

August 21, 2003

Mr. David Taggart, P.E.
D.F. Freeman Contractor's Inc.
8357 Monticello Road, Suite 100
Shawnee, KS 66227

Subject: Shawnee Mission Parkway (Pflumm to Halsey)
KDHE Requirements for Plugging Abandoned Water Wells

Engineers • Architects

One Renner Ridge
9801 Renner Boulevard
Lenexa, Kansas 66219-9745
Telephone (913) 492-0400
FAX (913) 577-8200
gba@gbutler.com
<http://www.gbutler.com>

Dear Dave:

As was requested at the pre-construction meeting, GBA has contacted KDHE to determine what requirements are going to be required for plugging the two existing water wells located in the area of the home adjacent to Midland Drive.

Enclosed you will find a copy of KDHE's requirements along with a few copies of the Water Well Record Form WWC-5 that will certify that the plugging procedures used meet those as dictated by the enclosed requirements. You will need to fill out a form for each of the wells and send them into to KDHE for their records.

If you have any questions or need additional information, please call our office.

Sincerely,

George Butler Associates, Inc



Shawn B. Stover, P.E.
Project Manager

cc: Paul Lindstrom, P.E. City of Shawnee



STATE OF KANSAS
DEPARTMENT OF
HEALTH &
ENVIRONMENT



PLUGGING PACKET

Bureau of Water - Geology Section
1000 S.W. Jackson, Ste. 420
Topeka, Kansas 66612-1367
(785) 296-5524

(PLUGGING PACKET)

Sections from Article 12 (K.S.A. Supp. 82a-1201 et seq.) which pertain to the plugging of abandoned water wells, cased and uncased test holes.

82a-1203. Definitions. As used in this act, unless the context otherwise requires:

(c) "Water well contractor" or "Contractor" means any individual, firm, partnership, association or corporation who shall construct, reconstruct or treat a water well. The term shall not include.

(1) An individual while in the act of constructing a water well on land which is owned by such individual and is used by such individual for domestic purposes at such individual's place of abode, but only when the well is constructed in compliance with prescribed minimum well standards as provided in this act;

82a-1212. Log of drilling, boring or digging; contents; filed with state geological survey. Any water well contractor licensed under this act who constructs, reconstructs or plugs a water well shall keep a careful and accurate log of the construction, reconstruction or plugging of such well and shall furnish a record of said well log to the secretary within thirty (30) days after completion of such well in such form as the secretary might require. The log shall show:

- (a) The name and address of the landowner and the legal description of the well;
- (b) The character and depth of the formation passed through or encountered;
- (c) The depth at which water is encountered;
- (d) The static water level of the completed well;
- (e) A copy of the record of pumping test, if any; and
- (f) The construction or reconstruction details of the completed water well including lengths and sizes of casing, length and size of perforations or screens, and length and size of gravel packing; [and]
- (g) The amount, type and placement of plug materials used in plugging a water well.

A water sample shall be furnished to the secretary, upon request, within thirty (30) days after completion of such well unless an extension of time is granted by the secretary, in which case, the sample shall be furnished to the secretary within such extended period of time.

The well logs and a copy of the water quality analysis shall be transmitted by the secretary to the state geological survey and kept on file by the survey and be available to the public.

History: L. 1973, ch. 417, § 12; L. 1974, ch. 352, § 180; July 1; L. 1979, ch. 334, § 7. July 1.

82a-1213. Abandoned holes; plugging; failure to properly seal. All holes drilled in search of a water supply and abandoned, shall be properly plugged by the drilling contractor in accordance with rules and regulations established by the secretary in order to assure adequate and proper plugging of abandoned wells to prevent pollution of existing groundwater. Any contractor who fails to properly seal any exploratory wells drilled in search of a water supply and abandoned by him or her shall be subject to the penalties set out in this act. All unplugged abandoned water wells shall be plugged or caused to be plugged by the landowner in accordance with rules and regulations established by the secretary in order to assure adequate and proper plugging of abandoned water wells to prevent pollution to existing groundwater supplies, except that no unplugged abandoned water well existing on the effective date of this act which is not polluting or threatening to pollute a groundwater supply shall be required to be plugged.

History: L. 1973, ch. 417, § 13; L. 1974, ch. 352, § 181; July 1; L. 1979, ch. 334, § 8; July 1.

Sections from Article 30 (K.A.R. 28-30-1 et seq.) which pertain to the plugging of abandoned water wells, cased and uncased test holes.

28-30-2. Definitions.

- (a) "License" means a document issued by the Kansas Department of Health and Environment to qualified persons making application therefore, authorizing such persons to engage in the business of water well contracting.
- (b) "Department" means the Kansas Department of Health and Environment.
- (c) "Abandoned Water Well" means a water well determined by the department to be a well;
 - (1) whose use has been permanently discontinued;
 - (2) in which pumping equipment has been permanently removed;

- (3) which either is in such a state of disrepair that it cannot be used to supply water, or it has the potential for transmitting surface contaminants into the aquifer or both;
 - (4) which poses potential health and safety hazards; or
 - (5) which is in such a condition it cannot be placed in active or inactive status.
- (d) “Water well contractor” or “contractor” means any individual, firm, partnership, association, or corporation who constructs, reconstructs, or treats a water well. The term shall not include:
- (1) an individual constructing, reconstructing or treating a water well located on land owned by the individual, when the well is used by the individual for farming, ranching, or agricultural purposes or for domestic purposes at the individual’s place of abode; or
 - (2) an individual who performs labor or services for a licensed water well contractor at the contractor’s direction and under the contractor’s supervision.
- (e) “Aquifer” means an underground formation that contains and is capable of transmitting groundwater.
- (f) “Confined aquifer” is an aquifer overlain and underlain by impermeable layers. Groundwater in a confined aquifer is under pressure greater than atmospheric pressure and will rise in a well above the point at which it is first encountered.
- (g) “Unconfined aquifer” is an aquifer containing groundwater at atmospheric pressure. The upper surface of the groundwater in an unconfined aquifer is the water table.
- (h) “Domestic uses” means the use of water by any person or family unit or household for household purposes, or for the watering of livestock, poultry, farm and domestic animals used in operating a farm, or for the irrigation of lands not exceeding a total of two acres in area for the growing of gardens, orchards and lawns.
- (i) “Public water-supply well” means a well that:
- (1) provides groundwater to the public for human consumption; and
 - (2) has at least 10 service connections or serves an average of at least 25 individuals daily at least 60 days out of the year.

- (j) "Groundwater" means the part of the subsurface water which is in the zone of saturation.
- (k) "Grout" means cement grout, neat cement grout, bentonite clay grout or other material approved by the department used to create a permanent impervious watertight bond between the casing and the undisturbed formation surrounding the casing or between two or more strings of casing.
 - (1) "Neat cement grout" means a mixture consisting of one 94 pound bag of portland cement to five to six gallons of clean water.
 - (2) "Cement grout" means a mixture consisting of one 94 pound bag of portland cement to an equal volume of sand having a diameter no larger than 0.080 inches (2 millimeters) to five to six gallons of clean water.
 - (3) "Bentonite clay grout" means a mixture consisting of water and commercial grouting or plugging sodium bentonite clay containing high solids such as that manufactured under the trade name of "volclay grout", or an equivalent as approved by the department.
 - (A) The mixture shall be as per the manufacturer's recommendations to achieve a weight of not less than 9.4 pounds per gallon of mix. Weighting agents may be added as per the manufacturer's recommendations.
 - (B) Sodium bentonite pellets, tablets or granular sodium bentonite may also be used provided they meet the specifications listed in paragraph (k)(3) of this regulation.
 - (C) Sodium bentonite products that contain low solids, are designed for drilling purposes, or that contain organic polymers shall not be used.
- (l) "Pitless well adapter or unit" means an assembly of parts installed below the frost line which will permit pumped groundwater to pass through the wall of the casing or extension thereof and prevent entrance of contaminants.
- (m) "Test hole" or "hole" means any excavation constructed for the purpose of determining the geologic, hydrologic and water quality characteristics of underground formations.
- (n) "Static water level" means the highest point below or above ground level which the groundwater in the well reaches naturally.

- (o) “Annular space” means the space between the well casing and the well bore or the space between two or more strings of well casing.
- (p) “Sanitary well seal” is a manufactured seal installed at the top of the well casing which, when installed, creates an airtight and watertight seal to prevent contaminated or polluted water from gaining access to the groundwater supply.
- (q) “Treatment” means the stimulation of production of groundwater from a water well, through the use of hydrochloric acid, muratic acid, sulfamic acid, calcium or sodium hypochlorite, polyphosphates or other chemicals and mechanical means, for the purpose of reducing or removing iron and manganese hydroxide and oxide deposits, calcium and magnesium carbonate deposits and slime deposits associated with iron or manganese bacterial growths which inhibit the movement of groundwater into the well.
- (r) “Reconstructed water well” means an existing well that has been deepened or has had the casing replaced, repaired, added to or modified in any way for the purpose of obtaining groundwater.
- (s) “Pump pit” means a watertight structure which:
 - (1) is constructed at least two feet away from the water well and below ground level to prevent freezing of pumped groundwater; and
 - (2) houses the pump or pressure tank, distribution lines, electrical controls, or other appurtenances.
- (t) “Grout tremie pipe” or “grout pipe” means a steel or galvanized steel pipe or similar pipe having equivalent structural soundness that is used to pump grout to a point of selected emplacement during the grouting of a well casing or plugging of an abandoned well or test hole.
- (u) “Uncased test hole” means any test hole in which casing has been removed or in which casing has not been installed.
- (v) “Drilling rig registration license number” means a number assigned by the department which is affixed to each drilling rig operated by or for a licensed water well contractor.

- (w) “Active well” means a water well which is an operating well used to withdraw water, or to monitor or observe groundwater conditions.
- (x) “Inactive status” means a water well which is not presently operating but is maintained in such a way it can be put back in operation with a minimum of effort.
- (y) “Heat pump hole” means a hole drilled to install piping for an earth coupled water source heat pump system, also known as a vertical closed loop system.

(Authorized by K.S.A. 1992 Supp. 82a-1205 and implementing K.S.A. 82a-1202, K.S.A. 1992 Supp. 82a-1205, 82a-1213; effective E-74-34, July 2, 1974; modified L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1987; amended Nov. 22, 1993.)

28-30-3. Licensing.

- (a) Eligibility. To be eligible for a water well contractor’s license and applicant shall:
 - (1) pass an examination conducted by the department; or
 - (2) meet the conditions contained in subsection (c).
- (b) Application and fees.
 - (1) Each application shall be accompanied by an application fee of \$10.00.
 - (2) Before issuance of a water well contractor’s license, each contractor shall pay a license fee of \$100.00 plus \$25.00 for each drill rig operated by or for the contractor. These fees shall accompany the application and shall be by bank draft, check or money order, payable to the Kansas Department of Health and Environment - Water Well Licensure.

(c) Reciprocity.

- (1) Upon receipt of an application and payment of the required fees from a nonresident, the secretary may issue a license, providing the nonresident holds a valid license from another state and meets the minimum requirements for licensing as prescribed in K.S.A. 82a-1207, and any amendments thereto.
- (2) If the nonresident application is incorporated, evidence shall be submitted to the Department of Health and Environment showing that the applicant meets the registration requirements of the Kansas Secretary of State.
- (3) Nonresident fees for a license shall be equal to the fee charged a Kansas contractor by the applicant's state of residence but shall not be less than \$100.00. The application fee and drill rig license fee shall be the same as the Kansas resident fees.

(d) License renewal.

- (1) Each licensee shall make application for renewal of license and rig registrations before July 01 of each year by filing the proper renewal forms provided by the department and fulfilling the following requirements:
 - (A) payment of the annual license fee and a rig registration fee for each drill rig to be operated in the state;
 - (B) filing of all well records for each water well constructed, reconstructed or plugged by the licensee in accordance with K.S.A. 28-30-4 during the previous licensure period;
 - (C) filing a report, on a form provided by the department, of all approved continuing education units earned by the licensee during the previous licensure period;
 - (D) satisfying the continuing education requirements set forth in subsection (g); and

- (E) providing any remaining outstanding information or records requested that existed prior to the issuance or revocation of a license.
- (2) Failure to comply with paragraphs (A), (B), (C), (D) and (E) above shall be grounds to revoke the existing license and terminate the license renewal process.
- (e) Water well construction fee. A fee of \$5.00 shall be paid to the Kansas Department of Health and Environment, either by bank draft, check or money order, for each water well constructed by a licensed water well contractor. The construction fee shall be paid when the contractor requests the water well record form WWC-5 from the department or shall accompany the water well records submitted on form WWC-5 as required under K.A.R. 28-30-4. No fee shall be required for reconstruction or plugged water wells.
 - (f) License number. Each drill rig operated by or for a licensed water well contractor shall have prominently displayed thereon the drill rig license number, as assigned by the department, in letters at least two inches in height. Decals, paint, or other permanent marking materials shall be used.
 - (g) Continuing education requirements. Licensed water well contractors shall earn at least eight units of approved continuing education per year beginning with the first full year of licensure or the renewal period. One unit of continuing education shall equal 50 minutes of approved instruction except for trade shows and exhibitions which shall be counted as one unit per approved trade show and exhibition attended. (Authorized by K.S.A. 1992 Supp. 82a-1205; implementing K.S.A. 82a-1202, K.S.A. 1992 Supp. 82a-1205, 82a-1206, 82a-1207, 82a-1209; effective, E-74-34, July 2, 1974; effective May 1, 1975; amended May 1, 1980; amended May 1, 1983; amended May 1, 1987; amended Nov. 22, 1993.)

28-30-4. General operating requirements.

- (a) *Water well record.* Within 30 days after construction or reconstruction of a water well, the water well contractor shall submit a report of such work, to the Kansas Department of Health and Environment and the landowner, on the water well record form, form WWC-5, provided by the department. The contractor shall report to the department and to the landowner on the water well record or attachments made thereto any polluted or other noncompliant conditions which the contractor was able to correct and any conditions which the contractor was unable to correct. The contractor shall report to the department and the landowner the plugging of any abandoned water well. The report shall include the location, landowner's name, method, type of material, its placement and amount used to plug the abandoned water well.

A landowner who constructs, reconstructs, or plugs a water well, which will be or was, used by the landowner for farming, ranching or agricultural purposes or is located at the landowner's place of abode, shall submit a water well record, on Form WWC-5, of such work to the department within 30 days after the construction, reconstruction or plugging of the water well. No fee shall be required from the landowner for the record.

- (b) *Artificial recharge and return.* The construction of artificial recharge wells and freshwater return wells shall comply with all applicable rules and regulations of the department.
- (c) *Well tests.* When a pumping test is run on a well, results of the test shall be reported on the water well record, form WWC-5, or a copy of the contractor's record of the pumping test shall be attached to the water well record.
- (d) *Water samples.* Within 30 days after receipt of the water well record, form WWC-5, the department may request the contractor, or landowner who constructs or reconstructs his or her own water well, to submit a sample of water from the well for chemical analysis. Insofar as is possible, the department will define in advance areas from which well water samples are required. (Authorized by K.S.A. 82a-1205, and implementing K.S.A. 82a-1202, 82a-1205, 82a-1212, 82a-1213; effective, E-74-34, July 2, 1974; modified, L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1987.)

28-30-7. Plugging of abandoned wells, cased and uncased test holes.

- (a) All water wells abandoned by the landowner on or after July 01, 1979, and all water wells that were abandoned prior to July 01, 1979 which pose a threat to groundwater supplies, shall be plugged or caused to be plugged by the landowner. In all cases, the landowner shall perform the following as minimum requirements for plugging abandoned wells.
- (1) The casing shall be cut off three feet below ground surface and removed.
 - (2) All wells shall be plugged from bottom to top using volumes of material equaling at least the inside volume of the well.
 - (3) Plugging top of well:
 - (A) For cased wells a grout plug shall be placed from six to three feet below ground surface.
 - (B) For dug wells, the lining material shall be removed to at least five feet below ground surface, and then sealed at five feet with a minimum of six inches of concrete or other materials approved by the department. Compacted surface silts and clays shall be placed over the concrete seal to ground surface.
 - (4) Any groundwater displaced upward inside the well casing during the plugging operation shall be removed before additional plugging materials are added.
 - (5) From three feet below ground level to ground level, the plugged well shall be covered over with compacted surface silts or clays.
 - (6) Compacted clays or grout shall be used to plug all wells from the static water level to six feet below surface.
 - (7) All sand and gravel used in plugging abandoned domestic or public water supply wells shall be chlorinated prior to placement into a well.

- (b) Abandoned wells formerly producing groundwater from an unconfined aquifer shall be plugged in accordance with the foregoing and in addition shall have washed sand, and gravel or other material approved by the department placed from the bottom of the well to the static water level.
- (c) Abandoned wells, formerly producing groundwater from confined and unconfined aquifers or in confined aquifers only, shall be plugged according to K.A.R. 28-30-7(a) and by using one of the following additional procedures:
 - (1) The entire well column shall be filled with grout, or other material approved by the department, by use of a grout tremie pipe.
 - (2) A 10 foot grout plug shall be placed opposite the impervious formation or confining layer above each confined aquifer or aquifers by use of a grout tremie pipe; and
 - (A) The space between plugs shall be filled with clays, silts, sand and gravel or grout and shall be placed inside the well so as to prevent bridging.
 - (B) A grout plug at least 20 feet in length shall be placed with a grout pipe so at least 10 feet of the plug extends below the base of the well casing and at least 10 feet of the plug extends upward inside the bottom of the well casing.
 - (C) A grout plug at least ten feet in length shall be placed from at least 13 feet below ground level to the top of the cut off casing.
 - (3) Wells that have an open bore hole below the well casing, and where the casing was not grouted into the well bore when the well was constructed, shall be plugged by (1) or (2) above, except that the top 20 feet of well casing shall be removed or perforated with the casing ripper or similar device prior to plugging. If the well is plugged according to part (2) of this subsection, the screened or perforated intervals below the well casing shall be grouted the entire length by use of a grout tremie pipe.

(d) Plugging of abandoned holes. If the hole penetrates an aquifer containing water with more than 1,000 milligrams per liter, mg/l, total dissolved solids or is in an area determined by the department to be contaminated, the entire hole shall be plugged with an approved grouting material from the bottom of the hole, up to within three feet of the ground surface using a grout tremie pipe or similar method. From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays; otherwise, the hole shall be plugged in accordance with the following paragraphs.

(1) Plugging of abandoned cased test holes. The casing shall be removed if possible and the abandoned test hole shall be plugged with an approved grouting material from the bottom of the hole, up to within three feet of the ground surface, using a grout tremie pipe or similar method. From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays.

If the casing cannot be removed, in addition to plugging the hole with an approved grouting material the annular space shall also be grouted as described in K.A.R. 28-30-6 or as approved by the department.

(2) Abandoned uncased test holes, exploratory holes or any bore holes except seismic or oil field related exploratory and services holes regulated by the Kansas Corporation Commission under K.A.R. 82-3-115 through 82-3-117. A test hole or bore hole drilled, bored, cored or angled shall be considered an abandoned hole immediately after the completion of all testing, sampling or other operations for which the hole was originally intended. The agency or contractor in charge of the exploratory or other operations for which the hole was originally intended is responsible for plugging the abandoned hole using the following applicable method, within three calendar days after the termination of testing other operations.

(A) The entire hole shall be plugged with an approved grouting material from bottom of the hole, up to within three feet of the ground surface, using a grout tremie pipe or similar method.

- (B) From three feet below ground surface to ground surface the plugged hole shall be covered over with compacted surface silts or clays.
 - (C) For bore holes of 25 feet or less, drill cuttings from the original hole may be used to plug the hole in lieu of grouting material, provided that an aquifer is not penetrated or the bore hole is not drilled in an area determined by the department to be a contaminated area.
- (3) Plugging of heat pump holes drilled for closed loop heat pump systems. The entire hole shall be plugged with an approved grouting material from bottom of the hole, to the bottom of the horizontal trench, using a grout tremie pipe or similar method approved by the department.
- (e) Abandoned oil field water supply wells. A water well drilled at an oil or gas drilling site to supply water for drilling activities shall be considered an abandoned well immediately after the termination of the oil or gas drilling operations. The company in charge of the drilling of the oil or gas well shall be responsible for plugging the abandoned water well, in accordance with K.A.R. 28-30-7(a), (b), and (c), within 30 calendar days after the termination of oil and gas drilling operations.

Responsibility for the water well may be conveyed back to the landowner in lieu of abandoning and plugging the well but the well must conform to the requirements for active or inactive status. The transfer must be made through a legal document, approved by the department, advising the landowner of the landowner's responsibilities and obligations to properly maintain the well, including the proper plugging of the well when it is abandoned and no longer needed for water production activities. If a transfer is to be made, the oil or gas drilling company shall provide the department with a copy of the transfer document within 30 calendar days after the termination of oil or gas drilling operations. Within 30 calendar days of the effective date of the transfer of the well the landowner shall notify the department of the intended use and whether the well is in active status or inactive status in accordance with K.A.R. 28-30-7(f).

- (f) Inactive status. Landowners may obtain the department's written approval to maintain wells in an inactive status rather than being plugged if the landowner can present evidence to the department as to the condition of the well and as to the landowner's intentions to use the well in the future. As evidence of intentions, the owner shall be responsible for properly maintaining the well in such a way that:
- (1) The well and the annular space between the hole and the casing shall have no defects that will permit the entrance of surface water or vertical movement of subsurface water into the well;
 - (2) the well is clearly marked and is not a safety hazard;
 - (3) the top of the well is securely capped in a watertight manner and is adequately maintained in such a manner as to prevent easy entry by other than the landowner;
 - (4) the area surrounding the well shall be protected from any potential sources of contamination within a 50 foot radius;
 - (5) if the pump, motor or both, have been removed for repair, replacement, etc., the well shall be maintained to prevent injury to people and to prevent the entrance of any contaminant or other foreign material;
 - (6) the well shall not be used for disposal or injection of trash, garbage, sewage, wastewater or storm runoff; and
 - (7) the well shall be easily accessible to routine maintenance and periodic inspection.

The landowner shall notify the department of any change in the status of the well. All inactive wells found not to be in accordance with the criteria listed in lines one through seven above shall be considered to be abandoned and shall be plugged by the landowner in accordance with K.A.R. 28-30-7(a) through (c). (Authorized by K.S.A. 82a-1205; implementing K.S.A. 82a-1202, 82a-1205, 82a-1212, 82a-1213; effective, E-74-34, July 2, 1974; modified, L. 1975, ch. 481, May 1, 1975; amended May 1, 1980; amended May 1, 1983; amended May 1, 1987.)

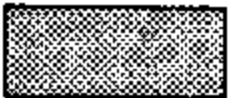
PLUGGING MATERIAL KEY CODE



GROUT



SOIL OR CLAY



SAND & GRAVEL

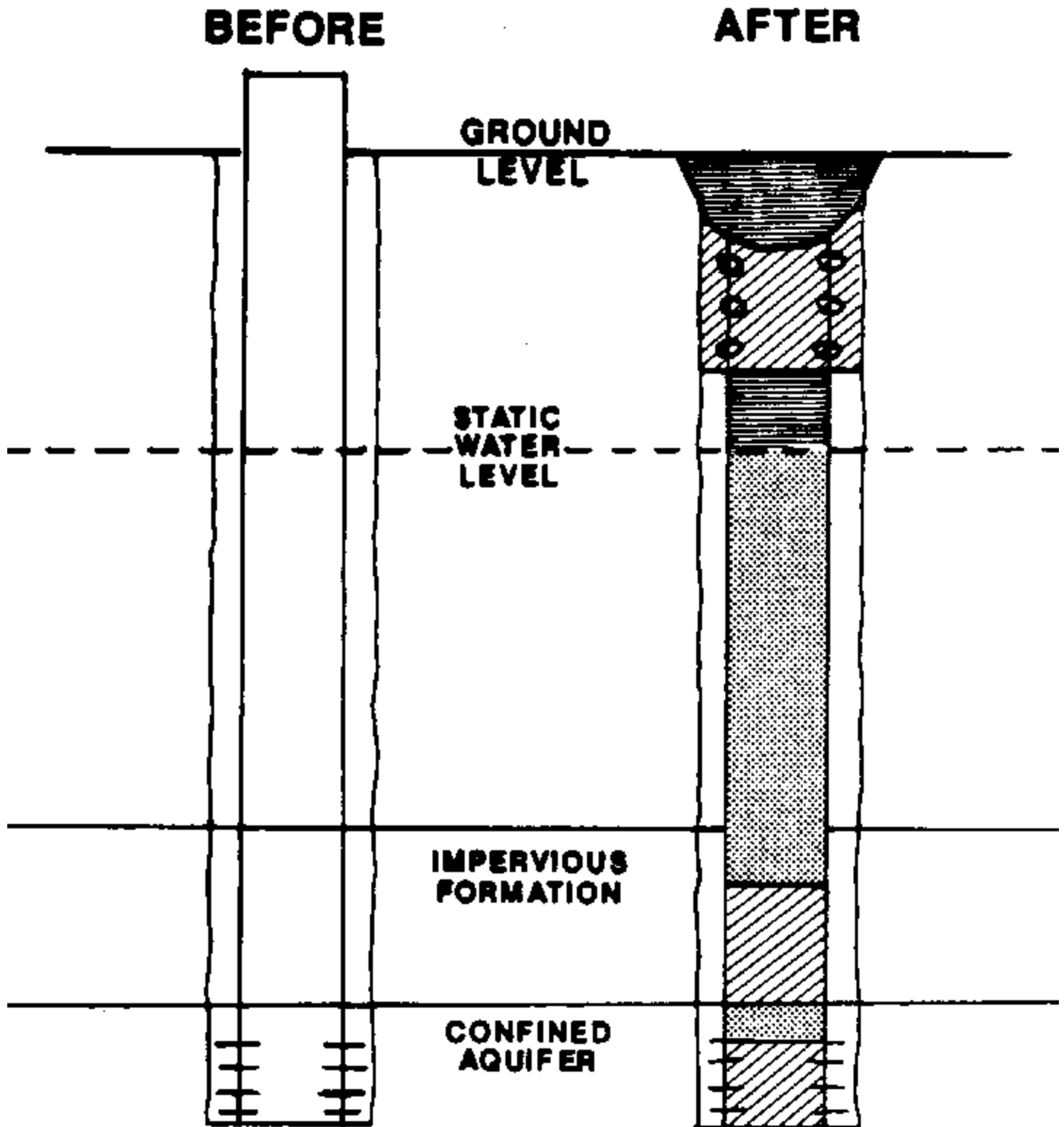


CASING RIPPED

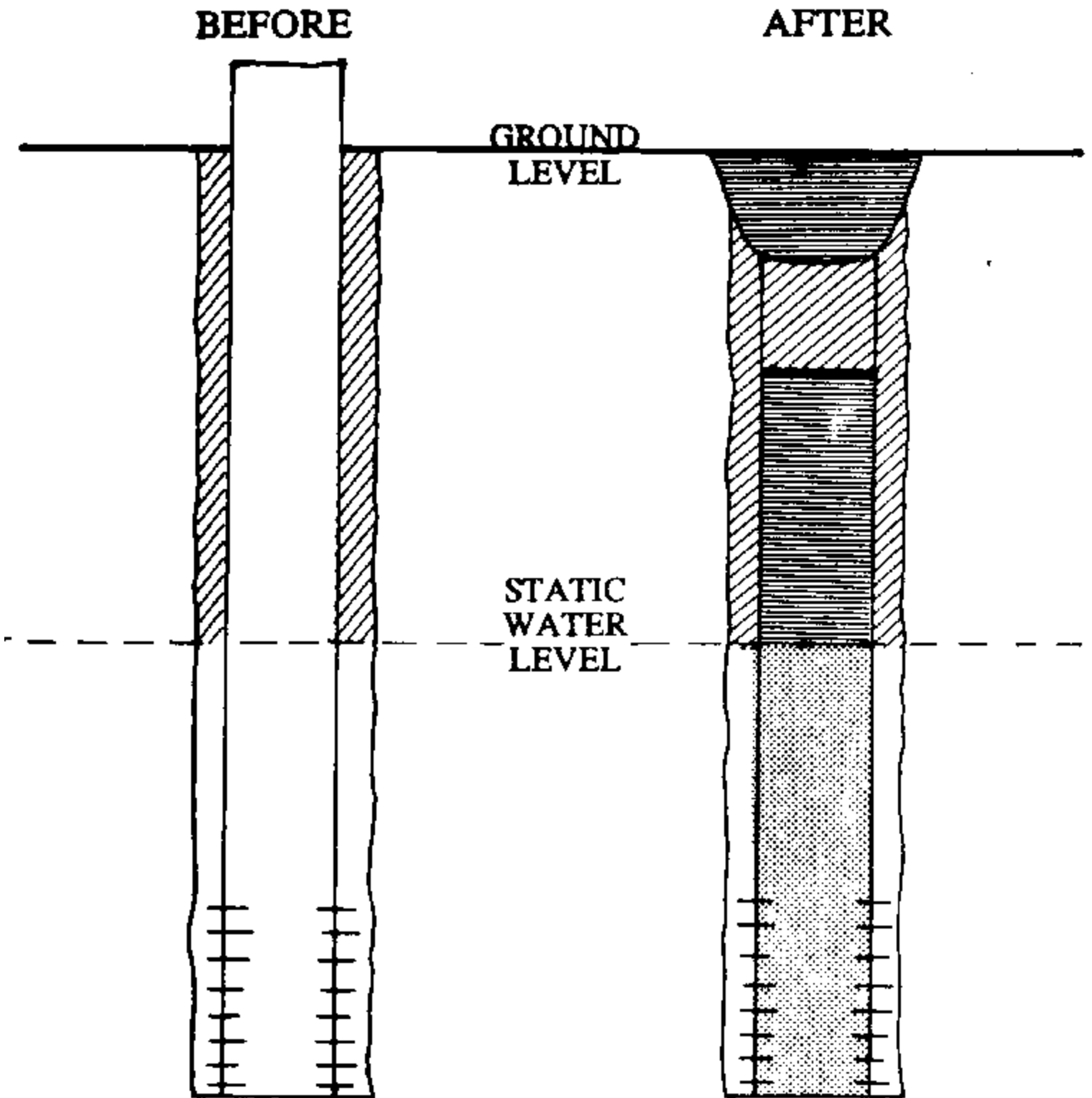


WELL SCREEN

PLUGGING OF AN UNCONFINED WELL (not grouted)



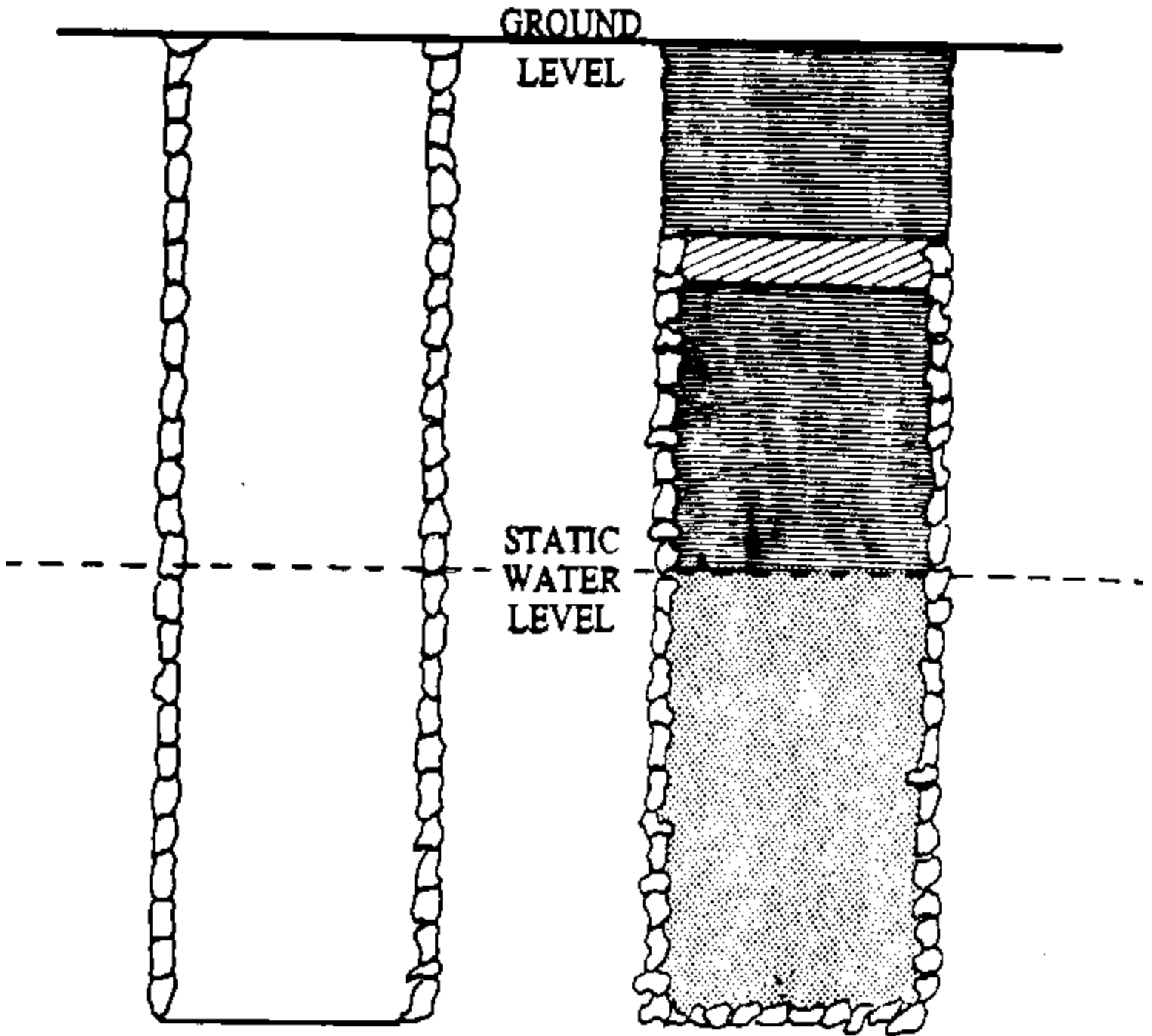
PLUGGING OF AN UNCONFINED WELL (grouted)



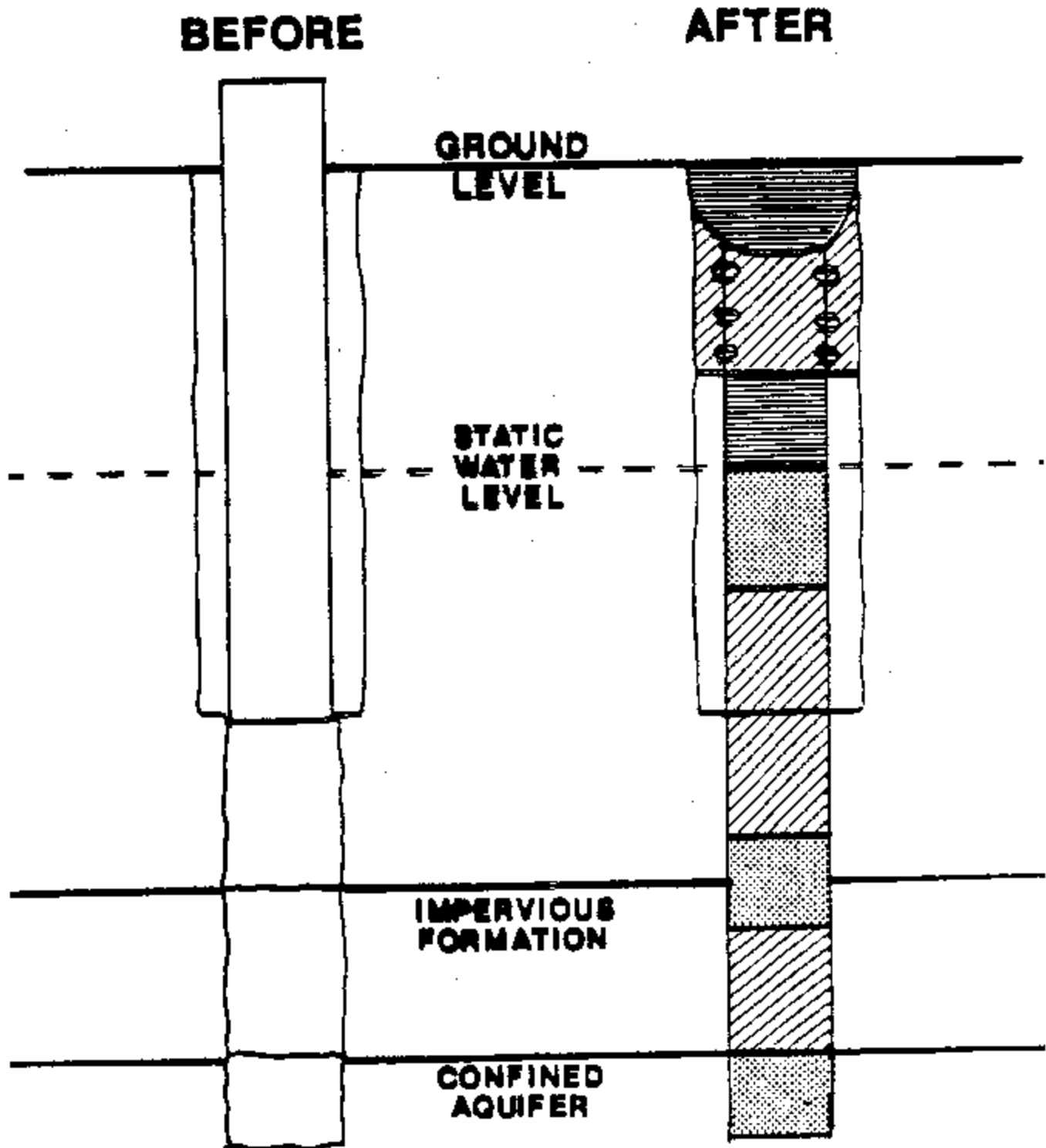
PLUGGING OF A DUG WELL

BEFORE

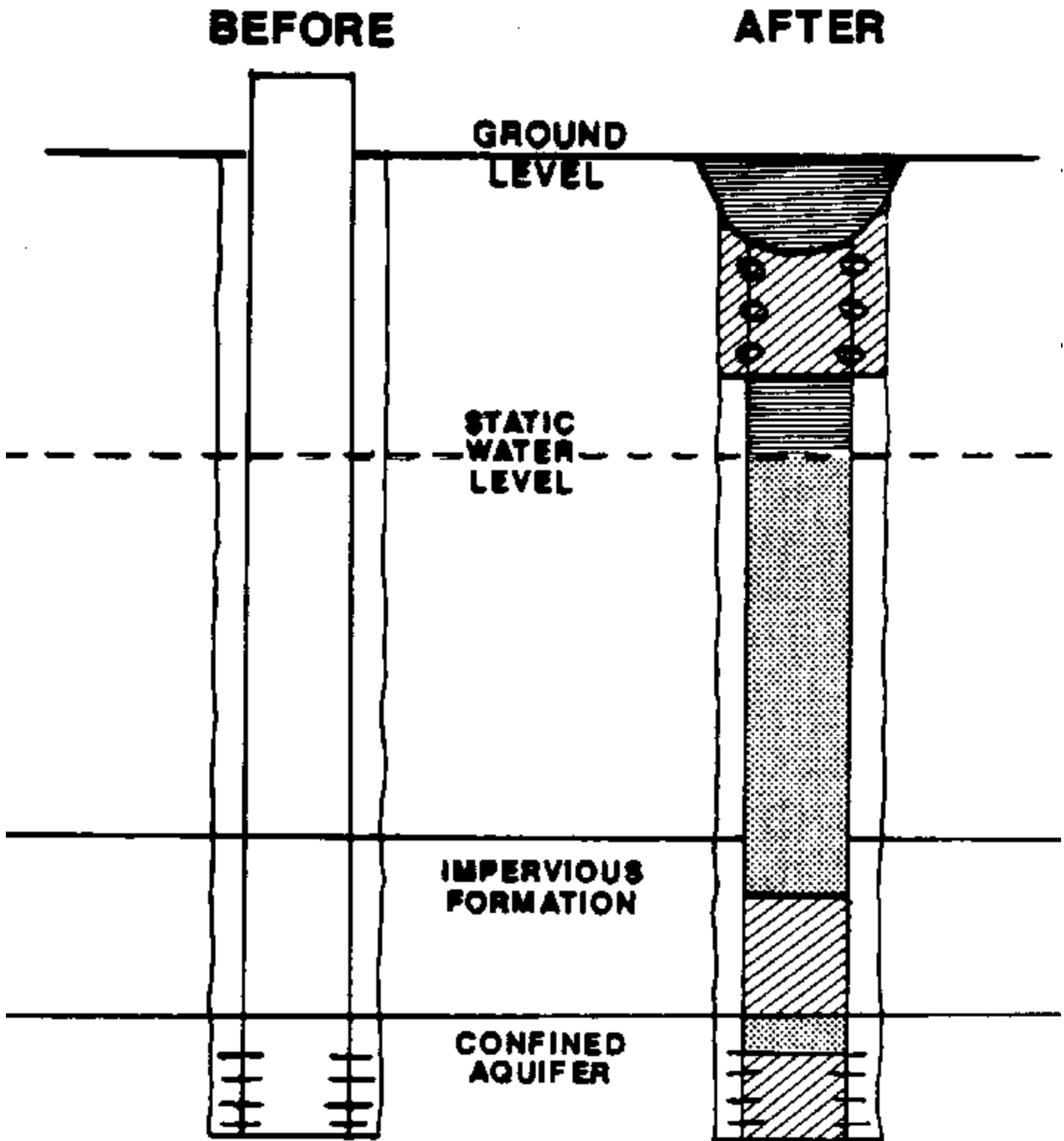
AFTER



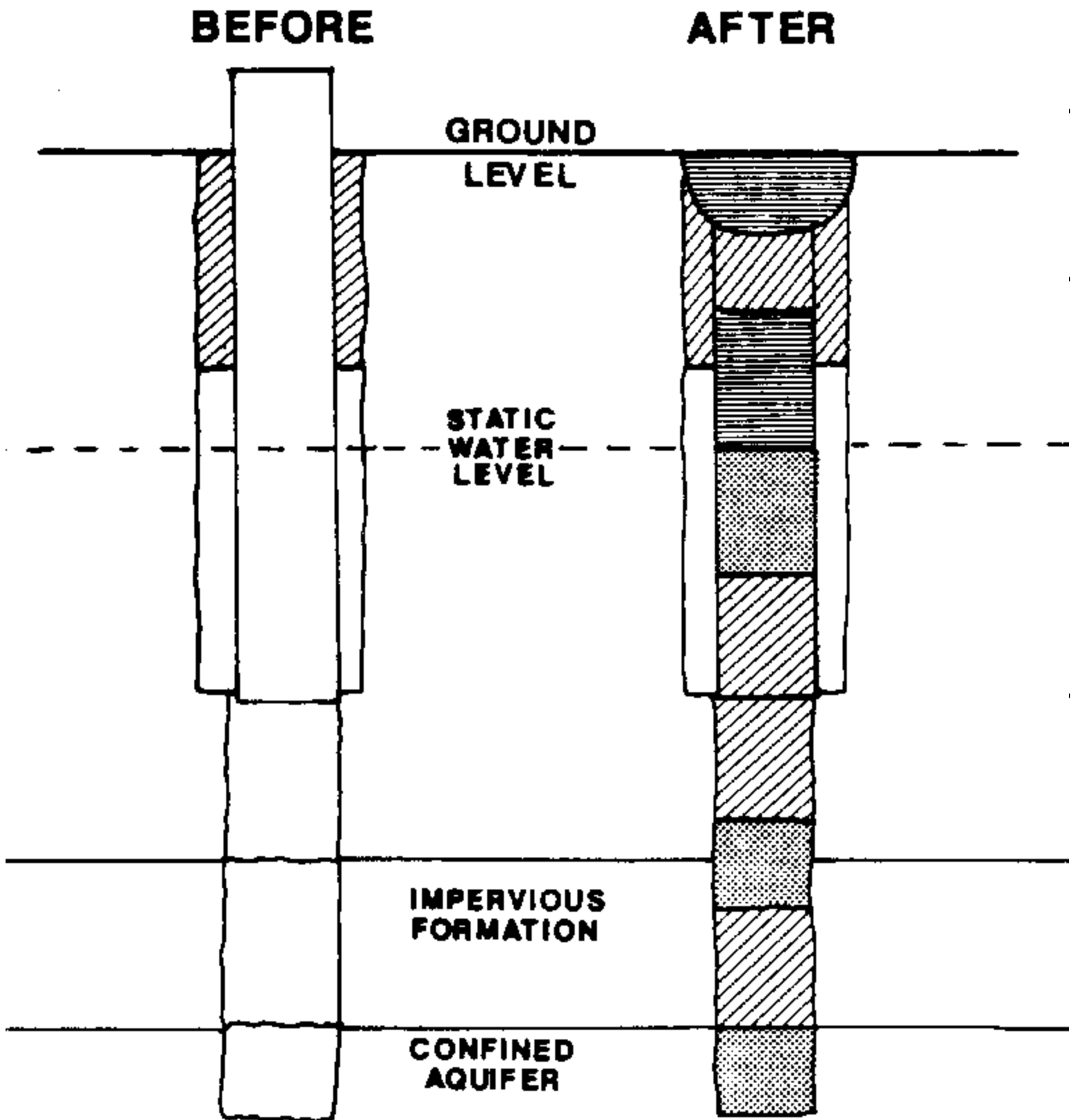
PLUGGING OF A CONFINED WELL (open hole, ungrouted)



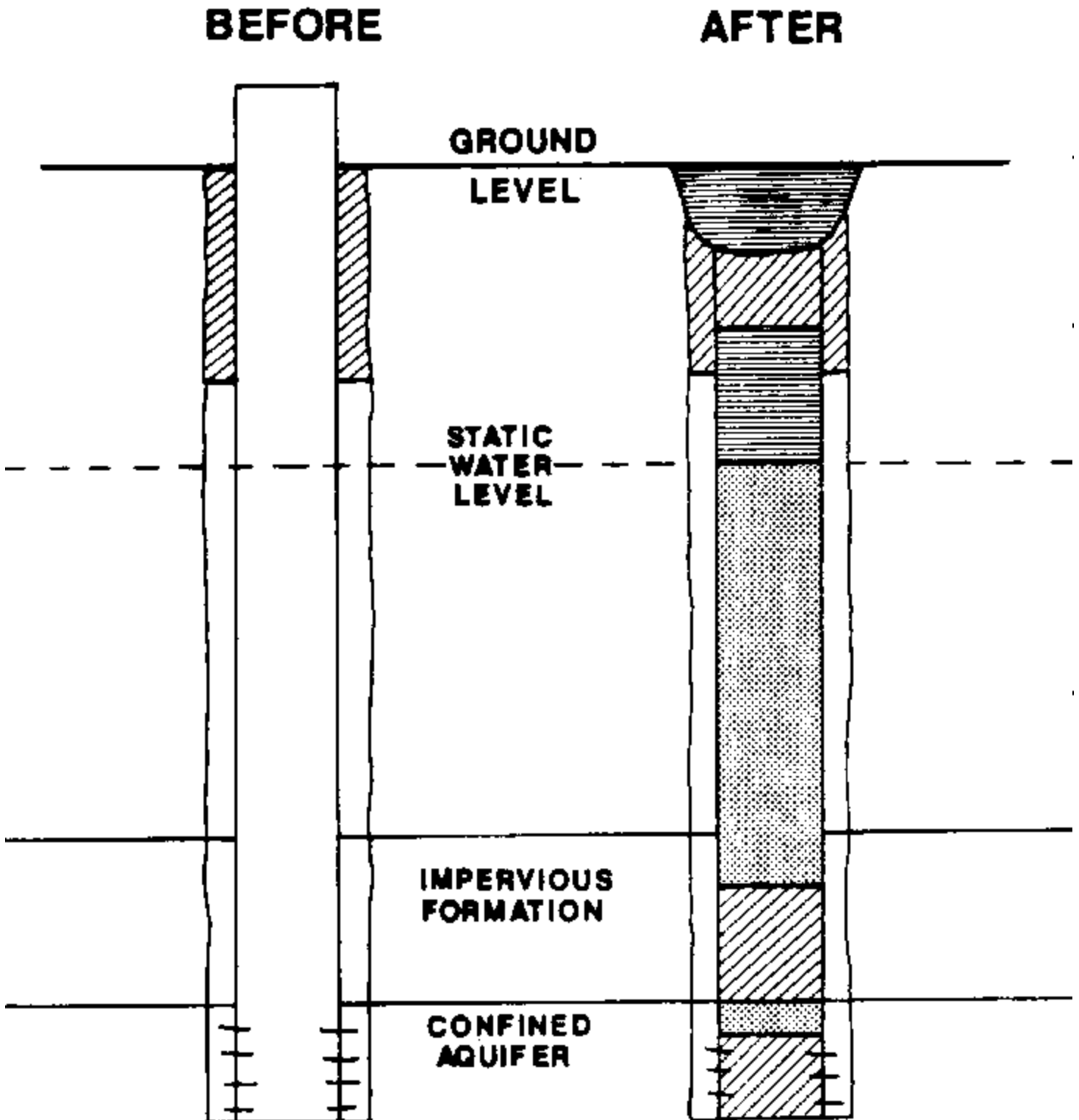
PLUGGING OF A CONFINED WELL (not grouted)



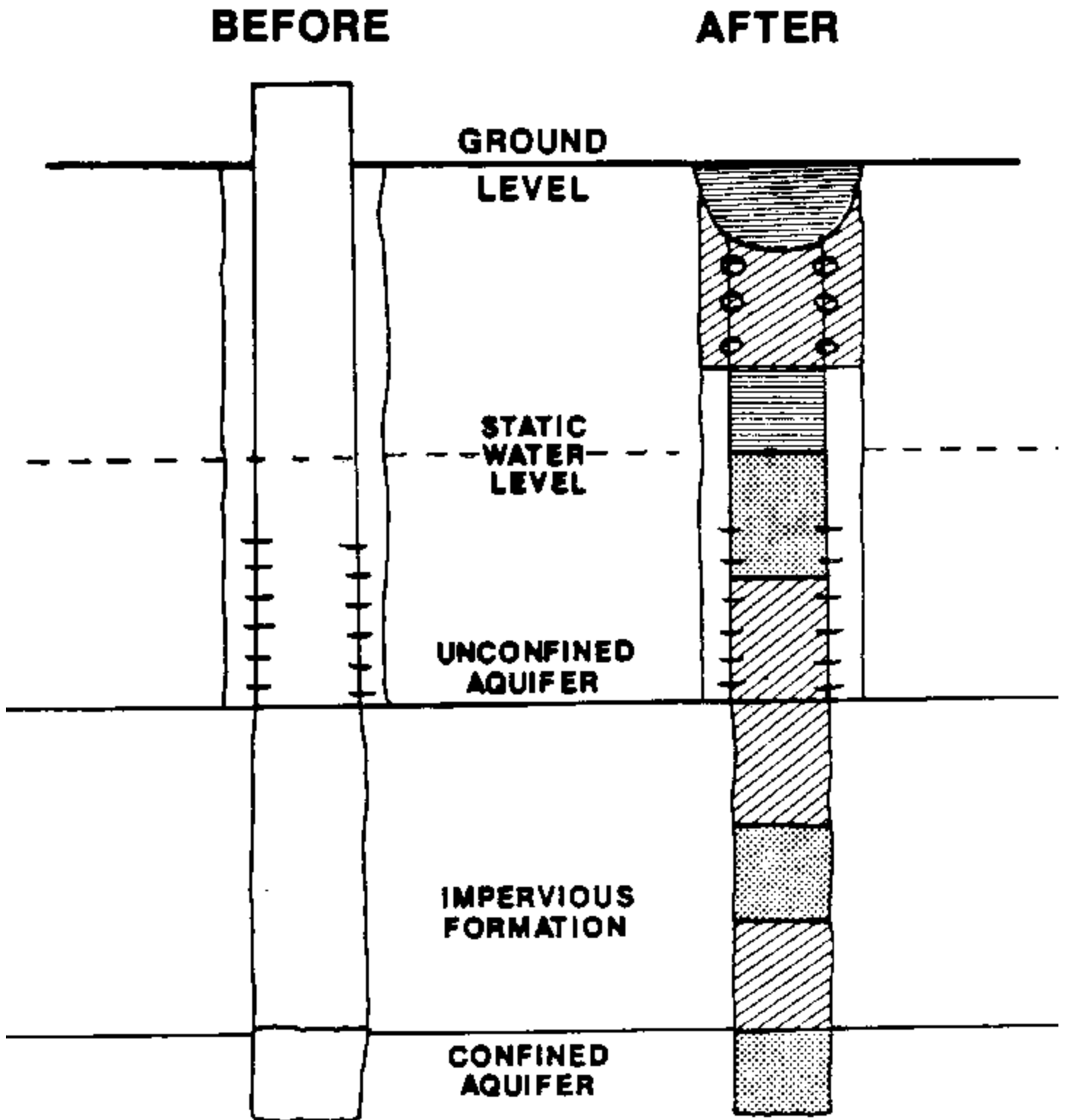
PLUGGING OF A CONFINED WELL (open hole, grouted)



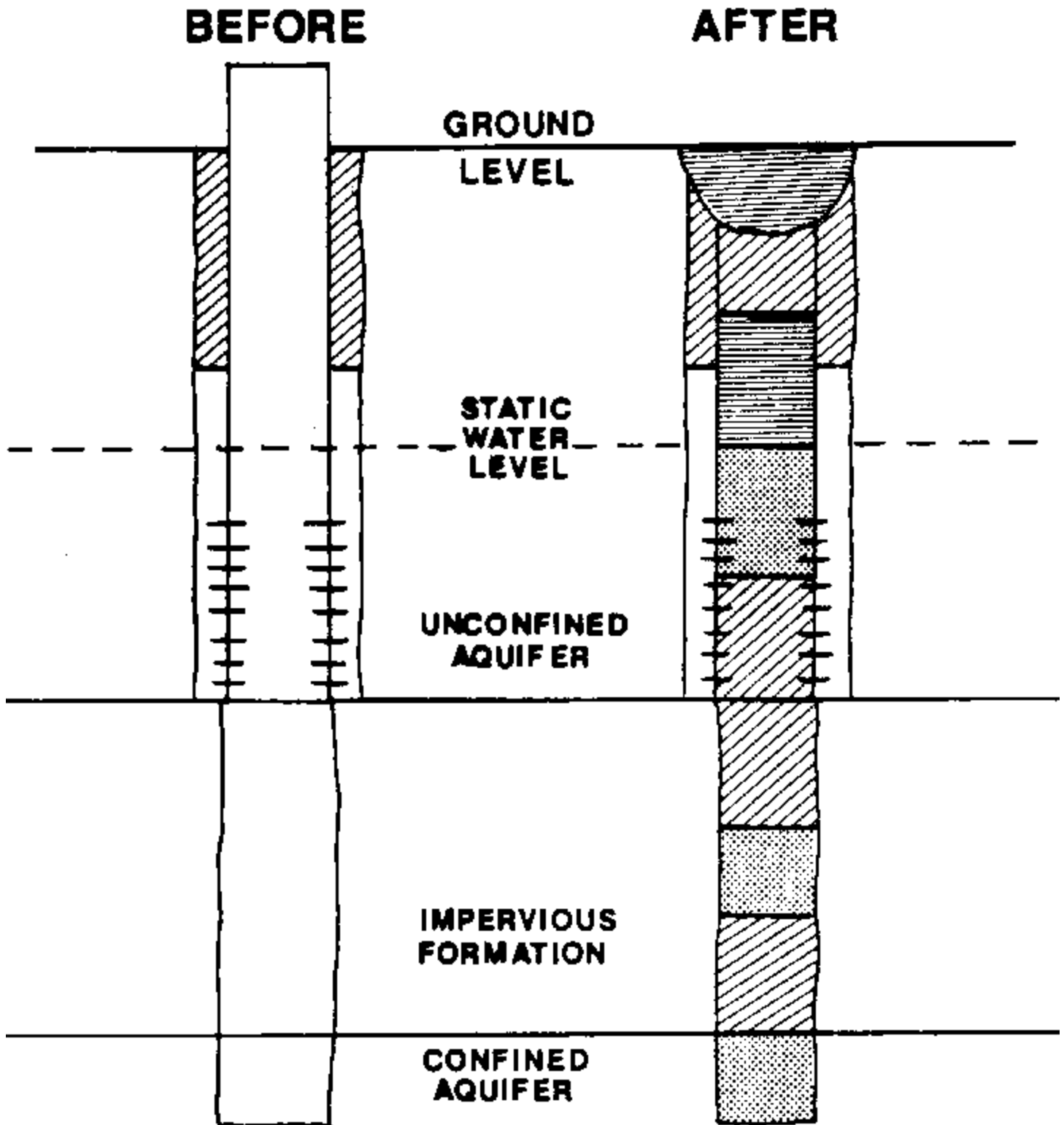
PLUGGING OF A CONFINED WELL (grouted)



PLUGGING OF AN UNCONFINED, CONFINED WELL (open hole, ungrouted)



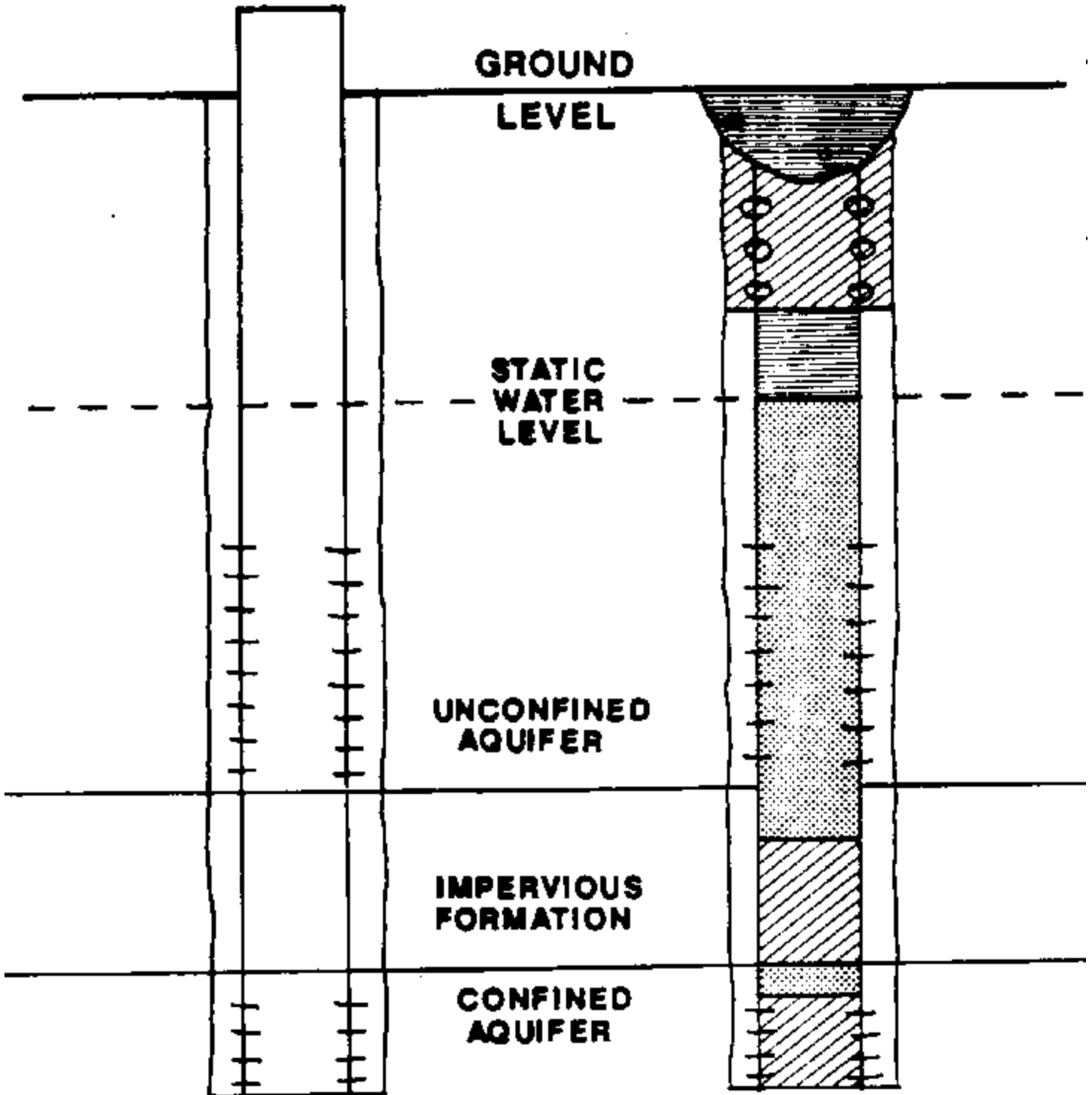
PLUGGING OF AN UNCONFINED, CONFINED WELL (open hole, grouted)



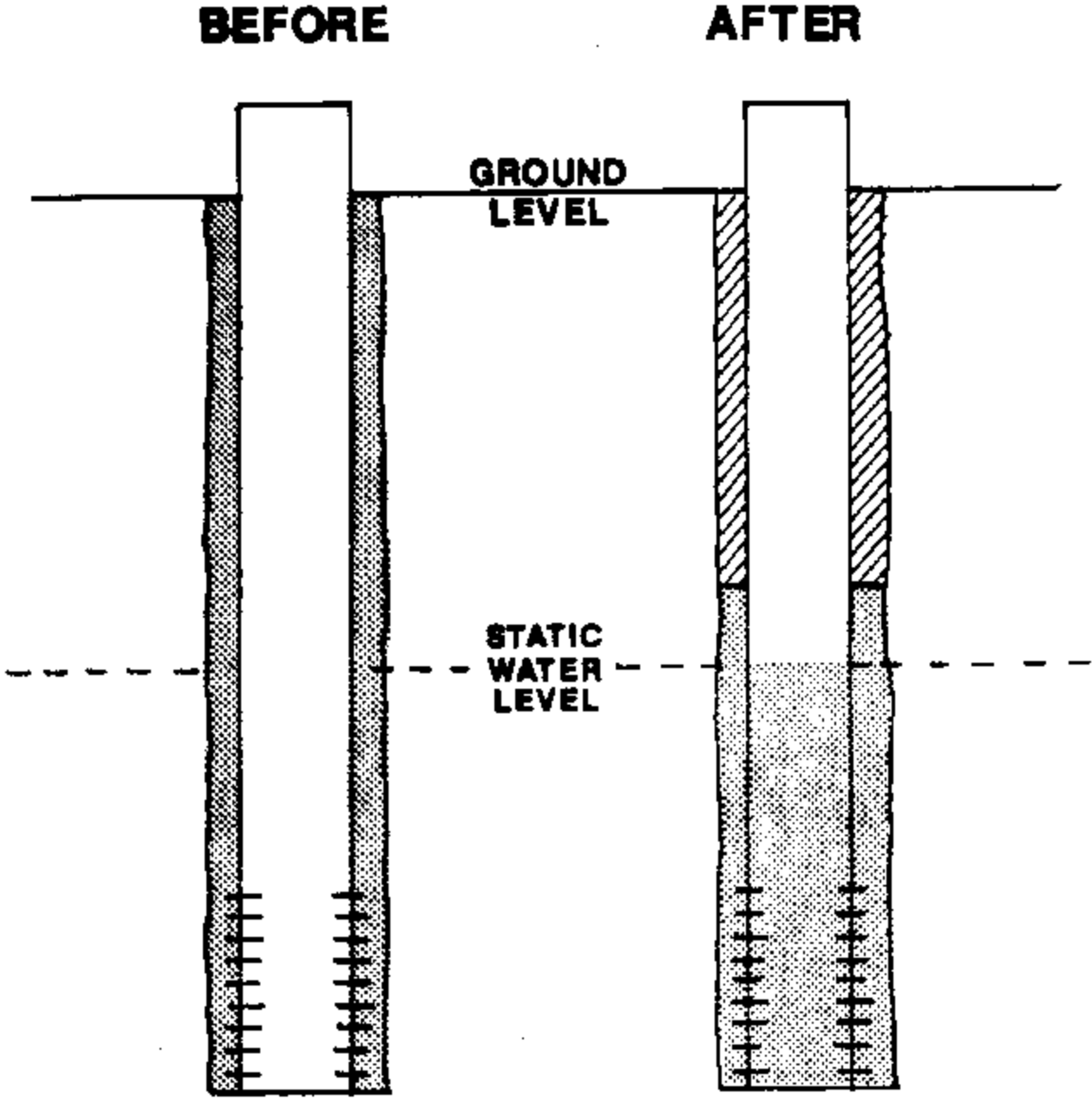
PLUGGING OF AN UNCONFINED, CONFINED WELL (not grouted)

BEFORE

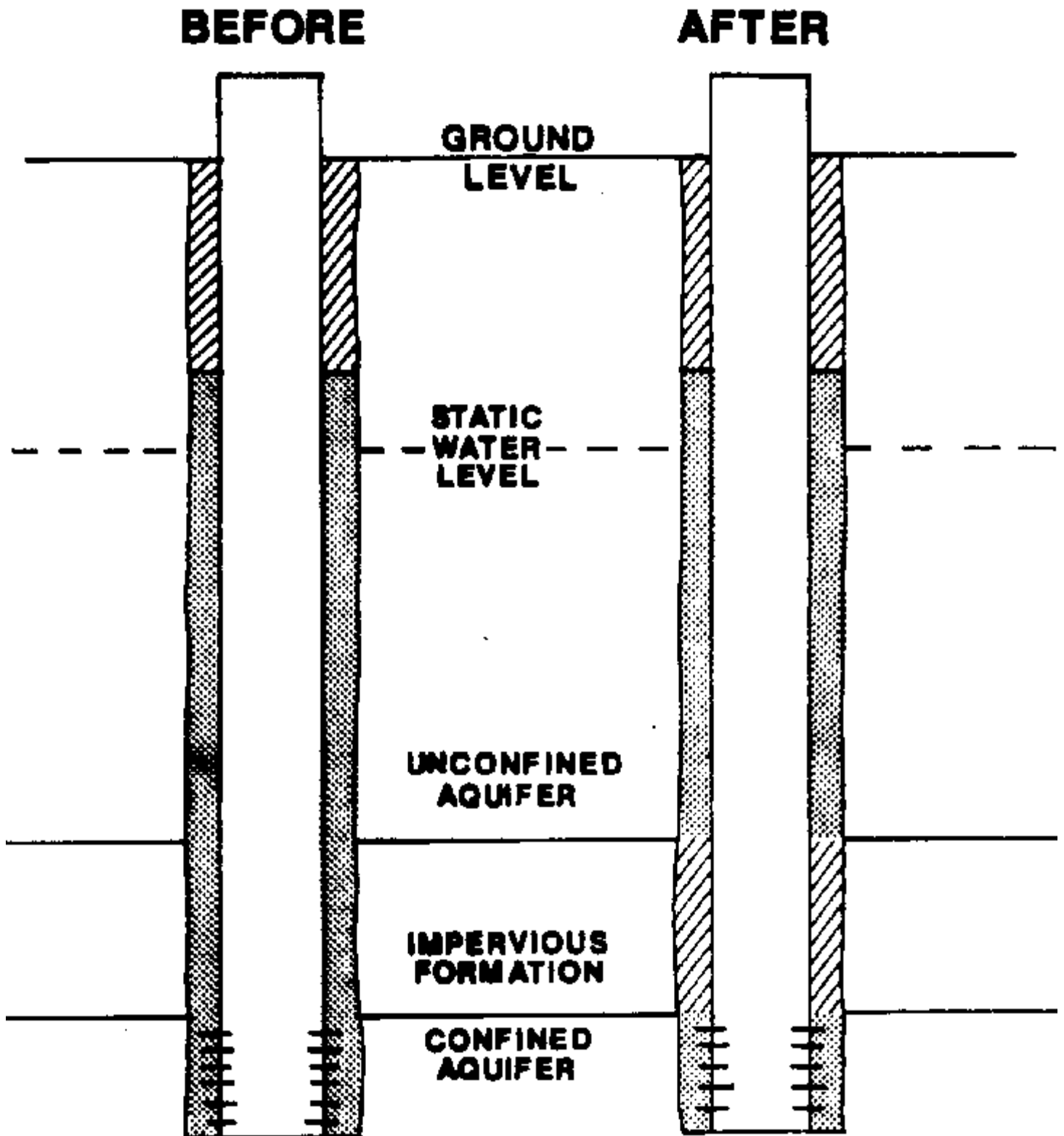
AFTER



GROUTING AN UNCONFINED WELL

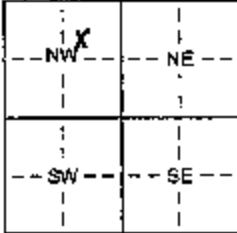


GROUTING A CONFINED WELL



1 LOCATION OF WATER WELL: Fraction SW 1/4 NE 1/4 NW 1/4 Section Number 13 Township Number T 26 S Range Number R 29 E
 County: Gray
 Distance and direction from nearest town or city street address of well if located within city?
225 S. & 0.25 E. of Ingalls

2 WATER WELL OWNER: John Doe
 RRA#, St. Address, Box #: RR2 Board of Agriculture, Division of Water Resources
 City, State, ZIP Code: Ingalls, Ks 67858 Application Number: 18651

3 LOCATE WELL'S LOCATION WITH AN "X" IN SECTION BOX:

 4 DEPTH OF COMPLETED WELL: 241 ft. ELEVATION:
 Depth(s) Groundwater Encountered: 1. _____ ft. 2. _____ ft. 3. _____ ft.
 WELL'S STATIC WATER LEVEL: 65 ft. below land surface measured on mo/day/yr: 2-16-81
 Pump test data: Well water was _____ ft. after _____ hours pumping _____ gpm
 Est. Yield _____ gpm: Well water was _____ ft. after _____ hours pumping _____ gpm
 Bore Hole Diameter: 3.5 in. to _____ ft. and _____ in. to _____ ft.
 WELL WATER TO BE USED AS:
 1 Domestic 2 Irrigation 3 Feedlot 4 Industrial
 5 Public water supply 6 Air conditioning 7 Domestic (lawn & garden) 8 Oil field water supply 9 Dewatering 10 Monitoring well
 11 Injection well 12 Other (Specify below) _____
 Was a chemical/bacteriological sample submitted to Department? Yes _____ No _____ If yes, mo/day/yr sample was submitted _____
 Water Well Disinfected? Yes _____ No _____

5 TYPE OF BLANK CASING USED:
 1 Steel 3 RMP (SR) 5 Wrought iron 6 Concrete tile 8 CASING JOINTS: Glued _____ Clamped _____
 2 PVC 4 ABS 7 Fiberglass 9 Other (specify below) _____ Welded _____
 Blank casing diameter: 16 in. to _____ ft. Dia. _____ in. to _____ ft. Dia. _____ in. to _____ ft. Dia. _____ in. to _____ ft. Dia. _____
 Casing height above land surface: 3 ft below X weight _____ lbs/ft. Wall thickness or gauge No. _____
 TYPE OF SCREEN OR PERFORATION MATERIAL:
 1 Steel 3 Stainless steel 5 Fiberglass 7 PVC 10 Asbestos-cement
 2 Brass 4 Galvanized steel 6 Concrete tile 8 RMP (SR) 11 Other (specify) _____
 12 None used (open hole)
 SCREEN OR PERFORATION OPENINGS ARE:
 1 Continuous slot 3 Mill slot 5 Gauzed wrapped 8 Saw cut 11 None (open hole)
 2 Louvered shutter 4 Key punched 6 Wire wrapped 9 Drilled holes
 7 Torch cut 10 Other (specify) _____
 SCREEN-PERFORATED INTERVALS: From _____ ft. to _____ ft. From _____ ft. to _____ ft. From _____ ft. to _____ ft.
 GRAVEL PACK INTERVALS: From _____ ft. to _____ ft. From _____ ft. to _____ ft. From _____ ft. to _____ ft.

6 GROUT MATERIAL: 1 Neat cement 2 Cement grout 3 Bentonite 4 Other _____
 Grout intervals: From 6 ft. to 3 ft. From _____ ft. to _____ ft. From _____ ft. to _____ ft.
 What is the nearest source of possible contamination:
 1 Septic tank 4 Lateral lines 7 Pit privy 10 Livestock pens 14 Abandoned water well
 2 Sewer lines 5 Cess pool 8 Sewage lagoon 11 Fuel storage 15 Oil well/Gas well
 3 Watertight sewer lines 6 Seepage pit 9 Feedyard 12 Fertilizer storage 16 Other (specify below) _____
 Direction from well? Southeast How many feet? 150 FT.

FROM	TO	LITHOLOGIC LOG	FROM	TO	PLUGGING INTERVALS
<u>141</u>	<u>65</u>	<u>Sand & gravel (248.8 cubic ft.)</u>			
<u>65</u>	<u>6</u>	<u>clays (83.4 cubic ft.)</u>			
<u>6</u>	<u>3</u>	<u>cement grout (4.2 cubic ft.)</u>			

7 CONTRACTOR'S OR LANDOWNER'S CERTIFICATION: This water well was (1) constructed, (2) reconstructed, or (3) plugged under my jurisdiction and was completed on (mo/day/year) 2-16-81 and this record is true to the best of my knowledge and belief. Kansas Water Well Contractor's Licence No. _____ This Water Well Record was completed on (mo/day/yr) 2-20-81 under the business name of _____ by (signature) John Doe

INSTRUCTIONS: Use typewriter or ball point pen. PLEASE PRESS FIRMLY and PRINT clearly. Please fill in blanks, underline or circle the correct answers. Send top three copies to Kansas Department of Health and Environment, Bureau of Water, Topeka, Kansas 66620-0001. Telephone 785-296-5524. Send one to WATER WELL OWNER and retain one for your records. Fee of \$5.00 for each constructed well.

SIGNIFICANCE OF WATER MINERALIZATION

Total Dissolved Solids: The total dissolved solids is a measure in weight (mg/l) of the mineral matter dissolved in the water. This figure multiplied by 8.34 gives pounds of mineral matter per million gallons of water. The U.S. Public Health Service Drinking Water Standards recommend less than 500 mg/l total solids for drinking or culinary uses. If such water is not available 1000 mg/l will be considered satisfactory. The specific conductance (micromhos per centimeter) is a measure of the water's ability to conduct an electric current and is therefore an indication of the ionic strength, or mineralization of the water.

Total Hardness: The calcium ion and the magnesium ion cause the hardness of water and the sum of the two, both expressed as CaCO_3 , is termed the total hardness. Hardness is undesirable in water in that it produces an insoluble sticky curd with soap and produces scaling in teakettles and hot water tanks. A total hardness above 400 mg/l as CaCO_3 is considered excessive for public water supplies in Kansas. Hardness can be removed readily by the softening process.

Sodium: Sodium is not particularly significant physiologically except to those persons having an abnormal sodium metabolism and who are thus on a restricted sodium diet. It is important in irrigation waters because a high sodium to calcium-magnesium ratio tends to decrease the permeability of the soil and thus will have a harmful effect on soil structure. The base exchange or zeolite process of softening increases the sodium content of the water being softened. Limit 100 mg/l.

Iron and Manganese: Iron and manganese have little significance physiologically but they are undesirable in a public water supply because both will produce staining of laundered fabrics and porcelain plumbing fixtures and create consumer complaint. If present in an appreciable amount, iron gives the water a rusty turbid appearance and an unpleasant taste. Both substances create problems in the chlorination of water. The U.S.P.H.S. Drinking Water Standards recommend that iron be less than 0.3 mg/l and manganese less than 0.05 mg/l. Iron and manganese can be readily removed by treatment, particularly if lime-soda softening is also being practiced.

Sulfate: Sulfate is one of the principal mineralizing characteristics of water in Kansas and if present in large amounts it will impart a bitter taste to the water and it may act as a laxative to people who are not accustomed to drinking the water. The drinking water standards recommend that sulfate be less than 250 mg/l. Sulfate cannot be removed economically.

Chloride: Chloride is one of the principal mineralizing substances present in water in Kansas. When present in sufficient amount, chloride imparts a salty taste to the water but otherwise has little or no physiological significance when present in concentrations not offensive to taste. The drinking water standards recommend that chloride be less than 250 mg/l. Chloride cannot be removed economically.

Nitrate: Nitrate is important in drinking water because high concentrations may produce cyanosis or methemoglobinemia in infants. The recommended limit for public water supplies in Kansas is 10 mg/l nitrate (as N) when used for infants under one year of age. Older children and adults are not affected. Nitrate is also important in water to be used for livestock watering because excessive amounts may be harmful, particularly to young animals. Nitrate cannot be removed economically.

THESE ARE ONLY SUGGESTED FOR PRIVATE WELLS

Fluoride: Fluoride is important in drinking water because in high concentration it may produce a mottling or discoloration of the tooth enamel of children and in low concentration it does not afford sufficient protection for the prevention of dental decay in children. A concentration of 10 mg/l fluoride is considered optimum for public water supplies in Kansas and a concentration of 1.5 mg/l fluoride is the recommended limit. It is recommended that fluoride be added to public water supplies when the concentration is substantially less than the optimum.

Phosphate: Total phosphate represents all forms of phosphate in water including polyphosphates used in the treatment of water. Phosphate in water has little physiological significance but it does stimulate the growth of algae and thus may cause water treatment problems. If a poly-phosphate is being fed to stabilize iron, it is recommended that the feed rate be limited to 3 mg/l phosphate per 1 mg/l iron.



- ★ mg/l = milligrams per liter
- ★ One gallon weighs 8.34 pounds
- ★ 1 mg/l = 8.34 lbs. Per million gallons
- ★ 17.1 mg/l = 1 grain per gallon
- ★ To obtain results in grains per gallon, divide results in milligrams per liter by 17.1
- ★ Reacting values are in terms of milligram equivalents per liter

DISINFECTATION TABLE TO DISINFECT THE WELL WATER
(Produces a 100 mg/liter chlorine solution per-foot of casing size)

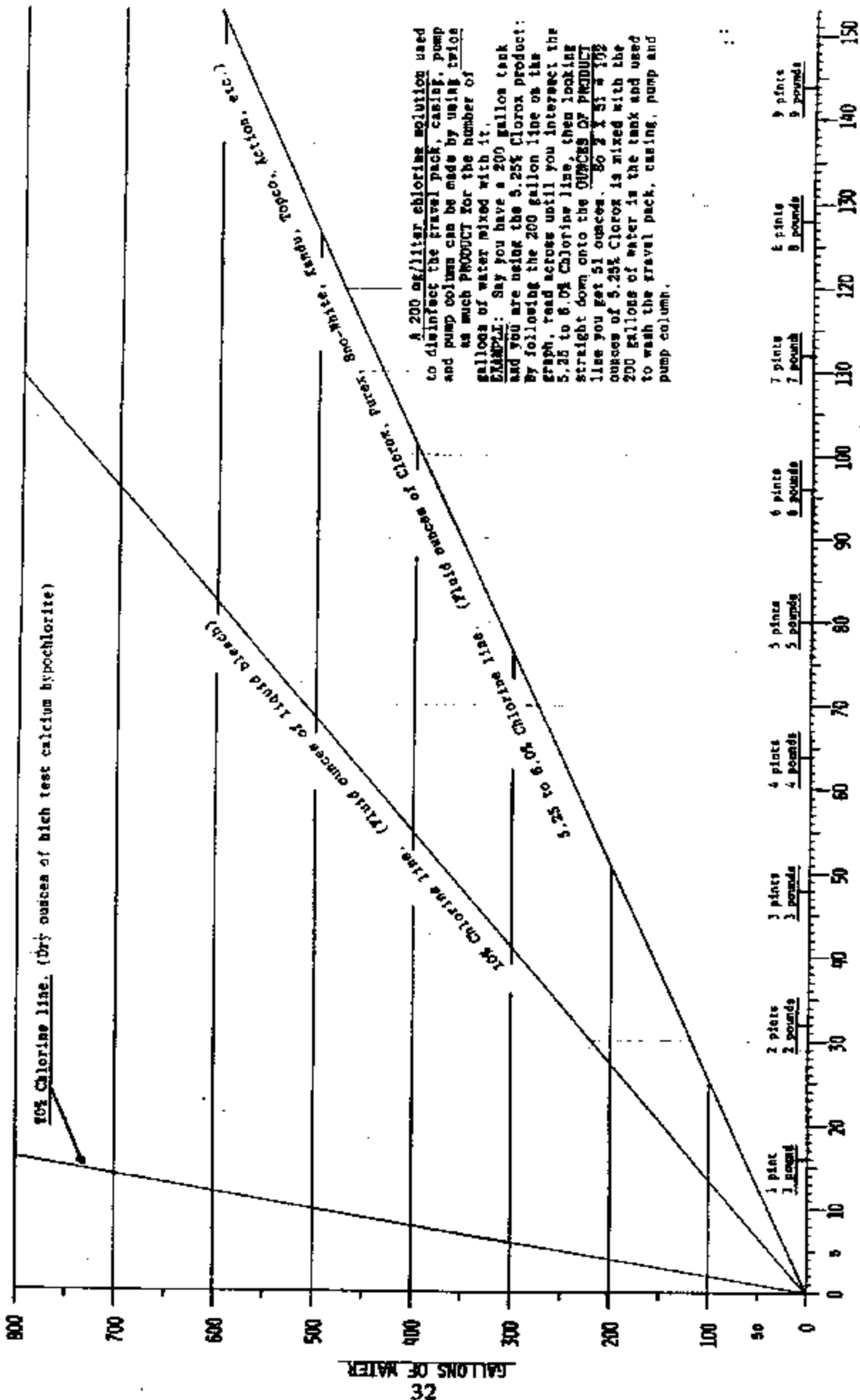
CASING SIZE Nominal diameter (INCHES)	GALLONS OF WATER PER ONE FOOT OF CASING SIZE (GAL/FT./CA. SIZE)	OUNCES OF PRODUCT ADDED TO DISINFECT ONE (1) FOOT OF WATER PER CASING SIZE		
		5.25% to 6.0% Chlorine PRODUCT: Clorox, Purex, Snow-White, Kandu, Topco, Action, White Magic, Surefine and MC ₂ or other brand names. (sodium hypochlorite)	10% Chlorine PRODUCT: Liquid Bleach, Purchased from a chemical supply company. (sodium hypochlorite)	70% Chlorine PRODUCT: High test Calcium Hypochlorite. Purchased from a chemical supply company. (calcium hypochlorite)
1.25	0.06	(FLUID OUNCES) 0.015	(FLUID OUNCES) 0.008	(DRY OUNCES) 0.0011
1.50	0.09	0.023	0.012	0.0017
2	0.16	0.041	0.021	0.0031
2.5	0.25	0.064	0.033	0.0048
3	0.37	0.094	0.049	0.0071
3.5	0.50	0.127	0.067	0.0095
4	0.65	0.165	0.087	0.0124
5	1.02	0.259	0.136	0.0194
6	1.50	0.381	0.200	0.0286
8	2.50	0.650	0.347	0.0495
10	4.08	1.036	0.544	0.0777
12	5.87	1.490	0.782	0.1118
14	8.00	2.031	1.066	0.1523
16	10.44	2.650	1.391	0.1988
18	13.21	3.354	1.761	0.2515
24	23.50	5.966	3.132	0.4474
30	36.70	9.317	4.891	0.6988

1. FORMULA TO FIND HEIGHT OF WATER COLUMN: (total depth of water well) - (measured static water level) = (height of water column)
EXAMPLE: (216 feet depth of well) - (37 feet static water level) = (179 feet of water column)

2. FORMULA TO FIND NUMBER OF OUNCES USED TO DISINFECT THE WELL WATER: (height of water column) X (ounces of PRODUCT added to disinfect one (1) foot of water per casing size) = (ounces of PRODUCT needed to be placed and mixed with the water in the well) EXAMPLE: For a 5 inch casing using 5.25% Clorox Product: (179 feet) X (0.259) = (46.36 fluid ounces) Which is approximately 3 pints of Clorox placed down the well and mixed with the well water by surging and left standing in the well for 8-10 hours to properly disinfect the well water.

3. FORMULA TO FIND NUMBER OF GALLONS INSIDE THE CASING: (gallons of water per one (1) foot of casing size) X (height of water column) = (gallons of water inside the casing) EXAMPLE: For 5 inch casing: (1.02) X (179) = (183 gallons)

DISINFECTION GRAPH TO DISINFECT THE WELL WATER
 (PRODUCES A 100 MG/LITER CHLORINE SOLUTION WHEN MIXED WITH THE NUMBER OF GALLONS OF WATER)



A 200 mg/liter chlorine solution used to disinfect the gravel pack, casing, pump and pump column can be made by using twice as much PRODUCT for the number of gallons of water mixed with it.

EXAMPLE: Say you have a 200 gallon tank and you are using the 5.25% Clorox product: By following the 200 gallon line on the graph, read across until you intersect the 5.25 to 6.0% Chlorine line, then looking straight down onto the OUNCES OF PRODUCT line you get 51 ounces. 50 2 1/2 51 + 102 ounces of 5.25% Clorox is mixed with the 200 gallons of water in the tank and used to wash the gravel pack, casing, pump and pump column.

NOTES: 1 PINT = 16 FLUID OUNCES
 1 POUND = 16 DRY OUNCES

METHODS FOR CHLORINATING PRIVATE WATER SUPPLIES

1. The well cover should be removed so that fluid can be dumped or poured into the well, if possible the pumping system should remain functional. Caution must be taken to avoid electrical shock.
2. The volume of water contained in the system should be estimated so that the appropriate amount of chlorine bleach can be added. The volume of water in the well, piping, pressure tank, and water heater must be totaled.
 - a. The volume of the well should be estimated by subtracting the depth to the water inside the well from the total depth of the well. This will tell you how many feet of water are in the well. The attached chart shows how many gallons of water per foot are contained in each different size (diameter) wells.
 - b. The volume of the water heater and the pressure tank (if used) should be readily available.
 - c. The piping from the well to the point of use can be estimated at between 20 and 100 gallons depending on the length and size of piping to the house and the number of sinks, toilets, showers or other dispensers. If the well is a long distance from the house (over 200 ft.) Some additional volume should be added.
 - d. Total the volume of water contained in the entire system.
 1. The amount of water contained in the well _____
 2. Capacity of the water heater _____
Capacity of the pressure tank _____
 3. Estimated volume contained in the piping _____
 4. Total: Add the four numbers above to obtain the total volume of water in the system. _____

One ounce of chlorine bleach should be added for every 2 gallons of water in the system. More chlorine may be required for heavy concentrations of bacteria to insure that the disinfection of the system is complete. In most cases $\frac{1}{2}$ to 1 gallon of chlorine laundry bleach is an ample amount to obtain complete disinfection of the system even with heavy bacteria concentrations. The chlorine bleach should be diluted before it is added to the well to minimize any corrosion of metal casing or pump parts from concentrated chlorine.

3. Obtain a tank or enough clean buckets or containers which can be filled with chlorinated water to equal at least the volume of water contained in the well. The chlorine solution can be mixed up by adding 1 oz. of chlorine bleach to every 2 gallons of water in the containers. These containers should be placed near the well before the chlorine solution is mixed since they will be poured into the well once step 4 has been completed.
4. Add the required amount of chlorine to the well. Run the hose from the nearest facet to the well and circulate the chlorine mixture through the hose and back into the well. By circulating the water in the well an even mixture of chlorine solution can be obtained. While mixing the chlorine solution with the hose the sides of the casing and the drop pipe for the pump can be washed with the chlorinated mixture.

A strong odor of chlorine smell should be present after the mixing process has been completed. If the chlorine smell is not strong, more chlorine should be added.

5. Pour the mixture of chlorinated water into the well and allow the well to set for 2 or more hours before proceeding with step 6.
6. Run water from each faucet in the distribution system until a chlorine odor is present in the water. This should be done for hot and cold water. The hot water should take longer than the cold because the hot water tank holds a large volume of water. Chlorinated water should be allowed to enter all the lines in the distribution system including lines to bathtubs, showers, toilets and outside hydrants so complete disinfection can be achieved. Carbon filters should be removed or bypassed. The air pressure should be released from the pressure tank (except those with a permanent air cushion) so that the entire tank may be filled with chlorinated water.

Caution: Some pressure tanks may be damaged by strong chlorine solutions. The manufacturer should be contacted to provide needed information about disinfection of the pressure tank.

It may be necessary to repeat steps 4 and 5 if the chlorine smell reaching the facets is weak. The chlorinated water should be allowed to remain in the well and piping for 12 to 24 hours if possible.

The chlorinated water contained in the system should be pumped to waste when the allotted time has passed. The water having a strong chlorine smell should not be discharged to a septic tank as it may kill the needed microorganisms in the septic system. This water should be discharged onto a driveway or area where damage will not be done to vegetation or other property. The chlorinated water contained in the plumbing system should be discharged until the chlorine odor is absent from all water sources. A small amount of chlorinated water contained in the plumbing of the house should not affect the septic tank. If bacteria problems persist, the chlorination process may need to be repeated.

After the well has been chlorinated, the well must be sealed to prevent surface water, small animals and insects from entering the well. A screened vent should be provided in the casing or well seal so air may enter the well but water and insects cannot.

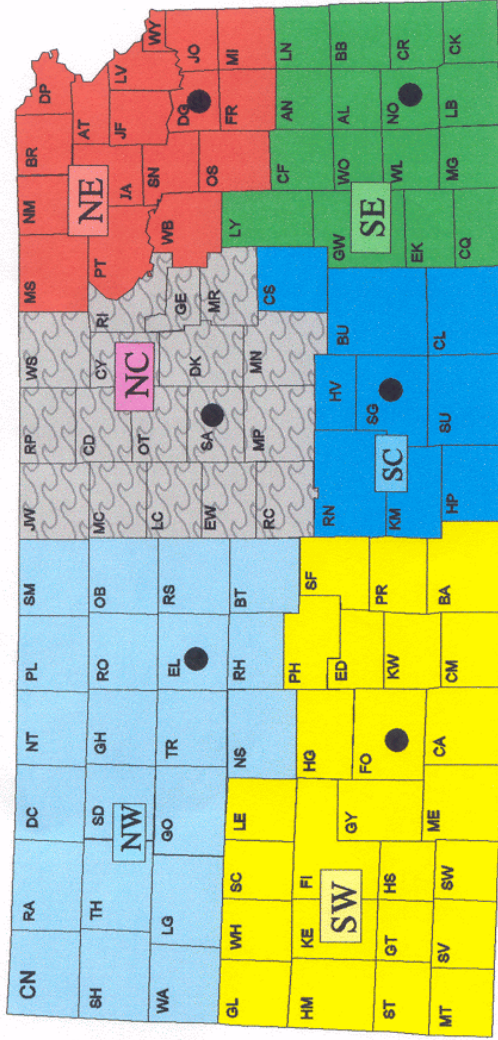
Some wells are constructed so that it is not possible to install a positive well seal such as a dug well. These wells can be reconstructed and cased or a continuous chlorination system can be installed which will kill the unwanted bacteria.

If after reading this publication you are unsure of this procedure for chlorination, you may contact the Bureau of Water within the Department of Health and Environment located in Topeka (785) 296-5522 or one of the six district offices at the locations shown below.

Dodge City	(620) 225-0596
Wichita	(316) 337-6020
Chanute	(620) 431-2390
Lawrence	(785) 842-4600
Salina	(785) 827-9639
Hays	(785) 625-5664

<u>Pipe or Well Diameter (Inches)</u>	<u>Gallons of Water Per Foot of Length</u>
1/2	.010
3/4	.023
1	.041
1 1/4	.067
1 1/2	.092
2	.163
2 1/2	.255
3	.37
3 1/2	.50
4	.65
5	1.02
6	1.50
8	2.60
10	4.08
12	5.87
14	8.00
16	10.44
18	13.21
24	23.50
30	63.70

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
 WATER PROGRAM DISTRICT OFFICE STAFF
 November 8, 2004



Northwest District-785.625.5664

2301 E. 13th
 Hays, KS 67601-2651

Dan Wells District Environmental Adm.
 Norb Windholz Environmental Technician
 Doug Armstrong Agricultural Technician
 Shelly Briley Agricultural Technician
 Doug Schneeweis Watershed Field Coordinator

Southwest District-620.225.0596

302 W. McArthur Road
 Dodge City, KS 67801-6098

Al Guernsey District Environmental Adm.
 Allen Nichols Environmental Technician
 Denise Boles Environmental Technician
 Susan Turner Agricultural Engineer
 Rodney Barrows Agricultural Technician
 Andi Curtiss Agricultural Technician

Ulysses Satellite Office-620.356.1075

325½ W. Oklahoma Terr.
 Ulysses, KS 67880

Dennis Hiltz Agricultural Technician
 Ethel Evans Agricultural Technician
 Jessica Johnson Agricultural Technician

North Central District-785.827.9639

2501 Market Place, Ste. D&E
 Salina, KS 67401-7699

Rick Brunetti District Environmental Adm.
 Bert Zerr Environmental Associate
 Marsha Carpenter Environmental Technician
 Greg Bland Agricultural Technician
 Max Richard Agricultural Technician
 Jennifer Nichols Agricultural Technician

South Central District-316.337.6020

130 S. Market, 6th Floor
 Wichita, KS 67202-3802

Michael Jones District Environmental Adm.
 John Goetz Water District Engineer
 Zack Phillips Environmental Scientist
 Heath Horyna Environmental Technician
 Susan Turner CAFO Engineer
 Julie Hooper CAFO Technician
 BJ Hope CAFO Technician
 Richard Basore Watershed Field Coordinator

Northeast District-785.842.4600

800 W. 24th St.
 Lawrence, KS 66046-4417

Julie Coleman District Environmental Adm.
 Helen Holm Water District Engineer
 Jeff Lamfers Environmental Technician
 Vic Montgomery Environmental Technician
 Dean Goodell Agricultural Technician
 Cindy Hotovy Agricultural Technician
 Beth Rowlands Watershed Field Coordinator

Southeast District-620.431.2390

1500 W. 7th St.
 Chanute, KS 66720

David Stuft District Environmental Adm.
 Vacant Water District Engineer
 Greg Taylor Environmental Scientist
 Mike Klauaman Environmental Technician
 Alan Sharp Agricultural Technician

