Tennessee Valley Authority, 1101 Market Street, LP 5A, Chattanooga, Tennessee 37402-2801

August 6, 2008

10 CFR 52.80

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

In the Matter of) Docket Numbers 52-014 and 52-015
Tennessee Valley Authority)

BELLEFONTE COMBINED LICENSE APPLICATION – RESPONSE TO ENVIRONMENTAL REPORT REQUEST FOR ADDITIONAL INFORMATION – TERRESTRIAL AND AQUATIC ECOLOGY

Reference:

Letter from Mallecia Hood (NRC) to Ashok S. Bhatnaker (TVA), Request for Additional Information Regarding the Environmental Review of the Combined License Application for Bellefonte Nuclear Plant, Units 3 and 4, dated July 11, 2008 [ML081840493].

This letter provides the Tennessee Valley Authority's (TVA) response to two of the Nuclear Regulatory Commission's (NRC) request for additional information (RAI) items included in the reference letter.

The enclosure to this letter provides a response to two of the NRC RAIs related to Terrestrial and Aquatic Ecology, as well as identifying any associated changes that will be made in a future revision of the BLN application. The status of the terrestrial ecology and aquatic ecology RAIs is also provided in the enclosure.

If you should have any questions, please contact Thomas Spink at 1101 Market Street, LP5A, Chattanooga, Tennessee 37402-2801, by telephone at (423) 751-7062, or via email at tespink@tva.gov.

D085
NRO

I declare under penalty of perjury that the foregoing is true and correct.

Executed on this 6th day of AUG, 2008.

Jack A. Bailey
Vice President, Nuclear Generation Development

Enclosure and Attachments:

See Page 3

Enclosure:

Response to NRC Requests for Additional Information – Terrestrial and Aquatic Ecology

Attachments:

2.4.2-1A. The Guntersville Aquatic Plant Management Stakeholder Group, "Guntersville Reservoir Aquatic Plant Management Plan: A Long-Term Action Plan," February 26, 2004. (Entire document)

2.4.2-1B. Webb, D. H., "Aquatic Plants in TVA Reservoirs and Potential Impacts at TVA Power Generation Facilities," Aquatic Plant Monitoring and Management, Tennessee Valley Authority, Chattanooga, TN, June 2007. (Entire document)

cc (Enclosure and Attachments):
M. A. Hood, NRC/HQ

cc (w/o Enclosure and Attachments):
S.P. Frantz, Morgan Lewis
M.W. Gettler, FP&L
R.C. Grumbir, NuStart
P.S. Hastings, NuStart
P. Hinnenkamp, Entergy
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M.C. Kray, NuStart
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R.F. Smith-Kevern, DOE/HQ
G.A. Zinke, NuStart

RESPONSE TO ENVIRONMENTAL REPORT REQUESTS FOR ADDITIONAL INFORMATION

TERRESTRIAL AND AQUATIC ECOLOGY

This enclosure provides the status of the Bellefonte Nuclear Plant, Units 3 and 4 (BLN) responses to the seven requests for additional information (RAI) related to Terrestrial Ecology and the six RAIs related to Aquatic Ecology.

Status of Requests for Additional Information Related to Terrestrial Ecology

RAI Number	Date of TVA Response
• 2.4.1-1	July 25, 2008. (Reference 1)
• 2.4.1-2	August 5, 2008. (Reference 2)
• 2.4.1-3	August 5, 2008. (Reference 2)
• 2.4.1-4	August 5, 2008. (Reference 2)
• 2.4.1-5	August 5, 2008. (Reference 2)
• 2.4.1-6	This letter – see following pages.
• 4.3.1-1	August 5, 2008. (Reference 2)

Status of Requests for Additional Information Related to Aquatic Ecology

RAI Number	Date of TVA Response
• 2.3.1-1	August 4, 2008. (Reference 3)
• 2.4.2-1	This letter – see following pages.
• Table 2.4-7	August 5, 2008. (Reference 2)
• 4.3.2-1	August 5, 2008. (Reference 2)
• 5.3.1.2-1	August 5, 2008. (Reference 2)
• 5.3.1.2-2	August 5, 2008. (Reference 2)

References:

1. Letter from Jack A. Bailey (TVA) to NRC Document Control Desk, "Bellefonte Combined License Application – Response to Environmental Report Request for Additional Information – Terrestrial Ecology," dated July 25, 2008.
2. Letter from Jack A. Bailey (TVA) to NRC Document Control Desk, "Bellefonte Combined License Application – Response to Environmental Report Request for Additional Information – Terrestrial and Aquatic Ecology," dated August 5, 2008.
3. Letter from Jack A. Bailey (TVA) to NRC Document Control Desk, "Bellefonte Combined License Application – Response to Environmental Report Request for Additional Information – Hydrology," dated August 4, 2008.

NRC Review of the BLN Environmental Report

NRC Environmental Category: TERRESTRIAL ECOLOGY

NRC RAI NUMBER: 2.4.1-6

Provide document cited as TVA (1998e) on page 4-74 of the DOE FEIS for the Production of Tritium in a Commercial Light Water Reactor (see ER Section 2.4.3, Ref. 3)

BLN RESPONSE:

The requested document cited as "TVA 1998e" on page 4-74 of the U.S. Department of Energy Final Environmental Impact Statement for the Production of Tritium in a Light Water Reactor (dated March 1999) and referenced as "TVA (Tennessee Valley Authority), 1998e, data input through comments, June-July" could not be located. The substance of those notes is documented and described in the following two paragraphs.

Between 1980 and 1998, the current TVA senior plant biologist visited TVA's Bellefonte site on at least seven separate occasions, over a total of about eight days, to conduct botanical survey work. His initial personal visit was in 1980 while Bellefonte Units 1 and 2 were under construction. The survey work covered at least 80 percent of the BLN site, and his recollection was that the surveys actually covered 90 to 95 percent of the site. These visits were conducted in support of various proposed TVA ancillary activities that involved wetlands and wetland habitats, riparian areas along the river, road routes to the main plant areas, the large ridge between the plant and the river, and agricultural land licensing on the site and along the perimeter of the site. The purpose of these visits was to search for federally or state-listed plants and their habitats.

In forested areas near the Tennessee River, he found habitats that seemed suitable or marginally suitable for certain Alabama state-listed plants, but did not locate any populations of these plants during the optimum seasons of the year for observing them. Consistent with his recollection of these surveys, the TVA Natural Heritage Program database indicates no federally or state-listed plant species reported for the BLN site. These field inspections were conducted over an 18-year period and the database review are the basis for stating that no rare plants have been reported for the site.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION TEXT CHANGES:

None.

ATTACHMENTS:

None.

NRC Review of the BLN Environmental Report

NRC Environmental Category: AQUATIC ECOLOGY

NRC RAI NUMBER: 2.4.2-1

Provide information on current methods of aquatic macrophyte control in Guntersville Reservoir and how successful they are.

BLN RESPONSE:

Aquatic plants are well established in Guntersville Reservoir, and cannot be eradicated (Attachments 2.4.2-1A and 2.4.2-1B). However, as described in Attachment 2.4.2-1A, a stakeholder group consisting of various Guntersville Reservoir user interests (fishermen, boaters, homeowners, industry, tourism councils, local governments, environmental groups, TVA, and others) was formed in 1998, and developed an aquatic macrophyte management plan for 1999 and beyond that balances the impacts of aquatic plants on reservoir use with the benefits aquatic plants provide for fish and wildlife, as described in Attachment 2.4.2-1A. As described in the plan, the strategy determined to be most effective is a combination of mechanical harvesting to provide access to open water areas and selective herbicide treatments to manage aquatic plant populations in nearshore areas.

Mechanical harvesters are primarily used to cut and maintain access to open water areas by clearing vegetation from 30-to-50-foot-wide boat access lanes through colonies of aquatic plants near developed areas (e.g., residential areas, commercial marinas and campgrounds, public and private boat ramps, and scout and church camps) and through colonies of mid-river vegetation to connect near-shore areas with deeper, open water. Harvesters are also used to remove vegetation around drinking water intakes, and private boathouses and piers, and to remove vegetation from small areas around public ramps where the water is deep enough. Mechanical harvesters are operated from June through September. The management plan indicates lanes will be re-cut as needed, but two-to-four-week intervals are generally sufficient. (Attachment 2.4.2-1A)

Herbicide treatments reduce macrophyte growth near developed shorelines and provide boating access lanes in areas inaccessible to harvesters. Herbicides approved by the U.S. Environmental Protection Agency for aquatic use are applied by certified contractors according to guidelines specified on product labels, beginning in June and continuing through September of each year. TVA determines scheduling and the order of areas to be treated. Due to aquatic plant regrowth, areas of developed shoreline may be treated one to four times during a growing season. (Attachment 2.4.2-1A)

Because aquatic plants are cyclic in coverage and abundance in response to environmental conditions such as, flow, turbidity, and other factors, they are well-established in Guntersville Reservoir and cannot be eradicated, but they can be managed. To address management objectives under the long-term plan, the aquatic vegetation is regularly monitored and activities to manage vegetation occur on an as-needed basis. Current TVA activities that manage aquatic macrophytes in Guntersville Reservoir account for less than 10 percent of the total macrophytes in the reservoir. (Attachment 2.4.2-1B) Therefore, only a small percentage of aquatic vegetation within the reservoir is affected.

This response is PLANT-SPECIFIC.

ASSOCIATED BLN COL APPLICATION TEXT CHANGES:

1. Change COLA Part 3, ER Chapter 2, Subsection 2.4.2.5, by adding **new** Subsection 2.4.2.5.5, as follows:

   2.4.2.5.5 Aquatic Macrophyte Control

   Aquatic plants are well established in Guntersville Reservoir, and cannot be eradicated (References 57 and 58). However, a stakeholder group consisting of various Guntersville Reservoir user interests (fishermen, boaters, homeowners, industry, tourism councils, local governments, environmental groups, TVA, and others) was formed in 1998, and developed an aquatic macrophyte management plan for 1999 and beyond that balances the impacts of aquatic plants on reservoir use with the benefits aquatic plants provide for fish and wildlife (Reference 57). As described in the plan, the strategy determined to be most effective is a combination of mechanical harvesting to provide access to open water areas and selective herbicide treatments to manage aquatic plant populations in near-shore areas.

   Mechanical harvesters are primarily used to cut and maintain access to open water areas by clearing vegetation from 30-to-50-ft. wide boat access lanes through colonies of aquatic plants near developed areas (e.g., residential areas, commercial marinas and campgrounds, public and private boat ramps, and scout and church camps) and through colonies of mid-river vegetation to connect near-shore areas with deeper, open water. Harvesters are also used to remove vegetation around drinking water intakes, and private boathouses and piers, and to remove vegetation from small areas around public ramps where the water is deep enough. Mechanical harvesters are operated from June through September. The management plan indicates lanes will be re-cut as needed, but two-to-four-week intervals are generally sufficient. (Reference 57)

   Herbicide treatments reduce macrophyte growth near developed shorelines and provide boating access lanes in areas inaccessible to harvesters. Herbicides approved by the U.S. Environmental Protection Agency for aquatic use are applied by certified contractors according to guidelines specified on product labels, beginning in June and continuing through September of each year. TVA determines scheduling and the order of areas to be treated. Due to aquatic plant regrowth, areas of developed shoreline may be treated one to four times during a growing season. (Reference 57)

   Because aquatic plants are cyclic in coverage and abundance in response to environmental conditions such as, flow, turbidity, and other factors, they are well established in Guntersville Reservoir and cannot be eradicated, but they can be managed. To address management objectives under the long-term plan, the aquatic vegetation is regularly monitored, and activities to manage vegetation occur on an as-needed basis. Current TVA activities that manage aquatic macrophytes in Guntersville Reservoir, account for less than 10 percent of the total macrophytes in the reservoir. (References 57 and 58) Therefore, only a small percentage of aquatic vegetation within the reservoir is affected.

2. Change COLA Part 3, ER Chapter 2, Subsection 2.4.3, by adding references, as follows:

   57. The Guntersville Aquatic Plant Management Stakeholder Group, "Guntersville Reservoir Aquatic Plant Management Plan: A Long-Term Action Plan," February 26, 2004.

58. Webb, D. H., "Aquatic Plants in TVA Reservoirs and Potential Impacts at TVA Power Generation Facilities," Aquatic Plant Monitoring and Management, Tennessee Valley Authority, Chattanooga, TN, June 2007.

ATTACHMENTS:

The following documents are provided as Attachments 2.4.2-1A and 2.4.2-1B:

2.4.2-1A. The Guntersville Aquatic Plant Management Stakeholder Group, "Guntersville Reservoir Aquatic Plant Management Plan: A Long-Term Action Plan," February 26, 2004. (7 pages: entire document)

2.4.2-1B. Webb, David H., "Aquatic Plants in TVA Reservoirs and Potential Impacts at TVA Power Generation Facilities," Aquatic Plant Monitoring and Management, Tennessee Valley Authority, Chattanooga, TN, June 2007. (4 pages: entire document)

ATTACHMENT 2.4.2-1A
THE GUNTERSVILLE AQUATIC PLANT MANAGEMENT STAKEHOLDER GROUP
GUNTERSVILLE RESERVOIR AQUATIC PLANT MANAGEMENT PLAN:
A LONG-TERM ACTION PLAN
FEBRUARY 26, 2004

The Guntersville Aquatic Plant Management Stakeholder Group

Guntersville Reservoir Aquatic Plant Management Plan:
A Long-Term Action Plan

February 26, 2004

Guntersville Reservoir Aquatic Plant Management Plan

A Long-Term Action Plan

Foreword

This plan lays out a strategy for future management of plants that grow in the waters of Guntersville Reservoir. It was developed primarily by the people who live on the reservoir or benefit from the recreational and economic development opportunities it provides. A stakeholder group made up of various reservoir user interests—fisherman, boaters, homeowners, industry, tourism councils, local governments, environmental groups, TVA, and others—evaluated control options for aquatic plants and recommend the following management strategy tailored to the unique needs and preferences of Guntersville Reservoir users.

The proposed strategy calls for a combination of mechanical harvesters to provide access to open water areas and herbicide treatments to manage aquatic plant populations in near-shore areas. These methods were used in combination in 1998 and were found to be effective in providing a satisfactory level of control.

This plan reflects a commitment to managing aquatic plants in Guntersville Reservoir in a way that is both responsive and responsible—in a way that achieves the related goals of meeting the recreational needs of as many reservoir users as possible and protecting the reservoir's ecological health and natural beauty.

Background

Aquatic plants have been abundant and widespread in Guntersville Reservoir since the 1960s. The most abundant species on the Reservoir are exotic, or non-native, species such as Eurasian water-milfoil, hydrilla, and spinyleaf naiad—all introduced to the United States from other regions of the world. Native species such as coontail, small pondweed, American pondweed, southern naiad, and muskgrass also grow in the reservoir but seldom colonize large areas like non-native species.

These plants provide many benefits. They provide food and cover for waterfowl, fish, and smaller aquatic organisms. They benefit the sport-fishing industry by making it easier to catch fish, which helps attract more recreational and professional anglers. They reduce the effects of wave action, filter sediments suspended in the water, add oxygen to the water, and help protect shorelines from erosion.

However, aquatic plants cause significant problems when they reach excessive levels. They can interfere with swimming, skiing, and bank fishing, clog boat propellers, and make it hard for boaters to reach ramps and docks. Large colonies are unsightly, which

impacts the aesthetic quality of the area for visitors and companies looking for relocation sites. They can also clog water intake screens, reduce local property values, decrease native plant diversity, and create mosquito habitat.

Aquatic Plant Growth

Populations of aquatic plants, whether native or exotic, undergo dramatic fluctuations in response to weather-related conditions, such Reservoir levels, river flow, and water clarity. During a record drought period from 1984 to 1988, for example, aquatic plants increased to an historical high in the Tennessee River system. This was followed by a dramatic decline during a period of high flows that began in early summer 1989 and culminated in the early 1990s.

During peak years of vegetation coverage in the late 1980s, aquatic plants colonized as much as 20,000 acres—or about 30 percent—of the surface area of Guntersville Reservoir. This was followed by significant declines in aquatic plants to about 5,000 acres in 1991. Since the early 1990s, aquatic plants have increased significantly—to about 15,000 acres in 1998. Fluctuations can be expected from year to year, but aquatic plant populations are almost certain to colonize large areas of Guntersville Reservoir in the foreseeable future.

Although non-native Eurasian water-milfoil is still the dominant plant on Guntersville Reservoir, hydrilla—a more aggressive and difficult to control non-native species—has increased from about 400 acres in 1996 to about 4,000 acres in 1998. It currently infests an estimated 25 percent of developed shoreline areas. Reports from other regions of the United States, where hydrilla has become established, suggest that it has the potential to displace Eurasian water-milfoil and most other submersed aquatic plants in Guntersville Reservoir. Hydrilla can grow at greater depths than Eurasian water-milfoil because it requires less light, which could allow it to spread into areas of the reservoir not previously colonized by aquatic plants.

Aquatic Plant Management

After the widespread colonization of Eurasian water-milfoil on Guntersville Reservoir in the late 1960s, TVA tried to eradicate it from the Reservoir with large-scale herbicide treatments. While these treatments significantly reduced the amount of milfoil, the plants re-grew. The failure of eradication efforts—and a growing recognition of the benefits of water-milfoil to waterfowl, fish, and other aquatic life—caused a change in strategy in the early 1970s. Instead of trying to completely eradicate the species, TVA began a management program of controlling water-milfoil only in areas where it caused conflicts with reservoir use—primarily developed shoreline. These areas were designated as "priority treatment areas" in the Guntersville Master Plan prepared by the U.S. Army Corps of Engineers and TVA in 1992.

In addition to the use of herbicides and normal Reservoir level fluctuations which provide some control of aquatic plants, TVA introduced 100,000 sterile grass carp into Guntersville Reservoir in 1990 to curtail the spread of aquatic plants. More recently, mechanical harvesters have been used to provide access to developed shoreline areas by cutting lanes through colonies of aquatic vegetation. Harvesters cut aquatic plants and grind them into small, mostly non-viable fragments or collect them for shore disposal.

The Planning Process

Increasing plant populations and growing concerns about their impact on reservoir recreation prompted the formation of a stakeholder group in February 1998. The group's goals were to help develop a process for involving local residents in addressing aquatic plant management issues on Guntersville Reservoir and to provide relief to homeowners and Reservoir users without adverse ecological and economic impacts to the reservoir. Fishermen, boaters, homeowners, industry, tourism councils, local governments, environmental groups, and other reservoir interests were represented. To accomplish their goals, the stakeholder group developed a short-term strategy for managing aquatic plants in the summer of 1998 and then drafted a long-term management plan for 1999 and beyond for public input and review. This long-term plan is outlined below.

As a first step in the planning process, the stakeholder group asked TVA to have an independent public opinion survey conducted to obtain new information about the needs for additional or different approaches to aquatic plant management on Guntersville Reservoir. TVA contracted this work to The Capstone Poll of the University of Alabama, which interviewed more than 400 area residents in June 1998. Survey respondents were randomly selected and screened to ensure some Reservoir-related experience in the previous two years.

Ecological health, habitat for wildlife and waterfowl, and clear shoreline areas emerged as top priorities—consistent with the results of surveys conducted in 1994 on other reservoirs. Sixty percent of the respondents said they approved of the use of herbicides. (For a complete report on the survey results, please write to TVA Aquatic Monitoring & Management, 1101 Market Street PSC 1X, Chattanooga, Tennessee, 37402-2801, or call TVA at 800-288-2483.)

Survey results were presented to the stakeholder group for consideration and used in developing a short-term management strategy, announced by the stakeholder group in July 1998. This interim strategy called for the expanded use of mechanical harvesters and for the resumption of herbicide treatments in near-shore areas along developed shorelines too shallow for mechanical harvesting.

Work on the long-term management plan began in earnest in October 1998, when two focus groups were convened by the mayors of Guntersville and Scottsboro at the stakeholder group's request. These focus groups were asked to identify existing problem areas—resulting from new construction or different property uses, for example—and to

compare these areas with the map of priority treatment areas included in the 1992 Guntersville Master plan.

The stakeholder group received public comments on the draft long-term plan, including the location of priority treatment areas at two public meetings in February 1999. Suggested modifications and public comments were incorporated into the long-term management plan, described below. Implementation will begin with the start of the 1999 growing season.

The Plan

Aquatic plants in Guntersville Reservoir will be managed to achieve three goals: to protect the ecological health of the Reservoir, to meet the needs of as many recreation users and homeowners as possible, and to preserve the reservoir's aesthetic and economic value. Consistent with these goals, this plan calls for continued management of aquatic plants—not eradication. Recognizing the natural cycles affecting plant populations in large Reservoirs along major rivers, it outlines a flexible strategy aimed at (1) suppressing aquatic plants in designated areas of the Reservoir where they cause conflicts with reservoir use, (2) protecting aquatic habitat, and (3) improving communication and public involvement.

Managing Plant Populations

Maps on display at local public facilities show the areas on Guntersville Reservoir which have been designated for aquatic plant management. These areas, totaling about 3,000 acres, were identified by the stakeholder group, as described above. Identified treatment areas fall into four major categories and will be given treatment priority as follows: Priority 1 - Public Access/Recreation; Priority 2 - Residential; Priority 3 - Commercial; Priority 4 - Aesthetic.

Plant populations in these areas will be controlled by two methods: mechanical harvesters and herbicides. Mechanical harvesters will be used to open boat access lanes and to clear small areas near drinking water intakes and around some public ramps. Herbicides will be used in near-shore areas along developed shorelines and to open access lanes in a few areas inaccessible to a mechanical harvester.

Use of these two methods in combination provides some distinct advantages. Harvesters can be used to provide site-specific and immediate reductions in aquatic plants and can be used in close proximity to water treatment plants, where herbicide use is restricted. Herbicides can be used to reduce aquatic plants in shallow water areas and confined areas around docks, where harvesters cannot operate efficiently. Factors such as cost, the location of the treatment area, and primary reservoir use will be considered in selecting the control method.

Two other control methods were considered, but rejected: increasing the reservoir drawdown on Guntersville Reservoir and use of biological control agents. The current reservoir drawdown of about two feet, conducted as part of TVA's normal reservoir operations, provides some control of aquatic plants. However, a deeper drawdown would cause significant problems for overall reservoir operation and commercial navigation. Biological control agents, such as herbivorous fish (grass carp), insects, and plant pathogens were not included in the plan because their use does not meet current management goals, or they have not been proven to be effective in large reservoirs.

TVA will remain abreast of research related to aquatic plant management and share information on improvements and innovations with the stakeholder group. Demonstrated advancements in technology will be evaluated jointly by TVA and the stakeholder group for possible incorporation in future Guntersville plant management operations.

Mechanical Harvesters — Mechanical harvesters will be used to cut and maintain access lanes 30 to 50 feet wide through colonies of aquatic plants near developed areas—for example, residential areas, commercial marinas and campgrounds, public and private boat ramps, and scout and church camps—and through colonies of mid-river vegetation to connect near-shore areas with deeper, open water. Harvesters also will be used to remove vegetation around potable water intakes and private boathouses and piers near drinking water intakes, to improve access to fishing areas, and to remove vegetation from small areas around public ramps where the water is deep enough.

Mechanical harvesters will be operated from June through late September or early October. Access lanes will be re-cut as needed--probably at two to four week intervals—to keep them open for boat traffic. Lanes will be cut in roughly the same locations as in 1998 and in new locations identified during the public review process. The schedule for cutting and maintaining access lanes will be determined and coordinated by TVA.

Herbicide Treatments — Aquatic vegetation in designated areas (see maps on display at local public facilities) will be controlled with herbicides approved by EPA for use in the aquatic environment. Herbicides, including 2,4-D, endothall, diquat, glyphosate, and chelated copper compounds, will be selected based on their effectiveness in controlling the target plant species (see Table 1). In some cases, these herbicides may be used in combination or with EPA-approved adjuvants to improve the effectiveness of control. A maximum of 2,800 acres delineated for aquatic plant management will be controlled with herbicides. Because regrowth is likely to occur in some areas following treatment, portions of the 2,800 acres designated for management may be treated more than once during the growing season. Many of the herbicides available for use in the aquatic environment do not kill the underground rootstock of the plants and regrowth can occur within about five to eight weeks. In other instances, removal of one species - Eurasian watermilfoil, for example - may allow a different species or group of plants to grow in the treated area.

Herbicide treatments will extend from the shoreline to about 50 feet beyond the end of docks, boathouses, and other facilities. Thus, most herbicide treatments on Guntersville Reservoir in areas with residential development, public access and recreational facilities, and commercial businesses will be within 150 to 200 feet of the shoreline. In areas managed for aesthetics, aquatic plants will be controlled up to a maximum of 600 feet from the shoreline or highway causeways. Vegetation reduction along causeways will increase fishing opportunities for bank anglers. Herbicides will also be used to open and maintain access lanes in a few areas that are inaccessible to a mechanical harvester. An example being embayments upstream of highway causeways that have bridges with low clearance and that lack ramps suitable for launching a harvester.

Herbicides will be applied from boats by certified contractors according to guidelines specified on the label. All treatment boats will be clearly marked with identifiable numbers and a flashing light or other method that indicates when the boat is actually applying herbicides. Treatments will be monitored by TVA personnel familiar with standard application techniques and safe handling procedures. The schedule and order of shoreline areas to be treated with herbicides will be determined by TVA. All treatments made in the vicinity of potable water intakes will be coordinated with the managers of water treatment plants to insure that drinking water supplies are not affected.

Herbicide treatments are expected to begin about the first of June and continue through September. Treated areas will be posted with signs that include the date of treatment, name of herbicide applied, appropriate water-use restrictions, and telephone number of the contract applicator.

Protecting Aquatic Habitat

Although this plan designates about 3,000 acres for management of aquatic plant populations, it also seeks to protect habitat created by aquatic plants elsewhere in Guntersville Reservoir—roughly 12,000 acres in 1998. As noted earlier, this is important because—while aquatic plants interfere with reservoir recreation and other uses—they also serve many beneficial functions in reservoir ecosystems.

TVA and the Alabama Department of Wildlife & Freshwater Fisheries, Game and Fish Division, will regularly evaluate fish stocks to ensure that Guntersville Reservoir has healthy populations of black bass and other sport fish. TVA also will continue to monitor the overall ecological condition of the reservoir as part of its Reservoir Monitoring Program. This program includes five important ecosystem components: dissolved oxygen, chlorophyll, sediment quality, benthic macroinvertebrate community, and fish community. Monitoring results will be compared to information collected on Guntersville in previous years and to conditions observed in other TVA reservoirs to identify changes and to determine if they are widespread or specific to Guntersville Reservoir.

Improving Communication and Public Involvement

During the summer season, a herbicide treatment schedule for the coming week will be published in local newspapers. Also included will be brief updates on work accomplished, a telephone number for contacting the contract applicator for information on water use restrictions for each herbicide, and a telephone number for contacting TVA personnel about the effectiveness of the program. TVA also will work with the stakeholder group to develop and distribute information materials about aquatic plants and management strategies.

Active public involvement is essential to ensure that aquatic plant management activities respond to changing Reservoir user needs. The public will be encouraged to provide input on ongoing plant management activities and suggest ideas for future improvement through the mayors' offices in Guntersville and Scottsboro. The stakeholder group and TVA will meet as needed, but at least annually, to review the status of aquatic plants in the Reservoir, consider citizen input, and evaluate the need for adjustments in future aquatic plant management operations

DHW/DGB 2/26/04

ATTACHMENT 2.4.2-1B
WEBB, D. H.
TENNESSEE VALLEY AUTHORITY
AQUATIC PLANTS IN TVA RESERVOIRS AND POTENTIAL IMPACTS AT TVA POWER GENERATION FACILITIES
JUNE 2007

Webb, D. H.
Tennessee Valley Authority
Aquatic Plant Monitoring and Management

Aquatic Plants in TVA Reservoirs and Potential Impacts at TVA Power Generation Facilities (4 pages: entire document)

June 2007

Aquatic Plants in TVA Reservoirs and Potential Impacts at TVA Power Generation Facilities

Background

Submersed aquatic plants (those that grow beneath the surface of the water) have colonized the TVA reservoir system since impoundment in the late 1930s and early 1940s. Until the introduction of Eurasian watermilfoil in the late 1950s and its subsequent and rapid spread in the 1960s into most of the main stem reservoirs along the Tennessee River, submersed aquatic plant populations were very localized and problems associated with clogging and impingement from aquatic plants at TVA generating facilities was minimal.

Currently, aquatic plants colonize an estimated 28,000 acres in TVA main stem reservoirs and about 150 acres in tributary reservoirs such as Melton Hill and Tellico. The dominant submersed species are exotic introductions such as hydrilla, spinyleaf naiad, Eurasian watermilfoil with substantially lesser amounts of native species such as southern naiad, coontail, and pondweeds. Aquatic plant abundance in TVA reservoirs is highly cyclic and since the 1980s coverage has ranged from about 15,000 acres to 46,000 acres. Aquatic plant growth and coverage generally increases during years of low flows and decreases during years with high flows. The highest coverage in the TVA reservoir system occurred during the late 1980s at the end of a several year record drought period in the Tennessee Valley region.

While aquatic plants are cyclic in coverage and abundance in response to environmental conditions such as flow, turbidity, etc., and other factors, they are well established and widely distributed in the TVA system and cannot be eradicated. Any large scale attempts at eradication would be strongly opposed by environmental groups (e.g., B.A.S.S, Ducks Unlimited) and state resource agencies that manage fish and wildlife.

Reservoirs with Major Aquatic Plant Populations

Most of the TVA main stem reservoirs and tributary reservoirs such as Melton Hill and Tellico historically have had populations of submersed aquatic plants. Currently, TVA reservoirs with large populations of aquatic plants include: Guntersville (19,000 acres), Kentucky (3,500 acres), Wheeler (2,500 acres), Nickajack (1,400 acres), Chickamauga (1,400 acres), and Pickwick (550 acres). Because of the large populations of aquatic plants on these reservoirs, potential impacts from aquatic plants to power generating facilities are highest on these reservoirs or to facilities that are "just" downstream of these reservoirs.

Growth Cycle and Fragment Transport

Aquatic plants begin growth from seed or from underground roots and rhizomes during the late spring months and reach peak biomass during the late summer and early

fall months. Beginning in late summer and extending into fall months, the stems and leaves begin to naturally senesce and to "breakup" which can result in large numbers of fragments and floating mats that can be transported downstream by flow and also moved laterally within reservoirs by prevailing winds. Thus, the source of plant fragments that impinge on the screens at intakes at power generating facilities usually are from colonies growing several miles from the generation facility.

Aquatic Plant Management Activities in TVA Reservoirs

TVA uses herbicides to manage aquatic plants in near-shore areas of developed shorelines on Guntersville and Nickajack reservoirs. Management activities in these two reservoirs and Chickamauga Reservoirs are guided by management plans developed by local stakeholder groups that balance the negative impacts of aquatic plants on reservoir use with the benefits that aquatic plants provide for fish and wildlife. In both Guntersville and Nickajack, the annual percentage of aquatic plants managed with herbicides is generally between 5 and 8 percent of the total amount of aquatic vegetation. Mechanical harvesters are also used to open and maintain boating access lanes on Guntersville, Nickajack, and Chickamauga reservoirs. The amount of aquatic plants managed by this method is less than 1 percent of the total vegetation coverage. A few private homeowners on some TVA reservoirs also hire private applicators to treat nuisance aquatic plants in the immediate vicinity of docks and boathouses. Since TVA aquatic plant management activities target plants in areas of developed shoreline and represent only a small percentage of total vegetation, TVA management activities have minimal impact to aquatic plant populations that impact TVA power generating facilities.

Facilities at Risk

Over the years, aquatic plants from reservoir populations have frequently impinged on intake screens at Brown's Ferry Nuclear Plant and Sequoyah Nuclear Plant. Johnsonville Steam Plant also experienced some clogging of intake screens in 2006 and there have been sporadic reports of clogging at other facilities during some years (i.e., hydro-generation facilities at Guntersville and Wheeler Dams). A brief description that includes species, location of colonies, and conditions associated with clogging problems at these facilities is summarized in the following paragraphs.

Brown's Ferry Nuclear Plant (BFNP) – A large percentage (estimated 1,500 acres) of the submersed aquatic plants on Wheeler Reservoir are just upstream of BFNP from the power line crossing at Round Island Creek at Tennessee River mile (TRM) 297 upstream to the railroad bridge crossing (TRM 304.5) near Decatur. Submersed aquatic plants are abundant in this shallow over bank area know as the "Decatur flats" that is heavily fished by bass anglers. Common species include Eurasian watermilfoil, spinyleaf naiad, and coontail. The beginning of the breakup and fragmentation of these species can be expected during the late summer months (e.g., August, September) and extend into the late fall (i.e, November). Historically, coontail has been the most problematic species based on samples collected on the intake screens at BFNP. Coontail is a submersed

species that is not rooted and has neutral buoyancy that allows it to remain suspended in the water column. Because coontail is not rooted, flow and wind easily move the species from the over bank areas to other reservoir areas such as BFNP. The potential occurrence of impingement is greatly increased by storm events that generate high winds and increased flow.

Sequoyah Nuclear Plant (SNP) – The dominant aquatic plant on Chickamauga Reservoir is spinyleaf naiad which is an annual species which each year re-grows from seed. Spinyleaf naiad is a "shallow water species" that grows in a few feet of water in shallow areas of embayments, sloughs, and over bank areas behind islands. After reaching peak biomass in mid summer, spinyleaf naiad undergoes a natural break-up during August and September and the stem and leaves float to the surface and form mats. After the break-up, the floating mats are moved by flow and wind to the reservoir channel and are transported downstream. The origins of most of the floating mats that impact SNP are several miles upstream of SNP in the area from TRM 495 to TRM 515 that includes the Hiwassee Island Wildlife Refuge.

Johnsonville Steam Plant (JSP) – During the past few years aquatic plants such as southern naiad, spinyleaf naiad, coontail, and pondweeds have increased substantially on Kentucky Reservoir including the area in the vicinity of New Johnsonville that now has one of largest concentrations of aquatic plants in the reservoir. In addition to the other species listed above, hydrilla is now well established on Kentucky Reservoir from just south of New Johnsonville (TRM 103) and north to near White Oak Creek embayment (TRM 83). The most likely time for fragments and mats of aquatic plants at Johnsonville would be during August and September and possibly into the early fall months. High winds or high flows during this time period could result in large quantities of fragments or mats that could impinge on the Johnsonville intake.

Hydro-generation Units - The trash racks for the turbines at TVA dams potentially could be clogged by aquatic plants fragments. Unusually high flows in late June and July of 1989 resulted in trash rack clogging at Guntersville and Wheeler Dams when water had to be passed over the dams until the racks could be cleaned. While an event of this scale is unusual for late June and early July, it illustrates that unusually high flows during mid to late summer can have significant impacts to TVA hydrogenation. A major storm system and unusually high flows from a major hurricane during the late summer or early fall could result major, short-term impacts to hydrogenation at dams on reservoirs with high coverage of aquatic plants. The flows would uproot aquatic plants during a time of near peak biomass and move plants from hundreds or perhaps thousand of acres downstream to dams.

Other TVA Facilities – Other TVA power generation facilities (e.g., Widow's Creek) might occasionally be impacted by aquatic plants during unusual flow or weather events (e.g., storms with high winds). Facilities on or just downstream of reservoirs with large populations of aquatic plants are also at risk if water had to be passed over the dams.

Summary Observations

- Aquatic plants are well established and widely distributed in several of the TVA main stem reservoirs (i.e., Guntersville, Kentucky, Wheeler, Nickajack, Chickamauga, and Pickwick) and cannot be eradicated.

- Coverage and abundance of aquatic plants are cyclic and expected to fluctuate dramatically from year to year and are dependent of flows, turbidity, and other environmental factors.

- Aquatic plants undergo a natural and predictable cycle of decline and breakup that can generate fragments and floating mats.

- Current TVA activities (herbicide applications, opening and maintaining boating access lanes) that manage aquatic plants in areas of developed shoreline to enhance reservoir use have little impact on coverage and abundance of aquatic plant populations.

- Fragments and floating mats of aquatic vegetation may originate at locations several miles from intakes.

- Fragmentation and breakup of aquatic plants in TVA reservoirs typically occurs in August and September and can extend into the fall months.

- High winds and high flows can also result in fragmentation and formation of mats and increase the natural rate of breakup and abundance of fragments and floating mats.

- Sequoyah Nuclear Plant and Brown's Ferry Nuclear Plant historically have experienced impingement problems which are expected to continue for the foreseeable future.

- Other power generating facilities (e.g., New Johnsonville) on reservoirs with large aquatic populations are beginning to experience similar problems.

- High flows and winds caused by a hurricane or other similar event could "dislodge" hundreds or thousands of acres of aquatic plants and impact hydrogenation at some TVA dams.