



**COLORADO**  
Division of Water Resources  
Department of Natural Resources

Dam Safety

August 26, 2016

Mr. David Kuntz  
President, Overland Ditch & Reservoir Company  
28444 Redlands Mesa Rd.  
Hotchkiss, CO 81419

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

**SUBJECT:** Engineer's Inspection Report

Dear Mr. Kuntz,

On July 27, 2016, 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 P. Ward, P.E.  
Dam Safety Engineer

Encl: Engineer's Inspection Report  
ec: Bill McCormick, Chief, Dam Safety Branch  
Doug Christner, District 40 Water Commissioner  
Jon Hare, Realty Specialist, GMUG National Forest: [jhare@fs.fed.us](mailto:jhare@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: 23	COUNTY: DELTA	DATE OF INSPECTION: 7/27/2016
DAM ID: 400422 YRCompl: 1987	DAM HEIGHT(FT): 60.0	SPILLWAY WIDTH(FT): 75.0	PREVIOUS INSPECTION: 9/16/2015
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	Robert Stephenson, Steve Widner
REPRESENTING : Dam Safety; Water Commissioner	Overland DRC President	Ditchrider, Dam Monitoring

FIELD CONDITIONS OBSERVED	WATER LEVEL: BELOW DAM CREST 18.5 FT. Below Spillway 12.5 FT. GAGE ROD READING 29.5
	GROUND MOISTURE CONDITION: <input checked="" type="checkbox"/> DRY <input type="checkbox"/> WET <input type="checkbox"/> SNOWCOVER OTHER

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

## UPSTREAM SLOPE

PROBLEMS NOTED ☐ (0)NONE ☒ (1)RIPRAP - MISSING, SPARSE, DISPLACED, WEATHERED ☐ (2) WAVE EROSION - WITH SCARPS

☐ (3) CRACKS WITH DISPLACEMENT ☐ (4) SINKHOLE ☐ (5) APPEARS TOO STEEP ☐ (6) DEPRESSION OR BULGES ☐ (7) SLIDES

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

**Main dam: Good full riprap coverage along majority of slope with no signs of erosion, slope movement or other indications of instability. Riprap somewhat sparse along slope of dike between Main dam and spillway but no signs of erosion or instability.**

**Auxiliary dam: (1) Riprap considered sparse but appears effective against wave erosion at this time. Slope change to steeper above high waterline, but stable appearance.**

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

## CREST

PROBLEMS NOTED ☐ (10) NONE ☒ (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) Small to moderate sized potholes forming on crest of main dam, particularly around the outlet controls manhole. Elevation, width, and alignment all appear uniform through main section of dam.**

**(11) Extensive rutting begins at right end of Main dam and extends along right wing dike of dam. POOR rating for this section only.**

**Auxiliary dam: Crest condition acceptable with no observed changes since gated from vehicular traffic several years ago. No problems observed.**

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☒ Poor

## DOWNSTREAM SLOPE

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

☐ (25) APPEARS TOO STEEP ☒ (26) DEPRESSION OR BULGES ☐ (27) SLIDE ☐ (28) SOFT AREAS ☐ (29) OTHER

**Main dam: Few areas of surface erosion, slope change, or surface irregularity. All judged minor with no observable changes since last inspection. Buttress along right half of dam appears uniform and stable. Livestock activity and trails less evident than in previous years.**

**Auxiliary dam: (26) Few areas with bulges and dense grass with uniform bare slope above it. Uncertain of cause, but historic condition with no changes observed.**

CONDITIONS OBSERVED: ☐ 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

### Main dam:

North toe drain outfall: running several gallons per minute (>15gpm); clear.

Outlet works conduit drain outfalls: both submerged by tailwater during inspection.

Gate chamber drain outfall: dry; no flow

"Drain B " outfalls (left and right): Flowing several gallons per minute; clear. Moss and soil buildup at end of pipes obstructs free flow condition for volume versus time measurements.

"Drain A" outfall: Difficult to locate due to dense tall grass, but found during inspection; damp, no flow.

Auxiliary dam: Damp along toe. Standing water in places well beyond toe. Embankment slope observed dry.

Spillway under drain outfall: trickle flow

Spillway floor drain outfall: dry; no flow (see Spillway Section for additional discussion).

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.

Ditchrider interviewed during inspection regarding operation. No known or reported problems.

Air vent audible during inspection. Uniform air intake with no problems observed.

Baffled impact basin performing well at outflow discharging approximately 58 cfs during inspection. Good energy dissipation with uniform downstream flow conditions.

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 Floor drain

(59) Spillway floor drain plugged or broken and does not allow for full drainage of basin. 8-12 inches of water remains in basin.

Weep holes in spillway walls plugged with moss. Several weepholes producing steady drip flow.

All structural elements appear sound and in acceptable to good condition.

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 drain outfalls

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

(118) Owner attempting to follow current monitoring program with newly hired man dedicated solely to instrumentation monitoring. However, several questions remain as to the condition of each instrument, numbering system, frequency of readings, etc. See 2015 inspection report for additional information. (119) Owner recently retained an engineer to evaluate the instrumentation and monitoring system.

(111) Known problem with gage rod at lower reservoir level. See 2015 inspection report for additional information.

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

**(63)(64) Small to moderate size brush and small pines periodic on all slopes should be sprayed and or removed.**  
**(63) Willows in spillway channel should be fully removed.**  
**(68) Repair spillway floor drain. Clean moss from spillway wall weepholes.**  
**See Action Items on page 3 for additional maintenance items.**

CONDITIONS OBSERVED: ☐ Good ☒ Acceptable ☐ Poor

*Go to next page for Overall Conditions and Items Requiring Actions*

## OVERALL CONDITIONS

Conditions observed for all features on the dam are rated either Good or Acceptable, with exception of a Poor condition of the far right portion of crest on the Main dam. The Poor crest condition is judged not to be a serious dam safety concern, but should be addressed with maintenance.

Emphasis should be placed on continued diligence towards completing an instrumentation evaluation and establishing a long-term monitoring plan. This may include repair or replacement of piezometers or drains. Other routine maintenance items identified below and in previous inspection reports should also continue.

Seepage monitoring and completion of maintenance items are viewed as critical to the safety of the dam are conditions of full storage. Therefore, a Conditionally Satisfactory rating is provided.

The Emergency Action Plan (EAP) for this high hazard dam is dated 2012 and should be reviewed and revised. CO Dam Safety can assist the Owner in updating and distributing the EAP prior to the next inspection.

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

The State Engineer, by providing this dam safety inspection report, does not assume responsibility for any unsafe condition of the subject dam. The sole responsibility for the safety of this dam rests with the reservoir owner or operator, who should take every step necessary to prevent damages caused by leakage or overflow of waters from the reservoir or floods resulting from a failure of the dam.

### MAINTENANCE - MINOR REPAIR - MONITORING

- ☐ (80) PROVIDE ADDITIONAL RIPRAP: \_\_\_\_\_
- ☒ (81) LUBRICATE AND OPERATE OUTLET GATES THROUGH FULL CYCLE **annually and report any operational problems or concerns**
- ☒ (82) CLEAR TREES AND/OR BRUSH FROM: **from spillway channel and all embankment surfaces as needed for clear access and visibility. Small pines among riprap on upstream slope should be removed**
- ☐ (83) INITIATE RODENT CONTROL PROGRAM AND PROPERLY BACKFILL EXISTING HOLES: \_\_\_\_\_
- ☒ (84) GRADE CREST TO A UNIFORM ELEVATION WITH DRAINAGE TO THE UPSTREAM SLOPE: **and repair ruts between Main dam and right wing dike**
- ☐ (85) PROVIDE SURFACE DRAINAGE FOR: \_\_\_\_\_
- ☒ (86) MONITOR: **Continue seepage and piezometer monitoring with annual submittal of data to CO Dam Safety. Also See item (95) below for additional requirements**
- ☒ (87) DEVELOP AND SUBMIT AN EMERGENCY ACTION PLAN: **Update and distribute with assistance from CO Dam Safety**
- ☒ (88) OTHER **Clean muck from toe drains 'A' and 'B' outfalls to facilitate monitoring.**
- ☒ (89) OTHER **Unclog or repair spillway floor drain to allow full draining of spillway basin; Clean moss from spillway wall weep holes.**

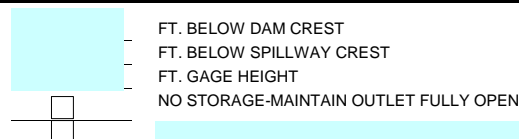
### ENGINEERING - EMPLOY AN ENGINEER EXPERIENCED IN DESIGN AND CONSTRUCTION OF DAMS TO: (Plans and Specifications must be approved by State Engineer prior to construction.)

- ☐ (90) PREPARE PLANS AND SPECIFICATIONS FOR REHABILITATION OF THE DAM: \_\_\_\_\_
- ☐ (91) PREPARE AS-BUILT DRAWINGS OF: \_\_\_\_\_
- ☐ (92) PERFORM A GEOTECHNICAL INVESTIGATION TO EVALUATE THE STABILITY OF THE DAM: \_\_\_\_\_
- ☐ (93) PERFORM A HYDROLOGIC STUDY TO DETERMINE REQUIRED SPILLWAY SIZE: \_\_\_\_\_
- ☐ (94) PREPARE PLANS AND SPECIFICATIONS FOR AN ADEQUATE SPILLWAY: \_\_\_\_\_
- ☒ (95) SET UP A MONITORING SYSTEM INCLUDING WORK SHEETS, REDUCED DATA AND GRAPHED RESULTS: **Continue diligence on instrumentation inventory and repair with long-term monitoring plan.**
- ☐ (96) PERFORM AN INTERNAL INSPECTION OF THE OUTLET: \_\_\_\_\_
- ☐ (97) OTHER: \_\_\_\_\_
- ☐ (98) OTHER: \_\_\_\_\_
- ☐ (99) OTHER: \_\_\_\_\_

## SAFE STORAGE LEVEL: RECOMMENDED AS A RESULT OF THIS INSPECTION

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

REASON FOR RESTRICTION



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

**Item (95) comprehensive report of instrument condition with a long-term monitoring plan should be completed prior to 2017 irrigation season. Complete all additional minor repair, maintenance, and monitoring items listed above.**

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 without 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 required

#### 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 of 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 line.

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





Looking upstream at outfall and discharge channel for Spillway Stilling Basin Floor Drain.



Spillway Stilling Basin Underdrain outfall.



Example of isolated brush that should be removed from dam.

View along downstream slope of northern dogleg portion of embankment. See Construction Drawings C-576C for overall plan view and embankment alignment.





Spillway

View looking back at spillway and northern portion of embankment.



Overall view along downstream slope of main section of embankment.



Photo taken on downstream slope near maximum section with south portion of embankment in background.





Outlet manhole access on downstream edge of crest at the maximum section.

Looking down along slope at outlet works.



Downstream baffled impact basin.





Wingwalls of baffled impact basin with various drain outfalls. Lower outfalls submerged at this outlet flowrate.

Typical piezometer casing and cap on downstream slope.



"Drain B" headwall and drain pipe outfalls.





Close-up of 'Drain B' outfalls.



'Drain A' pipe outfall.



'Drain A' headwall and pipe outfall.





Heavily rutted crest section along far south (right) freeboard dike portion of dam.

Gage rod laying along top of riprap on upstream slope.



Typical puddles on dam crest near maximum section of dam.





Gated left end of crest on Auxiliary Dam.

Typical view along upstream slope of Auxiliary Dam.



Looking up along typical area on downstream slope of Auxiliary Dam with historic bulge and upper portion of slope void of vegetation.





View looking across and slightly downstream at spillway crest and stilling basin.

Looking downstream in spillay channel just beyond stilling basin.



Spillway stilling basin floor drain intake. 8-12 inches of standing water constantly remains in stilling basin, indicating possible plugging of floor drain pipe.