2018 The Dalles Dam Spillway Stilling Basin ROV Inspection Report

Inspection date: 12/11/2018;

Inspection conducted for: Dam Safety;

ROV Inspection by: NWP Office of Dive/ ROV Operations and Safety;

Inspection location: The Dalles, OR;

Desired inspection targets: Verification of structural condition and debris loading;

ROV and Sonar description:

The Dalles spillway stilling basin structure was inspected using a Deep Ocean Engineering Phantom XTL remotely operated vehicle (ROV). Visual inspection was conducted using the installed high-resolution camera and documenting on DVD. Sonar imaging was conducted utilizing a BlueView 2D multi-beam sonar as well as a Tritech SeaPrince Sector/ Polar Scanning sonar.

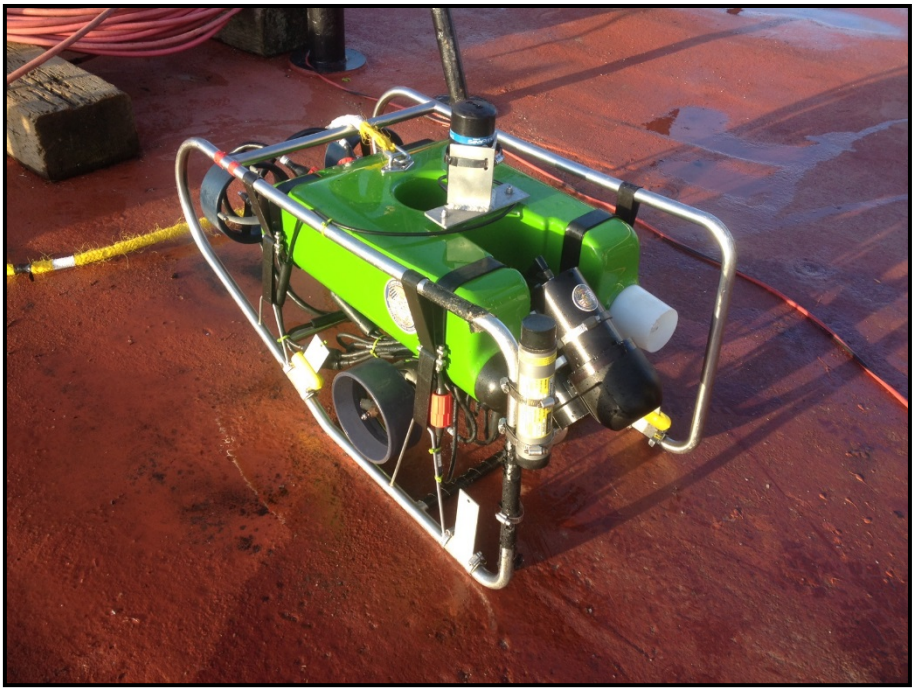

Figure 1 DOE Phantom XTL ROV and sonar

Figure 2 The Dalles Dam Spillway. Red box indicates approximate area of inspection coverage.

Project description and inspection findings:

Spillbays, ogees, apron, construction joints & baffle blocks- The spillway bays were inspected by BlueView sonar to determine the structural condition and debris loading. Once debris or structural defects were located by sonar, the ROV was piloted into the area of interest to gather video documentation. Sonar documentation was also captured of any pertinent items found for overall measurement purposes.

Spillbays 1-8 (to include apron, baffles, and 6/7 Spillwall)

Spillbay 1- Two areas of significant construction joint erosion was found. Both are perpendicular to the water flow. One is approx. 20 ft. long and varies in width from 1-4 ft. with approx. 6 inches of scour depth. The second is smaller at 9 ft. long by 1.5 ft. in width with approx. 6 inches of scour depth.

Spillbay 2- Minor concrete surface erosion of various depths (2-3 inches) was found across the majority of the SB2 ogee.

Spillbays 3 thru 5- No significant discrepancies found on the spillbay ogees or baffle blocks. The downstream apron surface shows moderate surface erosion and along its edge. Undercutting was found in this area and varies in range from 4 to 8 ft. deep. To capture these undercut images, the BlueView sonar was rotated 90* on its horizontal axis and positioned perpendicular to the downstream apron end sill. The resultant imagery indicates the undercut depth by showing how far back the sonar beams must travel to reflect off of solid structure.

Spillbays 6-8- No discrepancies noted.

6/7 Spillwall- No discrepancies were noted along the 6/7 wall.

Baffle Blocks- All baffle blocks inspected in bays 1-8 appear in good condition with no scour, exposed rebar or excessive rounding of the structural edges.

Spillbays 9-23 (to include apron, baffles and 8/9 Spillwall)

8/9 Spillwall- No major discrepancies noted. All structure interfaces were found intact with no displacement or undercutting. One small area was found on the Washington side of the wall where water has scoured rock on the river bottom near the base of the leveling slab but it is not undercutting the leveling slab.

Spillbay 9- The known scour on the Oregon side of the Spillwall where Bay 9 apron meets the wall and riverbed was inspected and does not appear to have changed much in size or condition since the last ROV inspection. There is a small area of undercutting under the apron located approx. 8- 10 ft. south of the wall. The undercut area is approx. 2-4 ft. in length.

Spillbay 10- A large pile of rock was located between the baffle blocks in SB10. This rock appears to be fractured basalt of various sizes. It appears to have collected in this location but does not appear to have caused any structural damage due to “ball milling” at this point.

Spillbays 11-23- The stilling basin just below the ogee to the upstream apron wall was covered in approx. 2-3 inches of silt across this entire area. Minor surface erosion of the downstream apron joints and the moderate to significant erosion of the downstream apron edge was noted in this area. The undercutting of the apron in the area of bay 23 was found to be anywhere from 15-20 ft. deep in places. Maneuvering the ROV to thoroughly inspect this end of the apron is difficult at best due to powerhouse flow coming around the bend in the river.

Baffle Blocks- All baffle blocks inspected in bays 9-23 appear in good condition with no scour, exposed rebar or excessive rounding of the structural edges.

Video and sonar imagery below highlight areas of interest found during the inspection. Yellow arrows in sonar imagery indicate direction of water flow for image reference.

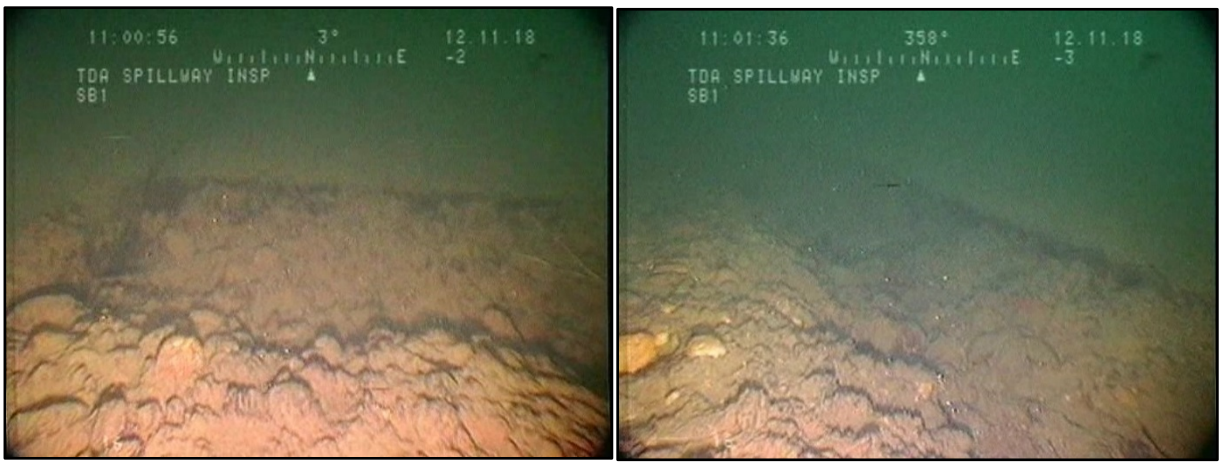

Figure 3 Scoured construction joint found on the ogee of Spillbay 1.

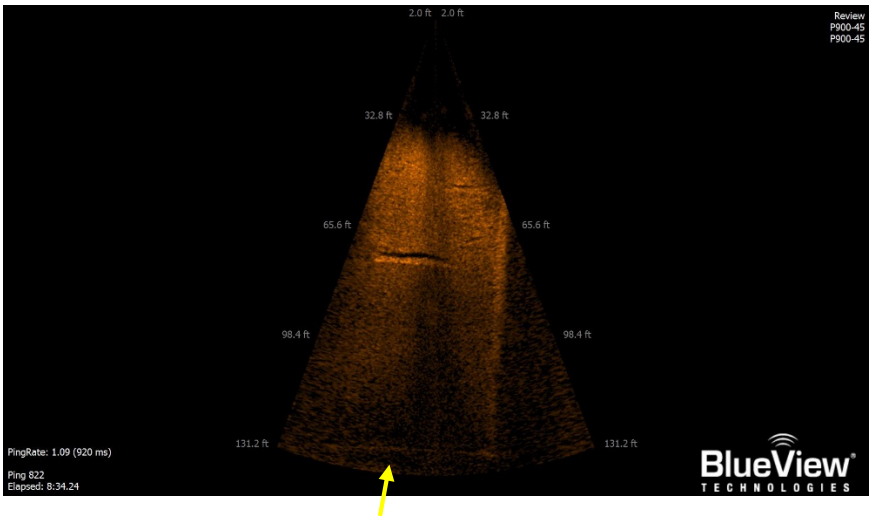

Figure 4 Sonar image of scour in Spillbay 1. The larger scour is approx. 20ft long by 2ft wide (width varies). The smaller scour is approx. 9ft long by 1-1.5ft in width.

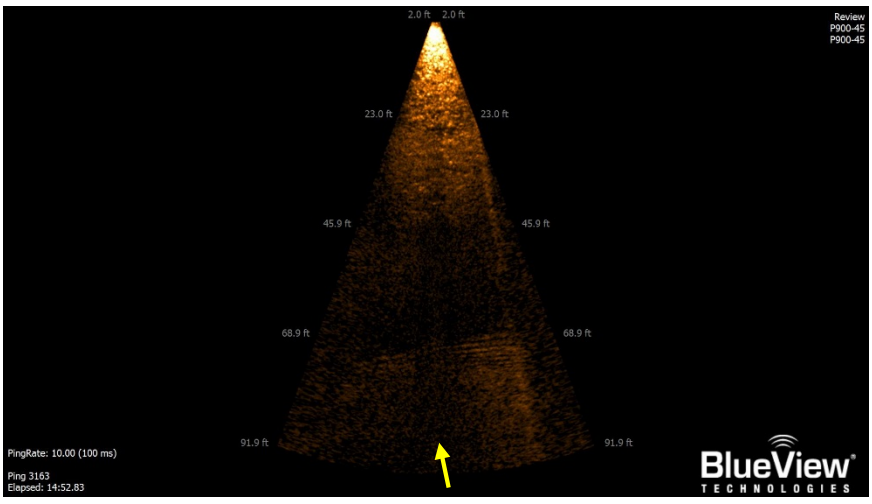

Figure 5 Sonar imagery showing rough surface conditions of ogee concrete in Spillbay 2.

Figure 6 Images showing typical downstream apron end sill erosion along the entire apron downstream of Spillbays 1-8.

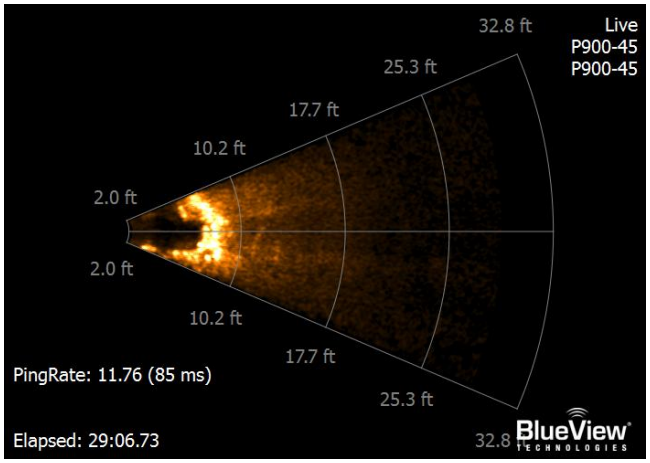

Figure 7 BlueView sonar image showing the approx. 5-6ft undercut of the apron downstream of Spillbay 3.

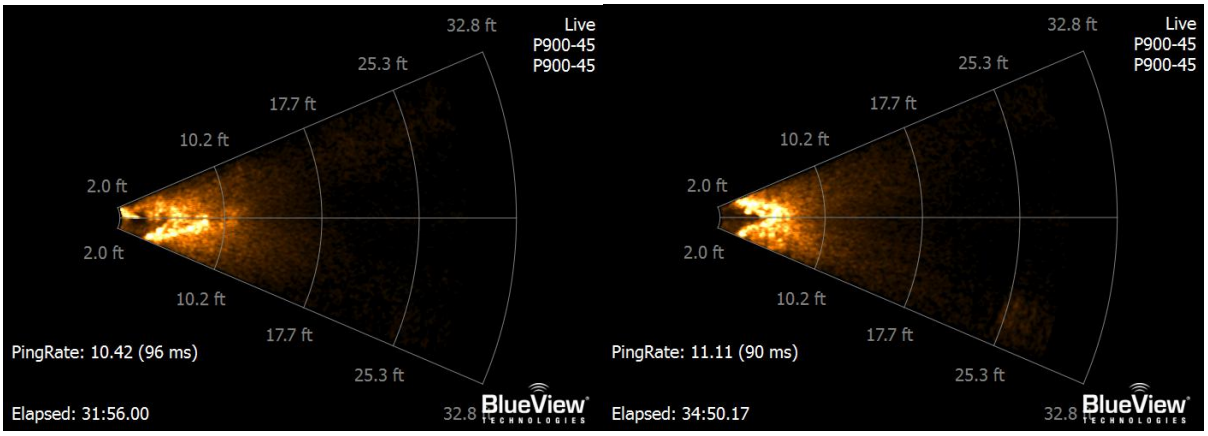

Figure 8 BlueView sonar images showing the approx. 6-7ft undercut of the apron downstream of Spillbay 4 (left) and 5-6ft of undercut at Spillbay 5 (right).

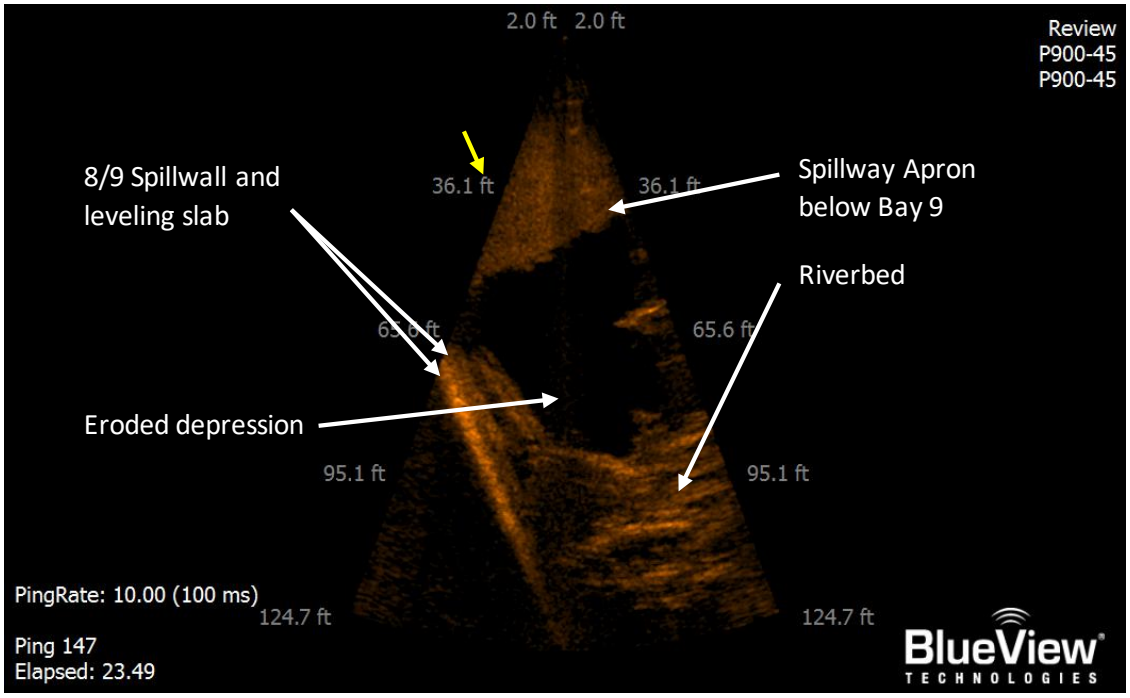

Figure 9 Sonar image showing the eroded area where the apron, 8/9 Spillwall and riverbed intersect. This area does not appear to have expanded since the last ROV inspection conducted here.

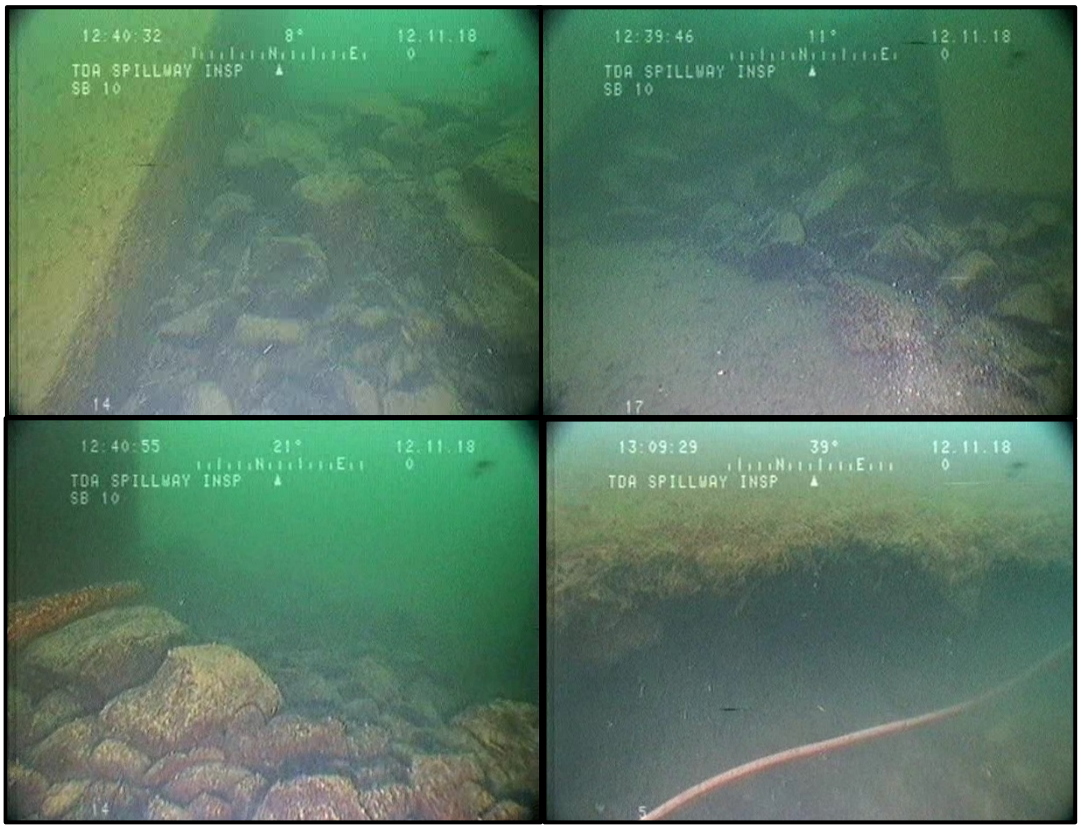

Figure 10 Images showing rocks found between baffle blocks in Spillbay 10 as well as the typical condition of the downstream apron end sill to riverbed interface showing minor undercutting.

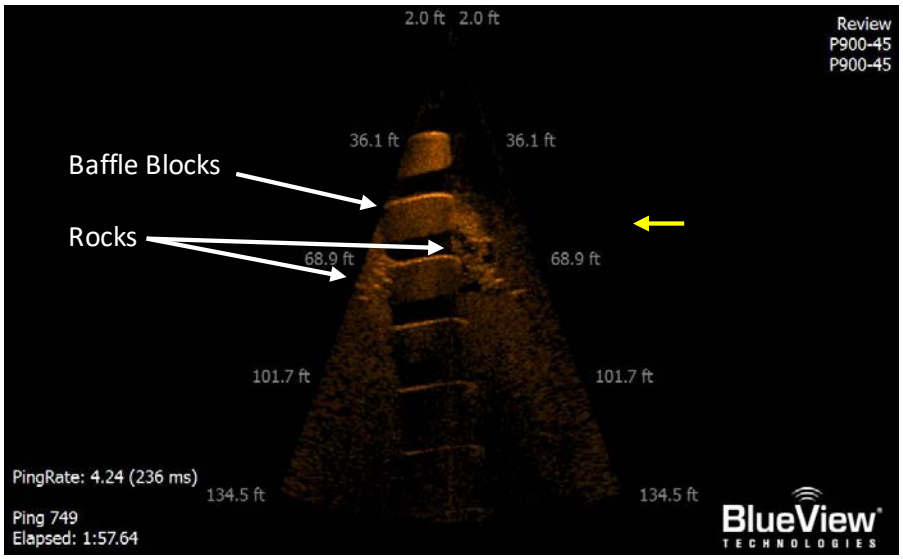

Figure 11 Sonar image showing the rocks found in Spillbay 10. Rocks are piled upstream, between and scattered downstream of baffle blocks. Rock pile is approx. 3 ft high between the baffle blocks.

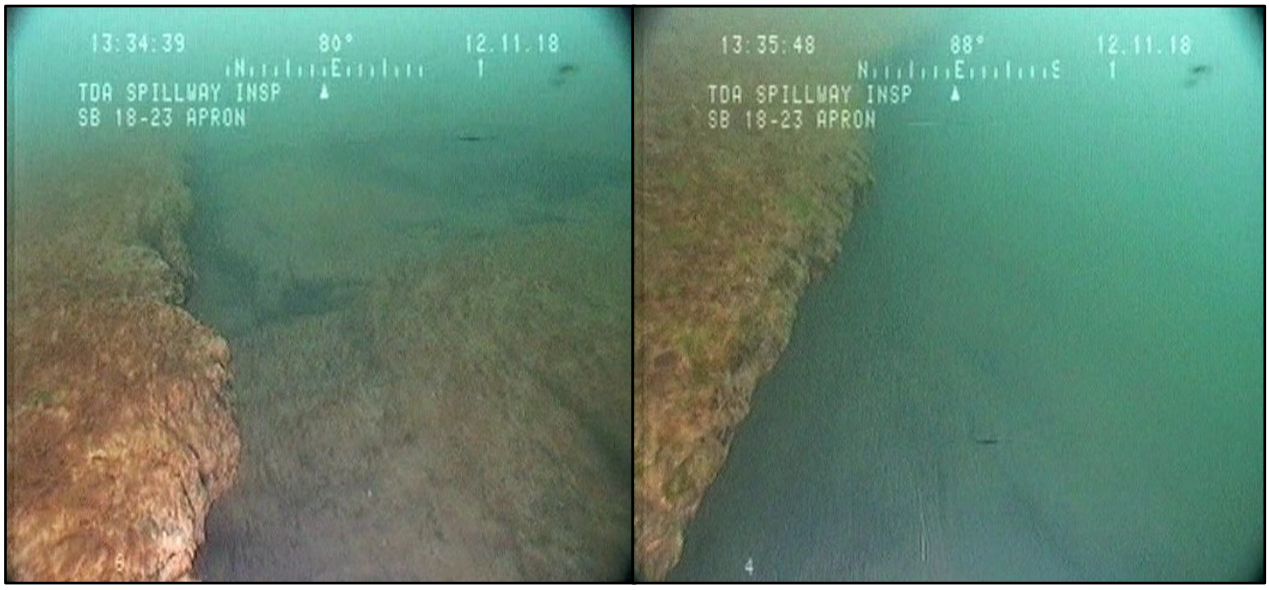

Figure 12 Image on the left is the apron to riverbed interface in the area of Spillbay 18. The image on the right is in the area of Spillbay 23. The distance from the apron edge to the river bottom increases in this area as the does the noted undercut. This area is very difficult to inspect by ROV due to the powerhouse generation and ice & trash sluiceway flow.

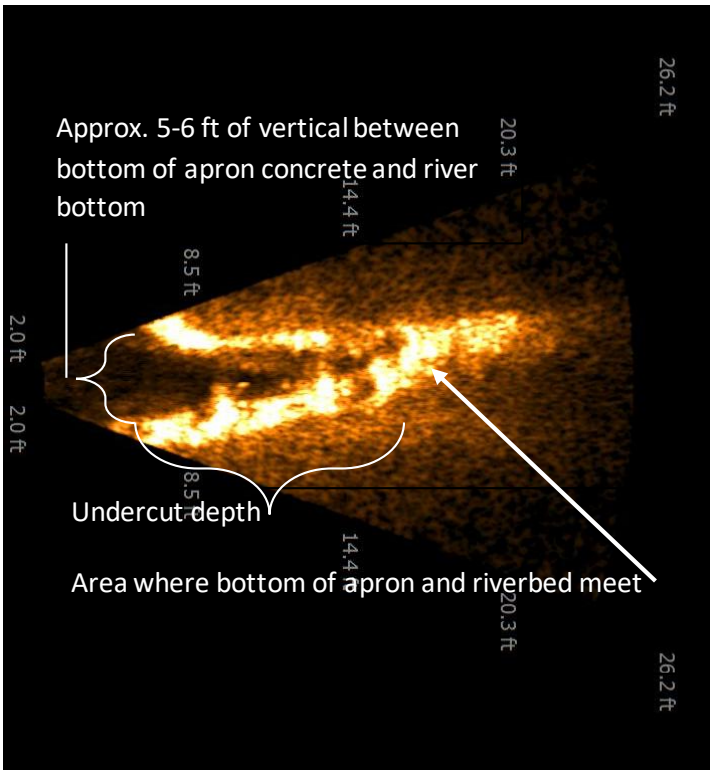

Figure 7 This rotated sonar image shows the approx. 15 ft of undercut in the area downstream of Spillbay 22. This also shows the vertical distance from the river bottom to the underside of the apron concrete.

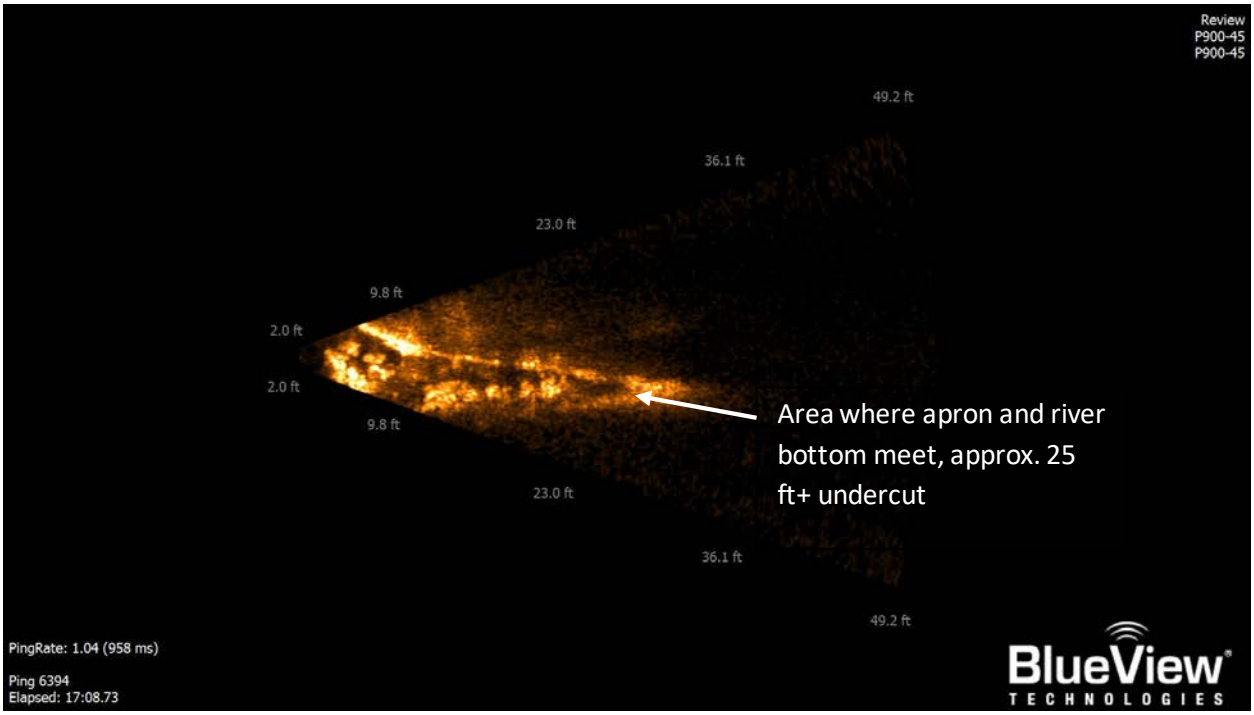

Figure 6 This sonar image shows the approx. 23-25 ft. undercut in the area of Spillbay 23. Due to the difficulty in inspecting this area, it is suggested to re-inspect during the lowest flow.

Point of contact for inspection results and report:

Todd Manny
NWP Office of Dive/ ROV Operations and Safety
503-661-2420 x2009 Office
541-554-9726 Cell
David.T.Manny@usace.army.mil