**RWSA BOARD OF DIRECTORS**
**Minutes of Regular Meeting**
**May 25, 2010**

A regular meeting of the Rivanna Water & Sewer Authority (RWSA) Board of Directors was held on Tuesday, May 25, 2010 at 3:13 p.m., in the lower level Board Room of the Albemarle County Service Authority, 168 Spotnap Road, Charlottesville, Virginia.

**Board Members Present:** Mr. Kenneth Boyd, Mr. Michael Gaffney - Presiding, Mr. Maurice Jones, Ms. Judith Mueller, Mr. Dave Norris, Mr. Gary O'Connell, and Mr. Robert Tucker.

**Authority Staff Present:** Ms. Tamara Ambler, Mr. David Golladay, Mr. Charles Kent, Ms. Mary Knowles, Mr. Cary Lang, Ms. Michelle Simpson, Ms. Jennifer Whitaker, Dr. Robert Wichser, and Mr. Lonnie Wood.

**Also Present:** Mr. Randy Bass and Mr. Chris Webster - RWSA Consultants with Schnabel Engineering, Mr. Kurt Krueger – RWSA Attorney, members of the public, and media representatives.

## 1.0 Call To Order

The regular meeting of the RWSA Board of Directors was called to order by Mr. Gaffney on Tuesday, May 25, 2010 at 3:13 p.m., and he noted that a quorum was present.

## 2.0 Minutes of Previous Board Meeting

**Mr. Tucker moved that the Board of Directors vote to approve the minutes of the regular meeting of the Board held on Tuesday, April 27, 2010, seconded by Ms. Mueller. The motion was approved by a 7 - 0 vote.**

## 3.0 Executive Director's Report

Mr. Frederick first reported on last month's request for RWSA staff to present a schedule for introducing the updated Five-Year Capital Improvement Plan (CIP). With the exception of the section entitled the "Community Water Supply Plan, the remainder of the CIP will be ready by the July Board meeting unless there are any further suggestions or objections to this proposed schedule. Concerning the "Community Water Supply Plan" section, the CIP should address questions such as whether the new Ragged Mountain Dam will be built, other dam options pursued, and if the South Fork Rivanna Reservoir (SFRR) will be dredged. These are questions that are still open for discussion. The CIP generally does not display an "array of options for that type of decision making," which is normally done outside of the development and implementation of the document itself. The Board could act on the CIP with the sections presented in July or wait until the "Community Water Supply Plan" component can be updated after all the ongoing studies have been completed. Mr. Wood can develop a financial analysis for the wastewater side without a decision on the "Community Water Supply Plan" element but not

one for the water side as part of the CIP. He anticipated being able to provide some financial options outside of the CIP related to the "deliberations" on the water supply. RWSA staff is open for suggestions on how best to present this information.

Mr. Boyd next stated that the community has an approved water supply plan, recognizing that it might change due to the ongoing discussions on this issue. He personally felt that it would be appropriate for staff to move forward on the CIP based on this approved plan. He then asked Mr. Norris to share his thoughts about this matter. Mr. Norris stated that "for purposes of starting the discussion, that's fine." Mr. Boyd next noted that all the updated costs will not be available until the ongoing studies are completed, so changes were possible after the decision-making process by the "four boards." Mr. Norris next commented that as long as it was understood that changes might occur, he could agree with moving forward with the CIP as suggested by Mr. Boyd. After further discussion, it was the consensus of the Board for RWSA to proceed with the CIP based on the approved water supply plan, and Mr. Frederick concurred that staff would proceed in this manner.

Mr. Frederick next reported that at the last Board meeting staff was requested to informally retain a consultant to review the 2004 Water Demand Study and also look at updated information since that study related to water use, conservation, and development. RWSA has received three proposals, which were currently being reviewed. A decision at the staff level was expected by next week. Mr. Frederick understood at the last meeting that the Board authorized him to make the decision on hiring the consultant, and "absent feedback to the contrary," he proposed to proceed as directed. Mr. Boyd inquired if the fee for the consultant would be less than the amount requiring formal procurement, and Mr. Frederick confirmed that the amount would be under the limit that requires formal procurement.

Mr. Frederick next updated the Board on stream flow conditions and the current water supply status. He commented that this information is generally presented in May since this has been identified by the Authority as the beginning of the "dry season." He further noted that particularly November through April for every year on record is typically a "recharge" period for our reservoirs. All the reservoirs are currently full with "healthy" overflow spills due to the recent wet season. Referring to the attached graph, he stated that the green line represents the 2009-10 stream flow and the blue line reflects the 37-year mean flow trend line. He then pointed out that the green line has at times been significantly above the blue line indicating that unseasonably wet conditions had occurred, which is the first time this has been observed for some time. More recently, stream flows are "functioning" near normal. RWSA will continue to monitor the situation throughout the "dry season," but based on current conditions, staff suggests that the risk this year of a major drought on the scale that occurred in 2002 is probably "very, very slim."

Mr. Frederick then updated the Board on the following two items not included in his report:

- The water level at the Ragged Mountain Dam will be drawn down during the next few days as a "planned condition" in order to reduce the pool level for the hurricane season. Staff expects the level to be at 3 feet below normal pool elevation by July 1, 2010.

- He learned yesterday that the Soil & Water Conservation Board (SWCB) did meet on May 14, 2010. The Authority was not asked or invited to attend and speak at this meeting, although staff was prepared to do so. He understood that the Upper and Lower Ragged Mountain Dams were granted a six-month permit extension and was not aware of any discussion or deliberations that might have occurred about this extension. The information received suggests that SWCB had other higher priority items on the agenda that needed to be addressed at that time. Information received back from the staff level suggests that how the Soil & Water Conservation Board acts in November will probably depend upon the decisions made by this community between now and November.

## 4.0 Items from the Public

**Ms. Betty Mooney,** who resides at 201 Sunset Avenue, Charlottesville, VA, commented about the agenda item concerning the earthen dam that she felt was a new option based on her reading of the Freedom of Information Act (FOIA) material requested over the past six months. She then asked Schnabel to provide "examples of comparable earthen dams that [they] have designed and built in the mountains that have similar geographical conditions to ours." She next claimed that Gannett Fleming, the previous dam designers, were "fired – not because of the cost of the dam that they gave us, which was significantly higher when they re-estimated it – they were in fact praised by the dam experts who were hired by Rivanna for their work on designing the dam …" Ms. Mooney then alleged that Gannett Fleming informed RWSA that they could build "a cheaper dam," but they did not want to "take the risk of building that dam… if Rivanna will accept the risk of a cheaper dam - which might mean seepage from the dam - which might mean cost overruns – we'll build your dam." She next claimed that RWSA "refused to go along with that and that's why Gannett Fleming was fired." She wanted the community to understand that she believed Gannett Fleming was fired "because they wouldn't accept the risk of a cheaper dam." Ms. Mooney then alleged that an earthen dam was now being considered because "it's cheaper." She further stated that in the Board report it was estimated that 170,000 gallons of water loss per day would occur with an earthen dam, which she claimed was 2% of this community's daily water usage. She felt this number was high and wanted the Authority to obtain more information about the potential seepage from an earthen dam. Ms. Mooney next asked the following: "Who would accept the risk if that number doubled? Who is going to accept the risk in this report – the risk of the seepage of the cheaper dam – the risk of cost overruns …?" It was not clear to her from reading the report that enough of the proper kind of clay could be found on-site to make the earthen dam a cheaper option. She then claimed that you would need to go through "silty dirt" in order to reach the clay that is on-site. Ms. Mooney next asked: "Who is going to oversee and assure and take the risk that they might not be able to find that clay or the clay will become contaminated in the delicate process that will be needed to get to the clay?" She felt that this was "a huge factor [as to] whether this will actually cost less or not." She then referred to the use of the word "potential" throughout the report and asked for reassurance that the cost being provided is "actually the cost" and further questioned about who would assume the risk of overruns and the life span of this earthen dam. Ms. Mooney next claimed that "we're not going to need that full dam, which would require a pipeline to come to it – we're not going to need that for 50 years … we know the life span of the concrete dam that Gannett Fleming was suggesting … I'd like to know the life span of this type of dam."

Ms. Mooney next commented that she felt the pipeline study included on today's agenda "was nothing more than an opinion piece. There's no actual information or data in this report that any responsible decision maker could base a decision on, which would show you which pipeline would be more economical to build." She felt that "one piece" of helpful data not included in the report was the Authority's costly experience with the Meadow Creek Interceptor of having to renegotiate easements. She believed that the Sugar Hollow pipeline was similar and wanted to know the amount of money RWSA spent renegotiating the Meadow Creek Interceptor easements, which she felt would be helpful in seeing what might be "true" for Sugar Hollow, as a "factual piece of information."

**Dr. Liz Palmer**, who resides in Albemarle County, next commented that "for many in this community, the Schnabel report on the New Ragged Mountain Dam is a cause for celebration." She then wanted to remind everyone about "how we got there in the first place" and read the following statement:

"In August of 2008, Rivanna released a revised Gannett Fleming report on the New Ragged Mountain Dam, giving it about an $85 million price tag. Mr. Frederick and his staff immediately recognized that Gannett Fleming was proposing more dam than this community needed. They rejected the report and immediately brought in Schnabel for a second opinion and set about assembling a panel of design experts to review the options. Twenty long months later, we received [the] results of those efforts. Mr. Frederick and his staff's foresight, professionalism, and dedication will result in our community saving millions of dollars, so I want to thank them. Now that we have a price for the new dam that is less than the price previously approved by the 'four boards,' I urge all of you to move forward as soon as possible to take advantage of the current construction climate, and the antiquated infrastructure in the Ragged Mountain – Sugar Hollow system is not getting any younger and the old Ragged Mountain Dam is not getting any safer."

**Mr. Richard Lloyd,** who resides at 1825 Locust Shade in Albemarle County, next commented that he was "really confused," and he hoped that Schnabel would be able to address his concerns during their presentation. He then stated that in researching the cost for the dam Mr. Lloyd found that the permit application document states the cost for breaching the dam would be $15 million. He then noted that further in the report the costs for Ivy Creek trail replacement are added, as well as the $12.8 million for the 18-inch pipeline from Sugar Hollow to Ragged Mountain that would be parallel to the existing pipeline – "$195 a foot they say" – environmental mitigation, and a "host of other things." He claimed that he could find none of the costs he just listed in any other document. Noting the increasing cost for the dam that he has seen, which included a range beginning from $37 million to $90 million, Mr. Lloyd commented that he has not seen a breakdown of the cost for any of those numbers. He was particularly interested in the amount of increase from the $18.9 million that was listed in the permit application document, which included the cost for breaching the dam, but did not break out the cost for the pipeline and the mitigation plan. He then asked for clarification about the cost for the "Gannett Fleming expanded full-blown dam" and if it was the $90 million figure. Mr. Lloyd next stated that he did not know the total cost of the dam because he did not know what items were included in the "price makeup" and would like to know "what the history of the pricing of the scope of supply

that Gannett Fleming was quoting has been and what it is now so I can see [if] this dam [is] in fact cheaper or does it cost more."

As there were no further comments from the public, Mr. Gaffney closed this portion of the meeting.

## 5.0 Responses to Public Comments

Mr. Frederick stated that he did not have any immediate responses to some of the comments made today, but he felt that the representatives from Schnabel Engineering would more appropriately be able to address many of the technically related questions during their presentation later in the meeting on the "Preliminary Design for Ragged Mountain Dam."

## 6.0 Consent Agenda

Mr. Gaffney asked if there were any items that the Board members would like to pull for questions or further discussion from the Consent Agenda.

6a) Staff Report on Finance
6b) Staff Report on Operations
6c) Staff Report on On-going Projects
6d) Cooperative Procurement for Contracted Sanitary Sewer Rehabilitation Services
6e) Personnel Manual Changes
6f) Cafeteria Plan Restatement
6g) Bid Award: Landscaping for Meadow Creek and Schenks Branch Interceptor Easements

**Mr. Tucker moved that the Board of Directors vote to approve Consent Agenda Items 6a), b), c), d), e), f), and g), seconded by Mr. Norris. The motion was approved by a 7 - 0 vote.**

## 7.0 Other Business

In regards to **Item 7a), Public Hearing on FY 2010-11 Operating Budget,** Mr. Gaffney opened the public hearing at 3:31 p.m.

As there were no members of the public in attendance at the meeting who wanted to speak on the proposed RWSA FY 2010-11 operating budget, Mr. Gaffney closed the Public Hearing at 3:31 p.m.

In regards to **Item 7b), Adoption of FY 2010-11 Operating Budget, Mr. Boyd moved that the Board of Directors vote to approve the following resolution regarding the adoption of the Rivanna Water & Sewer Authority operating budget and related wholesale water and wastewater rates for FY 2011 to be effective July 1, 2010, seconded by Mr. Norris:**

**RESOLUTION**
**ADOPTION OF THE RIVANNA WATER AND SEWER AUTHORITY**
**BUDGET AND RELATED WATER AND WASTEWATER**
**RATES FOR FISCAL YEAR 2011**

**WHEREAS**, the Authority has advertised and held a public hearing on May 25, 2010, on the proposed Fiscal Year 2011 budget and related rates in accordance with Section 15.2-5136(G) of the Code of Virginia, as amended;

**THEREFORE, BE IT RESOLVED** that the Rivanna Water and Sewer Authority Board of Directors hereby adopt the accompanying rates schedule effective July 1, 2010, and the Fiscal Year 2011 budget as summarized in the attached table.

| **WATER RATES** | **WASTEWATER RATES** |
|---|---|
| Urban Area<br>City - $2.438/1000 gal.<br>ACSA - $3.305/1000 gal. | Urban Area<br>City - $2.878/1000 gal.<br>ACSA - $3.048/1000 gal. |
| Crozet Water- $50,712/monthly<br>Scottsville Water - $32,834/monthly | Glenmore Wastewater - $21,806/monthly<br>Scottsville Wastewater - $25,603/monthly |

**VOTE**

**AYES: Mr. Boyd, Mr. Gaffney, Mr. Jones, Ms. Mueller, Mr. Norris, Mr. O'Connell, and Mr. Tucker**

**NAYS: None**

**ABSENT DURING VOTE: None**

**ABSENT DURING MEETING: None**

In regards to **Item 7c), Report and Presentation: Preliminary design for Ragged Mountain Dam,** Mr. Frederick introduced Mr. Randall Bass, Project Manager and Principal with Schnabel Engineering's Georgia office, and Mr. Christopher Webster, Contract Administrator and Principal with Schnabel Engineering's Charlottesville office, who will present their report using a PowerPoint® presentation.

Mr. Webster began the presentation by referring to a slide that showed a photograph of the Lower Ragged Mountain Dam, also known as Mayo's Rock Dam, which was constructed in 1908 and is immediately upstream of the proposed new dam site.

Mr. Webster next discussed the graph illustrating the present and proposed Ragged Mountain Dam elevation and storage capacity. The current dam elevation is at 641 feet with 1,625 acre-feet storage capacity. The proposed New Ragged Mountain Dam would increase the height to 686 feet with 7,850 acre-feet storage capacity, resulting in a 4 ½ fold increase in the existing storage capacity. There has been some discussion with constructing a shorter height dam, such as only 13 feet higher than the existing dam. Mr. Webster noted that constructing the dam to 13

feet higher would add 60% to the existing storage capacity at Ragged Mountain, compared to the 4 ½ fold increase by raising the pool 45 feet.

Mr. Webster then explained that Schnabel's preliminary design services consist of three components. The first one involved looking at the roller compacted concrete (RCC) dam design, as was initially considered, and the feasibility of using rock excavated from on-site that could be potentially crushed and used as aggregate for the dam. This process would reduce the amount of traffic on Reservoir Road. A geotechnical investigation was conducted at suitable locations within the proposed reservoir, which included several test borings and geophysical methods. Instead of shallow rock, Schnabel found more soil at the site. The soil overlying the rock is on average about 40 feet deep and in some areas up to 80 feet deep. Using that data, Schnabel looked at whether an earthen dam could be designed and constructed instead of a concrete dam because they felt there could be some cost savings with that approach. Mr. Webster then referred to the slide that pictured a typical RCC gravity dam and also a typical earthfill dam. He noted that there were several earthfill dams throughout Virginia, one of which is Beaver Creek. Mr. Webster then turned this portion of the presentation over to Mr. Randall Bass who would discuss specific comparisons of the RCC dam section versus the earthfill dam section.

Mr. Bass first provided some background information about his experience in the dam field. He stated that in 1970's, then Governor Jimmy Carter initiated a safe dam program in Georgia after there were several dam failures in the United States, and Mr. Bass managed that program for about seven years.

Mr. Bass then stated that the first RCC dam was built around 1980 and explained that an RCC dam is "nothing more than a concrete gravity dam" built by a different method. Earthfill dams have been in existence for a long time. The National Inventory of Dams maintained by the U.S. Army Corps of Engineers lists about 80,000 dams throughout the United States that are typically above 25 feet. About 90% of those dams are earthfill dams because it is cheaper to move dirt when available than to place concrete. RCC dams are suitable for certain situations and Gannett Fleming looked at the feasibility of constructing one at the Ragged Mountain Reservoir site. Favorable conditions for constructing an RCC dam include shallow rock and if there is a large spillway requirement. He then referred to the photograph showing that a spillway could be placed over an RCC dam. For an earthfill dam, if there is a large drainage area and large spillway, a large concrete chute spillway would be needed. In summary, an RCC dam "comes into play" as being an economical choice where there is shallow rock and a large spillway, and an earthfill dam is the more economical choice when there is limited shallow rock and a small spillway. Rock is limited in shallow areas for "borrow" at the Ragged Mountain Site, and the spillway component is small.

Mr. Bass next commented that Schnabel's first task was to do a preliminary design of an RCC dam, which involved improving upon the data compiled by Gannett Fleming (GF). However, when they began to search for on-site aggregate, less rock and more soil were found. Laboratory tests on the quality of the soil found that there was enough soil of suitable quality to build an earthfill dam. At a meeting with RWSA staff, Schnabel communicated that they felt an earthfill dam was best suited for the Ragged Mountain site. Schnabel then met with the ITRT concerning

some preliminary information on the earthfill dam recommendation, and the ITRT concurred with proceeding with this approach in the preliminary design work.

Mr. Bass then referred to the drawings of a typical RCC dam design that was provided by GF. All gravity RCC dams have a vertical upstream face and a 0.8H:1V step downstream face, and about 90% of RCC dams look like the one drawn on the current slide. Concerning the upstream facing, the waterproofing consists of a precast panel with a geomembrane liner, which keeps the water from going through the concrete joints. The concrete is placed in 1-foot lifts, which meant that a joint was placed through every foot of the dam. As an example, a 130-foot high dam would have 129 joints. The geo-membrane liner is an expensive process, but it is an important component as the waterproofing limits the water migrating through the dam.

Mr. Bass then noted that both dam types have grout curtains, which involve drilling holes into the ground and injecting a cement grout to fill any fractures in the rock. Because the footprint for this RCC dam design is only approximately 100 feet wide, the water from the river has a fairly short travel distance to go under the dam, increasing water pressure that could lift the dam. The estimated cost for a grout curtain is about $3.5 million. For an earthfill dam with a footprint of about 700 feet wide, a grout curtain does not need to be "quite as robust" because of the length that the water needs to travel. It is important to limit the amount of river water that is just going downstream due to seepage. The RCC dam will not leak very much with the membrane facing. The earthfill dam with the clay core will also not leak through the dam a great deal, and if there is any seepage, it will occur in the foundation since there are portions of the foundation that have fractures. He summarized that there is not much difference in the seepage rates between the RCC dam and the earthfill dam.

Mr. Bass next referred to GF's RCC Dam Plan View with an overflow spillway. GF had a concern with water leaking around the abutment at the end of the dam. GF proposed excavating that area and putting in concrete and backfilling it up with soil, which was estimated to cost about $6 million. An extensive grouting program would be required with an earthfill dam because there is some highly fractured rock down under the surface. To run a grout curtain under the dam and under the abutment would cost about $3.5 million. The intent is to reduce seepage to an appropriate amount that RWSA "could live with."

Mr. Bass then stated that Schnabel eliminated the core walls from GF's design and raised the foundation a little bit. GF had in their design the removal of about 30 feet of good rock to get down to some soil seams that were about a foot to three foot thick. Schnabel felt that those seams could be treated without removing 30 feet of good rock, because it becomes very expensive to put 30 feet of concrete into the area where the 30 feet of rock is removed. The ITRT included Mr. Donald Bruce, a world known grouting consultant, who agreed that a few million could be saved by treating those seams. Mr. Bass noted that the Schnabel estimate for an RCC dam listed in the "Alternative Evaluation" slide is actually several million dollars lower than what was submitted to RWSA as part of their previous value engineering study of GF's dam design work.

Mr. Bass next commented that Schnabel did not recommend the earthfill dam because it was "cheaper." Earthfill dams are built worldwide, some of which are 500 to 600 feet high.

Virginia's National Inventory of Dam lists about 30 earthfill dams in Virginia over 100 feet high. Careful design is required for both types of dams. Due to RCC dams being narrow and heavy, the foundation needs to be able to support that structure. With an earthfill dam, the stresses are spread out because soil is lighter than concrete. However, there are concerns about seepage carrying material out of the dam, which is called "piping." Mr. Bass then discussed dam failures involving both an earthfill dam and an RCC dam. The Teton Dam in Idaho was an earthen dam that was designed by the Bureau of Reclamation in the1970s. The dam was approximately 300 feet high and failed the first time it was filled due to a design flaw. The St. Francis Dam located in Los Angeles was a RCC dam over 100 feet high that also failed during the first filling. To ensure the safety of the dam, the structure must be properly designed and constructed and instruments in place that monitor water pressure and water movement.

Mr. Bass then pointed out on the currently viewed slide the potential soil borrow areas on the west and east side of the proposed Ragged Mountain Dam site, which will be the source for the majority of the material used for the dam's shell and the clay core material. The outlines of the areas shaded in green are the limits of the soil borrow areas, and he noted that there is over 1.5 million yards of available on-site soil for an earthen dam. The yellow-shaded areas illustrate the material located above the new normal pool, which would require the removal of about 7.5 acres of additional trees to remove the soil. He noted another area where there was the potential of having to remove about 2.4 acres of trees. The blue line reflects the new reservoir boundary.

Mr. Bass next discussed the series of slides that illustrated different sections of an earthfill dam. The currently viewed slide showed what is called a "zoned embankment." He explained that earthfill dams are either "homogeneous, which meant that the dam is built entirely out of the same soil, or the dam is zoned with the finer material in the center and the coarser grain material used for the dam shell, which is the downstream slope and the upstream slope. The drawing shows the old dam that will be left in place, and part of the upstream slope will rest on the lower portion of the soil buttress. The stability analyses conducted by Schnabel showed that the new dam would be safe and would not push the old dam over into the reservoir.

Mr. Bass then pointed out the grout curtain that is located under the center of the dam, which "ties into what we call the center core of the dam." At this time, the grout curtain will be around 120 to 130 feet deep as part of the preliminary design, but could be modified as the design work progresses. He reiterated that the sandy material is used in the dam's shell to allow for drainage of the water, and the clay soil is used for the core of the dam. Schnabel had identified areas containing sandy clay with fairly low permeability that can be used for the dam's core, a secondary core will be constructed out of the finer silty sand. The yellow-shaded area indicates the internal drainage section. Mr. Bass noted again that "all dams will leak water." Even with a clay core, water over a long period of time will migrate into the internal sand filter, go under the dam, and drain through a pipe where the flow can be measured and monitored. As the reservoir level goes up, the seepage rate will also increase slightly. The seepage should always be clear, and if the water is murky, then material is coming out of the dam, which is a matter of concern. Instrumentation and visual monitoring are important components to ensure the safe operation of a dam. Mr. Bass added that even with a grout curtain, every fracture in the rock is probably not going to be grouted unless "you make Swiss cheese out of the rock" prior to the grouting process.

Schnabel's model study showed that most of the seepage would still come through the foundation with a small amount going through the dam into the drainage system.

Mr. Bass next commented that ITRT recommended that Schnabel expand the limits of the "blanket drain," which is "basically in the valley below the dam − it's a combination of sand and gravel − so any water coming out of the foundation, gets into the filter and then drains out of the dam." The downstream shell should not get saturated, since it needs to stay "perfectly dry" in order to remain stable. If the slopes get saturated, they will tend to "slough off." A "fairly extensive blanket drain" is being proposed to go underneath the foundation to ensure that any seepage is collected and properly discharged. When the reservoir is at "full pool", the old dam is completely submerged. "…Other than grouting up the existing 18-inch pipe, the [old dam] will be left intact."

Mr. Bass then discussed the slide that listed a cost comparison of the two alternative dam types. The RCC dam would require 126,000 cubic yards or about 200 tons of aggregate, which equates to about 15,000 truckloads from a quarry. By using the on-site soil with an earthfill dam, most of the truck traffic will be eliminated. There is about 15,000 cubic yards of "conventional" concrete needed for an RCC dam's spillways and facings. Other costs associated with an RCC dam include excavation of soil and rock − $1.1 million, facing panels − $3 million, and grouting − $3.4 million. The total estimated cost with a 20% factor is $50,900,000. The estimate Schnabel provided to RWSA from their previous value engineering study he believed was around $58 million. When Schnabel removed the core wall and raised the foundation, the cost was reduced by $7 million.

Mr. Bass then addressed the costs associated with an earthfill dam as follows: 658,500 cubic yards of fill material would be required; 4,900 cubic yards of concrete is needed for a tunnel and retaining walls; grouting − $3,225,000; tunnel excavation − $1.4 million; rock excavation for the emergency spillway −$975,000. The total estimated cost with 20% factor is $29,533,000.

Mr. Bass next stated that one of the "pros" for an earthfill dam involves less traffic on Reservoir Drive. Unlike the limited pool associated with contractors who specialize in building RCC dams, there is the possibility of contracting with a local firm to build an earthfill dam. There are less foundation concerns with a broader footprint. With an RCC dam, the aggregate needs to be supplied from an off-site source, stockpiled ahead of time, and a place identified for the RCC mixing plant. Schnabel had looked at using Camp Holiday Trail for this operation but that would require obtaining permission from that organization in order to use their facilities. All the staging areas for an earthfill dam would occur in the reservoir area where the borrow sites are located. The construction costs of an earthfill dam would be substantially less than for an RCC dam.

Mr. Bass then addressed the "cons" associated with an earthfill dam. A small amount of land would need to be purchased at the "toe" of the dam, which impacts about .5 acres of the Camp Holiday Trails property. An additional 13 acres of trees would need to be removed. An earthfill dam would take an additional four to five months longer to construct than an RCC dam due to impacts from wet weather events. Since the "toe of the dam" extends downstream because of the 700-foot footprint, there would be an additional 360 feet of stream impacts, which is about 3%

greater than what was originally permitted. The permit would need to be modified to include the additional stream impacts. An additional bridge would need to be built in order to access the isolated inlet/outlet (I/O) controls situated in the reservoir versus the I/O controls being located right up against the face of an RCC dam.

Mr. Bass next stated that after the estimated costs were developed for both the RCC dam and the earthfill dam, this data was shared with the ITRT and RWSA staff. The decision was then made to proceed with the preliminary design for an earthfill dam, which entailed more field work, a little more office analysis, and a new cost estimate in order to obtain additional field information and refine the design. During this process, the cost of some items increased while others decreased. The cost increases from the "Alternatives Assessment Estimate" include the following:

- Selection of Tunnel Spillway $400,000
- Expansion of Internal Drains $550,000
- Drilling and Grouting $480,000
- Water Control $ 50,000
- Reservoir Clearing $ 70,000
- Gates and Valves (includes 2 gates) $222,000

Mr. Bass then addressed the cost decreases from the "Alternatives Assessment Estimates" as follows:

- Modifications to existing dams (Lower Dam will not be modified and good material recycled into new dam) $ 450,000
- Unit prices to earthworks (favorable bidding environment) $ 718,000
- Deletion of temporary 18" raw water line (water diverted thru tunnel) $1,716,000
- Shortening of 36" water line downstream $ 997,420
- Mobilization, Bond and Insurance (equates with cost decreases) $ 280,000
- Conventional Concrete $ 225,000
- Camp Holiday Trail Impacts (no longer proposing this land use) $ 250,000

Mr. Bass next discussed the addition of the tunnel to the preliminary design cost estimates. He stated that almost every earthfill dam has pipes throughout the structure, which is the "weakest point of an earthfill dam." Schnabel then looked at the rock profile at the site using the data from previous borings done by GF, as well as conducting some additional geophysical work Referring to the currently viewed slide, he commented that the "heavy line" is Schnabel's estimate as to where they believe is the top of the rock. There would need to be at least "a tunnel diameter over your tunnel to be able to drill and blast rather than [the debris] falling in on you." Schnabel bought a tunneling firm three or four years ago and uses their expertise to develop pricing and tunnel design. The tunnel is "horseshoe shaped" about 10 feet wide and 6 feet high that is drilled and blasted to a length of about 550 feet. An access shaft would be used to enter the tunnel. He then pointed out the location of the I/O tower that allows the withdrawal of water from various levels of the reservoir. A 36" pressure pipe would be located within that tunnel positioned up on "little cradles," which would carry water to the Observatory plant.

Mr. Bass then addressed the question about the life span of a RCC dam and an earthfill dam, which he felt were "about the same." The soil does not disintegrate in 100 years, and the concrete might show some wear, but it does not "tear up" in 100 years. The "ancillary components" of a dam are the items of potential concern, such as gates, pipes, and handrails that will rust and corrode. He believed that both types of dams would last over 100 years if they are designed, constructed, and maintained properly. The tunnel expands the life of the dam since the pressure pipe is accessible for replacement and repair work as opposed to being buried under the structure.

Mr. Bass next stated that the reservoir would need to be pulled down 20 feet during construction of the earthfill dam in order to build the I/O riser under dry conditions and also to be able to retrieve the borrow material.

Mr. Bass then noted that security is an important component with a dam's operation. If a terrorist act was responsible for "blowing up" the 36" pressure pipe in an earthfill dam, water from the pipe would be lost but not the dam itself. Schnabel felt that locating the pipe away from the dam makes the dam safer from those types of threats.

Mr. Bass next commented that since Ragged Mountain is a "high hazard dam," the design needed to pass what is called "the probable maximum precipitation," which is 38 inches of rain in 24 hours. Since it is only a 2 square mile basin, there is not a "huge amount of runoff;" however, a large body of water is formed with that much rainfall. The I/O riser will handle up to a 500-year storm, which involves the water rising 3 feet and running through the tunnel into the "plunge pool." Anything greater than a 500-year storm goes through a "rock emergency spillway." There would be some erosion during a 1,000-year storm to surficial soil below the spillway, but the spillway itself would be safe.

Mr. Bass then stated that the earthfill dam is about 2 ½ feet higher than what was proposed for the RCC dam because it needs to be designed for "wave action." Dam height is referred to as "hydraulic height" and a "structural height." A "hydraulic height" consists of the bottom of the lake to the top of the dam. The "structural height" refers to the bottom of the foundation to the top of the dam, so the "structural height" is always going to be higher than the "hydraulic height."

Mr. Bass next commented that Schnabel decided to provide a cost estimate range of +20% and -10% for both the construction and engineering work. The minus range was being presented due to the current favorable bidding environment, and the "plus 20" was also provided in the event there was a future inflationary increase. The ranges for construction are $20,285,000 (-10%) to $27,046,000 (+20%) and for engineering, $3,700,000 (-10%) to $4,059,000 (+20%).
Mr. Webster then provided some additional comments about the cost aspect of the earthen dam project. When the earthfill dam was first considered by Schnabel, there was about 850,000 cubic yards of soil needed for construction of this dam. Schnabel felt that at least 1 million cubic yards of soil would need to be available on-site to make it a feasible option, which their subsequent investigation found was the case. Then based on the test results on the retrieved soils, Schnabel further refined the design by "steeping up the slopes" of the earthfill dam so that the amount of soil needed was under 700,000 cubic yards. Their investigation also showed that "especially on

the more western peninsula" there is excess soil, so there is over 1 million cubic yards of available soil on-site. The amount of clay material is more limited. The sandy clay is found typically within four to five feet of the surface, which would need to be separated by the contractor and stockpiled. Schnabel talked to the contractors and discussed the various options related to separating soils and what the cost impacts would be if there was a need to truck additional clay onto the site. All these factors were taken into account when developing those cost ranges.

As this concluded Schnabel's presentation, the floor was opened to questions from the Board.

Mr. O'Connell asked if the Authority could provide a breakdown of construction costs versus total project cost in comparison to what the cost was for this project several years ago. Mr. Frederick replied that not all the studies are completed, which include the Dredging Feasibility Study and the I-64 Embankment Study. Mr. Brian Wheeler with Charlottesville Tomorrow requested last week if the Authority could provide Mr. Wheeler some number "in context" for a report. RWSA's consultant on the I-64 Embankment project is felt to be far enough along in the study that it is believed the estimate would range between $1.5 million to $2.3 million, which is the Authority's "best guess" since the study has not yet been completed. RWSA's current budget for the Mitigation Plan is $3.3 million. Schnabel included their engineering fees with the estimated cost for the Ragged Mountain Dam. The total for all those items range between $28 million to $36 million, which is within the cost estimate published in 2006. Mr. Frederick felt to some degree "this was a coincidence [because] 2010 dollars are not the same as 2006 dollars." To put the figures into "some context," the project cost estimates might be lower than what was reported in 2006. Mr. O'Connell next commented that he believed the estimated cost when the Community Water Supply Plan was considered and adopted was $37 million and inquired if that figure was correct. Mr. Frederick replied that $37 million was the cost estimate in 2006 dollars. Mr. O'Connell then noted that there was a potential for less cost due to the current favorable construction market. Mr. Frederick concurred and commented that over time numbers and estimates were going to change no matter what alternative was being considered because "estimates are designed to reflect the economy of the construction market at the time the estimates are prepared." As Schnabel just pointed out, the construction market is highly favorable at this time and most people believe that this climate will continue for a few more months. There is uncertainty about how long the favorable climate will continue after that time. There is the possibility that delaying decisions could become more costly.

Mr. Gaffney next questioned about the height of the Beaver Creek Dam. Ms. Jennifer Whitaker replied that she believed that the dam's height was in the 50 to 60 feet range.

Mr. O'Connell then asked if Schnabel could provide some examples of similarly sized earthfill dams for a comparison basis. Mr. Bass stated that he was aware of 30 in Virginia that were over 100 feet tall or more and a 70 to 80 foot earthfill dam on the Townsend Lake in Tennessee. He believed that the majority of earthfill dams are below 60 feet nationwide with the maximum height of around 300 feet. Mr. Gaffney next requested that Schnabel provide a list of earthfill dams over 100 feet in Virginia, as well as throughout the United States. Mr. Webster replied that Schnabel would be glad to provide that list.

Mr. Norris then asked if it was "safe" to assume that "the storage capacity of the reservoir will increase over existing projections given that we are excavating a lot more soil than we expected and the dam is a little bit higher than we expected …" Mr. Bass replied that only about 600,000 cubic yards of material is going to be excavated out of the reservoir and part of that soil will be used for the upstream slope. There was probably about 200 to 250 cubic yards of soil that will remain completely out of the reservoir. Mr. Bass then commented that Mr. Norris's statement was correct in that there would be about 158 acre feet or so of storage capacity that would be gained with the removal of soil. The normal pool of the dam would not be raised, so raising the height of the dam by 2.5 feet would not increase the storage capacity. Mr. Frederick added that the top of the dam is slightly higher than the pool because the objective is to never overtop an earthen dam. Mr. Bass then stated that an earthfill dam is also set higher due to the wave action.

As a follow-up to Mr. Norris's question, Mr. O'Connell inquired about the amount that storage capacity would be increased by the excavation process. Mr. Bass replied that there would be a slight increase in storage capacity. Mr. Frederick also stated that there is actually a loss of storage capacity where the slope of the earthfill dam backs up against the existing dam. Schnabel agreed to calculate the numbers in order to get a net figure on the potential storage capacity increase.

Mr. Norris next questioned if it would be "safe to say" that since Schnabel's plan "integrates" the existing dam, the implication is that the existing dam is "fairly sound structurally." Mr. Webster stated that he wanted to "back up for an illustration because there is a difference." Referring to the currently viewed schematic, the new earth that is going to be placed over the new dam will be used on the furthest upstream slope and go on top of the earth buttress and not the concrete section of the existing dam. "The brunt of the new dam is resting on sound rocks and sound foundation with only the toe resting against the existing structure … [resulting in] much lower stress." This was a different situation than if you built directly on top of a new dam, such as a concrete structure. There is documentation available that indicates the condition of the existing structure, as well as some of the "inadequacies." He was also aware that the City is looking at hiring a consultant to further study that issue.

Mr. O'Connell then asked if the "little point" on the schematic discussed above was related to the dam's design. Mr. Bass stated that "point" reflected the positioning of the new dam over the existing structure. This design places some stress on the existing dam, but the stress would have been greater if the new dam was raised to a higher level over the old dam. Schnabel conducted a stability analysis based on GF's parameter about whether the existing dam would fall into the reservoir if the reservoir was completely drained. Schnabel found that the dam did meet the safety standards under this scenario. Mr. O'Connell next inquired if the primary purpose of not eliminating the old dam was to assist with the construction work. Mr. Bass responded that when you draw down the reservoir 20 feet during construction, the old dam serves as a "caulking band." One of the highest risks for a contractor building a dam is to control the water. Drawing down the water level during the construction allows any rainfall to be stored in the old dam and reduces the risk for the work site to become inundated, as well as allowing the removal of soil from the borrow areas.

Mr. Tucker next inquired about the construction time table between the RCC dam and the earthfill dam. Mr. Bass stated that an RCC dam requires access to the site 24 hours a day once construction begins, and there is typically a 12- to 13-month time line from start to finish of the project. An earthfill dam would add four or five months to the construction schedule for an earthfill dam. The best time to construct an RCC dam is during the winter, but for an earthfill dam during the summer when it is dry since wet weather will slow down the process. Mr. O'Connell then asked if an earthfill dam's construction schedule is about 1-1/2 years from start to finish, and Mr. Bass indicated that it was an approximate schedule. Mr. Webster added that an advantage with an earthfill dam is that it can be constructed during the normal working hours, so the impact to surrounding landowners and community is much less because it is not a continuous operation. Mr. O'Connell also questioned about the engineering schedule to get a better sense of project time lines once a decision is made about the Community Water Supply Plan's future direction. Mr. Bass stated that completion of the final design will take approximately seven months. Mr. Frederick next stated that the Authority determined during its analysis a few months ago that if final design was authorized by August 2010, the project could be completed by the fall of 2013. At that time a decision had not been made to proceed with an earthfill dam. If four or five months are added to the schedule as just discussed by Mr. Bass, it could mean a completion date the end of 2013 or the early part of 2014 when all the work is completed. Mr. Frederick also felt that the dam could go above the 641 elevation much earlier in the construction phase when looked at from the perspective of removing the dam safety issue with the existing dam. Mr. Bass added that we would then be able to fill the reservoir back to its normal pool level.

Mr. Norris next commented that Schnabel "came across" during their oral presentation as more confident than in their written report about the availability of soil on-site. He then asked them to comment further on Schnabel's confidence level of finding sufficient on-site soil. Mr. Webster stated that there are two types of soil needed for the earthfill dam. The sandier, silty soils would be used for the shell, which are found throughout the site as indicated by the borings done by Schnabel. The potential for the presence of boulders as well as a rock surface below them that could have some "tentacles" between their borings was considered when Schnabel prepared their soil estimates. They also "ignored" some areas that could potentially bring large quantities of that type of soil. The soils that are more clay-like are present but not "in abundance" at the site and are typically five feet from the surface. The process of separating and stockpiling the material was included in the cost estimates, as well as the possibility that due to some unexpected conditions there is insufficient amount of clay material for the dam's core. Several contractors were interviewed throughout Virginia about prices for hauling in clay from an off-site source, which were included in the estimate ranges.

Mr. Norris next asked if the loss of an additional 13 acres of trees would impact the current mitigation plan. Mr. Frederick replied that the earlier RCC dam proposal would remove 140 acres of trees and plant 200 acres of trees as part of the mitigation area. Adding 13 acres to 140 acres that would still be below the acreage that the Authority will be planting in new forest. Mr. Webster further stated that with the expanded footprint of the earthfill dam, there would be additional impact to just over 300 feet of streams downstream of the dam versus the RCC dam option. DEQ and the U.S. Army Corps of Engineers are aware of those stream impacts.

Mr. Frederick added that after reviewing the mitigation plan in terms of the credits that the Authority was receiving for stream and wetland restoration, it was determined that the additional environmental impacts are covered under the current mitigation plan.

Mr. O'Connell then inquired about the date for a public meeting on the new Ragged Mountain Dam project. Mr. Frederick stated that the public meeting is scheduled for 6:00 p.m. on June 1, 2010 at CitySpace. Mr. Tucker next asked if the presentation at the public meeting would basically be the same as the one presented today. Mr. Webster state that it would be very similar but would also include the "flyover" done by Charlottesville Tomorrow and representative samples of rock cores and some soil samples for each of the zones shown on the slides. Mr. O'Connell then asked if it would be possible during the presentation to provide some examples of localities that have comparable earthfill dams. Mr. Webster replied that those examples could be included in Schnabel's June 1 presentation.

Mr. O'Connell next asked about the next steps in this process. Mr. Frederick stated that there were two more studies that are going to be completed within the next four to six weeks. He believed the suggestion was made that the "four boards" meet sometime during the summer to discuss this issue further. There had been no set plan devised on the format for this discussion, but he felt this Board could initiate the process with the other Boards. Mr. O'Connell then inquired if the follow-up studies would be presented at the July Board meeting. Mr. Frederick replied that this Board would have all the information from the studies developed through the "four boards' process by July. The review of the 2004 demand analysis was just requested last month, which will probably be completed a little later, and he was uncertain as to when the City's study would be completed. Ms. Mueller commented that the City was still in the process of finalizing the study's schedule.

Mr. Jones then questioned how the June 1 meeting was being publicized. Mr. Frederick stated that the Authority has sent an e-mail to members of the public who have expressed an interest in receiving e-mail updates about this project. RWSA works through the City Cable, as well as all the media, issued a press release, and posted the meeting information on the Authority's website. Staff will see if *The Daily Progress* will list this meeting on their community calendar.

Mr. Frederick next asked the Schnabel representatives to address some earlier public comments about any seepage concerns and the life span of an earthfill dam. Mr. Bass replied that as engineers they developed a two-tiered model of the geology of the dam and what is underneath the dam. Typically, when permeability values are run in the laboratory for the soil, the most conservative numbers are used. The seepage rates that are calculated using those models are generally less than when the dam was built. The seepage rate that he was referencing is 118 gallons a minute, which is not a "huge volume of water in terms of this size of dam." The seepage rate for an RCC would be the same, since both dam types would have the same foundation condition. The higher the dam, the more seepage would occur due to the increased pressure. The minimum release requirement for the Authority is 18 gallons per minute, which an earthfill dam would exceed. There is an elaborate collection seepage system that would carry at least 50 times that seepage amount. As mentioned earlier in their presentation about the life span of the dam, the earthfill dam will be around "for a very long time" if it is properly maintained. It will deteriorate over time, as will any concrete structure. Due to improvements in the

composition of concrete mixes, concrete dams will also "be around for a very long time." The life span of an earthfill dam is over 100 years, but at some point the gates and pipeline will probably need to be replaced. The seepage system is also "overdesigned" to handle any slow clogging that could occur over time. Mr. Webster next added that their analysis showed that most of that seepage was going through the dam's foundation through the fractured rock that will be grouted. Schnabel also made some very conservative assumptions as to the seepage values. When the permeability values were input related to the earth section of the dam, it was assumed that the dam would be more of a "homogeneous" type of structure, which meant that there would be a minimal amount of clay available on-site. If more clay was available and the grouting program is effective as believed and budgeted for, then it was felt that the seepage would be less than stated today. Mr. Tucker then questioned if the clay would be used for the core section of the dam, and Mr. Webster affirmatively replied. Mr. Webster next referred to the currently viewed slide and noted that the dark brown section is the area where the clay was found, but not in an extensive amount. When Schnabel conducted the modeling, it was assumed that the seepage rates in that area would be higher but it could be much less. The "intermediate layer" consists of more silty soil, which meant more fine grained material but not as "plastic." Mr. Bass next commented that "very seldom can you build a large dam homogeneously." It is usually done using a "zoned embankment" method. This option costs a little more because the contractor needs to keep the sections separated, but it reduces the seepage rates.

As there were no further questions or discussion by the Board, Schnabel concluded its presentation.

In regards to **Item 7d), The "Pros and Cons" of the Three Pipelines,** Mr. Frederick suggested that due to the length of the meeting the discussion on this item be deferred until the June meeting. Mr. O'Connell then asked the other Board members if there were any objections to deferring this item until June. Mr. Norris was in agreement with deferring this item and also expressed agreement with a previous speaker who requested additional concrete information on the projected easement costs and the legal status of those easements. Mr. Frederick replied that when the Authority was requested to conduct this report by the "four boards," there was extensive discussion about whether RWSA should hire consultants to evaluate, collect data and do a quantitative analysis. The decision of the "four boards" was for the Authority to just use its judgment on existing data, which was being provided today. If the decision now is to gather more quantitative information, then more money will be needed to hire a consultant.
Mr. Gaffney then asked Mr. Krueger if he could give an opinion based on the Authority's experience with Meadow Creek easement process. Mr. Krueger responded that he could approach the request in two ways. First, "the cost of the easements is more than just what [the Authority] would pay a landowner." It would also include what we would pay a company to negotiate them. Since Mr. Krueger does not handle the negotiations, RWSA contracts with KDR Real Estate Services to provide that service, which involves staff time during this process. The legal analysis is a small part of the cost, and what is actually paid to the landowners after agreement is reached is also not a "huge part of the cost." Concerning a legal analysis, it would require a closed session as there would "theoretically" be negotiations with some of the landowners. As pointed out in the Board report, "above and beyond" just negotiating with people with whom we will need to modify existing easements, because the pipeline would not necessarily follow the same contour or path that it has now because of the way it is laid and

stream erosion, we would also be negotiating for new easements. He reiterated that he felt it was not appropriate to provide a legal analysis since it is part of the negotiations with the landowners. Mr. Krueger also noted that the existing easements are older than the Meadow Creek easements.

Mr. Norris next commented that he was trying to determine whether the easements would have to be renewed or whether the Authority could utilize its existing rights to go in and replace the pipeline. Mr. Krueger commented that the question does not concern renewing an easement. The three basic issues with these easements are "what are the rights under these 1920 drafted easements in terms of what we can put in, construction width, and access easements to get in there to do the construction." Most of those items are not explicitly stated with older easements, so "the width is implied by what you are using it for and we don't have temporary construction easements beyond that width to lay any of this," and depending on what the terrain is and what equipment we would have to get in we may need access easements. The combination of those three items needs to be looked at for each property to determine if "the language from the 1920 document does give us those rights to be able to do that."

Mr. Gaffney then asked if it would be possible to use what the Authority went through with the Meadow Creek project, which were 1950 easements, and project it onto some of the language of the 1920 documents and say, "this is the trouble we had with Meadow Creek, and Ragged Mountain is going to be more difficult?" Mr. Krueger affirmatively responded but added that it would be difficult for him "to put a dollar figure on that." Mr. Gaffney next inquired if a dollar figure could be obtained on the Meadow Creek easements. Mr. Frederick stated that the Authority could provide the cost for the Meadow Creek easements. The Sugar Hollow easements are older and less specific than the Meadow Creek Interceptor easements. He felt "you could draw your own judgment what that probably means in terms of the effort. Land patterns and land use development change over time." Meetings were held with some of the property owners along the existing Sugar Hollow route who had built structures and "encroached on the pipeline." He felt that you would not ask the property owners to remove the buildings in order to install a pipeline in the same location. The creeks have shifted over time as well. A few years ago the Authority had to make a fairly lengthy repair on a section of the Sugar Hollow pipeline because the creek had moved, and through the erosion of the creek, the section of the pipeline was exposed and in danger of collapsing. RWSA had the same experience with the Meadow Creek Interceptor. The objective at first was to stay in the same alignment as much as possible. In about 60% to 70% of the alignment the Authority was able to do that. However, there were places "where it just didn't make sense to hold to a strict rule [that] it's got to go in the same place again." Judgments were made based on surveys and the geotechnical study conducted during final design to place the pipeline "where it made the most sense today and not necessarily apply some ironclad rule that it has to go in exactly the same location." The Authority's judgment is that if you tried to replace the Sugar Hollow pipeline, "you will run into many of those same types of judgments to some degree or another." The Authority would need to go through the process before it can be determined how many of those judgments will be faced. He felt the Authority was being asked "to make guesses" and asked, "How accurate a number do you want and how much are you willing to pay to get an answer?" He further questioned about how critical the answer to this question is in making decisions about the water supply. He felt that much of the current debate he has been hearing suggests that "we do anything we want to do as long as we just make local decisions … we can set whatever criteria

we want; we can study whatever we want." During the water supply planning process, a "very well designed step-by-step process" was implemented in order to meet federal and state regulatory requirements. At some point if changes are made to the plan, "we're going to have to go back in front of those regulators and they're going to apply their criteria according to federal law and not our preferences." Mr. Frederick felt that depending on the criteria used to compare the three pipelines, any of the three pipelines can be favorable to that particular criterion. If one looks at the important criteria with respect to "the least environmentally damaging practicable alternative, I think it leads you to where we came up with the plan adopted."

Mr. Gaffney then stated that "we'll look forward to the 'pros and cons' of the pipeline at our next meeting." Mr. Norris next commented that "all I'm looking for is a simple chart which spells out the various kinds of complications without going into detail − even what you all just said about how when you are dealing with x number of easements that are x number of years old you run into these kinds of issues versus a new pipeline that has far fewer easements - without going into easement-to-easement detail. That's all I'm looking for. I'm trying to help us make a public case for why one alternative might be more preferable to the other." Mr. Boyd then asked if
Mr. Norris was asking for information about the obstacles and the process and not the costs, and Mr. Norris affirmatively replied. Mr. Frederick then stated that staff could provide a "general discussion along the lines of what you are asking for." Mr. Krueger added that "I think we know basically those numbers now."

## 8.0 Other Items from Board/Staff not on the Agenda

There were no other items from Board or staff not on the Agenda.

## 9.0 Closed Meeting

There was no need for a closed meeting.

## 10.0 Adjournment

**There being no further business, Mr. Tucker moved that the meeting be adjourned, seconded by Ms. Mueller All members present voted aye, and the meeting was adjourned at 4:45 p.m.**

Respectfully submitted,

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Mr. Robert W. Tucker, Jr.
Secretary-Treasurer