

PMNorthAnna3COLPEmails Resource

From: Alicia Williamson
Sent: Tuesday, April 22, 2008 4:06 PM
To: NorthAnnaCOLAEIS Resource
Subject: FW: FOLA concerns about 3rd Reactor at Lake Anna & 16 Apr 08 meeting
Attachments: FOLA - Presentation to NRC Hearing re 3rd reactor on 16Apr08 - 16Apr08.doc

From: Harry Ruth [mailto:HC.RUTH@LOUISA.NET]
Sent: Sunday, April 13, 2008 12:32 PM
To: Francis Cameron; Thomas Hipschman; Christopher Cook; Michael Masnik; Alicia Williamson
Cc: Lake Anna Observer Attn: Ed Kube; Irene Luck (Central Virginian); Greg Dorazio (Cntrl Virginian); Tersh & Jean Norton; Ken Remmers; George Franklin (LABARA); George & Gerry Heino; Doug Smith (LACA); Dale Jones 2 (LABARA); Dale Jones (LABARA); Bob & Jo Richards; Barbara Crawford (Cuckoos Nest); Walter Michalski; Bill McGrath (Pine Harbour); Brian Ruth; Christopher Paine (NRDC); Dan Byers (Jackson Dist); Dave & Bonnie Norem; David & Susan Ebe; Dennis Schaible; Gary Muller; Harro & Christine Zuest; Jerry & Sheryl Giaccai; Jim Burdge; Rick Parrish (SELC); Sandra Brockel (The Waters); Steve & Doris McGuire; Will & Aileen Frazee (Jerdone Is); Willie Gentry (LCBS)
Subject: FOLA concerns about 3rd Reactor at Lake Anna & 16 Apr 08 meeting

13 April 2008

Dear Nuclear Regulatory Commission

Reference: Public Scoping meeting on April 16th, 2008 at Louisa High School sponsored by the NRC re the 3rd proposed nuclear reactor at the North Anna Plant.

Unfortunately, I will be unable to attend you public scoping meeting on April 16th, due to a previous commitment. The Friends of Lake Anna (FOLA) is not anti-nuclear, nor do we have not in my backyard sentiments. . We do support the addition of the 3rd reactor at the North Anna plant, but want to ensure that all environmental issues are taken care of prior to the issuance of a Combined Operating License. We have several concerns, primarily with the cooling method proposed for the 3rd reactor which will use up to 24 million gallons a day of Lake Anna water. If the cooling method were changed to dry cooling which Dominion has proposed for the 4th reactor and which is used in other parts of the world, most of our concerns would go away.

Since the there are many concerns, primarily with the proposed cooling method and all the concerns may be impossible to cover in the time allotted in the public meeting, we have prepared the attached document "FOLA presentation to NRC Hearing re 3rd reactor on 16 April 2008" . Several of our members will be present at the meeting to individually touch on some of the concerns.

Please incorporate the attached document into your official records to supplement those presentations at the public meeting.

Thank you in advance for your consideration. We look forward to meeting with you in the future to review these concerns in more detail.

Sincerely,

Harry Ruth
for the Friends of Lake Anna
C/O 230 Heather Drive, Bumpass, Va. 23024

-Phone 540-872-3632

Hearing Identifier: NorthAnna3_Public_EX
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Mail Envelope Properties (Alicia.Williamson@nrc.gov20080422160600)

Subject: FW: FOLA concerns about 3rd Reactor at Lake Anna & 16 Apr 08 meeting
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(Presentation to U.S. Nuclear Regulatory Commission 3rd Reactor public scoping meeting on April 16, 2008 at Louisa High School, Louisa, Va.)

Dear Nuclear Regulatory Commission & Ladies and Gentlemen,

1. Friends of Lake Anna. “The Friends of Lake Anna” is a citizen group representing 2,650 persons whose mission is to protect Lake Anna (both main reservoir and cooling lagoons) and its surrounding landscape, together with any related concerns, within Louisa, Spotsylvania, and Orange Counties for the health, safety and welfare of current residents/users and for future generations. We are not anti-nuclear, nor do we have “not in my backyard” sentiments, but do support a wise and safe use of nuclear energy. Our goal is simply to protect Lake Anna for its 500,000 plus annual users and insure compliance with the law.

We believe that the U.S. should become self-reliant for energy sources and not be dependent on foreign oil, but we do want to promote the wise and safe use of nuclear energy and not have the impact of a new 3rd nuclear reactor destroy Lake Anna in the process. If the project at the North Anna Plant is accomplished correctly and takes into account our concerns, possibly the new reactors could become a model for the continued growth of nuclear energy throughout the country. If the project is handled poorly, resulting in public and political uproar and bad national press, the entire future of increased nuclear energy within the U.S. could be on hold for many more years.

We applaud Dominion Resources for their past stewardship of Lake Anna and we are not opposed to the North Anna Project. We do support the addition of the 3rd reactor at the North Anna plant, but want to ensure that all environmental issues are taken care of prior to the issuance of a Combined Operating License. We have several concerns, primarily with the cooling method proposed for the 3rd reactor which will use up to 24 million gallons a day of Lake Anna water. If the cooling method were changed to dry cooling which Dominion has proposed for the 4th reactor and which is used in other parts of the world, most of our concerns would go away. I will now address each of our concerns.

2. Declining Water Levels in Lake Anna.

- a. Dominion has acknowledged that the wet/dry cooling method for the 3rd reactor will use up to an additional 24 million gallons of Lake Anna water each day in the Energy Conservation Mode and up to 16.6 million gallons per day in the Maximum Water Conservation Mode.

- b. The Virginia Dept of Environmental Quality (VDEQ) Dept of Water Resources and the Dept of Game & Inland Fisheries (DGIF) have previously indicated that the North Anna watershed is too small to allow large water withdrawals. These could adversely affect the beneficial users of the North Anna and Pamunkey River which eventually flows into the Chesapeake Bay and the Atlantic Ocean. The DGIF & VDEQ analyses and Dominion acknowledges that the 3rd reactor would increase the drought cycle and cause decreased water flows during March, April; May; June, July, August and September (7 months) of each year. Dominion has stated that the drought cycle will double with the addition of the 3rd reactor wet/dry cooling method. The proposed cooling method will cause the average drought period to increase from 21 to over 40 days per year (most likely during the summer months). Note that lake levels have decreased below 248 MSL in five out of the last eight years. Dominion has stated that with the addition of reactor 3 that a drought would only occur each 10 years. Our current drought started in May 2007 when the lake level fell below 250 MSL. The DEIS should explore facts versus Dominion predictions with lake levels decreasing below 250 MSL and related impacts to the public, fish, clams/mussels, and wildlife.
- c. Both VDEQ and DGIF, in conjunction with Dominion Resources are currently conducting an Instream Flow Incremental Methodology (IFIM) study on Lake Anna and the North Anna River and Pamunkey Rivers downstream to determine the effects of the reduced water flow on recreation, wildlife, aquatic life and fish as part of the conditional certification for the 3rd reactor Early Site Permit (ESP). This IFIM study must also address all of the comments made by the VA. Dept of Conservation and Recreation (DCR). **This IFIM study should be completed before any Draft Environmental Impact Statement for the COL is issued by the NRC so all the results of the IFIM study can be reviewed and commented on by the public. Otherwise the results from this important study will cause much re-work later by the NRC, Virginia and the public and waste much time. Currently there is no public participation in the study plan or results.**
- d. The previous NRC Lake Model in the ESP EIS has compared the once through cooling method (used by units 1 & 2) with total wet cooling only and also used 20 year averages to compute modeling results. **This lake model should be updated to the current proposed unit 3 wet/dry cooling method and use median results for the past 20 years, so all the high's & low's are defined, including the most recent and current drought levels.** VDEQ's Dept of Water Resources has estimated that the lake levels will decline approximately 1.1 inches per month during a drought. During the current that started in May 2007, this would translate into decreased water level of over 1 foot today.
- e. The Lake Anna Lake Level Task Force consisting of members from the Friends of Lake Anna, Lake Anna Civic Association and the Lake Anna Boating and Recreation Association have identified the following impacts that will be caused as a result of declining lake water levels. **Each of these issues should be reviewed during the DEIS of the COL for the 3rd reactor:**
- The creation of many boating hazards with previously submerged items (rocks, stumps, sandbars, etc.) are exposed creating major safety hazards for recreational users when their boats hit these submerged items;

- The water will get hotter faster in the summer months to unsafe water temperatures causing negative health impacts to humans, fish, wildlife, aquatic life, clams and mussels;
- There will be major fire safety hazards for lake homes/communities by making the dry fire hydrants unusable due to the lack of water at the lake intake caused by the decreasing lake water level.
- There will be shoreline stabilization problems and
- There will be negative impacts on many lake businesses as people go elsewhere to recreate and live.

Please see attachment 1 for a complete list of all the advantages and disadvantages that should also be evaluated during the COL DEIS for each of the six (6) types of people that will be impacted as a result of decreased Lake Anna water levels. The six types include: (1) Real Estate Sales/Rentals; (2) Construction; (3) Lake Recreation Businesses; (4) Business Lake Services; (5) Homeowners; and (6) Day Users .

An example of one of the impacts is: Recreational boaters will find more hazards throughout the lake, with stumps, rocks, sandbars, etc. causing lower units to hit them which in turn could necessitate major repairs or replacement of propellers, other engine components and boat hulls. When the lake level is below 250 MSL and continues to decrease during drought cycles, these hazards will only increase. The drought cycles will double if the wet/dry cooling method for unit 3 is selected.

- f.* The previous NRC Lake Model in the ESP EIS also provided no details on how the assessment was made when it concluded that the **lake water temperature would not rise any more than 0.1F with decreased water levels**, and the addition of the proposed reactor 3 wet/dry cooling method. It appears that the EIS lake model did not take into consideration that Lake Anna is unique for providing cooling water for nuclear power plants. Most nuclear power plants receive cooling water from robust fast flowing rivers or oceans with the heated water flowing downstream and is quickly cooled. Lake Anna is unique in that 99% of the water is re-circulated between the power plant and the dam, while only 1% of the water flows over the dam and downstream. As a result, 99% of the recirculated water gets hotter and hotter over the summer months. **The NRC lake model for the COL DEIS should be updated to reflect the continuous re-circulation of Lake Anna water and the cumulative effects of Units 1, 2 & 3 operating at the same time, with results being published in the COL DEIS. The projected cumulative impacts of global warming should also be included in this lake water temperature calculations.**

Note that with only Units 1 & 2 operating, water temperatures have previously been recorded at over 104F in the cooling lagoons and over 93F on the main reservoir. The hot water is where humans recreate and where fish, wildlife, clams/mussels, and aquatic life share the water in what appears to be unsafe conditions.

The NRC in keeping with its charter to protect public health and safety should evaluate in the DEIS for the Unit 3 COL all the related public health impacts that could result from hotter water in Lake Anna as a result of further lake level declines caused by the evaporation of up to 24 million gallons per day. (Please see Attachment 2 for an example of the many potential human health impacts from hotter water.

- g. **The SDEIS should also include the results of a professionally conducted total Clam/Mussel Survey of the entire Lake Anna as was previously requested by Brian Watson, the DGIF Wildlife Diversity Biologist/Malacologist. Apparently this study has never been completed.** According to Brian Watson (Phone 434-525-7522) a clam/mussel survey should be conducted by a Virginia State certified malacologist and should be current within the last 2 year time period. Mr. Watson has identified that the Asian clam (*Corbicula fluminea*), Eastern elliptio (*Elliptio complanata*), Paper pondshell (*Uterbackia imbecillis*) and Easter Floater (*Pyganodon cataracta*) are resident in Lake Anna. In addition, he is concerned about the potential impacts of elevated water temperatures upon native freshwater mussels and that other freshwater rare species mussels (Yellow lampmussel-*Lampsills cariosa*), (eastern lampmussel – *Lampsills radiata*, Eastern pondmussel-*Liguimia nasuta*) and the (Tidewater mucket-*Leptodea ochracea*) which are rare species may also be present. This study needs to be done and now is the time to do it before irreparable harm is done.
- h. The DEIS **should examine the source of Lake Anna PCB contamination** that has now caused the Virginia Dept of Health to issue a fish consumption advisory on August 31, 2007. The VDH advisory cautions: Do not eat any Lake Anna gizzard shad and do not eat more than two meals a month of carp, largemouth bass, striped bass, white perch, white catfish, channel catfish or blue gill sunfish. The health advisory applies to the total lake, both the main reservoir and cooling lagoons. The DEIS should further investigate the fire at the North Anna Power station in 1981 and the significant spill of transformer oil associated with this event as it likely contained polychlorinated biphenyls (PCB's). It was reported at the time that some unknown quantity of oil did reach the waters of Lake Anna. **The complete remediation effort, including what happened to the contaminated material from the ground site and precisely how the PCB's were extracted from Lake Anna should be identified in the DEIS. This survey should include what possible impact the ground excavation for the 3rd reactor (which is on the same site as the PCB spill) and its facility buildings will have on Lake Anna.**
- i. Since there are significant incremental surface water impacts that will be caused by the proposed Unit 3 (cooling method using up to 24 million gallons per day), **the system design alternatives should include the alternative of imposing some form of water saving measures on the two nuclear reactors that already exist on the site, as a form of offset to the impacts of the proposed new reactors.** These unit 1 & 2 offsets are necessary under the National Environmental Policy Act (NEPA) where the applicant and its affiliates seek to add a nuclear reactor at the same location of existing nuclear operations. The unit 1 & 2 water conservation measures should mitigate against the significant and adverse incremental impacts that will be caused by the proposed Unit 3 cooling method.

- j. **The DEIS should also examine the effects of increased undesirable aquatic growth from the declining water levels which allows sunlight to permeate to lower levels of the lake, that previously were darkened. Will this declining water level caused by unit 3 create a reoccurrence of increased undesirable aquatic life throughout the lake and the associated human safety concerns defined below?** The sun light penetration enhances the growth of aquatic weeds (hydrilla) and (skunk weed) and possibly others. Approximately 11 years ago, hydrilla growth created many safety risks for the public and created many boating hazards in Lake Anna. Humans could not swim in many parts of the lake due to 10' long hydrilla patches throughout. Children would become entangled in the hydrilla creating serious safety concerns. Boats would come to an abrupt stop when there motors were choked out by hydrilla causing people to become thrown about in their boats. Sterile Grass Carp were introduced to assist in controlling the hydrilla. The grass carp life span was projected to be 15 years and that is just a few years away.
- k. **The DEIS should examine the impact of declining Lake Anna Water levels on the wetlands and feeder streams throughout both the main reservoir and cooling lagoons of the lake.** What will happen to the fish and wildlife that currently depend on the wetlands for survival? The DEIS should look at how long it takes to reestablish life forms at new water levels and the impact of increasing the range of variation of levels on the wetland areas. The ESP EIS identified that a cursory check had been accomplished and concluded that changes in the lake level result in creation of as much wildlife as is inundated or destroyed, hence low impact. A more comprehensive survey must now be accomplished.
- l. **The DEIS should examine what is the actual water flow into Lake Anna from all feeder streams during times of drought.** Apparently all lake level predictions are based on computer models only and no one has ever taken actual water measurements on water flow from all the feeder streams to Lake Anna during drought conditions. Since Lake Anna is in a very small watershed and outflow over the dam is based on the Lake water level (and the outflow fluctuates during a drought), it is extremely important to know how much water is coming in the lake. The lake has experienced drought conditions during 5 of the past 8 years, so the accurate measure should easily be achieved. It is widely acknowledged that the water sources for Lake Anna are not nearly as substantial or robust as was originally planned.
- m. **The DEIS should examine the effects of adding additional treated sewage effluent from the requested expansion of the Dominion sewage treatment plant as needed for the influx of new workers who will be hired to construct the new reactor at Lake Anna.** This sewage effluent will then be dumped into Lake Anna water and re-circulated throughout the lake with the current re-circulation flow. Note that 99% of the lake water is currently re-circulated between the power plant and the dam and only 1% runs over the dam. This water is heated by the power plant, which increases the risk to humans who swim and recreate in the water to increased biological risks from the sewage effluent. *See attachment 2 for potential health risks from hotter water in Lake Anna.*

3. Revisions to the COL Draft Environmental Impact Statement (DEIS).

As part of the earlier ESP process, Dominion continued to make revisions to issues as they were identified and analysed. Hence our review of the DEIS became a moving target, without the NRC extending the time for the public to respond. **It is requested that each time that Dominion makes a change to a previously submitted document that impacts the DEIS, that the NRC automatically extends the public comment period and the COL schedule as well to give the public sufficient time to review the changes and make comments.** Hard copies of the original documents and changes should also be supplied to the persons who sign up to request them, as trying to keep up with thousands of pages and changes on a home computer and ink-jet printer is next to impossible

4 . The people who use the North Anna and Pamunkey Rivers should not benefit at the expense of those people who live and work on Lake Anna, as well as the over 500,000 people who travel to Lake Anna to enjoy its state park and many virtues on a year round basis. One set of the North Anna River Users should not benefit at the expense of another set of users.

For example, the lake levels should not be raised which could cause property damage to lake owners in order unduly to quarantine more water so that it can be released later to satisfy the downstream users at different times of the year.

Likewise the consumptive use of water and increased needs for water caused by population growth by downstream users should not cause the lake levels to be dropped so more water flow could be released to downstream users and then create mud flats throughout the lake.

5. Alternative Cooling Method.

One alternative discussed, but not proposed by Dominion for the 3rd reactor's cooling method is to exclusively use Dry Air Cooling for the 3rd unit, which would then negate any further water withdrawals from our small watershed and would also hopefully reduce major safety problems in the event that the dam would break or be blown-up by a terrorist attack, causing sudden loss of water for cooling any of the reactors. The North Anna Nuclear Power Plant (which supplies over 20% of Virginia's power) could be offline for 3 years while we wait for the lake to refill. Our power would be purchased from other sources and our bills would increase significantly. The dry-air cooling appears to be a feasible option, since this is the same technology that Dominion has proposed for Unit 4 and is used by many overseas countries that do not have a local water source. In addition, many of the recommendations by VDEQ analysis to the NRC, requests that the air cooling mode be used with unit 3 for 7 months of the year to reduce lake water drawdown and reduce the risk of a complete unit 3 shutdown.

In its response to the ESP DEIS, VDEQ's Division of Water Resources (DWR) expressed its preference that the once-through cooling process proposed for Unit 3 be changed to a dry cooling tower because the dry cooling tower would results in less consumptive use of water than the either the once-through cooling or the combination wet/dry cooling tower. Also in its comments on the DEIS, DWR stated that it would have no concerns about this project if both the third and fourth reactors at North Anna were air cooled. **The COL DEIS should fully analyze this alternative dry cooling method. .**

6. Other related concerns:

To ensure that the proposed construction of a 3rd reactor will minimize the adverse effects on the quality of life for those who live and work on and around or use Lake Anna, we also ask that you further evaluate the following concerns prior to your making a final decision on the ESP (conditional certification requirements) and are included for evaluation in the COL DEIS.

a. The height of dry and wet cooling towers and facility buildings should not exceed the tree line to protect the rural aesthetic landscape of the community as Dominion indicated in its Jan 2006 stakeholder meeting.

b. Why there is a discrepancy of the ESP defining of 5,000 – 7,000 new workers (construction, periodic maintenance, professional) employees for 5 years on local roads and schools and now Dominion is saying there will only be 2,000 workers involved with the 3rd reactor. In any case, the COL DEIS should evaluate these new worker impacts on the need for new expanded and improved roads before the project begins because of the heavy equipment, large number of workers and the three newly approved Louisa County subdivisions for about 1800 new homes in close proximity to the plant.

New schools and other county infrastructure (police, fire, rescue squads, etc.) will need to be planned and built prior to any new tax dollars coming from Dominion. Louisa is now the 73rd fastest growing county in the U.S. Louisa and Spotsylvania are centrally located between three major fast growing metropolitan areas (Washington D.C, Richmond and Charlottesville, Va). Who is going to pay for all these new requirements? **Is the Federal Government (NRC & other departments) going to give grants to Louisa and Spotsylvania Counties, similar to the 8 to 10 million dollar grant they gave to Dominion for processing the Early Site Permit?**

c. Emergency evacuation on small 2 lane roads. Need for expanded road system to accommodate new workers, heavy construction equipment and subdivisions.

d. Spent nuclear fuel: Where and how the various types of nuclear waste are being stored. What types are being shipped to other states and how is it being shipped? When will all the nuclear waste be transferred to a national nuclear waste site? What is being done at the North Anna plant to protect this waste from terrorist attack or accidental failure of the dam? What is the status of the Federal Repository?

e. Impact of additional fog and icing from wet cooling towers on local roadways and surrounding residential homes and communities.

f. Noise concerns/decibel levels emitted from 180/230 foot buildings that will travel long distances without having tree barriers to break the sound from giant fans.

7.. Summary

We thank Dominion Resources for being good stewards of Lake Anna during the past 30 plus years. We also believe that the North Anna project for the 3rd Reactor as currently proposed which will use up to an additional 24 million gallons per day of Lake Anna water, needs to have the items described above fully evaluated as part of the COL Environmental Impact Statement phase. The above referenced issues must be satisfactorily resolved prior to issuing a Construction and Operating License.

We request that you thoroughly evaluate and analyze the alternative dry air cooling method for the 3rd Reactor. The dry air cooling for the 3rd Reactor is used by many overseas countries to eliminate the consumptive water loss associated with using wet/dry cooling towers. Although it may cost Dominion a few more dollars to implement, the dry air cooling method will achieve a win-win situation for Dominion, the Lake Anna community and the over 500,000 Virginia citizens who use Lake Anna. Lake Anna was originally planned for both residential development and recreation around the total 13,000 acre lake in addition to providing cooling water for reactors. Dry Air cooling of the 3rd reactor will preserve this beautiful lake resource for future generations and will not create all the decreasing water levels and negative effects as defined above that will be caused by the proposed wet/dry cooling towers. .

Thank you for your time and consideration of the above items,

Sincerely,

Harry Ruth
For the Friends of Lake Anna
C/O 230 Heather Drive, Bumpass, Va. 23024
Phone 540-872-3632

Attachment 1 – Advantages/Disadvantages of Lake Anna Lake Level Declines by User Category

a. Business Real Estates Sales/Rentals (BR)

- i. Advantage: None
- ii. Disadvantages –
 - 1. Lower lake level discourages any potential buyers or renters – minimal sales
 - 2. Current depressed real estate market will further decline
 - 3. Real Values and Assessments will decrease
 - 4. Sales /rental commissions will decrease
 - 5. Taxes to local communities will decrease
 - 6. Insurance rates may increase due to lack of water at dry fire hydrants
 - 7. Shoreline instability problems may create many related impacts.
 - 8. Fewer sales will mean less need for loans from banks/mortgage lenders
 - 9. Fewer sales will means less need for future land development
 - 10. Fewer sales will mean less need for title agencies

b. Business Construction (BC)

- i. Advantages: None
- ii. Disadvantages
 - 1. With fewer real estate sales/rentals there will be less need for future construction
 - 2. This will directly reduce need for building designers, building contractors, building materials, cabinetry & countertops, clearing services, concrete, construction of decks, decorative concrete, docks and boathouses, drywall contractors, excavating, hauling, heating & air conditioning, home improvement, home staging, interior design, kitchen & bath, landscape design, landscape lighting, lumber, remodeling, soil consultants, surveyor, underground sprinkler systems and water treatments

c. **Business Lake Recreation (BL)**

- i. Advantages: Boating major repairs will increase for the few boaters that use lake
- ii. Disadvantages
 1. With less water in the lake, fewer people will want to use the lake or visit the lake
 2. Less water will cause the existing water to get hotter faster in the summer and increase the possibility of adverse impacts to humans through the increased health risks of human immersion in heated water, together with the potential for dangerous growth of bacteria (microorganisms) or algae blooms.
 3. Fish, aquatic life, clams, mussels and wildlife may be adversely impacted with less lake water which is also hotter in the summer months.
 4. This will directly reduce the business for boat rentals, boat repairs for many boaters who would have previously used the lake, boat RV/PWC/storage, boat sales, campgrounds and marinas
 5. Recreational boaters will find *more hazards throughout the lake, with stumps, rocks, sandbars, etc. causing lower units to hit them which in turn could necessitate major repairs or replacement of propellers, other engine components and boat hulls. In addition, the safety of all aboard the boats is severely jeopardized when the boats run into these newly emergent and changing boating hazards when the lake level is below 250 MSL and continues to decrease during drought cycles. Note: Per Dominion and the NRC, these drought cycles will be doubled with the proposed type of 3rd reactor wet/dry cooling method. These increased droughts will result in many human safety risks increasing dramatically.*
 6. Boat slip rental business and lake waterfront owners will encounter major difficulties in getting boats off boat lifts, possibly having mud-flats in front of their property making the lake unusable for swimming or using their boats.

7. Lower and hotter water levels could encourage the hydrilla and other aquatic life to proliferate, thereby making it less desirable to swim and recreate on the lake. Previous high levels of hydrilla caused major difficulties in launching boats, caused the weeds to become entangled in boat propellers and choked off the engine. In addition, young children when swimming previously became entangled in the hydrilla creating a very serious safety issue.
8. Marinas, Campgrounds and lake front owners may have to extend their boat ramps & docks so they can launch and retrieve their boats.
9. Any substantial change to the lake water level will cause further erosion, as current bulkheads and rip rap and are installed for protecting the shoreline at the 250 MSL lake level. These installed shoreline stabilization techniques coupled with the natural shoreline weeds and tree roots have created the current shoreline stabilization throughout the 13,000 acre lake. If the lake level decreases, then the wave action will cause erosion to occur at a different water level. This increased erosion may create muddy water and the current shoreline stabilization techniques may need to be changed.

d. Business Lake Services (BS)

- i. Advantages: None
- ii. Disadvantages
 1. If fewer people come to the lake because of declining lake levels, then the need for other lake services will also decline.
 2. Fewer real estate sales & rentals and less construction will mean fewer people will live on or visit the lake, thereby decreasing the business for accounting, advertising, automotive, attorneys, awards, bed and bath, blinds & shades, business services, catering services, cleaning services, computer services, county stores, physicians, dentists, dining, event location, fitness centers, investment securities, lawn care, newspapers, retailers, self storage, shipping services, skin care, beauty shops, television services, travel & leisure, wineries, etc.

e. Homeowners (H)

1. Advantage: Potential for lower taxes due to decreasing value of property.
2. Disadvantages: –
 - a. Lower lake level discourages any potential buyers or rentals
 - b. Real estate values and assessments could decrease
 - c. Less water will cause the existing water to get hotter faster and increase the human health risks for immersion in heated water, together with the potential for adverse effects of increased bacteria (microorganisms) or algae blooms. .
 - d. Fish, aquatic life, clams, mussels and wildlife may be adversely impacted with less water and therefore hotter water because units 1 & 2 cooling will still generate the same heat as today, but will have less water to cool it and the result will be hotter water.
 - e. Waterfront owners will encounter major difficulties in getting boats off boat lifts, possibly having mud-flats in front of their property making the lake unusable for swimming & boating.
 - f. Lower and hotter water levels could encourage the hydrilla and other dangerous aquatic life to proliferate, thereby making it less desirable to swim and recreate on the lake. Previous high levels of hydrilla caused major difficulties in launching boats, caused the weeds to become entangled in boat propellers and choke off the engine. In addition, young children when swimming previously became entangled in the hydrilla creating a very serious safety issue.
 - g. Some owners and/or Property Owner Associations may have to extend their boat ramps so they can launch and retrieve their boats.
 - h. When *boating, the lake users will **find more hazards** throughout the lake, with stumps, rocks, sandbars, etc. causing lower units to hit them which in turn could necessitate major repairs or replacement of propellers, other engine components and boat hulls. In addition, the **safety of all aboard** the boats is severely jeopardized when the boats run into these newly emergent and changing boating hazards when the lake level is below 250 MSL and continues to decrease during drought cycles. Note: Dominion and the NRC state these drought cycles will be doubled with the proposed type of 3rd reactor wet/dry cooling method. The doubling of the drought cycle will increase the human safety risks dramatically.*

i. Any substantial change to the lake water level will cause further erosion, as current bulkheads and rip rap and are installed for protecting the shoreline at the 250 MSL lake level. These installed shoreline stabilization techniques coupled with the natural shoreline weeds and tree roots have created the current shoreline stabilization throughout the 13,000 acre lake. If the lake level decreases, then the wave action will cause erosion to occur at a different water level. This increased erosion may create muddy water and the current shoreline stabilization techniques may need to be changed, which will increase the cost to the homeowner to modify their existing stabilization technique.

J. Homeowner Insurance rates may increase due to lack of water at dry fire hydrants

k. If fewer people come to the lake because of declining lake levels, then it is quite possible that many of the current lake services (restaurants, retail, etc.) will be unable to grow or stay in business due to lack of customers.

f. Day User (DU) Does not own Lake Anna property and uses Lake Anna for recreation (e.g. campground, marina, state park, etc.) for day and then goes to home, motel or cabin.

1. Advantage: None.

2. Disadvantages:

a. Less water will cause the existing water to get hotter faster and increase the human health risks for immersion in heated water, together with the potential for health risks of increased bacteria (microorganisms) or algae blooms. Hotter water makes the lake less desirable in summer time and day users may try to find other cooler waters to recreate in.

b. Fish, aquatic life, clams, mussels and wildlife may be adversely impacted with less water and the water temperatures rising could cause lethal effects to various water related wildlife.

c. Lower and hotter water levels could encourage the hydrilla and other aquatic life to proliferate, thereby making it less desirable, as well as unhealthy to swim and recreate on the lake. Previous high levels of hydrilla caused major difficulties in launching boats, caused the weeds to become entangled in boat propellers and choke the engine. In addition, young children when swimming previously became entangled in the hydrilla creating a very serious safety issue.

*d. When boating, the lake users will **find more hazards** throughout the lake, with stumps, rocks, sandbars, etc. causing lower units to hit them which in turn could necessitate major repairs or replacement of propellers, other engine components and boat hulls. In addition, the **safety of all aboard** the boats is severely jeopardized when the boats run into these newly emergent and changing boating hazards when the lake level is below 250 MSL and continues to decrease during drought cycles. Note: Dominion and the NRC state these drought cycles will be doubled with the proposed type of 3rd reactor wet/dry cooling method. The doubling of the drought cycle will increase the human safety risks dramatically.*

e. If fewer people come to the lake because of declining lake levels, then it is quite possible that many of the current lake services (restaurants, retail, etc.) will be unable to grow or stay in business due to lack of customers and will be unavailable to the day user when they visit.

f. Fewer people will visit the Lake Anna State Park because of the increased risks at the lake.

Attachment 2 – POTENTIAL HUMAN HEALTH IMPACTS FROM HOTTER WATER IN LAKE ANNA

What do we know that is identified in official government, university, or government sanctioned studies/documents about the potential health risks to humans from hot water in Lake Anna from the current 2 nuclear reactors? Will the Lake water temperatures get hotter from the proposed 3rd Unit cooling method and decreased water levels? What are the health risks to humans from hot water???

Note: (1) We are very concerned that that the declining water levels caused by natural drought cycles, global warming and water release rates to downstream users will be exasperated by the addition of a 3rd nuclear reactor with wet/dry cooling towers that will cause an additional evaporation rate of up to 28 million gallons per day and doubling of the drought cycle that will cause the water to decline further and the water to get hotter faster.

(2) We are also concerned that these declining water levels will cause the water to get hotter faster in the summer months to unsafe water temperatures causing negative impacts to humans, recreation, fish, wildlife, aquatic life, clams and mussels.

(3) The U.S. Clean Water Act appears to have more safeguards for fish, wildlife, aquatic life, clams and mussels than for the protection of humans and recreation. VDEQ assumes that if the fish are o.k. – then everything else must be o.k.

(4) There are currently no water temperature limits in Fahrenheit imposed in the current Water Discharge permit and its 316A Variance for the North Anna plant for the current 2 reactors that can be measured by the public. Dominion can currently heat the entire lake to any temperature it desires with no penalties.

What do we know specifically about the human health issues and hot water?

1. **Water level decrease.** - According to the Nuclear Regulatory Commission Environmental Report (See Page 5.12) says: Because the Unit 3 Cooling tower would consume water (up to 28 Million Gallons per day – see section 3.2), the volume of water in Lake Anna would be reduced (compared to operation of only Units 1 and 2 alone) when the lake level elevation is below 250 ft MSL. Assuming the heat rejection rate from operations of Units 1 and 2 remains constant, **the reduced volume of water in the lake caused by Unit 3 operation would result in a faster increase of lake water temperature (See Page 5.12).**

Note: The Va. Dept of Water Resources estimated that with the 3rd unit operating, the lake would decline at an additional rate of approximately 1.1 inches per month and the current drought started in May 2007. **When the lake was recently down about 30 inches, with the 3rd reactor wet/dry cooling method operating it would have been down about another 12” for a total of about a 42” drop in water level. Dominion states that when the lake is down to 242 ft., the reactors must be shut down. If the 3rd reactor as proposed with wet/dry cooling towers is operational, one wonders whether Lake Anna can sustain three reactors running simultaneously, with the possibility of an 8’ drop in water levels. .**

2. **Previous water temps.** – LACA/VDEQ water teams in 2006 and 2007 have confirmed in various tests that the Water Temperatures have risen to 104.6F on the warm side of the lake and 93F on the cool side of the lake. Dominion's data reported to VDEQ and NRC is very close to this.
3. **How water temps affect prolonged human immersion and changes in concentrations of micro-organisms.** The Virginia State Health Commissioner in a Sep 15, 2005 letter to the Virginia Department of Environmental Quality state when evaluating the potential health effects of any such new nuclear reactors from (1) Direct effects of heat from immersion in ambient waters by recreational bathers, and (2) the potential adverse effects of any changes in the concentrations of microorganisms in those waters said in part:
 - a. **Naegleria Fowleri (amoebas¹ which have been found at various locations in Lake Anna) species organism begins to proliferate at temperatures around 86F and thrives especially well (compared to its competitors) at temperatures of 95 to 113F.** Primary Amoebic Meningoencephalitis (PAM) is a rare but nearly always fatal infection caused by Naegleria fowleri.
 - b. **Persons with heart disease, children, parents and guardians of young children, the elderly, pregnant women and persons with spinal cord or peripheral nerve disorders should be cautious of prolonged immersion in waters that are warmer than body temperature.** Bodies of water that have a temperature exceeding 104F should be considered unsafe for recreational activity for all persons due to the effects of heat alone.
 - c. **Common sense suggests that to reduce the risk of PAM, swimmers might wish to avoid swimming in freshwater venues when water temperatures are high, (e.g. when surface water temperatures are greater than or equal to 95F.**
4. **How elevated water temps affects prolonged human immersion.** The U.S. Consumer Safety Commission indicates that no one should go into a Hot Tub if the water temperature exceeds 104F because of possible fatal consequences.
5. **Various newspapers articles during the summer of 2007 identified that 6 deaths occurred in 3 different states in the U.S. during the summer of 2007 due to PAM. This is a major increase from previous statistics where the Centers for Disease Control said there were only 24 deaths between 1989 and 2000.**

¹ Both amoeba and ameba are acceptable spellings as well as the plurals –bas and bae and all are used throughout this document by various authorities

6. The Virginia Commonwealth University conducted tests for Lake Anna Civic Association (LACA) the summer of 2007 to identify the presence or absence of *Naegleria Fowleri* (NF) in Lake Anna. See report dated Dec 2007 that identified 16 locations were tested and that 9 of the 16 locations tested positive for NF. 5 on the warm side of the lake and 4 on the cold side of the lake. Some of the locations on the cold side are in the upper part of the lake above the 208 bridge. (See the full report at www.LakeAnnaVirginia.org)
- a. On Page 4 of the VCU Related research about NF Amebae states “In studies of fresh water lakes associated with power plants, *N. fowleri* was routinely isolated. The heated water is a breeding ground for pathogenic NF amebae” Thermal enrichment of water can cause proliferation of amebae especially at temperatures of 86F to 111F.
 - b. On Page 5 Recommendations to reduce the risk of infection. The report says “Since it has been shown that *N. fowleri* is present in Lake Anna, the public should be warned to wear nose plugs while diving, swimming or engaging in water activities in which the head is submerged when temperatures of Lake Anna reach 84F or higher.
 - c. On Page 13 – In Conclusion the report says Quote Lake Anna Civic Association studies indicate that Lake Anna is unique in that 99% of the water between the power plant and the dam is re-circulated by the North Anna Power Station cooling pumps. During the summer months water temperatures are in excess of 100 degrees F at some locations. Thus, recirculation of the water could account for sites being positive on one sampling date and negative at another sampling date. This study indicates that increased temperatures at sites on the lake are associated with the presence of *Naegleria fowleri*. These sites should be monitored during the summer months when there are increased water activities to determine the abundance of amebae, in order to prevent primary amebic meningoencephalitis. There is a large body of literatures that demonstrates that as water temperatures rise, the amebae proliferate. This increased proliferation is consistent with a possible increased risk of human infection. Unquote.
 - d. On Page 13 – In summary the report says that Identifying the risk of contracting Primary Amebic Meningoencephalitis infection when *N. fowleri* amebae are present in the water is a very complex issue and there are no U.S. Standards. When concentrations of amebae are high there is a greater chance of becoming infected, but we do not know what all of the risk factors are and what the actual risk of infection is.

7. , In October 2007, the Virginia Department of Environmental Quality (VDEQ) has granted a water discharge permit to Dominion that has imposed **no water temperature limits in Fahrenheit that can be measured by the public at the North Anna plant for the current two operating nuclear units. In addition, VDEQ has granted Dominion a 316A Variance from the U.S. Clean Water Act which allows them legally to heat the entire lake to any temperature that they desire without any penalties.**

8. **Microcystis Algae Bloom Fact's – Note that Algae Blooms occur in Lake Anna every summer when the lake water gets hot.**

Frequently Asked Questions Concerning Health Impacts of Algae Blooms

a. **What is microcystis?**

Microcystis is a cyanobacteria algae that grows naturally on the surface of many waterbodies. Under certain conditions (such as warm weather and an abundance of nutrients in the water) the algae may undergo an explosive type of growth that results in dense, floating mats of algae. This is commonly referred to as an “algae bloom.”

b. **Can exposure to microcystis cause health problems?**

Yes. Microcystis is different from most other types of algae because it secretes a toxin into the water. During an algae bloom, the amount of toxin in the water can become elevated and exposure can be potentially harmful to people and animals.

c. **What types of health concerns are associated with exposure to toxins from microcystis?**

Health concerns vary depending on the type of exposure (contact or ingestion) and the concentrations of microcystis and its toxin, microcystin. Contact with high levels of the cyanobacteria algae has been found to contribute to eye, ear, and skin irritation. More serious health effects (e.g. muscle cramps, twitching) can also occur. If elevated levels of the algal toxin, microcystin, are also present in the water, serious liver damage can result.

d. **How can I reduce my risk of health problems associated with exposure to microcystis?**

Do not come into contact with water near the algae bloom. This also applies to pets.

e. **How long is the bloom expected to last?**

Since algae benefit from warm, sunny weather, as the days get shorter and cooler, the algae are likely to dissipate. Any toxins that are in the water will decline as the algae die off. In addition, any rainfall will help to circulate the water and break-up the bloom.

f. **If I have had contact with this water or the algae bloom, what should I do?**

For questions related to health concerns, contact your health care provider, local board of health, or the Massachusetts Department of Public Health, Center for Environmental Health at (617) 624-5757.

This information is provided by the [Environmental Toxicology Program](#) within the [Department of Public Health](#).

Summary: Lake Anna has currently experienced water temperatures exceeding 104 degrees F in some areas in the cooling lagoons and over 93F on the main reservoir with just two nuclear reactors operating. The NRC says (1) With the addition of the proposed 3rd reactor cooling method (a combination air and water cooling system), that the lake water will evaporate at a rate of up to 24 millions gallons per day and (2) the water temperature will get hotter faster as the water level declines. The VDEQ Water Resources Dept says the water level will decline at an additional rate of about 1.1 inches per month when the 3rd unit is operating and the water level is below 250 MSL.

The Va. State Health Commissioner says that as water temperatures rise there is an increased risk to the public for immersion in the hot water and also that amoebae proliferates faster in water temperatures above 85F. LACA/VDEQ teams have recorded water temperatures of 104.6F on the warm side and 93F on the cold side.

The Va State Health commissioner says that persons with heart disease, children, parents and guardians of young children, the elderly, pregnant women and persons with spinal cord or peripheral nerve disorders should be cautious of prolonged immersion in waters that are warmer than body temperature (98.6F).

The U.S. Safety Commission says that it could be fatal if you go into a hot tub with temperatures greater than 104F. Various newspapers confirmed the deaths of 6 young people in 3 states due to PAM during the summer of 2007.

Virginia Commonwealth University (VCU) studies during the summer of 2007 confirmed the presence of Naegleria Fowleri (NF) on both sides of Lake Anna. The VCU studies further states that as water temperatures increase above 86F and the NF proliferate the risk of getting PAM in Lake Anna increases. The study also says there is a large body of literatures that demonstrates that as water temperatures rise, the amebae proliferate. This increased proliferation is consistent with a possible increased human infection.

VDEQ has granted water discharges permits for the current 2 units to Dominion to heat up the entirety of Lake Anna to any water temperature it desires without any penalties. We have previously had water temperatures over 104F in some parts of the lake and in the high 90's in many parts of the lake. We also know that 99% of the water re-circulates between the power plant and the dam and what amoebas are at one location today could be at another tomorrow.

There is much scientific evidence that there is increased risk of an algae bloom (with heated water and an abundance of nutrients in the water) which in turn creates various health concerns with the type of water exposure (contact or ingestion). The health risks to human from algae blooms have found to contribute to eye, ear, and skin irritation. More serious health effects (e.g. muscle cramps twitching) can also occur.

Question? -- Can we take the chance that one of our loved ones will get sick or die because the water temperatures in Lake Anna which are currently at high levels in the summer months and will be increased further because of the up to 24 million gallons a day additional evaporation from the 3rd reactor cooling method than what they currently are from the existing two reactors?? Why? Because the water level will decline and there will be less water to cool the heat from the two current reactors causing the water to get hotter starting earlier in the summer and increasing temperatures throughout the summer and extending further into the fall.

A simple analogy for the heating of water faster can be made with the fact that heating a ½ cup of coffee will occur much faster than for heating a whole cup of coffee.

If Dominion changed its proposed 3rd reactor cooling method to dry cooling (which they proposed for unit 4 and is currently used in many places throughout the world), then the 3rd reactor cooling method would not further impact the hot water temperatures during the summer months in Lake Anna.

How will we feel if we sit back and do nothing about it now while we still can??