III - HISTORY OF PROJECT

3-01 Authorization

Santa Fe Dam was authorized by the Flood Control Act of 1936, approved 22 June 1936 (Public Law 738, 74th Congress), as amended by the Flood Control Act of 1938, approved 26 June 1938 (Public Law 761, 75th Congress). Santa Fe Dam was incorporated into a comprehensive development plan described in the LAD District Engineer's report entitled, "Survey of Los Angeles and San Gabriel Rivers and Their Tributaries, and Ballona Creek, California", dated 5 February 1940. This comprehensive plan was implemented by the Flood Control Act of 1941, approved 10 August 1941.

3-02 Planning and Design

In 1935 and 1936, LAD and the Los Angeles County Flood Control District (LACFCD) became partners in a large Works Progress Administration contract to design a comprehensive flood control plan for Los Angeles County. During the next three years, a comprehensive flood control system was designed for the Santa Ana, Los Angeles, and San Gabriel Rivers. Santa Fe Dam is one part in the plan for the construction of reservoirs and principle flood channels on the San Gabriel River, as described in the report entitled, "Definite Project for Construction of Reservoirs and Principle Flood Channels, Los Angeles County Drainage Area, California, authorized by the Flood Control Act of 1936", approved 30 April 1937, and later revised in 1939 to include the influence and data of the March 1938 flood. Other design reports include: "San Gabriel River Improvement, Santa Fe Dam, Analysis of Design", Volumes I and II dated April 1941, Addendum A dated August 1942, and Addendum B dated May 1944; and "Analysis of Design of 6'x9' Slide Gates for Santa Fe Dam" dated June 1947.

3-03 Construction

Construction for Santa Fe Dam began in August 1941 and was suspended in 1943 by the order of the Chief of Engineers at the recommendation of the War Production Board until 1946. The project was accomplished under 4 principle contracts, which are listed below. Installation of the slide gates was delayed by metal shortages until January 1949. The total Federal cost construction was $12,636,949.00. Construction drawings (File Nos. 438) and copies of the project contracts are on file in the LAD office, in the Design Branch.

1. Dam and appurtenant work
   contractor: Morrison-Knudsen Company
   contract number: W-509-Eng. 1574
   work started: 8 August 1941
   work completed: 23 September 1943

2. Completion of embankment and spillway
   contractor: Guerin Brothers
   contract number: W-04-353-Eng. 1849
   work started: 24 June 1946
   work completed: 14 February 1947

3. Channels and levees
   contractor: Macco Corporation
   contract number: W-04-353-Eng. 1981
   work started: 1 May 1947
   work completed: 24 December 1947

4. Slide gates and appurtenances
   contractor: Guy F. Atkinson Company
   contract number: W-04-353-Eng. 2115
   work started: 23 September 1947
   work completed: 26 January 1949

3-04 Related Projects

Plate 3-1 shows related projects for the entire San Gabriel River system.

a. Cogswell Dam. Cogswell Dam is located on the San Gabriel River approximately 18 miles upstream of Santa Fe Dam. The rockfill structure, completed in April 1934, is operated and maintained by LACDPW for flood

control and water conservation. Cogswell Dam has a storage capacity of spillway crest of 8968 ac-ft (as of the last survey in December 1984). Information pertaining to Cogswell Dam and Reservoir is given in Exhibit B.

b. San Gabriel Dam. San Gabriel Dam is located on the San Gabriel River approximately 9 miles upstream of Santa Fe Dam. The rockfill structure completed in July 1939, is operated and maintained by LACDPW for flood control and water conservation. San Gabriel Dam has a storage capacity at spillway crest of 44,183 ac-ft (as of the least survey in September 1986). Information pertaining to San Gabriel Dam and Reservoir is given in Exhibit B.

c. Morris Dam. Morris Dam is located on the San Gabriel River approximately 6 miles upstream of Santa Fe Dam. The concrete gravity structure, completed in 1935, is operated by LACDPW for water conservation. Morris Dam has a storage capacity at spillway crest of 22,551 ac-ft (as of the last survey in November 1983). Information pertaining to Morris Dam is given in Exhibit B.

d. Whittier Narrows Dam. Whittier Narrows Dam is constructed across the Rio Hondo and San Gabriel Rivers approximately 8 miles downstream of Santa Fe Dam. The earthfill structure, completed in 1957, is owned and operated by LAD for flood control. Information pertaining to Whittier Narrows Dam is given in Exhibit B.

e. LACDPW Spreading Grounds. Santa Fe Reservoir Spreading Grounds, Buena Vista Spreading Basin, and Peck Road Spreading Basin are owned and operated by LACDPW for groundwater recharge. Initially constructed in 1953, modifications to the spreading grounds will be completed in 1991. Santa Fe Reservoir Spreading Grounds are located within Santa Fe Reservoir and spillway channel (detail on pl. 3-1). As of 1989, there are a total of 8 basins within the reservoir (each containing several smaller sub-basins) and 12 basins within

the spillway channel. Buena Vista Spreading Basin is located along Buena Vista Channel downstream of the Santa Fe Dam outlet works (pl. 3-1). Peck Road Spreading Basin is located within the Rio Hondo Channel downstream of Buena Vista Channel (Pl. 3-1). Commonly, the spreading grounds use water either purchased from MWD, or released from upstream LACDPW reservoirs. The water may be percolated along the San Gabriel riverbed between Morris Dam and Santa Fe Dam, or diverted into the Santa Fe Reservoir Spreading Grounds. Water not percolated in these sections flows into Santa Fe Reservoir, and may then be diverted at the Santa Fe Dam outlet works into the Santa Fe Diversion and into Buena Vista Channel, then either percolated at Buena Vista Spreading Basin or further downstream at Peck Road Spreading Basin. Excess flow would then continue downstream to Whittier Narrows Dam. Pertinent information (September 1989) on the spreading grounds are listed below:

Pertinent Information on related LACDPW Spreading Grounds and Basins

(September 1989)

	Buena Vista	Peck Road	Santa Fe
Max. basin intake capacity (ft^3/s)	2900	30,100*	600
Storage volume (ac-ft)	194	3347	700
Percolation rate (ft^3/s)	4	25	400
Area (ac)	10	157	338

*Spreading Basin has no intake control and receives entire flow of river. Value given indicates total channel capacity at this site.

f. San Gabriel River Channel. The San Gabriel River Channel has been improved from Santa Fe Dam upstream to the San Gabriel Canyon mouth, and downstream to Whittier Narrows Dam. Upstream channel improvements consist of a series of 7 invert stabilizers and 10 drop structures which extend from the confined within trapezoidal earthen levees protected by grouted rock revetments which begin at the canyon mouth and end within the reservoir.

Improvement of the channel upstream of Santa Fe Dam was completed in 1949, and resulted in an increased channel capacity of 98,000 ft^3/s. Downstream channel improvements consist of a series of drop structures and invert stabilizers within trapezoidal earthen levees protected by grouted rock revetments. Channel configurations and capacities for the San Gabriel River Channel between Santa Fe and Whittier Narrows Dam are shown on plate 3-2. The original channel capacity of 19,000 ft^3/s just below the dam increased to 41,000 ft^3/s following completion of downstream channel improvements in January 1961.

3-05 Modifications to Regulations

The original design gate regulation schedule presented in Report No. 4 of Table 1-1 had all gates closed until the debris pool was at a depth of 21 feet, corresponding to a WSE of 442 feet. The gates were then gradually opened to maintain WSE 442, keeping inflow equal to outflow up to 19,000 ft^3/s. A change in the regulation schedule came with the completion of the San Gabriel River Channel improvement in 1961. The debris pool was set at WSE 456 feet. The gates were then opened gradually, reaching fully open at WSE 462. Between the elevations of 462 and 496 feet, the gates were fully open, following the gate rating curve until discharge equaled the new downstream channel capacity of 41,000 ft^3/s at spillway crest (elevation 496 feet). If downstream high confidence runoff predictions were available, deviation from the fixed gate operation was permissible. Should communication with the District Office fail, the dam operator would operate according to the fixed schedule.

The authorized reservoir regulation schedule initially required all 16 gates closed during standby conditions. The schedule was revised in 1982 to have one gate (No. 14) open 0.5 feet during standby conditions. Allowing low flows to pass through helps reduce insect propagation and improve maintenance associated with sedimentation and gate corrosion. Standing instructions to

the dam operator were also revised. A one hour wait time during rising stages after loss of communication with the LAD office was required before regulation resumes according to the schedule. During falling stages, current downstream gage height is to be maintained until communication with the district office was reestablished.

The current schedule, in Exhibit A of this manual, is a revision of the 1982 schedule. The plan calls for building a debris pool to WSE 456, then operating in coordination with Whittier Narrows Dam. Also, the current schedule modifies the operation of Santa Fe Dam when loss of communication occurs between the LAD office and the dam tender (after six full hours).

3-06 Principal Regulation Problems

Santa Fe Dam has never spilled, and except for the trash rack problem in 1943 described below, there has never been any structural deficiencies or major hydraulic malfunctions.

During the flood of 1943, the trash racks were completely clogged with organic debris. Although the regulation schedule called for building a debris pool to WSE 442, the pool could not be built because the outlet gates had not yet been installed. At the time, clogging of the trash racks was believed to represent a serious hazard to safe operation of the dam in the event of "back-to-back" floods. Close examination of the trash racks indicated that, should another flood occur before the racks could be cleaned, there would be a strong possibility that the racks would act like a dam, preventing flow from going through the outlet works and causing premature spillway discharge. Cleaning the racks proved to be a very difficult operation. Therefore, the bottom 15 feet of rack at Santa Fe Dam was removed permanently. After the gates were installed in 1947, the gate schedule requiring a debris pool be formed could be implemented. When a flood has passed, the debris pool would be drained

slowly, allowing the debris to settle to the bottom rather than being drawn into the gates. No significant trash rack problems have been experienced since 1943.

Based on the results of the August 1969 reservoir sedimentation survey, sediment inflow to Santa Fe Reservoir for the period of April 1943 to August 1969 was 4228 ac-ft. This amount exceeded the original 1000 ac-ft allowance for a 50-year time span. In 1968, 2194 ac-ft of sediment was excavated to increase reservoir capacity. Although sediment and debris removal has restored some of this lost capacity, the 50-year sediment allowance was revised in June 1978 to 8000 ac-ft (Report No. 16 of Table 1-1). As of September 1982, when the most recent reservoir sedimentation survey was performed, Santa Fe Dam had 32,109 ac-ft capacity below spillway crest, or about 7% less than the original gross capacity of 34,670 ac-ft (see Table 4-1). Total sediment deposition to that date (1943-1982) amounted to 4761 ac-ft, including sediment excavated to restore capacity. These figures indicate that sediment accumulated behind the dam at an average rate of 121 ac-ft per year during the 1943-1982 period (includes sediment removed in 1968). The area-capacity curve for Santa Fe Dam reflecting the 1982 sediment survey is shown on plate 3-3.