

Snake River Slide Gate 2007 Season Summary

Version 1.0

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Prepared for:

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1. INTRODUCTION

1.1 *Background*

2004 through 2006 were difficult times for the slide gates at Lower Granite, Little Goose and Lower Monumental. In 2006 alone there were 27 gate related issues between the three sites. The issues ranged from gates sticking open or closed to gates breaking due to slamming.

These difficult years resulted in a meeting held on October, 25th 2006 at Lower Monumental Juvenile Facility to discuss the gate problems that occurred through out the 2006 season and possible ways to mitigate future problems. Each site was represented by the site biologist and lead mechanic. Also in attendance were Dave Hurson and John Bailey from the WW district office, Carter Stein, Don Warf and Troy Humphrey from PSMFC and Jim Simonson from NMFS.

Several topics were discussed and below is a brief summarization of what was discussed.

a) Responsibilities

- (1) It was established that the COE is responsible for the gates from the solenoids to the gate and PSMFC is responsible for the PLC and wiring to the solenoids.

b) Documentation

- (1) PSMFC to provide links to gate information they have via the web and keep that up to date. Included on the web page:

1. Standard Operating Procedures
2. Electrical Schematics
3. Mechanical Drawings
4. Solenoid Sequence of Events
5. Photos
6. Recommended Maintenance Procedures and a Spare Parts list.(Gate Maintenance WW District-1.pdf)
7. Memorandum of Agreement, USACE-BPA
8. Updated spare parts list with items that would be most helpful to have in stock at all times.(this includes a new slide for each site)

c) Pilot Air for Solenoids

- (1) Pilot air was discussed and PSMFC recommended that the site mechanics review the SOP provided on the web page (SOP Solenoid Porting Required for Pilot Air) prior to changing out solenoids in the future as pilot air has been added to the side

to side gate at Little Goose and to all WW district slide gates (except for McNary).

d) Anti-Slam Sensor Installation and Testing

- (1) PSMFC inquired about the possibility of having the gates pulled and delivered to NMFS Pasco shop so that sensors could be tested and installed.

e) Training

- (1) PSMFC was asked to meet with the site biologists and the mechanics prior to water up each season and go through the operation of each gate and provide troubleshooting and maintenance tips along with things to look for when testing a gate.

1.2 **Purpose of Document**

The purpose of this document is to capture what was done and by whom, what the results were from the actions taken and recommendations for future actions.

1.3 **Definitions and Acronyms**

This section provides the definitions of terms and acronyms used in the document.

1.3.1 **Definitions**

- 1) *Slide Gate* –A gate mounted on the bottom of a flume typically just downstream of the separator used to divert specifically tagged fish back to the river by opening and letting the fish drop down another path.
- 2) *Tagging* - The process of imbedding a transponder into a fish for the purpose of tracking the fish.

1.3.2 **Acronyms**

- 1) NMFS National Marine Fisheries
- 2) COE Corp of Engineers
- 3) PLC Programmable Logic Control
- 4) SOL Solenoid
- 5) MOU Memorandum of Understanding
- 6) PSMFC Pacific States Marine and Fisheries Commission
- 7) HMI Human Machine Interface, used to view and manipulate PLC values

1.4 References

This section lists reference documents available on the web

- 1) http://php.ptagis.org/wiki/index.php/Fish_Diversion_Gate_Documentation%2C_Operation_and_Maintenance ; Author - Troy Humphrey; Organization - PSMFC November, 2006.
- 2) http://php.ptagis.org/wiki/index.php/Gate_Maintenance_WW_District ; Author - Troy Humphrey; Organization – PSMFC November, 2006.
- 3) http://php.ptagis.org/wiki/index.php/SOP_Solenoid_Porting_Required_for_Pilot_Air ; Author - Troy Humphrey; Organization – PSMFC October, 2006

2. PROJECT SUMMARY

The following is a brief description of what was done as a result of the meeting. Please refer to the sub list under section 1.1 of this document.

- a.) Site personnel addressed all issue that fell under their responsibility, PSMFC addressed all issues that fell under their responsibility. On the very few instances where there was a gate related issue both organizations work well at resolving the issue.
- b.) Please refer to the References section of this document, section 1.4 to find links to web pages that encompass all that is listed for PSMFC to provide.
- c.) No solenoids were changed this year so Pilot Air was not an issue. Links to documentation concerning pilot air are listed above in section 1.4 reference 3)
- d.) Little Goose and Lower Granite pulled and delivered their gates to the NMFS shop. Jim Simonson and crew in conjunction with PSMFC performed the following on each gate:
 - Replaced the slide.
 - Replaced the cylinder.
 - Replaced the guide rails.
 - Upgraded and Replaced the shocks.
 - Attached a mounting bracket for the sensors.
 - Added a mounting bracket for the sensor control wire box.
 - Added a flag for the sensors.
 - Installed a guard to protect personnel from the flag.
 - Re-worked the mounting holes for GRJ's slide gate cylinders.
 - Re-programmed the PLC.
 - Thoroughly tested the sensors and PLC program.
 - Installed trouble lights in 2 locations at each site that flash when the PLC logic determines there is a problem with either the gate or the sensors.

Lower Monumental mechanics in conjunction with PSMFC and NMFS performed the following for each gate:

- Jim Simonson and crew built new slides that were installed by Lower Monumental mechanics.
 - Replaced the shocks.
 - Replaced the cylinders.
 - The gate structure was modified by Lower Monumental mechanics to accommodate the sensors.
 - Re-programmed the PLC.
 - Thoroughly tested the sensors and PLC program.
 - Installed trouble lights in 2 locations that flash when the PLC logic determines there is a problem with either the gate or the sensors.
- e.) PSMFC met with site personnel prior to the season start up and trained them on possible causes of a trouble light and how to respond to a trouble light.

3. 2007 SEASON RESULTS

The 2007 season showed marked improvement in gate efficiencies and overall gate performance. Gate banging was virtually eliminated by the sensors and anti-slam PLC logic. PSMFC was on site weekly and sometimes twice a week during the peak of the season. The operation of the gates during the peak was exceptional. Not one single gate failure occurred during the 2007 season. The trouble lights gave site personnel and PSMFC early warning when there was a potential problem which was followed by a joint effort to resolve the issue. Early on in the season there were some nuisance alarms that occurred while the PLC program was being fine tuned, once those issue were resolved the trouble lights became a very useful tool. The following is a breakdown by site of the gate issues that occurred at each site during the 2007 season.

3.1 GRJ 2007 Slide Gate Performance

Lower Granite had two viable gate trouble alarms both on A Gate.

- The first being an instance where a separator operator inadvertently set the gate travel open time to 0 as a result of a PSMFC screen being left open. The gate remained closed until PSMFC arrived and set the parameter back to the proper value.
- The second pointed to an issue with the cylinder for A Gate. There is slight air leak most likely on the rear seal of the cylinder. Re-timing the gate has eliminated the major issue but the gate cylinder still needs to be replaced. During a long sample the gate creeps completely open throwing the travel close timing off.

3.2 GOJ 2007 Slide Gate Performance

Little Goose had three viable trouble lights, two on B Gate and one on A Gate.

- The cylinder on B Gate had developed a leak on the front side of the cylinder which caused a weak and erratic soft close and resulted in a trouble light. Site personnel replace the cylinder; PSMFC was on site to assist.

- The second B Gate trouble light may have been due to the soft close/open regulator being closed too far? The trouble light was cleared by site personnel but no report as to the cause was phoned in.
- The A gate trouble light was due to a sensor that had lost its alignment and was missing the flag. The sensor was repositioned and the problem was solved.

3.3 **LMJ 2007 Slide Gate Performance**

Lower Monumental had one viable trouble light.

- The A Gate trouble light may have been due to the soft close/open regulator being closed too far? The trouble light was cleared by site personnel but no report as to the cause was phoned in.

4. **RECOMMENDATIONS FOR THE FUTURE**

PSMFC would like to recommend the following actions be done on a yearly basis.

4.1.1 **General Winter Maintenance**

1. Replace the cylinders on all gates.
2. Replace the soft close/open regulator on all gates.
3. Replace the shocks on all gates.
4. Inspect the leading edge of each gate for signs of banging.
5. Inspect the connection point between the gate and cylinder for signs of elongations.
6. Inspect and tighten the flag.
7. Inspect and clean the lenses of the sensors (PSMFC to do).
8. Inspect the pass through port that the flag rides on for signs of wear.
9. Inspect and possibly replace the guide rails.

4.1.2 **Site Specific Winter Maintenance**

1. Lower Granite
 - a. Move the sensor for E gate to the opposite site of the gate to help eliminate sensor misses.
 - i. NMFS and PSMFC to do.
2. Lower Monumental
 - a. Clean moss from sensors
 - i. COE and PSMFC to do in conjunction.