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Technical Management Team

System Operation Request to Operate the Snake River Projects at MOP + 1 During 2004 Season

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Introduction

The Columbia River Towboat Association consists of the nine major tug and barge companies operating along the Columbia Snake River System. We work in close coordination with other navigation interests in the region including the Columbia River Steamship Operators; Regional Maritime Security Coalition; Columbia River Pilots; Columbia River Bar Pilots; all 26 Ports; the International Longshore and Harbor Worker's Union; the Inland Boatman's Union and the Master, Mates and Pilots Union to facilitate the transportation annually of nearly 14 million tons of mostly agricultural products. Freight forwarders, exporters, shippers, growers and producers count on the low-cost barging alternative to insure the competitiveness of the region with the other export centers around the world. 49,000 family wage jobs depend on the continued viability of this, the second-most vital trade corridor in the United States. A permanent loss of one foot of barge draft equates to the loss of 1,000 jobs. The second foot would likely eliminate the most cost-competitive transportation alternative available.

Most Americans are blithely aware that international commerce is approaching 25% of gross domestic product and that 95% of U.S. foreign commerce is transported by maritime. The U.S. Commerce Department is forecasting a doubling of international trade by 2020. Current transportation infrastructure, with respect to truck and rail, is nearing maximum capacity. The barging industry, on the other hand, is approximately 40% utilized. In many parts of the country, and in other areas of the world, the positive benefits of barging are recognized and strong efforts are underway to make best use of it.

It is not widely understood that barging is the most environmentally benign mode of transportation. To illustrate the point, consider that a modal shift from barge to rail would require 1,400 more trains annually to handle the volume. The trains would burn 331% more fuel and produce an additional 8,000 tons of hydrocarbons, carbon monoxide and nitrous oxide each year. A modal shift from barge to truck would require 500,000 more trucks burning 826% more fuel and generate an additional 44,000 tons of emissions per year. Runoff from the country's roads and parking lots are the cause of 90% of the contaminates entering the nation's waterways each year.

Despite the benefits of barging, the system is degrading.

Background

On Wednesday April 9, 2003, the Columbia River Towboat Association (CRTA) submitted evidence of significant shoaling in the Snake River to the Technical Management Team (TMT). The U.S. Army Corps of Engineers lacked current and, in some cases, previous survey data necessary to determine the

accuracy of the information provided by the CRTA. At the request of the CRTA, the TMT authorized continued operation of the reservoirs to MOP +1 for one week, until April 16, 2003. This allowed a designated team, including CRTA; USACOE and USCG representatives, time enough to physically verify CRTA claims by taking soundings of the identified areas. On April 15, 2003, the CRTA presented their findings to the Technical Management Team. The group confirmed that significant shoaling has occurred in the areas identified by the CRTA.

Another year has passed without dredging. Each year, more sedimentation enters the system. Shoaling is most evident near the confluence of the Snake and Clearwater Rivers. Other trouble spots include the approaches to Ice Harbor, Lower Monumental and Lower Granite Dams and the upper reaches of the Lower Granite Reservoir. CRTA has requested the United States Coast Guard to establish navigation aids in the following areas to mark the extent of shoaling and help avoid a serious marine incident:

Lower approach to Ice Harbor
Establish green can at approx. 46 13. 641 N , 118 59. 605 W

Ice Harbor Pool (mile 27.5)
Establish red can at approx. 46 23. 754 N , 18 39. 793 W

Ice Harbor Pool (mile 28.2)
Relocate red nun #38 to approx. 46 24. 273 N , 118 39. 201 W

Ice Harbor Pool (mile 30.8)
Relocate red nun #34 to approx. 46 26. 186 N, 118 38. 405 W

Ice Harbor Pool (mile 31.5)
Relocate red nun #38 to approx. 46 26. 603 N, 118 38. 387 W

Little Goose Pool (mile 99.9)
Establish red nun at approx. 46 40. 756 N, 117 33. 127 W

Lower Granite Pool (mile 129.2)
Establish green nun at approx. 46 26. 155 N, 117 12. 656 W

Lower Granite Pool (mile 129.8)
Establish green nun at approx. 46 25. 801 N, 117 12. 703

Failure of the Army Corp of Engineers to maintain the channel approaches to docks near the confluence of the Clearwater River has resulted in several recent groundings. One such grounding involved a cruise vessel attempting to dock at Clarkston, Washington. The vessel was loaded with passengers and the incident resulted in personal injury.

In December 2004, a grounding occurred in the Ice Harbor Cut resulting in a $ 1.0 million loss. The stakes can be much higher. In this case, there were no injuries, there was no oil spill, the barges were not affected and the tug was re-floated within 12 hours. The cost of an incident involving the release of oil

could reach a level in excess of $50 million not counting the impact of a prolonged system-wide outage or loss of life. While lack of dredging was not specifically attributable to this particular incident, there is no doubt, on the part of CRTA, that system degradation from lack of maintenance dredging is increasing the danger to the lives and safety of our crews and increasing the potential for a serious marine incident.

The CRTA, based on reports received from our vessels, will continue to make recommendations to the Army Corp of Engineers for areas that should be included in future surveys. Our Captains and crews are relying on the Coast Guard's willingness to establish and relocate aids to navigation necessary for safe navigation. The CRTA is committed to monitoring this situation and will endeavor to keep the USCG and the COE appraised of changes we observe which affect safety to navigation and the environment. CRTA cannot over emphasize the importance of maintaining the system.

Tugs and barges engaged in this work are purpose-built and specifically designed to safely operate within the physical confines of the federally-authorized 14-foot deep by 250-foot wide navigation channel. A typical, fully-laden grain barge draws 13.6 feet. Most barges are 42-feet wide by 272-feet long. The typical four-barge tow is 84-feet wide by 544-feet long. Tugs range in draft between 10.6 feet and 12.6 feet. Their overall length is between 90-feet and 103-feet. This allows, dependent on the configuration of the typical four-barge tow, between 3 feet to 16 feet of clearance between the tow and the end of the navlock and 1 foot on either side between the edge of the barge and the lock wall. In addition to the obvious limitations to maneuvering in such tight quarters, there are other effects amplified by changes in the hydrodynamics of the navigation channel caused by lack of dredging that multiply the degree of difficulty in handling the tug and tow.

The problem of controllability of tows in confined waters, particularly narrow waterways and the potential hazards of collision or allision and grounding, is maximum. Hydrodynamic forces and moments acting on vessels in narrow, shallow waterways are greatly different from those in open, deep waters. A great deal of technical research, including captive model tests, digital simulations and computer modeling, has been conducted in recent years at various hydrographic facilities to assess the hydrodynamic characteristics of vessels in confined waters. The predictability of the dynamic behavior of the tugs and tows can no longer be relied upon under a constantly changing environment. Some important factors affecting the directional stability and control of vessels in restricted waters include:

Sinkage & Trim
As a tug and tow increases speed, she sinks appreciably with respect to the mean surface of the water. Both the bow and stern ride lower in the water as the velocity is increased and the water level alongside is lower than the surrounding water. There is a distinct bow wave and a distinct stern wave, and the water between the two is depressed. The tow rides in this depression. If the trim is off (leaning), the handling characteristics are affected. The operator always prefers his barges to be trim.

Squatting
As the tow travels along, it rides in a depression created by her own passage. If the speed is increased, the bow begins to rise and the stern sinks more rapidly. This is known as *squatting.*

Both *sinking* and *squatting* are increased in shallow water. The proximity of the bottom causes increased relative velocity as the water flows under the tow. The combined effect of *sinking* and *squatting*, in the extreme, can add up to 15% greater draft to the tow. *Squatting* can become a serious problem, both from

the effect on the propulsion system (cavitation), the reduction in under-keel clearance and the danger from the resultant wake (*bank cushion*).

Bank Suction and Bank Cushion
If the tow strays from the center of the channel, there is a tendency for the tow to move bodily toward the near bank. As she steams closer to one bank than the other, the passage between her side and the nearer bank becomes more restricted and the velocity of the flow on that side increases reducing the water level between the tow and the near bank. This tends to force the tow into the near bank, an effect known as *bank suction.* If the tow is maintained on a course parallel to the adjacent bank, she will move into the bank. As the tow approaches the bank, the bow wave on the near side tends to push the bow away from the bank. So, in addition to *bank suction* tending to draw the tow bodily into the bank, there is the *bank cushion* effect, which tends to make the tow sheer away from the bank. The resultant sheer may become so great that the tow will cross the channel and go aground on the opposite shore.

In practice, the tow can usually transit safely near one bank, but she must maintain an inclination (crabbing) away from the bank to overcome the *bank suction.* This requires several degrees of rudder and sometimes the *bank cushion* effect may be too large to be overcome by the rudder. When the tow is crabbing, it uses more of the channel. A typical 84-foot wide tow with an inclination of just 10 degrees, in effect, uses the entire authorized 250-foot wide channel. For this reason, passing arrangements with other vessels are made well in advance and only in the increasingly a-typical areas that have adequate water depths outside of the authorized channel.

Current
The resistance of the underbody of the tow to the flow of current is proportional to the square of the velocity of the current and the cross-sectional area presented to the flow. It is impossible to have a current relative to the tow other than ahead or astern. If the current, as it is often, is other than parallel to the axis of the tow, then offsetting forces must be applied. As speed is changed, the effect of the current increases. If the tow becomes broadside to the current, the tow will be swept along with the current requiring large forces to compensate. Currents around the approaches to the dams range in velocity and predictability from moderate to extreme. To overcome these forces, the operator entering the navlocks must maintain sufficient speed over the ground to maintain steerage and overcome these forces until reaching the entrance of the lock. When departing the locks, full power is often required to gain sufficient speed to overcome the effects of the current. Currents, man-made and/or natural, commonly reach velocities in excess of 6 miles per hour.

Steerage
At slow speeds, even a hard-over rudder, in some instances, is not sufficient to overcome some forces. When the vessel has lost *steerageway*, her heading can no longer be controlled by rudder alone. *Steerageway* depends on the water flow over the rudders. The greater the flow, the greater the effect. Even with propellers turning at full speed increasing the flow past the rudders, sufficient momentum must be carried to overcome the effects of wind and current. When the tow is proceeding on an off-centerline course parallel to the centerline of the channel, the effects of *bank suction* force is produced..

Meeting and Passing
As tows approach one another, they must move off of their centerline course. The yaw and sway forces created by the *bank cushion* tends to force the tows toward the center of the channel and the oncoming vessel. As the tows close on one another, very large interacting forces take place. As sediments encroach on the extremities of the channel, the tugs find themselves sweeping the bottom with their propellers. The dynamic disturbances are combined with the channel wall to create oscillatory diverging motions that will cause noticeable heading changes. To overcome these forces, the operator must maintain inertia. A top down view of the approaching vessels would reveal that they are carrying large drift angles to the centerline of the channel (crabbing). The drift angle could easily exceed 10 degrees. A ten-degree drift angle will place the stern of the vessel outside of the channel limits. Meeting situations must be carefully planned to occur in wide and deep areas of the river.

Conclusion
These effects are not inclusive of all of the external forces our operators are challenged with nor do they represent the full extent of those forces that are changing, as a direct result of degradation of the system. In some areas, where silt is encroaching on channel boundaries and, particularly, the entrances to the navlocks, the effects of some of the aforementioned forces are becoming increasingly pronounced. As the depth of the channel diminishes and the width is further constricted, reaction to conditions that affect the handling characteristics of tugs and tows becomes more unpredictable.

If this situation is not resolved, we in the CRTA fear that the result could be devastating to the environment. Further, we respectfully caution policy makers that if the system is allowed to continue to degrade, the welfare of 49,000 families will likely suffer.

We also feel strongly that the lack of maintenance dredging is unfairly increasing the risk to the lives and safety of our crews in whom we entrust with the responsibility to deliver their vessel and cargoes. In the absence of dredging, it is imperative to safe navigation that we are provided with the authorized depth of water (14-feet) by operating at least one foot above MOP.

We request that the pools above the Snake River Dams be operated at a level at least one foot above MOP during 2004 as necessary to insure a fourteen foot channel.

Respectfully,

COLUMBIA RIVER TOWBOAT ASSOCIATION

Captain Larry G. Johnson
Member