STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

"Better Service for a Better Environment"

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REPLY TO:

DRINKING WATER & RADIOLOGICAL PROTECTION DIVISION
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June 15, 2001

TO: Local Health Departments
Attn: Environmental Health Directors
Field Sanitarians

FROM: Michael Gaber, Chief
Well Construction Unit
Ground Water Supply Section
Drinking Water and Radiological Protection Division

SUBJECT: Constant Pressure Water Systems

Constant pressure (CP) technology for on-site water well systems is currently used on a limited basis. However, contractor and consumer acceptance and demand for these systems has increased. Some industry experts are citing CP as the most significant change in water system technology since the development of the submersible pump. Sanitarians should be aware of the operational differences between CP systems and conventional pump/pressure tank installations.

The CP systems are designed to provide consistent pressure to the building occupants and eliminate pressure fluctuations that normally occur with conventional water systems. A goal is to duplicate the pressure and flow conditions of municipal water systems. Two common methods are being used to achieve the CP output:

1. Electronic control of submersible pump motor speed to correspond to water demand, also known as variable speed pumps or variable frequency drives.

2. Valves that regulate the output or flow, also known as pump control valves (PCVs).

The following manufacturers are marketing CP equipment (*this listing may be incomplete*):

Variable Speed Pumps

A.Y. McDonald Mfg. Co. (Pressure Master)
F.E. Myers (Emerald Elite)
Flint & Walling Inc. (Commander Pro 4)
Franklin Electric (CP)
Goulds Pumps/ITT Industries (Aquavar Pump Control System)
Grundfos Pumps Corp. (Smart Flow SQE Line)
Hays Pumps Inc. (Quantum VS)
Jacuzzi Bros. (Aqua Genie)
Lancaster Pumps
Weber Industries (Webtrol Pumps)

Pump Control Valves

Acquatech North America, Inc. (Mascontrol)
Amiad Filtration Systems
Cycle Stop Valves, Inc.
Flomatic Valves Corp.

Benefits of variable speed pumps may include energy savings due to the pump motor running at lower speeds during low water demand periods and extension of pump motor life. The softer start and stop of variable speed pumps reduces water hammer. Both variable speed pumps and the PCVs use substantially smaller pressure tanks. A typical household system with a variable speed pump will have a 1-2 gallon tank, compared to a 20-30 gallon tank for a conventional submersible pump. The tank provides a small amount of water to prevent the pump from starting for short-term, low-flow demands. With PCV, standard size pressure tanks are common. For a building with limited amounts of space for a pressure tank (e.g., a modular home with crawl space), installing a CP system may be preferable to a standard pump system with a buried pressure tank.

Conventional pressure tank sizing methodology is not applicable to CP systems. Achieving a minimum pump run time is not an objective for CP systems. Therefore, traditional pressure tank sizing criteria found in Department of Environmental Quality (DEQ), Drinking Water and Radiological Protection Division (DWRPD), training course manuals should not be applied to CP systems. To determine appropriate pressure tank sizes for CP systems, follow the CP equipment manufacturers' installation procedures.

The PCV's function by responding to downstream pressure and automatically opening or closing to maintain system pressure. The PCVs are installed upstream of the pressure tank. The PCVs are used with standard submersible pumps that do not have variable speed motors. The DEQ has identified two potential concerns with the PCVs: (1) backpressurization between the water well and the PCV may exceed the working pressure of the water service line or pitless adapter gaskets when pumps larger than ¾ horsepower (h.p.) are used (Example: a ¾ h.p. 10 gallons per minute submersible pump can exceed 150 pounds per square inch of shut-off head), and (2) some PCVs contain check valves or the PCV manufacturer suggests installing a check valve between the PCV and the water well. The check valves violate Rule 155 (R 325.1655(1)) of the state well code, which states as follows:

> *"The buried portion of a water service line between the well casing and the pressure tank in any installation 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 check valve shall be in compliance with the requirements for a suction line pursuant to the provisions of R 325.1654."*

It is recommended that PCV installations and product specifications be carefully evaluated to determine compliance status with Rule 155.

The DEQ, DWRPD, is interested in receiving comments about field experiences with CP equipment. Please forward any comments to me by phone at 517-335-8304, fax at 517-335-9434, or e-mail at gaberm@state.mi.us.

cc: Water Well Drilling Contractors
Pump Installers
Field Offices, DEQ