



**PUBLIC QUESTIONS/COMMENTS**

**RE: Studying Options for**

**Raspberry Falls and Selma Estates Community Systems**

**1. What is the total cost of the consulting firm's studies to date? Who will pay this cost?**

Loudoun Water paid for the cost of the studies, which will total approximately \$161,000.

**2. The filtration study includes the costs of connecting the 27 homes in RF on private wells. I saw no reference to that cost in the ToL connection study. Is it included?**

The 27 homes in Raspberry Falls on private wells are included in both studies.

**3. For each of the two options recommended by the consultants, what is the current estimated annual cost per household compared to the current actual average cost per household?**

In response to a question from the Loudoun County Board of Supervisors received before our formal presentation to the body, Hazen and Sawyer calculated the cost of the preferred treatment option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot for the preferred treatment option for Raspberry Falls only is estimated to be \$1,830 per year for 20 years. For Selma Estates only, the cost per lot is estimated to be \$1,310 per year for 20 years. For a combined system serving both Raspberry Falls and Selma Estates, the cost per lot is estimated to be \$1,570 per year for 20 years.

Hazen and Sawyer also calculated the cost of the preferred pipeline option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot is estimated at \$4,260 per year for 20 years.

**4. The filtration study doesn't appear to address the potential for well collapse or insufficiency of supply during periods of intense drought. Are these of concern to LW?**

The studies do not address well collapse because the highest risk for collapse is during the drilling of the well. There is no evidence from the wells that collapse will be an issue with long-term usage. In addition, we did not find any indications of any long-term impact from the August earthquake.

Regarding the potential for insufficiency of supply during periods of intense drought, all water utilities have their supplies affected by drought conditions. Voluntary, and even mandatory water restrictions may be put in place by water utilities to address supply issues.

During times of drought, all utilities are encouraged to cut back on water withdrawals from rivers, including the Town of Leesburg and its use of the Potomac. Withdrawal restrictions during drought

situations are coordinated between users of the supply and per the Interstate Commission on the Potomac River Basin (ICPRB) Cooperative agreement.

**5. The ToL study contemplates sufficient water volume for fire control. Is fire control addressed in the filtration study? The filtration study appears to leave fire control to procedures generally in use in rural districts. What has been the experience of RF with actual house fires and the adequacy of such procedures?**

Fire flow is addressed in the studies. Regardless of the option selected, Raspberry Falls will remain under Rural Policy Area fire-fighting procedures.

This question was asked and answered by Loudoun County Fire and Rescue prior to the fire that occurred in October 2011.

Answer from Loudoun County Fire and Rescue:

The Raspberry Falls sub-division has experienced at least two major incidents in the last ten years. In 2003 a large single-family dwelling burned to the ground on Swiftwater Drive. At the time, I believe there was only one dry hydrant/cistern in the development, a 12,500 gallon tank located on Raspberry Drive near the golf clubhouse. When that tank was depleted, units relocated to another dry hydrant/cistern in the Big Spring subdivision off Whites Ferry Road on the east side of James Monroe Highway which has a capacity of 10,000 gallons. There were problems with this tank and units ultimately ended up shuttling water from a hydrant on Chadfield Way, NE in Leesburg. The second incident was a house fire after a propane explosion in January, 2004. This was almost directly across the street from the first house fire on Swiftwater Drive but did not require a water shuttle operation.

Since the above mentioned fires, at least two additional dry hydrants/cisterns have been added in the Raspberry Falls subdivision. Both are 12,500 gallon tanks. As a whole, Loudoun County has greatly improved their rural water supply capabilities by adding nine tankers with capacities of 3,000 gallons or more. This would benefit incidents in Raspberry Falls as tankers are located at Lucketts, Lovettsville, Hamilton, Purcellville, & Round Hill. Leesburg Fire has also purchased a 2,500 gallon tanker which is 1,000 gallons more than the tanker they had in service at the time of the fires in 2003-2004.

Though we have made significant improvements in our rural water supply capabilities in the last eight years, all incidents in areas without hydrants are much more difficult to battle. In area's with hydrants, engines (pumpers) hook to the hydrant and have water immediately. Even if the engine broke down, many hydrants have enough pressure to push the water through the engine to the fire. In non-hydranted areas such as Raspberry Falls, we must carry all water to the scene on engines and tankers and then refill off buried water tanks with "dry hydrants". This requires us to hook hard sleeves to the connection and suck the water up out of the tank. A typical engine carries 750-1000 gallons so we can only refill the number (or less) of engines that the tank holds and we are never able to get all of the water out of the tanks.

All dry hydrants and cisterns are inspected in Loudoun County each year by career staff, however we find problems with a number of tanks each year such as leaking, broken connections due to vandalism, ultra-violet damage on the PVC that causes it to become brittle and snap off, air leaks, etc...

Loudoun County has a performance goal of placing 4,000 gallons of water on the scene within 12 minutes. Last fiscal year we were successful 77% of the time but this is a difficult measure to achieve due to the rural nature of the county, size of the tankers and roads.

**Additional information regarding the Ferriers Court fire supplied by Loudoun Fire & rescue in supplemental response**

**6. Activated Carbon is one of the oldest water treatment technologies and is known to remove a wide range of contaminants such as pesticides, herbicides, pharmaceuticals, etc. Raspberry Falls is vulnerable to this type of pollution based on the location near a golf course, medical treatment facility and bison farm. Historical data may not predict the future make up of the water. Therefore, shouldn't it be assumed that for a truly long term solution activated carbon will be required and should be considered when comparing cost to the ToL option?**

Loudoun Water has performed special sampling in the past specifically aimed at looking for SOCs, VOCs, and other parameters not typically monitored for in a groundwater system. The addition of carbon is recognized as a process that could be added now or in the future based on the levels and frequency of the contaminants of concern. This future data will help determine the need for, and timing of carbon.

The Hazen and Sawyer report did address activated carbon contactors for removal of the types of constituents noted in the question, and the cost of options including carbon now and in the future, were estimated for comparison to other treatment technologies and the TOL pipeline option.

Because of the low concentrations and sporadic nature of occurrence of SOCs found in the source water, it was recommended that the new membrane filtration facility be designed with space allowance for future addition of activated carbon contactors. Installation would be triggered by source water concentrations close to the chemicals' respective maximum contaminant levels (MCLs) in the Safe Drinking Water Act regulations and/or more frequent occurrence.

**7. While VDH has experience with On site treatment plants for GUDI wells, what experience does Loudoun Water have with this setup, especially in a Karst environment?**

Some residents were informed in a July 1, 2011 letter from the Virginia Department of Health, "[VDH] has been informed that Loudoun Water currently has eight licensed water operators on staff. Some or all of these operators are licensed at a level appropriate to be the operator in responsible charge at a membrane treatment plant."

The operation process of a membrane treatment plant is similar to that of other plants and equipment that Loudoun Water operates. Staff will be properly trained and certified in accordance with local and state agency standards and/or regulations.

**8. If the membrane filtration option fails due to this environment and geology, will the community be in a position that a Pipe Line is the only option left and then pay twice for a solution?**

Membrane filtration treatment systems are utilized in various geologic environments if the water quality of the water supply requires such treatment. There are no concerns that the membrane filtration technology for groundwater treatment would fail so completely that the facility would need to be abandoned. The only type of failure remotely possible is one in which a single piece of equipment breaks down and needs to be replaced. This possibility is considered during design and, where necessary, 100 percent equipment redundancy is constructed.

32 of the 35 GUDI systems overseen by the Abingdon and Lexington field offices of VDH utilize membrane filtration. The geology in the areas where the GUDI sources are located was reported by VDH to be predominantly limestone geology. Of the 35 GUDI systems, all but 1 or 2 are in limestone geology. None of the membrane systems have failed in a manner that would require abandonment.

**9. What is the contingency plan if the on site plant fails?**

Loudoun Water's contingency plan will be the same as its current plan, which is put in place if/when an emergency takes place that prevents drinking water from being delivered properly to our customers in Raspberry Falls. The interconnection with Selma Estates would be used to supply water and if that remedy is not sufficient for any reason, then drinking water would be brought into the community by tanker truck.

**10. Why was fire flow not discussed at all for the onsite treatment options?**

Fire flow for the Raspberry Falls system was previously discussed in the January 2011 Preliminary Engineering Report prepared by Hazen and Sawyer. The treatment options considered included the basic facility improvements covered by the report, fire flow included.

**11. Why is 1200 gallons per day the minimum requirement for Raspberry Falls for the Pipeline and is this a standard for all communities supplied by ToL?**

1,200 gallons per day is the estimated maximum daily water demand for a residential connection within the Raspberry Falls community. This is based on historical water usage by the homes in the Raspberry Falls community (based on the 98<sup>th</sup> percentile of daily usage for the years 2006 through 2010).

The ToL maximum daily water demand standard for a single family dwelling unit (per the ToL's Water and Fire Regulations) is slightly over 600 gallons per day (350 gallons per day/unit x 1.75). It was assumed for the analysis that the higher water demand would be used for planning purposes.

**12. Please provide cost estimates for the Pipeline Option at 400 gallons per day and 900 gallons per day for comparison to the filtration plant.**

It is not anticipated that the costs for the recommended Pipeline Option, Alternative 3, at 400 gallons per day or 900 gallons per day would be substantially less than they are for 1,200 gallons per day. Within the water industry, the typical minimum waterline diameter installed is 8-inches. An 8-inch waterline is recommended under Alternative 3, at 1,200 gallons per day.

Therefore, the recommended pipe diameter at 400 gallons per day or 900 gallons per day would be the industry minimum 8-inches. The waterline cost, which would be based on an 8-inch waterline at 400, 900, or 1,200 gallons per day, is the bulk of the cost associated with the Pipeline Option.

**13. How will either option pay for the capital cost of the improvements? How will the annual and life cycle costs be spread and financed?**

Pursuant to Loudoun Water policies, the cost of improvements to the Raspberry Falls Community Water System will be recovered from Raspberry Falls Customers. Loudoun Water will support the Board of Supervisor's consideration of establishing a sanitary district.

**14. Assuming it is financed by a bond and amortized over decades and divided by the number of customers, we need to know the interest rate, the term of the bond and the number of customers to accurately evaluate.**

It is too early in the process to provide the interest rate, term of the bond, and the number of customers. At the request of the Board of Supervisors after the release of the studies, an estimate was created using current data, current interest rates and a 20-year term.

**15. Why is the Rate Impact Information Column blank in the Onsite Treatment report and absent completely from the Pipe Line Report? When will it be provided?**

The column was left blank because there are several undetermined variables that did not allow us to provide the information.

**16. For each option, what is the estimated annual cost per RF household compared to the current actual average cost per household?**

In response to a question from the Loudoun County Board of Supervisors received before our formal presentation to the body, Hazen and Sawyer calculated the cost of the preferred treatment option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot for the preferred treatment option for Raspberry Falls only is estimated to be \$1,830 per year for 20 years. For Selma Estates only, the cost per lot is estimated to be \$1,310 per year for 20 years. For a combined system serving both Raspberry Falls and Selma Estates, the cost per lot is estimated to be \$1,570 per year for 20 years.

In response to a question from the Loudoun County Board of Supervisors received before our formal presentation to the body, Hazen and Sawyer calculated the cost of the preferred pipeline option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot is estimated at \$4,260 per year for 20 years.

**17. In the Frequently Asked Questions, it says the Raspberry Falls only Treatment system has a capital cost of \$4M and annual cost of \$117k however this does not match any scenario in the Report Table ES2. Which scenario is used?**

The cost information was updated after the report was finalized to better compare the treatment option costs with the pipeline option costs. The scenario selected is the 1,200 gpd/connection membrane filtration facility with deferral of granular activated carbon (GAC) contactors as described on Table ES-2.

**18. In the on site filtration plant, the 27 homes on private wells are included. Are they included in the Pipe Line option?**

Yes, the 27 homes on private wells are included in the Pipeline Option.

**19. Changes in technology will progress and will be implemented at the Town of Leesburg facility with the costs for improvements spread over all users. How will an On Site Treatment Plant keep current with technology changes at a cost reasonable to the community?**

No treatment technology changes are anticipated for the Raspberry Falls system based on current and pending future regulations and historical data, except for the potential future addition of GAC contactors. The costs of that addition (capital and operating) are included in the treatment study.

**20. In the Study Evaluation of Treatment Options, it is noted in numerous places that the source water is considered Groundwater with the exception of RF Well PW1. Testing parameters for groundwater are different than for other water sources. Therefore, is it possible that VOCs, SOCs, pesticides, herbicides, pharmaceuticals and other biological contaminants could be present in the water, now or in the future, that may not have been seen since groundwater testing does not look specifically for these items?**

In accordance with current regulations, groundwater testing does not specifically look for SOCs and VOCs on a regular basis. Loudoun Water has performed special sampling in the past specifically aimed at looking for SOCs, VOCs, and other parameters not typically monitored for in a groundwater system. Loudoun Water has conducted multiple scans of the well and there is no evidence at this time that chemicals are entering the raw water wells.

The addition of carbon is recognized as a process that could be added now or in the future based on the levels and frequency of the contaminants of concern. Testing will provide data to establish the need for, and timing of, carbon.

**21. Is it true that microfiltration does not address viruses, while nanofiltration or higher would address not only bacteria but viruses and organic material as well and if so, why were these levels of filtration not considered given the unpredictable nature of this water source?**

Because disinfection with free chlorine rapidly and cost effectively addresses viruses, the combination of microfiltration membranes for pathogen removal and free chlorine disinfection was considered a better option for Raspberry Falls. Organic matter concentrations are very low in the source water, which is seen in the very low disinfection by-product (DBP) measurements in the finished water.

Nanofiltration is a more expensive, energy-intensive (higher power costs) treatment technique that may require a microfiltration membrane treatment step upstream of the nanofiltration membranes depending on water quality and the design flux offered by the membrane system manufacturers. Nanofiltration also creates more wastewater than microfiltration because of the greater amount of reject water.

**22. It is stated that All treatment options for Raspberry Falls Water Systems must include a new finished water storage reserve, new finished water booster pumps and new electrical equipment to address capacity and this was determined in the January 2011 RF Improvements PER completed prior to this study. Therefore, is it correct that these costs are costs that the community will experience regardless of option chosen?**

Yes.

**23. If so, are the storage facilities and other upgrades sized and priced identically in both options (128,400 gallons for the PipeLine on page 5)?**

The costs associated with the required storage facilities and other upgrades within the Pipeline Study match those presented in the Treatment Study. Sizing criteria for both studies also match. The 128,400 gallons presented in the Pipeline Study is the minimum required storage. However, 235,080

gallons of storage is recommended and for purposes of cost estimating the larger tank size was accounted for. This was done to provide consistency between the studies.

**24. Is the Membrane filtration at risk of increased maintenance costs due to damaged membranes because of the large amount of limestone sediment found in the water?**

The turbidity in the source water is consistently low, particularly in comparison to the Potomac River, and is on-par with similar types of groundwater sources. The membrane treatment system will have a “break tank” upstream where some settling can occur as well as parallel 400 micron cartridge filters. These units are designed to protect the membranes from damage and are included in the membrane treatment system description in the report.

**25. When will we be provided the Hazen and Sawyer January 2011 Preliminary Engineering Report that was used as a basis in the study?**

The Hazen & Sawyer Preliminary Engineering Report is available online at [www.loudounwater.org](http://www.loudounwater.org).

**26. It is the understanding that groundwater, as opposed to surface water or GUDI water, parameters have been used to test the community’s water to date. Since water conditions in the area change drastically over time, as evidenced by the declaration of the well as GUDI, and groundwater testing does not look for the wide variety of contaminants that flow could through the community’s aquifer, why should the Board of Supervisors and residents be confident that a microfiltration, the lowest possible of all levels of membrane filtrations, is a final and sufficient long term solution?**

Because disinfection with free chlorine rapidly addresses viruses, the combination of microfiltration membranes for pathogen removal and free chlorine disinfection is considered the best filtration option for Raspberry Falls. Organic matter concentrations are very low in the source water, which is seen in the very low disinfection by-product (DBP) measurements in the finished water.

The addition of carbon is recognized as a process that could be added now or in the future based on the levels and frequency of the contaminants of concern. Testing will provide data to establish the need for, and timing of, carbon.

**27. By continuing to pull water out of the aquifer, larger voids in the underlying ground will develop thereby reducing the level of natural filtration the water receives. Over time, is it possible that the water in both the private and community wells will see greater contamination thereby requiring higher order membrane filtration and additional costs ultimately bringing this solution closer to the cost of the Pipe Line?**

The comment before the question states a series of assumptions as facts. To answer the question posed, the rate (and volume) of groundwater withdrawal from the underlying bedrock aquifer will not exceed the rates and volumes previously tested and approved by the Virginia Department of Health (VDH), the Loudoun County Health Department, and the Loudoun County Department of Building & Development.

Membrane filtration is a water treatment technology that has been extensively proven and is utilized in a wide variety of settings, including in Virginia for treatment of GUDI source waters. It is also a proven technology on many non-GUDI groundwater and surface water supplies.

**28. In this case, could it be more beneficial to spend the money on a known and proven technology than a system vulnerable to the ever changing environment?**

Membrane filtration is a proven treatment technology in Virginia for treatment of GUDI source waters, and is also a proven technology on many non-GUDI groundwater and surface water supplies. Leesburg’s Rollins Water Filtration Plant utilizes conventional treatment technology (rapid mixing,

flocculation, sedimentation and media filtration) to treat water withdrawn from the Potomac River. Both technologies are known and proven technologies, and both are similarly vulnerable to changes in the source water.

**29. Of the 32 membrane treatment facilities on GUDI wells, how many of them are located in a karst geology?**

32 of the 35 GUDI systems overseen by the Abingdon and Lexington field offices of VDH utilize membrane filtration. The geology in all but two areas where the GUDI sources are located was reported by VDH to be predominantly limestone geology.

**30. How many of these 32 were built and opened by Loudoun Water?**

None of these facilities are in Loudoun County and, therefore, none of them have been built by Loudoun Water.

**31. Are any of the community water systems Loudoun Water manages reporting a break even or profitable financial position?**

Community systems are pooled and share operational, maintenance and ordinary (customary) capital expenditures. Loudoun Water just completed an independent rate study that will allow existing community systems, as a whole, to be financially self-sustaining by 2014.

**32. If not, does a long term risk exist where the on site plant is not reasonably supportable and thus another solution will be required?**

Because the community systems will be financially self-sustaining by 2014, it is not anticipated that the on-site plant will become unsupportable and require another solution.

**33. The filtration study doesn't address the potential for well collapse or insufficiency of water supply during drought periods, neither of which risks exist with the ToL pipeline option. How is this significant reliability risk factored in?**

The studies do not address well collapse because the highest risk for collapse is during the drilling of the well. There is no evidence from the wells that collapse will be an issue with long-term usage. In addition, we did not find any indications of any long-term impact from the August earthquake.

Regarding the potential for insufficiency of supply during periods of intense drought, all water utilities have their supplies affected by drought conditions. Voluntary, and even mandatory, water restrictions may be put in place by water utilities to address supply issues.

During times of drought, all utilities are encouraged to cut back on water withdrawals from rivers, including the Town of Leesburg and its use of the Potomac, as discussed with other users of the supply and per the Interstate Commission on the Potomac River Basin (ICPRB) Cooperative agreement.

**34. COMMENT: LW considered numerous additional sites for additional wells in RF before settling on well F. Well F has been taken out of service. Continuing to search for new well locations is not a viable long term option.**

**35. Well F was shut immediately after it was operational due to turbidity. If it is brought on line in the future, what assurance is there that it will not again become turbid and therefore have a negative impact on the membrane?**

It has been determined through an extensive investigation that the elevated turbidity levels observed in the water produced by Well RSP-F, several days after start-up, were the direct result of mechanical

and infrastructure problems with the new raw water pipeline between the wellhead and pumping station. These mechanical problems resulted in Well RSP-F temporarily operating at a higher than recommended pumping rate, which stirred up and loosened sediment in the bedrock fracture system surrounding Well RSP-F.

The necessary adjustments to the system have been identified and will be implemented prior to bringing Well RSP-F back on line. VDH will approve of Loudoun Water's work before Well F is brought back online.

**36. Why was the option of ToL selling water to Loudoun Water not considered? Could this remove the requirement of Fire Flow and allow more flexibility in finding the best long term cost effective solution?**

Loudoun Water did not evaluate wholesale purchase of water as part of our study work. However, the option was considered and it does not appear to be a viable one from Loudoun Water's point-of-view for two reasons:

1. Loudoun Water would have limited ability to address water quality concerns related to the formation of disinfection byproducts as detailed in the studies.
2. Loudoun Water would not have decision authority over the water treatment means and technologies deployed to address water quality concerns related to the formation of disinfection byproducts as detailed in the studies.

**37. Loudoun Water purchases water from Fairfax and delivers it to communities. What has the history of Boil Water notices been for these communities?**

Central System Boil Water advisories are typically limited to isolated areas as the result of water main breaks or water main construction. The last system-wide Boil Water Advisory in Loudoun Water's Central System was the result of Fairfax Water power outages due to Hurricane Isabel in September 2003.

**38. For communities supplied using water from Fairfax, what is the longest distance the water travels from the plant and what precautions are used to ensure the water quality?**

The distance the water travels from either the Corbalis WTP or the Griffith WTP to the furthest customer is over 15 miles. Fairfax Water practices chloramination, as well as ozonation, both of which help to protect water quality for the distances covered in the system.

**39. Pumping in RF during development negatively impacted the water level in Big Springs and therefore the last remaining trout stream in the area. Environmentally, is there a long term benefit to the surrounding streams if we cease pumping?**

Loudoun Water is not aware of any water level changes to Big Spring as a result of pumping the community water supply wells at Raspberry Falls or Selma Estates. In fact, we have collected groundwater level data throughout the past several years that provide evidence to the contrary. Therefore, ceasing pumping at either development is not anticipated to have any significant effect on the Big Spring water level or yield.

**40. The RF Waste Water Treatment Plant currently expels its effluent into a 303 impaired stream. All of the on site filtration options require the WWTP to handle the residual wastewater thereby increasing the risk of further contamination of this stream. Long term, is there a risk of increased destruction of the surrounding environment, including the streams and private wells, by adding on site filtration?**

The question implies that the wastewater treatment plant (WWTP) is a reason why the stream is a 303 impaired stream. The stream is not being contaminated by the effluent and the "risk of

increased destruction” implies that destruction is taking place because of the WWTP, which is not the case.

The discharge from the plant is permitted by the Virginia Department of Environmental Quality for various parameters. The permit requires disinfection to meet bacteria standards so that it does not add to stream impairment or negatively impact the private wells.

**41. Is there a benefit in ceasing withdrawal of water out of the ground from a sinkhole creation risk perspective?**

Sinkholes are created due to a variety of factors, including the withdrawal of water. To address this issue, the rate (and volume) of groundwater withdrawal from the underlying bedrock aquifer will not exceed the rates and volumes previously tested and approved by the Virginia Department of Health, the Loudoun County Health Department, and the Loudoun County Department of Building & Development.

**42. What is the expectation for maximum daily water usage for 4 and 5 bedroom homes when new communities are planned, with and without irrigation?**

The number of bedrooms within a residence does not adequately correlate with water usage, particularly since this factor is outweighed by irrigation and lot size. Consequently, neither Loudoun Water nor VDH estimate residential average or maximum daily water usage based on the number of bedrooms in a residence.

**43. What is the history for Raspberry Falls for the maximum daily usage, understanding that the community was allowed irrigation when planned and that homeowners may or may not choose the pay for this option?**

The limited space does not allow for a complete answer. For the history of usage in Raspberry Falls, please read the Preliminary Engineering Report by Hazen & Sawyer, posted on the Raspberry Falls page of [www.loudounwater.org](http://www.loudounwater.org).

**44. Has 400 gallons per day ever been an adequate estimate for Raspberry Falls homes?**

The limited space does not allow for a complete answer. For the history of usage in Raspberry Falls, please read the Preliminary Engineering Report by Hazen & Sawyer, posted on the Raspberry Falls page of [www.loudounwater.org](http://www.loudounwater.org).

**45. Why was 900 gallons per day considered?**

The 900 gpd estimate per connection was based on Loudoun Water analysis of average water usage across all Loudoun Water community water systems, which resulted in the Loudoun Water Engineering Design Manual requirement that all new community water systems be designed for a maximum daily flow of 900 gpd per equivalent residential connection (ERC).

**46. Can the wells support 1200 gallons per day and has it ever been required?**

Yes, the wells can support 1,200 gpd/connection flow rate and it has been required in the past, primarily during summer periods when lawn irrigation has been practiced.

**47. Is the Fire Flow minimum requirement a standard for all communities supplied by ToL?**

From the Town of Leesburg: The 750 gallon per minute fire flow rate presented in the pipeline study is a minimum rate under Town of Leesburg standards.

**48. Can ToL sell water to Loudoun Water at a wholesale price to alleviate Town requirements for daily water supply and Fire Flow?**

Loudoun Water did not evaluate wholesale purchase of water as part of our study work. However, the option was considered and it does not appear to be a viable one from Loudoun Water's point-of-view for two reasons:

1. Loudoun Water would have limited ability to address water quality concerns related to the formation of disinfection byproducts as detailed in the studies.
2. Loudoun Water would not have decision authority over the water treatment means and technologies deployed to address water quality concerns related to the formation of disinfection byproducts as detailed in the studies.

**49. Were the costs and benefits of a filtration plant vs ToL water for Tuscarora High School weighed similarly when facing their decision?**

From the Town of Leesburg: The situations are not comparable; Tuscarora High School is contiguous to the Town distribution system. Travel times are not as long, usage is different, and the connecting water mains are well looped system unlike the proposed Raspberry Falls pipeline option.

**50. What factors led to the County's decision to extend ToL water to Tuscarora High School rather than implementing a filter system?**

From the Town of Leesburg: Tuscarora High School is in the Town of Leesburg corporate limits, and the use of ground water for domestic service is prohibited.

**51. Was the cost incurred greater than the cost estimated to supply water to the high school?**

From the Town of Leesburg: Tuscarora High School is in the Town of Leesburg corporate limits, and the use of ground water for domestic service is prohibited.

**52. Were the estimates for a pipe line greater than the estimates for a filtration plant?**

From the Town of Leesburg: Tuscarora High School is in the Town of Leesburg corporate limits, and the use of ground water for domestic service is prohibited.

**53. Why is water age not a concern for the schools, which have larger pipes and likely a smaller volume?**

From the Town of Leesburg: Tuscarora High School is contiguous to the Town of Leesburg's water system, and therefore connects to the remainder of the system in two locations, providing a water main loop, preventing a long dead-end water main.

**54. If the cost of annual maintenance for the on site treatment plant is \$117k with a full membrane filtration, how is it possible for the Pipe Line option to cost \$418k annually, driven primarily by the addition of 2 people, when only a subset of the on site facility will be required and ToL has excess capacity and will realize additional profits with increased customers?**

From the Town of Leesburg: In order for the town to own and operate this system, a minimum of 2 full time staff have to be hired in addition to other expenditures such as water treatment costs, flushing requirements to reduce water age, and operational costs associated with retreatment in the pipeline to remove disinfection by-products. The Pipeline Study only analyzed costs associated with the pipeline option; the study did not consider rates, revenue, etc. However, in the October 11, 2011

presentation to the Leesburg Town Council, Town staff indicated that current Out-of-Town water rates would not cover operational costs presented in the pipeline study.

**55. Is this consistent with the support other communities receive?**

From the Town of Leesburg: The Town of Leesburg has spent much effort through the years planning their water system for an anticipated service area, generally serving properties contiguous to the existing Town water system. Consequently, the Town can provide service to their existing and planned customers, for which the system was designed, much more efficiently than they can provide service to an unplanned customer such as Raspberry Falls.

The Town of Leesburg water system was not planned or designed to deliver water to Raspberry Falls, and therefore is not optimized to serve that area. The additional flushing and labor costs to reduce disinfection by-products in the pipeline are due to the water age in the pipeline, resulting from a long dead-end water main. Thus, all communities served by the Town of Leesburg receive the same support, but service is more efficient in areas the system was designed to support.

**56. Are there 2 additional people for every 214 connections in the Town of Leesburg? For each subsection of the system?**

From the Town of Leesburg: The Town of Leesburg has spent much effort through the years planning their water system for an anticipated service area, generally serving properties contiguous to the existing Town water system. Consequently, the Town can provide service to their existing and planned customers, for which the system was designed, much more efficiently than they can provide service to an unplanned customer such as Raspberry Falls.

The Town of Leesburg water system was not planned or designed to deliver water to Raspberry Falls, and therefore is not optimized to serve that area. The additional flushing and labor costs to reduce disinfection by-products in the pipeline are due to the water age in the pipeline, resulting from a long dead-end water main. Thus, all communities served by the Town of Leesburg receive the same support, but service is more efficient in areas the system was designed to support.

**57. Did Hazen and Sawyer evaluate the Town of Leesburg financial inputs for objectivity?**

Hazen and Sawyer requested this information from the Town of Leesburg under the assumption that the Town of Leesburg would and has provided reasonable and realistic input. The Town of Leesburg is a highly respected and professional water utility and has an excellent understanding of cost of water line installation and maintenance. To remain objective Hazen and Sawyer has not adjusted any input received directly from Loudoun Water or the Town of Leesburg.

**58. How did the out of town rates impact the Town of Leesburg estimates?**

Town of Leesburg Out of Town rates were not evaluated as a part of these studies.

**59. The tables in the report for the on site filtration do not clearly show the \$117k annual maintenance that is mentioned in the FAQ and at the Board of Supervisors presentation. It shows about \$68k. Where does the \$117k number come from?**

The number in the report for annual operating costs was the additional cost incurred for membrane filtration. The number was increased after the study was finalized to include the existing operating costs as well to better compare the treatment operating cost with the pipeline option operating cost from the Town of Leesburg.

**60. What profit is realized by the ToL when adding the Raspberry Falls connections, thereby increasing efficiency, and how is this profit accounted for in this study?**

In the October 11, 2011 presentation to the Leesburg Town Council, Town staff indicated that current Out-of-Town water rates would not cover operational costs presented in the Pipeline Study.

**61. Why in the Pipeline study in Table EA1 a Disadvantage is always listed that the water quality cannot be guaranteed?**

The data was included to indicate that, should a pipeline option be pursued for implementation, design consideration would need to be given to ensuring that water quality is maintained. The length of the pipeline necessary to connect the Raspberry Falls community to the Town of Leesburg's water distribution system creates the potential that chlorine levels could possibly drop to unacceptable levels along this pipeline and an increased potential for Disinfection By-Products (DBPs). Because of this, maintaining water quality was considered a disadvantage. Potential future measures to help improve water quality are presented in the Pipeline Study.

**62. Can water quality always be guaranteed in the on site filtration study when there is greater variability in the source water?**

Membrane filtration is an absolute barrier to particle passage (turbidity and pathogenic organisms, etc.). It must also be noted that the source water variability in Raspberry Falls is much lower than that of the Potomac River.

**63. Has a quality problem ever occurred with the ToL delivered water?**

From the Town of Leesburg: No, but maintaining the water quality involves costs.

**64. For each option, what is the estimated annual cost per RF household compared to the current actual average cost per household?**

In response to a question from the Loudoun County Board of Supervisors received before our formal presentation to the body, Hazen and Sawyer calculated the cost of the preferred treatment option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot for the preferred treatment option for Raspberry Falls only is estimated to be \$1,830 per year for 20 years. For Selma Estates only, the cost per lot is estimated to be \$1,310 per year for 20 years. For a combined system serving both Raspberry Falls and Selma Estates, the cost per lot is estimated to be \$1,570 per year for 20 years.

In response to a question from the Loudoun County Board of Supervisors received before our formal presentation to the body, Hazen and Sawyer calculated the cost of the preferred pipeline option per lot in Raspberry Falls spread out over a period of 20 years. The cost per lot is estimated at \$4,260 per year for 20 years.

**65. How will the annual and life cycle costs be spread and financed?**

Pursuant to Loudoun Water policies, the cost of improvements to the Raspberry Falls Community Water System will be recovered from Raspberry Falls Customers. Loudoun Water will support the Board of Supervisor's consideration of establishing a sanitary district.

**66. For rates with the On Site Filtration Option, will RF be stand alone, part of the community water systems, part of the entire Loudoun Water base, or something else?**

Loudoun Water Board will make a decision on cost recovery options after the long-term option is chosen.

**67. For rates on the Pipe Line Option, will RF be stand alone, part of the Out of Town Rates, part of the In Town Rates, or something else?**

From the Town of Leesburg: Under the Town of Leesburg's current rate structure, Raspberry Falls would pay Out-of-Town water rates at a premium due to operational cost.

**68. What is the total cost for the system that exists today?**

According to our records, the developer claimed \$511,627 for the Raspberry WTP when deeding the facility to us (constructed in 2001).

For additional recent cost information, please see #70 below.

**69. Annual operating, Life Cycle (future cost of repairs and improvements), current rates?**

Due to space limitations, the answer to this question can be found in the "Studying Options for Raspberry Falls and Selma Estates Community Systems" brochure, which can also be found at [www.loudounwater.org](http://www.loudounwater.org).

**70. What is the total of recently incurred costs such as the consultants, the test wells, the uv systems, the well F costs, the RF/Selma Interconnect, etc.**

The following contracts were issued related to this work:

Well RSP-F Development and WTP Work = \$985,772

Emery & Garrett Groundwater - Well RSP-F Investigation, Drilling, and Testing = \$200,000

Well Pump Purchase = \$10,000

Urban Engineering Design = \$66,468

Hazen & Sawyer Design = \$35,943

Piping and WTP Improvement Construction Contract (A&M Concrete) = \$616,417

UV Reactor Purchase (Two Reactors) = \$52,994

Electromagnetic Meter Purchase (Three Meters) = \$3,950

Raspberry Falls - Selma Interconnect Total = \$136,000

Urban Engineering Design = \$40,200

Pipeline and Vault Construction Contract (Tri-Star Development) = \$95,800

Hazen & Sawyer Engineering Studies & Ongoing Support = \$255,200

PER Study = \$94,100

Filtration Study = \$95,200

Pipeline Study = \$65,900

**71. How will these be relayed to customers?**

Loudoun Water Board will make a decision on cost-recovery options after the long-term option is chosen.

**72. What is the cost/long term risk of doing nothing, if that is a viable option?**

Loudoun Water’s Board of Directors passed a resolution on November 10, 2011, stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls.

**73. The study states that the annual operating cost of the RF system is \$50,000. Please provide details.**

The primary driver for cost in community systems is labor.

**74. How do we know the estimated costs are accurate?**

The estimated costs are based on the information available at the time of the study. More detailed cost information will be developed during the design phase of either option.

**75. What is the history of estimates vs. actuals for Hazen and Sawyer calculations?**

Hazen and Sawyer has a proven track record of estimating costs for its projects. Study phase estimates (opinions of probable construction costs) carry contingencies appropriate to that level of analysis / detail. These estimates are refined as the projects progress, with a concurrent reduction in the amount of contingency (typically 5% for bid ready design projects). A table comparing Hazen and Sawyer’s estimates against contractor bid prices is provided on the next page.

Project	Client Location	Engineer's Estimate	Bid Price	Over (+) / Under (-)
10 mgd Nansemond WWTP	Suffolk, VA	\$29,900,000	\$30,044,067	+0.5%
Nansemond WWTP 10 to 30 mgd Expansion	Suffolk, VA	\$48,500,000	\$48,800,000	+0.6%
Petersburg WWTP 15 to 20 mgd Expansion	Petersburg, VA	\$5,000,000	\$4,755,520	-4.9%
Neuse River WWTP Phase 1 30 to 40 mgd Expansion	Raleigh, NC	\$7,100,000	\$6,850,000	-3.5%
Neuse River WWTP Phase 2 30 to 40 mgd Expansion	Raleigh, NC	\$8,800,000	\$9,040,580	+2.7%
Plum Island WWTP 18 mgd Upgrade	Charleston, SC	\$13,100,000	\$12,155,486	-7.2%
Plum Island WWTP 18 to 27 mg Upgrade	Charleston, SC	\$17,555,000	\$16,350,000	-6.9%
Neuse River WWTP Phase 3 30 to 40 mgd Expansion	Raleigh, NC	\$18,246,000	\$15,809,900	-13.4%
Bluestone WTP	Summers County, WV	\$22,000,000	\$23,000,000	+4.3%
P.O. Hoffer WTP	Fayetteville, NC	\$10,000,000	\$9,700,000	-3.1%
Rockville WTP Residuals Piping Upgrades	Rockville, MD	\$379,000	\$344,000	-9.0%
Abingdon WTP Expansion	Abingdon, MD	\$64,440,000	\$61,847,000	-4.0%
West End Tanks - Phase 1	Hagerstown, MD	\$6,550,000	\$5,698,000	-15.0%
Dulles South Tanks	Ashburn, VA	\$11,428,000	\$10,305,000	-9.8%

**76. If a filter system is such a good idea, why was a pipe run to the HS and the equine center?**

From the Town of Leesburg: Tuscarora High School is in the town corporate limits and use of ground water for domestic service is prohibited.

**77. In the Frequently Asked Questions, it states that RF Well PW-1 GUDI determination falls under the “experiencing significant and relatively rapid shifts that mirror climatological or surface water conditions”. Is it true that all of water in the area has this risk which is why in the cover letter Mr. Jennings states [the GUDI] “determination was a reminder of the nature of wells in limestone geology and how they can change over time”?**

GUDI determinations are specific to each well because of the uniqueness of the limestone geology surrounding each well. This geology serves to filter the water before it reaches the well. However, the limestone may provide less filtration over time. This is one of the reasons why Loudoun Water’s Board of Directors passed a resolution on November 10, 2011, stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls.

**78. If so, doesn’t it also follow that it is difficult to know what exactly is in the water at any given time leaving an on site filtration plant designed for low turbidity groundwater vulnerable to failures and therefore not as robust a solution as Pipe Line water?**

Both treatment systems are robust systems, and if variability of source water is a concern, the membrane filtration system is considered to have higher reliability than conventional treatment on the Potomac River. The turbidity variance in the groundwater is low, even in Well PW-1. The membrane filtration system will provide an absolute barrier.

**79. The RF wells are downstream from runoff from the drug treatment center just to the west of RF the sewage from which is discharged into the brook that runs through RF. Has our well water been tested for pharmacological chemicals, and will the favored filtration system filter out these toxic chemicals? These chemical would not be a factor in ToL delivered water.**

Emerging contaminants is a current area of research in surface water systems nationwide. Membrane filtration of the type proposed for Raspberry Falls is not intended to remove pharmaceuticals. The conventional treatment process employed at Leesburg is also not intended to remove pharmaceuticals.

The potential future addition of GAC contactors is intended to address these potential contaminants (to the extent that they can be adsorbed). The Town of Leesburg water is withdrawn from the Potomac River, which has an even greater watershed than Raspberry Falls, and is similarly prone to influence from runoff/discharges.

**80. If Loudoun Water does not have extensive experience with managing Membrane filtration plants in Karst, why should Raspberry Falls be another experiment where a potentially good idea is not viable long term because of the nature of the geology?**

The operation process of a membrane treatment plant is similar to that of other plants and equipment that Loudoun Water operates. Staff will be properly trained and certified in accordance with local and state agencies.

**81. It is mentioned many times that the Raspberry Falls water source is a low turbidity water. How is this possible given the first 27 homes were required filtration in part due to their turbidity, given Raspberry Well F was taken off line less than 1 month after startup due to high turbidity, and given homeowners have data showing high turbidity at their tap?**

The water leaving the treatment facility has always met Safe Drinking Water Act requirements for turbidity.

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.

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 Groundwater as a “hard start”.

Water levels in Well F were also observed 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 Groundwater 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 Groundwater did not find any evidence that the bedrock aquifer or Well F was damaged by the quake.

Given the results of the investigation, Emery & Garrett Groundwater made short-term and long-term recommendations to address the elevated turbidity. As a result of their recommendations, Loudoun Water submitted a response plan to the Virginia Department of Health. If the plan that was submitted is approved by VDH, Loudoun Water will do the following: 1) Install, in consultation with the Virginia Department of Health, an automatic flow control valve on the raw water main at the water treatment plant – this will eliminate the “hard start” conditions and allow us to prevent over-pumping; 2) bring Well F back online at a production rate of 75 gallons per minute (gpm) for a minimum of three months. After that period of time, the pumping rate may be increased to 100 gpm to meet demands; and 3) monitor water levels, flow rates and turbidity continuously for the next 12 months.

**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.** Following the implementation of the response plan and approval of the work by VDH, Well F will again be used to supply water to Raspberry Falls.

The reference to homeowners having data showing high turbidity at their tap is based on one testing result, the quality of which is in dispute and has not been duplicated.

**82. What was the incidence of turbidity in well F from its first operation (not just in a 24 day period in 2010)?**

Space is limited to fully answer this question. Reports detailing the turbidity detected in the water produced by Well RSP-F are available for review at either Loudoun Water’s office or the VDH-ODW office.

**83. Why is water travel time not an issue with the connection to Selma using a filtration on site when the distance from the plant to the end of Raspberry Falls is 2 miles alone, but Option 3 of the Pipe line requires only 2.25 miles (11,900 linear feet)?**

Water travel time was of concern in the pipeline study because of the potential for increased formation of Disinfection By-Products. Because of the low organic matter concentration in the groundwater, resulting in low reported DBP concentrations in the Raspberry Falls treated water, there would be very little DBP formation if the filtration plant provided water to Selma Estates.

**84. Why is looping not considered in the membrane treatment option when the study states that water pressure in Raspberry Falls is an issue?**

Looping was recommended for the pipeline option to provide the 750 gpm fire flow needed per Town of Leesburg standards. The treatment option will include facility improvements tied to system pressure / pumping capacity and finished water storage improvements. These improvements will provide the 500 gpm fire flow as stated in the January 2011 Raspberry Falls PER.

**85. How much water is required for the wastewater treatment facility? It is not included in the connections calculation.**

Meter readings for the wastewater treatment plant show average usage is under 100 gallons per day.

**86. Why does Option 2 from the Western Plant on the Pipeline study not have sufficient fire flow with a 12 in pipe?**

Hydraulic modeling results indicated that serving Raspberry Falls via Alternative 2 (12-inch pipe) did not provide fire flow (750 gpm) in accordance with Town of Leesburg minimum requirements. Modeling results indicated fire flows below 500 gpm. A larger diameter may provide supplemental fire flow, but water quality and increased costs were concerns which led to this alternative being eliminated from further consideration.

**87. What testing requirements will be used to test the source water being treated on site to ensure the proper level of filtration is always applied?**

Testing requirements will be as stipulated in the Virginia Department of Health Working Memo 880 for membrane filtration systems and in accordance with the Safe Drinking Water Act regulations.

**88. Why is flushing not required for the filtration?**

Flushing was required for the pipeline option to reduce the "age" of the water to limit the formation of disinfection by-products (DBPs), which are not an issue for the groundwater at Raspberry Falls. Since the organic matter concentration is low and the water age is similarly low, there is no need to flush the system to control DBPs.

**89. Are other communities located the same distance from the Main plant currently using 8 in pipes and flushing their lines?**

From the Town of Leesburg: The Town of Leesburg does not currently serve any communities from a comparable three mile dead-end water main. Town of Leesburg Customers generally connect adjacent to the existing Town distribution system, and are therefore typically supplied by well looped water mains. However, Town staff must routinely flush water mains (including 8-inch water mains), as all water purveyors must do, particularly on distant reaches of the system.

**90. On the annual maintenance costs, the Pipe Option assumes 98,440 gallons per day usage. What is the comparable usage assumption for the On Site Filtration plants annual costs?**

The average demand in Raspberry Falls is 98,440 gallons per day. The “average” flow used in the development of operating cost estimates in the treatment study report varied depending on the flow option being evaluated.

Therefore, the average flow rate for a facility sized for 400 gpd/connection was less than the average flow rate for a facility sized for a 1,200 gpd/connection flow rate. Specific peaking factors used to calculate “average” flow for the various treatment options are describe in the report appendices.

**91. While there is mention of expected water quality for the pipeline option, there is no indication of expected water quality with the membrane option. Why?**

Finished water quality was provided for the pipeline option because the finished water data is readily available from the Town of Leesburg for their given treatment processes, and was extrapolated based on water age. The membrane system finished water quality will provide an absolute barrier to particle passage (turbidity, bacteria / pathogens, and some viruses), and will otherwise not affect the finished water quality previously presented in the report.

**92. COMMENT: The membrane option includes both Raspberry Falls and Selma Estates, but the pipeline option only includes Raspberry Falls. If the pipeline were extended to Selma Estates, it would still be more expensive than the membrane option, but the cost per lot would almost certainly be greatly reduced.**

**93. With the experiences with wells in Leesburg and the surrounding limestone area, what is the likely long-term life of the Raspberry Falls and Selma Estates wells before they run dry and/or collapse?**

Wells have been successfully drilled and used in limestone bedrock throughout Loudoun County and the country, most notably in the Shenandoah Valley of Virginia.

The rate (and volume) of groundwater withdrawal from the underlying bedrock aquifer will not exceed the rates and volumes previously tested and approved by the Virginia Department of Health – Office of Drinking Water (VDH-OWD), the Loudoun County Health Department, and the Loudoun County Department of Building & Development.

Initial water well drilling and the subsequent rigorous yield and drawdown testing of the new community water supply wells are intended to put a maximum stress on the bedrock aquifer system. No sinkholes or contamination were detected during the testing program.

Geological events can affect any water supply well, as recently documented extensively up and down the Eastern US Seaboard during the September Earthquake centered in Mineral, Virginia. It is important to note that even with this earthquake, no structural damage was observed in any of the Selma or Raspberry Wells.

**94. The August, 2011 Hazen and Sawyer Report states that in VA, 32 membrane filtration treatment systems are in use for GUDI source waters mostly in the VDH's Abingdon and Lexington Offices, a) What is the geology of that area, b)What is the length of time that those systems have been in operation, c) What populations are those systems serving, d) If any of those systems are in limestone geology, have they demonstrated a restriction of capability to produce source water.**

The report stated that 32 of the 35 GUDI systems overseen by the Abingdon and Lexington field offices of VDH utilize membrane filtration. There may be more GUDI systems using membranes elsewhere in the Commonwealth.

- a) The geology in the areas where the GUDI sources are located was reported by VDH to be predominantly limestone geology (of the 35 GUDI sources all but 1 or 2 are in limestone geology).
- b) The Lexington Field Office of VDH did not report dates for when the sources were determined to be GUDI. The Abingdon Field Office reported dates for when the systems were determined to be GUDI and, assuming those dates coincide with the initiation of membrane filtration, the systems have been in operation between 6 and 23 years, with an average time frame of about 16 years.
- c) The Abingdon Field Office of VDH did not report populations served for the systems with GUDI source waters. The Lexington Field Office did report population data, and for the systems under their purview the populations served range from 50 to 155,000 persons, with an average population served of a little less than 10,000 persons.
- d) VDH did not report any restrictions in source water capacity as a result of the systems being located in limestone geology.

**95. What chemicals does the Raspberry Falls Golf Course use for maintenance of its property? Is the Course regulated? If so, by whom? Does the Golf Course report to Loudoun Water its chemical usage, how often?**

In a June 15, 2011 meeting with VDH, some residents of Raspberry Falls asked these questions of VDH. In a July 1, 2011 letter, VDH informed that this information is not maintained by VDH and identified contacts at both Virginia Department of Agriculture and Consumer Services and Virginia Department of Environmental Quality. These contacts are:

Ms. Liza Fleeson, Pesticide Services Program Manager, VDACS, 804-371-2283.

Mr. Doug Frazier, Northern Virginia Regional Office, DEQ, 703-583-3873.

The golf course does not report its chemical usage to Loudoun Water. However, Loudoun Water has conducted multiple scans of the well and there is no evidence that chemicals are entering the raw water wells.

**96. On the Loudoun Water webpage it is reported that Loudoun community systems are designed to deliver 500 gals a day to a connection (household), what will be the designed gallons per day delivery to Raspberry Falls per connection with a membrane filtration plant? Loudoun Water manages the water system of the Town of Lovettsville. Lovettsville uses several wells as their source water, please compare Lovettsville's population served, number of wells and design gallons/day delivery to that planned for Raspberry Falls.**

As described in the Hazen and Sawyer report, three different capacities were evaluated for the new membrane filtration facility – 400 gallons per day per connection (gpd/conn), 900 gpd/conn, and 1,200 gpd/conn. The cost estimates provided in the presentation to the Loudoun County Board of

Supervisors were based on the 1,200 gpd/conn system size. The decision as to what capacity will ultimately be provided rests with the Loudoun Water Board.

Comparisons to the Town of Lovettsville were not addressed as part of the study work.

**97. If Raspberry Falls receives piped water from Leesburg, are there any adverse geologic risks involved in introducing an increased volume of water to the watershed through additional irrigation of lawns?**

If lawns are irrigated with the proper amount of water (i.e. only the water the lawn needs to sustain itself) then there should be little to no effect on the local geology. However, irrigation becomes a concern to any groundwater environment when lawns and other vegetation are over-irrigated creating excessive runoff and 'water loading' of the local soils occurs.

Over-irrigation could have similar effects as heavy precipitation events. More importantly, utilization of 'environmentally friendly' fertilizers and lawn chemicals can help avoid adding these components to local surface water and groundwater systems.

**98. Does the Loudoun Water Board expect to take a position on which options they recommend, if any, be implemented at Raspberry Falls and/or Selma? What is the timing for selecting an option?**

Loudoun Water is guided by our mission to ensure sustainable water services to protect health, the environment and quality of life. Providing a reliable and safe water supply drives our decision-making process. The Well PW-1 GUDI determination highlighted the nature of wells in limestone geology; that some – but not all – wells in the karst can become under the direct influence of surface water over time and require a different level of treatment.

Therefore, after taking all of the facts into consideration, Loudoun Water's Board of Directors passed a resolution on November 10, 2011, stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls.

Loudoun Water requests that Loudoun County and the Town of Leesburg decide whether to pursue the pipeline extension no later than May 2012 otherwise Loudoun Water will proceed with installation of membrane filtration at Raspberry Falls.

**99. Has LW's review of the Elysian community fire hydrants been completed? Will LW conduct a similar review of the hydrants in RF?**

A pilot program for the color coding of hydrants was developed and implemented between Loudoun Water and Loudoun County Fire & Rescue for the Elysian Heights community. The color coding program for hydrants in all community systems is scheduled to be implemented in January 2012.

**100. Is well F operating? Have you discovered the cause of the turbidity?**

Well F is not in operation at this time. The results of the investigation were released to the residents of Raspberry Falls on December 5, 2011. Loudoun Water also released the following statement:

Loudoun Water recently completed its investigation into an event on August 9, 2011 when elevated turbidity was experienced in a portion of the system, resulting in a shutdown of Well F, a water well serving Raspberry Falls.

Loudoun Water has completed its investigation into an event on August 9, 2011 when elevated turbidity was experienced in a portion of the system, resulting in a shutdown of Well F, a water well serving Raspberry Falls.

Loudoun Water enlisted Emery & Garrett Groundwater, a company with a significant, positive track record of work in Loudoun County, to conduct an investigation into the incident. Emery & Garrett Groundwater 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 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.

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 Groundwater as a “hard start”.

Water levels in Well F were also observed 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 Groundwater 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 Groundwater did not find any evidence that the bedrock aquifer or Well F was damaged by the quake.

Given the results of the investigation, Emery & Garrett made short-term and long-term recommendations to address the elevated turbidity. As a result of their recommendations, Loudoun Water submitted a response plan to the Virginia Department of Health. If the plan that was submitted is approved by VDH, Loudoun Water will do the following: 1) Install, in consultation with the Virginia Department of Health, an automatic flow control valve on the raw water main at the water treatment plant – this will eliminate the “hard start” conditions and allow us to prevent over-pumping; 2) bring Well F back online at a production rate of 75 gallons per minute (gpm) for a minimum of three months. After that period of time, the pumping rate may be increased to 100 gpm to meet demands; and 3) monitor water levels, flow rates and turbidity continuously for the next 12 months.

**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.** Following the implementation of the response plan and approval of the work by VDH, Well F will again be used to supply water to Raspberry Falls.

**101. What has been the cost of developing well F from inception to date? Will this cost be borne solely by RF customers, or by all of the community systems?**

The following contracts were issued related to this work:

Well RSP-F Development and WTP Work = \$985,772

Emery & Garrett Groundwater - Well RSP-F Investigation, Drilling, and Testing = \$200,000

Well Pump Purchase = \$10,000

Urban Engineering Design = \$66,468

Hazen & Sawyer Design = \$35,943

Piping and WTP Improvement Construction Contract (A&M Concrete) = \$616,417

UV Reactor Purchase (Two Reactors) = \$52,994  
Electromagnetic Meter Purchase (Three Meters) = \$3,950

The costs were paid by VMK; these costs were not borne by all Loudoun Water community system customers.

**102. LW reported that the Selma interconnect was turned on when PW 2 was taken out of service for maintenance. How long was the interconnect functioning, and has it been shut off?**

The Selma interconnect is not in use at this time. It does, however, open automatically, when the pressure in the Raspberry Falls distribution system drops below a certain point during a contingency, like the maintenance on PW-2, or an emergency. Loudoun Water monitors its use 24/7. The interconnect was in use for several hours when maintenance was being conducted on PW-2.

**103. What was the total cost of building the Selma interconnect?**

The following contracts were issued related to this work:

Raspberry Falls - Selma Interconnect Total = \$136,000  
Urban Engineering Design = \$40,200  
Pipeline and Vault Construction Contract (Tri-Star Development) = \$95,800

**104. What was the total cost of the Hazen and Sawyer study? Did LW circulate a RFP soliciting competitive bids before selecting Hazen?**

The total cost of both Hazen and Sawyer studies was approximately \$161,000. Loudoun Water procured the services of Hazen and Sawyer for both studies under an existing Basic Ordering Agreement for professional engineering services, which was established in response to an RFP issued during 2009.

**105. Although the data may be in your report, I was not able to discover what the projected annual cost for each RF customer will be for the optimal filter option vs the Leesburg connection over the estimated useful life of the Leesburg pipeline compared to the estimated useful life of the filter system. In other words, a water main has a very long useful life and a very low annual maintenance cost, while a complex and fragile filter system has a much shorter life span and a much higher maintenance and operating cost. A comparison of only the initial capital construction costs is incomplete; customers want to know what their annual costs will be when the capital and maintenance costs are amortized over the useful lives of the assets.**

Options analyzed in both studies were evaluated under the same financial metrics, including a 50-year life cycle, incorporating all capital, operations, and maintenance costs. These total life-cycle costs are summarized in both studies.

**106. On January 8, 2010, LW committed to install a UV system on wells PW 1 and 2. Has the UV system commenced operating on PW 2? Was a UV system also installed on well F, and the Selma well?**

As part of the construction contract to bring Well F online, Loudoun Water completed installation of UV reactors on both Well PW-2 and Well F, and placed both reactors in service during summer 2011. Loudoun Water is currently evaluating water treatment at Selma Estates, and will evaluate treatment needs following completion and evaluation of the remaining Selma Estates wells.

**107. If the RF community chooses the filter system, will LW act as the general contractor for constructing the system? If it will not, is the estimated cost of the contractor included in the study? Will LW subcontract the ongoing operation and maintenance of the filter system, and if so, what is that estimated cost?**

Loudoun Water does not typically act as a general contractor for new facility construction. Consequently, Hazen and Sawyer included estimated contractor costs in the cost estimates for both studies. As presented in the treatment study, Loudoun Water would operate the proposed filtration system and perform routine maintenance on treatment facility equipment. The costs for treatment plant operation and maintenance are included in the study.

**108. Does LW have any prior experience in constructing and operating a membrane filter system? If so, when completed, did the actual cost exceed the estimated cost at the planning stage?**

Some residents were informed in a July 1, 2011 letter from VDH, "ODW has been informed that Loudoun Water currently has eight licensed water operators on staff. Some or all of these operators are licensed at a level appropriate to be the operator in responsible charge at a membrane treatment plant."

The operation process of a membrane treatment plant is similar to that of other plants and equipment that Loudoun Water operates. Staff will be properly trained and certified in accordance with local and state agency standards and/or regulations.

While Loudoun Water's Broad Run Water Reclamation Facility utilizes membranes for wastewater treatment, its size and scale are not comparable to the proposed Raspberry Falls facility. However, Hazen and Sawyer have considerable experience estimating treatment facility costs. Study phase estimates (opinions of probable construction costs) carry contingencies appropriate to that level of analysis/detail. These estimates are refined as the projects progress, with a concurrent reduction in the amount of contingency (typically 5% for bid ready design projects). A table comparing Hazen and Sawyer's estimates against contractor bid prices is provided in response to Question #75.

**109. Did the study take into account the risks of well failure, like well F, or inadequate water volume during a prolonged drought? If well PW 2 were to fail, and if well F is not functioning due to turbidity or some other problem, and if similar problems occur in the Selma wells, what is the contingency plan? Has there ever been a shortage of Potomac River water for the Leesburg plant, or an operational failure at that plant?**

The studies do not address well collapse because the highest risk for collapse is during the drilling of the well. There is no evidence from the wells that collapse will be an issue with long-term usage. In addition, we did not find any indications of any long-term impact from the August earthquake.

Regarding the potential for insufficiency of supply during periods of intense drought, all water utilities have their supplies affected by drought conditions. Voluntary, and even mandatory, water restrictions may be put in place by water utilities to address supply issues.

During times of drought, all utilities are encouraged to cut back on water withdrawals from rivers, including the Town of Leesburg and its use of the Potomac, as discussed with other users of the supply and per the Interstate Commission on the Potomac River Basin (ICPRB) Cooperative agreement.

**110. The LW study contemplates that a Leesburg connection would provide adequate fire flow; but not the filter option. If the RF community elects to build a filter plant, will LW construct sufficient storage capacity to enable future fires to be controlled with greater success than the catastrophic fire two weeks ago?**

Fire flow is addressed in the studies. Regardless of the option selected, Raspberry Falls will remain under Rural Policy Area fire-fighting procedures.

This question was asked and answered by Loudoun County Fire and Rescue prior to the fire that occurred in October 2011.

Answer from Loudoun County Fire and Rescue:

The Raspberry Falls sub-division has experienced at least two major incidents in the last ten years. In 2003 a large single-family dwelling burned to the ground on Swiftwater Drive. At the time, I believe there was only one dry hydrant/cistern in the development, a 12,500 gallon tank located on Raspberry Drive near the golf clubhouse. When that tank was depleted, units relocated to another dry hydrant/cistern in the Big Spring subdivision off Whites Ferry Road on the east side of James Monroe Highway which has a capacity of 10,000 gallons. There were problems with this tank and units ultimately ended up shuttling water from a hydrant on Chadfield Way, NE in Leesburg. The second incident was a house fire after a propane explosion in January, 2004. This was almost directly across the street from the first house fire on Swiftwater Drive but did not require a water shuttle operation.

Since the above mentioned fires, at least two additional dry hydrants/cisterns have been added in the Raspberry Falls subdivision. Both are 12,500 gallon tanks. As a whole, Loudoun County has greatly improved their rural water supply capabilities by adding nine tankers with capacities of 3,000 gallons or more. This would benefit incidents in Raspberry Falls as tankers are located at Lucketts, Lovettsville, Hamilton, Purcellville, & Round Hill. Leesburg Fire has also purchased a 2,500 gallon tanker which is 1,000 gallons more than the tanker they had in service at the time of the fires in 2003-2004.

Though we have made significant improvements in our rural water supply capabilities in the last eight years, all incidents in areas without hydrants are much more difficult to battle. In area's with hydrants, engines (pumpers) hook to the hydrant and have water immediately. Even if the engine broke down, many hydrants have enough pressure to push the water through the engine to the fire. In non-hydranted areas such as Raspberry Falls, we must carry all water to the scene on engines and tankers and then refill off buried water tanks with "dry hydrants". This requires us to hook hard sleeves to the connection and suck the water up out of the tank. A typical engine carries 750-1000 gallons so we can only refill the number (or less) of engines that the tank holds and we are never able to get all of the water out of the tanks.

All dry hydrants and cisterns are inspected in Loudoun County each year by career staff, however we find problems with a number of tanks each year such as leaking, broken connections due to vandalism, ultra-violet damage on the PVC that causes it to become brittle and snap off, air leaks, etc...

Loudoun County has a performance goal of placing 4,000 gallons of water on the scene within 12 minutes. Last fiscal year we were successful 77% of the time but this is a difficult measure to achieve due to the rural nature of the county, size of the tankers and roads.

**Additional information regarding the Ferriers Court fire supplied by Loudoun Fire & rescue in supplemental response**

**Additional information regarding the Ferriers Court fire supplied by Loudoun Fire & rescue in supplemental response**

**111. After the public comment period, what is the timetable for reaching a conclusion? Will the RF community be permitted to vote for an option, or will LW commission a poll of residents?**

Loudoun Water's Board of Directors passed a resolution on November 10, 2011, stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls.

The resolution stated, "Because the extension of municipal water into the Rural Policy Area is not permitted by Loudoun County, Loudoun Water will proceed with the installation of membrane filtration for all Raspberry Falls water supply wells and will not proceed with further development of the pipeline extension of Leesburg Town Water unless:

1. Loudoun County amends the Revised General Plan to authorize the pipeline extension and approves a Commission Permit for the pipeline extension; and
2. the Town of Leesburg approves an agreement to accept ownership and operation of the Raspberry Falls Community Water System.

Loudoun Water requests that Loudoun County and the Town of Leesburg decide whether to pursue the pipeline extension no later than May 2012 otherwise Loudoun Water will proceed with installation of membrane filtration at Raspberry Falls.

Loudoun Water is currently fulfilling the request of VDH and the Loudoun County Board of Supervisors to take in public comment and questions about the studies. This highly-publicized comment period will run from August 22, 2011 to December 31, 2011 and includes several public meetings and presentations. The input we receive from this period will be factored into the decision-making process. Community input throughout the decision-making process is desired moving forward into 2012, and initiatives by members of the community to receive input from all of the residents and provide it to the decision-makers are encouraged.

**112. We sent a large number of questions to you on 10/4/11 and you will take over two months to respond to them if you respond at your December meeting. It is unreasonable for us to evaluate the answers and have you close the public input session on December 31st, 2011. We request that we be provided the same time you took to respond to evaluate your answers since you have refused all correspondence and have set this meeting up around the holiday season. We feel that if it took you 8 months to prepare the study and 2 months to start to provide answers, allowing us 2 months to digest your answers is more than reasonable.**

Loudoun Water believes its four-month public comment and review period has given interested parties an appropriate amount of time to respond to the studies. This packet alone contains answers to at least 137 questions from the community.

The public meetings we are holding are in keeping with the Board of Supervisors request that we a) hold a meeting close to/in the community; b) that we do so sooner rather than later; c) that we make a presentation similar in its clarity to the one we made to the Board of Supervisors; d) that we respond to the community's questions and e) take in and share public comment as part of the decision-making process.

Loudoun Water agrees that it will answer all study-based questions submitted prior to the end of the comment period to properly conclude the overall review and comment process on the studies. We are confident that given, all of the steps we have taken and the time we have allowed, that the public comment and review process on the studies has been appropriate and should end on December 31, 2011.

**113. If you are spending Raspberry Falls money to pay for an upgrade that per your statements is not required because we always have had safe drinking water, why have you decided to take the route of the membrane filtration PRIOR to the community meetings you have set up, especially considering no one stayed at the BoS public input session to hear our concerns?**

Multiple Loudoun Water representatives were on hand for the Board of Supervisors public input session to hear the concerns that were outlined by the four residents that were on hand and chose to speak. Multiple Loudoun Water representatives were also on hand for the public presentation to Leesburg's Town Council. The session was not attended by any Raspberry Falls residents.

Loudoun Water's Board of Directors did not decide to take the route of membrane filtration as stated in the question. It actually passed a resolution stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls. Loudoun Water's statement concerning the resolution that explains the thought process behind the decision to pass the resolution follows below:

Loudoun Water is guided by our mission to ensure sustainable water services to protect health, the environment and quality of life. Providing a reliable and safe water supply drives our decision-making process. The Well PW-1 GUDI determination in Raspberry Falls highlighted the nature of wells in limestone geology; that some – but not all – wells in the karst can become under the direct influence of surface water over time and require a different level of treatment.

For eight months, Loudoun Water has worked with Hazen & Sawyer, a leading environmental engineering firm, and the Town of Leesburg to produce studies that would objectively evaluate and determine the constructible options that will address the situation in the Raspberry Falls.

After careful review of the studies, Loudoun Water found sufficient information to conclude that both the treatment and pipeline options are technically able to be constructed and identified preferences for a treatment option and a pipeline alignment. Other issues, including operational considerations, costs and implementation timeframes were outlined and found to be factors that could significantly influence a final decision.

Therefore, after taking all of the facts into consideration, Loudoun Water's Board of Directors passed a resolution on November 10, 2011, stating its determination that either the preferred treatment option or the preferred pipeline alignment will be selected as the appropriate long-term solution to the situation at Raspberry Falls.

The resolution states, "Because the extension of municipal water into the Rural Policy Area is not permitted by Loudoun County, Loudoun Water will proceed with the installation of membrane filtration for all Raspberry Falls water supply wells and will not proceed with further development of the pipeline extension of Leesburg Town Water unless:

1. Loudoun County amends the Revised General Plan to authorize the pipeline extension and approves a Commission Permit for the pipeline extension; and
2. the Town of Leesburg approves an agreement to accept ownership and operation of the Raspberry Falls Community Water System.

Loudoun Water requests that Loudoun County and the Town of Leesburg decide whether to pursue the pipeline extension no later than May 2012 otherwise Loudoun Water will proceed with installation of membrane filtration at Raspberry Falls.

**114. You state in your 11-15-11 email that you will proceed with the membrane filtration for Raspberry Falls in the absence of the BoS and ToL agreeing to the pipeline. Exactly what system will be put in? Microfiltration membrane or higher? Will activated carbon be included?**

The preferred option detailed in the treatment study would be implemented.

Because of the low concentrations and sporadic nature of occurrence of SOCs found in the source water, it was recommended that the new membrane filtration facility be designed with space allowance for future addition of activated carbon contactors. Installation would be triggered by source water concentrations close to the chemicals' respective maximum contaminant levels (MCLs) in the Safe Drinking Water Act regulations and/or more frequent occurrence.

**115. What is the cost of the configuration of the membrane filtration you have already decided on for Raspberry Falls? Your reports provide numerous costs and no where could I track to the \$4M number in your FAQ section.**

The cost information was updated after the report was finalized to better compare the treatment option costs with the pipeline option costs. The scenario selected is the 1,200 gpd/connection membrane filtration facility with deferral of granular activated carbon (GAC) contactors as described on Table ES-2.

**116. You state in the report that RF will require upgrades to our storage tanks. Will this upgrade allow sufficient storage for the neighborhood to provide fireflow to fire hydrants as we understand Selma has?**

No. Increasing storage does not mean Raspberry Falls will be able to have suburban fire flow capabilities. It will remain under Rural Policy Area fire-fighting procedures. Additionally, finished water storage is only one component in providing fire flow; the actual fire flow capabilities are a combined function of finished water storage, pumps, water mains within the streets, and fire hydrant locations.

**117. Why is water age not a concern for Selma where there are large storage tanks and few homes when it is a concern with the pipeline option for RF?**

Water travel time was of concern in the pipeline study because of the potential for increased formation of Disinfection By-Products. Because of the low organic matter concentration in the groundwater, resulting in low reported DBP concentrations in the Raspberry Falls treated water, there would be very little DBP formation if the filtration plant provided water to Selma Estates.

**118. With the new storage tanks in RF, will water age be a seasonal concern with fluctuating water demands?**

Water travel time was of concern in the pipeline study because of the potential for increased formation of Disinfection By-Products. Because of the low organic matter concentration in the

groundwater, resulting in low reported DBP concentrations in the Raspberry Falls treated water, there would be very little DBP formation if the filtration plant provided water to Selma Estates.

**119. Why if you are deciding to implement the Membrane Filtration for RF, one of many of your community water systems, will RF residents bear the entire cost of the upgrade considering that all of the other community systems work off of pooled resources? Ie — when a capital project is done in another community water system, doesn't the entire community water system group share that cost? The same rules should be applied to this as to all capital upgrades for community systems, especially considering that our reserves were depleted when the decision was made to pool the resources.**

Pursuant to Loudoun Water policies, the cost of improvements to the Raspberry Falls Community Water System will be recovered from Raspberry Falls customers. Loudoun Water will support the Board of Supervisors to consider establishing a sanitary district.

**120. Will the money that the developer contributed for this community's water system, on the order of \$1M, be used to offset the cost of these upgrades since it is contained solely within the community?**

Nearly all of the \$1 million contributed by the developer has been used for the improvements that have already been made to the system.

**121. If orthophosphate continues to be added, why won't the membrane filter it out? If it filters it out, what happens to pinhole leaks? Leesburg water does not produce pinhole leaks.**

Orthophosphate is added to the system after treatment.

**122. The estimated cost per lot for the filter system for RF only is \$1,830 per year for 20 years, vs. \$4,260 for the pipeline. Does the estimate of \$118,000 for annual operating cost for the filter system include LW staff only? Or does it also include independent contractors? Will LW retain any independent contractor to maintain and operate the filter system?**

The \$118,000 annual operating cost includes all anticipated yearly operating expenses, such as Loudoun Water staff time, electricity, and chemicals. The system would be operated and maintained by Loudoun Water staff, similar to Loudoun Water's current operation of membrane filtration at the Broad Run WRF. The periodic membrane replacement cost (every 10 years) would involve an outside contractor, to replace membrane modules, which is accounted for in the life-cycle costs.

**123. What are the components of the estimated \$418,000 of Leesburg costs for the pipe option? Leesburg is already producing water from its plant, the additional water that would be sold to RF is presumably a very small increment to the current plant output, so this figure seems on the high side.**

From the Town of Leesburg: In order for the town to own and operate this system, a minimum of 2 full time staff have to be hired in addition to other expenditures such as water treatment costs, flushing requirements to reduce water age, and operational costs associated with retreatment in the pipeline to remove disinfection by-products.

**124. When Leesburg water was extended to the high school, what was the length of the added pipe, what was the capital cost, how does the amount of additional water being distributed to the high school compare to the estimated usage of RF, and what is the annual Leesburg operating cost related to the high school?**

From the Town of Leesburg: This was not financed by Town. All expenses were borne by the Loudoun County School Board.

**125. I understand the concept of a 50 year life cycle cost for the filter plant of \$7.3 million. I don't understand why the estimate is \$18.9 million for the 1.5 mile pipeline extension: why would a pipeline have a 50 year life cycle? Pipes last a lot longer than 50 years. If this cost is attributed to pumps and a chlorination injector, please provide the details. It is difficult to understand why simple pumps and chlorine injectors would cost more than twice as much as a complex membrane system to maintain and replace over a 50 year cycle, and difficult to understand why a "facility" consisting of a water pipe and simple pumps would ever have to be upgraded at the 50 year point.**

The 50 year life cycle utilized in both studies is standard industry practice, and reflects Loudoun Water's customary accounting procedures for such assets. The annual operating costs in the Pipeline Study, which include electricity, chemicals, and Town of Leesburg treatment costs and staff time, drive the life cycle cost of the pipeline. Production of water and maintaining water quality within the community significantly affect the life cycle cost; the costs are not limited to pipeline maintenance.

**126. Your paper states that "the extension of town water to Raspberry Falls adds to the water's travel time and would increase the levels of disinfection byproducts." Presumably the same risk exists with the travel time of Leesburg water to other customers in the area, such as the high school and River Creek. What has been Leesburg's experience with disinfection by products in these cases?**

From the Town of Leesburg: Tuscarora High School is contiguous to the Town of Leesburg's water system, and therefore connects to the remainder of the system in two locations, providing a water main loop, preventing a long dead-end water main. River Creek is a similar situation, having been in Leesburg's service area, with multiple connections and water main looping.

**127. If wells in a karst environment are a satisfactory source of drinking water, why did the County extend the Leesburg water main to its new high school immediately to our south rather than drill wells, surely a less expensive source of water?**

From the Town of Leesburg: Tuscarora High School is in the town corporate limits and use of ground water for domestic service is prohibited. Tuscarora High School is contiguous to the Town of Leesburg's water system, and therefore connects to the remainder of the system in two locations, providing a water main loop, preventing a long dead-end water main.

**128. What will construction of a membrane plant cost vs. what will be the cost to extend the Leesburg water main from Tuscarora High School approximately 1.5 miles along state road Route 15 to Raspberry Falls?**

The construction of the membrane filtration plant has estimated capital costs of \$4 million. The construction of the pipeline alignment has estimated capital costs of \$7.5 million, covering construction-related costs.

**129. What will be the annual maintenance cost of the filter plant vs. the annual maintenance cost of the water main?**

For the membrane filtration plant, the estimated annual operating costs of \$118,000 pay for pumping the water throughout the system, the use of chemicals in the treatment process, and staffing costs.

For the pipeline alignment, the estimated annual operating costs of \$418,000 covers the costs of Town of Leesburg treatment, pumping of the water and labor.

**130. How much experience does Loudoun Water have in designing, constructing, operating and maintaining a membrane filtration plant in a private community vs. how much experience does the Town of Leesburg have in operating its public water treatment plant on Route 7?**

Both Loudoun Water and the Town of Leesburg are highly respected water utilities, with historic track records of providing quality water and wastewater services to their customers.

**131. How long will it take to construct a filtration plant vs. how long will it take to extend a water main 1.5 miles to Raspberry Falls, bearing in mind that Loudoun Water committed on January 8, 2010 to add UV disinfection to the Raspberry Falls system, but as of today, it has not brought that upgrade online?**

As published in "Studying Options for Raspberry Falls and Selma Estates Community Systems" guide provided to the residents, the implementation time for the filtration plant is approximately two years, while the implementation time for the extension of Town of Leesburg water main is approximately two and a half years after legislative approval.

**132. What is the degree of risk that the wells would be inadequate during periods of severe drought vs. the risk that the Potomac River would cease to have sufficient water to supply the Leesburg water plant?**

Regarding the potential for insufficiency of supply during periods of intense drought, all water utilities have their supplies affected by drought conditions. Voluntary, and even mandatory, water restrictions may be put in place by water utilities to address supply issues.

During times of drought, all utilities are encouraged to cut back on water withdrawals from rivers, including the Town of Leesburg and its use of the Potomac, as discussed with other users of the supply and per the Interstate Commission on the Potomac River Basin (ICPRB) Cooperative agreement.

**133. What are the risks that wells in Raspberry Falls and Selma could collapse given the known information that a community well has already collapsed in Selma Estates (noted in Selma Sanitary Survey, August 2010)?**

The studies do not address well collapse because the highest risk of collapse occurs during the drilling of the well. There is no evidence from the wells that collapse will be an issue with long-term usage.

Selma Well 7E2 did not collapse. The use of the term in the VDH sanitary survey was an incorrect description of the problem experienced with the well during original start-up, and most likely stems from an uninformed comment made to the VDH inspector during the survey visit. The "collapse" simply consisted of some mud and silt drawn into the well from the fracture zone during an uncontrolled pump start up, due to contractor error.

In addition, we did not find any indications of any long-term impact from the August earthquake. We test pumped Well 7E2 for 24 hours on October 20 -21, 2011 and obtained acceptable raw quality water within a matter of hours after start-up.

**134. If any of the remaining Raspberry Falls and Selma wells cease to function, how difficult will it be to locate places to drill additional wells? Would new wells (like Well Rasp-F) also end up in areas that would require setback reductions (which reduce the ability to protect wellhead)?**

In the unlikely event that existing wells at Raspberry Falls or Selma Estates should "... cease to function...", Loudoun Water would undertake a program of well exploration and development, subject as always to VDH review and approval, to replace the lost well.

Well F did not require a setback reduction from VDH standards. The well, as originally sited, met the VDH required setback of 50 feet. Loudoun County has a separate 100 foot setback requirement that was waived during Well F construction.

**135. I am attaching a copy of an email dated April 27, 2011 that VDH gave us. VDH states on that date that LW had already concluded that a membrane system would be the most effective option, but that LW had not yet received any input from Leesburg on the water main extension option. Please explain whether, as implied in the email, LW reached a conclusion as to the superiority of one of two options before having received any information about the other option.**

The question incorrectly states that Loudoun Water had concluded the "superiority" of one of the two options. The email actually states that Loudoun Water had concluded that one of the two options was the most "cost-effective" solution because membrane filtration is found to be acceptable by the author's agency for GUDI wells and is almost always a less-costly alternative to the construction of a pipeline.

Cost-effectiveness was not the entire scope of the studies' work. The studies were designed to determine the technically viable options for further consideration and presented both a preferred treatment option and a preferred pipeline alignment for consideration.

**136. COMMENT: I am attaching the Consent Protective Order dated May 6, 2011 which exempts anything related to the water options study from the litigation. In view of this exemption, it seems to me that LW could engage in real time conversation with us, which would be much more productive than the method that you have elected of considering only written questions and a unilateral presentation.**

**137. Regarding the Raspberry Falls Study Option, would another more economical option for homeowners be the option of each homeowner purchasing their own home purification/filter system for approximately \$2,000 to \$3000 one time capital cost versus additional \$1500 per year for 20 years? I believe the annual maintenance cost for individual home purification systems would be much less than \$1500 per year. Since several homeowners in Raspberry Falls have already installed home purification systems, I believe that the County and City of Leesburg, along with all homeowners in Raspberry Falls and Selma could easily save thousands and millions of dollars. Does this sound like a reasonable solution and would this satisfy any water quality/safety concerns that homeowners would have?**

While the suggestion is certainly a reasonable one, this option is not available as a remedy to the situation. Raw water pumped from water wells must be treated according to EPA and VDH regulations based on the testing results of the raw water in the wells, not testing of the finished water at the customer's taps following treatment by a home treatment system.

## 16605 Ferriers Court House Fire – Fact Sheet

### Operational Details:

Incident: 16605 Ferriers Court, Raspberry Falls, Leesburg VA

Date: Monday, October 24, 2011

- At 5:30:21 p.m., a 9-1-1 call was received for house fire, fire in the garage. At 5:30:53 p.m., **just 32 seconds after the 9-1-1 call was received**, a call was dispatched alerting 5 engines, 3 tankers, 1 ladder truck, 1 rescue squad, 1 ambulance, 2 command officers, 1 EMS officer and 1 safety officer.
- At 5:33:13 p.m., the first due engine from Leesburg (3 personnel) responded and advised incoming units of the location of the underground water storage tank (12,500 gallons) on Raspberry Drive just east of Ferrier's Court.
- At 5:37:26 p.m., while Leesburg engine was en route, officer requests a Water Supply Task Force (3-additional water tankers, 1 additional engine) due to visible smoke and multiple reports of a working fire.
- At 5:37:48 p.m., **just under 7 minutes from dispatch, the Leesburg engine is on scene** (see LTM photo) reporting a working fire with heavy smoke and fire from the garage with fire running up the side of the house. Officer sets up incident command.



- At 5:38:52 p.m., officer confirms heavy fire in the garage. A “Blitzfire” deluge gun (large volume water flow) is deployed in an attempt to knock the fire down in the garage while a second line

attack is positioned in the house to hold the fire. **Water was placed on the fire within 2 minutes of arrival.**

- At 5:39:22 p.m., the second arriving engine (Lucketts) on scene and connecting to the dry hydrant on Raspberry Drive near Ferrier's Court to supply the Leesburg engine.
- At 5:43:22 p.m., Battalion Chief (assumes incident command) on the scene, advises heavy smoke on second floor of house above the garage.
- At 5:43:54 p.m., second engine (Lucketts) officer reports it appears that fire has overtaken the attack.
- **In just 15 minutes from the 9-1-1 call, the fire progressed to a point where the potential of roof collapse became a legitimate concern.** Operations were changed to defensive attack.
- At 5:45:33 p.m., Battalion Chief advises all units to evacuate the structure due to fire overtaking the attic. Evacuation tones dropped by Communications.



- The fire took approximately one hour to control but several more hours to overhaul and extinguish all “hot spots” and smoldering materials.
- At 9:50 p.m., the last tactical unit left the scene. The Fire Marshal's Office remained on the scene overnight and into the next day to investigate the fire. The fire appears to be accidental in nature, however has not been given a final disposition at this point.

During this incident, Fire-Rescue had adequate water supply throughout the incident and operations were handled effectively according to the county's rural water supply protocols. **The total estimated water used during this incident (including engine and tanker capacities, and dry hydrants) is 61,550 gallons.**

## Rural Firefighting Water Supply System Overview

The main issue during this Ferriers' Court incident was the advanced state of the fire when first responders arrived to the scene. Below is a summary of the rural firefighting water supply system used, which is typical of that used countywide in non-hydrant areas.

A few years ago, these type of operations were limited by non-standard tankers that were insufficient to transport and deliver water capacities as listed above. **However, the Loudoun County Board of Supervisors has invested approximately \$9 million in the acquisition of 3,000 gallon tankers throughout the system to standardize water capacity across the county, which has greatly improved the odds of controlling/extinguishing these types of structure fires.**

### Engine capacities "on call" = 5,750 gallons

Wagon 601 = 750 gallons; Engine 698 = 750 gallons; Reserve Engine 622 = 500 gallons; Engine 605 = 1000 gallons; Wagon 606 = 500 gallons; Wagon 605 = 1000 gallons; Engine 601 = 750 gallons; Engine 622 = 500 gallons

### Tanker capacities of tankers "on call" = 20,800 gallons

Tanker 601 – 2500 gallons; Tanker 610 – 3000 gallons; Tanker 605 – 3000 gallons; Reserve Tanker 610 – 3000 gallons; Tanker 602 – 3000 gallons; Engine Tanker 928 – 1500 gallons; Tanker 604 – 3000 gallons; Tanker 607 – 1800 gallons.

### Total gallons used from dry hydrants on cisterns (tanks) in Raspberry Falls (RF) = 35,000 gallons

Raspberry Drive near Ferrier's Court (12,500 gallons; emptied on call)

Raspberry Drive (41601) near RF Golf Clubhouse (10,000 gallons; emptied on call)

Raspberry Drive near Limestone Lane (12,500 gallons; emptied on call)

## More Information

- If you have any questions on the rural water supply firefighting information presented above, please contact Chief Brower at 703.777.0333.
- If you have any other questions, please do not hesitate to contact John Sandy, Loudoun County Assistant County Administrator at 703.771.5962, or Anna Nissinen, Loudoun County Public Affairs and Communications Officer at 703.771.5086.