Well F Turbidity Investigation FAQs

What happened?

On August 9, 2011, elevated turbidity was experienced in a portion of the system during routine monitoring. Because Well F was the only well servicing the system at the time, it was taken offline to assess the situation and determine the source of the problem. As a result, the emergency interconnection with Selma Estates was opened to provide water to the community.

Normally, incidents of elevated turbidity do not call for the issuance of a precautionary boil water advisory (PBWA). However, because Loudoun Water could not determine that the turbidity did not result from a break in the service line, a PBWA was issued for the community. No break was found and the precautionary boil water advisory was lifted three days later after testing confirmed no contamination occurred.

What steps did Loudoun Water take to investigate what happened?

Loudoun Water enlisted Emery & Garrett Groundwater, Inc., a company with a significant, positive track record of work in Loudoun County, to conduct an investigation into the incident. In consultation with the Virginia Department of Health (VDH), Emery & Garrett and Loudoun Water then conducted a series of pumping tests and water quality tests to further assess turbidity and bacteria to determine the cause of the elevated turbidity.

The series of tests was modified as a result of the 5.8 earthquake experienced throughout the area on August 23rd. The quake struck 2.5 hours into the planned 3-day testing program. As a result of the earthquake and the eight smaller ones that followed, local bedrock aquifers were shaken and impacted, causing reports of turbidity in numerous wells in Loudoun County. Pumping intervals were extended and sampling frequency was increased.

What did the investigation find?

The investigation revealed that the event was caused by unforeseen hydraulic transients in the raw water main. These transients – which, in this case, were rapid fluctuations in flow and pressure – allowed the well pump to operate at higher discharge rates than it was designed to maintain. Well F was found to have been intermittently pumped at a rate higher than the recommended rate of 100 gallons per minute during the period between July 7 and August 9, 2011, which ultimately resulted in the elevated turbidity. This intermittent over-pumping was also found during the investigation.

The investigation also found that when Well F began pumping, it was immediately, but briefly, sent into an over-pumping state due to low backpressure in the pipeline. This is referred to by Emery & Garrett as a “hard start”.

Water levels in Well F were also found to rapidly fluctuate by one foot or more during some pumping intervals. These fluctuations confirmed that unstable (and variable) pumping rates were occurring and causing the water level to essentially surge and be agitated, increasing the turbidity in the well.

Emery & Garrett determined that Well F and the local bedrock aquifer were not permanently damaged as a result of the intermittent over-pumping and "hard starts" that caused the elevated turbidity. Finally, the investigation was ongoing when our area experienced a rare 5.8 earthquake on August 23, 2011. Turbidity monitoring recorded the expected spike caused by the quake followed by a return to normal, acceptable levels. Emery & Garrett found no evidence that the bedrock aquifer or Well F was damaged by the quake.

What is Loudoun Water doing to alleviate the chances of another elevated turbidity incident?

Loudoun Water submitted a response plan to the Virginia Department of Health and is awaiting approval from VDH. If approved as submitted, Loudoun Water will:

- Modify the current set-up of the raw water pipeline between Well F and the water storage tank in the treatment plant to prevent over-pumping of Well F. The modification involves the installation of a flow control valve at the pumping station. The valve will control the start-up of pumping and prevent "hard starts", reducing the potential for elevated turbidity.
- Bring Well F back online as soon as possible at the production rate of 75 gallons per minute for a minimum period of three months. After that period of time, the pumping rate may be increased to 100 gallons per minute to meet demands.
- Monitor water levels, flow rates, and turbidity continuously for the next 12 months as Well F is brought back online.

What is the current status of Well F?

Well F remains offline and will not be brought online until a VDH-approved response plan is put in place to reduce the potential for future turbidity incidents.

Will Well F be used again?

The results of the investigation confirm that Well F is an acceptable water source and should not experience high turbidity if the pumping is controlled. Emery & Garrett found that over-pumping and "hard starts" in Well F caused it to produce water having elevated turbidity. Following implementation of recommendations made by Emery & Garrett and approval of our work by VDH, Well F will be used again because it remains a viable source for water in the community.