



Oregon

John A. Kitzhaber, MD, Governor

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CITY OF SILVERTON
PUBLIC WORKS

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
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February 18, 2014

Gerald Fisher, Public Works Director
City of Silverton
306 S Water Street
Silverton, OR 97381

Re: Silver Creek Dam (S-66) – Inspection Summary

This dam was inspected on September 4, 2013. I performed the inspection with you and engineering intern Chuck Williams. A group of legislative support personnel were also there, and your hospitality and support for the dam safety program was much appreciated. The Water Resources Department conducts these routine inspections to identify safety, maintenance or operational issues that may affect dam integrity. Dams are assigned a hazard rating based on downstream hazard to people and property, not on the condition of the dam. Silver Creek is classified as a high hazard dam, inspected annually.

The results of this inspection are illustrated and described in the following photos and text. This inspection includes recommendations to keep the dam safe and properly working.

Results of Inspection:



Spillway control section

There is nothing apparent that would affect capacity of the emergency spillway. The spillway is clear of obstructions and shows no signs of erosion that might affect its safely passing flood flows. The reservoir level was 423.4 feet on the staff gage when inspected. Minimum recent freeboard was 13 feet, which is very good.



Spillway discharge channel

The stilling basin and base of spillway were repaired last year, and the repairs should bring the energy dissipation function to near its designed condition. As of this inspection, these repairs were not yet tested by a high flow event.



Spillway drain

Spillway drains three and six were the only two drains with significant flow for this inspection. These are the drains that most commonly flow. Flow from drain three was 9 gallons per minute, and flow from drain six was 6 gallons per minute. All flow was clear.



Concrete loss between spillway slabs

As was first observed during the 2012 inspection, a hammer strike on the concrete spillway slab results in hollow sounds, especially around a few of the joints. There is also delamination and exfoliation cracking around a few of the joints, as shown in the photo above. We discussed the need for a few core holes through the slabs while we were on site, in order to determine the cause of the isolated voids under the slabs.



Crest and upstream face

The embankment shows no signs of settlement, instability, or internal erosion. The crest is wide and shows no signs of settlement. This dam has a well maintained cover of grass and other non woody vegetation. The grass cover on the dam now effectively reduces surface erosion and provides very little cover for burrowing animals. Over the last three years, maintenance of the embankment has been superior.



Low level conduit discharge and toe drains

The conduit did not close completely during this inspection. In review of the inspection files, the 2001 OWRD inspection, the report included the following. "To gain access to the 42" diameter outlet conduit through the dam, city personnel installed a cofferdam across the stilling basin and pumped the accumulated water into the downstream channel. The biggest obstacle during the inspection was the amount of leakage (estimated 2 cfs) that traveled down the pipe and into the stilling basin. It was necessary to use three portable pumps to effectively drain the stilling basin and thus expose the downstream invert of the 42" outlet conduit." This situation has not seemed to change much. At some point this leak should be addressed.

There are many toe drains on this dam, and there flows were measured as follows:

- Drain 1 – 25 gpm
- Drain 2 - drip
- Drain 3 - drip
- Drain 4 – 10 gpm
- Drain 5 - drip
- Drain 6 – 1 gpm
- Drain 7 - missing
- Drain 8 – 3 gpm
- Drain 9 – 1 gpm

The flow was 20 gallons per minute on the right side of the conduit discharge box, but I believe most of this was from the drains above it. There was just a trickle flowing from the left side of the discharge box. The flow rates are not greatly different from those measured between 2001 and 2010. The water from all toe drains dam was clean and the flow does not appear to be increasing based on the results of our previous inspections.



Discussion of dam safety at Silver Creek dam

We had a very good discussion of issues facing dam owners with legislative staff at the dam. The main issues are access to the dam and monitoring. Access to the dam from the south does not yet exist. The Emergency Action Plan is current as of January 2009. Overall, this dam has been well maintained and operated, and its condition has improved over the last three years.

Recommendations in order of priority:

- 1) Continue excellent vegetation management that makes the dam easy to inspect for potential changes in seepage.
- 2) Continue progress and secure access by road to the main dam embankment (probably from the south).
- 3) Investigate the small voids under the discharge spillway slabs.
- 4) Continue to work towards remote monitoring of the dam.
- 5) Investigate leakage through the low level conduit.

A copy of the field inspection sheet for this dam is attached. Thanks again for meeting with us. Please let me know if you have any questions about this inspection, and if there is a general time you prefer for the next inspection.

Sincerely,

Keith Mills, P.E., Dam Safety Engineer
(503) 986-0840

C: Mike McCord, Watermaster District 16
Dam Safety File S-66



Dam Safety Inspection Form

State of Oregon
Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1271
(503) 986-0900

Name of Dam: Silver Creek
 File #: C-66
 Height: 65 ft. Storage: 1300 ac. ft. Permit: R5948 NID #: OR- 00622
 Hazard: Low Significant High Request Inundation Analysis for change
 Inspector(s): FAM & CLW Watermaster District: 16
 Date: 9-4-13 Weather: cloudy
 Prior Inspection Date: 9-7-12 Issues from prior inspection: Spillway - chipping
basin repair, access to dam
 Expedited Re-inspection Needed: Next Inspection Date: 2014

Rating Criteria: 5-Very good; 4-Adequate 3-Maintenance or minor repair needed
 2-Serious repair needed; 1- Urgent dam safety issue - action now - Contact dam owner and dam safety engineer directly

I. Dam	<input checked="" type="checkbox"/> Earth <input type="checkbox"/> Rock <input type="checkbox"/> Concrete <input type="checkbox"/> Other	Rating
Up. Slope	Vegetation, Animals, Erosion, Wave Action, Depression, Whirlpool adjacent	4
Crest	Width, Surfacing, Vegetation, Trampling, Depression, Cracks, Breaching	5
Down. Slope	Vegetation, Animals, Erosion, Seepage, Leak (muddy), Bulge, Depression Slide <i>excellent</i>	5
R. Abutment	Vegetation, Animals, Erosion, Seepage, Leak (muddy)	4
L. Abutment	Vegetation, Animals, Erosion, Seepage, Leak (muddy)	5
Toe	Vegetation, Erosion, Seepage, Leak (muddy), Boil	4
Seepage/leak flow	Right ___ gpm Center ___ gpm Left ___ gpm Other ___ gpm (use comment)	500 <i>check</i>
Auxiliary dike (s)	<input checked="" type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> over 5	
Comments:		

II. Reservoir	Pool elevation: <u>4232</u>	Point of Reference: <u>gauge</u>	Rating
Minimum freeboard	Vertical distance debris from debris line to crest <u>13</u> ft.		4
Floating Debris/Trash	<input type="checkbox"/> Clean <input type="checkbox"/> Around reservoir <input type="checkbox"/> Near spillway <i>incidental</i>		4
Landslides/Erosion	<input checked="" type="checkbox"/> No activity <input type="checkbox"/> Gully <input type="checkbox"/> Inactive slide <input type="checkbox"/> Active movement <input type="checkbox"/> Stabilized		-
Log Boom	<input checked="" type="checkbox"/> Not needed <input type="checkbox"/> Present <input type="checkbox"/> Needed <input type="checkbox"/> Deterioration <input type="checkbox"/> Ineffective		-
Comments:			

III. Toe Drains #	Spillway 1	Spillway 2	Spillway 3	S4	S5	S6		
Flow (gpm)	0	0	9 gpm	0	0	6 gpm		
Damage								
Sediment								
Rating	4	4	4	4	4	4		

Toe 1 2 3 4 5 6 8 9
 25 gpm chip chip 10 gpm chip 1 gpm 3 gpm 1 gpm
 R - 20 gpm L 0.5 gpm

III.A. Other Instrumentation	<input type="checkbox"/> Piezometers	<input type="checkbox"/> Inclinator(s)	<input type="checkbox"/> Ground Motion
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Reviewed by dam safety engineer: NA Yes No

IV. Conduit	Control:	Rating
	<input type="checkbox"/> Trickle tube <input type="checkbox"/> Manual Valve <input checked="" type="checkbox"/> Power Valve <input type="checkbox"/> other	
Inlet gate	<input checked="" type="checkbox"/> Submerged	—
Trash Rack	<input checked="" type="checkbox"/> Submerged	—
Control/Stem	<input type="checkbox"/> Clean <input type="checkbox"/> Greased <input type="checkbox"/> Irregular	—
Valve(s) cycling	<input type="checkbox"/> Frozen <input type="checkbox"/> unknown <input type="checkbox"/> past year <input checked="" type="checkbox"/> frequent	4
Diameter:	Material _____ Condition <i>Submerged</i>	*
Outlet Structure	<input type="checkbox"/> Overgrown <input type="checkbox"/> Clean <input type="checkbox"/> Pressurized <input type="checkbox"/> Leaking _____ gpm <i>Subm</i>	—
Secondary outlet	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type _____ Diameter _____ in.	
Comments:	<i>* Needs to be drained</i>	

V. Spillway	<input type="checkbox"/> Earth <input type="checkbox"/> Rock <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> Other	Rating
Modifications	<input checked="" type="checkbox"/> None <input type="checkbox"/> Reduction in capacity <input type="checkbox"/> Feature not on design	—
Approach Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> debris <input type="checkbox"/> sill	4
Flashboards/Gate	<input checked="" type="checkbox"/> None <input type="checkbox"/> In place <input type="checkbox"/> operational <input type="checkbox"/> deteriorated	—
Discharge Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> leakage <input type="checkbox"/> headcutting <i>concrete joints at 10'</i>	3
Stilling basin	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Functional <input type="checkbox"/> Minor Erosion <input type="checkbox"/> Severe Erosion/Undercutting	5
Aux. Spillway	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (use comments below)	—
Comments:		

VI. Access and Security	Rating	
Vehicle access	<input checked="" type="checkbox"/> Public road <input type="checkbox"/> all weather road <input type="checkbox"/> dirt road <input type="checkbox"/> cross country	3
Fencing, signage	<input type="checkbox"/> Remote <input checked="" type="checkbox"/> Clear signage <input type="checkbox"/> Secure Fence <input type="checkbox"/> Camera <input type="checkbox"/> Unsecure	4
On Site Dam Tender/Contact	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Name: _____ Phone: _____	—
Emergency Action Plan	<input type="checkbox"/> Not required <input checked="" type="checkbox"/> Completed _____ at dam (dated <u>2009</u>) <input type="checkbox"/> None	—
Comments:	<i>SOOTY SIDE INACCESSIBLE BY VEHICLE</i>	

Comments:

*PICTURE LOCATION FOR SPILLWAY JOINT INSP 3rd HORIZONTAL @ CENTER VERT,
3rd HORIZONTAL JOINT @ 1st VERTICAL, 2nd HORIZONTAL @ RIGHT SIDE, "
3rd HORIZONTAL @ RIGHT WALL, 4' ABOVE 4th HORIZONTAL JOINT CENTER & SPILLWAY.*