

VIII - EFFECT OF WATER CONTROL PLAN

8-01 General. Mathews Canyon Dams is a component of a coordinated flood control plan with Pine Canyon Dam. Both units provide protection for much of the downstream area, which consists of about 13,280 acres of flood plain lands. The flood plain includes about 80 miles of the Union Pacific Railroad mainline, many miles of county roads, the City of Caliente, and about 3,500 acres of irrigated land.

8-02 Flood Control.

a. Spillway Design Flood. The spillway of the dam was designed to pass, without danger to the structural integrity of the dam or threat of overtopping the dam, the greatest discharge that could be expected from the most severe combination of rainfall and runoff conditions that could reasonably occur. This hypothetical flood is called the probable maximum flood (PMF).

(1) Original Probable Maximum Flood. In the design of the spillway structure, two types of floods were analyzed to determine which was most critical, namely 1) Type "A" flood, which produces a peak discharge based on the maximum possible thunderstorm, and 2) Type "B" flood, which produces a peak volume based on the maximum possible general storm, with accretion to storm runoff from snowmelt. The Type "A" flood was determined to be most critical for Mathews Canyon, and was used as the probable maximum flood in designing the spillway. The probable maximum precipitation (PMP) that would produce this hypothetical flood would have an average rainfall depth over the entire basin of 8.6 inches in 6 hours. The 1/2-, 1-, 3-, and 6-hour precipitation totals are 2.0, 3.5, 7.7, and 8.6 inches, respectively. Routing of the original PMF through the dam having a peak inflow of 35,000 cfs (a total volume of 13,400 acre-feet) resulted in a calculated peak water surface elevation and peak outflow discharge of 5,478.1 feet, msl, and 13,060 cfs, respectively.

(2) Revised Probable Maximum Flood. According to the "Interim Report on Hydrology and Hydraulic Review of Design Feature of Existing Dams for Pine Canyon and Mathews Canyon Dams," dated July 1978, the National Weather Service updated the PMP based on a new criteria which was established in September 1977. The 1/2-, 1-, 3-, and 6-hour precipitation values changed from 2.0, 3.5, 7.7, and 8.6 inches, to 5.2, 6.6,, 8.8, and 10.1 inches, respectively. As a result, the probable maximum flood that would result from this updated PMP would produce a peak inflow of 57,000 cfs and a total runoff volume of 16,000 acre-feet. Routing of this revised PMF through the dam would result in a maximum water surface elevation of 5,481.7 feet, msl, and a maximum outflow of 16,650 cfs. Since the maximum water surface would be 1.3 feet below the top of dam elevation, the report also recommended that the dam be raised 1.7 feet or the spillway lengthened from 50 feet to 100 feet to satisfy the minimum freeboard

requirement of 3.0 feet; however, there are no plans to implement any of these recommendations. Plate 8-01 shows the routing for the revised probable maximum flood.

b. Standard Project Flood (SPF). The standard project flood, which was used as the reservoir design flood, occurs from the most severe combination of meteorologic and hydrologic conditions that are reasonably characteristic of the geographic area. A synthetic general winter type storm based on previous events, especially the storms of 1938 and 1946, was established in Design Memorandum No.1, "Hydrology for Pine Canyon and Mathews Canyon Dams, dated April 1955, as the basis of design. The duration of the synthetic storm was 24 hours, including intense rainfall. Ground conditions reasonably conducive to runoff were established by assuming the intense rainfall to occur 17 hours after the start of the storm. Rainfall over the entire drainage area during the 24-hour storm resulted in a total average depth of 7.2 inches, of which 3.9 inches occurred during the 6-hour period of intense rainfall. Infiltration loss rates varied with time. The average loss rate for the period of intense rainfall was 0.15 inches per hour. Runoff from snowmelt was considered to constitute a minor contribution to the flood flows and was therefore neglected. The routing for a reservoir design flood having a peak inflow of 8,500 cfs (a volume of 5,800 acre-feet) resulted in a calculated maximum water surface elevation of 5,460.6 feet, msl, and a peak outflow of 260 cfs. Plate 8-02 shows the Mathews Canyon Dam reservoir design standard project flood routing.

c. Other Floods. As mentioned before, the floods of 1910, 1925, 1938, 1941, and 1946 were representative of major floods within the basin. Based on the flood events of 1938 and 1946, the value for the SPF was later derived. The outcomes of storms and floods that occurred after Mathews Canyon and Pine Canyon Dams were completed in December 1957, were not as severe as before. These storms and floods are discussed in the following paragraphs.

(1) Storms and Floods of January and February 1969. General winter storms produced widespread precipitation throughout the state. Total precipitation at the Mathews Canyon Dam was 3.09 inches during January and 5.69 inches during February. Runoff was negligible during February because most of the precipitation fell as snow. The peak mean hourly inflow of 1,771 cfs to the reservoir resulted in a maximum water surface elevation of 5,430.66 feet, msl, and a peak outflow of 132.6 cfs on 21 January. Plate 8-03 shows the operation hydrographs of Mathews Canyon Dam during the storm period.

(2) Storms and Floods of 10 February - 5 March 1978. In a series of low-latitude winter storms between early February and early March 1978, one especially intense storm stalled just off the southern California coast, pumping abundant tropical moisture into Nevada and to western and central Arizona. This strong storm occurred on February 9 -10, and brought 2.16 inches of precipitation to the Pine Canyon precipitation

station and 1.74 inches of precipitation to the Caliente precipitation station. On 10 February, Mathews Canyon Dam reached a maximum water surface elevation of 5,439.61 feet, msl with a peak inflow of 1,462 cfs and a peak outflow of 180 cfs. Meadow Valley Wash near Caliente had a peak flow of 580 cfs on 10 February. Inflows, water surface elevations, and outflows from Mathews Canyon Dam are shown graphically on Plate 8-04.

(3) Storms and Floods of 24 February - 3 March 1983. The winter season of 1982-83 was characterized by several series of low-latitude Pacific storms that moved across southern California, Nevada, and Arizona from the west, driven by a very prominent El Nino condition in the equatorial Pacific Ocean. The climax of the season occurred from 24 February through 3 March, when storms stalled just southeast of San Diego and produced large quantities of tropical moisture in southern California, Nevada and western Arizona. Mathews Canyon Dam had 3.98 inches of precipitation during the entire period, with 1.26 inches on 2 March alone. Pine Canyon Dam had 2.48 inches for the entire period, and the Caliente precipitation station had 2.32 inches. Mathews Canyon Dam briefly experienced the highest water surface elevation in 37 years of service, when it reached 5,445.0 feet, msl, on 3 March. The peak inflow on 3 March was 1,588 cfs, resulting in a peak outflow of 204 cfs to Clover Creek. The peak flow at Meadow Valley Wash near Caliente was 1,610 cfs, also recorded on 3 March. Plate 8-05 shows the operation hydrographs at Mathews Canyon Dam during the storm period.

(4) Storms and Floods of 6 January - 27 February 1993. The winter season of 1992-93 was characterized by a series of low-latitude Pacific storms that moved across southern California, Nevada, and Arizona from the west, driven by cooler than normal temperatures across the north Pacific Ocean. The first significant storm period occurred on 6-18 January. The Mathews Canyon precipitation station recorded 4.37 inches for that period and the Caliente precipitation station recorded 2.56 inches for the period of 7-19 of January. The second significant storm period occurred during 1-10 February. The Mathews Canyon station recorded 3.45 inches of precipitation for that period. The Caliente station recorded 1.70 inches of precipitation for the same period. The highest water surface elevation occurred on 9 February with an elevation of 5,435.24, a peak inflow of 1,475 cfs on 8 February, and a peak outflow of about 160 cfs on 9 February to Clover Creek. The highest peak instantaneous flow at Meadow Valley Wash near Caliente also occurred on 9 February, with a flow of 1,590 cfs. The mean flow records for this storm in Meadow Valley Wash near Caliente were the maximum highest for the months of January and February for the USGS station's 42 years of record. Plate 8-06 shows the operation hydrographs of Mathews Canyon Dam during the storm period of 8 - 10 February.

8-03 Recreation. Although Mathews Canyon Dam Project was originally authorized for recreational development (PL 78-534), no recreational facilities have been formally developed. However, there was a camp site that was provided under the dam

construction contract to accommodate contractor employees and Los Angeles District employees working at the project site. This site, consisting of two restrooms, picnic table, and a barbecue pit, is not formally open or closed to the public. However, because the camp site is located in a remote back-country far from any urban area, it does not receive many visitors outside of the Los Angeles District maintenance personnel.

8-04 Water Quality. The operation of Mathews Canyon Dam has a negligible effect on Water Quality.

8-05 Fish and Wildlife. The Bureau of Land Management (BLM) lands associated with Mathews Canyon Dam are used for cattle grazing, and otherwise are in their natural state. The intermittent nature of streams in the area preclude the existence of fish, and wildlife resources are small. The effects of the project and its water control plan on fish and wildlife is negligible.

8-06 Water Supply. Waters passing through the Mathews Canyon Dam supply local water tables and ultimately become part of the Colorado River storage at Lake Mead. However, neither the dam nor its operation plan has any effect on water supply.

8-07 Hydroelectric Power. The water control plan does not include procedures for hydroelectric power since there is no existing or contemplated hydroelectric power generation at Mathews Canyon Dam.

8-08 Navigation. The water control plan does not include procedures for navigation since there is no navigation in the Mathews Canyon Dam reservoir, in Clover Creek, in Meadow Valley Wash, nor in the lower Muddy River.

8-09 Drought Contingency Plans. Drought contingency plans are only required at projects with controlled reservoir storage (ER 1110-2-1941).

8-10 Flood Emergency Action Plans. A Corps document entitled "Flood Emergency Plan Mathews Canyon Dam, Clover Creek, Lincoln County, Nevada, Emergency Action and Notification Subplan", dated February 1986, contains the flood emergency plan for this project as discussed in paragraph 7-13. Since the dam is ungated, however, it cannot be regulated for emergency purposes, and does not have an effect on the plan.

8-11 Frequencies.

a. Peak Inflow Probability. Plate 8-07 shows the peak inflow and outflow discharge frequency curves for Mathews Canyon Dam. The curves were derived from a recent discharge frequency analysis of historical flows through the reservoir. The frequency analysis was completed in July 1998. Frequency analysis data are shown on

Plate 8-08.

b. Filling Frequency. Plate 8-09 shows the exceedance filling frequency curves. Maximum pool elevations for the period of record are shown on Plate 4-05. The curves were derived from the same discharge frequency analysis mentioned above.

8-12 Environmental Documentation. An Environmental Assessment report (EA) was developed to establish baseline conditions at the project site and the effects of the current water control plan. The EA was completed on 24 August 2000 and resulted in a “Finding of No Significant Impact” (FONSI) which documents that the continued operation of the existing project would not have any lasting negative impacts to the surrounding environment. The EA and FONSI are included in this report as Exhibit D.

8-13 Other Studies. There are no other up-to-date studies in relation to Mathews Canyon Dam and reservoir.