3/10/83

THE CONSERVATION COUNCIL OF NORTH CAROLINA
307 Granville Road, Chapel Hill, N.C. 27514
(919) 942-7935 or 942-1080 (24 hours)

In the Matter of	)	
	)	Docket Nos. 50-400 OL
CAROLINA POWER AND LIGHT COMPANY	)	50-401 OL
AND NC EASTERN MUNICIPAL POWER	)	
AGENCY	)	
	)	
(Shearon Harris NPP, Units 1 & 2)	)	

CONSERVATION COUNCIL RESPONSE TO
APPLICANTS' INTERROGATORIES (FIRST SET)

Pursuant to the Memorandum and Order dated February 10, 1983, response to Applicants' interrogatories was postponed until the prehearing conference of February 24, 1983, and subsequently postponed further until March 10, 1983.

The Conservation Council agrees to the definitions included in Applicants' interrogatories dated January 31, 1983. We also will adhere to the Applicants' request that the interrogatories are to be continuing in nature and will supplement or amend our answers if new material is obtained. Documents, in accordance with the provisions of 10 C.F.R. 2.741(a)(1), will be made available at a place mutually convenient to the parties.

To facilitate the answering of these interrogatories, the general interrogatories will be answered first on a particular contention, followed by the specific interrogatories on that same contention, and then general and specific interrogatories on the next contention.

DS03

CONTENTION 12 (JORDAN DAM BREAK)

1(a). As each response to a specific interrogatory is made, the sources for the response will be included, along with pertinent information for each person or document. This will be done to facilitate the responses and keep the information together.

(b). Each fact used in response to the specific interrogatories will be referenced as far as presently possible.

(c). We assume that the term "Joint Intervenors" was meant to read "CCNC" as this contention has not been adopted by any other intervenor in this matter. As such, we will do this to the best of our ability in the responses to the specific interrogatories.

2(a). This information will also be included in the response to specific interrogatories. Overall, our principal researcher in this matter was Daniel V. Besse, Attorney-at-Law, 401-C Holt Ave., Greensboro, NC 27405 (919/272-4727). We request that questions to Mr. Besse be submitted through us.

(b). All of the responses to specific interrogatories contain information collected by Mr. Besse.

3(a). At the present time CCNC has not finalized the list of expert witnesses which we intend to call relating to this contention.

(b) see above.

(c) see above.

4(a) Again, we assume that the term "Joint Intervenors" was meant to read "CCNC" as this contention has not been adopted by any other intervenor in this matter. As such, to the best of our knowledge, all documents we relied on in formulating this contention has been incorporated in responses to specific interrogatories or listed in our response to 5(a).

(b) Each document relates solely to the contention in which it is referenced.

(c) Each document will be used in responses to specific interrogatories and unless otherwise stated, will be used to support the specific allegation in which the interrogatory and response relate to.

5(a) Each response to specific interrogatories will be documented with reference to all documents used, excluding attorney work product and other privileged material. Background information relevant to the responses to most of the specific interrogatories is available in the following documents: 1) NC Dam Failure Plan for Major Dams, Division of Emergency Management, Department of Crime Control and Public Safety, reprinted January 1983. Available through Jim Weathers, Division of Emergency Management, NC Department of Crime Control and Public Safety, PO Box 27687, Raleigh, NC 27611 (919/733-3867). 2) "Modeling Gradual Dam Breaches," Ponce, Victor Miguel and Tsivoglon, Andrew J., Journal of the Hydraulics Division (American Society of Civil Engineers), Vol. 107, No. 7, July 1981, pp. 829-838. Available at the Health Sciences Library, UNC-CH, Chapel Hill, NC 27514.

3) "New Dynamic Model for Earth Dams Evaluated Through Case Histories," Gazetas, George, Soils and Foundations, Vol. 21, No. 1, March 1981, pp. 67-78. Available at both Duke University and NC State University libraries.

(b) Responses to specific interrogatories will include references to documents.

6(a) Other sources of information not referred to in Interrogatories 2 or 5 will also be referenced to in the responses to specific interrogatories to the extent possible.

(b) Responses to specific interrogatories will include references to other information.

7(a) At the present time CCNC has not finalized the list of exhibits we intend to use in this proceeding to support this contention.

(b) see above.

12-1 (a). No.

(b). Not applicable.

(c). Yes. No analysis has been offered of the potential impact of a flood resulting from a break in the Jordan Dam which would have the potentioal to cause more harm than the mere failure of the Main Dam.

12-2 In Section 2.4.2.2.4 of the ER, "Floods on the Cape Fear River," the Standard Project Flood Water Level for Buckhorn Dam and the near vicinity of the Makeup Water System Intake is cited as

182 feet MSL. According to the September 1979 Inundation Maps from the B. Everett Jordan Reservoir Dam Break Study by the U.S. Army Corps of Engineers (available through Doug Quinn, Hydrologic Engineering Section, Corps of Engineers, PO Box 1890, Wilmington, NC 28402 (919/343-4906) or Jim Weathers, see response to Interrogatory 5(a)), the peak flood level from a Jordan Dam break would be 184 feet MSL at the same point. However, the Army Corps study is predicated on a non-flood level of the river and its tributaries, including feeder streams into the Harris Reservoirs, in order to assume the minimum downstream warning time in its planning.

The combination of a Jordan Dam break and natural flood levels results in water levels significantly above the Standard Project Flood used by the Applicant. Adding the Jordan-created crest to the Standard Project Flood crest results in a height approximately 217 feet MSL.

Information for this answer came in part from Dr. Miguel Medina, hydrologist, Department of Civil and Environmental Engineering, Duke University, Durham, NC 27706 (919/684-2434).

12-3. The normal water level at the Buckhorn Dam is less than 160 feet MSL. The level at that point from a Jordan Dam break (non-flood condition) would be 184 feet MSL, ensuring that the dam would be overtopped. Buckhorn Dam is a relatively small, masonry structure which has required repairs for wear in the past. The assumption that a major, sudden flood caused by a Jordan Dam break would cause damage is not unreasonable.

At least three potential means for serious damage are identifiable: 1) water pressure from rapid water level build-up behind the dam (more than 30 feet in three hours); 2) debris carried by the flood surge colliding with the dam or clogging the spillway; and 3) undercutting of the toe downstream of the dam with overspill turbulence. A Jordan Dam break during flood condition would only increase the likelihood of damage.

Information for this answer came in part from Dr. Miguel Medina, see response to Interrogatory 12-2. Charles Gardner, Land Quality Section, Department of Natural Resources and Community Development, PO Box 27687, Raleigh, NC 27611 (919/733-3833) also provided information on possible damage scenarios.

12-4 (a). We have not completed our analysis on this question, pending our receipt of responses to interrogatories which will presently be submitted to the Applicants.

(b) see above.

(c) see above.

12-5 (a). We have not completed our analysis on this question, pending our receipt of responses to interrogatories which will presently be submitted to the Applicants.

(b) see above.

(c) see above.

12-6 (a). Yes.

(b) The Main Dam crest is not the only relevant elevation level in consideration of possible impacts on the Main Dam and auxiliary dams. The flood crest height at Buckhorn Dam from a break in the Jordan Dam is predicted to be 184 feet MSL by the Army Corps of Engineers. The foundation of the Main Dam is lower (our preliminary investigation places it about 150 feet MSL). It should be clear that effects on the downstream face of the Main Dam must be considered.

(c) Not applicable.

CONTENTION 14 (HYDRILLA)

1(a). As each response to a specific interrogatory is made, the sources for the response will be included, along with pertinent information for each person or document. This will be done to facilitate the responses and keeping the information together.

(b). Each fact used in response to the specific interrogatories will be referenced as far as presently possible.

(c). We assume that the term "Joint Intervenors" was meant to read "CCNC" as this contention has not been adopted by any other intervenor in this matter. As such, we will do this to the best of our ability in the responses to the specific interrogatories.

2(a). This information will also be included in the response to specific interrogatories. Overall, our principal researcher in this matter was Cecil Frost, Botanist, Department of Botany, UNC-CH, Chapel Hill, NC 27514 (919/962-3775 (o), 968-9458 (h)). We

request that questions to Mr. Frost be submitted through us.

(b) All of the responses to specific interrogatories contain information collected by Mr. Frost.

3(a). At the present time CCNC has not finalized the list of expert witnesses which we intend to call relating to this contention.

(b). see above.

(c). see above.

4(a). Again, we assume that the term "Joint Intervenors" was meant to read "CCNC" as this conention has not been adopted by any other intervenor in this matter. As such, we relied on the following as background information in formulating this contention: IMPACT TVA--Natural Resources and the Environment, Vol. 2, No. 5; Vol. 2, No. 7; available through Don Rucker, Information Services, TVA Office of Natural Resources, Room 272, 401 Building, Chattanooga, TN 37401 (615/751-3743).

(b) Each document relates solely to the contention in which it is referenced.

(c) The documents referred to in 4(a) relate to the overall problem of hydrilla in reservoirs. Other documents referenced in responses to specific interrogatories will be used to support the specific allegation in which the interrogatory and response relate to.

5(a). Each response to specific interrogatories will be documented with reference to all documents used, excluding attorney work product and other privileged material. Background information relevant to the responses to most of the specific interrogatories includes those listed in the response to Interrogatory 4(a) and the following: IMPACT: TVA--Natural Resources and the Environment, Vol. 5, No. 2; Vol. 5. No. 4, available through Don Rucker, see address in 4(a). The lead article in Vol. 5, No. 4, is particularly relevant as it specifically looks at the spread of hydrilla in the Guntersville Reservoir in northeastern Alabama near the Bellefonte Nuclear Plant.

(b). Responses to specific interrogatories will include references to documents.

6(a). Other sources of information not referred to in Interrogatories 2 or 5 will also be referenced to in the responses to specific interrogatories to the extent possible.

(b) Responses to specific interrogatories will include references to other information.

7(a) At the present time CCNC has not finalized the list of exhibits we intend to use in this proceeding to support this contention.

(b). see above.

14-1(a). Yes.

(b). Hydrilla is a weedy aquatic plant introduced from Africa. It was discoved in Florida in 1960 and has spread rapidly.

It is readily spread from one body of water to another by reproductive portions adhering to boats and outboard motors used for recreation. Long distance dispersal is accomplished by waterfowl, explaining the appearance of the species in isolated new locations remote from sources of infestations.

Hydrilla has now been reported from states as far north as Delaware, Iowa, and Wisconsin. Within the past five years it has appeared in North Carolina, first clogging small lakes in Umstead State Park about 15 miles north of the SHNPP site. A survey in 1982 revealed its presence in a total of 13 bodies of water in the area. Its recent appearance in Lakes Wheeler and Benson, a few miles to the northeast, is the closest reported occurrence to the plant site.

Even if recreational use of the main and auxilliary reservoirs were prohibited, waterfowl such as ducks and herons are common in the area and there is no way known to prevent the spread of hydrilla. A task force for study of the problem considers the infestation serious enough that eradication no longer seems possible. The Army Corps of Engineers expects hydrilla to continue to spread. The SHNPP site is on the present periphery of its expanding range, and the shallow nature of the reservoirs is such that hydrilla can be expected to flourish.

The principal source for this response is from Delmont, D., N. Rhodes and R. Sutter, Eds. "The status of Hydrilla in North Carolina: Report of the participants in the Hydrilla Workshop," May 4, 1982, Raleigh; Water Resources Research Institute.

(c). Not applicable.

14-2 (a). Yes.

(b). Hydrilla has been reported to clog water intake systems (North Carolina Agriculture Extension Service, "Hydrilla, a water weed menace," Reprint of pamphlet prepared by TVA). Hydrilla, like many introduced weeds, has no natural predators in this hemisphere and multiplies without restriction, completely filling some bodies of water and closing them to navigation. The Corps of Engineers reports that "in Rodman County, Florida, what began as a 2-acre bed of hydrilla in 1971, spread to completely fill 3,000 acres by 1975." (U.S. Army Corps of Engineers, "The inclusion of hydrilla in the Aquatic Plant Control Program for the State of North Carolina," 1982).

Climate appears not to be a limitation in this area. The species has already appeared in other northern states. In Sycamore Lake in Umstead State Park, after only a few years of growth, 70% of the lake surface is covered, with vegetation extending from the lake bottom to the surface.

Heavy infestation can reduce the water storage capacity of a reservoir by 40 to 60%. Submersed aquatic plants have water content of about 90%, so the mass of hydrilla is near that of water, approximately 9 lbs./gallon (National Academy of Science, "Making aquatic weeds useful," 1976). The design flow per unit of water intake through the 3 screens in the filtering system is 21,500 gpm (FSAR). This is the amount of water that would pass through 2 of the 8 intake bays. At this flow rate, the straining system could

not be expected to function for more than a few minutes after pumping was begun under a heavy infestation of hydrilla.

Using the situation at Sycamore Lake a few miles away as an example, assume conservatively that 25% of water volume were tied up in the hydrilla mass (40 to 60% reported possible). If hydrilla were free to move with the intake water, the amount entering would be one-fourth that of intake flow or 5,375 gal/min or 48,375 lbs/minute.

The Service Water System is designed to be protected from effects of various conditions but not the possibility of clogged pipes or actual blockage of the initial screening system. Design load for the travelling screens is a differential head of 5 feet, with maximum head of 10 feet (FSAR 9.2.1). The system is designed to handle normal inputs of debris, but not intake water with a high percentage of wet plant material. The travelling screens would be required to lift, for each unit, 24 tons of wet plant material per minute, remove it from the screens, and transport it rapidly and automatically to a sufficient distance to reach a land disposal site large enough to accumulate the buildup for as long as the emergency situation lasts.

There are three possible situations that might result from the use of the reservoirs under conditions of heavy hydrilla infestation:

1) Initiation of pumping from the auxilliary reservoir under emergency conditions brings strands of hydrilla into contact with the outer coarse strainer. As water flows across the strainer, hydrilla forms a lattice and accumulates a sufficiently large mass

to completely block the flow through the strainer. This might occur in 5 to 10 minutes, depending upon the quantity of free hydrilla below the surface. The travelling screens are able to handle the plant material that comes through the strainer but the chamber is pumped empty in a few minutes. Butterfly valves are switched from the auxilliary reservoir to the main reservoir (time about one minute), where the same process occurs.

2) As above, but hydrilla moves freely through the coarse strainer to the travelling screens. The screens hold but are unable to transport 24 tons/minute/unit of wet plant matter, or the wash pumps are unable to remove the material fast enough, or waste piles up until the system cannot function. As soon as movement stops, the fine mesh travelling screens accumulate an impermeable mass of hydrilla and the pumping chamber goes dry.

3) Hydrilla moves freely through the coarse strainer to the travelling screens. Plant mass builds up until the travelling screen mechanism seizes. Under tension, a screen fails allowing free flow to the fine mesh screens. The fine screens either hold, allowing buildup of hydrilla until the chamber is pumped dry, or the fine screens break, allowing hydrilla intake into the Service Water System where it clogs the numerous pipes and valves in the 18 systems per unit requiring cooling water.

14-3 (a). Yes.

(b). Since some water is required to cool the reactors and since a heavy hydrilla infestation has the potential to block all water intake, water intake clogging by hydrilla could prevent sufficient water intake to cool the reactors.

(c). Not applicable.

14-4 (a) Yes.

(b) See the response to Interrogatory 14-2 (b).

(c) Not applicable.

14-5 (a). No.

(b). Not applicable.

(c). Our contention is that hydrilla could clog the intake structure (see the response to Interrogatory 14-2 (b)). The travelling screens and associated design are not adequate to handle the potential plant load. There is no provision to store the accumulated waste and dumping it back into the reservoir through waste troughs would only concentrate it in this area and speed clogging. There is no provision for removal should the blockage occur at the first coarse screen.

14-6 (a). Yes.

(b). Depending upon water clarity, freshwater aquatic plants may grow as deep as thirty feet (Arber, A, Water Plants, Cambridge University Press, p. 86, 1920). The depth to which hydrilla will grow under Piedmont, NC, conditions is yet to be determined as the species is new to the area. Whether or not the plant can root and grow at that depth should matter little since there is the possibility of large volumes of free-floating material at any depth. Submersed aquatic plants are often barely attached to the substrate by delicate threadlike roots, and can become detached by mechanical

action, herbicides, or unhealthy condition due to disease or overshadowing by plants above.

14-7 (a). Yes.

(b). The maximum flow rate under which hydrilla may become established is unknown, but it can occur in streams which at least occasionally exceed a flow rate of 0.4 feet per second. In the Piedmont area, one of the sites for hydrilla is Crabtree Creek. Water velocity in this stream of 5.4 feet/second was recorded on March 1, 1983 after a light rain (Frost, C,"Unpublished measurement of water flow in Crabtree Creek," 1983).

14-8 (a). Yes.

(b). Hydrilla may be expected to move freely with water under conditions such as those discussed under Interrogatory 14-6 above. Whether transport is by water currents (as modelled in the FSAR) may be immaterial since, in the case of a heavy infestation, 40 to 60% of the reservoir storage capacity could be in the hydrilla mass. Transport sufficient to inactivate intake screens could occur simply with movement of water to the Service Water System intake by pumping.

(c). Not applicable.

I, John D. Runkle, Esq., have prepared the responses to the Applicants' Interrogatories (First Set) No. 12 (Jordan Dam Break) and No. 14 (Hydrilla).

These answers are true and correct to the best of my knowledge.

So sworn,

John D. Runkle

John D. Runkle, Esq.
Executive Coordinator
Conservation Council of NC

Dated this 10th day of March, 1983