



PUBLIC QUESTIONS/COMMENTS

RE: Studying Options for

Raspberry Falls and Selma Estates Community Systems

PART II

- 1. Produce an accounting of the total costs of the work over the past year with a breakdown when it comes to: a) Well F, b) UV and c) Selma interconnect.**

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

- 2. How does Leesburg get to \$418,000 for annual operating costs?**

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.

- 3. When is SOC, VOC testing done by the ToL and by LW?**

From the Town of Leesburg: VOCs are collected annually by the ToL in the 2nd quarter, and SOCs are collected every 3 years in the 2nd and 3rd Quarters. SOCs are due to be collected in 2012.

Loudoun Water: Testing for VOCs and SOCs is conducted in compliance with EPA and VDH requirements and is currently performed on a quarterly basis at Raspberry Falls and Selma Estates.

4. What is the longest distance of pipe from RF's WTP to a RF home?

The longest measured distance of water main between the Raspberry Falls Water Treatment Plant and any connection appears to lie along the Raspberry Drive to Hunters Crossing Lane segment, which entails approximately 7,000 linear feet of water main. As shown on the exhibits contained in the Treatment and Pipeline studies, the first 3,000 feet of this alignment also supply demands on Swiftwater Drive, Limestone Court, and Hunter Place.

The distance between water treatment and customers is not the sole factor in disinfection by-product (DBP) formation. Factors such as source water consistency and quality, treatment processes, line sizes, storage, and usage on a line dictate Disinfection By-product formation in concert with total length of distribution main. Organic matter concentrations are very low in the Raspberry Falls source water, which is seen in the very low disinfection by-product measurements in the finished water.

5. Is there a requirement to retain a certain chlorine residual at the farthest home? Or is this just measured at the point of entry into distribution system?

VDH has no requirement for a minimum chlorine residual in a community distribution system that is supplied by groundwater sources. For Raspberry Falls, Loudoun Water maintains a free chlorine residual at the WTP entry point of 1.1 to 1.3 mg/l to achieve 4-log virus inactivation, per VDH requirement. The entry point residual is measured daily during a peak demand period. Loudoun Water follows a VDH-approved monitoring plan for testing the water at various locations in the distribution system for the presence of any bacteria and also tests for chlorine residual.

6. In the 32 systems in Shenandoah where GUDI is on karst wells, did any of the wells become GUDI after treatment was put in place?

The GUDI status of a well is not determined by the treatment performed on the raw water, it is a determination specifically related to the raw water from the well, prior to treatment. VDH does not routinely prepare a narrative summary of the GUDI history of a particular well or system.

7. Provide a full accounting for communal system to include capital improvements.

See Raspberry Falls accounting information attachment.

8. Is there a possibility of grants helping recoup the cost?

As was mentioned in the community meetings in December 2011, there may be grants available for recouping costs pertaining to the chosen path forward from these studies.

9. Provide proof that the effluent from WWTP is not affecting 27 private wells.

The discharge from the wastewater treatment plant must meet strict Virginia Department of Environmental Quality and U.S. Environmental Protection Agency permit limits for the WWTP effluent discharge on a daily basis.

10. Waivers for VOC, SOC testing. Why? Doesn't this mean you haven't been testing so we don't know what is in our water re: VOCs, SOCs?

Waivers are given by the Virginia Department of Health (VDH) so utilities do not have to conduct tests that are determined to be unnecessary given certain conditions. After initial VOC/SOC monitoring during

well development and start-up, VDH reviews the VOC/SOC results closely to determine if any of these contaminants have entered the well. If little to no VOC/SOC contamination is observed in the extensive sampling, then VDH may determine (accounting for well location) that the relative risk for VOC/SOC contamination is very low and a monitoring waiver is granted to the utility.

Utilities must re-apply to VDH for waivers, and certify to VDH that no changes in land use have occurred that would impact the well. Although no land use changes have occurred that might impact the Raspberry and Selma wells, Loudoun Water proactively decided to conduct normal VOC/SOC sampling of the wells in 2011.

11. Provide a spreadsheet showing the breakdown of the numbers for life-cycle costs.

Appendix D of the treatment study report, and the appendix of the pipeline study, both contain capital costs, operating costs, and corresponding life-cycle costs for all treatment options considered.

12. Provide data sheets showing how TTHM numbers in presentation were arrived at for groundwater, considering a GUDI well (PW-1) was part of the averages.

The TTHM numbers for Raspberry Falls were taken directly from Loudoun Water's Annual Drinking Water Quality Report, which can be found on the Loudoun Water Website, www.loudounwater.org.

13. Wouldn't there be disinfection byproducts in the membrane system? How did LW come to its disinfection byproducts number for membrane?

The microfiltration membrane system is not targeted at removing total organic carbon; therefore, the post-membrane organic concentration would not be different than what currently exists in the system. Because total organic carbon concentrations would not change, the same system detention time (water age) would exist, and chlorine residual concentrations would not change, the disinfection by-products concentrations would not be different than what is currently seen. As stated in the presentation, the disinfection by-product values shown for the current Raspberry Falls system would be the same values we would expect under a membrane filtration treatment system.

14. LW committed to laying out various changes in the numbers based on adjustments to the options. The two examples given were: What happens to the cost of the pipeline if the need to provide fire flow at 750 gpm is reduced to 500 gpm? What happens to the cost of the membrane option if the GAC option is implemented from the start?

Refer to the attached tables for the requested breakdown in capital cost estimates.

The existing Raspberry Falls community water system is comprised largely of 6-inch diameter water distribution system piping, and based on modeling results associated with the recommended pipeline option it is not possible to meet a minimum fire flow requirement of 500 gpm without modifications to the existing onsite water system infrastructure. Similar improvements to those recommended to provide 750 gpm of fire availability (primarily local looping), as were presented in the Pipeline Report and graphically shown on Figure 15 of the Pipeline Report, would be required to provide 500 gpm of fire flow availability.

However, it is noted that without the aforementioned modifications, the fire flow availability, as hydraulically evaluated, is only slightly below 500 gpm at approximately 475 gpm. Therefore, reducing the fire flow availability requirement from 750 gpm to slightly below 500 gpm could reduce the capital cost by \$1.2 million. It is not anticipated that the operating cost of the pipeline option would change based on a reduction in fire flow. Therefore, the life cycle cost of the two options would be approximately

\$18.9 million for 750 gpm of fire flow availability and \$17.7 million for slightly below 500 gpm of fire flow availability.

The treatment costs with deferral of GAC contactors and with immediate installation of GAC contactors were previously provided in Table ES-2 of the treatment study report; however, as requested the capital cost numbers are repeated here. The cost of the system improvements required to address VDH noted capacity limitations and fire flow are also broken out. As indicated in Table ES-2, the life cycle cost of the treatment option with and without deferral of GAC contactors is \$5,981,000 and \$8,247,000, respectively.

ToL Pipeline	Individual Cost	Total Cost with 750 gpm Fire Flow	Total Cost with 475 gpm Fire Flow
cost of main line	\$ 6,310,000		
cost of improvements for 750 gpm fire flow	\$ 1,210,000	\$ 7,520,000	
cost of improvements if reduced to 475 gpm fire flow	\$ 0		\$ 6,310,000

Membrane Treatment Facility	Individual Cost	Total Cost with Deferral of GAC	Total Cost with GAC Implemented Immediately
cost of pumping and storage improvements for fire flow / capacity (VDH)	\$ 1,125,000		
cost of membrane treatment facility (GAC deferred)	\$ 2,900,000	\$ 4,025,000	
cost of membrane treatment facility (GAC immediate)	\$ 3,882,000		\$ 5,007,000

15. How is water from ToL treated? How is water treated by membranes? How did the two compare?

ToL Treatment Overview

The Rollins WTP is a conventional water treatment plant, having a VDH permitted treatment capacity of 10.8 mgd between November 1 and April 30 and 12.9 mgd between May 1 and October 31. The main process facilities currently consist of in-line rapid mix, tapered energy flocculation, sedimentation augmented with tube settlers, dual-media filtration, and clearwell to provide disinfection for drinking water.

Raw water is conveyed from the Potomac River to the wet well of the raw water pump station via two (2) 24-inch diameter pipelines extending from a submerged intake/bar screen. At the raw water pump station the water from the intake lines passes through a stilling chamber and two (2) travelling water screens prior to entering the raw water wet well. Three (3) raw water pumps equipped with variable frequency drives are used to pump the raw water from the wet well to the Rollins WTP process train. Two of the pumps have a capacity of 7.7 mgd and the third pump has a capacity of 5.8 mgd, which provides a firm raw water pumping capacity of 13.5 mgd. Potassium permanganate is added to the discharge of the raw water pumps. The pumped raw water flows through parallel 16-inch and 24-inch raw water lines prior to combining into a single 30-inch diameter line just upstream of the rapid mix process.

Rapid mixing is achieved via two (2) 5 hp in-line mechanical mixers, one duty and one spare. The constant speed mechanical mixers are installed on the parallel 30-inch raw water lines (the single 30-inch raw water line splits into two lines inside the raw water treatment area). A number of chemicals are added upstream of the rapid mixers for oxidation, coagulation and pH adjustment, including sodium hydroxide (caustic), ferric chloride (primary coagulant), sulfuric acid, and sodium hypochlorite. Sodium hypochlorite is only fed to the raw water on a very rare basis.

From the rapid mixer, coagulated water enters four (4) parallel trains of two-stage, tapered energy flocculation. The flocculation devices are of the horizontal paddle wheel type. Just upstream of the flocculation basins (at the influent channel) powdered activated carbon (PAC) and coagulant aid polymer are fed. Combined flocculated water is conveyed through a common flume to the influent of four (4) parallel sedimentation basins. Roughly half of each sedimentation basin is covered with tube settlers, each rated at just under 0.3 gpm/ft². Sodium hypochlorite can be added to the sedimentation basin influent flume for control of biological growth on the tubes. Settled water flows from the collection launders on top of the tube settlers to a common filter influent flume. Prior to filtration, sodium hypochlorite, PAC, and a filter aid polymer can be added.

Filtration is accomplished via four (4) conventional dual-cell, dual-media filters. Each filter cell has a filtering area of 225 ft² for a total area per filter of 450 ft². Filter media consists of 3 inches of garnet, 6 inches of sand, and 21 inches of anthracite. Filter Nos. 1 and 2 have Wheeler bottoms and surface wash devices, whereas Filter Nos. 3 and 4 have Leopold underdrains equipped with IMS caps and air scour capability. The VDH approved filter loading rate varies from 4 gpm/ft² between November and April to 5.5 gpm/ft² between May and October.

The effluent from each filter passes through a Venturi meter rate-of-flow-control device and into the 0.52 mg clearwell, which is located directly below the filters. Four chemicals can be added at the clearwell – a corrosion inhibitor (currently not used), fluoride, sodium hydroxide, and sodium hypochlorite – the latter for primary disinfection (CT). Filtered water follows a serpentine flow pattern through the clearwell before entering the two (2) clearwell effluent conduits and flowing to the 33,900 gallon (effective) finished water pump station wet well. Three (3) variable speed pumps are used to convey finished water to the Town's distribution system; two (2) have a capacity of 7.5 mgd and one has a capacity of 5 mgd, for a firm finished water pumping capacity of 12.5 mgd. Sodium hypochlorite can be added to the finished water pump station wet well for adjusting the free chlorine residual prior to entering the distribution system.

Membrane Treatment Overview

As discussed in the treatment study report, the membrane filtration process will consist of the skid mounted membrane modules, influent screens, membrane cleaning chemicals, cleaning waste neutralization tank, compressed air system, and associated piping and controls. In addition to some of these standard membrane appurtenances, it is also recommended that a "break" tank be installed. This tank would have an approximate capacity of 1,500 gallons, and would be located immediately upstream of the membrane system. The break tank will effectively "de-couple" the membrane system operation from the well pumps, which will provide facility operations personnel with more flexibility in operating the membrane system. The break tank will also provide an opportunity for the little bit of iron present in the raw water to be oxidized via chlorine contact prior to reaching the membrane modules.

In pressurized membrane filtration, raw water to be treated is fed under pressure to a series of modules, each of which contains thousands of hollow fiber membranes. The water within each module passes through the pores in the membrane filters into the interior of the individual fibers. The water that passes into the interior of the fibers is the treated water, and the water that does not pass through fibers is the reject. For the microfiltration membranes studied for this project, all particles larger than 0.1 micron in diameter are left on the outside of the membrane fibers in the reject water. Thus, the membrane fibers essentially "strain" the particles out of the water, and provide an absolute barrier to particle passage, including bacteria and pathogenic organisms such as Cryptosporidium.

Membrane treatment facilities are sized on the basis of flux, or the amount of water treated per unit membrane area, and is reported in units of gallons per square foot per day (gfd). For a system such as the one proposed for Raspberry Falls, the membrane flux at the maximum day flow should be no more than 50 gfd.

Sodium hypochlorite will continue to be fed to the finished water for disinfection as well as to the influent of the break tank for iron oxidation, and zinc orthophosphate will continue to be fed to the finished water as a corrosion inhibitor.

How do the Processes Compare

The media filtration process used at the Rollins WTP by the Town of Leesburg relies on proper upstream process chemistry (coagulation) to destabilize the particles in the raw water and get the particles remaining in the water after settling to “stick” to the filter media grains. If proper coagulation is not practiced, the performance of the filters can worsen and turbidity breakthroughs can occur. Membrane filtration is a physical straining process that relies purely on the pore size of the membrane to prevent particles from passing through the membrane fibers. Both processes are good processes for water treatment.

16. Loudoun Water was asked to determine if there were similar pipelines in similar situations in other areas of the state.

Flushing is sometimes practiced in distribution systems seasonally to maintain water quality (such as chlorine residuals), and high velocity flushing is used annually to remove pipeline deposits in larger mains. Some systems practice continuous (daily or weekly) flushing at extreme points to ensure bacteriologic quality and chlorine residuals. Flushing daily or weekly is considered a waste of treated drinking water and an undesirable solution to water quality issues. Pipe looping in some pipe grid systems can minimize flushing needs.

From VDH: Many waterworks have waterlines (some more lengthy than others) that dead-end and create different types of water quality issues that may have to be addressed by special operational attention. Perhaps even some of the medium and large Northern Virginia utilities have this experience. Several utilities in the immediate Culpeper area are having to deal with this type of situation. The Town of Culpeper supplies treated surface water through several “deadend” waterlines that have been extended a mile or two into Culpeper County. My understanding is that the town is now considering taking over the ownership and operation of these waterlines from Culpeper County. Another example is the Town of Orange which supplies treated surface water to the Town of Gordonsville, some 8-10 miles away. Not surprisingly, DBPs have been a problem due to the water age.

17. For the membrane option, are the private well owners subject to being assessed any costs since they are not Loudoun Water customers today?

Loudoun Water is not aware of any existing federal, state, or local regulations that will mandate the private well owners to be connected to the system and therefore incur any cost.

18. If the pipeline option should ever come about due to changes in legislation, would the costs incurred by the private well and septic owners to hook up to the water supply higher than for the neighbors being already connected today to the LW wells?

At this point, we do not know all the circumstances that might be associated with the specific details should a change in legislation, such as the one this question suggests, occurs.

19. What if well F periodically becomes turbid? How much turbidity can the membrane system tolerate?

Membrane systems are designed to remove turbidity. Periodic increases in turbidity do not affect performance. The two membrane manufacturers, contacted as part of the study, indicated water turbidities of several hundred NTU are not a problem if experienced on an occasional basis (i.e., periodic spikes). The Pall system was reported to be operating well on an application at the Yellowstone River, which sees maximum turbidity levels of 300 NTU. Memcor reported that 100 NTU spikes would not be a problem, but the duration and frequency of the spikes would need to be assessed in order to size the membrane system appropriately.

20. Has UV been added to PW 2? To F? To Selma?

As part of the construction contract to bring Well F online, Loudoun Water completed installation of UV disinfection on both Well PW-2 and Well F, and placed both reactors in service during summer 2011. Installation of UV disinfection is planned for Selma Estates.

21. Has LW ever used a consultant other than Hazen & Sawyer? If so, please name those.

Loudoun Water has utilized the services of numerous engineering consultants over its 52 year history. 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. Loudoun Water established Basic Ordering Agreements with six environmental engineering firms through this RFP, including Hazen and Sawyer, Camp Dresser and McKee (now CDM Smith), Malcolm Pirnie, Gannett Fleming, CH2MHill, and Michael Baker Corporation.

22. How much has LW paid Hazen & Sawyer over the past years?

Loudoun Water has paid 637 invoices for a total of \$4,282,564.90 starting with an invoice dated 04/20/2001 and the last invoice dated 12/13/2011.

The competitive procurement resulting in selection of Hazen and Sawyer, as well as five other environmental engineering firms, is governed by the Virginia Public Procurement Act (VPPA). Loudoun Water has several ongoing Task Orders under Basic Ordering Agreements established by this competitive procurement, which are continuously paid on a monthly basis. Loudoun Water complies with the VPPA, and this procurement specifically complies with total expenditure limits, as well as single contract expenditure limits, established in § 2.2-4301 of the VPPA.

23. Was there ever published a RFP before retaining Hazen & Sawyer for this study? And if so, to how many other companies was the RFP sent?

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.

24. Can we see Hazen & Sawyer's work papers, because the published numbers all by themselves are opaque: how could the simple pipe cost so much more to maintain than the intricate filter system?

The studies and appendices, produced by Hazen & Sawyer provide detailed information on option costs.

25. What was the cost per mile to extend the Leesburg water main to the high school? The straight distance from the high school to RF is 1.3 miles.

From the Town of Leesburg: Tuscarora High School is contiguous to the Town distribution system, and extensions to serve the school were not financed by Town; all expenses were borne by the Loudoun County School Board.

From Loudoun Water: Concerning the water main distance, while the physical distance from Tuscarora HS to the Raspberry Falls community boundary is approximately 1.3 miles, this is not the actual distance for a water main extension. Due to pressure constraints, the water main shown in Alternative 3 of the Pipeline Study would need to extend from Tuscarora HS to the existing Raspberry Falls WTP, not simply stopping at the boundary of the Raspberry Falls community. Both selected alternatives in the studies (Alternative 3 in the Pipeline Study and Membrane Filtration in the Treatment Study) rely on pumping capacity at or near the existing Raspberry Falls Water Treatment Plant. Much like the existing system, where wells send raw water to the Raspberry Falls Water Treatment Plant before increasing pressure and distributing to homes, the Pipeline Study proposes sending water from Leesburg to the existing Raspberry Falls Water Treatment Plant, where pressure will be increased for distribution to homes. What this means, is that both selected alternatives (Alternative 3 in the Pipeline Study and Membrane Filtration in the Treatment Study) distribute from the existing Raspberry Falls Water Treatment Plant location, and therefore proximity of the community boundary has little bearing on costs in either study. The alignment of Alternative 3 from the Pipeline Study results in a distance from the existing TOL connection point to the Raspberry Falls Water Treatment Plant of 12,300 feet, or approximately 2.3 miles.

26. For the 27 homes with their own wells how could the backup pipe system which is proposed to be put in place be used one day if we (the 27 homeowners) are required or offered to hook up to the community well (or pipeline) solution?

Both selected alternatives in the studies (Alternative 3 in the Pipeline Study and Membrane Filtration in the Treatment Study) are sized to provide service for all customers within Raspberry Falls, as well as the existing private well customers in Hamlets 1-A and 1-B. The costs for a private homeowner to connect to the public system would depend on the particular financing option used to fund an improvement at Raspberry Falls (in addition to plumbing costs between the home and the water main in the street). Issues such as funding, grants, time for repayment, ability to prepay, abandonment of individual wells, etc. have not been determined, and can only be determined once available financing options have been pursued.

27. How can LW guarantee with the increased demand in the future that the individual wells of the 25 home owners are not impacted? After all this is karst area ?

To clarify the question, Loudoun Water is not providing any guarantees, however, we understand the question to be a request for reasons why groundwater withdrawals for the public water supply will not adversely affect private wells. 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. The approved rate and volume of withdrawal was established during well development, which considers potential impact to surrounding wells.

28. How is the groundwater table impacted in the future?

During development of Well F, eight years of water level data were evaluated. The data revealed normal variations based on seasonal usage and climatic (heavy rain, drought) events. 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. The development of the wells in Raspberry Falls was based on the full built-out development of the community.

29. If a well owner wants be connected one day to the LW community well what would be LW response and conditions?

Both selected alternatives in the studies (Alternative 3 in the Pipeline Study and Membrane Filtration in the Treatment Study) are sized to provide service for all customers within Raspberry Falls, as well as the existing private well customers in Hamlets 1-A and 1-B. The costs for a private homeowner to connect to the public system would depend on the particular financing option used to fund an improvement at Raspberry Falls (in addition to plumbing costs between the home and the water main in the street). Issues such as funding, grants, time for repayment, ability to prepay, abandonment of individual wells, etc. have not been determined, and can only be determined once available financing options have been pursued.

30. What proof does LW have that the planned double output of sewage from the water plant does not impact the well water of the 25 home owners where the LOD has been stating that individual wells and septic systems in a karst area are a risk and no study has been done to show that the individual wells are not impacted and when the first 25 homes were built already Loudoun County was concerned to approve the permits for 25 small wells in this geology?

The discharge from the wastewater treatment plant must meet strict Virginia Department of Environmental Quality and U.S. Environmental Protection Agency permit limits for the WWTP effluent discharge on a daily basis.

31. How can LW be sure that after 5 years of water quality issues a reliable long term solution for the whole RF development can be developed without including the homes with individual wells?

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

32. The study does not show additional other substantial costs from the filter system: LW will use outside contractors to build and operate it, where are their costs?

The estimated costs in all the studies are based on either option being fully designed, implemented, and operated/maintained.

33. The study does not address the costs and feasibility (whoever will carry them) to connect a private well owner to either the pipeline or community well using either the backup pipes or not. With the section of the 27 well owners being fairly close to Route 15 and having the shortest straight distance to the high school would the pipeline option overall cost not be less for each house in RF than building pipes for 27 homes to hook them into the community wells when using the membrane filtration?

Costs are spread evenly throughout the Raspberry Falls development, regardless of proximity within the distribution system.

34. There is no discussion of reliability of the LW wells: What happens to supply volume in a serious drought? What happens if one or more wells physically collapses? Leaking or failing waterpipes can be easily repaired because it is a proven way to transport water since thousands of years. And are we not looking for a reliable effective solution?

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.

35. What was the incremental cost incurred by Leesburg to provide water to the high school?

From the Town of Leesburg: None.

36. At the meeting it was stated that the financing options are not researched enough and that the \$ amounts per lots mentioned in the study are only estimates. I heard a rumor that one possibility to recoup the costs would be for LW or ToL to put a lean (sic) on my house and if I want to sell my house I would have to pay the amount to LW or ToL as part of the settlement. Is this possible or true?

As mentioned previously, financing options have not been determined, and any indications of costs-per-lot are only preliminary estimates. Regardless, financing options rarely have a direct relationship with liens. Liens are typically placed on properties for failure to pay individual bills. For instance, if a routine water and sewer bill is not paid by a customer, Loudoun Water maintains the right to place a lien on the property, assuring the eventual payment of that individual bill. This ability, or a similar version, is common to many practices, such as contracting and property tax collection.

37. Since the septic system is not part of the solutions that are being studied, wouldn't the membrane filtration option be less reliable?

The current septic system for the front 27 houses may compromise the water whereas it would not impact the pipeline solution.

Water level monitoring in several wells during Well F development documented a distinct hydraulic slope and groundwater movement through the site, generally west to east (towards the Potomac and away from the wells). In addition, membrane filtration treatment provides an absolute barrier to particle passage and is considered a highly reliable and sustainable solution for the Raspberry Falls community.

38. LW and VDH have done a good job advertising that there is not a problem with the finished drinking water in Raspberry Falls. As such, there are some people among us who are either in newer homes in the front of the neighborhood equipped with whole house filtration systems, some on wells and some who simply do not seem to understand or want to believe why either a filtration plant or pipe extension is required to ensure long term quality water. It appears that these people do not want to pay and may have even formed a petition stating they are the majority and do not want a change. How will Loudoun Water protect the true majority of Raspberry Falls residents, who understand the issues at hand, to ensure that safe long term quality water is provided for us (i.e. continue to require one of the two options) and also protect us from paying extra for those who may refuse to pay because they believe there to be no issue (i.e. subsidies, grants, requiring all to pay, etc)?

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.

39. What is the upfront capital cost of creating a truly looped system back to the town of Leesburg and would/could that reduce the yearly operating costs thereby meaning that the rate impact and overall lifecycle costs will be mitigated should a pipeline be the chosen path?

From a water quality perspective it is not recommended to create a loop from the Town of Leesburg to Raspberry Falls and back to the Town of Leesburg. The additional pipeline would increase travel time within the water distribution system, which could lead to reduced water quality. This loop would nearly double the amount of pipeline that would need to be installed. Local looping within the Raspberry Falls community, as is recommended for fire flow upgrade purposes (to reach 750 gpm of fire flow availability) and graphically shown on Figure 15 within the Pipeline Report, would provide the most effective means of circulating water within the Raspberry Falls community to promote improved water quality.

40. If at some point in time, the very real possibility that a pipe line is run past Raspberry Falls to support future development (either by ToL, LW or possibly a newly formed and/or combined LW & ToL company) and Raspberry Falls is on a membrane filtration plant, how will the community be compensated for the fact that a pipe was not chosen for us? How can we ensure that if a pipe is extended right past us in the future and the community so desires, due to rates or continued water concerns, that we will be connected at minimal cost considering we would have already paid for the membrane option?

In order to achieve the situation stated in this question, a number of hypothetical circumstances would have to occur, including decisions that would have to be made by the Loudoun County Board of Supervisors. Therefore, the question cannot be answered at this time.

41. What are the exact requirements of VDH on LW to remain in compliance regarding the GUDI determination and the May 2012 deadline? For example, if the local government is working to allow a pipeline extension but does not have full approval, will LW have to move forward with the membrane filtration option to ensure they are meeting the requirements of the GUDI determination?

The two distinct references to the May 2012 date, one by VDH and the second by the Loudoun Water Board, are not related to one another.

The VDH letter, dated November 23, 2010, notifying Loudoun Water of the GUDI determination for Well PW-1, stated the following:

Accordingly, we request that you take immediate action to address the situation. Actions which should be considered:

- Discontinue use and disconnect permanently the surface influenced source (Loudoun Water has indicated in conversation with Mr. Edelman that the well was shut down on 11/16/2010).
- Install filtration and disinfection treatment for the GUDI source within 18 months of this notice, or by May 23, 2012, in accordance with 12VAC5-590-420 of the *Waterworks Regulations*.
- Develop new or replacement sources.
- Connect to another waterworks such as the Town of Leesburg or Selma Estates.

With the implementation of Well F into the system, and the interconnect to Selma Estates as a backup for contingency situations, Loudoun Water is fully compliant with VDH requirements.

As was set forth by the Loudoun Water Board resolution from November 10, 2011, and clarified in the community meetings held in December 2011, the decision to implement either the preferred treatment option or the preferred pipeline alignment was a proactive step to ensure the long-term sustainability of the system. The reference to the May 2012 request, in the November 10, 2011 resolution, is fully at the discretion of the Loudoun Water Board.

- 42. Who will be tasked with working to find grants and other monies to offset the costs of either option since the residents of Raspberry Falls did not create this situation and have been trying for years to have it acknowledged so that some responsibility could be borne by the developer before they left the community?**

As was mentioned in the community meetings in December 2011, there may be grants available for recouping costs pertaining to the chosen path forward from these studies. Responsibility for grants will depend on the financing vehicle once an option is selected.

- 43. What testing protocol (daily, weekly, and monthly for what range of contaminants) will be required if the membrane option is chosen?**

The requirements for testing and frequency would be established by VDH as a part of the membrane option permitting process.

- 44. How much will it cost to install wet fire hydrants in the neighborhood as outlined in the pipeline option if the membrane option is chosen?**

Construction cost estimates within the Pipeline Study identify \$1.21M for improvements to the distribution system to achieve 750 gpm fire flows meeting TOL requirements. Approximately 10 percent of this cost, or \$121,000 is for installation of 20 fire hydrants within the development. The remaining costs cover additional water mains within the subdivision, allowing capacity increase from nearly 500 gpm to 750 gpm. However, regardless of the option selected, Raspberry Falls will remain under Rural Policy Area fire-fighting procedures.

- 45. There is a perception that RF residents are asked to carry a heavier burden than other communities and that the rate reporting may be broken into different categories of communal system users. Since we all contribute to one bucket of funds to support the community systems, we all need to live under the same rules and not have a few carrying the weight of many in our rates. If our capital costs are being born solely by us, other communities need to pay for theirs as well and if they have had the luxury of using the community funds for capital improvements, those funds need to be recouped from the benefitting communities to lower the rates for us all. So the question is, for the membrane option how will LW ensure that Raspberry Falls is not penalized in the community rates because of the types of homes that exist in the neighborhood?**

This question is not related to the treatment or pipeline studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

46. It is still not clear exactly why LW is able to purchase Fairfax water and not have the disinfection byproducts issue but is unable to affordably do the same with ToL water. Is there any way this can effectively be considered and accomplished?

The difference is because the Town of Leesburg uses free chlorine in their treatment system and Fairfax Water uses chloramines. Chloramines are a mixture of free chlorine and ammonia, and do not react with organic matter. Feeding chloramines essentially stops the formation of Disinfection By-Products (DBPs), which means the water can travel a great distance from Fairfax Water to Loudoun Water without forming significant DBPs. In the case of the ToL, the free chlorine is still available to react and so DBPs will continue to form, resulting in potentially elevated levels at Raspberry Falls.

47. It was requested in the meeting, but just to be sure it has formally been requested, please provide a detailed breakdown of the \$418k yearly operating cost for the pipeline option.

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.

48. It was requested in the meeting, but just to be sure it has formally been requested, please provide a summary table showing the more accurate comparison of costs where the Pipeline option and upgraded fire flow are identified and broken apart and where the Membrane filtration plant includes the Activated Carbon (since it will most likely be required in the future as the membrane does not protect against pesticides and herbicides) and also has clearly defined the cost / limitations of fire flow. Finally on the membrane option, please provide a cost to provide fire flow upgrades comparable to the pipeline option.

Refer to the attached tables for the requested breakdown in capital cost estimates.

The existing Raspberry Falls community water system is comprised largely of 6-inch diameter water distribution system piping, and based on modeling results associated with the recommended pipeline option it is not possible to meet a minimum fire flow requirement of 500 gpm without modifications to the existing onsite water system infrastructure. Similar improvements to those recommended to provide 750 gpm of fire availability (primarily local looping), as were presented in the Pipeline Report and graphically shown on Figure 15 of the Pipeline Report, would be required to provide 500 gpm of fire flow availability.

However, it is noted that without the aforementioned modifications, the fire flow availability, as hydraulically evaluated, is only slightly below 500 gpm at approximately 475 gpm. Therefore, reducing the fire flow availability requirement from 750 gpm to slightly below 500 gpm could reduce the capital cost by \$1.2 million. It is not anticipated that the operating cost of the pipeline option would change based on a reduction in fire flow. Therefore, the life cycle cost of the two options would be approximately \$18.9 million for 750 gpm of fire flow availability and \$17.7 million for slightly below 500 gpm of fire flow availability.

The treatment costs with deferral of GAC contactors and with immediate installation of GAC contactors were previously provided in Table ES-2 of the treatment study report; however, as requested the capital cost numbers are repeated here. The cost of the system improvements required to address VDH noted capacity limitations and fire flow are also broken out. As indicated in Table ES-2, the life cycle cost of the treatment option with and without deferral of GAC contactors is \$5,981,000 and \$8,247,000, respectively.

ToL Pipeline	Individual Cost	Total Cost with 750 gpm Fire Flow	Total Cost with 475 gpm Fire Flow
cost of main line	\$ 6,310,000		
cost of improvements for 750 gpm fire flow	\$ 1,210,000	\$ 7,520,000	
cost of improvements if reduced to 475 gpm fire flow	\$ 0		\$ 6,310,000

Membrane Treatment Facility	Individual Cost	Total Cost with Deferral of GAC	Total Cost with GAC Implemented Immediately
cost of pumping and storage improvements for fire flow / capacity (VDH)	\$ 1,125,000		
cost of membrane treatment facility (GAC deferred)	\$ 2,900,000	\$ 4,025,000	
cost of membrane treatment facility (GAC immediate)	\$ 3,882,000		\$ 5,007,000

49. Define why the communal systems of Raspberry Falls (“RF”) and Selma Estates (“SE”) are (or are not) “sustainable” today?

A. Neither the Studies nor Loudoun Water’s Summary (“Summary”), dated November 15, 2011 define:

- 1. What is a sustainable communal system?**
- 2. What is LW’s policy and criteria for assessing a communal system’s “sustainability” now and in the future?**

B. Regardless of what tests are performed at SE (and their respective outcome), why would LW consider an upgrade at RF, but not SE when both communal systems share the same and adjacent hydrogeology?

Part A: This question is not related to the studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

Part B: 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.

Selma Estates system is still in the development stage, and continues to be evaluated.

- 50. Hazen & Sawyer's analysis failed to include well replacement and easement acquisition costs for RF and SE. Given the fact that multiple wells have been abandoned or taken out of service at RF and given the fact that multiple test wells had to be drilled just to find one additional well site that was acceptable (Well F) and given the fact that the most recent well has cost \$1.7 million (and counting), why has Hazen & Sawyer intentionally omitted well replacement costs based on historical experience? At the going rate, a new well at RF would be needed every 5-7 years. Over a 50 year period well replacement costs at RF alone could easily exceed \$10M.**

The work on the most recent well, Well F, cost \$985,722 as detailed below:

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

Well replacement costs are not addressed in the studies because both options mitigate the issues which required Well PW-1 to be taken out of service due to the GUDI determination.

Also, it is important to note that no raw water well has ever been abandoned; Well PW-1 would be brought back into service if membrane treatment is the selected solution.

- 51. Why is LW even considering the onsite membrane option supported by onsite wells when the risk of existing well failure is both known and likely and there are no known easements to secure additional well sites? If LW is unable to secure its next well at RF, why do a membrane system?**

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.

- 52. Why are two full time employees estimated under the Town of Leesburg connection option for an additional 214 connections at RF (approx. 1 employee per 100)? Does the Town average 1 employee per 100 connections to provide water? I believe the Town has over 10,000 water connections (I do not think the Town has over 100 employees just providing drinking water). Provide the number of Town water connections (both commercial and residential) and the number of full-time employee equivalent units that support the Town's water 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.

53. Does LW have expertise in managing the proposed membrane system? If so, describe.

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. Loudoun Water operations staff currently operates two water reclamation facilities that utilize similar membrane technology. The largest of these facilities has a membrane design flow of 18.8 million gallons per day (MGD).

54. Will LW secure a performance bond (or similar performance mechanism/guarantee) on its ability to operate a membrane system?

No. Several layers of planning, permitting, licensing and regulatory oversight provide for operational compliance with state and federal regulations.

55. Will the *initial capital cost* be allocated in a fixed manner per lot regardless of use? If charged on a fixed basis, how will future lots that are built-out at both RF and SE be allocated? Will those lots be responsible for the same initial capital cost as all other existing lots?

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. It is too early in the process to provide information as to if or how the initial capital cost will be allocated to future lots.

56. Will the *annual operating costs* be allocated in a fixed manner or based on use?

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. It is too early in the process to provide information as to if or how the initial capital cost will be allocated to future lots.

57. What happens in years that RF operates at profit/surplus? Where does this money go? Pay down the capital bond? Into a reserve for RF or shared among the communal systems?

This question is not related to the treatment or pipeline studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

58. What happens when the RF system operates at deficit? Who is responsible for the deficit?

This question is not related to the treatment or pipeline studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

59. Will the rates and costs of sewer side of the RF and SE communal system be shared by other communal users or will the entire system (water and sewer) be segregated from the other communal systems?

This question is not related to the treatment or pipeline studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

60. The Studies point out that RF's current well and storage capacity will neither meet the current LW design guidelines nor VDH guidelines at build-out. In addition, the studies point out other necessary upgrades relating to older equipment that needs to be replaced even before a membrane system is added. Why are these types of costs not shared by other communal systems per LW's communal system policy? Why hasn't a cost segregation analysis been performed on the proposed capital costs? Have you warned other communal users that they may bear this financial burden?

This question is not related to the treatment or pipeline studies, which are the subjects of this particular public comment and review process.

Information on community system rates can be found on the Loudoun Water website, www.loudounwater.org.

61. Are the property owners responsible for the costs per lot for either the Membrane or Pipeline option or is this cost coming out of the taxes we already pay to the county and state?

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. At this stage of the process, we do not have any further information regarding the financing vehicles for either option.

62. If the property owners are responsible for the costs, would the property lots that have their own wells, and are not on the well(s) that require a Membrane filter, have to pay for that membrane option (if that option was chosen). I would expect that those lots would not have to pay for something that they will never see a benefit.

Loudoun Water is not aware of any existing federal, state, or local regulations that will mandate the private well owners to be connected to the system and therefore incur any cost. It will be a choice for each private well owner within the Raspberry Falls development to make.