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Rod R. Blagojevich, Governor
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MEMORANDUM

TO: Licensed Water Well Contractors
Local Health Departments ✓
Directors of Environmental Health
Regional Engineers/Supervisors

FROM: Jerry Dalsin
Division of Environmental Health

DATE: July 23, 2004

SUBJECT: Liner Pipe - Installation and Grouting Procedures

It has come to the Department's attention that there is some confusion regarding the intent and requirements of the Illinois Water Well Construction Code, Section 920.40 (c) Undesirable Geologic Formations. The purpose of this notice is to provide clarification on this section.

Section 920.40 Design Factors c) Undesirable Geological Formations, states: "Water bearing formations shall be excluded by installing casing or a liner and properly sealing when such formations contain undesirable water. When a contaminated formation is to be excluded, the liner must be grouted in place, in accordance with Section 920.90 (h), from 10 feet below the bottom of the contaminated formation to at least 10 feet above the top of the contaminated formation.. When multiple water-bearing formations of different static water levels are penetrated in the construction of a water well and the lower water-bearing formation has sufficient yield for the water well, the upper water-bearing formations shall be excluded by installing casing or a liner and properly sealing to prevent dewatering of the upper water-bearing formations."

The purpose of installing a liner is threefold: first to seal off a formation with caving material and/or very little water; second, to seal off a formation with the significant quantity of water and the water quality is desirable; and three, to seal off a formation where the water is contaminated or undesirable.

Basically, the requirements for the installation and grouting of liner pipe fall under three scenarios:

- 1. Upper Geologic formation with caving material and/or very little water**
An example of a geologic formation with caving material would be a shale formation that occurs below a formation in which the casing has already been set. The amount of water is minimal, less than 1 gallon per minute, and of acceptable quality. In this case, install a liner through the shale formation with a packer on both ends of the liner. The quality of the packer for the bottom of the liner, such as a Griffin packer, has to be manufactured for setting in a rock formation. A K-packer is not appropriate for setting in a rock formation, but it can be used on the upper part of the liner if it terminates in the casing. In most cases, the shale will cave and provide additional sealing. Grouting is not necessary.
- 2. Upper Geologic Formation with a significant quantity of water where the water quality is desirable and the source of water is from a lower water-bearing formation that has sufficient yield for the water well**
An example of an upper geologic formation with a significant quantity of water and the water quality is desirable, would be a shallow rock formation that produces at least 1-2 gpm. Install a liner and pressure grout to prevent the dewatering of the upper water-bearing formation. An alternative method would be to install an appropriate packer on the bottom of the liner and a similar packer 10' above the packer on the bottom of the liner. As the liner with the packers is being installed, fill the 10' annular space between the packers and casing with bentonite chips. This creates a 10' bentonite plug on the outside of the liner. If any water leaks by the upper packer, the water would hydrate the bentonite. In addition, any water in the rock formation adjacent to the bottom of the 10' liner would also hydrate the bentonite.
- 3. Water-bearing geologic formations and the water quality is contaminated or undesirable**
A water-bearing formation that contains undesirable or contaminated water must be properly sealed by installing a liner and grouting it in place, in accordance with Section 920.90 h), from 10 feet below the bottom of the formation containing contaminated or undesirable water to at least 10 feet above it.


Grouting Methods

If the grout is to be pumped through a tremie pipe, the diameter of the hole constructed through the formation shall be a minimum of 3 inches greater than the outside diameter of the liner pipe or coupling, whichever is greater. If the grout is to be pumped through the inside of the liner and up the annular space, the diameter of the hole constructed through the formation shall be a minimum of 2 inches, nominal, greater than the outside diameter of the liner pipe or coupling,

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whichever is greater. Another method is construct a hole 2 inches, nominal, greater than the outside diameter of the liner pipe or coupling, whichever is greater, fill the hole with grout, and then push the liner through the grout so that the liner sets at the bottom of the hole. After the grout has set, drill out the grout inside the liner.

To carry this even further, there are some instances where the water is very aggressive. If a steel liner was exposed to this water, the water could corrode and eat through the liner, which renders it useless. In this case, it is imperative that the entire liner be grouted to protect its future integrity.



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cc: Water Well Licensing Board
IAGP