

**EASTERN VIRGINIA GROUNDWATER MANAGEMENT
ADVISORY COMMITTEE**

WORK GROUP #2B – TRADING

MEETING NOTES – MEETING #3 - FINAL

MONDAY, DECEMBER 14, 2015

9:00 A.M. – 12:30 P.M.

DEQ PIEDMONT REGIONAL OFFICE – TRAINING ROOM

Meeting Attendees

EVGMAC – WORKGROUP #2B	
Jamie Mitchell – Hampton Roads Sanitation District	Chris Pomeroy – Western Tidewater Water Authority - AquaLaw
Terry Blankenship – Aqua Virginia	Don Rice – Newport News Waterworks (Alternate for Ron Harris)
Eric Gregory – King George County	Kurt Stephenson – Virginia Tech
Lewie Lawrence – Middle Peninsula PDC	Shannon Varner – Troutman Sanders/Mission H2O
Britt McMillan – ARCADIS – Eastern Shore Groundwater Committee	Wilmer Stoneman – Virginia Farm Bureau
Sandi McNinch – VA Economic Development Partnership	

EVGMAC – WORKGROUP #2B – STATE AGENCIES	
Scott Kudlas – DEQ – Central Office	Bennett Ragnauth – VDH-ODW (Alternate for Susan Douglas)

NOTE: Workgroup Members NOT in attendance: Susan Douglas – VDH – ODW; Jeff Gregson – VA Well Drillers Association; Ron Harris – City of Newport News; Kara Hart – VA Economic Development Partnership; Dwayne Roadcap – VDH – OEHS

INTERESTED PARTIES ATTENDING MEETING	
Phil Abraham – VECTRE Corp./VACRE	Chris Gill – Christian & Barton
Jay Bernas - HRSD	Joe McMahon - JLARC
Jason Early – Consulting Hydrogeologist	Susan Stevens - DAA
Katie Frazier – VA Agribusiness Council	

SUPPORT STAFF ATTENDING MEETING	
Brandon Bull - DEQ	Bill Norris - DEQ
Craig Nicol - DEQ	Mark Rubin – VA Center for Consensus Building

1. Welcome & Introductions (Mark Rubin – Meeting Facilitator)

Mark Rubin, Executive Director of the Virginia Center for Consensus Building at VCU, opened the meeting and welcomed everyone.

He asked for introductions of those in attendance.

2. Review of Agenda; General Sense of the Process and Introductory Comments (Mark Rubin):

Mark Rubin reviewed the agenda for the meeting and the plan for conducting the meeting.

3. Workgroup Updates (Mark Rubin):

Mark provided a brief update on the activities of the Eastern Virginia Groundwater Management Advisory Committee and the EVGMAC Workgroups. He noted the following:

- Since the last meeting of this group there has been a meeting of the Advisory Committee – Thursday, November 19th;
- The other 2 Workgroups had meetings last week on Monday, December 7th;
- In the Alternative Management Structures Meeting (WG #2A) there was a lot of discussion about whether we needed to look at having sub-regions as a management concept – the general consensus was "No", but that there are geological regions that we need to take into consideration with any management approach – that concept is going to be fleshed out a great deal more in future meetings of the Workgroup;
- The other thing that was discussed during Workgroup #2A's last meeting was some information about Alabama where there is a 501 (c) (3) that has been put together that is a nonprofit organization that has been put together representing big users and representatives of lots of users who are involved with the planning and putting together of collaborative projects – this was another concept that the Workgroup members wanted to look more closely at in addition to the management structures we already have in place.
- In the Alternative Sources of Supply Workgroup (Workgroup #1) and also in the Alternative Management Structures Workgroup (Workgroup #2A) the general sense was that we need looking at an "integrated water system" approach. We should be looking at all sources of water in terms of putting together a system – groundwater; stormwater; surface water; and reclaimed water all need to be taken into consideration. This concept needs to be fleshed out considerable because it was just a concept that was introduced for consideration.
- The Workgroups are all doing what they need to do.
- The concept of trading did come up in both of the other Workgroups. There is a lot of overlap between the Workgroups especially in looking at Banking as it relates to Trading. There is a lot of interest in fleshing out this concept.
- The Alternative Sources of Supply Workgroup has started the process of narrowing down the list of possible alternatives and are starting at their next meeting to focus on the criteria for selection of alternative sources and the development of a matrix to evaluate these alternative sources.

4. Presentation – Variability of Impacts (Jason Early – Consulting Hydrogeologist):

Jason Early provided an overview of the Variability of Impacts to the Groundwater System – "How Groundwater Withdrawal Rates and Locations Affect Impacts to Virginia's Coastal Plain Aquifers"... His presentation included the following:

- DEQ's Groundwater Model: VAHydroGW:
 - Developed by US Geological Survey in 2009;
 - Uses the industry standard MODFLOW code;
 - Covers the entire VA Coastal Plain and adjacent areas in MD & NC;
 - Grid cells in most areas = 1 mi²;
 - Model layers range from 35 to 100 ft thick;
 - Transient = allows for evaluation of changes over time;
 - DEQ uses model to predict impacts of new GW withdrawals compared to baseline;
 - Baseline = impacts of all existing GW withdrawals, at their total permitted rates
- 80% Drawdown = 80% of Distance from Land Surface to Aquifer Top;
- Evaluating Potential Impacts of GW Withdrawals:
 - Run model under baseline scenario (without withdrawal in question) – 50 Years from present;
 - Run model with new or expanded withdrawal – 50 years from present;
 - Calculate Area of Impact (AOI) and Critical Cells
- Baseline Scenario – 2015 Total Permitted Withdrawals – Model predicts 1,746 critical cells in Potomac aquifer;
- The model was run with hypothetical withdrawal simulations using simulated pumping wells in Suffolk City; New Kent County and York County:
 - 1 MGD in York County – 1,803 critical cells – 57 new critical cells created;
 - 10 MGD in York County – 2,184 critical cells – 438 new critical cells created;
 - 1 MGD in New Kent County – 1,832 critical cells – 86 new critical cells created;
 - 10 MGD in New Kent County – 2,194 critical cells – 448 new critical cells created;
 - 1 MGD in Suffolk City – 1,784 critical cells – 38 new critical cells created; and
 - 10 MGD in Suffolk City – 2,064 critical cells – 318 new critical cells created
- What the Model Shows Us:
 - Effects of Groundwater withdrawals depend on the magnitude of the withdrawals (pumping rates);
 - Effects of Groundwater withdrawals depend on the location of the withdrawals (where the pumping wells are located in the aquifer system); &
 - Aquifers generally reach a critical state more quickly along the western part of the Coastal Plain where the aquifers are thinner than in the eastern part of the Coastal Plain, where the aquifers are thicker.

Discussions included the following:

- The further west the greater the impact of the pumping station/site.
- If you are further west you have more impacts.
- Easier to trade west to east then from east to west. The further away you get – the smaller the impact.
- We don't get a lot of requests for 10 mgd withdrawals but if we were to get requests for 10 – 1 mgd withdrawals in general the same area – the effect would essentially be the same. The model runs give you a sense of water availability in a geographic context without "trading".
- The baseline we are currently looking at is 116 mg for 50 years – continuous pumping – the reason that we are all here is that we want that 116 to be closer to 80; 70; 60 to extend the life of the aquifer.
- The model is actually running closer to 126 mg because it includes an estimate of the non permitted withdrawals.
- The impacts of the non permitted withdrawals have been raised in each of the workgroups.
- The actual estimated total withdrawals are closer to 169 mg when the Maryland and the North Carolina withdrawals are included.
- The question that seems to come up a lot is where are we in terms of the permit? What are our assumptions for the next 50 years? Is it much trouble to have a "cheat sheet" that identifies our starting points and the assumptions that we are working off of for the next 50 years? Permitted? Unpermitted? Growth assumptions? We need to have a common numerical basis to work from. It was noted that the only trouble is that the current scenarios that are being used in the model run are based on the total permitted use. We can use some of the information from the "water supply plans" to compile information on the growth estimates and the estimates of future water needs.

ACTION ITEM: Staff will look at developing a "cheat sheet" that would include the assumptions that we are going to be working off of over the next 50 years as a reference for the workgroup.

- Actual use is roughly about 1/2 the currently permitted amount.
- The assumption in the model is that everyone is pumping at their full permitted rate.
- The only growth factors that are taken into consideration in the current model runs are what are already built into the permits.
- The runs are done at a "fully permitted rate" because the permits do not stipulate when that total permitted amount will be withdrawn. When the permit is issued and it contains a growth factor of 20, it is assumed that you can pump that full amount at any time during the permit period.
- In the permitting process the growth factor is a negotiated value.
- Typically the issue is that the growth projections are done on a larger term than the permit is issued for. The permit is issued for what is anticipated to grow during the 10 year permit term instead of the longer planning horizon.

- Do we know the number of permittees who come back to DEQ for more water during their permit term? Can't think of any municipality that has come back in to request more water – but typically municipalities are more conservative in their estimates.
- Effectively there are "cushions" built into the permits. How do we account for those "cushions"? 50% seems to be a large number. Politically, how do we address the "cushion" in the numbers? Some of the built-in cushions for the models are to address the sources of error in the model. The thinking in the program has always been we need to try to account for the things that we don't know by being a little more conservative. We need to look at how we apply the current model to the existing conditions and anticipated future conditions. There is conservatism on both sides – in terms of how we use the "tool" and in how the projections are made.
- Does the model account for subsidence and loss of capacity? The model does not yet account for subsidence or the loss of capacity. There are some model components that might be used to provide for this information but there is a problem with sufficient information for calibration of the model. We do not have a lot of actual measurements regarding subsidence. It appears that in most cases the model runs are indicating a lot more subsidence than is actually occurring, which is probably the result of a very small data set to calibrate to. We basically only have two subsidence points that contain 20 years of data. There are some serious challenges with coming up with a good planning scenario to obtain this type of information.
- Are "recharge rates" included in the model? The model does include estimates of "recharge". The recharge rate is based on the annual precipitation and it is roughly 1/2 of the annual precipitation but the vast majority of that recharge water goes into the surficial aquifer which then goes out into the streams. What is actually going into the deep confined aquifers is some very small fraction of annual precipitation. The heart of the issue is that there is a lot more water being withdrawn from the system than is going back into the system through natural recharge.
- The rate of induced recharge is not keeping up with the rate of pumping.

5. Presentation – Continuation of Trading/Banking Discussions – Groundwater Trading Program Strawman (Kurt Stephenson):

Kurt Stephenson provided an overview of a "strawman" for a Groundwater Trading Program. He noted that during the last workgroup meeting we had a discussion about the concept of a groundwater trading program strawman". The intent today is to try to start laying some ground work to develop the strawman. His presentation included the following:

- Groundwater Allowance Trading: Strawman for Discussion:
 - Allowance = permission to withdraw 1 million gallons of groundwater from confined aquifer (Potomac)
 - Allowances are "retired" after water is withdrawn
 - Allowances issued every "X" years by state (allocation period)

- Max limits set in permits
- Sum of Groundwater allowances equals "cap"
- This is essentially what the state current does (just some slightly different language). The state issues permits for permission to withdraw specific amounts of groundwater. What needs to be decided is to what extent are additional choices granted to users over the permissions to withdraw.
- Major Issues to Discuss/Decide:
 - Spatial extent of GW allowance trades
 - Banking (extent of allowance banking and banking of injected water)
 - Initial assignment of GW allowances
 - Groundwater allocation time period and allocation across time periods.

Discussions included the following:

- Over what period of time would the allowance be available? The allowances would be issued by the state for a given allocation period – similar to what we have now for a permit period, for 10 or 15 years. If you had a 1 mgd permit, that would be 365 allowances over the course of a year or for a 10-year period would be 3,650 million allowances. Those allowances could be used any time during the allocation period. Once the allowance is used that allowance goes away or is "retired". You could still have a permitting system that sets maximum limits to address or avoid any localized issues or concerns.
- The allowance could be identified as the total amount of water that you can pump over a 10-year period. If the allowance is 1 million gallons then you could only pump 1 million gallons over the allowance period. If the allowance is 1 million gallons a day average then for a 10 year period then it would be 3,650 million gallons over the allowance period. It is one lump sum over a given permit period.
- Regarding the "sum of the allowances equaling the cap": Does this mean that we are going to issue allowances on day one that use up the entire cap? Yes, over that 10-year period that would be correct. What if an entity wants to come in next year that needs access to the water? Once you close the cap, the question becomes does the state issue any more allowances? Or does a new groundwater user have to buy into the system by buying someone else's existing allocation? Or does the state set aside or reserve a portion of the cap as a "reserve allocation" amount for future need or growth? Once you "close the aquifer" there would have to be a buy-in to gain access to another user's allocation.
- Under this program the "cap" would be a predetermined volumetric number whereas now the "cap" is basically a hypothetical surface level. An interesting concept would be to translate the "cap" to a moving "cap" that achieves the hypothetical surface.
- A concern was noted regarding the idea of this being essentially what we are doing now – it is similar to the existing system but in the current system there is no mechanism to "trade".

- We will be dealing with a number of diverse users with different practices and amount of needs, unlike some of the examples of programs in other states, i.e., Nebraska, Kansas, Texas, North Carolina, etc.
- A question was raised about the current permit system and the amount of water that is being requested which includes a "fudge factor". When an applicant comes in with a permit request needing access to groundwater the normal process is for the applicant to ask for some amount of "fudge factor" – additional water over and above their actual current needs.
- What a "trading system" is ultimately about is trying to say that the state says they have the public interest in determining this – in trying to extend the life of the aquifer for future generations – there is a public interest in trying to manage land subsidence and the state is going to manage those public interests by establishment of this total "allowable cap". What a "trading program" is trying to do is establish that we are going to give more of those decisions and responsibilities on who gets what and how much they get and when they get it to the users.
- A concern was voiced regarding the impact of this type of program on the agricultural users – especially those that have not developed or established their irrigation rights. Once the "cap" is set and this system instituted then those users would need to go buy rights from someone else that has an established volume of water allowances when those agricultural users already have a perception that they already have some rights to use the water as a landowner. When the door is slammed shut the perception is that their rights as a landowner have gone away and now they have to buy the rights to something that they have always had the assumption that they already had the rights to.
- It was noted that the same thing happened to landowners when the Groundwater Management Act area was expanded to include the Middle Peninsula – prior to that expansion the landowners could poke as many holes in the ground as they wanted now they can't without going through the permitting process if they fell into the threshold of needing a permit.
- Now we are dealing with a limited supply of groundwater.
- A concern was noted that we seem to be floating around identifying who is "in the game" and who is not. When you are looking at a 1 million gallon limit, it doesn't take someone long to reach that limit. One way of addressing the agricultural concerns is through the initial assignment of groundwater allowances.
- Some concerns were noted regarding the temporal aspects of this approach – there are already folks that have permits or have some form of grandfathered status – the "poker chips" are already on the table that represents "their" perceived portion of the available groundwater resource. If the word gets out that we are going to start a trading program for the allocations – if there is enough time there may be some folks that come into the picture and try to gain some additional allocations, "poker chips" to be able to play in this new "trading scenario". The biggest assumption that we are going to be dealing with is "how many chips are already on the table". Just by talking about creating a thing like this "games" that assumption. How do you account for that? That is a big issue that will need to be addressed – how do you start-up a

program like this – it is a variable that needs to be addressed. It was noted that under this program there would be no grand-fathering.

- Regarding the term "well": A well can mean different things to different people – just by size. Sometime we talk about a well that would service a paper plant and other times about an individual well that is "unpermitted". Where are the "unpermitted" wells going to fit into this discussion? These wells would also be addressed during the initial assignment of groundwater allowances.
- The question is how are the initial assignments of groundwater allowances going to be handled?"
- There are groups other than agriculture who may stand to lose "rights" under this program – the development community; homebuilders, commercial development; office development etc. who also need to be addressed during the initial assignment of the groundwater allowances.
- In trying to build the best trading program that we can we need to identify what the allocation rules are for each allocation period. Will a "fixed portion" of the cap be reserved for future allocations – for future growth? How much flexibility do we need to build into the system? Is there a mechanism to purchase future allocations? How would the purchase of future allocations be addressed? Who can trade with whom? How will the spatial reallocation issues be addressed?
- We are not saying that trading is going to happen but we are looking at it as an option/an alternative.

6. Break

7. Discussion of the Big Issues related to a Trading Program - Summary (Kurt Stephenson/Mark Rubin/Workgroup):

The Workgroup discussed the "Big Issues" that were identified in Kurt's presentation:

- **Major Issues to Discuss/Decide:**
 - **Spatial extent of GW allowance trades**
 - **Banking (extent of allowance banking and banking of injected water)**
 - **Initial assignment of GW allowances**
 - **Groundwater allocation time period and allocation across time periods.**

Kurt provided additional details related to each of the "big issues" to the group. For the "Spatial Extent of Trading" issue he noted the following:

- Issue: Under what conditions can users trade allowances with each other.
- Interests:
 - Provide users trading options (provide flexibility and create incentives)
 - Minimize third-party impacts (availability, diminished quality, etc.)

- Keep trade approval costs low (for state & users)
- Possible Options:
 - No spatial limits: Individual case-by-case review & approval based on meeting specified regulatory criteria
 - Differential levels of review/approval based on distance or zones
 - Trade zones (trade allowed only within specific zones)
 - Combinations
 - Others?

Discussions included the following:

- The review would be done by DEQ, because of the state's interest in preventing dewatering of the aquifer.
- Is there any mechanism to prevent someone from hoarding water? From becoming a water baron"? Everyone in the system has an interest in claiming as much water as possible. There is a financial consequence of "holding" or "hoarding" water.
- Assuming everyone has their "chips" on the table – how can they exchange their "chips"? Their allocations?
- We could look at the trading concept and the potential for hoarding of water from both a monetary benefit perspective and a conservation benefit perspective.
- What is it that we are trading? Are we trading property rights or a temporary regulatory license? Who can own it?
- Keep it simple – keep it as open as possible – very detailed modeling approach – zones – certain zones would have more credits or premium costs
- Would need a periodic review.
- A concern was noted that there has to be some notion that a trade makes a difference – there needs to be a way to balance it in some form or fashion.
- Concern: No two withdrawals are created equal in regard to effect on the aquifer – how do you address this? No you need to have offsets?
- The lack of any spatial limit may create some problems – don't think that will not make the situation worst.
- Is there a system anywhere in existence that has not created "water barons" in some form or fashion? If you have a large and diverse system that should not be an issue.
- Are there any safe guards to prevent the establishment of water barons? There are examples in other areas where there are boundaries that might be placed on the system.
- We need to keep in mind that part of this program is "adding water to the system".
- The model allows you to look at things on a case-by-case basis – it takes a couple of hours to run the model.
- Are there areas that could be pre-approved? What can we pre-approve and what process would we need to have in place to make this effective? How do you draw the boundaries?

- A fundamental question was raised – how permanent are these trades? In some trading programs you are talking about perpetual. In other words, once you have traded the rights away they are gone. Is this a duration of the permit trade? Is it 10 years? Is it 30 years? Is this permanent? How we answer that question, would boil down to what the “zones” should be, simply because you might be able to get some back if it ends in 10 years. If it is an in perpetuity situation then the “zone” needs to be pretty tight. If it is a once in 10 year permit then the “zone” could be broader.
- For what purposes: Is it a management tool rather than creating a resource or new sources? How does this incentivize banking?
- It has to have some positive impact on the resource.
- Are we creating a trading system just for people to make money?
- For what purpose would you set up a trading system?
- Could you limit the trades to those that have the effect of banking water?
- For areas that are rural, if they are left out of this because they don’t have any existing permits then those communities will be left in the stone age because they will have no ability to get into the system because they have no current users of the commodity. Should we consider that the areas - the value of it are inversely proportional to the number of permits that you have? If you don’t have a lot of straws poking holes in the ground and you don’t have a lot of users sucking water out of the ground then anything that you are trading in those areas could be worth more, because if they are not, then those areas are going to be punished because they don’t have any economic development ongoing on the surface.
- Is it a broad system or does it have a narrow focus?
- The total amounts of allowance are way over the actual use of the resource.
- Once everyone has their chips on the table how does someone else buy into the game – how do I get my chips?
- How long is the credit in effect?
- The notion is to set up the ground rules up front.
- Are allowances given or bought? You could auction them off.
- The system should be as open as possible.
- This needs to be as open as possible – there should be no case-by-case review.
- Allowances and “excess allowances” need to be addressed.
- The question was raised as to whether staff or workgroup members could look at some different scenario planning (some preliminary model runs) and provide examples before the next meeting. It would depend on when the next meeting is scheduled. It was noted that given enough time that there are resources that could do this work.

ACTION ITEM: Model runs will under taken to look at different scenarios regarding allowance and use for an upcoming meeting.

- Banking: GW Storage (via Injection)

- Issue: Under what conditions can local users receive allowances (“credit”) for temporary storing treated drinking water in aquifer?
- Interests
 - § Provide users with management options (new storage options and create recharge incentives)
 - § Minimize third-party impacts (including adverse impacts on local GW quality).
- Currently, the City of Chesapeake has a local ASR project but credit and recovery unclear.
- Possible Options:
 - Assign additional allowances for stored (injected) water?
 - Apply uncertainty or recharge ratio on recoverable water?
 - Are credited allowances time limited?
- What base-line do we work from?
- The time period should be over permit periods but not in perpetuity.
- With banking you would have a secure right to the water that you injected with no time limit imposed on withdrawal.
- There will be some percentage of loss – it would not be 1 to 1 – but would be likely around 80%. There could be an uncertainty factor and/or a “cut to the aquifer”.
- There should be quality restrictions on the injected water – treated near drinking water standards.
- Allowance Banking:
 - Issue: Under what conditions can users bank allowances in one allocation (permit) period for use in another?
 - Interests:
 - § Provide users water management flexibility & incentives to reduce consumption early
 - § Minimize third-party impacts
 - § Reduction state’s future management flexibility.
- Will need to define duration of time for an allowance or allowances.
- Can unused allowances be carried forward?
- There is a need for regulatory stability for this type of program to work.
- A framework needs to be developed for this process to be effective.
- Can banking be done across permit periods?
- The issue is how do we allocate the resource – the tendency is to request everything within the 10 year permit period – if it is unused – it is unused.
- How do you plan/allocate across permit periods/allocation periods? It becomes a base-line question.
- It comes down to having a time period – it should not be in perpetuity. (Time period that could be considered: 10 year; 20 year; perpetuity.)

Flip Chart Notes: Trading System

- Default – trading system should be as open as possible.
 - No limits:
 - Set ground rules upfront
 - No case-by-case review – how do you get away from a technical case-by-case review?
 - Take into consideration geographic and aquifer sensitivity – east/west influence – currency rate by zone
 - Concerns:
 - § For what purpose
 - § Impacts
 - § Duration of allowance
-

Flip Chart Notes: Zones:

- Use crater as dividing line – option
 - Are there zones that are within a zone where there is no impact of trading? Possibly but may be arbitrary
 - Duration of allowance affects
 - Are allowances given or bought?
 - § Duration of allowance
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Flip Chart Notes: Banking/Storage:

- You have a secured right to water you inject (some percentage but not 1 to 1).
 - Time limit on when you can withdraw what you inject? No.
 - § Duration of allowance
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Flip Chart Notes: Banking – Not using all of allowance:

- Should you use allowance from permit period to another?
 - If yes, does it defeat conservation purpose – eliminates cushion on current system.
 - Duration of period input – long enough to incentivize folks.
 - Banking across permit periods but with a limit (not perpetual).
 - Mechanism needed for situation where there are needed cuts in the future.
 - Need to define period (NC example of phase-in)
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8. Scheduling and Next Steps (Mark Rubin):

Mark Rubin thanked everyone for their input to the process today and reviewed the “next steps” in the process.

The group discussed the possibility of holding the next meeting sometime during or after the week of February 16, 2016 - during session but after “Cross-Over”.

Mark suggested that during the next meeting that the group should consider continuing to go through the parameters of the outlined strawman for a trading/banking/storage process/program and further refine the strawman.

The Alternative Sources of Supply group (Workgroup #1) is going to meet sometime prior to the start of the GA Session but the date has not been set.

Meeting materials will be provided to the work group and will be posted to the web page – an agenda will be distributed prior to the next meeting.

9. Public Comment:

No Public Comment was offered.

10. Balance of Meeting Schedules:

The current balance of the meeting schedule for the Advisory Group and the various EVGMAC Workgroups for 2015 include the following meeting dates:

- **Eastern Virginia Groundwater Management Advisory Committee Meeting #3 – Monday, December 14, 2015 – 1:00 – 4:00**

11. Meeting Adjournment: Mark Rubin thanked everyone for their attendance and participation in today's meeting. The meeting was adjourned at approximately **12:10 P.M.**