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 Bon Tempe Dam No. 33-6 County Marin
Type of Dam ERTH Type of Spillway Concrete weir and chute
Water is 3 feet below the spillway crest and 5.6 feet below the dam crest.

Weather Conditions Clear and mild
Contacts Made Lucy Croy, Carl Sanders, and Conner Pollard during the inspection
Reason for Inspection Periodic Evaluation

Important Observations, Recommendations or Actions Taken

Following the placement of additional large boulder riprap, the upstream face riprap protection is satisfactory.

Conclusions

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

Observations and Comments

Dam

The visible portions of the upstream face, crest, downstream face, and abutments are in satisfactory condition, with no indication of surficial distress or instability. Following the placement of additional large boulder riprap, the upstream face riprap protection is satisfactory.

Vegetation control is very good, and the embankment is covered with ankle to knee tall grass and other low ground cover that provide protection against erosion without hindering access for inspection and monitoring for seepage and other defects. More frequent vegetation clearing within the left downstream groin would help improve the effectiveness of monitoring for seepage and other defects within this important location.

Similar to recent past inspections rodent control is also satisfactory, and few to no indications of rodent activity were observed.

Spillway

The spillway approach, control section, and exit channel were open and clear. The concrete lined spillway channel remains in satisfactory condition, and the invert and walls are free of significant cracks or spalls indicative of excessive stress or deterioration. I asked Ms. Croy to investigate whether the seepage into the spillway near the bottom of the concrete channel is consistent with design expectations.

The current design storm, prepared in 1952, is for a 1000-year return period producing 2360 cfs (~871 cfs / sq mi) from the 2.71 square mile drainage area. The spillway capacity is ~4110 cfs which is greater than the peak inflow. Total freeboard is 6 feet and the residual freeboard for the design storm is 1.7 feet. Freeboard is satisfactory.

Outlet

Two 20-inch hydraulically operated butterfly valves provide upstream outlet control for the fully encased normally pressurized outlet. Downstream control is provided by three 12-inch mechanically operated butterfly valves. A fourth, 8-inch gate valve, controls flow to an irrigation supply line.

All upstream and downstream controls were fully cycled and found to be in good operating condition.

Inspected by J. Lowe
Date of Inspection 14 February 2018
Date of Report 16 February 2018

Photos taken? Yes X No
cc for Owner/Book

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Observations and Comments

Seepage

The downstream face and toe were dry and free of any indications of seepage.

Clear seepage from the left abutment was approximately 2 gpm to 3 gpm as measured at the outflow pipe below the downstream groin; the right groin seepage collection pipe dry. Seepage from right leak has diminished to near zero since 2009, probably the result of the installation of a gravel filled seepage interceptor trench near the center-right downstream toe in the year 2000. Seepage at both locations appears to correlate more with rainfall than with reservoir elevation, and remains within historical values.

Instr.

Instrumentation consists of the following:

- Twelve (12) survey monuments installed to monitor settlement and displacement of the embankment. Five (5) benchmarks or reference points are used to locate and monitor the survey monuments. Monuments are read at roughly five-year intervals.
- Two (2) seepage measurement locations installed to monitor seepage from the left and right abutments. Seepage from the left abutment is measured at an iron pipe below the left groin. Seepage from the right abutment is measured at a corrugated culvert pipe near the right-center toe of the embankment.

The latest instrumentation data was received from the owner on 21 June 2017.

Seepage data covers the reporting period between January 2007 and May 2017. Reported seepage from the left leak varies from less than 1 gpm to a maximum of 82 gpm (January-February 2016), with an average of around 20 gpm. Seepage appears to correlate more with rainfall than with reservoir elevation. Seepage from right leak has diminished to near zero since 2009, probably the result of the installation of a gravel filled seepage interceptor trench near the center-right downstream toe in the year 2000. All seepage observed was clear and the volume of seepage measured at both groins is within historical values.

Survey data covers the reporting period between January 1982 and July 2016. The maximum total recorded settlement is 0.483 feet, or 5.8 inches, at monument M-8 on 12 March 2007. Incremental settlement is very small within the data reporting period, and is considered to be minor.

Alignment readings are also stable following the use of a new survey instrument introduced in December of 2005. The maximum displacement, recorded at monument M-3, is less than 1-inch, which is also considered to be minor.

The owner's conclusions from their June 2017 submittal were that, "The Bon Tempe Dam left seepage is consistent with historic readings. Monitoring of the right seepage was reinitiated in February 2017. The last recorded seepage flow rate prior to February 2017 was 0.75 gpm in 2009. The maximum flow recorded at the right seepage since monitoring was restarted was 0.11 ppm in February 2017. Bon Tempe Dam is trending towards stabilization: settlement of -0.48 ft (maximum) and alignment of -0.48 ft (downstream direction; maximum)". Based on the data submitted I agree with the owner's conclusions. The dam appears to be performing satisfactorily, and no additional instrumentation is believed necessary at this time.

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The upstream face and spillway entrance as viewed from the right abutment. The recently placed large boulder riprap along the upstream face waterline is lighter in color than the original rock.

Another view of the upstream face, this time looking towards the spillway entrance.

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The downstream face looking towards the left abutment, above, and looking towards the right abutment, below. Vegetation control is very good.

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The concrete lined spillway channel remains in satisfactory condition (above); direction of flow is indicated by the arrow. I asked Ms. Croy to investigate whether the seepage into the spillway near the bottom of the concrete channel is consistent with design expectations (below).