Policy #:
FP-10 (2014)

Subject of Policy:
Use of Wells as a Water Supply for Fire Protection Systems

Reviewed and Approved By:
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Title:
State Fire Marshal

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Revised Date:
n/a (new)

APPLIES TO:
All Inspection Personnel, Inspection Supervisors, Code/Plans Specialists.

PURPOSE:
To establish installation criteria allowing the use of private wells as the water supply for fire protection systems.

POLICY:
Private wells meeting the following criteria can be used as the water supply for fire protection systems.

Section 1 – Basic Requirements

1.1 The private water supply system (well and pump) can serve as either a stand-alone water supply for fire protection or as a combination for domestic, irrigation, and fire protection water needs.

1.2 From a reliability standpoint, it is generally preferred to have a combination domestic / irrigation and fire protection water supply. Rationale: there is a higher probability that a problem with the well or private water supply system will be detected sooner if there are problems with the domestic or irrigation usage.

1.3 If a private water supply system (well and pump) is used to supply water for both fire protection and domestic or irrigation purposes, they should not be interpreted to be a fire pump. Fire pumps have specific installation criteria and electrical requirements. These are private water supply systems that provide water for fire protection but not defined as fire pumps (see NFPA 20 – 2003, Section 5.7.1 and A5.7.1).

1.4 A stand-alone well for fire protection systems can be used but additional protection and procedures will be necessary. Stand-alone wells must meet the requirements for fire pumps. Rationale: fire pumps have a higher reliability.

1.5 Private wells of sufficient diameter are allowed to have multiple pumps within the same casing. This is desirable in situations where low flow domestic use and high flow irrigation / fire protection situations may occur or where there may be low flow for domestic and small sprinkler flows and high flow for high sprinkler demands.
1.6 The private water supply system may be combined with on-site storage capacity or may be the sole source of the fire protection system water supply if the flow is adequate.

1.7 If the well is the sole source of the fire protection water supply (i.e. there is no on-site storage), the well must incorporate a variable speed or frequency drive / controller. Variable frequency drives sense a loss of pressure and will adjust the pump speed to maintain constant pre-set pressure on the system.

Section 2 – Well Size and Capacity

2.1 The well and pump must be installed to meet the fire protection demands. This includes both flow (in gallons per minute – GPM) and pressure (in pounds per square inch – psi).

The following chart is provided as guidance for design purposes (note: these well diameters and flow rates will vary from one equipment manufacturer to another; specific pump manufacturer’s criteria should be consulted):

<table>
<thead>
<tr>
<th>Gallons per Minute (Demand):</th>
<th>Minimum Well Size (in inches):</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 75 GPM</td>
<td>6”</td>
</tr>
<tr>
<td>76 – 150 GPM</td>
<td>8”</td>
</tr>
<tr>
<td>151 – 350 GPM</td>
<td>10”</td>
</tr>
<tr>
<td>351 – 700 GPM</td>
<td>12”</td>
</tr>
<tr>
<td>Above 700 GPM</td>
<td>Specific design criteria needed</td>
</tr>
</tbody>
</table>

Section 3 – Electrical Supply

3.1 The electrical supply must meet the requirements of the Minnesota State Electrical Code (i.e. the National Electric Code / NFPA 70).

3.2 Since these wells are not fire pumps, the specific installation criteria and exemptions for fire pumps in the Minnesota State Electrical Code are not applicable.

3.3 The power supply for wells shall be arranged so that the interruption of electrical power to the building from firefighting operations (i.e. pulling the electric meter or turning off the main disconnect) will not disable the well. The following are possible means of accomplishing this:

3.3.1 Provide a separate electrical power service to the well. This would include its own disconnect means, over-current protection, and electric meter.

3.3.2 Provide a common electrical power service to the well and building. The service would first go to the well (with a separate disconnect means, over-current protection, and electric meter) and then travel to the building (which would again have a separate disconnect means and over-current protection).

3.4 The well shall have an independent disconnecting means and over-current protection located near the well. It is preferred that the well be on a separate electrical feed from the electric utility.
3.4 A back-up or secondary power supply (such as a generator) is required to supply the well with electrical power in the event of a power outage in the following circumstances:

3.4.1 If the well is located in an area where the electric power is lost for more than four (4) hours per year.
3.4.2 The well supplies fire protection to occupancies with a high life safety risk (such as hospitals, nursing homes, schools, and assembly occupancies).
3.4.3 The Private Water Supply system supplies fire protection water to occupancies posing a high property loss fire risk (such as manufacturing occupancies – where the loss of power poses an enhanced fire risk due to the loss of cooling, process controls, or ventilation – or large mercantile occupancies).

Section 4 – Reliability and Monitoring

4.1 The private water supply system shall have an electronic device to monitor the integrity of pump. The controller shall send an alarm signal for the following conditions:

- Loss of electrical power to the well pump, including loss of phase in three-phase electrical installations.
- Pump failure or no start condition.
- Low temperature conditions in the well-house (if one is present).

4.2 The monitoring required by Section 4.1 shall send an alarm signal to a constantly attended location or central station alarm monitoring service.

Section 5 – Initial Acceptance

5.1 The private water supply system shall produce the minimum required flow (in GPM) at the required pressure (in psi) for a minimum of four (4) hours or show pumping level stability of 6” per hour (which ever comes first). The pumping level shall be monitored at minimum flow rate (in GPM) and shall the pump shall maintain a minimum of 15 ft of submergence.

5.2 The private water supply system shall be equipped with a flow meter, orifice, weir, or other acceptable device to measure the flow (gpm) of the system at minimum design rate during the required test.

5.3 A copy of the Minnesota Dept of Health Well Record and the as-built drawings shall also be kept within the control cabinet housing the variable frequency drive. The as-built drawings shall show the depth of the well, static water level, pumping level, pump setting, pump model, motor horsepower, voltage, amp load, and casing depth.

5.4 The well shall be test pumped at 75%, 100% and 125% of design flow capacity showing both flow rates and corresponding pumping levels. The design of the pump and variable frequency drive controls shall consider seasonal static water level fluctuations and interference from other wells in the area. The water supply system shall be capable of providing minimum flow rates at 125% of the normal or design total dynamic head (TDH).
5.5 A copy of the original test pump report shall be maintained on site at all times as a reference for future testing of the system.

Section 6 – Maintenance

6.1 The private water supply system shall be tested annually (if a stand alone system) or once every five (5) years if the system has a domestic use. The private water supply system shall produce the minimum required flow (in GPM) at the required pressure (in psi) for a minimum of four (4) hours or show pumping level stability of 6” per hour (which ever comes first). The pumping level shall be monitored at minimum flow rate (in GPM) and shall the pump shall maintain a minimum of 15 ft. of submergence. It is recommended to test the system during peak demand on the formation during the months of July and August.

6.2 A copy of the annual test report showing the static water level, flow rate (GPM), volts, amps, pressure (psi), pumping level in the well (in feet), and submergence (in feet) shall be kept within the control cabinet housing the variable frequency driver for a minimum of the past ten (10) years.