

## VII - WATER CONTROL PLAN

### 7-01 General Objectives

The objective of Carbon Canyon Dam is flood control, specifically, the minimization of flood damages for portions of the coastal Orange County plain along Carbon Canyon and Carbon Creek Channels and Coyote Creek. In this regard, water is temporarily stored behind Carbon Canyon Dam during periods of high inflows and is released more slowly through the downstream channels.

There is no legal authority for the storage of impounded water for conservation purposes. However, the release rate from the gates may be adjusted provided the hydrologic forecast is favorable and there is not immediate threat to the dam or its regulation purpose.

There is no objective to operate the dam to reduce inundation damages to its reservoir lands. All usage of reservoir land is intended to have a purpose secondary to its role as the bottom of the flood control reservoir. All costs associated with reservoir inundation are intended to be routine maintenance costs associated with a clear understanding of risk and subsequent willingness to locate within the flood control reservoir.

### 7-02 Major Constraints

No major physical or regulation constraints exist at the project. Notable changes, however, have taken place or been made over the years, including:

a. Loss of storage space due to sedimentation. Based on the results of the 1969 reservoir sediment survey, current storage capacity below the spillway crest elevation of 475 feet approximately 6615 ac-ft, which is 6 percent less than the initial storage capacity of 7033 ac-ft. This represents an average sediment rate somewhat higher than the rate originally expected. However, the available storage was, as of 1969, still sufficient to control RDF to a maximum outflow of 1000 ft<sup>3</sup>/s. See plate 7-1 for area-capacity curve reflecting 1969 conditions.

b. Sedimentation and clogging of gates from debris. Revisions to the reservoir regulation schedule have been made to alleviate sedimentation in the vicinity of the gates, and rack bar problems. Originally both gates remained closed during normal standby operations. The revised schedule has one gate open 0.5 foot to pass low flows during standby operations. This prevents the occurrence of small stagnant pools at the outlets, as well as reducing sediment build up, gate corrosion, and providing for an easier silt cleaning operation at the intake channel. The gates will be alternated as to which remains open.

c. Gate Operations. During falling stages, the original schedule called for a progressive gate closing from elevation 425 feet to the gate sill elevation 403 feet. The schedule was revised to keep both gates set at 0.9 feet during falling stages below elevation 425 feet so that the reservoir could be drained more rapidly.

d. Natural Channel through the Golf Course. Approximately 2.5 miles downstream from Carbon Canyon Dam, Carbon Canyon Channel is natural channel and runs through Alta Vista Golf Course. The channel is overgrown with saplings, bushes, and tall grasses. The channel capacity is unknown. With such overgrowth the flooding potential of this reach is undetermined. A channel observer should be sent out when there is any significant release from Carbon Canyon Dam. An estimate of channel capacity under given reservoir release rates for this segment can then be made. This channel capacity estimate will not alter the current release rate from the dam. The Gate Regulation Schedule and Standing Instructions to Dam Operator are to remain the same.

#### 7-03 Overall Plan for Water Control

Carbon Canyon Dam is operated for flood control on Carbon Canyon Creek. Plate 2-2, which depicts the storage allocations for Carbon Canyon Reservoir, shows that the entire space of the reservoir below elevation 475 feet (spillway crest) is devoted to flood control (includes debris pool). Elevation 475 feet is also the maximum water surface elevation for RDF. The revised spillway surcharge pool is between elevations 475 and 491.9 feet. Once the elevation of 475 feet is reached, flood control is no longer the prime objective. Passing as much water out of the reservoir as is required to assure the safety of the dam becomes the major regulation concern. The space between elevation 491.9 and 499 feet is reserved for freeboard.

Extenuating circumstances downstream may create the need to decrease (or increase) releases from the dam. These conditions are discussed in section 7-13.

#### 7-04 Standing Instructions to Dam Operator

In the event that all communication with the District Office, including the Base Yard, should be interrupted, a set of Standing Instructions to Dam Operator has been compiled for each District dam. A copy of these instructions for Carbon Canyon Dam is included in Exhibit A of this manual.

The original instructions have been changed. The revised instructions call for a wait time of one hour without communication with the District Office before regulation is continued according to the gate schedule.

#### 7-05 Flood Control

a. General. The plan for controlling floods on Carbon Canyon Creek below Carbon Canyon Dam is presented in this section. The objective of the water control plan is to maximize flood control benefits. Project releases will be regulated to protect downstream communities and to avoid spillway flow. Although releases from Carbon Canyon Dam could affect downstream discharges in Coyote Creek and the Santa Ana River, the dam is not usually regulated as part of these systems. Release rates from the dam are not to exceed the downstream capacity of Carbon Canyon Channel between the outlet works and Golden Avenue.

b. No Forecast is Available. When no forecast information is available, the project should be operated according to the Regulation Schedule in Exhibit A. This is achieved by keeping one of two gates open 0.5 feet to pass low flows during normal standby. Once the reservoir water surface elevation reaches 419 feet, both gates are operated. Gate openings increase during rising stages until the water surface reaches elevation 455 feet, when downstream channel capacity of 1000 ft<sup>3</sup>/s is reached. As the water surface elevation rises, the gates are progressively closed such that the downstream channel capacity is not exceeded. At a water surface elevation of 477.3 feet (2.3 feet above spillway crest), both gates are completely closed and only spillway flow exists. During falling stages, both gates remain open 0.9 feet as the water surface drops from elevation 425 to 403 feet. Exhibit A provides the reservoir regulation schedule. Section 7-13 describes situations when deviations from the normal regulation schedule may be permitted.

c. Forecast is Available.

(i) No Spillway Flow Forecast. When forecast information clearly indicates that Carbon Canyon Dam will not experience spillway flow (reservoir water surface will not exceed elevation 475 feet), both gates may be partially or fully closed in order to alleviate downstream emergencies (see Sec. 7-13), to prevent downstream damages, or to add an additional safety factor when the downstream channel is experiencing high flows.

(ii) Spillway Flow Forecast. The regulation schedule is to be followed when forecast information indicates that spillway flow will occur. If it becomes apparent that there will eventually be spillway flow that will exceed downstream channel capacity and cause flood damages, the gate outlet release rate may be increased to exceed downstream channel capacity, upon concurrence by the District Engineer. The purpose of this "pre-release" is to evacuate space within the reservoir more quickly, so that the peak of the eventual spillway flow would not exceed the maximum "pre-release", thus minimizing downstream damages.

d. Reservoir Evacuation. Carbon Canyon Reservoir should be drained as rapidly as possible, consistent with the achievement of downstream flood control. The objective is to empty the reservoir in preparation for the next flood. When no additional storms are forecast, however, and flood control benefits can be achieved, both gates may be partially or fully closed.

e. Forecasts. A forecast, on which regulation decisions may be made, could be either a series of computer generated inflow hydrographs (expected in future years) or a reasonable judgmental assessment of ongoing rainfall and runoff, based upon available information. In either case, LAD RRS would be responsible for developing the forecast and for determining its usefulness in making reservoir water control decisions. The intent is to consider all appropriate information in implementing the water control plan described above.

#### 7-06 Recreation

As mentioned previously, the sole purpose of Carbon Canyon Dam is flood

control. No water is impounded behind the dam for the purposes of recreation.

Carbon Canyon Channel downstream of Carbon Canyon Dam is strictly a flood control channel, and provides no water oriented recreation use. Thus no releases are made for recreational purposes.

#### 7-07 Water Quality

Carbon Canyon Dam has no ungated outlets and may be operated to contain contaminant spills, unless the WSE exceeds 475 feet (spillway crest). Carbon Canyon Dam is not operated for water quality objectives.

#### 7-08 Fish and Wildlife

No Carbon Canyon Dam water control objectives exist for fish and wildlife, either within the reservoir, or within Carbon Canyon Channel downstream.

#### 7-09 Drought Contingency Plan

Carbon Canyon Dam does not contain any storage allocation for water supply. However, the Water Resources Development Act of 1986, Report 99-1013, Section 847 authorizes the Secretary of the Army to facilitate water conservation and groundwater recharge measures at Carbon Canyon Dam in coordination with OCEMA, to the extent consistent with other project purposes. Carbon Canyon Channel downstream of the dam is concrete lined, but flow can be diverted at the Miller Basin Complex (see secs. 3-04a. And b.). Currently, no storage is used for water conservation. However, in the event of a drought, the possibility of impounding water for water conservation would be considered. Any such plan would be evaluated to ensure that the flood control purpose of the project would not be compromised.

#### 7-10 Hydroelectric Power

No facilities for the generation of hydroelectric power at Carbon Canyon Dam exist, nor are any contemplated.

#### 7-11 Navigation

No navigation of any sort is possible or allowed in Carbon Canyon Reservoir or in Carbon Canyon Channel; either upstream or downstream of Carbon Canyon Dam.

#### 7-12 Other

Maintenance and construction on Carbon Canyon Channel downstream of the dam normally occurs during the dry season of late spring and summer. During such periods, both Carbon Canyon Dam gates may be closed in order to reduce releases in support of such downstream activities.

### 7-13 Deviation from Normal Operation

The release plan for Carbon Canyon Dam is outlined in Exhibit A and discussed in Sections 7-5, b and c. However, it is possible, and would be desirable under certain limited circumstances, for the release rate from Carbon Canyon Dam to be decreased below what is called for in Exhibit A.

In addition to the prevention of downstream damages (discussed in Sections 7-5, b and c), there are other reasons for deviation from the normal release plan at Carbon Canyon Dam:

a. Emergencies. In the event of a potential drowning, toxic spill, or other accident in which high flows on Carbon Canyon Channel downstream of Carbon Canyon Dam could prevent rescue or could cause further injury, both gates at Carbon Canyon Dam could temporarily be partially or totally closed. This would reduce or eliminate the flow in the downstream channel. Such emergency action should be taken immediately, unless such action would likely result in worse conditions. Notifications to all concerned agencies of emergency actions must be made as soon as possible.

b. Unplanned Minor Deviations. Unplanned events that could create a temporary need for minor deviations from the schedule in Exhibit A include emergency bridge repairs, the restoration of utility lines across Carbon Canyon Channel, and certain unplanned necessary maintenance and inspection, Carbon Canyon Dam may be operated to support these activities, provided that flood protection is not jeopardized.

c. Planned Deviations. The same arguments apply to planned construction, maintenance, inspections, etc., as under Section 7-13. Such planned activities should be scheduled for the dry season, whenever possible. The dry season is normally May through October, although on a rare occasion, a tropical storm with heavy rain and high runoff potential can occur during the late summer or early fall.

### 7-14 Rate of Release Change

Gates at Carbon Canyon Dam are hydraulically operated and can generally be adjusted within a reasonable amount of time. During emergencies, or when downstream inflow has filled Carbon Canyon Channel, gradual increases or decreases in gate openings at Carbon Canyon Dam, based upon downstream reports, may be desirable. The normal maximum rate of increase indicated by the regulation plan shown in Exhibit A is less than 200 cfs. Sometimes it is necessary to release stored or incoming water even though weather conditions would not indicate runoff. It is important to alert people and agencies downstream that the dam will be releasing water in order to prevent damages and minimize a threat to both lives and property. In order to safely clear the area, the initial release rate should be small to provide a warning to people downstream.

### 7-15 Water Control Planning Tools

Specific planning tool have been utilized in the development of the

flood control plan. These tools are also used to evaluate and set regulation rules for planned deviations and also facilitate regulation of the dam during emergencies and unplanned deviations. Water control planning tools used for Carbon Canyon Dam include:

- a. Area-Capacity Curve (pl. 7-1)
- b. Outlet Discharge Curve (pl. 7-2)
- c. Spillway Discharge Curve (pl. 7-3)
- d. Downstream Channel Capacity Plate (pl. 3-1).