COLORADO
Division of Water Resources
Department of Natural Resources

Dam Safety Branch

August 25, 2020

David Kuntz
Overland Ditch & Reservoir Company
28444 Redlands Mesa Road
Hotchkiss, CO 81419

When replying, please refer to:
OVERLAND #1 DAM, DAMID 400422
Water Division 4, Water District 40

via email: overlandditch@gmail.com

SUBJECT: Engineer's Inspection Report

Dear Mr. Kuntz,

On August 6, 2020, our office inspected Overland #1 Dam in accordance with Section 37-87-107 of the Colorado Revised Statutes that assigns the State Engineer responsibility to determine the amount of water which is safe to impound in the reservoirs of all dams in the state of Colorado. Enclosed is a copy of the Engineer's Inspection Report for your use and reference. Please sign the signature block on page 3 to acknowledge your receipt of report and return a copy to the Division 4 office via mail or email.

Conditions observed during the dam safety inspection resulted in an overall rating of Conditionally Satisfactory with a recommended safe storage level of *Conditional Full Storage*, indicating that the dam may be used to full capacity provided certain conditions are met. Specifically, the maintenance, repair, and/or monitoring items listed on page 3 of the inspection report are actions required to improve the safety of the dam.

If you have any questions concerning this inspection report or any other dam safety related matters, please do not hesitate to contact me in the Montrose office at (970) 249-6622.

Sincerely,

Jason Ward, Ph.D., P.E.
Dam Safety Engineer

Enc. Engineer's Inspection Report

ec: Bill McCormick, Chief, Colorado Dam Safety Branch
Doug Christner, District 40 Water Commissioner
Bruce Marvin, Western Engineers, Inc., westeng23@gmail.com
GMUG National Forest: Albert Borkowski, aborkowski@fs.fed.us

ENGINEER'S INSPECTION REPORT

INSPECTOR: JPW

OFFICE OF THE STATE ENGINEER - DIVISION OF WATER RESOURCES - DAM SAFETY BRANCH 1313 SHERMAN STREET, ROOM 818, DENVER, CO 80203, (303) 866-3581

DAM NAME:	OVERLAND #1			T: 110S	R: 0920W	S: 22	COUNTY: DELTA	DATE OF INSPECTION:	8/6/2020
DAM ID:	400422	YRCompl:	1987	DAM HEIGHT(FT):	60.0	SPILLWAY WIDTH(FT):	75.0	PREVIOUS INSPECTION:	7/25/2019
CLASS:	High hazard			DAM LENGTH(FT):	3200.0	SPILLWAY CAPACITY(CFS):	4367.0	NORMAL STORAGE (AF):	5828.0
DIV:	4	WD:	40	CRESTWIDTH(FT):	20.0	FREEBOARD (FT):	6.0	SURFACE AREA(AC):	252.0
EAP:	8/4/2012			CRESTELEV(FT):	9897.0	DRAINAGE AREA (AC.):	6200.0	OUTLET INSPECTED:	9/4/2009

CURRENT RESTRICTION: -- NONE --

OWNER:	OVERLAND DITCH & RESERVOIR COMPANY	OWNER REP.:	DAVID KUNTZ
ADDRESS:	28444 REDLANDS MESA RD.	CONTACT NAME:	DAVID KUNTZ
	HOTCHKISS CO 81419-0000	CONTACT PHONE:	(970) 640-7851X

INSPECTION PARTY : Jason Ward; Doug Christner; David Kuntz and others

REPRESENTING : Dam Safety Branch; Water Commissioner; Owners; See pg 3.

FIELD CONDITIONS OBSERVED

WATER LEVEL: BELOW DAM CREST Empty FT. Below Spillway FT. GAGE ROD READING 0.0

GROUND MOISTURE CONDITION: [x] DRY [ ] WET [ ] SNOWCOVER OTHER

DIRECTIONS: MARK AN X FOR CONDITIONS FOUND AND UNDERLINE WORDS THAT APPLY

UPSTREAM SLOPE

PROBLEMS NOTED [ ] (0)NONE [x] (1)RIPRAP - MISSING, SPARSE, DISPLACED, WEATHERED [x] (2) WAVE EROSION - WITH SCARPS

[ ] (3) CRACKS WITH DISPLACEMENT [ ] (4) SINKHOLE [ ] (5) APPEARS TOO STEEP [ ] (6) DEPRESSIONS OR BULGES [ ] (7) SLIDES

[ ] (8) CONCRETE FACING - HOLES, CRACKS, DISPLACED, UNDERMINED [ ] (9) OTHER

Main Dam:
Full embankment visible for inspection with empty reservoir. Full riprap coverage along slope from toe of slope to top of berm just below dam crest. Slope appears stable and in Good condition.
Less riprap coverage and few areas of erosion along boat ramp/reservoir access road located between main embankment section and spillway. No safety concerns at this time.

Auxiliary Dam:
(1) Sparse riprap with (2) areas of wave erosion scarp along high waterline with some areas more pronounced than others. Condition is marginally Acceptable along high waterline, but no signs of worsening or advancement towards the dam crest.

Upstream slope provided split rating: Good for Main Dam and Acceptable for Auxiliary Dam.

CONDITIONS OBSERVED: [x] Good [x] Acceptable [ ] Poor

CREST

PROBLEMS NOTED [ ] (10) NONE [x] (11 RUTS OR PUDDLES [ ] (12) EROSION [ ] (13) CRACKS - WITH DISPLACEMENT [ ] (14) SINKHOLES

[ ] (15) NOT WIDE ENOUGH [ ] (16) LOW AREA [ ] (17) MISALIGNMENT [ ] (18) IMPROPER SURFACE DRAINAGE [ ] (19) OTHER

Main Dam:
(11) Numerous ruts and puddles along far right end of dam as observed over recent past years. Remainder of crest recently graded with spot treatment of ruts and puddles and appears in Good condition.

Auxiliary Dam:
Crest is rough and uneven, but generally unchanged from recent past inspections. Prohibited vehicular access has stabilized condition over recent past years.

Split rating with GOOD for Main Dam, POOR for far right wing dike of Main Dam, and ACCEPTABLE for Auxiliary Dam.

CONDITIONS OBSERVED: [x] Good [x] Acceptable [x] Poor

DOWNSTREAM SLOPE

PROBLEMS NOTED [ ] (20) NONE [ ] (21) LIVESTOCK DAMAGE [ ] (22) EROSION OR GULLIES [ ] (23) CRACKS - WITH DISPLACEMENT [ ] (24) SINKHOLE

[ ] (25) APPEARS TOO STEEP [x] (26) DEPRESSIONS OR BULGES [ ] (27) SLIDE [ ] (28) SOFT AREAS [ ] (29) OTHER

Main Dam:
Good conditions observed all along Main dam downstream slope. Slope is uniform with near as-constructed condition.

Auxiliary Dam:
Surface and slope inclination varies with few areas of bulges (26). Condition is possibly as-constructed or occurred shortly after construction. No evidence of movement, sloughing, cracking, or other signs of slope instability.

CONDITIONS OBSERVED: [x] Good [ ] Acceptable [ ] Poor

SEEPAGE

PROBLEMS NOTED ☐ (30) NONE ☐ (31) SATURATED EMBANKMENT AREA ☐ (32) SEEPAGE EXITS ON EMBANKMENT

☐ (33) SEEPAGE EXITS AT POINT SOURCE ☐ (34) SEEPAGE AREA AT TOE ☐ (35) FLOW ADJACENT TO OUTLET ☐ (36) SEEPAGE INCREASED / MUDDY

DRAIN OUTFALLS SEEN ☐ No ☑ Yes Show location of drains on sketch and indicate amount and quality of discharge. ☐ (37) FLOW INCREASED / MUDDY ☑ (38) DRAIN DRY / OBSTRUCTED

☐ (39) OTHER

Toe drains B-1, B-2, and drains through the downstream outlet wingwalls producing trickle flows during inspection. Otherwise, no seepage observed during inspection with empty reservoir.

(38) Few drain outfalls becoming partially obstructed with moss and debris buildup.

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

OUTLET

PROBLEMS NOTED ☐ (40) NONE ☐ (41) NO OUTLET FOUND ☐ (42) POOR OPERATING ACCESS ☐ (43) INOPERABLE

☐ (44) UPSTREAM OR DOWNSTREAM STRUCTURE DETERIORATED (45) OUTLET OPERATED DURING INSPECTION ☐ YES ☑ NO

INTERIOR INSPECTED ☑ (120) NO ☐ (121)YES ☐ (46) CONDUIT DETERIORATED OR COLLAPSED ☐ (47) JOINTS DISPLACED ☐ (48) VALVE LEAKAGE

☐ (49) OTHER

Outlet discharging during inspection with no problems observed. Owner testimony indicates no known problems with outlet works operation or performance.
(120) Internal outlet inspection due in 2019 based on Rules requiring inspection once every 10-years.

CONDITIONS OBSERVED: ☒ Good ☐ Acceptable ☐ Poor

SPILLWAY

PROBLEMS NOTED ☑ (50) NONE ☐ (51) NO EMERGENCY SPILLWAY FOUND ☐ (52) EROSION WITH BACKCUTTING ☐ (53) CRACK - WITH DISPLACEMENT

☐ (54) APPEARS TO BE STRUCTURALLY INADEQUATE ☐ (55) APPEARS TOO SMALL ☐ (56) INADEQUATE FREEBOARD ☐ (57) FLOW OBSTRUCTED

☐ (58) CONCRETE DETERIORATED / UNDERMINED ☐ (59) OTHER

Stilling basin drain cleaned since last inspection. Only 2-3" of standing water in stilling basin remains.
Concrete structure(s) appear in acceptable condition with no obvious signs of advanced deterioration, displacement, or structural instability.
Cracks along upstream weir wall appears satisfactorily sealed at this time.

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

MONITORING

EXISTING INSTRUMENTATION FOUND ☐ (110) NONE ☑ (111) GAGE ROD ☑ (112) PIEZOMETERS ☐ (113) SEEPAGE WEIRS / FLUMES

☑ (114) SURVEY MONUMENTS ☑ (115) OTHER drains

MONITORING OF INSTRUMENTATION ☐ (116) NO ☑ (117) YES PERIODIC INSPECTIONS BY: ☑ (118) OWNER ☐ (119) ENGINEER

(111) Gage rod pipe skewed and disconnected at approximately half-height of embankment. Accuracy is questionable.
Owner and Owner's Engineer anticipate submittal of engineering plans for replacement of gage rod shortly after inspection. See Page 3 Overall Conditions for additional discussion.

(112)(115) Piezometer and seepage monitoring reportedly occurring periodically, but submittal of data from past few years is sparse.
Owner retained a professional engineer to inventory, repair, and report status of all dam safety instrumentation. However, no reporting provided to CO Dam Safety for past 3-years since kick-off meeting in 2017.

Monitoring rating considered Acceptable with diligence shown to complete long-term monitoring report.

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

MAINTENANCE AND REPAIRS

PROBLEMS NOTED ☐ (60 NONE ☐ (61) ACCESS ROAD NEEDS MAINTENANCE ☐ (62) LIVESTOCK DAMAGE

☑ (63) BRUSH ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☑ (64) TREES ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE

☐ (65) RODENT ACTIVITY ON UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, TOE ☐ (66) DETERIORATED CONCRETE - FACING, OUTLET SPILLWAY

☐ (67) GATE AND OPERATING MECHANISM NEED MAINTENANCE ☑ (68) OTHER Crest grading

(63)(64) Medium-sized brush and small pines should be removed from all embankment surfaces, particularly from upstream slope of Auxiliary Dam.
(68a) Repair rut damage and grade right end of Main dam crest.

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

Go to next page for Overall Conditions and Items Requiring Actions

OVERALL CONDITIONS

The priority action item for the owners of Overland Dam remains to complete the instrumentation evaluation and long-term monitoring program ongoing for the last 3-years. The owner's engineer indicated that the inventory, evaluation, and repairs to all instrumentation is nearly complete with report completion anticipated by late 2020. Implementation of the monitoring program should begin in 2021.

Several maintenance items completed since last inspection and Owner continues to show diligence in completion of all maintenance items.

The Owner retained a professional engineer to design a concrete reinforced stem wall for replacement of the gage rod. The Engineer was present during the inspection and the proposed plan was reviewed at the gage rod site. The Owner is allowed to perform the following activities in advance of approval of plans and specifications:
- Removal and stockpiling of riprap in the required footprint for construction.
- Shallow excavation (2-14"max) per proposed plan in footprint of construction.
- Formwork and reinforcement preparation.
PLEASE BE AWARE, that no additional work other than mentioned above can be performed prior to approval by the State Engineer. Additionally, provisions should be made for changes to the proposed plan upon approval of the plans and specifications. Also, a winter shut-down contingency plan may need to be submitted if the project is not completed prior to the end of the season.

Based on results of the inspection and recent file review, a Conditionally Satisfactory rating is provided with Full Storage of the reservoir allowed if the action items listed below are completed.

List of inspection Attendees:
Overland D&RC: Shellie Gies, David Kuntz, Brian Klaseen, Pete Klaseen, Ray Penland, Robert Stephenson
Owner's Engineer: Bruce Marvin, Western Engineer's Inc.
Division of Water Resources: Jason Ward, Dam Safety; Doug Christner, Water Commissioner

Based on this Safety Inspection and recent file review, the overall condition is determined to be:

☐ (71) SATISFACTORY ☑ (72) CONDITIONALLY SATISFACTORY ☐ (73) UNSATISFACTORY

ITEMS REQUIRING ACTION BY OWNER TO IMPROVE THE SAFETY OF THE DAM

MAINTENANCE - ORDINARY REPAIR - MONITORING

☐ LUBRICATE AND OPERATE OUTLET GATES THROUGH FULL CYCLE

7/25/2019 - **as part of standard operating procedure for the dam.**

☐ CLEAR TREES AND/OR BRUSH FROM

7/25/2019 - **all embankment surfaces, particularly from upstream slope of Auxiliary Dam.**

☐ GRADE CREST TO A UNIFORM ELEVATION WITH DRAINAGE TO THE UPSTREAM SLOPE

7/25/2019 - **along right end of Main Dam.**

☐ MONITOR

7/25/2019 - **Continue piezometer and seepage monitoring as agreed upon frequency until otherwise directed by forthcoming long-term monitoring plan.**

☐ MONITOR

8/6/2020 - **Compile and submit recent past years monitoring data to Dam Safety.**

☐ OTHER

8/6/2020 - **Clean moss and debris from drain outfalls.**

ENGINEERING - EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO

☐ PREPARE PLANS AND SPECIFICATIONS FOR REHABILITATION OF THE DAM

7/25/2019 - **for replacement of gage rod (if concrete stem wall installation or other installation requiring embankment excavation).**

☐ SET UP A MONITORING SYSTEM INCLUDING WORK SHEETS, REDUCED DATA AND GRAPHED RESULTS

7/25/2019 - **inventory and evaluate all instrumentation with preparation of a long-term monitoring program.**

☐ PERFORM AN INTERNAL INSPECTION OF THE OUTLET

7/25/2019 - **per CO Dam Safety Rules and Regulations 10-year inspection frequency for high hazard dams.**

EMERGENCY ACTION PLAN

☐ UPDATE EXISTING EMERGENCY ACTION PLAN

7/25/2019 - **Update and distribute with assistance from CO Dam Safety**

ENGINEER'S INSPECTION REPORT

DATE. 8/6/2020

DAM NAME: OVERLAND #1

DAM I.D.: 400422

SAFE STORAGE LEVEL: RECOMMENDED AS A RESULT OF THIS INSPECTION

- ☐ (101) FULL STORAGE
- ☑ (102) CONDITIONAL FULL STORAGE
- ☐ (103) RECOMMENDED RESTRICTION
- ☐ (104) CONTINUE EXISTING RESTRICTION

→ { _____ FT. BELOW DAM CREST
_____ FT. BELOW SPILLWAY CREST
☐ _____ FT. GAGE HEIGHT
☐ NO STORAGE-MAINTAIN OUTLET FULLY OPEN

REASON FOR RESTRICTION

ACTIONS REQUIRED FOR CONDITIONAL FULL STORAGE OR CONTINUED STORAGE AT THE RESTRICTED LEVEL:

Complete all Action Items listed above to improve the safety of the dam.

Engineer's Signature _____ INSPECTED BY

Owner's Signature _____ OWNER/OWNER'S REPRESENTATIVE

DATE: ___/___/___

GUIDELINES FOR DETERMINING CONDITIONS

CONDITIONS OBSERVED - APPLIES TO UPSTREAM SLOPE, CREST, DOWNSTREAM SLOPE, OUTLET, SPILLWAY

GOOD
In general, this part of the structure has a near new appearance, and conditions observed in this area do not appear to threaten the safety of the dam.

ACCEPTABLE
Although general cross-section is maintained, surfaces may be irregular, eroded, rutted, spalled, or otherwise not in new condition. Conditions in this area do not currently appear to threaten the safety of the dam.

POOR
Conditions observed in this area appear to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO SEEPAGE

GOOD
No evidence of uncontrolled seepage. No unexplained increase in flows from designed drains. All seepage is clear. Seepage conditions do not appear to threaten the safety of the dam.

ACCEPTABLE
Some seepage exists at areas other than the drain outfalls, or other designed drains. No unexplained increase in seepage. All seepage is clear. Seepage conditions observed do not currently appear to threaten the safety of the dam.

POOR
Seepage conditions observed appear to threaten the safety of the dam. Examples:
1) Designed drain or seepage flows have increased withou increase in reservoir level.
2) Drain or seepage flows contain sediment, i.e., muddy water or particles in jar samples.
3) Widespread seepage, concentrated seepage, or ponding appears to threaten the safety of the dam.

CONDITIONS OBSERVED - APPLIES TO MONITORING

GOOD
Monitoring includes movement surveys and leakage measurements for all dams, and piezometer readings for High hazard dams. Instrumentation is in reliable, working condition. A plan for monitoring the instrumentation and analyzing results by the owner's engineer is in effect. Periodic inspections by owner's engineer.

ACCEPTABLE
Monitoring includes movement surveys and leakage measurements for High and Significant hazard dams; leakage measurements for Low hazard dams. Instrumentation is in serviceable condition. A plan for monitoring instrumentation is in effect by owner. Periodic inspections by owner or representative. OR, NO MONITORING REQUIRED.

POOR
All instrumentation and monitoring described under "ACCEPTABLE" here for each class of dam, are not provided, or required periodic readings are not being made or unexplained changes in readings are not reacted to by the owner.

CONDITIONS OBSERVED - APPLIES TO MAINTENANCE AND REPAIR

GOOD
Dam appears to receive effective on-going maintenance and repair, and only a few minor items may need to be addressed.

ACCEPTABLE
Dam appears to receive maintenance, but some maintenance items need to be addressed. No major repairs are requirecl

POOR
Dam does not appear to receive adequate maintenance. One or more items needing maintenance or repair has begun to threaten the safety of the dam.

OVERALL CONDITIONS

SATISFACTORY
The safety inspection indicates no conditions that appear to threaten the safety of the dam, and the dam is expected to perform satisfactorily under all design loading conditions. Most of the required monitoring is being performed.

CONDITIONALLY SATISFACTORY
The safety inspection indicates symptoms of structural distress (seepage, evidence of minor displacements, etc.), which, if conditions worsen, could lead to the failure of the dam. Essential monitoring, inspection, and maintenance must be performed as a requirement for continued full storage in the reservoir.

UNSATISFACTORY
The safety inspection indicates definite signs of structural distress (excessive seepage, cracks, slides, sinkholes, severe deterioration, etc.), which could lead to the failure o the dam if the reservoir is used to full capacity. The dam is judged unsafe for full storage of water.

SAFE STORAGE LEVEL

FULL STORAGE
Dam may be used to full capacity with no conditions attached.

CONDITIONAL FULL STORAGE
Dam may be used to full storage if certain monitoring, maintenance, or operational conditions are met.

RESTRICTION
Dam may not be used to full capacity, but must be operated at some reduced level in the interest of public safety.

HAZARD CLASSIFICATION OF DAMS

High hazard
Loss of human life is expected in the event of failure of the dam, while the reservoir is at the high water line.

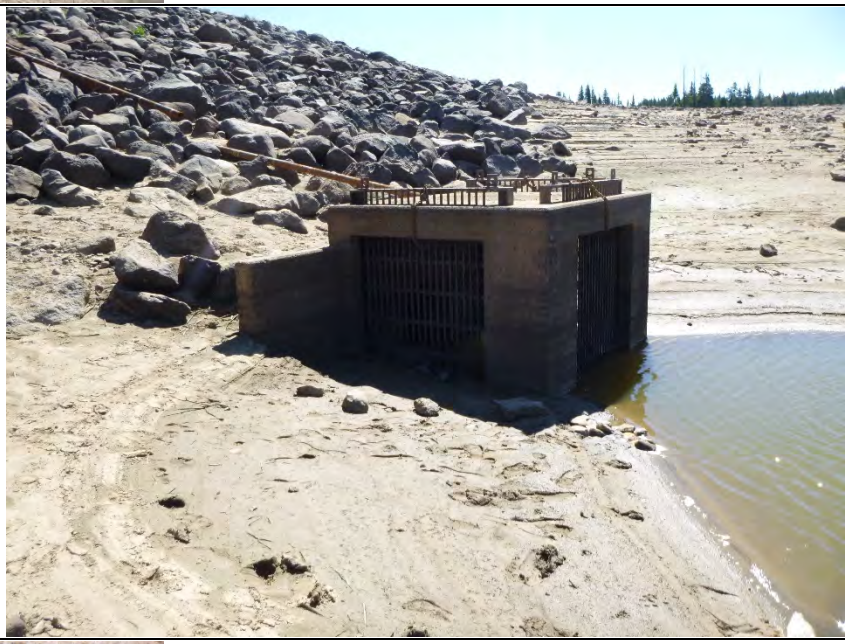
Significant hazard
Significant damage to improved property is expected in the event of failure of the dam while the reservoir is at the high water line, but no loss of human life is expected.

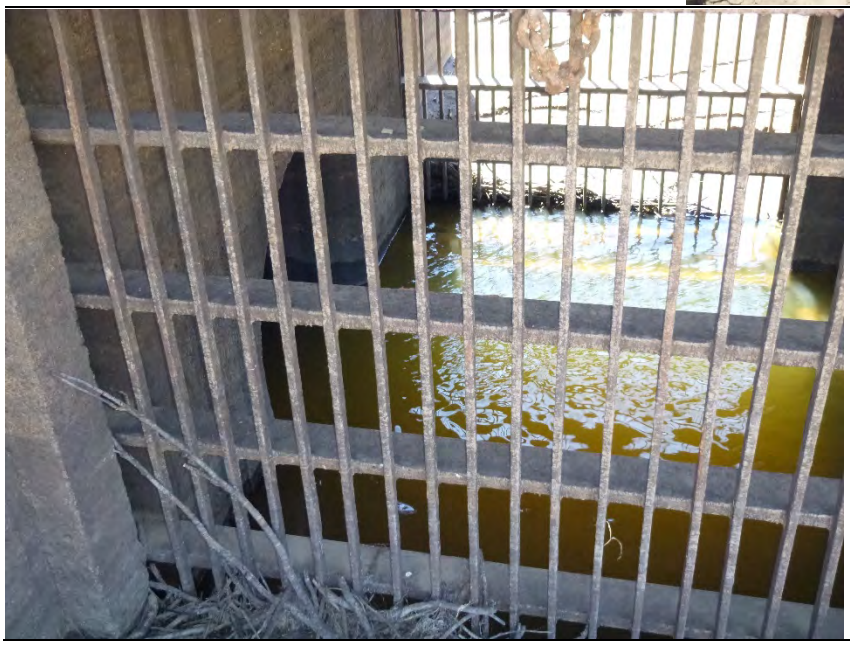
Low hazard
Loss of human life is not expected, and damage to improved property is expected to be small, in the event of failure of the dam while the reservoir is at high water fine.

NPH hazard - No loss of life or damage to improved property, or loss of downstream resource is expected in the event of failure c the dam while the reservoir is at the high water line.

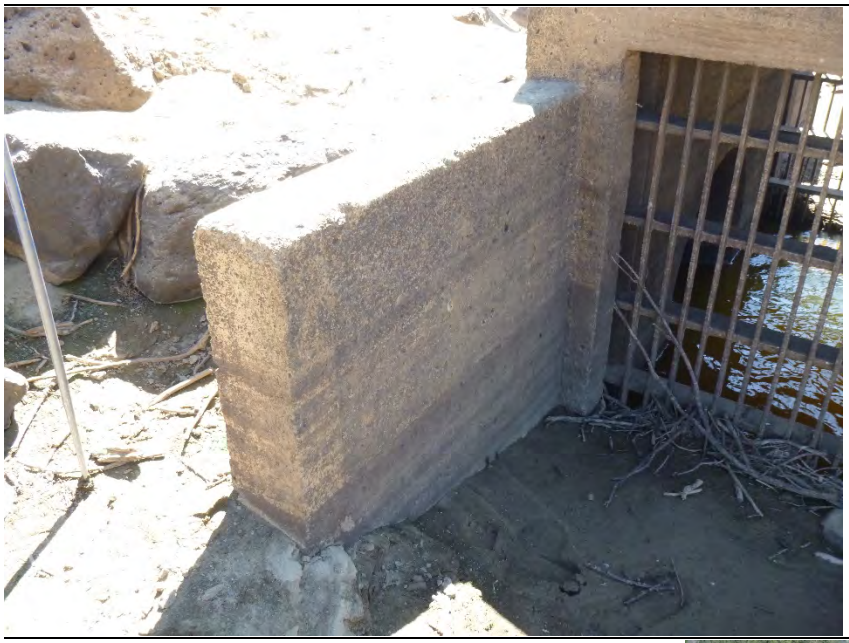
Upstream slope at maximum section with outlet intake structure in foreground.

Outlet intake structure.



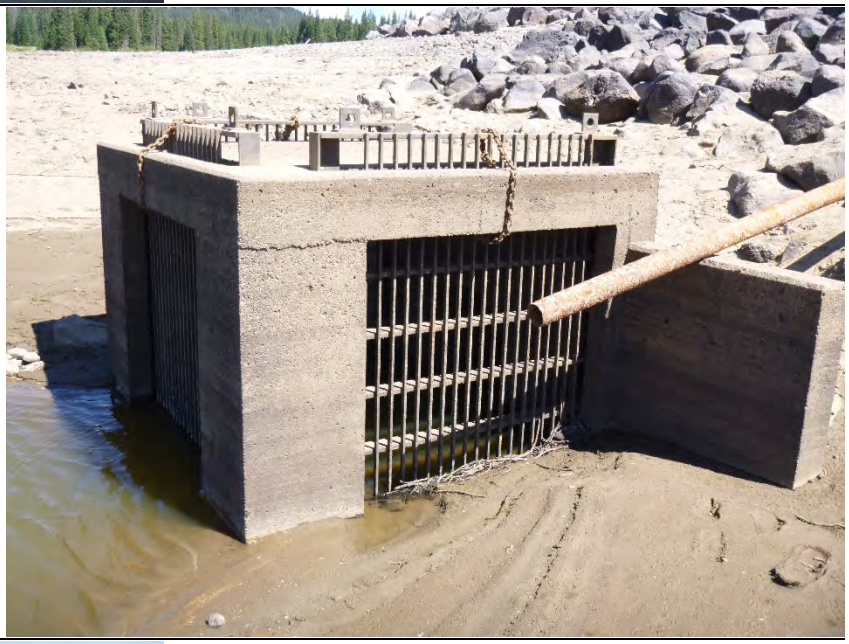


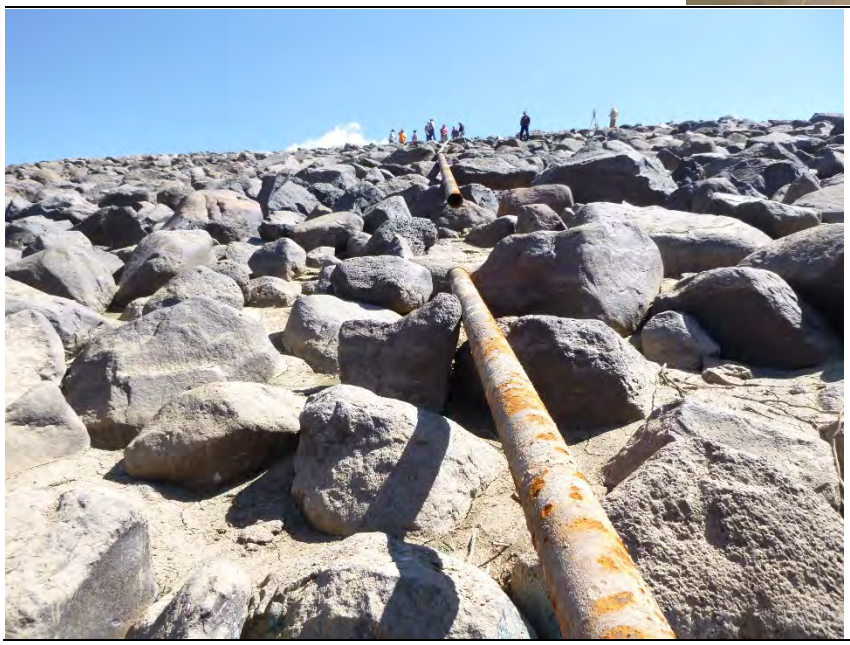
Close-up of outlet entrance taken through left trashrack grate.



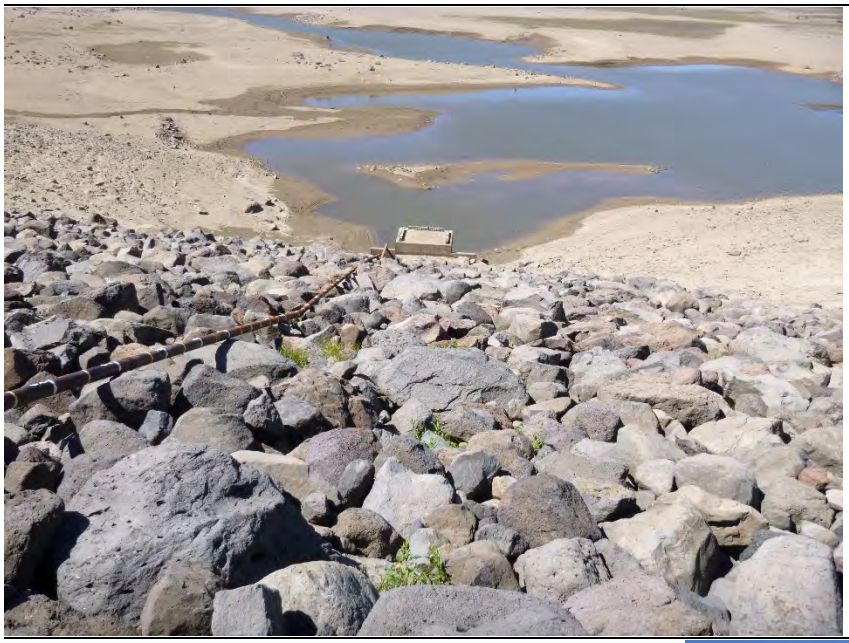
Left wingwall of outlet intake structure; possible connection point for proposed gage rod stem wall.

Right side of intake structure; pipe is current gage rod.



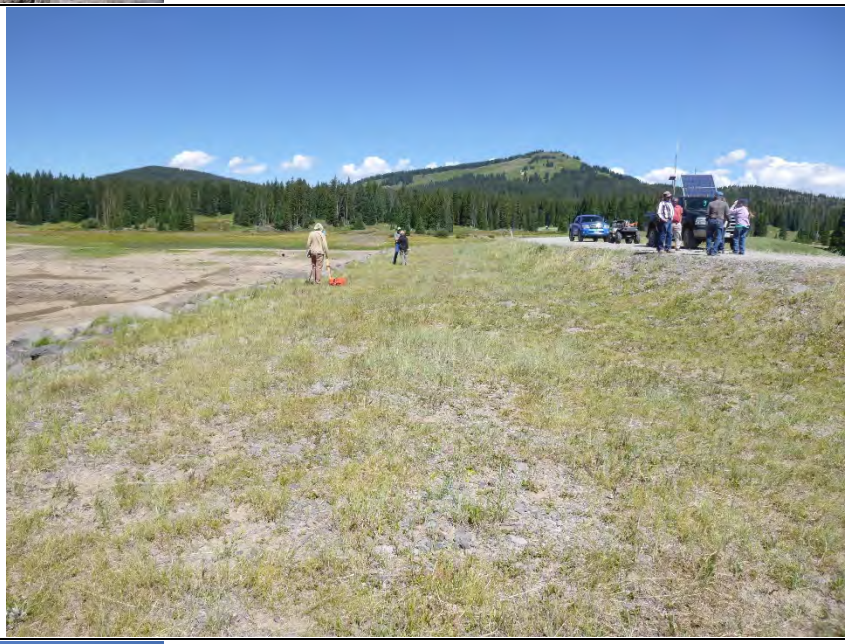


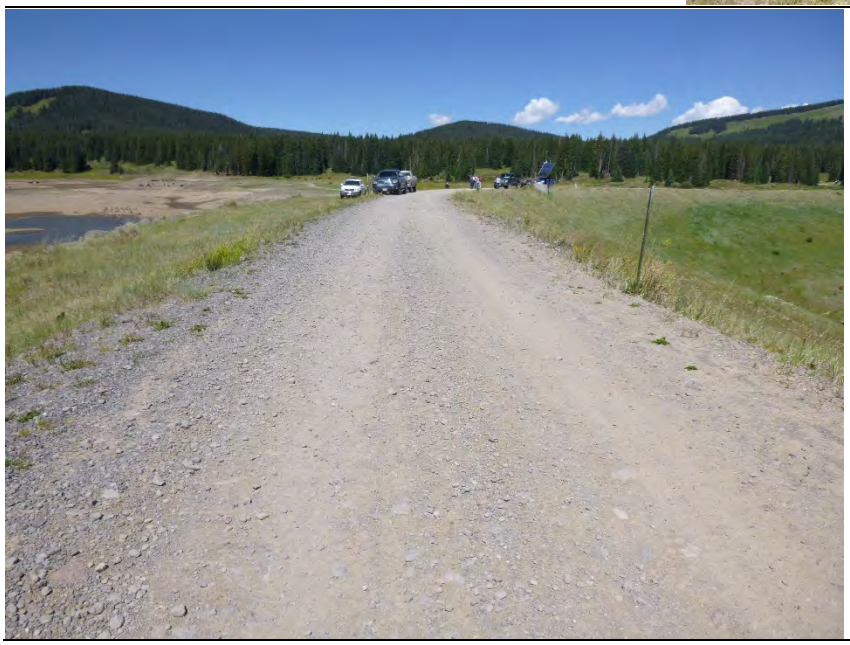
Gage rod pipe disconnected and displaced at about half embankment height.



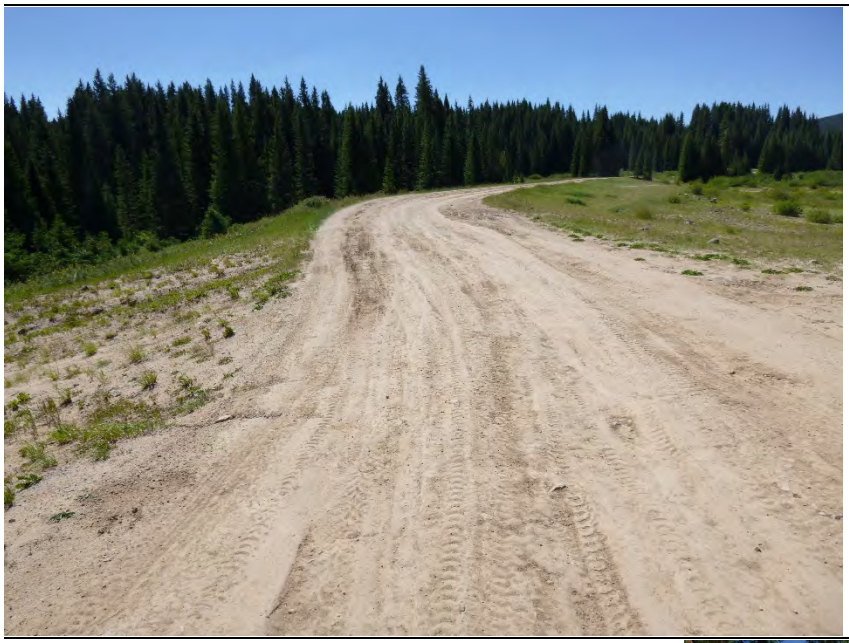
Looking down along upstream slope.

Typical view along widened crest section (constructed for future enlargement) near maximum section.



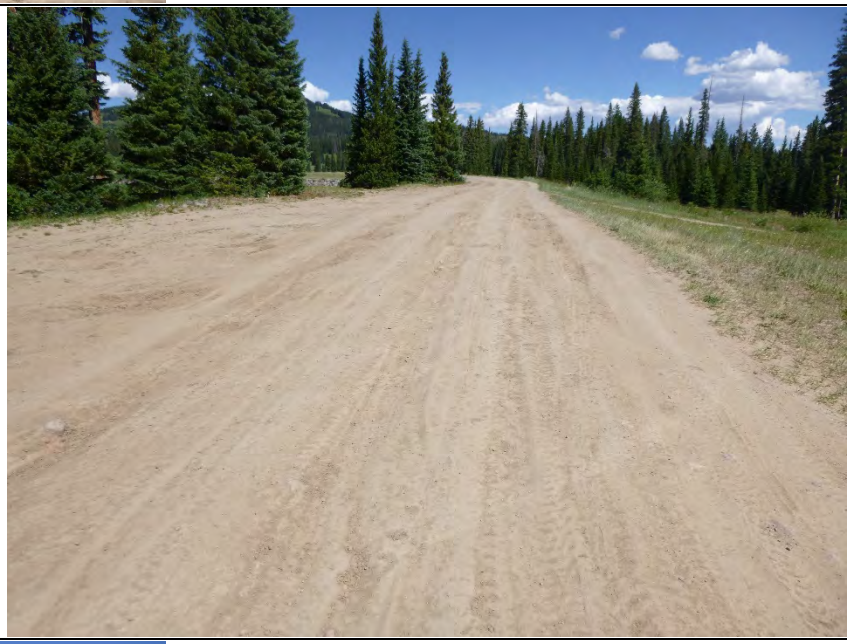


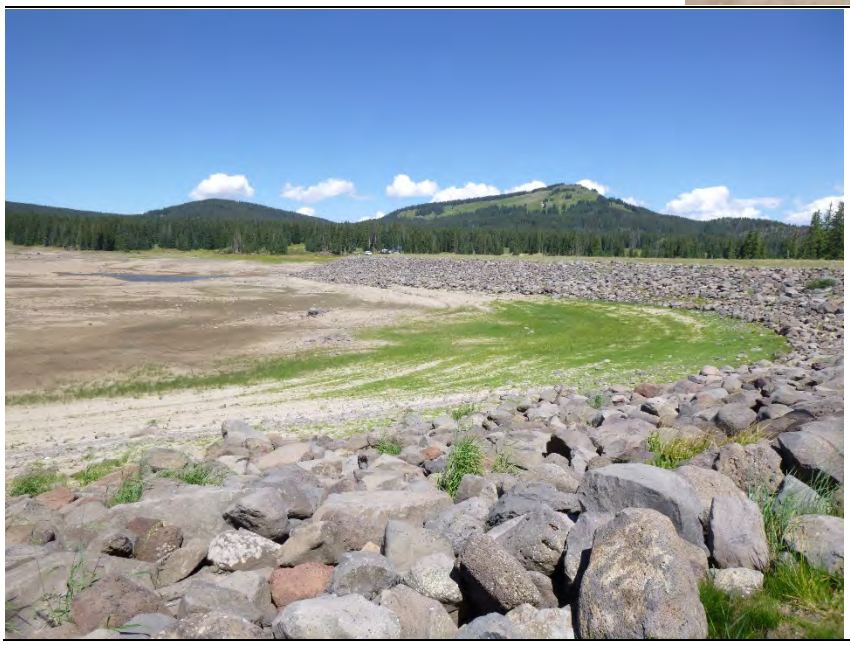
Typical view along dam crest.



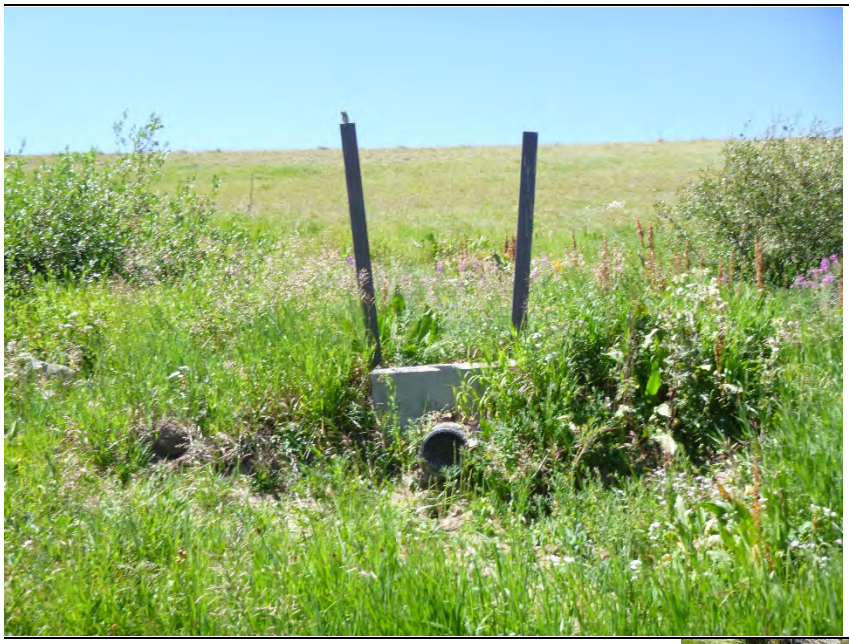
Dam crest along far right freeboard dike.

Looking back towards main dam.



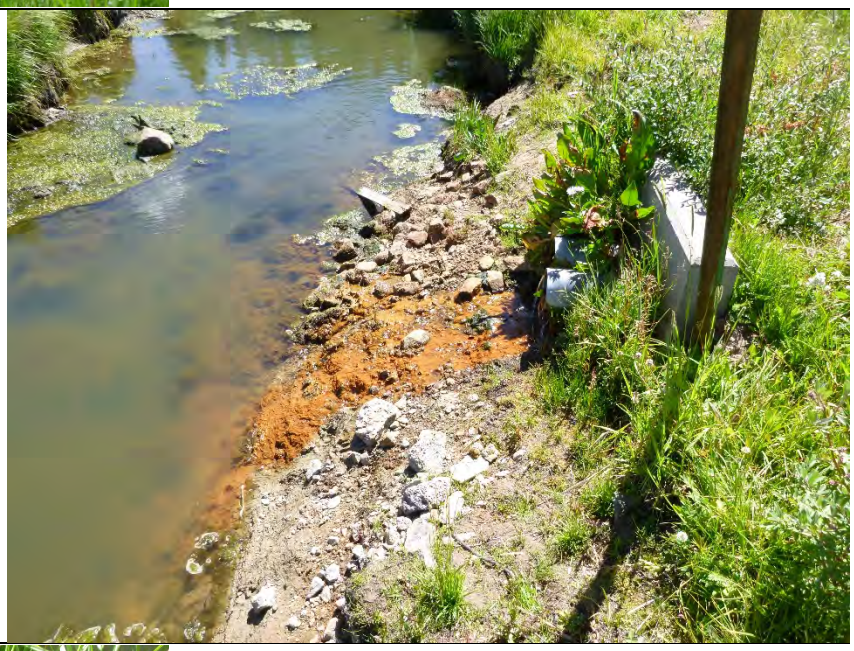


Overall view of upstream slope from far right end of dam.

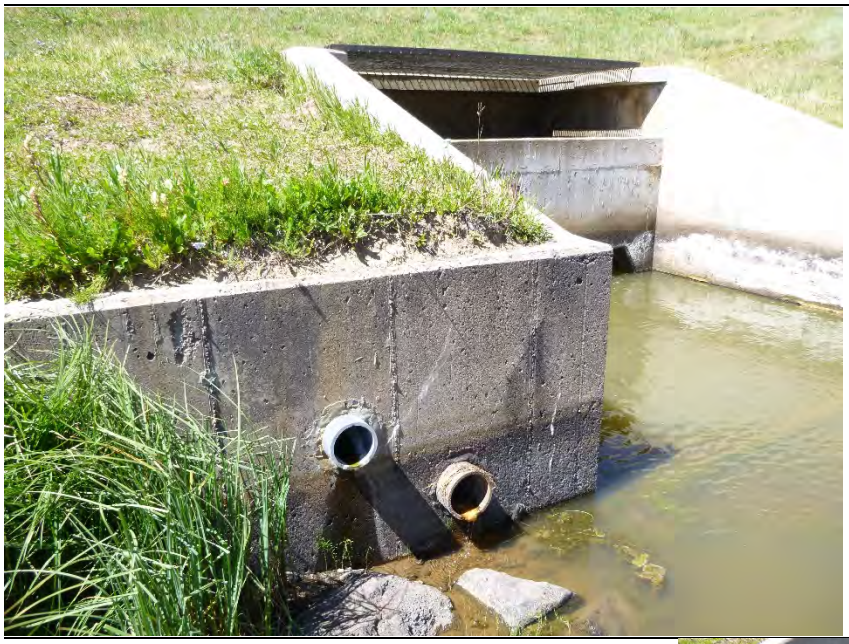


Toe drain outfall (drain ‘A’).

Toe drain outfalls.

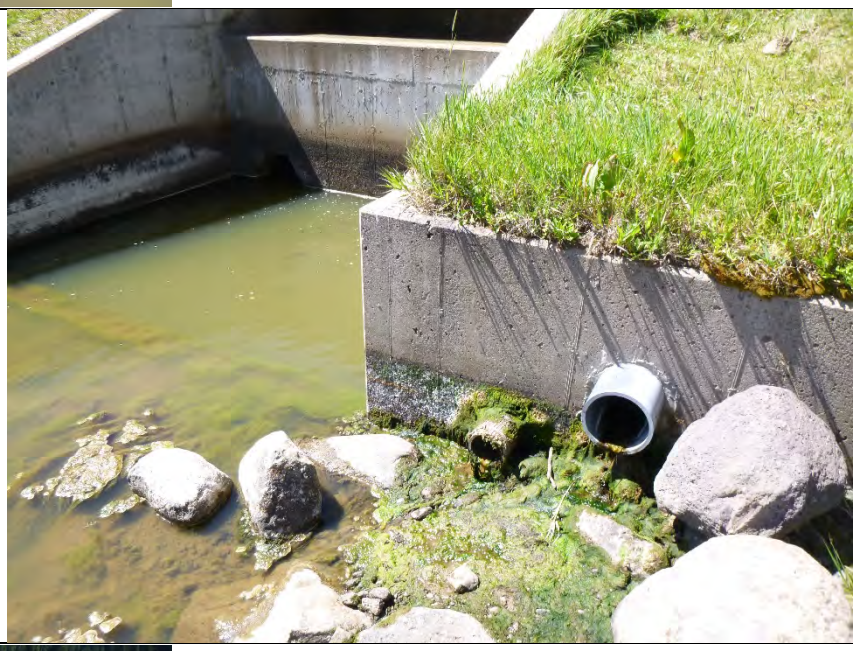


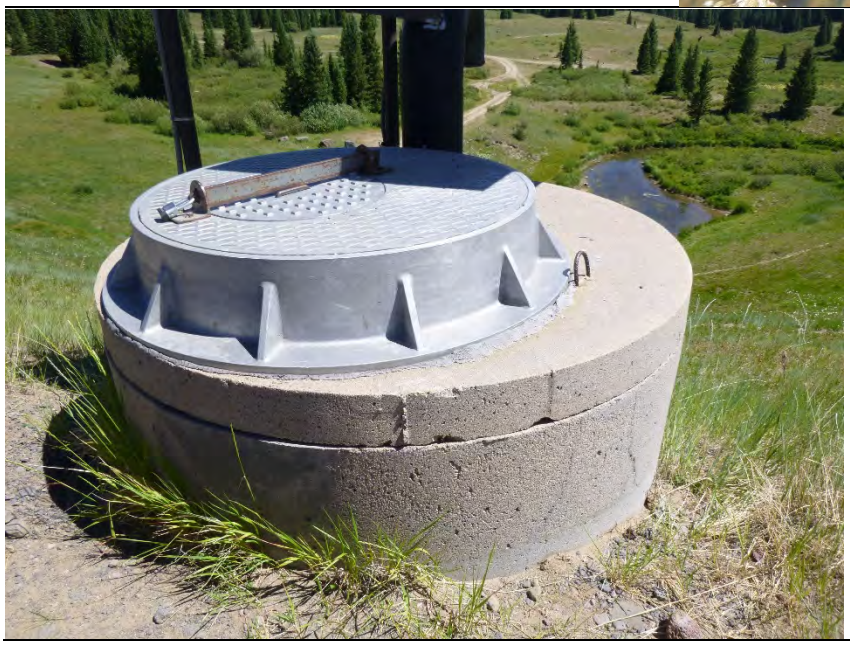
Close-up of toe drain outfalls (‘B-1’ right in photo, and ‘B-2’ left in photo).



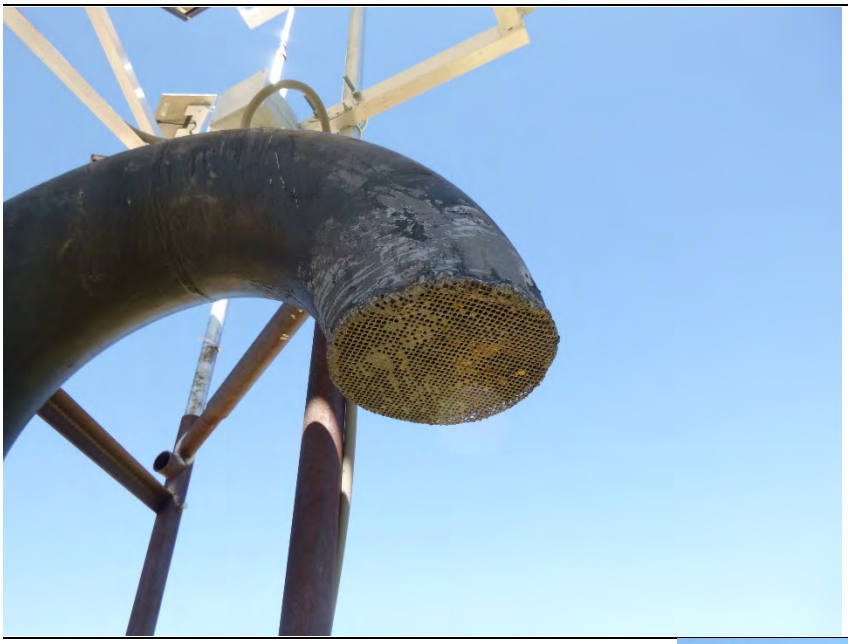
Outlet Chamber Drain (left in photo) and Conduit Filter Drain (right in photo) from right wingwall of downstream outlet structure.

Toe drain (right in photo) and Conduit Filter Drain (left in photo) from left wingwall of downstream outlet structure.



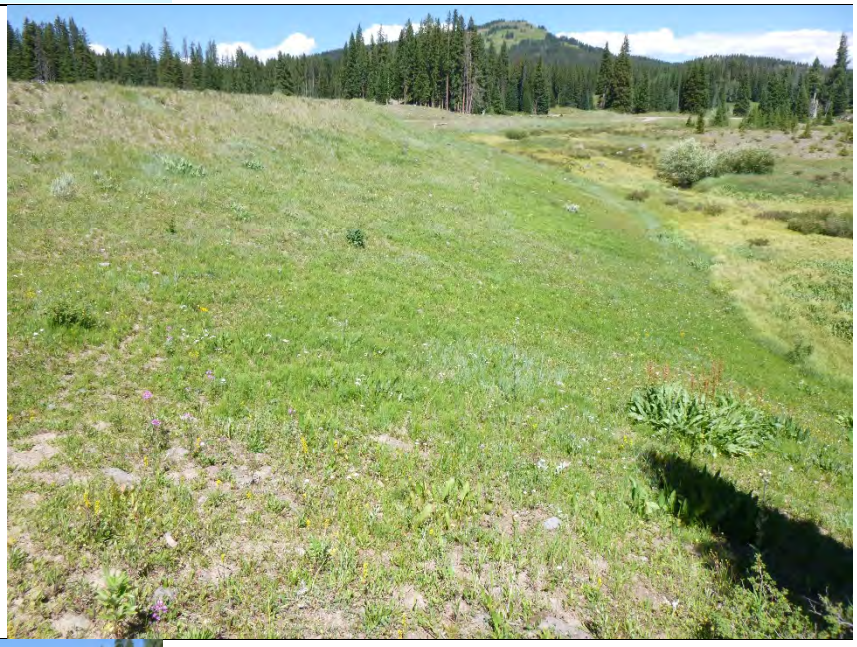


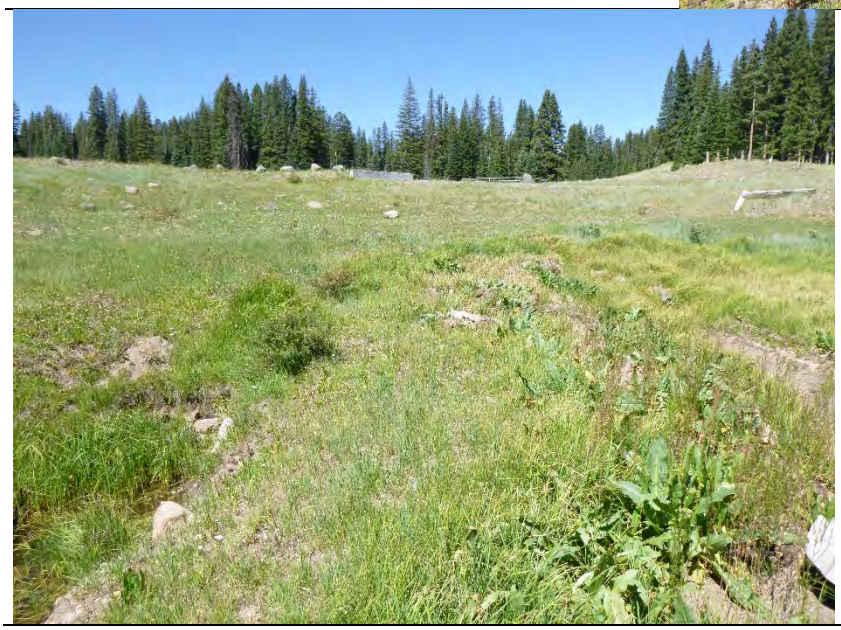
Outlet valve control vault.



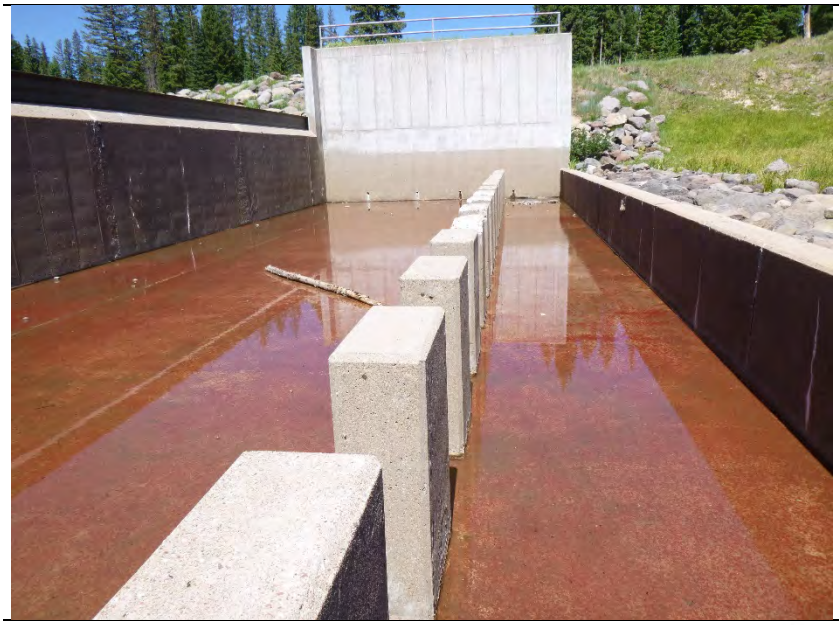
Air vent.

Typical view along downstream slope.



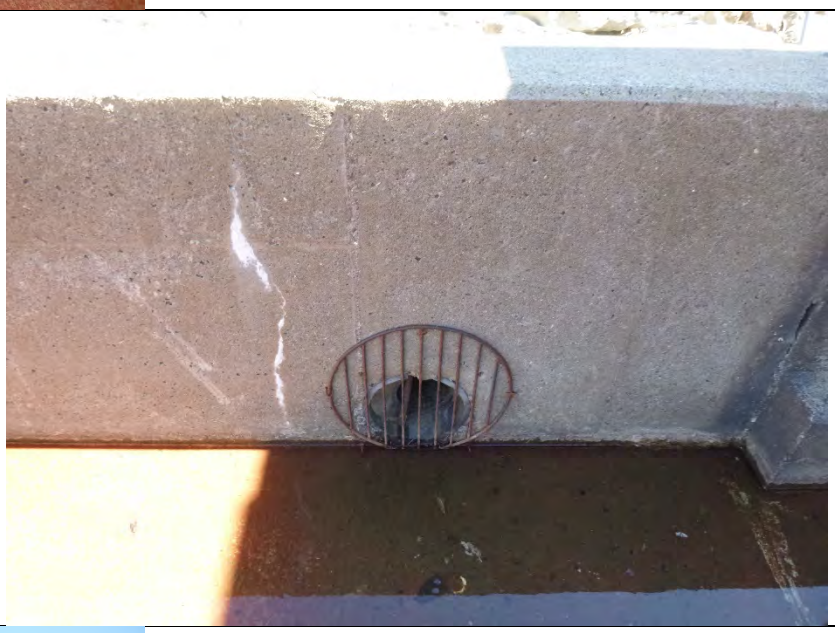


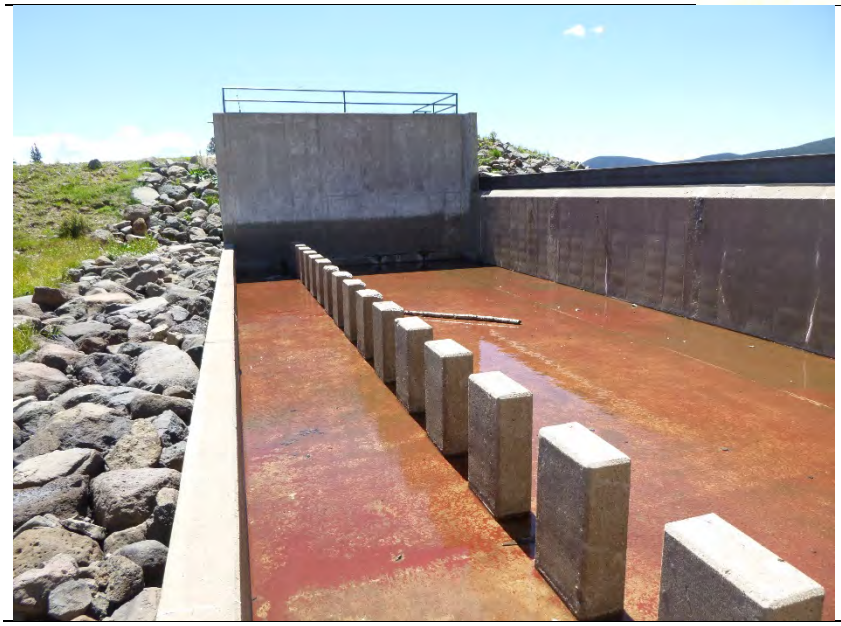
Stilling basin drain outfall channels (downstream end of drains obscured by grass in photo)

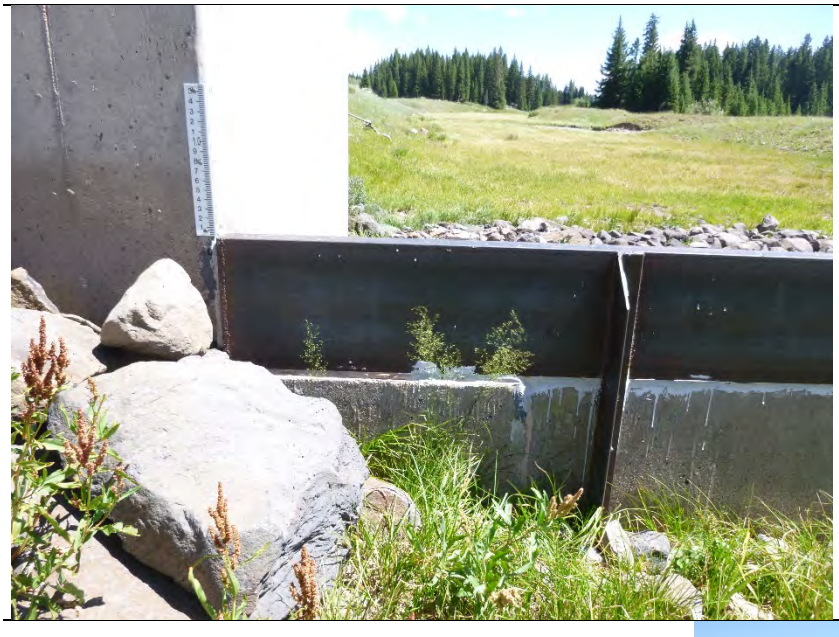


Spillway stilling basin.

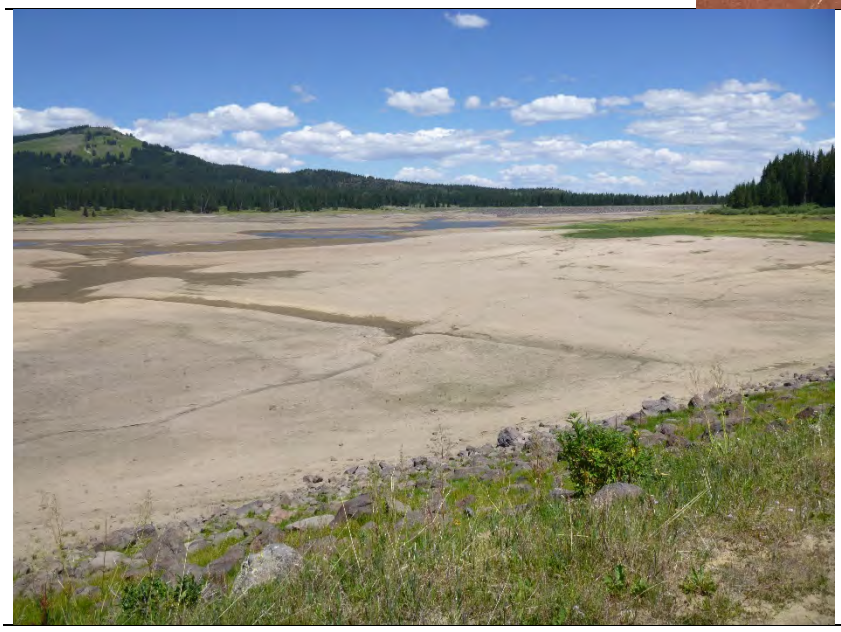
Stilling basin drain.







Original concrete sharp crested weir with steel stoplog constructed around 1991.



View of empty reservoir from crest of Auxiliary dam located on southwest end of reservoir.