ABSTRACT
Low pressure distribution systems became popular in Prince William County, Virginia, in the early 1990’s. The 1982 Sewage Handling and Disposal Regulations included design parameters for septic tank effluent LPDs with loading rates reduced by as much as 50% in clayey soils.

As more systems were installed in the county, Prince William Health District (PWHD) Environmental Health Specialists (EHS) became concerned about maintenance and clogging in these systems due to the small orifice size. To determine if the systems were clogging, EHSs measured the pumping rate of operating systems and compared it to the initial pumping rate measured at the time of inspection. The current pumping rate was expressed as a percentage of original flow.

Although the number of systems was limited, the data strongly indicated that septic tank effluent LPDs began to clog about 2 years after installation if no maintenance was performed on the systems. The authors noted hair and lint collected around the valve stems as well as clogging within the laterals. Rather than flush the systems to restore flow, PWHD worked with a local installer and a local septic hauler to develop a procedure for vacuuming the laterals to remove clogging solids and restore flow.

Vacuuming the laterals rather than flushing the system prevents the discharge of raw or partially treated wastewater on the ground surface and pulls clogging solids back through the orifices rather than pushing them out.

INTRODUCTION
Low pressure distribution (LPD) was the first pressure dispersal choice to become available for owners and developers who needed to maximize the capacity of an onsite sewage site for larger homes, commercial systems, or special site conditions. The Virginia Sewage Handling and Disposal Regulations (Virginia Department of Health 2000) have had standards for dispersal areas up to 50% smaller for low pressure distribution systems dispersing septic tank effluent since 1982.

As Environmental Health Specialists in Prince William County in northern Virginia, the authors became concerned that LPD systems dispersing septic tank effluent would clog over time. There was scant literature on maintenance of alternative systems in the early 1990s, so the authors, with the support of the local health department, conducted an informal study of operating LPD systems to determine the extent of clogging. Finding significant clogging in the residential systems they investigated, the authors then launched a second stage of study to determine the
best procedure for restoring flow to clogged systems. A video produced in 1993 shows the findings of the investigations the authors conducted. (McCord and Revis 1993)

DETERMINING THE EXTENT OF THE PROBLEM
To determine the extent of clogging and try to determine a maintenance interval, for systems designed according to the Regulations, the authors conducted a simple test on each LPD system to determine the pumping rate for the system by measuring the water level in the tank before and then again after running the pump through a timed cycle. As-built information for the pump chamber allowed the authors to calculate the amount of effluent pumped during the timed cycle to calculate the flow of the system. The authors compared this pumping rate to the rate recorded during initial functional testing of the system and expressed the result as a percentage of original flow to enable comparison among different size systems.

While the number of systems was not large enough to provide statistically valid results, the data were compelling, indicating LPD systems dispersing septic tank effluent showed significant clogging after 2 years of operation without maintenance. The discharge test showed that systems that had not received maintenance had flow reductions averaging 50% in the third year of operation. Such drastic flow reductions resulted in alarm events for these systems. Continued clogging would render the systems inoperable resulting in sewage backing up into the house or discharging to the ground surface.

FINDING A SOLUTION
As the authors were conducting the study, a few homeowners with operating LPD systems experienced pump failures or alarm conditions in their systems. Working with the installer of the systems and a local septic hauler, the investigators found that clogging was indeed a factor in the problems with these systems. Flushing the systems seemed to be the obvious approach to clearing clogging, however the systems were located in the homeowner’s lawns. All of the stakeholders involved, including the homeowners, were concerned that flushing would cause ponding of septic tank effluent in the homeowners lawns exposing their families to partially treated sewage. We were also concerned that flushing would tend to force material that could clog the 3/16” – ¼” holes into the holes, causing additional problems. The material clogging the laterals appeared to be a mixture of organic and inorganic material. The installer, sewage handler, and health department decided to work together to see if it were possible to vacuum the laterals to remove debris that may be interfering with dispersal.

THE PROCEDURE
To vacuum the laterals, the installer obtained a length of clear PVC pipe to attach to the laterals and provide a “window” into the system to help determine when the material clogging the system had been cleared.

The sewage handler used appropriately sized adapters to connect his hose to the laterals and provide an airtight seal.

The procedure works best when there is water in the system. We found that the operator should pump the tanks and then wait for them to fill up before vacuuming so that the operator can pump water to the field if needed during the procedure. When vacuuming the laterals, the operator
should begin with the uppermost laterals and should only open the lateral that is being cleared to maintain vacuum within the system

Following the procedure, the operator must be sure to reset the valves and make sure that the system is operating properly.

The following is a link to a video from 1993 showing the procedure: https://drive.google.com/file/d/0B1NjzHMvSrAvdkZuakI5dWtgVVU/view?usp=sharing.

CONCLUSION
The LPD systems tested and vacuumed using this procedure were dispersing septic tank effluent. All were designed according to the Regulations with proper pipe sizes, hole sizes, and scouring velocities. All of the systems had been subject to functional testing and adjustment by the installer and the Health Department before being put into service. The clogging appeared to be the result of solids building up in the septic tank without maintenance of the tanks by pumping out the solids.

The vacuuming procedure was successful in restoring nearly full flow to the systems without causing ponding of septic tank effluent in the owners’ yards.

Works Cited