VIII - EFFECT OF WATER CONTROL PLAN

8-01 GENERAL

The operation of Lopez Dam has resulted in a reduction in the magnitude of flows along the lower portion of Pacoima Wash. The dam has successfully provided a headworks to direct flows into the downstream flood control channel. Indirect benefits have also resulted from operations by controlling flows for conservation diversions into Lopez Spreading Grounds and the downstream channel.

8-02 FLOOD CONTROL

a. Spillway Design Flood. The spillway of a dam must be designed in order to pass, without danger to the structure of the dam or threat of overtopping the dam, the greatest rate of 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 PMF.

(1) Original Criteria. The spillway at Lopez Dam was designed for a peak outflow of 32,000 cfs, with 21 feet of surcharge. An additional 5 feet of freeboard to handle runup by waves from the water surface was incorporated, which set the top of the dam at elevation 1,298.9 feet.

The original spillway design flood resulted from a 24-hour stable orographic-type storm. The average precipitation depth over the drainage area for the probable maximum storm was 21.5 inches with an effective total precipitation of 17.9 inches. The probable maximum flood (PMF) peak inflow to Lopez Dam was 32,000 cfs. The total 2-day flood volume, including base flow, was 37,800 acre-feet. The maximum water surface elevation obtained during the PMF routing was 1293.9 feet, approximately 5 feet below the top of the dam.

(2) Revised Criteria. In a subsequent 1978 study, the adequacy of the Lopez Dam spillway was reviewed under modern criteria. This led to the development of a revised PMF resulting from a probable maximum storm based on a 6-hour convective-type storm. The average depth of precipitation for 1/2, 1, 3, and 6 hours during the probable maximum storm for the drainage area above Lopez Dam were 4.1, 5.9, 8.7, and 11.3 inches, respectively. The total flood volume, including base flow, was 19,900 acre-feet.

The revised PMF (peak inflow of 30,400 cfs) was routed, assuming that the outlet conduit was plugged and that the debris storage pool was filled. The peak outflow would be 30,200 cfs and the maximum pool elevation would be 1292.8 feet. This provides 6.1 feet of freeboard which exceeds the required freeboard of 5 feet. The inflow, outflow, and water surface elevation hydrographs for the revised spillway design routing are shown in Plate 8-1.

b. Standard Project Flood. The SPF represents the runoff event that would result from the most severe combination of rainfall and watershed conditions that are considered reasonably characteristic for the region in

question. The COE generally applies the SPF as the criteria for protecting urban areas. Thus, since approximately 1952, the SPF has been used as the Reservoir Design Flood for the construction of new dams.

For the rainfall to be used in the determination of the SPF at a given site, a Standard Project Storm is normally selected as the most severe reasonably characteristic storm of record within a climatically homogeneous region surrounding the site, and is then transposed to the drainage area above the target site.

The SPF has been routed through the reservoir assuming that the reservoir outlet was closed and that the debris storage of 794 acre-feet was full. The SPF was based on a general type storm having a duration of 48 hours. The average precipitation depth over the drainage area is 21.2 inches with an effective total precipitation of 7.8 inches. The SPF peak inflow and outflow are both 11,200 cfs. The total flood volume, excluding base flow, is 14,100 acre-feet. The maximum water surface elevation obtained during the SPF routing is 1,283.2 feet, approximately 16 feet below the top of the dam. Plate 8-2 shows the inflow, outflow, and water surface elevation hydrographs for the SPF routing.

8-03 WATER QUALITY

At most times during most years, inflows are not detained in the reservoir, but pass immediately downstream, with little change in water quality. Impoundment of water occurs in the winter storm season for debris control purposes. These impoundments are of such short duration that little adverse effect on water quality will occur. In fact, whatever effect would probably be beneficial as suspended solids and debris would settle out and result in higher quality releases downstream. In most instances, water flowing from Lopez Reservoir should meet Federal and state water quality standards and be suitable for the identified beneficial uses, primarily groundwater recharge.

8-04 FISH AND WILDLIFE

Any impacts on biological resources resulting from the new flood control operation plan are expected to be minor. No vegetation exists within the reservoir basin. The margins of the basin have a scattered covering of tree tobacco (Nicotiana glauca) and broom baccharis (Baccharis Sarothroides). The existing vegetation either tolerates inundation well or can quickly reestablish itself after inundation. Prolonged inundation does not occur within the reservoir basin.

The basin does not provide suitable habitat for wildlife. The lack of cover and intermittent flooding makes the area unsuitable for most species. There are no State or Federally listed threatened or endangered species within the general vicinity of the reservoir.

8-05 FREQUENCIES

a. Peak Inflow and Outflow Probabilities. Plate 8-3 is a graph of the inflow and outflow frequencies at Lopez Dam, computed from a December 1984 LACDA review study. The values from which these curves were derived are

listed in Table 8-1. The inflow curve is affected by the Water Control Plan for Pacoima Dam, as discussed in Section 4-07. The inflow and outflow frequencies at Pacoima Dam are presented on Plate 8-4. Table 8-2 contains the values from which the curves on Plate 8-3 were derived. The inflow curve, is of course not affected by the Water Control Plan for Lopez Dam, which has bearing only upon regulation of the outflow and consequently the impoundment of water behind the dam.

The outflow curve of Plate 8-3, on the other hand, does reflect the Lopez Dam Water Control Plan. The sharp break in the slope of the curve at water surface elevation 1,273 feet reflects the fact that the water surface elevation in Lopez Dam has reached the spillway crest 1,273. The outflow rate increases rapidly for any additional rise in the reservoir water surface above elevation 1,273 feet.

b. Pool Elevation Duration and Frequency. Plate 8-5 is the computed filling frequency curve for Lopez Dam. Plate 8-6 shows a similar curve for Pacoima Dam. The curves on Plate 8-5 and Plate 8-6 are based upon, and have been adjusted for, 1984 conditions. These conditions include percent of impervious cover in the drainage area above Lopez and Pacoima Reservoirs, runoff routing conditions, and the gate operation schedule of the Water Control Plan for Lopez and Pacoima Dams. The values from which the curves of Plates 8-5 and 8-6 were constructed are listed in Tables 8-1 and 8-2, respectively. As with the outflow frequency curve (Plate 8-3), the relatively sharp change in slope of the filling frequency curve for Lopez Dam (Plate 8-5) reflects the fact that the outflow rate increases rapidly as the reservoir water surface elevation in Lopez Dam rises above elevation 1,273 feet, therefore, the rate of additional impoundment of water within the reservoir is reduced for a given increase in inflow.

8-06 OTHER STUDIES

a. Discharge-frequency values presented in this manual were derived from ongoing (1984) investigations in the COE LACDA study. The "Interim Report on Hydrology and Hydraulic Review of Design Features of Existing Dams for Los Angeles County Drainage Area Dams," dated June 1978, presents the derivation of the Probable Maximum and Standard Project Floods used in this manual.

b. No flood plain management studies addressing the downstream channel have been conducted by the COE since the downstream channel was constructed. Several flood insurance studies have been completed to date by the COE and LACDPW for the Federal Emergency Management Agency. These studies show no downstream flood problem. Currently (1984) the COE is conducting an ongoing review study of the entire LACDA system in order to reassess the adequacy of flood protection provided by the downstream channels.

TABLE 8-1

INFLOW, OUTFLOW, AND FILLING FREQUENCY VALUES, LOPEZ RESERVOIR

RETURN PERIOD (Years):	2	5	10	25	50	100	200	500
INFLOW (cfs)	156	323	616	1,130	2,720	2,990	3,390	4,630
OUTFLOW (cfs)	70	115	233	296	2,710	2,990	3,380	4,580
FILLING (max elevation, feet above NGVD)	1,257	1,258	1,261	1,264	1,276	1,277	1,277	1,279

NOTES:

1. These preliminary data values, which represent 1984 conditions, were obtained from a December 1984 LACDA review study performed by the Hydrologic Engineering Section of the U.S. Army Corps of Engineers, Los Angeles District.

2. Inflow and outflow frequency curves, drawn from the data values listed in this table, appear on Plate 8-3.

3. A filling frequency curve, drawn from the data values listed in this table, appears on Plate 8-5.

TABLE 8-2

INFLOW, OUTFLOW, AND FILLING FREQUENCY VALUES, PACOIMA RESERVOIR

RETURN PERIOD (Years):	2	5	10	25	50	100	200	500
INFLOW (cfs)	204	843	1,600	2,740	7,110	8,920	10,600	12,500
OUTFLOW (cfs)	200	405	799	1,370	2,720	2,990	3,390	4,630
FILLING (max elevation, feet above NGVD)	1,900	1,905	1,910	1,920	1,959	1,968	1,981	1,995

NOTES:

1. These preliminary data values, which represent 1984 conditions, were obtained from a December 1984 LACDA review study performed by the Hydrologic Engineering Section of the U.S. Army Corps of Engineers, Los Angeles District.

2. Inflow and outflow frequency curves, drawn from the data values listed in this table, appear on Plate 8-4.

3. A filling frequency curve, drawn from the data values listed in this table, appears on Plate 8-6.