

# **LAND 11 VOLCANIC AND SEISMIC ASSESSMENT**

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## **1.0 EXECUTIVE SUMMARY**

In 2002, the seismic hazard zone, volcanic events hazard zone, and the recommended design and construction measures for volcanic hazards were described in LAND-11 Volcanic and Seismic Assessment Technical Study Report (TSR). In 2003, SCE's records of dam inspection by the Federal Energy Regulatory Commission (FERC) and the California Department of Water Resources Division of Safety of Dams (DSOD) were compiled and summarized.

SCE's Dam Safety Group (DSG) performs safety inspections and technical analyses of SCE dams and associated facilities. SCE Project dams are under the jurisdiction of the FERC. Although the Federal Power Act preempts state law in this area, SCE also involves the DSOD in SCE's dam safety work as a matter of courtesy. SCE's DSG engineers work cooperatively with FERC and DSOD to conduct annual inspections. FERC regulations (18 CFR Part 12) require SCE to retain an independent consultant every five years to conduct a comprehensive inspection of Project works including dams spillways and other related structures as outlined in 18 CFR Part 12. An independent consultant retained to conduct FERC inspections must meet the requirements of 18 CFR Part 12.31. After the independent consultant completes the inspection and report, SCE submits the report to the FERC regional engineer. All SCE Project dams that fall under the purview of these regulations have been inspected per 18 CFR Part 12 on the same five-year schedule for the past eight cycles. The most recent FERC Part 12 inspection of Project works was completed in 2002.

## **2.0 STUDY OBJECTIVES**

Review the volcanic and seismic hazard ratings for the Project area. Determine management practices or building codes recommended by the USGS, the Division of Safety of Dams, and local ordinances. Use this information to determine whether the Project facilities have the required level of protection for the hazard rating.

### **2.1 STUDY IMPLEMENTATION**

#### **2.1.1 STUDY ELEMENTS COMPLETED**

The following study element was completed in 2003:

- Reviewed and summarized SCE records of dam safety inspections by the FERC and DSOD including inspection frequency and findings.

#### **2.1.2 OUTSTANDING STUDY ELEMENTS**

- None

### **3.0 STUDY METHODOLOGY**

Dam inspection reports on file with SCE for all Project dams were collected and their frequency and findings were reviewed and summarized.

#### **3.1 STUDY RESULTS AND ANALYSIS**

##### **3.1.1 PROJECT DAMS INSPECTIONS**

SCE's DSG consists of a group of professional engineers that perform safety inspections and technical analyses of SCE dams and associated facilities and monitor SCE dams for geophysical parameters such as movement and seepage. SCE Project dams are under the jurisdiction of the FERC. The DSG engineers coordinate with the FERC and the DSOD to conduct annual inspections of dams and associated facilities. Every five years the DSG contracts with a FERC approved Independent Consultant to complete comprehensive inspections and reporting as required by FERC regulations (18 CFR Part 12). These studies and associated reports are commonly referred to as the FERC Part 12 inspections and reports.

For dams that are not licensed by FERC, the DSOD has jurisdiction over dams in California with a height between 6 ft. to 25 ft. and a storage capacity of 50 acre-ft or more and dams with a height of 25 ft. or greater and a storage capacity of 15 acre-ft or more. The mission of the DSOD is to avoid dam failure and thus prevent loss of life and destruction of property. As a matter of courtesy, SCE allows DSOD to conduct annual inspections of jurisdictional dams. Items that are reviewed include operation and maintenance activities, gates, spillways, ancillary equipment, and also include clearing of debris and vegetation around dam structures. The DSOD dam inspection process consists of three steps: 1) the review of general background information; 2) the review of monitoring data and inspection reports from the previous year; and 3) conducting and reporting on a visual inspection of the dam and related facilities. Prior to field inspections, the DSOD reviews the history of each dam including background information such as local seismic activity, geologic features, and hazard evaluations. DSOD engineers also review as-constructed drawings, inspection reports from the previous year, and the completion status of requested actions from the previous year. The annual inspections include physical field inspection of all accessible features of the dam, near abutment slopes, galleries, if applicable, and downstream groin and toe areas. Particular attention is given to issues noted in previous inspections and any change in conditions. The DSG cooperatively address DSOD inspection recommendations through preparation of an internal inspection report and a list of any action items recommended by DSOD inspectors or the DSG for each Project dam. SCE will then process a work request to address recommendations from the internal inspection report.

FERC regulations (18 CFR Part 12) require SCE to retain an independent consultant(s) on a five year cycle to conduct a comprehensive inspection of Project works including dams, spillways, and other related structures. The FERC required Part 12 inspections include physical field inspections of the Project works and a review and assessment of

all relevant data concerning settlement, movement, erosion, seepage, leakage, cracking, deterioration, seismicity, internal stress and hydrostatic pressures in Project structures or their foundations or abutments, regional and site geological conditions, and specific evaluation of the adequacy of spillways, and the effects of overtopping of non-overflow structures. This evaluation also specifically evaluates project works' performance including structural adequacy and the stability of structures under all credible loading conditions. The loading conditions range from a full reservoir, Inflow Design Floods, probable maximum flood (PMF), and a full reservoir under the Maximum Credible Earthquake.

The independent consultant(s) retained to conduct FERC Part 12 inspections must meet the requirements of 18 CFR Part 12.31. These include a licensed professional engineer with at least 10 years experience and expertise in dam design, construction, and investigation of the safety of existing dams and is not, and has not been within the previous two years retained to perform an inspection under this subpart, an employee of the licensee or its affiliates or an agent acting on behalf of the licensee or its affiliates.

After the independent consultant completes the inspection and report, SCE submits the report to the FERC regional engineer. If the independent consultant report recommends any additional studies and/or corrective actions, SCE has 60 days (from the time the report is submitted to FERC) to submit a plan and schedule for designing and carrying out studies/actions, which SCE proposes. The studies or actions commence after the FERC regional engineer approves the plan and schedule.

All Big Creek Project works that require inspection under these guidelines have been inspected per 18 CFR Part 12 on the same five-year schedule for the past eight cycles. The most recent FERC Part 12 inspection of Project works was completed in 2002. Table Land 11-1 summarizes the years in which the FERC Part 12 inspections were completed.

The FERC Part 12 Reports are considered Critical Energy Infrastructure Information (CEII) under FERC's final rule issued on February 21, 2003 (Docket RM-01-4-000, Order No. 630). This information is not available for public review as it could be useful to a person planning an attack on the infrastructure. The Commission is restricted by these CEII regulations from allowing the release of CEII information. The CEII regulations limit how the Commission handles, distributes, and provides access to this information.

SCE maintains copies of the FERC Part 12 inspection reports at the Northern Hydro Office located in Big Creek. The Part 12 inspection reports are not included in this LAND 11 Seismic and Volcanic technical study report because the information they contain are considered CEII, and due to the technical nature of their information and findings they could not be succinctly and accurately summarized here. If qualified stakeholders with a legitimate need for this information so desire, SCE will allow these reports to be viewed in the SCE Big Creek Relicensing Library. SCE reserves the right to require said persons to sign a confidentiality agreement. Alternatively, parties can formally request access to the information from the FERC. Table LAND 11-2 provides a

reference list summarizing the titles of the Part 12 inspection reports from the seventh and eighth inspection cycles that were previously filed for the Big Creek Northern Hydro dams that fall under the purview of these regulations.

#### **4.0 CONSULTATION CITED**

Milikan, Don. 2003. Southern California Edison Dam Safety Group. Personal communication. Discussion about SCE dam inspection processes and internal procedures. Telephone conversation. December 2003.

## **TABLES**

**Table 11-1. FERC Part 12 Inspection Cycles for Big Creek ALP Dams.**

<b>FERC Project Nos.</b>	<b>First Cycle</b>	<b>Second Cycle</b>	<b>Third Cycle</b>	<b>Fourth Cycle</b>	<b>Fifth Cycle</b>	<b>Sixth Cycle</b>	<b>Seventh Cycle</b>	<b>Eighth Cycle</b>
2175-CA (Dam 1)	1967	1972	1977	1982	1987	1992	1997	2002
2175-CA (Dam 2)	1967	1972	1977	1982	1987	1992	1997	2002
2175-CA (Dam 3)	1967	1972	1977	1982	1987	1992	1997	2002
2175-CA (Dam 3A)	1967	1972	1977	1982	1987	1992	1997	2002
2157-CA (Dam 4)	1967	1972	1977	1982	1987	1992	1997	2002
67-CA (Dam 5)	1967	1972	1977	1982	1987	1992	1997	2002
67-CA (Florence Lake Dam)	1967	1972	1977	1982	1987	1992	1997	2002
67-CA (Shaver Lake Dam)	1967	1972	1977	1982	1987	1992	1997	2002
67-CA (Balsam Meadow Dam)*	NA	NA	NA	NA	NA	1992	1997	2002
120-CA (Dam 6)	1967	1972	1977	1982	1987	1992	1997	2002
2085-CA (Mammoth Pool Dam)	1967	1972	1977	1982	1987	1992	1997	2002

\* - Balsam Meadow Dam was completed in late 1987.

**Table Land 11-2. FERC Part 12 Inspection Report Titles (7<sup>th</sup> and 8<sup>th</sup> cycles).**

Dam 1	<p>Huntington Lake Dam 1 FERC Project No. 2175-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Huntington Lake Dam 1 FERC Project No. 2175-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 2	<p>Huntington Lake Dam 2 FERC Project No. 2175-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Huntington Lake Dam 2 FERC Project No. 2175-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 3	<p>Huntington Lake Dam 3 FERC Project No. 2175-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Huntington Lake Dam 3 FERC Project No. 2175-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 3A	<p>Huntington Lake Dam 3A FERC Project No. 2175-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Huntington Lake Dam 3A FERC Project No. 2175-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 4	<p>Big Creek Dam 4 FERC Project No. 2175-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Big Creek Dam 4 FERC Project No. 2175-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 5	<p>Big Creek Dam 5 FERC Project No. 67-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Big Creek Dam 5 FERC Project No. 67-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>

**Table Land 11-2. FERC Part 12 Inspection Report Titles (7<sup>th</sup> and 8<sup>th</sup> cycles)  
(continued).**

Florence Lake Dam	<p>Florence Lake Dam FERC Project No. 67-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p> <p>Florence Lake Dam FERC Project No. 67-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p>
Shaver Lake Dam	<p>Shaver Dam FERC Project No. 67-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Shaver Lake Dam FERC Project No. 67-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Balsam Meadow Dam	<p>Balsam Meadow Dam FERC Project No. 67-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Balsam Meadow Dam FERC Project No. 67-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Dam 6	<p>Big Creek Dam 6 FERC Project No. 120-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Big Creek Dam 6 FERC Project No. 120-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>
Mammoth Pool Dam	<p>Mammoth Pool Dam FERC Project No. 2085-CA, Seventh Five-Year Safety Inspection. April 1997. Prepared for SCE, Rosemead, CA. Prepared by Northrop, Devine &amp; Tarbell, Inc., Portland, ME.</p> <p>Mammoth Pool Dam FERC Project No. 2085-CA, Eighth Five-Year Safety Inspection. April 2002. Prepared for SCE, Rosemead, CA. Prepared by Duke Engineering &amp; Services Inc., Portland, ME.</p>