



## LOSS CONTROL SERVICES

January 22, 2015

Mike Amodeo  
Metro  
600 NE Grand Ave  
Portland, OR 97232-2736

Policy No: 367747  
Policy Dates: 7/1/2014 to 6/30/2015

Dear Mike:

### Introduction

A hazard recognition evaluation survey was conducted at Metro's Multnomah Channel North and South Water Control Structures. The purpose of the evaluation was to determine if the process of adjusting the weir height in the North and South water control structures that separate the channel from adjacent wetlands presents employee workplace and "Permit Required" confined space hazards.

### Process

The North and South water control structures that separate the Multnomah Channel from adjacent wetlands each consist of two water control gates with fish-ways that allow Salmon to enter the wetlands to spawn. The water level of the wetlands are raised or lowered by physically inserting or removing 2" by 6" stop logs into and out vertical riser slots located on the wetlands side of the gates. The wetland's water level can also be lowered (draw-downs) by manually turning a circular hand wheel that is attached to a worm gear stem that in turn raises or lowers a slide valve. Access to the base of the stop logs on the channel side of the riser is restricted by permanently attached heavy gauge wire screens. Water is channeled under a gravel road by way of six and eight foot diameter inverted pipes where it streams through one of three debris grates and out into the channel. The fish-way pipe has a slightly smaller diameter inverted pipe with water features built into it that reduces flow velocity and allows the fish to rest on their journey into the wetlands.

Each riser has a tide gate that allows water to enter the wetlands but prevents wetlands water from emptying back into the channel. Periodically both the tide gates and channel side debris grates will get stuck with debris requiring staff to enter the inverted pipes to access the tide gates after the wetlands water has drawn down, or during the summer when the water level is low, to manually remove debris from the debris grate. On occasion, after drawdowns, staff will enter the low water in front of the stop-logs to remove debris that is stuck in the tidal gates or hung up on the top of the stop-logs.

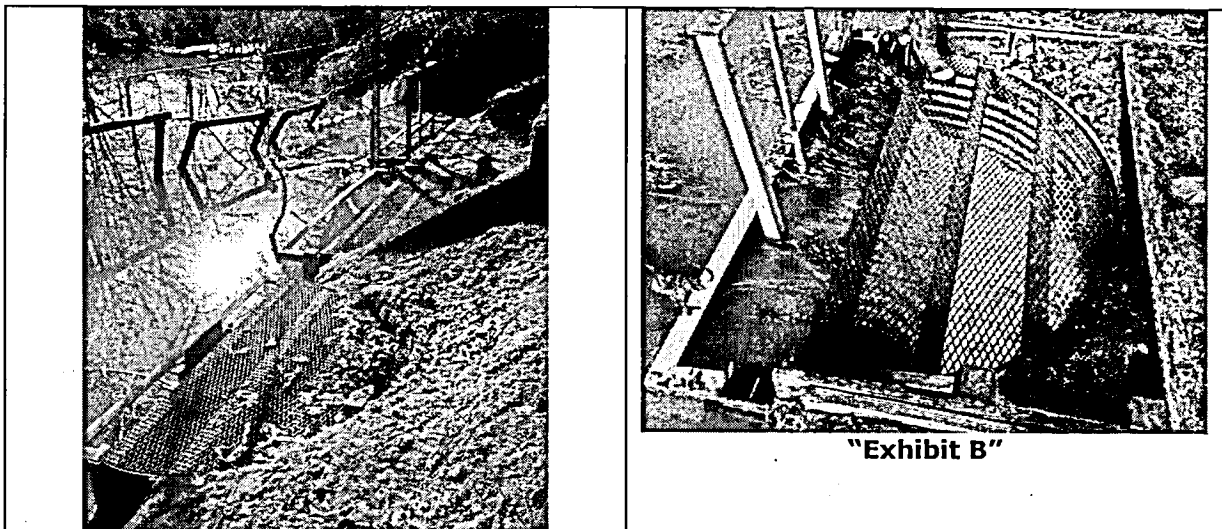
### Observations

1. To install or remove the stop-logs employees must bend over and kneel down on the riser's steel grate covers in an ergonomically stressful position that increases their chance of experiencing a back injury and puts their reaching arms in ergonomically stressful "Red Zone" postures. The task also increases their chance of falling into the water, getting entangled in debris, developing hypothermia in the cold water and possibly drowning before they can be assisted by a co-workers. See exhibit B.
2. The wetlands sides of both the North and South channel's gates are unprotected by standard guardrails increasing the potential that an employee may fall into the water during routine servicing of the gates. See exhibits A & E.
3. A life ring is not stationed at either water control structure and employees typically do not wear personal floatation devices during routine servicing of the gates.
4. The debris grates on the discharge or channel side of the water control structures are stuck, bolted or welded in place. The structure's plans call for hinged gates but the hinges have long since rusted tight preventing the gates from functioning as designed. Access holes have been cut into the grates (South gate observed) in order to allow employee entry into to pipes for access to the tide gates and stop-logs. It also allows debris to enter the inverted pipes during high tides further increasing the number of debris clean-outs required to be done by staff. See exhibits C & F.
5. One thousand pound capacity rotating davit lift arms, equipped with a hand operated winches, were at one time available to remove debris and stop-logs from the risers but have since been damaged by vandals and removed from service requiring employees to manually do the work. The base holes are still available for use on the wetlands side of the structures but were not constructed for use on the channel sides. See exhibit E for base holes.
6. The manual opening and closing of the slide gates to drawdown the wetlands takes an employee approximately one hour of turning a ring handle in an ergonomically stressful "High Red Zone" posture that increases ergonomic stressors to their shoulders. In most cases the worm gears are rusted increasing the force necessary to raise or lower the slide gates. See exhibit D.
7. To access the South water control structure's stop-logs and slide valves, employees must both descend and ascend a slippery slope on the unguarded wetlands side of the gates increasing their chances of falling into the cold water and drowning.
8. To access the stop logs from the channel side of the riser, employees will enter inverted pipes (six foot diameter for North structure, eight foot diameter for the South) by way of a holes cut in the South structure debris grates and by a hinged grates at the North structure. The inverted tubes are partially filled water, present unseen trip hazards and may meet the criteria for a "Permit Required" confined space.
9. Pressure treated 6"x6" stop-logs are water logged and have expanded over time. The water logged stop-logs make it difficult in not impossible to remove them by hand forcing the employees to enter the water on the channel side of the gate and cut them out with a chain saw for piece removal. This unsafe act increases the potential for a sprain-strain injury during the initial removal attempt and for a laceration or amputation injury when using the chain-saw on the wetlands side of the structure in a slippery environment where footing is unsure.

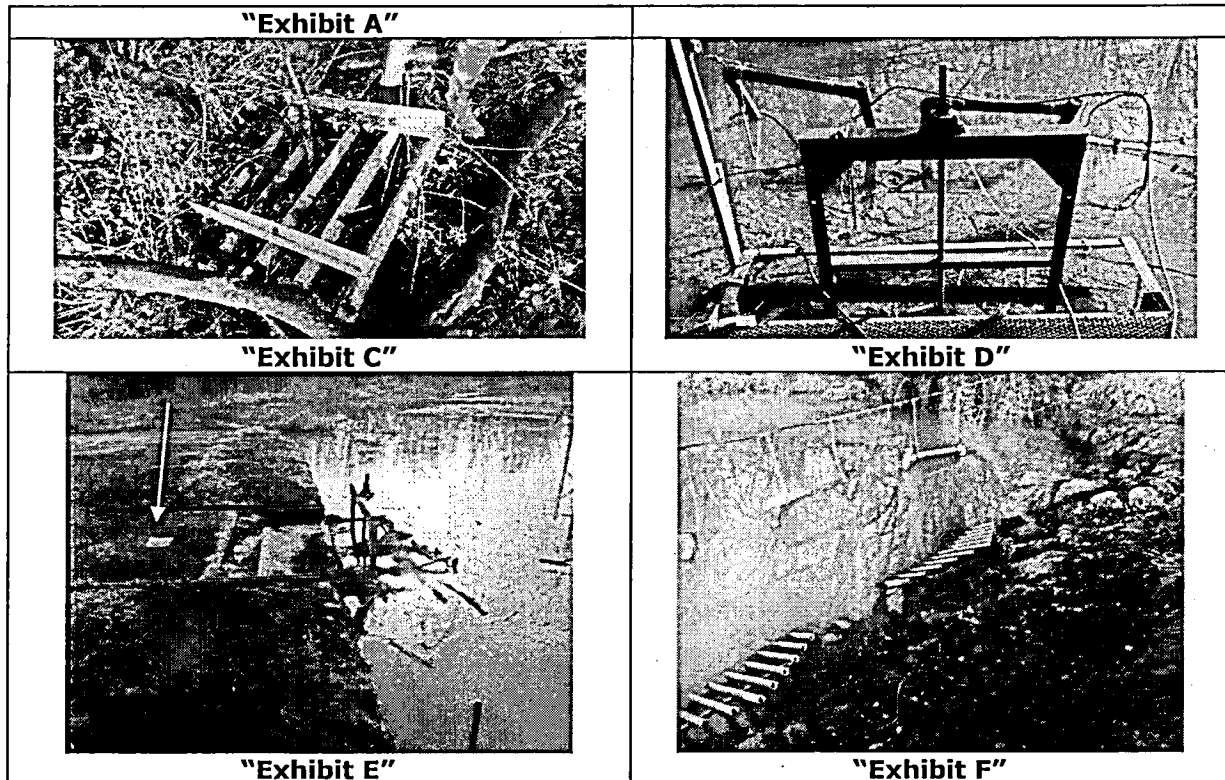
### Recommendations

1. Install standard guardrails on the wetlands sides of both water control structures as a strategy to prevent fall-in water and drowning hazards.
2. At the South structure install a stairway from the road to the riser access area as a strategy to prevent slip and fall related injuries when ascending and descending the slope.
3. Require employees to wear personal flotation devices when servicing the risers as a strategy to help prevent drowning accidents.
4. Reinstall and/or reacquire a 1,000 lb rated rotating davit lift arm with a hand operated winch for use at both water control structures to install or remove heavy stop-logs from the riser channels and as a strategy to prevent manual material handling and laceration injuries.
5. Consider using environmentally friendly 4"X6" tongue and groove stop logs (install one inch spacers in riser channels as needed) to allow for stop-log swelling as a strategy to reduce the force needed to remove the units after they become saturated with water.
6. Reinstall the cut-out sections of the debris grates on the channel side of the South water control structure and repair or replace the frozen hinges (on North structure as needed) as a strategy to prevent tidal debris from entering the inverted pipes and reducing the number of required entries. Consider additional study of the task to determine if the area is a "Permit Required" confined space and develop OSHA required entry procedures as needed.
7. Replace the rusted stems (worm gears) on the tide gates or install a gear/power drive unit as a strategy to decrease the force necessary, and resulting ergonomic stressors to the employees, when opening or closing the units.

### Exhibits



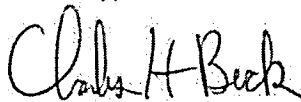
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Safety remains your responsibility.



### Conclusion

Thank you for utilizing SAIF's loss control services. Please give me a call if you have any questions or need further assistance.

Sincerely,



Charles H. Beck, CSP, ALCM, ARM  
Senior Safety Management Consultant

C: William Jemison/Risk Manager, Chuck Paxton/Underwriter, Willis of Oregon/Agent, Firm File

CAZ comments



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Handwritten notes in red ink: LEAK, Process, 6", SOUTH?, BECOME BLOCKED/ OBSTRUCTED, REVERSE, UPSTREAM OF, ?



2 - HAZARDOUS STAFF

### Observations

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SPANK

THIS WAS NOT USED PRIOR TO VANDALISM ONE TO CHALLENGES TO TRANSPORTING TO LOCATION + CUMBERSOME FUNCTION.

RTGS

151

WITH

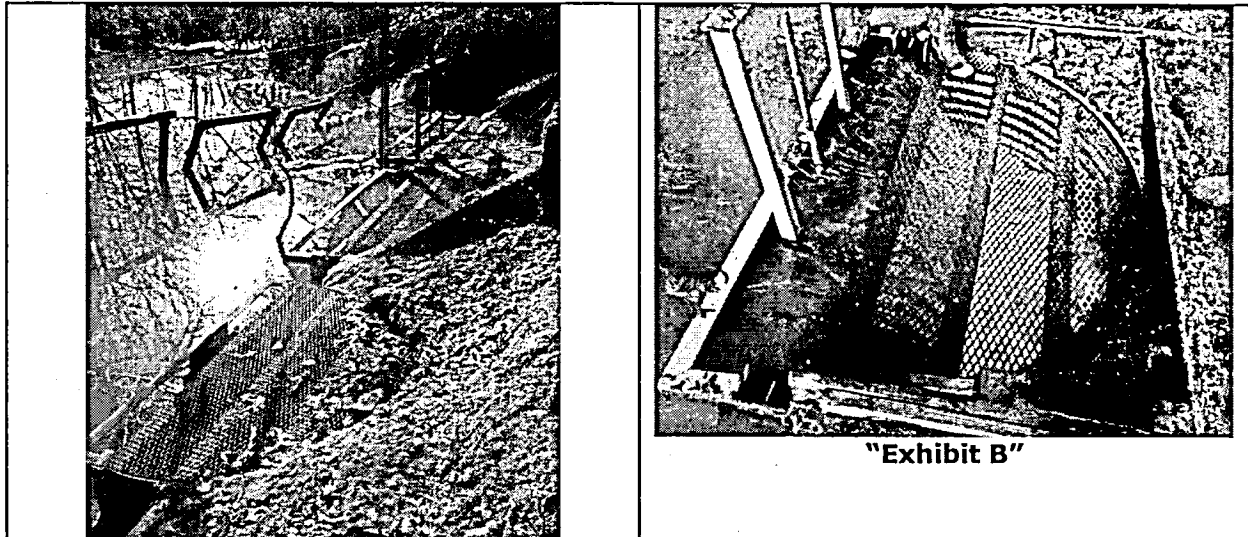
(GOOD!)

NOT  
HUH?  
NEVER  
YES

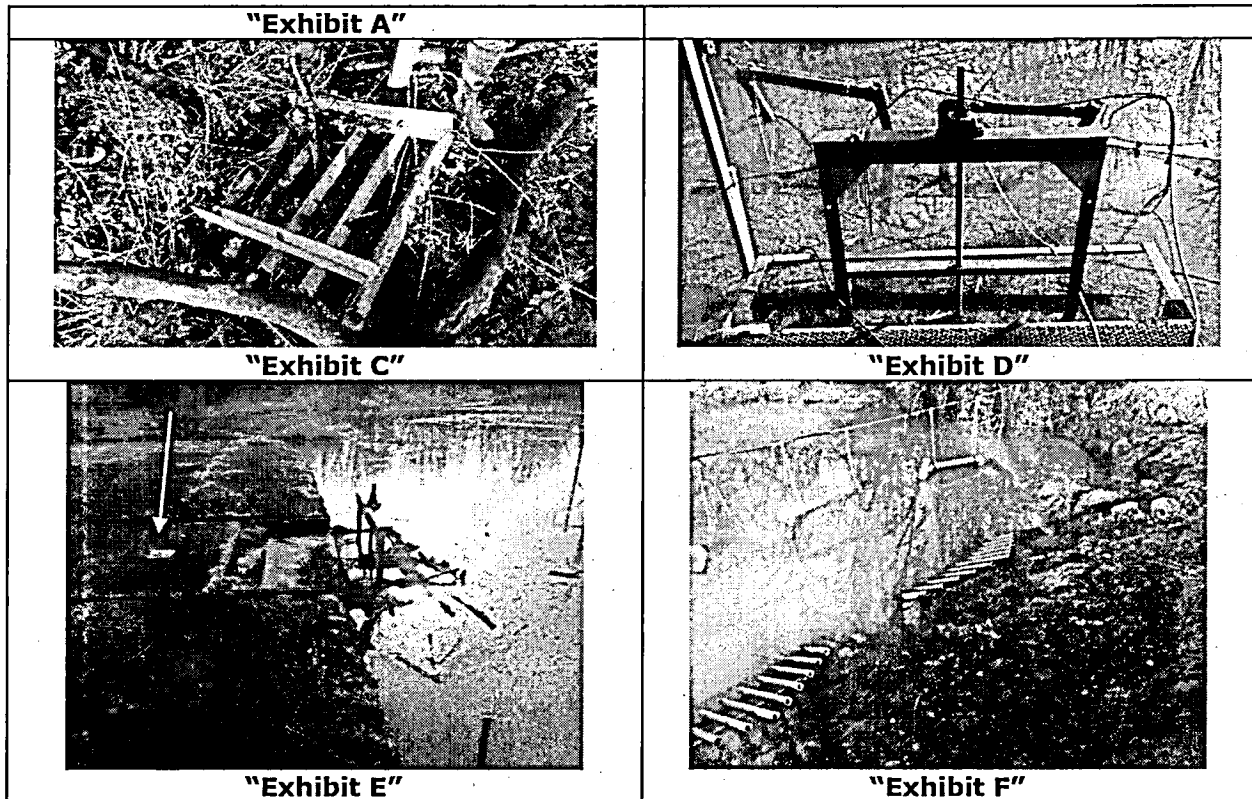
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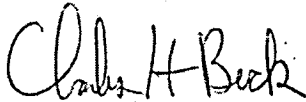
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