN 56031

MAHER WELL DRILLING INC 19301
TOM MAHER
RT 1
HASTINGS MINN 55033

MAHER TERRY 19302
TERRY MAHER
HWY 316 R R 1
HASTINGS MINN 55033

BAROTT DRILLING SERVICES 02303
GARY R BAROTT
681 BIRCH ST
HUGO MINN 55038

CUSTER BROTHERS 31304
CHESTER I CUSTER
RURAL ROUTE 1
WIRT MINN 56688

TIN MAN INC 60305
DAVID A CARLSON

ST CROIX FALLS WISC 54024

DIEKMANN JOSEPH B. 78306
JOSEPH B DIEKMANN
R. F. D.
BEARDSLEY MINN 56211

MORRIES WELL DRILLING 03307
MORRIS ENGER
RT 2
PELICAN RAPIDS MINN 56572

ERICKSON EARL K WELL DRILLING 57308
EARL ERICKSON
118 S KINNEY AVE
THIEF RVR FLS MINN 56701

HALVORSON WELL DRILLING 91309
ERVIN HALVORSON
BOX 68
RAKE MINN 56465

HASSKAMP BROS WELLING DRILLING 01310
GORDON HASSKAMP
RTE 3
AITKIN MINN 56431

JOHNSON WELL COMPANY 53311
MICHAEL JOHNSON
ROUTE 1
BIGELOW MINN 56187

JIMS WELL DRILLING 60312
JAMES LOHSE
P O BOX 24
GULLY MINN 56646

MATHESON WELL CO. 84313
ALFR P MATHESON

WOLVERTON MINN 56594

MCCARROLL DRILLING 31314
MIKE MCCARROLL
BOX 211
DEER RIVER MINN 56636

NORDRUM WELL DRILLING 62315
HOWARD NORDRUM
1138 S CENTURY AVE
ST PAUL MINN 55119

TWEED RICHARD WELL CO 02316
RICHARD TWEED
9431 176TH AVE NW
ANOKA MINN 55303

FREDERICKSONS INC. 08317
DUANE VERDECK

SLEEPY EYE MINN 56085

HYDRO ENGINEERING INC 10318
AUSTIN G HUFFMAN
BOX 98
YOUNG AMERICA MINN 55397

PETERSON WELL CO 17319
GAYLE PETERSON
535 BIRCH
WESTBROOK MINN 56183

NORTH STAR WELLS INC 27321
JOSEPH L GLEASON
5629 10TH AV SO
MINNEAPOLIS MINN 55417

JENNINGS WELL DRILLING 73321
STEPHEN B JENNINGS
BOX 152
RICHMOND MINN 56368

EMPIRE IRRIGATION DRILLING CO INC 92322
PAUL W KING
BOX 1252
HURON SD 57350

KLAVU WELL DRILLING 09323

ERWIN W KLAVU
BOX 102
KETTLE RIVER MINN 55757

GM INVESTMENT CO THE
MENKVELD CO 02324
GILBERT A MENKVELD
BOX 447
ANOKA MINN 55303

CLIFFS WELL SERVICE 90325

CLIFFORD W PORTER

ARMSTRONG IOWA 50514

STEMPER WELL CO 28326

JOE E STEMPER
R R 1
HOKAH MINN 55941

LENS WELL + PUMP SERVICE 71327

LEONARD J STUTTGEN
R R =3
ELK RIVER MINN 55330

THOMPSON WELL DRILLING 50328

ELMER J THOMPSON
BOX 133
RACINE MINN 55967

VADNAIS PLUMBING AND WELL CO 62329
ROBERT W VADNAIS
414 MILLER AVE
WHITE BEAR LAK MINN 55110

VALNES WELL DRILLING 75330

ROBERT D VALNES
ROUTE 1
MORRIS MINN 56267

ST PETER WELL CO 40331

ARNO R FLOWERS
PO BOX 334
ST PETER MINN 56082

EOF READ ON DSI 1.

37 BLOCK(S) READ ON DSI 1. FIL

COUNTY OFFICES

Mike Johnson	Zoning Adm., Aitkin County Courthouse	Aitkin 56431
Bob Hutchison	Co. Sanitarian, Anoka County, 2211 N. Upland Crest	Columbia Hgts. 55421
Lindy Higdem	Zoning Adm., Becker County Courthouse	Detroit Lakes 56501
William Patnaude	Zoning Adm., Beltrami County, Box 248	Bemidji 56601
Paul Schneider	Zoning Adm., Benton County Courthouse	Foley 56329
Vincent Taffe	Act. Zoning Adm., Big Stone County Courthouse	Ortonville 56278
Herb Wenkel	Co. San., Blue Earth County, City Hall	Mankato 56001
Arthur Stone	Zoning Adm., Brown County Courthouse	New Ulm 56873
Albert Anderson	Zoning Officer, Carlton County Courthouse	Carlton 55718
Orwin R. Pierson	Zoning Officer, Carver County Courthouse	Chaska 55318
John Rohr	Zoning Officer, Cass County Courthouse	Walker 56484
Gerald Peterson	Zoning Adm., Chisago County	Center City 55012
Emery Stordahl	Dir. of Health, City Hall	Moorhead 56560
Daniel Logelin	Co. San., Clearwater County Courthouse, 2nd Floor	Bagley 56621
Harry Brothers	San. & Zoning Adm., Cook County Courthouse	Grand Marais 55604
LeRoy Krahn	Zoning Adm., Cottonwood County Assessors Office	Windom 56101
Dennis Gustafson	Zoning Adm., Crow Wing County Courthouse	Brainerd 56401
Gunner Isburg	Co. Planner, Dakota Co., 310 Vermillion St.	Hastings 55033
Dick Holton	Zoning Adm., Dodge County Courthouse	Mantorville 55955
Maurice Faehnrich	Douglas County Building Inspector, Courthouse	Alexandria 56308
Chester Christianson	Zoning Adm., Faribault County Courthouse	Blue Earth 56013
Wesley Kasten	Zoning Adm., Fillmore County Courthouse	Preston 55965
Truman Throndd	Freeborn Co. Plng. & Zoning Adm., Courthouse	Albert Lea 56007
Joyce Bucher	Zoning Adm., Goodhue County, Route 1	Zumbrota 55992
James Standish	Grant County Coordinator, Courthouse	Elbow Lake 56531
Luther Nelson	Chief, Environment Service Station, Dept. of Public Works	Hopkins
Duane Wohlers	Zoning Adm., Houston County	Brownsville 55919
E. F. Fernandes	Zoning Adm., Hubbard County Courthouse	Park Rapids 56470
Aaron Boettcher	Zoning Adm., Isanti County Courthouse	Cambridge 55008
James Sullivan	Zoning Officer, Itasca County Courthouse	Grand Rapids 55744
A.Walter Sternke	Co. San., Jackson County, Box 184	Worthington 56187
Marv Erickson	Zoning Adm., Kanabec County Courthouse	Mora 55051
Chester Johnson	Kandiyohi County Assessor, Courthouse	Willmar 56201
Clarence Beck	Zoning Adm., Kittson County Courthouse	Hallock 56728
George Gehant, Jr.	Dir., Planning & Zoning Office, Courthouse	Madison 56258
Lester Mattson	Planning & Zoning Officer, Lake County Courthouse	Two Harbors 55616
Gary Lockner	Zoning Adm., Lake of the Woods County, R.R. 1, Box 23	Baudette 56623
Henry Fahning	Zoning Adm., LeSueur County Highway Office	LeCenter 56057
Jake Janzen	Environmental Administrator, Lyon County Courthouse	Marshall 56258
A. O. Victonian	Zoning Adm., McLeod County Courthouse	Glencoe 55336
Eugene Fitterer	Zoning Adm., Meeker County, Route 1	Litchfield 55355
Douglas Holt	Mille Lacs County Zoning Adm., Courthouse	Milaca 56353
H. A. Ives	Zoning Chm., Mille Lacs County	Isle 56342
Lee McKinnon	Morrison Co. Plng. Adm., Old Courthouse	Little Falls 56345
Larry Landherr	Co. San., Mower County Courthouse	Austin 55912
Del K. Pryor	Zoning Adm., Murray County Courthouse	Slayton 56172
Archie Ollerman	Zoning Adm., Nicollet County Courthouse	St. Peter 56082
G. C. Bomgaars	Zoning Officer, Nobles County Courthouse	Worthington 56187
H. Christianson	Zoning Adm., Norman County Courthouse	Ada 56510
Eugene Hippe	Planning Dir., Olmsted Co., 1421 3rd Ave. S.E.	Rochester 55901
Malcolm Lee	Shoreland Mgmt. Adm., Otter Tail County Courthouse	Fergus Falls 56537
Arnold Ellingson	San., City Hall	Fergus Falls 56537

Henry Grednig	Zoning Adm., Polk County, 1417 Radison Road	Crookston 56716
Michael Howe	Pope County Env. Plng. Adm., Courthouse	Glenwood 56334
A. J. Hughes	Zoning Adm., Red Lake County Courthouse	Red Lake Falls 56750
Ed Honetschlager	Zoning Insp., Redwood County Courthouse	Redwood Falls 56283
James Tersteeg	Zoning Adm., Renville County Courthouse	Morton 56270
Merton Hoover	Health & San. Insp., Rice County Courthouse	Faribault 55021
William McCormack	Zoning Adm., Rock County Engineering Building	Luverne 56156
Emanuel Seidel	Zoning Adm., Roseau County Courthouse	Roseau 56751
Michael Miller	Zoning Dir., St. Louis County Courthouse	Duluth 55802
Francis Doyle	Zoning Adm., Scott County Courthouse	Shakopee 55379
Kenneth Mitchell	San., Sherburne County Courthouse	Elk River 55330
Gary Lee	Zoning Adm., Sibley County Courthouse	Gaylord 55334
Kenneth Hopke	Zoning Adm., Stearns County Planners Off., Box 604	St. Cloud 56301
Silvin Pribyl	Zoning Officer, Steele County Courthouse	Owatonna 55060
Donald Madsen	Zoning Adm., Stevens County Courthouse	Morris 56267
Jack Langan	Chm., Board of Com., Swift County Courthouse	Benson 56215
Mike Lorentz	Adm. Asst., Todd County Courthouse Annex	Long Prairie 56347
Greg Kempf	Zoning Adm., Wadena County Courthouse	Wadena 56482
Don Gomsrud	Zoning Adm., Waseca County Courthouse	Waseca 56093
William Schwab	Zoning Adm., Washington County Office Building	Stillwater 55082
Martin Gran	Zoning Adm., Wilkin County Courthouse	Breckenridge 56520
Karl Grabner	San., Winona Sanitation Dept.	Winona 55987
George Isaacson	Zoning Adm., Wright County Courthouse	Buffalo 55313
Percy Aadland	Zoning Adm., Yellow Medicine County Courthouse	Granite Falls 56241

LOCAL HEALTH DEPARTMENTS

Alice K. Brill, M.D.	Bloomington Health Dept., 2215 W. Old Shakopee Road	Bloomington 55431
John Urbach	Crystal Health Dept., City Hall, 4141 Douglas Drive N.	Minneapolis 55422
C. A. Smith, M.D.	Minneapolis Health Dept., 250 S. 4th St.	Minneapolis 55415
Emery Stordahl	Dir., Moorhead Health Dept., Box 779	Moorhead 56560
James Trow, M.D.	Richfield Health Dept., 6700 Portland Ave. S.	Richfield 55423
Duane Beckstrom	St. Cloud Health Dept., 111 4th Ave. S.	St. Cloud 56301
City Manager	St. Louis Park Health Dept., 5005 Minnetonka Blvd.	Minneapolis 55416
C. Henke, M.D.	St. Paul Bureau of Health, 555 Cedar St.	St. Paul 55101
W. W. Haesly, M.D.	Winona City Health Dept., City Hall	Winona 55987
George Steiner	Anoka County Comprehensive Health Unit, Courthouse	Anoka 55303
R. MacDonald, M.D.	Cook County Board of Health	Grand Marais 55604
A. Walter Sternke	Jackson-Nobles County Environmental Health Dept., Box 184	Worthington 56187
H. B. Leppink, M.D.	Lake County Health Dept., Community Clinic and HealthCenter, 4th St. at 11th Ave.	Two Harbors 55616
V. O. Wilson, M.D.	Olmsted County Health Dept., 415 4th St. S.E.	Rochester 55901
G. Rysgaard, M.D.	Rice County Health Dept., Medical Arts. Bldg.	Northfield 55057
H. B. Leppink, M.D.	St. Louis County Health Dept., 504 2nd St. E.	Duluth 55805
Lawrence Landherr	Austin-Mower Co. Health Unit, Mower County Courthouse	Austin 55912

LOCAL SANITARIANS

E. C. Omundson	San., City of Albert Lea	Albert Lea 56007
Martin Winston	San., City of Crystal, 4141 Douglas Drive	Crystal 55422
Kenneth Van Ess	St. Louis County Health Dept., 504 2nd St. E.	Duluth 55805
Arnold Ellingson	San., City of Fergus Falls	Fergus Falls 56537
Tom Oas	San., Village of Golden Valley, 7800 Golden Valley Road	Golden Valley 55427
Herb Wenkel	San., City-County Planners Office, City Hall	Mankato 56001
James Brinda	Dir. of Environmental Hygiene, Public Health Center, 250 S. 4th St.	Minneapolis 55415
Richard Geisen	San., Village of New Brighton, Village Hall	New Brighton 55112
William Poblete	P.H. Engineer, Rochester-Olmsted County Health Unit, 415 4th St. S.E.	Rochester 55901
Harvey McPhee	San., City of St. Louis Park, 5005 Minnetonka Blvd.	St. Louis Park 55426
Walter Jopke	San., Village of Roseville, 2701 Lexington Ave. N.	St. Paul 55113
Jay Makela	San., City of Virginia, City Hall	Virginia 55792
Theo J. Schima	Winona City Health Dept., City Hall	Winona 55987

MISCELLANEOUS

Nathaniel Perlmutter
Geraghty and Miller, Inc.
Water Research Building
44 Sintsink Drive East
Port Washington, L.I., New York 11050

Robert R. Storm, Publisher
Water Equipment News
P.O. Box 367
Urbana, Illinois 61801

Prof. William C. Walton, Dir.
Water Resources Research Center
University of Minnesota
Room 107 - Hubbard Building
2675 University Avenue
St. Paul, Minnesota 55114

H. E. Wirth, P.E., Dir.
Bureau of Environmental Health
State Dept. of Health and Social Services
P.O. Box 309
Madison, Wisconsin 53701

Debs T. Lake
519 South River Street
Chatfield, Minnesota 55923

G. F. Briggs, Publisher
Johnson Drillers Journal
P.O. Box 3118
St. Paul, Minnesota 55165

Prof. Rex Singer
1110 Mayo
University of Minnesota
Minneapolis, Minnesota 55455

Robert Herbst, Commissioner
Department of Natural Resources
Centennial Building
St. Paul, Minnesota

Gerald Christensen, Director
State Planning Agency
Capitol Square Building
St. Paul, Minnesota

John Wefald, Commissioner
Department of Agriculture
State Office Building
St. Paul, Minnesota

Edward J. Driscoll, Commissioner
Department of Commerce
State Office Building
St. Paul, Minnesota

Dennis Ferche
Legislative Research
State Capitol
St. Paul, Minnesota

John Helland
Legislative Research
State Capitol
St. Paul, Minnesota

Hon. Winston W. Borden
State Senator, District 13
6th & Laurel
Brainerd, Minnesota 56401

Hon. Jerome V. Blatz
State Senator, District 38
7701 Harriet Avenue S.
Bloomington, Minnesota 55423

Hon. Charles Berg
State Senator, District 15
Chokio, Minnesota 56221

Hon. John J. Bernhagen
State Senator, District 22
Route 1
Hutchinson, Minnesota 55350

Hon. Otto T. Bang, Jr.
State Senator, District 39
5200 Dugan Plaza
Edina, Minnesota 55435

Hon. Robert O. Ashbach
State Senator, District 48
1585 Lake Johanna Blvd.
St. Paul, Minnesota 55112

Hon. Norbert Arnold
State Senator, District 3
Route 1, Box 93
Pengilly, Minnesota 55775

Hon. J. C. Anderson
State Senator, District 19
Box 503
North Branch, Minnesota 55056

Dart

Hon. J. M. Hughes
State Senator, District 50
1978 Payne Avenue
Maplewood, Minnesota 55117

Hon. Ralph R. Doty
State Senator, District 8
4107 Dodge St.
Duluth, Minnesota 55804

Hon. John T. Davies
State Senator, District 60
2100 Summit Ave.
St. Paul, Minnesota 55105

Hon. Roger Hanson
State Senator, District 10
Box 128
Vergas, Minnesota 56587

Hon. George R. Conzemius
State Senator, District 25
800 W. Hoffman
Cannon Falls, Minnesota 55009

Hon. Mel Hansen
State Senator, District 61
4505 28th Avenue S.
Minneapolis, Minnesota 55406

Hon. Baldy Hansen
State Senator, District 31
State Bank of Rose Creek
Rose Creek, Minnesota 55970

~~Hon. Nicholas D. Coleman~~
~~State Senator, District 65~~
~~Coleman/Goff Inc., 1000 Capital~~
~~Centre Plaza, 386 North Wabasha~~
~~St. Paul, Minnesota 55102~~ Duplicate

Hon. Edward J. Gearty
State Senator, District 54
1102 W. Broadway
Minneapolis, Minnesota 55411

Hon. Florian Chmielewski
State Senator, District 14
Sturgeon Lake, Minnesota 55783

Hon. Mel Frederick
State Senator, District 32
414 Clyde St.
West Concord, Minnesota 55985

Hon. John C. Chenoweth
State Senator, District 66
1378 Searle St.
St. Paul, Minnesota 55101

Hon. Richard W. Fitzsimons
State Senator, District 1
303 E. Prairie Ave.
Warren, Minnesota 56762

Hon. Robert J. Brown
State Senator, District 51
c/o College of St. Thomas
2115 Summit
St. Paul, Minnesota 55105

Hon. Robert G. Dunn
State Senator, District 18
503 8th Ave. S.
Princeton, Minnesota 55371

Hon. James Lord
State Senator
Rt. 4 - P.O. Box 950
Excelsior, Minnesota 55331

Hon. Robert B. Lewis
State Senator, District 41
1601 Hillsboro Ave. S.
St. Louis Park, Minnesota 55426

Hon. Roger Laufenburger
State Senator, District 34
Box 6
Lewiston, Minnesota 55952

Hon. L. W. Larson
State Senator, District 35
Mabel, Minnesota 55954

Hon. Harold G. Krieger
State Senator, District 33
425 1st Natl. Bank Bldg.
Rochester, Minnesota 55901

Hon. Al Kowalczyk
State Senator, District 45
6016 70th Ave. N.
Brooklyn Park, Minnesota 55429

Hon. Howard A. Knutson
State Senator, District 53
1907 Woods Ln.
Burnsville, Minnesota 55378

Hon. J[illegible] T. Kleinbaum
State Senator, District 17
27 - 7th Ave. S.
St. Cloud, Minnesota 56301

Hon. W. G. Kirchner
State Senator, District 37
6625 Lyndale Ave. S.
Richfield, Minnesota 55423

Hon. Stephen Keefe
State Senator, District 59
4217 Garfield Ave. S.
Minneapolis, Minn. 55409

Hon. John B. Keefe
State Senator, District 40
32 - 10th Ave. S.
Hopkins, Minnesota 55343

Hon. J. A. Josefson
State Senator, District 20
310 Grant N.
Minneota, Minnesota 56264

~~Hon. C. A. Jensen~~
~~State Senator, District 28~~
~~127 E. Main St.~~
~~Sleepy Eye, Minnesota 56085~~ Duplicate

Hon. Hubert H. Humphrey, III
State Senator, District 44
8116 40th Ave. N.
New Hope, Minnesota 55428

Hon. George Perpich
State Senator, District 5
104½ W. Lake St.
Chisholm, Minnesota 55719

Hon. A. J. Perpich
State Senator, District 6
4 Lakeside Drive S.
Ely Lake
P.O. Eveleth, Minnesota 55734

Hon. John Patton
State Senator, District 30
1007 S. Moore
Blue Earth, Minnesota 56013

Hon. Joseph T. O'Neill
State Senator, District 63
1381 Summit Ave.
St. Paul, Minnesota 55105

Hon. J. L. Olson
State Senator, District 26
612 Lake St.
Worthington, Minnesota 56187

Hon. H. D. Olson
State Senator, District 27
Route 3
St. James, Minnesota 56081

Hon. A. G. Olson
State Senator, District 21
RR #1
Spicer, Minnesota 56288

Hon. Wayne Olhoft
State Senator, District 11
Herman, Minnesota 56248

Hon. Harmon T. Ogdahl
State Senator, District 58
5026 Morgan Ave. S.
Minneapolis, Minnesota 55419

Hon. Edward G. Novak
State Senator, District 64
1424 Arundel St.
St. Paul, Minnesota 55117

Hon. Robert D. North
State Senator, District 62
1642 Blair
St. Paul, Minnesota 55104

Hon. Rolf Nelson
State Senator, District 43
3735 N. Highway 52
Robbinsdale, Minnesota 55422

Hon. Roger D. Moe
State Senator, District 2
304 S. 2nd St. W.
Ada, Minnesota 56510

Hon. John Milton
State Senator, District 49
1 Sparrow Lane, North Oaks
White Bear Lake, Minnesota 55110

Hon. William McCutcheon
State Senator, District 67
2238 Edgebrook Ave.
St. Paul, Minnesota 55119

Hon. Gerald L. Willet
State Senator, District 4
207 Mill Road
Park Rapids, Minnesota 56470

Hon. Sam G. Solon
State Senator, District 7
616 W. 3rd St.
Duluth, Minnesota 55806

Hon. Myrton O. Wegener
State Senator, District 12
Bertha, Minnesota 56437

Hon. Douglas H. Silers
State Senator, District 9
Route 2
Moorhead, Minnesota 56560

Hon. Arnulf Ueland, Jr.
State Senator, District 29
2013 Roe Crest Dr.
North Mankato, Minnesota 56001

Hon. Ed Schrom
State Senator, District 16
Route 2
Albany, Minnesota 56307

Hon. Stanley N. Thorup
State Senator, District 47
319 - 104th Lane N.E.
Blaine, Minnesota 55434

Hon. David D. Schaaf
State Senator, District 46
6550 E. River Road
Fridley, Minnesota 55432

Hon. Robert J. Tennessen
State Senator, District 56
304 Title Insurance Bldg.
Minneapolis, Minnesota 55401

Hon. Carl W. Renneke
State Senator, District 23
RR # 2
LeSueur, Minnesota 56058

Hon. Eugene Stokowski
State Senator, District 55
2231 Stinson Blvd.
Minneapolis, Minnesota 55418

Hon. Clarence M. Purfeerst
State Senator, District 24
Route 2
Faribault, Minnesota 55021

Hon. Robert J. Stassen
State Senator, District 52
2320 Kraft St.
South St. Paul, Minnesota 55075

Hon. George S. Pillsbury
State Senator, District 42
930 Dain Tower
Minneapolis, Minnesota 55402

Hon. Allan H. Spear
State Senator, District 57
2024 Seabury Ave. S.
Minneapolis, Minnesota 55406

The Honorable Glen H. Anderson
State Representative
Odessa, Minnesota 56276

The Honorable Delbert F. Anderson
State Representative
Route #2, Box 70
Starbuck, Minnesota 56381

The Honorable Richard A. Andersen
State Representative
2600 Rice Creek Terrace
New Brighton, Minnesota 55112

The Honorable Salisbury Adams
State Representative
Route #2, Box 1122
Wayzata, Minnesota 55391

The Honorable James L. Adams
State Representative
4234 - 19th Avenue South
Minneapolis, Minnesota 55407

The Honorable Douglas W. Carlson
State Representative
Sandstone, Minnesota 55072

The Honorable Tom Berg
State Representative
2112 Newton Avenue South
Minneapolis, Minnesota 55405

The Honorable Bernard O. Carlson
State Representative
1216 Selmser Avenue
Cloquet, Minnesota 55720

The Honorable Tony Bennett
State Representative
1414 Mechanic Avenue
St. Paul, Minnesota 55106

The Honorable Arne Carlson
State Representative
4301 Fremont Avenue South
Minneapolis, Minnesota 55410

The Honorable Robert C. Bell
State Representative
1480 Northwestern Nat'l. Bank Bldg.
St. Paul, Minnesota 55101

The Honorable Bernard J. Brinkman
State Representative
Richmond, Minnesota 56368

The Honorable Art Braun
State Representative
Greenbush, Minnesota 56726

The Honorable Jerome J. Belisle
State Representative
407 Glenbrook Avenue North
Oakdale, Minnesota 55119

The Honorable John S. Biersdorf
State Representative
409 E. Broadway
Owatonna, Minnesota 55060

The Honorable Lynn H. Becklin
State Representative
615 South Dellwood
Cambridge, Minnesota 55008

The Honorable Linda Berglin
State Representative
2648 10th Avenue South
Minneapolis, Minnesota 55407

The Honorable Irvin N. Anderson
State Representative
909 - 13th Street
International Falls, Minnesota 56649

The Honorable Wendell O. Erickson
State Representative
Hills, Minnesota 56138

The Honorable Harold J. Dahl
State Representative
P. O. Box 337
Howard Lake, Minnesota 55349

The Honorable Dale E. Erdahl
State Representative
Route #2, Box 50
Blue Earth, Minnesota 56013

The Honorable David R. Cummiskey
State Representative
117 1/2 Marshall Street
Mankato, Minnesota 56001

The Honorable Stanley A. Enebo
State Representative
3304 - E. 25th Street
Minneapolis, Minnesota 55406

The Honorable Robert Culhane
State Representative
Route #1
Waterville, Minnesota 56096

The Honorable Willis R. Eken
State Representative
Twin Valley, Minnesota 56584

The Honorable Joe Connors
State Representative
1410 Trollhagen Drive
Fridley, Minnesota 55421

The Honorable A. J. Eckstein
State Representative
411 South State
New Ulm, Minnesota 56073

The Honorable J. B. Clifford
State Representative
9400 Northwood Parkway
New Hope, Minnesota 55427

The Honorable Aubrey W. Dirlam
State Representative
Route #2
Redwood Falls, Minnesota 56283

The Honorable David Cleary
State Representative
8924 - 16th Avenue Circle
Bloomington, Minnesota 55420

The Honorable James R. Casserly
State Representative
1100 Vincent Avenue North
Minneapolis, Minnesota 55411

The Honorable Neil Dieterich
State Representative
2171 Knapp Street
St. Paul, Minnesota 55108

The Honorable Frank H. DeGroat
State Representative
Lake Park, Minnesota 56554

The Honorable Lyndon R. Carlson
State Representative
5819 Halifax Avenue North
Brooklyn Center, Minnesota 55429

The Honorable O. J. [redacted]nitz
State Representative
2555 Queensland Lane
Wayzata, Minnesota 55391

The Honorable Peter X. Fugina
State Representative
5 Merritt Drive
Virginia, Minnesota 55792

The Honorable Neil S. Haugerud
State Representative
Route #3
Preston, Minnesota 55965

The Honorable Stanley J. Fudro
State Representative
2322 Second Street Northeast
Minneapolis, Minnesota 55418

The Honorable Walter Hanson
State Representative
1136 Hague Avenue
St. Paul, Minnesota 55104

The Honorable Mrs. Mary M. Forsythe
State Representative
4605 Edina Blvd.
Edina, Minnesota 55424

The Honorable Thomas M. Hagedorn
State Representative
Route #2
Truman, Minnesota 56088

The Honorable David Fjoslien
State Representative
Route #2
Brandon, Minnesota 56315

The Honorable Joan R. Crowe
State Representative
16836 Canterbury Drive
Minnetonka, Minnesota 55343

The Honorable Robert J. Ferderer
State Representative
440 Hoyt Avenue East
St. Paul, Minnesota 55101

The Honorable Joseph P. Graw
State Representative
10730 W. Bloomington Freeway
Bloomington, Minnesota 55431

The Honorable Ray W. Faricy
State Representative
2240 Goodrich Avenue
St. Paul, Minnesota 55105

The Honorable Joseph P. Graba
State Representative
Route #1, Box 94-2
Wadena, Minnesota 56482

The Honorable Gilbert Esau
State Representative
Mountain Lake, Minnesota 56159

The Honorable Frank Knoll
State Representative
5316 - 1st. Avenue South
Minneapolis, Minnesota 55419

The Honorable Gerald Knickerbocker
State Representative
10100 Minnetonka Blvd.
Minnetonka, Minnesota 55343

The Honorable Walter K. Klaus
State Representative
Route #1
Farmington, Minnesota 55024

The Honorable Ray Kempe
State Representative
310 Christine Lane
West St. Paul, Minnesota 55118

The Honorable William M. Kelly
State Representative
430 Tenth Avenue North
East Grand Forks, Minnesota 56721

The Honorable Phyllis Kahn
State Representative
100 Malcolm Avenue S.E.
Minneapolis, Minnesota 55414

The Honorable Thaddeus Jude
State Representative
4400 Shoreline Blvd.
Mound, Minnesota 55364

The Honorable Ralph P. Jopp
State Representative
Mayer, Minnesota 55360

The Honorable Robert W. Johnson
State Representative
1950 Bayard Avenue
St. Paul, Minnesota 55116

The Honorable John W. Johnson
State Representative
5101 Irving Avenue South
Minneapolis, Minnesota 55419

The Honorable Douglas J. Johnson
State Representative
P. O. Box 14
Cook, Minnesota 55723

The Honorable Carl M. Johnson
State Representative
Route #3
St. Peter, Minnesota 56082

The Honorable Mike Jaros
State Representative
2721 West 4th Street
Duluth, Minnesota 55806

The Honorable Joel Jacobs
State Representative
11932 Zion Street
Coon Rapids, Minnesota 55433

The Honorable Julian Hook
State Representative
3601 Park Center Blvd.
St. Louis Park, Minnesota 55416

The Honorable M. J. [redacted]auley
State Representative
404 East Howard
Winona, Minnesota 55987

The Honorable Ernest A. Lindstrom
State Representative
7406 Fremont Avenue South
Richfield, Minnesota 55423

The Honorable Paul McCarron
State Representative
732 - 82nd Avenue N.E.
Spring Lake Park, Minnesota 55432

The Honorable Richard Lemke
State Representative
Lake City, Minnesota 55041

The Honorable Mrs. Ernee M. McArthur
State Representative
2118 - 55 Avenue North
Brooklyn Center, Minnesota 55430

The Honorable Jack H. LaVoy
State Representative
1708 East Third Street
Duluth, Minnesota 55812

The Honorable George Mann
State Representative
Route #1
Windom, Minnesota 56101

The Honorable Calvin R. Larson
State Representative
111 North Mill
Fergus Falls, Minnesota 56537

The Honorable Verne E. Long
State Representative
Route 1, Box 307
Pipestone, Minnesota 56164

The Honorable Gary Laidig
State Representative
114 North 4th Street
Bayport, Minnesota 55003

The Honorable Vincent H. Lombardi
State Representative
6741 Shadow Lake Drive
Lino Lakes, Minnesota 55038

The Honorable Adolph L. Kvam
State Representative
25 Lockerbie
Litchfield, Minnesota 55355

The Honorable John C. Lindstrom
State Representative
415 W. 7th
Willmar, Minnesota 56201

The Honorable Richard Kostohryz
State Representative
2478 East Indian Way
North St. Paul, Minnesota 55109

The Honorable Fred C. Norton
State Representative
1230 Commerce Building
St. Paul, Minnesota 55101

The Honorable Donald M. Moe
State Representative
456 Summit Avenue
St. Paul, Minnesota 55102

The Honorable Joseph T. Nichaus
State Representative
Route #3
Sauk Centre, Minnesota 56378

The Honorable Melvin J. Miller
State Representative
Randall, Minnesota 56475

The Honorable Thomas W. Newcome
State Representative
W. 1557 First Nat'l. Bank Bldg.
St. Paul, Minnesota 55101

The Honorable Darrel R. Miller
State Representative
Route #1
Pine Island, Minnesota 55963

The Honorable Ken Nelson
State Representative
3100 - 5th Avenue South
Minneapolis, Minnesota 55408

The Honorable Richard J. Menke
State Representative
Jordan, Minnesota 55352

The Honorable Leonard C. Myrah
State Representative
Route #2
Spring Grove, Minnesota 55974

The Honorable Helen E. McMillan
State Representative
1230 Second Drive
Austin, Minnesota 55912

The Honorable Willard M. Munger
State Representative
1121 - 70th Avenue West
Duluth, Minnesota 55807

The Honorable Robert J. McFarlin
State Representative
4329 Coolidge Avenue
St. Louis Park, Minnesota 55424

The Honorable August B. Mueller
State Representative
Route #1
Arlington, Minnesota 55307

The Honorable Bob McEachern
State Representative
601 North Walnut
St. Michael, Minnesota 55376

The Honorable Roy R. Ryan
State Representative
1085 Thomas Avenue
St. Paul, Minnesota 55104

The Honorable James Pehler
State Representative
734 - 14th Avenue South
St. Cloud, Minnesota 56301

The Honorable James I. Rice
State Representative
2220 Vincent Avenue North
Minneapolis, Minnesota 55411

The Honorable Robert L. Pavlak
State Representative
116 West Belvidere Street
St. Paul, Minnesota 55107

The Honorable Thomas H. Resner
State Representative
3714 - 3rd Street N.W.
Rochester, Minnesota 55901

The Honorable Raymond Pavlak
State Representative
412 Southview Blvd.
South St. Paul, Minnesota 55075

The Honorable E. W. Quirin
State Representative
P. O. Box 6537
Rochester, Minnesota 55901

The Honorable Al Patton
State Representative
Box 163
Sartell, Minnesota 56377

The Honorable Norman Prahl
State Representative
General Delivery
Keewatin, Minnesota 55753

The Honorable Richard J. Parish
State Representative
2565 Vale Creet Road
Golden Valley, Minnesota 55422

The Honorable Ray O. Pleasant
State Representative
9841 Xerxes Curve
Bloomington, Minnesota 55431

The Honorable William R. Ojala
State Representative
Box 776
Gilbert, Minnesota 55741

The Honorable Bradley G. Pieper
State Representative
804 East 134th Street
Burnsvill, Minnesota 55378

The Honorable Michas M. Ohnstad
State Representative
P.O. Box 55
Stacy, Minnesota 55079

The Honorable Harry Peterson
State Representative
Route 2
Madison, Minnesota 56256

The Honorable John Spanish
State Representative
2202 - 1/2 - 11th Avenue East
Hibbing, Minnesota 55746

The Honorable William H. Schreiber
State Representative
10001 Zane Avenue North
Brooklyn Park, Minnesota 55443

The Honorable Howard E. Smith
State Representative
116 West Main
Crosby, Minnesota 56441

The Honorable Henry J. Savelkoul
State Representative
222 East Main
Albert Lea, Minnesota 56007

The Honorable Andrew O. Skaar
State Representative
Route 1
Thief River Falls, Minnesota 56701

The Honorable John J. Sarna
State Representative
2837 Ulyssess Street
Minneapolis, Minnesota 55418

The Honorable Michael R. Sieben
State Representative
1535 - 4th Avenue
Newport, Minnesota 55055

The Honorable Donald B. Samuelson
State Representative
1018 Portland Avenue
Brainerd, Minnesota 56401

The Honorable Harry A. Sieben, Jr.
State Representative
4940 Viking Drive
Minneapolis, Minn. 55435

The Honorable John J. Salchert
State Representative
Suite 706
825 South 8th Street
Minneapolis, Minnesota 55404

The Honorable Glen Sherwood
State Representative
Longville Route
Pine River, Minnesota 56474

The Honorable Douglas St. Onge
State Representative
Route 4
Bemidji, Minnesota 56601

The Honorable Rodney N. Searle
State Representative
Route 1
Waseca, Minnesota 56093

The Honorable Martin O. Sabo
State Representative
3129 East 22nd Street
Minneapolis, Minnesota 55406

The Honorable Victor Schulz
State Representative
Route 1
Goodhue, Minnesota 55027

The Honorable Raymond O. Wolcott
State Representative
4110 Coffman Lane
Minneapolis, Minnesota 55406

The Honorable Robert E. Vanasek
State Representative
108 2nd Street N.E.
New Prague, Minnesota 56071

The Honorable Neil E. Wohlwend
State Representative
1314 - 10th Avenue South
Moorhead, Minnesota 56560

The Honorable James E. Ulland
State Representative
Route 6, Box 181
Duluth, Minnesota 55804

The Honorable Richard E. Wigley
State Representative
Route 2
Lake Crystal, Minnesota 56055

The Honorable John D. Tomlinson
State Representative
2150 Wilson Ave., Apt. 168
St. Paul, Minnesota 55119

The Honorable Stephen G. Wenzel
State Representative
204 S.E. 8th Street
Little Falls, Minnesota 56345

The Honorable James C. Swanson
State Representative
6827 - 5th Avenue South
Richfield, Minnesota 55423

The Honorable Charles R. Weaver
State Representative
830 River Lane
Anoka, Minnesota 55303

The Honorable Russell P. Stanton
State Representative
Arco, Minnesota 56113

The Honorable Gordon O. Voss
State Representative
11120 N.E. 7th Street
Blaine, Minnesota 55434

The Honorable Arlan I. Stangeland
State Representative
Route 2, Box 32
Barnesville, Minnesota 56514

The Honorable Bruce F. Vento
State Representative
1534 Atlantic Street
St. Paul, Minnesota 55106

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of the Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

FINDINGS OF FACT

The above-entitled matter came on for hearing before the Minnesota State Board of Health on the 9th day of January, 1974, at 9:30 A.M. in the Board Room, Minnesota Department of Health Building, 717 Delaware Street S.E., Minneapolis, Minnesota 55440, after proper notice required by Minn. Stat. § 15.0412 (1971) was served upon all persons, associations and other interested groups registered with the Secretary of State for that purpose as well as upon other persons, associations and groups of which the State Board was aware of as possibly having an interest in the above-captioned rules.

After affording interested persons an opportunity to present written and oral data, statements and arguments, and having heard and considered all of the testimony and evidence adduced and upon the records, files and proceedings herein, the Board makes and enters the following findings:

1. Authority to adopt regulations pertaining to the examination and licensing of water well contractors is contained in Minn. Stat. §§ 156A.03 and 156A.05 (1973 Supp.).

2. A need exists to amend the regulations governing the examination and licensing of water well contractors as the 1973 Minnesota Legislature amended Minn. Stat. ch. 156A (Minn. Laws 1973, ch. 747) by:

(a) Repealing the provisions which permitted individuals who had three years of water well drilling experience prior to the effective date of the licensing act to receive a license without taking and passing an examination;

(b) Providing for the issuance of limited licenses to individuals who perform only well repair service or install unconventional wells;

(c) Providing for annual licensing of water well contractors; and

(d) Providing for the registration of well drilling machines.

The regulations had to be changed to comply with and to enable the State Board to administer the law as amended. In addition, an amendment to the definition of the term "year of experience" was necessary to clarify the definition and to aid in the determination of whether applicants meet requirements for licensure.

3. Authority to adopt regulations pertaining to the design, location, drilling, construction, repair, maintenance, and abandonment of water wells is contained in Minn. Stat. §§ 156A.03 and 156A.05 (1973 Supp.). These sections must be interpreted liberally in light of the intent and purpose of the Legislature as stated in section 156A.01, to wit:

> . . . to reduce and minimize the waste of ground water resources within this state by reasonable legislation in licensing of drillers or makers of water wells in Minnesota and to protect the health and general welfare by providing a means for the development and protection of the natural resource of underground water in an orderly, sanitary and reasonable manner.

4. Since ground water is the main fresh water reservoir on earth, the need to adopt these regulations is apparent. The ground water of this state must be maintained, developed, and protected for the health and welfare of the citizens of the state. In excess of 90 percent of the municipalities in Minnesota are dependent upon ground water. Ground water provides a high quality water requiring little or no treatment. It is a cornerstone to the state's development.

5. Geologic formations influence the chemical and physical characteristics of ground water. The water obtained from underground is filtered in passing through the layer of soil which lies between the surface and the water-bearing stratum. In this way harmful bacteria are removed from the water, provided that this layer of soil is of a kind through which water will filter and there are no natural or artificial channels in the soil or rock formations. The amount of intervening soil required to accomplish the filtering process depends upon the composition of the soil. Those formations which are not very pervious provide an excellent filtering action and protection against the transmission of most sources of contamination. On the other hand, some formations permit water to move rapidly through them and therefore provide little filtering action. Thus, while the earth itself serves as a natural filter for the protection of the ground water, an improperly constructed well may completely

bypass and render the natural processes ineffectual. Such a well can serve as a direct passageway for pollution to enter the ground water system. This is of particular significance in view of the fact that approximately 12,600 water wells were drilled in Minnesota in 1972. These regulations, therefore, are directed at minimizing this threat to the quality of the ground water and to establish reasonable rules for the location, design, drilling, construction, maintenance, repair, abandonment and all related aspects of water well systems built in the state.

6. Authority to adopt regulations pertaining to the system of reporting on wells drilled by requiring the submission of well logs, formation samples or well cuttings, water samples and other special information as contained in Minn. Stat. §§ 156A.05 and 156A.07 subd. 4 (1973 Supp.).

7. The information gained will enable the State Board of Health and other governmental agencies to administer Minn. Stat. ch. 156A (1973 Supp.) as well as to further implement the Legislature's purpose and intent as expressed in Minn. Stat. § 156A.01 (1973 Supp.).

8. Authority to adopt regulations pertaining to well water safety and health standards and related items is contained in Minn. Stat. §§ 144.12 (1971) and 156A.05 (1973 Supp.).

9. Adopting sections of the regulations relating to health and safety is necessary not only for the protection, development and maintenance of ground water as a principle source of potable water but also because of the need to assure that the citizens of the state, whether grouped in a

municipality or individually on a homestead or elsewhere, receive water for personal and other uses which is safe and healthy.

10. Minn. Stat. § 156A.03 subd. 1 (1971) requires that the regulations containing the construction code be promulgated only after the State Board consults with the Commissioner of the Department of Natural Resources and the Pollution Control Agency. Such consultation has taken place on a continuing basis thereby satisfying the requirement of section 156A.03.

11. The location of wells (MHD 217) is an important aspect of protecting ground water. Since wells provide a direct access route to ground water, they should be placed a reasonable distance from potential sources of contamination and located consistant with the general layout of the surrounding area so as to provide maximum protection from the seepage of contaminants into the well and consequently into the ground water. MHD 217 specifies reasonable standards to satisfy these principles.

12. Not all water wells are drilled for the purpose of obtaining a potable supply of water; however, water wells drilled for other purposes may still provide an avenue for the contamination of the ground water. Therefore, MHD 218 (General Protection of Ground Water Quality and Resources) specifies reasonable and necessary special standards applicable to such wells. These special standards are in addition to the standards applicable to all water wells provided for in the rest of the regulations.

13. MHD 218 (b) regulates the maintenance and repair of wells. It is necessary that a water supply be carefully and intelligently operated if the results which are normally expected from a properly located and correctly constructed water supply are to be obtained and maintained. A good water supply may become contaminated through careless management. Repairs should be made to prevent and to close any openings through which contamination may enter the water supply. Further, the repair activity itself must be conducted in a manner so that it does not become the source of contamination. The regulations pertaining to repair and maintenance are both necessary and reasonable for the protection of the ground water.

14. Regulation MHD 218 (c), relating to the abandonment of wells, is necessary and reasonable as an improperly abandoned water well may allow contamination to enter the ground water system just as if the well were in routine use.

15. A storage reservoir is part of the total well system, thereby making MHD 219 (c) (Storage Reservoirs) a valid regulation. Any connection to the piping system of a well is considered as a possible source of contamination to the well, distribution system, and ground water if the complete water system is connected to a non-potable source of water. The complete distribution system, therefore, including storage reservoirs, must be designed and constructed to prevent the entry of contamination to the system. It is impossible to protect ground water if the entire well system is not subject to regulation.

16. The ordinary and conventional method for obtaining a potable source of water by a home owner or other water consumer without access to a municipal water supply is by engaging a water well contractor and having a well drilled. Should geologic conditions preclude the use of a water well and a surface water or near surface water supply is the only available supply, then the owner must take special measures to develop and treat the alternate water supply. MHD 219 (b) provides for the licensee to advise the owner of proper procedures to follow. MHD 219 (b) is a valid regulation under Minn. Stat. § 144.12 (1971) as well as Minn. Stat. ch. 156A (1973 Supp.).

17. The standards included in MHD 220 (Standards for Construction of Wells) are found to be reasonable and necessary since an improperly constructed well will create various hazards to the ground water system and hence the water supply system.

18. The requirements for pipe used as casing are based upon standards developed by nationally recognized testing associations and laboratories. The pipes permitted to be used for casing are of adequate strength and durability to retain the earth formations, maintain the opening in a permanent manner, and are reasonably corrosion-resistant to waters from inside and outside the well casing. The only exception to the stronger pipe requirements supported by the evidence are for wells which penetrate non-artesian water constructed for irrigation use in shallow continuous glacial outwash material.

19. Strict standards for casing pipe are mandatory as damage or injury to the pipe or joints thereof are likely to subject the ground water to contamination by the seepage through the casing into the well of undesirable waters and materials from higher elevations.

20. Grouting (MHD 220 (c)) is the filling of the annular space between the excavation line and the outside of the casing or curbing in such a manner as to prevent surface water, shallow ground water or water from other zones subject to contamination from running directly to the outside of the casing or curbing and thence into the well or into the water-bearing strata. The grouting provisions are reasonable, necessary, and in accordance with standard public health engineering practices.

21. Cavernous rock wells (MHD 220 (h)) require special treatment in the regulations. Geological formations (primarily limestone or dolomite) which are creviced, cracked, or cavernous should not be used as a source of potable ground water if not protected by an overlying mantel of glacial drift or similar materials. The crevices or cracks act as channels through which contaminated water may be transmitted quickly to the water formations immediately below it. The quick movement of the water prevents it from being subject to natural filtration and purification which usually occurs to ground water. Special drilling techniques are therefore justified.

22. Since there is no information available to permit the selection of absolute geohydrologic boundaries, specifying the exact areas in which the problem discussed in finding number 22 occurs, the provisions in the regulations

as proposed and considered at the public hearing which specified such boundaries (MHD 220 (h)(4) and (5), page 27) will not be adopted. While the geographic areas listed in the proposed regulations do contain practically all of the known portions of the state in which the problem occurs, the exact location of all problem-causing formations in the specified areas is not known. The added drilling expense for the special construction techniques does not justify requiring that every well in those areas be so drilled. Therefore, the regulations as adopted only require the licensee to follow special procedures if creviced, cracked, or cavernous rock formations are encountered in the drilling of a particular well rather than placing special requirements on all wells drilled in a specific geographic area regardless of the rock formations encountered.

23. The construction of dug or bored wells (220 (o)) cannot be universally authorized as they are more readily subject to contamination than drilled wells. Dug or bored wells are not prohibited, however, since geologic conditions may prevent the development of a drilled well. Special well wall or curbing standards required by the regulations are reasonable and necessary due to problems encountered in assuring that all joints are watertight.

24. MHD 221 (Well Casing Seals and Connections) is reasonable and necessary as the material and methods used in the construction of casings, covers, seals, and connections have an important bearing upon the safety of the supply.

25. MHD 222 (Pump Installation) is a reasonable and valid regulation. Pump installation and equipment is an integral part of the delivery system which, if improperly installed, would contaminate the water supply and ground water system.

26. In order to satisfactorily fulfill the purpose of the Minnesota Legislature as expressed in Minn. Stat. § 156A.01 (1973 Supp.), more detailed information must be obtained concerning the hydrologic and geologic conditions of the state. Information gathering from licensees is authorized by Minn. Stat. § 156A.07 subd. 4 (1973 Supp.). MHD 223 (Records and Samples) reasonably fulfills the legislative mandate of section 156A.07 subdivision 4.

27. Water quality analysis will be performed for each new well drilled which will provide basic data on the ground water quality. The analysis will give an initial report on any contamination entering the water supply system. Contaminated water will be an indication that either the aquifer has been contaminated or that the well has been installed unsatisfactorily and is allowing contamination to enter the ground water system. MHD 223 (a) is clearly needed and reasonable.

28. MHD 223 (b) requires the licensee to complete a water well record. Significant data will be obtained from the records to further the state's understanding of the location and distribution of ground water resources, permit the refinement of geological mapping of the state, and determine if permissible types of drilling actually provide the desired protection of the ground water. For these reasons, as well as meeting other purposes, MHD 223 (b) is reasonable and necessary.

29. MHD 223 (c) reasonably meets the mandate of Minn. Stat. § 156A.07 subd. 4 (1973 Supp.) in establishing criteria and procedures for submission of water well cutting formation samples. Formation samples are essential for

geologic mapping purposes and provide the least expensive source of this kind of information. Accurate geologic maps are required for management, protection and development of the ground water resource along with other land use planning and development programs.

30. Other provisions of the regulations not specifically referred to herein are found to be supported by the evidence.

31. Many comments and suggested amendments were made at the hearing or submitted in written form. Based thereon, modifications were made but in no instance do those modifications significantly change the substance of the regulations as presented at the public hearing.

32. The regulations as adopted will assure that the policies of Minn. Stat. ch. 156A (1973 Supp.) will be fulfilled. Regulation of the licensee and the drilling procedure established by the regulations provide for the development and protection of the state's ground water in an orderly, sanitary and reasonable manner.

Dated: April 30, 1974.

STATE OF MINNESOTA
BOARD OF HEALTH

John H. Westerman
JOHN H. WESTERMAN
President

Michael E. Keable
MICHAEL E. KEABLE
Vice President

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

STATEMENT OF NEED

The above-captioned rules are, in part, amendments to existing rules of the State Board of Health and, in part, adoption of new regulations. The rules which are being amended were first adopted on November 20, 1972. This is the first time that they are being amended.

The need to adopt these rules arises because:

(1) The Minnesota Legislature, during the 1973 session, amended Minn. Stat. ch. 156A, relating to water well contractors. Those amendments require the changes that are proposed to the regulations relating to the licensing and examination of water well contractors plus dictate the addition of provisions for the registration of drilling machines.

(2) Minn. Stat. ch. 156A, as amended, require the State Board of Health to adopt rules and regulations governing the design, location, construction, and reporting of water wells, the submission of well logs, formation samples or well cuttings, water samples or other special information, and the adoption of other regulations designed to protect the health and general welfare by providing a means for the

development and protection of the natural resource of underground water in an orderly, sanitary and reasonable manner. These proposed regulations are intended to fulfill these legislative mandates.

(3) Minn. Stat. § 144.12 (1971) permits the State Board of Health to adopt reasonable rules and regulations for the protection of the public health. Certain sections of the proposed rules require various actions of water well contractors to help assure that users of water from wells will have a safe and continuous supply of water.

STATE OF MINNESOTA

BOARD OF HEALTH

Date: November 30, 1973.

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

APPOINTMENT

David Giese is hereby appointed to serve as hearing officer on behalf of the State Board of Health in the above-captioned matter, said hearing to be held on January 9, 1973, and to continue until all representatives of associations or other interested groups or persons have had an opportunity to be heard.

This appointment is made pursuant to the following authority: resolution of the State Board of Health adopted at its meeting of September 13, 1973.

STATE OF MINNESOTA

BOARD OF HEALTH

WARREN R. LAWSON, M.D.
Secretary and Executive Officer

Dated: 11/30/73

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

CERTIFICATION OF CONSULTATION

I, Robert L. Herbst, Commissioner, Minnesota Department of Natural Resources, do hereby certify that on December 17, 1971, I appointed and designated Gene H. Hollenstein, Chief Hydrologist, Division of Waters, Soils, and Minerals, to represent the Minnesota Department of Natural Resources for the purpose of consultation on the establishment of standards for the design, location and construction of water wells within the State of Minnesota. Since that time, Mr. Hollenstein has actively consulted with the representatives of the State Board of Health concerning the development of the above-captioned regulations in compliance with Minn. Stat. § 156A.03 subd. 1 (1971).

Dated: 12-3-73

STATE OF MINNESOTA

DEPARTMENT OF NATURAL RESOURCES

ROBERT L. HERBST
Commissioner

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

STATE BOARD OF HEALTH

In the Matter of Proposed Amendments to the Rules Relating to the Examination and Licensing of Water Well Contractors and the Adoption of Rules Relating to the Construction and Reporting of Wells

CERTIFICATION OF CONSULTATION

I, Grant J. Merritt, Executive Director, Minnesota Pollution Control Agency, do hereby certify that on September 1, 1972, I appointed and designated Dale Wikre, Geologist, Division of Water Quality, to represent the Minnesota Pollution Control Agency for the purpose of consultation on the establishment of standards for the design, location and construction of water wells within the State of Minnesota. Since that time, Mr. Wikre has actively consulted with the representatives of the State Board of Health concerning the development of the above-captioned regulations in compliance with Minn. Stat. § 156A.03 subd. 1 (1971).

Dated: 11/30/73

STATE OF MINNESOTA

POLLUTION CONTROL AGENCY

GRANT J. MERRITT
Executive Director

CERTIFICATE OF BOARD'S

ADOPTION OF RULES RESOLUTION

I, Warren R. Lawson, M.D., do hereby certify that I am the Secretary and Executive Officer of the Minnesota State Board of Health, a board duly authorized under the laws of the State of Minnesota, and that the following is a true, complete, and correct copy of a resolution adopted at a meeting of the said Board of Health duly and properly called and held on the 11th day of April, 1974; that a quorum was present at said meeting; that a majority of those present voted for the resolution; that said resolution is set forth in the minutes of said meeting and has not been rescinded or modified.

> "RESOLVED, that the amendments to the rules relating to the examination and licensing of water well contractors and the new regulations governing the design, location, drilling, construction, repair, maintenance, and abandonment of water wells and establishing a system of reporting on wells drilled, identified as MHD 210 to 230, are found to be reasonable, necessary and supported by the evidence contained in the record, and are hereby approved and adopted, pursuant to authority vested in us by Minn. Stat. §§ 156A.03, 156A.05, 156A.07 (1973 Supp.), and that Warren R. Lawson, M.D., Secretary and Executive Officer of the Minnesota State Board of Health, be and hereby is authorized to sign an order adopting those rules.
>
> "BE IT FURTHER RESOLVED, that Regulations MHD 210 to 230 shall become effective 30 days after their approval by the Attorney General and filing with the office of the Secretary of State and the office of the Commissioner of Administration."

IN WITNESS WHEREOF, I have hereunto subscribed my name this 30th day of April, 1974.

STATE OF MINNESOTA

BOARD OF HEALTH



WARREN R. LAWSON, M.D.
Secretary and Executive Officer

STATEMENT OF COMPLIANCE WITH

MANUAL OF RULE MAKING PROCEDURES

I, Special Assistant Attorney General Richard A. Wexler, do hereby declare that I have examined the proposed amendments to the rules relating to the examination and licensing of water well contractors and the new regulations governing the design, location, drilling, construction, repair, maintenance, and abandonment of water wells and establishing a system of reporting on wells drilled, identified as MHD 210-230, and all related documents and that, based on them and my personal familiarity with the applicable procedures, the Manual of Rule Making Procedures has been followed. One exception is noted below:

The Notice of Hearing which was mailed on December 7, 1973, mistakenly noted that the public hearing was scheduled for January 9, 1973, rather than 1974. The mistake was obvious and could not have been misleading. However, to avoid a possible grounds for complaint, an Amended Notice of Hearing was mailed on December 28, 1973. The amended notice gave the correct date and stated that anyone claiming to have been misled by the mistake in the original notice so as to lack sufficient time to prepare for the hearing should inform the Department of Health in writing. The amended notice said that appropriate adjustments would have been made upon receipt of such claim. No claims were received so the hearing was held on the day scheduled (January 9, 1974) with the record being left open for receipt of additional written comments the usual 20 days.

The mistake in the original notice was not prejudicial or misleading. The procedural irregularity was inconsequential and should not prevent these rules from being approved.

Dated: May 22, 1974.

Richard A. Wexler

RICHARD A. WEXLER
Special Assistant
Attorney General