

July 13, 2009

**Client:** Loudoun County Sanitation Authority  
44865 Loudoun Water Way  
P.O. Box 4000  
Ashburn, VA 20146-2571

**Service:** Identification of intermittent *E. coli* bacteria in Raspberry Falls Public Water System.

MapTech is contracted to provide information to assist in identifying the source of intermittent *E. coli* bacteria in the Raspberry Falls Public Water System (231-562400-RSBRY). The purchase order is 20081259-00.

A known source library, developed under a separate contract from Virginia's Department of Environmental Quality (DEQ), by collecting source samples from four primary sources of fecal bacteria in the watershed (human, livestock, pets and wildlife) was used as the basis for this analysis. Known source samples from the four source classes were collected, analyzed, and entered into a known-source library for the Loudoun County area (Hydrologic Unit 02070008). The known source library was assessed, and considered to be acceptable for source classification of bacterial samples cultured from environmental samples.

Water samples collected from Raspberry Well #1 and #2 were analyzed for the presence of *E. coli* bacteria in MapTech's Environmental Detection Laboratory (EDL). When *E. coli* contaminated samples were confirmed those samples were analyzed for sources of *E. coli* bacteria. The presence of *E. coli* bacteria was confirmed in three samples from Well #1 on May 13, June 10 and June 29, 2009. MapTech proceeded with a bacterial source tracking procedure (BST) to determine the likely source(s) of the bacteria. Results of this analysis are presented in Table 1, below. The bacteria source proportions reported are formatted to indicate statistical significance (*i.e.*, **BOLD** numbers indicate a statistically significant result). The statistical significance was determined through two tests. The first was based on the sample size. A z-test was used to determine if the proportion was significantly different from zero ( $\alpha = 0.10$ ). During the second test, the rate of false positives was calculated for each source category in the

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library, and a proportion was not considered significantly different from zero unless it was greater than the false-positive rate plus three standard deviations.

**Table 1 Raspberry Well #1 BST results**

Label	Site	Sample Date	Isolates	Wildlife	Human	Livestock	Pets
LCR003	Well #1	5/13/09	<b>24</b>	4%	8%	12%	<b>76%</b>
LCR005	Well #1	6/10/09	<b>24</b>	0%	<b>25%</b>	<b>71%</b>	4%
LCR006	Well #1	6/29/09	<b>24</b>	<b>17%</b>	12%	<b>17%</b>	<b>54%</b>

Bold in a source category indicates a statistically significant result.

The results from the May 13<sup>th</sup> and June 29<sup>th</sup> sample indicate that the most likely source of the *E. coli* in the well is from pets and the June 10<sup>th</sup> results indicate that livestock is the most likely source and human source(s) could have contributed as well. It should be noted that, as with other environmental samples, variation occurs in space and time. Therefore a small number of samples should be viewed with some caution, as they represent a limited “snapshot” in time and only additional sampling can provide a more accurate picture. In addition the concentration of *E. coli* bacteria in the samples was very low  $2 < \text{cfu}/100 \text{ ml}$  which means that while the samples didn’t meet drinking water standards the contamination was very light and could have been caused by a very small animal and/or human population.

MapTech would like to thank you for looking to us for your water quality needs. If you have any questions please feel free to contact Dr. Jim Kern at 540-961-7864, ext. 404 or Murn Ford at 540-961-7864, ext. 425.