

STATE OF CALIFORNIA
CALIFORNIA NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF SAFETY OF DAMS

INSPECTION OF DAM AND RESERVOIR IN CERTIFIED STATUS

Name of Dam Alpine Dam No. 33 County Marin
 Type of Dam Gravity Type of Spillway Eight siphons
 Water is 0.13 feet above the spillway crest and 7.87 feet below the dam crest.
 Weather Conditions Sunny and warm
 Contacts Made Lucy Croy, Kristin Arnold, and Jonathan Fouche (Marin Municipal Water District)
 Reason for Inspection Annual Inspection

Important Observations, Recommendations or Actions Taken

Vegetation in both downstream groins needs to be removed to allow for access, visibility for inspection, and monitoring for seepage and other defects (photos 3 & 4).
 The owner must arrange for the galleries to be inspected during the next periodic inspection.
 The downstream outlet controls will need to be cycled in the presence of DSOD during the next inspection.
 In future instrumentation submittals, the owner must provide an evaluation of each component of the data with regards to dam safety.

Conclusions

From the known information and visual inspection, the dam, reservoir, and the appurtenances are judged safe for continued use.

Observations and Comments

<u>Dam</u>	<p>The visible portions of the upstream face, crest, downstream face, and abutments are in satisfactory condition, with no indication of surficial distress or instability. Minor cracks and offsets appear unchanged from previous inspection reports.</p> <p>Vegetation control is generally satisfactory, but trees, bushes, and other tall and dense vegetation in both downstream groins needs to be removed to allow for access, visibility for inspection, and monitoring for seepage and other defects (photos 3 & 4).</p> <p>Rodent control is satisfactory, and no rodent activity was observed.</p>
<u>Galleries</u>	<p>The galleries are considered a permit required confined space, requiring qualified and trained personnel for access and inspection and were not entered during this inspection. The galleries were last inspected on June 26, 2013. The owner must arrange for the galleries to be inspected during the next periodic inspection.</p>
<u>Spillway</u>	<p>The spillway approach, siphon entrances, and siphon discharges were clear and unobstructed. A polyethylene log boom was in place several dozen yards upstream of the dam.</p>
<u>Outlet</u>	<p>All upstream outlet controls were cycled during this inspection and found to be in satisfactory operating condition. The top most slide gate, which was the only remaining original gate, was completely replaced in June 2019, and 4 of the 5 valve stems were replaced (photo 2). This was considered routine maintenance and an application was not required.</p> <p>None of the downstream outlet controls were cycled during this inspection but were last cycled by the owner on September 17, 2019 and found to be in satisfactory operating condition. The downstream outlet controls were last cycled in the presence of DSOD during the February 15, 2018 inspection</p>

Photos taken? Yes No
 cc for Owner/Book
 DWR 1261 (Rev. 10/09)

MM 4/22/2020 Inspected by Michelle Lockhart
 Date of Inspection April 15, 2020
LS 4/22/2020 Date of Report April 20 2020
RB 4/22/2020 Sheet 1 of 5

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and will need to be cycled in the presence of DSOD during the next inspection.

The discharge area below the outlet conduit "Tee" outfall is susceptible to erosion, and the owner is planning to armor the susceptible area with concrete stabilized large-boulder riprap. The owner is working to obtain the required environmental permits and devise a plan to get the necessary equipment to that area.

Seepage

The spillway was spilling at the time of this inspection which obscured any seepage on the downstream face. Seepage from the right abutment is collected and measured at two locations designated the "Upper" and "Lower" leaks. The Upper leak was seeping approximately 5 gpm and the lower leak was seeping approximately 20 gpm. The owner has reported that seepage rates decrease significantly when the reservoir level drops more than 22.5 feet below spillway elevation.

There is no designated collection point or weir for estimating seepage from the left galleries and left abutment. In the past, the total seepage from the left side of the dam has been visually estimated as it flows over and around the left downstream toe. With the reservoir being high, flows from the left side of the dam were approximately 5 gpm, which is consistent with previous inspections.

Seepage from both sides of the dam was clear and remains within historical levels.

Instr.

Instrumentation consists of the following:

- Four (4) piezometers
- Twelve (12) survey monuments
- Two (2) seepage measurement locations

The latest instrumentation data was received from the owner on July 31, 2019 and covers the monitoring period through 2018.

Piezometer data for the reporting period from July 2009 through July 2019 was reviewed.

Piezometers P1 and P4 are located along the downstream half of the dam crest, near the right and left abutments, respectively. Piezometer P2 is located several feet to the right of the right spillway wall just above the mid elevation of the dam; piezometer P3 is located near the left abutment just below the mid elevation of the dam. Piezometer P3 was retrofitted with a vibrating wire piezometer in 2016.

The average elevation of piezometers P1 and P4 remain relatively steady within the reporting period, directly responding to the reservoir water surface elevation. Piezometer P2 has remained constant at approximately 540' elevation since 2010 when it was modified to prevent surface water intrusion.

Piezometer P3 has remained constant at approximate 560' elevation for the entire reporting period.

Monument data for the reporting period from July 2014 through July 2019 was reviewed and no anomalous movement beyond the range of instrument error was observed. Between reporting period July 2018 and July 2019, all monuments trended upwards, except M-1, which reported a settlement of 0.01 ft. Maximum reported alignment deviation continues to be in M-4, with an overall movement in the upstream direction of 0.1 ft since 2014, however, it is reported to have moved in the downstream direction by 0.007 ft since July 2018. Due to the relatively short sample period, no obvious trends in settlement or alignment can be discerned. Both settlement and horizontal deflections do not indicate any apparent adverse trends and are within tolerances of the survey instruments

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Both the "upper leak" and "lower leak" seepage trends with reservoir water surface elevation. The "upper leak" fluctuates between 0 and 5gpm, and the "lower leak" fluctuates more drastically between 0 and 40 gpm.

The owner's conclusion from their July 2019 submittal: "The Alpine Dam seepage and piezometer data gathered over the most recent monitoring period are consistent with historical observations." I agree with the owner's conclusion. The dam appears to be performing satisfactorily, and no additional instrumentation is believed necessary at this time.

As was stated in the previous inspection report, the owner must provide an evaluation of each component of the data with regards to dam safety.



Photo 1: View of the upstream face as seen from the right abutment.

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Photo 2: View of the recently replaced valve stems for the upstream slide gates.



Photo 3: View of the downstream face as seen from the left abutment. Minor vegetation in the right groin (circled) requires removal.

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Photo 4: View of the downstream face looking towards the left abutment. Vegetation in the left groin (circled) requires removal.