

Enclosure 3

Project to Remove the Neosho River Logjam at the Entrance to John Redmond Reservoir



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Introduction

Over 10 years ago, a raft or logjam began forming where the Neosho River, the main tributary, flows into the John Redmond Reservoir near Burlington, Kansas. Besides being the principal flood control on the Cottonwood and Neosho Rivers, this reservoir is the backup water supply for the Wolf Creek Nuclear Power Plant. Flooding on the Cottonwood and Neosho Rivers this spring proved that this logjam is permanent. The logjam is now about one and one half miles long and threatens to backup the whole river. It is likely that the obstruction caused by this significant raft of logs will change the course of river in the near future. Already, the river water elevation upstream from the logjam is increasing and flooding the adjacent national wildlife refuges. Two other smaller, but significant, rafts of logs upstream could release under high river flows and trigger this sudden change in the course of the Neosho River upstream from this primary logjam at the entrance to the John Redmond Reservoir.

Historically, logjams as significant as this one found above John Redmond Reservoir do not naturally dislodge over the course of time. For instance, a raft of logs on the much larger Red River in Louisiana grew over three centuries upstream until it reached 160 miles in length. It extended into Texas and changed the course

of the river in numerous places, creating serious flooding and permanent swamps like Caddo Lake. After many unsuccessful efforts by others, Henry Shreve in the 1830s, using special steam-powered snag boats, dislodged the whole 160 miles, opening up river traffic to Texas. Shreveport, Louisiana, is named after his base camp for this monumental feat. The United States government has actively pursued a policy of dislodging logjams to prevent the progressive accumulation of these river obstructions. This policy prevents the disastrous environmental and financial losses caused by the growth and eventual removal of these rafts of logs on rivers. In the case of the raft above John Redmond Reservoir, the immediate removal of the logjam can prevent the destruction of the present national wildlife refuge and the flooding of the village of Jacob's Creek. This preemptive raft removal will also save the eventual costly removal of a much larger logjam or the construction of a new channel for the Neosho River.

Scope of Project

Three surveys were conducted to essay the scope and conditions of the raft of logs just above the entrance of the Neosho River into Redmond Reservoir. Below are older satellite images and several aerial photos taken on Friday, August 20, 2004. The lake level appears to be about four feet down from the normal level of the lake.



Satellite Image from 1991 shows no blockage on Neosho River



Silted mouth of Neosho River into John Redmond Reservoir with a 90 degree turn.

The first of a series of aerial photos show that entrance of the river into the reservoir is seriously silted in and the flow is forced to make a 90 degree turn to enter the lake.



One half mile of river channel near mouth with little log debris.

From the mouth upstream, there is about a half mile stretch which is nearly clear of snags or debris. About a half mile from the mouth, there is side channel. From the side channel upstream on the main channel, debris and a partial logjam begins to appear for several hundred yards until a second side channel appears.



A satellite view shows both side channels off the main channel at the top of photo. These side channels appear to be an original oxbow of the Neosho River.

At their other ends, both side channels are cut off from each other and presently dead end into silt barriers which also prevents them from entering the lake at the present lake water levels.



Looking upstream from the lower end of the Neosho River logjam.

Upstream from the upper side channel, the logjam becomes generally solid on the main channel across the whole width of the river. New vegetation is growing in part of the logjam. The logjam appears to be one and half miles long past the boat ramp on the river at Jacob's Creek.

A ground survey was made the same afternoon of August 20, 2004, of the boat landing at Jacob's Creek.



The above photos show that the upper end of the logjam covers the full width of the river and totally blocks the boat ramp from both upstream and downstream

access. The upper end of the raft appears to be several hundred yards upstream from the boat ramp.

The third survey was made Saturday, August 28, 2004, by airboat to the downstream area of the logjam and by vehicle to the Jacob's Creek boat ramp at the upper end. A Global Positioning System (GPS) was used in coordination with taking physical depths of the water to build a bathymetric picture of the river channel, the river entrance into the lake, and the lake itself. Data supplied by the United States Corps of Engineers revealed that the lake level is not below normal lake or conservation pool levels, contrary to our observations on the first aerial survey. In fact, the reservoir level on both August 20 and August 28, 2004 is almost exactly at the normal or conservation pool level of 1037 feet above sea level. The entrance of the Neosho River into John Redmond Reservoir is less than one foot deep which would pose serious difficulties for logs and debris to exit through the river mouth and to enter the lake under the present river flows and normal lake levels.



Launching of the Airboat near John Redmond Dam



John Redmond Reservoir showing debris snags from the shallow bottom



Channel without debris below the logjam near lake entrance of Neosho River



Lower end of logjam on Neosho River



View from airboat of silt in Neosho River logjam

The above photos were taken on the lake, at the entrance, at various points downstream of the main body of the logjam, and at the Jacob's Creek boat ramp.

Some of the conclusions of this survey are:

- (1) The GPS confirmed that the length of the logjam is over one and one half miles in length, the partially obstructed channel length just below the jam is about one quarter of a mile, and the next clear river section to the channel entrance into the lake is one half a mile.**
- (2) The lake itself is very shallow with maximum of only 4 to 5 feet of depth nearly a mile and one half in every direction from the Neosho river entrance into the lake at this normal lake level.**
- (3) The river channel itself from the Jacob's Creek boat ramp to its entrance into the reservoir varies from 3-6 feet in water depth, except where silt has collected in some of the logjam, resulting in no water depth. Other places near Jacob's Creek have water depths of over 10 feet.**

Conditions and Costs of Project

A rough estimate of the quantity of wood to be removed is between 80,000 and 120,000 cubic yards. Ninety-five percent of this must be removed to be considered effective. Several collection and burn areas need to be supplied by the Corps of Engineers to remove and burn these logs along the length of the logjam. A good access route back to Jacob's Creek needs to be established to conduct the operations. The lake level needs to be raised three to four feet above the present multipurpose level for these project operations. The operations need to be carried out when the weather is above freezing and without ice conditions. There will need to be silt disposal sites possibly during the dislodgement and certainly during the dredging operations for silt removal from the river and lake. The project should be done on a design-build basis with the competitors proposing turn-key projects for evaluation and bid selection.

Three options can be considered:

- (1) The logjam would be dislodged and the freed logs placed and entrapped by berms or levees in the two side channels. After dislodgement, the logs would be ferried into the side channels and substantial berms would be placed at each end of the side channel to encapsulate the debris. A cost estimate for this option would be \$ 1.0 million to \$ 1.5 million.
- (2) The logs in the raft would be dislodged and ferried to several points on the side of the river channel. There a crane or large backhoe would remove them from the water and a loader would stack them into separate piles for burning. A cost estimate for this option would be \$ 1.5 to \$ 2.2 million.
- (3) In addition to doing option 2, dredging would be done at the entrance of the Neosho River into the reservoir to open up the entrance and to create a large silt basin to intercept the river silt from moving into the rest of the lake. This would probably involve removing 1 million cubic yards of silt and original material at the river entrance to create this in-lake basin. A cost estimate for this logjam removal and dredging of 1 million cubic yards would be \$ 5.5 million to \$ 8.0 million depending on the type of dredge material.

Options 1 and 2 would probably take 6 to 8 months to complete and option 3 would probably take 18 months to 24 months to complete.

Respectfully,

David Penny
President
The Master's Dredging Company, Inc.

