Operations 03 – Trash Management Plan Study Report

EXECUTIVE SUMMARY

Trash and debris enters the Catawba-Wateree Project (Project) reservoirs from a number of sources. Debris includes natural, organic matter which is biodegradable. This "woody debris" serves an important role in providing aquatic habitat for fish and macroinvertabrates in reservoirs and stream reaches. Woody debris can be produced by natural processes such as toppling and wind storms as well as manmade activities including land clearing. The source of the woody debris includes tributary streams and the riparian zone of the Project reservoirs. Non-biodegradable trash entering the Project does not readily decompose. Examples include household garbage and sports balls.

While not originating from the Project hydroelectric stations, the operation of the hydroelectric faculties does influence the movement of trash through the Project. The majority of trash enters the reservoirs and is transported during high water / high flow events. Trash can create operational issues for the hydroelectric generation facilities by partially blocking or "blinding" the trash racks, resulting in reduced flow and increased structural loadings on the trash racks. Duke Power estimates short-term 10-15% reductions in generation due to debris collecting behind the stations trash racks.

This study identified existing and planned programs that relate to trash management. Duke Power has traditionally supported voluntary annual clean-up activities within the Project. The initial draft (October 2004) of the Agreement in Principle proposes to continue this support of an annual liter clean-up. In addition, the Duke Lake Management group removes navigation hazards when reported. This includes large floating debris. Currently, the only mechanical trash handling system within the Project is located at the Great Falls Headworks. On a very limited basis, trash is removed at other locations utilizing barges and manual labor. Duke plans to install a trash rake system at the Fishing Creek Powerhouse. This system will include the capability to collect trash that is removed and will permit segregation of non-biodegradable material and proper disposal of all removed trash. Large volumes of trash typically accumulates at this location and the addition of the trash rake system will provide significant reductions in trash volumes downstream

1.0 INTRODUCTION

Debris, naturally occurring and man-made, collects and accumulates in front of the trash racks at the Project developments. Debris build-up causes increased pressure loading on the trash racks and their support structure, and reduces water flow to the turbines,

resulting in reduced and less efficient power generation. Naturally occurring biodegradable debris is an important component of the Catawba-Wateree ecosystem.

This report describes the current trash management practices for the Catawba-Wateree Project and defines potential enhancements to trash management practices.

2.0 STUDY METHODOLOGY

2.1 Phase One:

The initial step of this study was a review of Duke Power's current debris management practices. These management practices were assessed by interviewing personnel from Duke Power's Hydro Generation group familiar with Catawba-Wateree hydroelectric operations and historic trash management activities. A summary document, describing current state practices was developed. Findings of that review and the salient points from that initial document have been incorporated in this study report.

2.2 Phase Two:

The study team evaluated safe, cost effective, and environmentally responsible options for biodegradable and non-biodegradable trash management. Options explored included continuation of current practices as well as modification and enhancement of current activities.

2.3 Phase Three:

Representatives from the State Relicensing Teams (SRT's) and Regional Advisory Groups (AG's) reviewed and commented on the draft management plan concepts. This input is reflected in this study report.

3.0 RESULTS and DISCUSSION

Debris in the reservoirs is either floating on the surface or submerged. Submerged debris can build up in front of the project trash racks. Biodegradable trash decomposes naturally or in conjunction with biological agents. Examples of biodegradable trash occurring in the project are: logs, trees, leaves and other "natural" debris. Non-biodegradable trash does not readily decompose. Examples include household garbage, cans, bottles, styrofoam and sports balls.

Debris typically moves through the system slowly and accumulates at Project structures gradually. However, during high water events, like experienced during the spring of 2003, debris collects much more rapidly. High water events mobilize significant volumes of debris that is stranded within the reservoir fluctuation zone and floodplain. Typically, Duke does not allow logjams or rafts or debris to accumulate prior to passing downstream through gates or sluices. This becomes more problematic during high flow events where

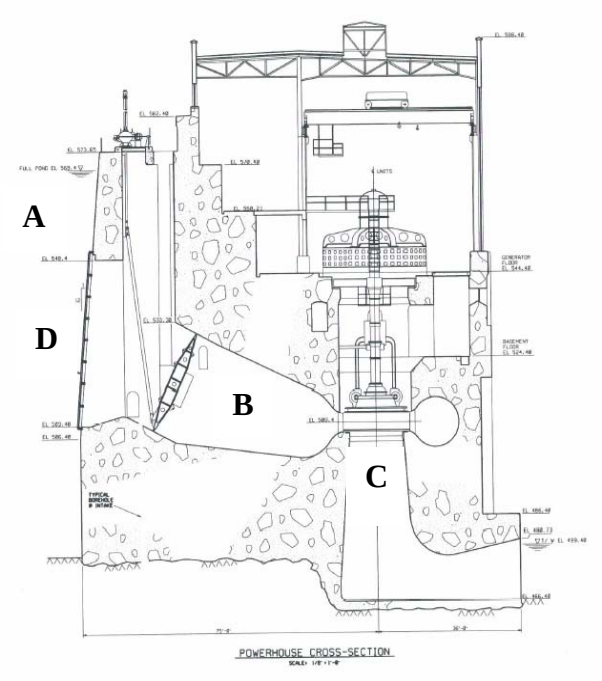
the trash accumulates rapidly. This can necessitate releasing larger volumes of debris. In these situations trash frequently passes uncontrolled over project spillways or through floodgates and can not be collected. Trash enters the project naturally or through intentional human influence. Even though most Counties and States have proactive "litter" control programs, people continue to deposit their household refuse into lakes or areas adjacent to the water. Natural or biodegradable debris consists primarily of trees and vegetation that has fallen into the lake. Natural debris provides habitat for aquatic species. Woody debris (i.e. fallen trees of substantial size and density lying within the FERC Project Boundary) provides coverage and habitat for fish and other aquatic species.

3.1 Generation Description

Water passes through an trash rack (A) into the intake (B) which directs water into the turbine (C) (generator). The turbine rotates and produces electricity. Before water enters the intake it passes through a trash rack (D). The trash rack is designed to screen debris from the flowing water entering the intake and potentially causing damage to the generation equipment. At times trash racks do become clogged and impede water flow and generation efficiency. The description of current practice for trash management is the scope of this report.

3.2 Impacts on Generation

The thirteen (13) Catawba-Wateree hydroelectric stations are not impacted by trash to the same degree. Impacts on generation primarily occur on Lake Rhodhiss (Rhodhiss Hydro), Fishing Creek Reservoir (Fishing Creek Hydro) and Cedar Creek Reservoir (Rocky Creek Hydro). Duke Power estimates short-term 10-15% reductions in generation due to debris collecting behind the stations trash racks. The trash racks are cleaned and debris removed if generation is impacted greater than 10-15%.



3.3 Current Trash Management Practices

In general, trash moves through the system very slowly and does not cause widespread impacts on generation or navigation. However, during heavy or severe storm events biodegradable and non-biodegradable trash can collect against project trash racks quickly. High water events can often cause unexpected generation and navigation impacts.

In addition to removal and cleaning project trash racks, Duke Power Lake Management responds to public reports of navigational hazards. If Duke Power Lake Management receives a call regarding specific navigational hazards they dispatch personnel to remove the debris in a timely manner.

Rhodhiss Development

Generation at Lake Rhodhiss is not typically impacted by trash and debris. The trash racks are cleaned every three to four years. When the trash racks are cleaned the debris is removed sorted and taken to a local land fill for disposal. As long as the trash racks are cleaned every three to four years impacts to generation are minimal. During high water events when debris moves through more quickly, it sometimes is washed over the ungated overflow concrete spillway.

During Hurricane Francis trash collected at Rhodhiss Hydro Station

Fishing Creek Development

Debris collects behind the Fishing Creek Dam gradually. However, during high water events there are typically large amounts of debris behind the trash racks and dam. During normal operation manual removal of debris is required once every three years. When trash racks are cleaned the debris is removed from the system, separated, and disposed of properly in a local land fill. During storm events, floodgates are used to pass the debris downstream and reduce impacts on the generation equipment.

Trash collects gradually during normal operation.

Great Falls Bypassed Reach Short Channel

The Great Falls Headworks is designed with a trash gate to help manage trash and debris that collects against the headworks dam. As debris collects a trash rake (small crane attached to the headworks dam) is used to direct debris through the trash gate and into the Great Falls Headworks bypass.

Great Falls Headworks –Trash rake

Rocky Creek/Cedar Creek Development

Rocky Creek hydro does receive substantial build-up of trash behind the trash racks. Trash racks are cleaned as needed. When the trash racks are cleaned the debris is sluiced downstream. During high water, trash is passed over the spillway and moves downstream.

Of the eleven Catawba-Wateree impoundments and 13 powerhouses, these are the only four locations were debris typically causes operational issues. Navigational hazards can occur on any Catawba reservoir at any time and current practice is that following reporting of the hazard, Duke Power Lake Management will take appropriate actions to remove the hazard.

4.0 ALTERNATIVES

This section describes alternatives, current and planned, that address trash management on the Catawba-Wateree Project. Additional resource enhancement measures related to trash management may be developed as part of the activities of the Operations Resource Committee and completion of the Resource Committee Report.

4.1 Voluntary Initiatives

Duke Power has historically supported an annual voluntary clean-up program on the reservoirs of the Catawba-Wateree Project. Duke has proposed in the October 2004 Draft Agreement In Principle to support an annual litter clean-up on the Project reservoirs. This

annual clean-up may also include selected portions of the regulated river reaches downstream of the Project Developments. This program has resulted in the collection and removal of significant quantities of non-biodegradable debris.

4.2 Navigation Hazards

Duke Power Lake Management will continue the existing program of removing hazards to navigation. Hazards are investigated and removed when they are reported to the Lake Management group.

4.3 Fishing Creek Trash Rake

A mechanical trash rake is scheduled to be installed at the Fishing Creek Hydroelectric facility. When completed, this device will remove floating and submerged debris that collects at the Fishing Creek Powerhouse trash racks. All debris removed will be transported via a sluice mechanism to collection containers. At that point, debris will be sorted into biodegradable and non-biodegradable components and disposed of consistent with regulatory requirements.

Significant quantities of debris collect at this location. Installation and operation of the trash rake system described above will result in significant removal of debris, reducing the transport of trash to the Hydroelectric Developments and river reaches downstream.

5.0 REFERENCES

Ohio Department of Natural Resources, Division of Water Planning, Guide No. 21, “Large Woody Debris in Streams”.

Chelan County PUD, “The Role of Large Woody Debris in Rocky Reach Reservoir”, November 9, 2000.

APPENDICES

Appendix A: Study Plan Scope Document