EXHIBIT A

PROJECT DESCRIPTION

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Table A-1

CERRILLOS DAM AND RESERVOIR
PERTINENT DATA

Location:	Municipality of Ponce in south-central Puerto Rico
Purpose:	Flood control, water supply, recreation, fish & wildlife, water quality enhancement
Stream:	Cerrillos River
Distance from Ponce:	Approximately 4 miles (NE)
Drainage Area:	17.5 square miles
Dam:	
Type	Rockfill w/impervious core
Height	323 feet
Length	1,555 feet
Upstream side slope	1V - 2.2H and 1V - 3.5H
Downstream side slope	1V - 1.8H
Crest Elevation	634.7
Crest Width	32.8 feet
Outlet Works:	
Type	Multiple-use inclined intake structure
Regulating outlet slide gates w/ Emergency gates	Two - 3’ X 4’9"
Low-flow withdrawal slide gates w/ Emergency gates	Two - 1’ X 1’8"
Selective withdrawal	Multiple level intake at 4 levels
Opening at each level	One 5’ X 5’ to 3’ X 3’ to 3’ round
Centerline elevation of the withdrawal ports feet, NGVD	407.5, 435.0, 474.5, 524.5
Regulating outlet tunnel	18-foot-diameter, concrete lined
Length (including cut & cover)	1,425 feet
Cut and cover length	69 feet
Upstream invert elevation	345 feet
Downstream invert elevation	308 feet

Table A-1 (continued)

CERRILLOS DAM AND RESERVOIR
PERTINENT DATA

Stilling Basin:	
Elevation	308.80 to 290.00 feet
Length	188 feet
Width	varies 18 feet to 28 feet
Endsill elevation	291.34 feet
Baffle Block elevation	291.75 feet
Rows of baffle blocks	1
Emergency Spillway:	
Location	Right abutment
Type	Unpaved, ungated overflow
Crest length	394 feet
Crest elevation	611.3 feet
Design discharge	75,280 cfs
Storage and Principal Elevations:	
Flood control storage	15,975 acre-feet
Water supply storage	25,200 acre-feet
Minimum and sediment storage	5,635 acre-feet
Total storage	46,810 acre-feet
Elev., max. pool	629.4 feet
Elev., max. flood control pool	611.3 feet
Elev., min. flood control pool/ max. conservation pool	573.0 feet
Elev. min. conservation pool	451.0 feet
Reservoir:	
Area, maximum pool	525 acres
Area, minimum flood control pool	350 acres
Area, minimum conservation pool	100 acres
Length	1 mile

Note: All elevations in this report are referenced to the 1929 mean sea level datum known as the National Geodetic Vertical Datum (NGVD).

EXHIBIT A

PROJECT DESCRIPTION

A-01. General. The project consists of a multiple purpose dam and reservoir on the Cerrillos River. The Cerrillos Dam is a rockfill dam with outlet works consisting of an inclined intake structure, a regulatory outlet tunnel, and a stilling basin located in the left abutment, and a spillway excavated in the ridge adjacent to the right abutment. These features are shown on Plate 2-2.

A-02. Main Embankment. The main embankment is a 323 feet high zoned rockfill embankment consisting of a central clay core flanked by a two stage filter which is supported by zoned rock shells. The embankment's axis is approximately 1,555 feet long and arched upstream. The crest elevation is 634.7 feet, NGVD and is 32.8 feet wide along its entire length. The upstream and downstream sideslopes are 1V on 2.2H and 1V on 1.8H, respectively. A 105-foot high cofferdam, constructed within the upstream slope of the main dam to protect downstream areas during construction of the main dam, serves as an integral part of the main dam. Riprap is placed on the upstream slope for protection against wave action. A triple line grout curtain 200 feet deep is provided beneath the embankment along the centerline axis. Typical cross sections of the embankment are shown on Plate 2-3.

A-03. Outlet Works. The outlet works consist of an inclined multipurpose intake structure, an 18-foot diameter regulatory outlet tunnel and a stilling basin located in the left abutment. The intake structure features two regulatory outlet gates which will provide for flood control releases up to the downstream bankfull channel capacity of 2,500 cfs from the minimum flood control pool elevation of 573.0 feet, NGVD, to the maximum pool elevation of 629.4 feet, NGVD. A low flow withdrawal system is provided to permit small releases from different levels within the reservoir pool. A section view of the intake structure is shown on Plate 2-4.

a. Regulating Outlet. The regulating outlet will provide for flood control releases up to the downstream bankfull channel capacity of 2,500 cfs when both gates are in operation. Flood control releases will normally occur when the pool level is above elevation 573.0 feet, NGVD.

Whenever the reservoir elevation is between 611.3 (spillway crest) and 613.2 feet, NGVD the uncontrolled spillway will release floodwaters equal to or less than 2,500 cfs (see Emergency Spillway Discharge Rating Curve, Plate A-3). Under these conditions the outlet works may be utilized to augment spillway flows to evacuate flood control space as long as the

combined releases will produce non-damaging stages in the downstream reaches of the river.

When the reservoir elevation begins to exceed 613.2 feet, NGVD the outlet works gates shall be closed. The outlet works gates shall remain closed until releases to evacuate the flood control space can be made with non-damaging stages in the downstream reaches of the river.

If the reservoir level is expected to exceed elevation 629.4 feet, the outlet works will be fully opened to pass maximum discharge regardless of downstream flow conditions. The gates shall remain completely open until the reservoir has receded below elevation 611.3 feet, NGVD, at which point the regulating outlet shall be operated according to criteria in paragraph 7-05.b., Reservoir Elevation between 573.0 and 611.3 feet, NGVD. See the Operations and Maintenance Manual for operating equipment limitations concerning gate hydraulic pressure system and special instructions.

Due to potential damage caused by low pressure in the vicinity of the gate seal, a minimum gate opening of 6 inches has been established. Discharge rating curves for the outlet works are shown on Plate A-1.

b. Low-Flow Withdrawal System. The purpose of the low-flow withdrawal system is to permit selective withdrawal from the reservoir for water quality and rate of discharge control. Each of the four identical entrances provide entry into one of two wetwells. The base of each wetwell junctions with a wye. One leg of each wye is further reduced to suit the low-flow withdrawal gate. Each gate discharges directly into the outlet works tunnel. The other leg of each wye reduces to a 30 inch diameter water supply conduit. The maximum flow from the low-flow withdrawal system is 70 cfs per wetwell (Source: Design Memorandum No. 11, Feature Design Memorandum - Cerrillos Dam Outlet Works - Volume No. 1 Report - February 1983, Paragraph 2.4.3, Page 2-3).

Due to potential damage caused by low pressure in the vicinity of the gate seal, a minimum gate opening of 4 inches has been established. Discharge rating curves for the low-flow withdrawal are shown on Plate A-2.

c. Water Supply Pipe. The water supply pipe will be used to supply water to the treatment plant for the city of Ponce, Puerto Rico. The 30 inch diameter line will draw from the upper leg of the wye, one wetwell at a time. While the entry and valving geometry permit selecting from one or two levels for the low-flow withdrawal system, the water supply must use a single intake source for operation. The maximum design flow within the 30-inch-diameter pipe is 33.9 cfs or 21.9 MGD (Source: Design

Memorandum No. 11, Feature Design Memorandum - Cerrillos Dam Outlet Works - Volume No. 1 Report - February 1983, Paragraph 2.4.3, Page 2-2).

A-04. Spillway. An ungated spillway is cut through the ridge adjacent to the right abutment of the dam as shown on Plate 2-2. The spillway crest is at elevation 611.3 feet NGVD. The discharge rating curve for the spillway is shown on Plate A-3.

A-05. Reservoir. Lake Cerrillos is a multipurpose reservoir with a maximum storage of 46,810 acre-feet at the maximum pool elevation of 611.3 feet, NGVD. Included in this maximum storage are 15,975 acre-feet of flood control storage, 25,200 acre-feet of conservation (water supply) storage, and a minimum and sediment storage of 5,635 acre-feet. The conservation pool ranges from the minimum conservation pool elevation, 451.0 feet, NGVD, to the minimum flood control pool elevation, 573.0 feet, NGVD. The flood control pool ranges from the minimum flood control pool elevation to the maximum pool elevation, 629.4 feet, NGVD. Table A-2 shows the storage and area of the reservoir at key pool elevations. The lake has a length of approximately one mile and about 12 miles of shoreline. A plan view of the reservoir is shown on Plate 2-5. An Area-Capacity Curve is provided on Plate A-4. A graphical plot of the Cerrillos Reservoir filling history is provided on Plate A-5.

Table A-2

Storage and Area of the Reservoir at Key Pool Elevations

	Elevation (Ft., NGVD)	Storage (Acre-feet)	Area (Acres)
Minimum Conservation Pool	451.0	5,635	100
Minimum Flood Control Pool	573.0	30,835	350
Spillway Crest	611.3	46,810	470
Maximum Pool	629.4	55,500	525

Source: Design Memorandum No. 26, Feature Design Memorandum - Lake Cerrillos Initial Filling Plan - January 1989, Table 2-1, Page 2-2, Revised June 1997 by ENHW

EXHIBIT B

DROUGHT CONTINGENCY PLAN

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EXHIBIT B

DROUGHT CONTINGENCY PLAN

B-01. Purpose. The purpose of this exhibit is to (1) provide a platform from which to make decisions on implementation of water conservation measures during droughts, (2) review the operational flexibility of the Cerrillos Reservoir Water Control Plan in a drought, and (3) address potential problems associated with an extreme drought.

B-02. References.

a. ER 1110-2-1941 - "Drought Contingency Plans"
b. ER 1110-2-240 - "Water Control Management"
c. EM 1110-2-3600 - "Management of Water Control Systems"

B-03. Introduction. A severe drought in the Portugues and Bucana Rivers project area develops over a fairly long period of time. Adequate time will be available to plan specific details of a drought operation. Therefore, this plan is an outline of water management measures and coordination actions to be considered when a severe drought occurs. Details of particular water management measures and the timing of their application will be determined as the drought progresses. Usually, the demand for water is the greatest when the natural supply is the least. Experience also shows that recreational use of lakes also begins to suffer once the elevation drops significantly.

B-04. Summary of Existing Water Control Plan. The total project plan will provide essentially standard project flood protection, a dependable surface water supply for Ponce and surrounding area, and recreation facilities for full public use of the reservoir. In addition, the reservoir will be operated to assist in helping improve downstream sanitary conditions by periodic release of impounded water to provide flow in the Portugues and Bucana river beds. Such flows will curtail mosquito breeding in stagnant pools during the dry season. Regulation flexibility is very limited under existing authority. When the reservoir elevation is below optimum, the project will be operated to meet water supply and water quality needs. Table B-1 shows the storage allocations from the reservoir.

Table B-1

Cerrillos Reservoir Storage Allocations

Flood control storage	15,975 acre-feet
Water supply storage	25,200 acre-feet
Minimum and sediment storage	5,635 acre-feet
Total storage	46,810 acre-feet
Elev., max. pool	629.4 feet
Elev., max. flood control pool	611.3 feet
Elev., min. flood control pool/ max. conservation pool	573.0 feet
Elev. min. conservation pool	451.0 feet
Area, maximum pool	525 acres
Area, minimum flood control pool	350 acres
Area, minimum conservation pool	100 acres
Length	1 mile

B-05. Water Supply.

a. Reservoir Yield.

(1) Reservoir yield is the amount of water which can be supplied from the reservoir in a specified period of time. Yield depends on inflow and varies from year to year. Reservoir reliability is defined as the probability that it will deliver the expected demand through its lifetime without incurring a deficiency. Zero risk or 100 percent reliability is impossible to achieve because there is also some chance, no matter how slight, of encountering a more critical period than experienced in the synthetic or observed record (Viessman and Welty, 1985). Since yield (outflow) is equal to the inflow plus or minus an increment of storage, the determination of capacity to supply a given yield is based on the storage equation:

Inflow - Change in Storage = Outflow

Thus a reservoir does not make water but merely permits its redistribution with respect to time. Use of reliability analysis permits cost comparison of achieving various levels of reliability and to determine if an increase of reliability is warranted. Given a target yield, the selection of reservoir capacity is dependent on the acceptable risk that the yield will not always be realized. A reservoir to supply municipal water should have a relatively low design yield so the risk of a period below the design yield is small. (Linsley and Frazini, 1979).

(2) While reservoir capacity is the most important physical characteristic of the facility, it is the relation between the yield that can be expected from the reservoir and its capacity that is of primary concern to those designing and operating the facilities. In most instances, a target yield based on anticipated user needs is specified for a reservoir. The problem is to provide sufficient reservoir capacity so the probability of not meeting the target is acceptable. For municipal water supplies the risk of not meeting the target should be low, whereas for other purposes such as irrigation, the risk to be accepted is often much higher. (Viessman and Welty, 1985).

(3) With regard to reservoir sizing Fair, Geyer, and Okun (1966) stated "Storage values equaled or exceeded but once in 20, 50, or 100 years (i.e. 5, 2, or 1 % of the time) are often considered. For water supply, Hazen suggested employing 5% value in ordinary circumstances. In other words, design storage should be adequate to compensate for a drought of severity not expected to occur oftener than once in 20 years. In still drier years, it may be necessary to curtail the use of water." For every draft imposed on a reservoir there is some risk associated with being able to meet this demand over a specified period (Clark, Viessman, and Hammer, 1977).

b. Reservoir Storage Space. The determination of required capacity for a river reservoir is usually called an operation study and is essentially a simulation of the reservoir operation for a period of time in accord with an adopted set of rules. An operation study may analyze only a selected "critical period" of very low flow, but modern practice favors the use of a long synthetic record (Linsley and Frazini, 1979). In the first case the study can do no more than define the capacity during a selected drought. With the synthetic data it is possible to estimate the reliability of reservoirs of various capacities. An operation study may be performed with annual, monthly, or daily time intervals. Monthly data are most commonly used, but for large reservoirs which carry storage for many years, annual intervals are satisfactory. For very small reservoirs, the sequence of flow within a month may be important and a weekly or daily interval should be used.

B-06. Definition of Drought. Droughts are generally considered to have three components - duration, magnitude (average water deficiency), and severity (cumulative water deficiency). Dry periods occur randomly during any time period. There is no major indicator to distinguish "normal" dry periods from a severe drought. Conditions may vary slightly depending on the time of year, length of time that water elevations remain below optimum levels, and water supply and water quality requirements. A

typical textbook definition of a hydrologic drought given by Linsley et al. (1975) is a period during which streamflows are inadequate to supply established uses under a given water management system. Perhaps the greatest uncertainty in planning reservoirs for drought regulation is the uncertainty of the representativeness of historical droughts as an indicator of future drought potential (Beard and Kubik, 1972).

B-07. Planning for Drought. In the case of water supply the analysis of the combination of drought intensity and duration can be more complex. For unregulated stream diversions or small reservoirs having a small capacity-to-inflow ratio, short intense drought may be those with the greatest impact on yield. Conversely, as the volume of storage (reservoir size) increases in relation to runoff, the system becomes less susceptible to short term deficits and droughts of longer duration but with a greater total moisture shortfall become increasingly important (Morris and Vazquez, 1990). In irrigation applications, for example, severe droughts that occur during the non-irrigation seasons may be of minor significance, whereas moderate droughts during the irrigation seasons might be of critical consequences. Where the use of water is only a small fraction of the supply, long-duration droughts might be of minor consequences, whereas severe short-duration droughts could be critical. Haan (1977) points out that a water resource system design using past or historical records provides no guarantee that the design will perform satisfactory in the future. Stochastic models, such as HEC-4, are probability models having parameters that must be obtained from observed data. Stochastic streamflows are neither historical flows or predictions of future flows but are representative of possible future flows in a statistical sense.

B-08. Drought Management Plan. This plan may be initiated by the Commonwealth when the stage in the Cerrillos Reservoir falls below Elevation 451.0 feet, NGVD.

1. Public press releases will be made on an "as-needed" basis through the Antilles Public Affairs Office (PAO). Statements shall provide the public with a full explanation of drought operations and forecasts of expected conditions in an effort to reduce inquiries from recreation and other concerned interests.

2. A drought situation report for the Cerrillos Reservoir and other projects within the Jacksonville District should be prepared by the Water Management and Meteorology Section of the Jacksonville District. This report should provide detailed information on current and forecast situations for informational purposes of the District and the South Atlantic Division.

3. A water budget may be initiated by the Jacksonville District (retroactive to the date that the reservoir first drops below elevation 475.0 feet, NGVD).

4. The Jacksonville District, U.S. Army Corps of Engineers should be updated by the Commonwealth, on a weekly basis regarding water supply storage remaining and water quality.

5. When 25 percent of the water supply remains, implementation of water conservation measures should begin.

6. Whenever the elevation at Cerrillos Reservoir is drawn down to elevation 475.0 feet, NGVD, a Drought Management Committee could convene to discuss a course of action for the continued operation of the reservoir and possible alternatives. The Drought Committee should be formed by the Commonwealth and could include representatives of the U.S. Army Corps of Engineers, Jacksonville District and other Federal agencies as required. Advisors to the committee should include representatives from the Commonwealth, the City of Ponce, and other local government agencies. Coordination activities shall include but not be limited to initiation of the Drought Contingency Plan, alerting recreation interests within the reservoir, issuing forecasts of water supply and water quality storage remaining, implementing conservation measures, and making public information releases. The potential alternatives include, but are not limited to, the following:

a. Implement restrictive water use measures for personal and emergency use only (no water for lawns, gardens, pools, car washes, etc.)

b. Temporarily relax standards for water quality requirements below the reservoir to permit continued operation of municipal and industrial waste treatment facilities and conserve remaining water supply storage.

c. Reallocation of water remaining in the minimum/sediment storage pool.

d. Declaration by the Commonwealth of Puerto Rico of a water emergency. Diversions of water may be made to meet the needs of human consumption, necessary sanitation, and public safety.

SELECTED FEDERAL EMERGENCY AUTHORITIES FOR DROUGHT ASSISTANCE

The responsibility for providing an adequate supply of water to the inhabitants of any area is basically non-Federal. Corps assistance to provide emergency water supplies will only be considered when non-Federal interests have exhausted reasonable means for securing necessary water supplies, including assistance and support from other Federal agencies.

Assistance may be available from the Corps through PL 84-99 as amended by PL 95-51. Before Corps assistance is considered under PL 95-51, the applicability of other Federal assistance authorities should be evaluated. If these programs cannot provide the needed assistance, then maximum coordination should be made with appropriate agencies in implementing Corps assistance. The applicability of programs administered by the following Federal agencies, as a minimum, will be determined prior to consideration of Corps assistance.

1. Small Business Administration (SBA).

2. Farmers Home Administration (FmHA).

3. Economic Development Administration (EDA).

CORPS AUTHORITY FOR DROUGHT ASSISTANCE

The authority for Drought Assistance is contained in Chapter 6, "Emergency Water Supplies and Drought Assistance" of Engineering Regulation (ER) 500-1-1 Natural Disaster Procedures. Under this authority, the Chief of Engineers, acting for the Secretary of the Army, can construct wells and transport water to farmers, ranchers, and political subdivisions within areas he determines to be drought distressed.

List of References.

Clark, J., W. Viessman, and M. Hammer. Water Supply and Pollution Control. IEP. 1977.

Fair, M., J. Geyer, and D. Okun. Water and Wastewater Engineering. Volume 1. Water Supply and Wastewater Removal. J. Wiley. 1966.

Haan, C.T. Statistical Methods in Hydrology. Iowa State Press. 1977.

Linsley, R.K., M.A. Kohler and J.C.H. Paulhus. Hydrology for Engineers. 2nd Edition. McGraw-Hill 1975.

Linsley, R.K. and J. B. Frazini. Water Resources Engineering. McGraw-Hill. 1979.

Morris, G. and M. Vazquez. The Geographic Distribution of Drought On Two Caribbean Islands: Puerto Rico and St. Kitts. Proceedings of Symposium on Tropical Hydrology and Caribbean Water Resources. American Water Resources Association. 1990.

U.S. Army Corps of Engineers. Engineer Publication. 1165-2-1 Digest of Water Resources Policies. Washington, D.C. 1989.

U.S. Army Corps of Engineers. A Preliminary Assessment of Corps of Engineers' Reservoirs, Their Purposes and Susceptibility to Drought. Hydrologic Engineering Center. 1990.

U.S. Army Corps of Engineers. HEC-5, Simulation of Flood Control and Conservation Systems. Hydrologic Engineering Center. 1982.

U.S. Army Corps of Engineers. HEC-4, Monthly Streamflow Simulation. Hydrologic Engineering Center. 1971.

Viessman, W. and C. Welty. Water Management: Technology and Institutions. Harper and Row. 1985.

Design Memorandums and Reports:

Design Memorandum No. 26: Feature Design Memorandum - Lake Cerrillos Initial Filling Plan. January 1989.

EXHIBIT E

STANDING INSTRUCTIONS TO DAMTENDER

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EXHIBIT E

STANDING INSTRUCTIONS TO DAMTENDER

E-01. References. The following manuals should be available for ready reference to the Damtender.

a. "Water Control Manual for Cerrillos Dam and Reservoir, Chapter VII, Water Control Plan, should be consulted for instructions for water control operations.

b. "Cerrillos Dam - Operation and Maintenance Manual" should be consulted for specific guidance on structure operations and maintenance.

c. "Cerrillos Dam and Reservoir - Emergency Action Plan" should be consulted for procedures to be implemented when emergency conditions in the reservoir and/or the dam embankment develop, as well as when unusual readings develop in the instrumentation.

E-02. Special Operating Instructions.

a. Opening Gates. The service gates used for regulation of flow in the control structure should be opened gradually. This provides an even transition to the new flow regime and minimizes the hydraulic effects downstream. Operating experience has shown that increasing gate openings of 6 inches per half-hour allows downstream communities time to adjust to the increasing flows.

b. Channel Capacity. Release flows that produce non-damaging stages in the downstream reaches of the river. The bankfull capacity of the channel from immediately downstream of the dam to the debris basin is estimated to be 2,500 cfs. The bankfull channel capacity downstream of the dam was verified through controlled releases and monitoring that was conducted 21 March 1997. Depending on estimates of local inflow between the damsite and the debris basin, releases through the regulating outlets will be limited to a maximum of 2,500 cfs except for emergency conditions prescribed in the Emergency Action Plan.

c. Vayas Low Flow Crossing. Normal reservoir discharges (above 100 cfs) will impact families living on the east side of the Vayas low flow crossing downstream of Cerrillos Dam. During large flows the crossing becomes a channel obstruction forcing a portion of the flow out of natural streambed and down an alternate access road. Community residents should be notified of impending reservoir releases.

The channel capacity monitoring that was conducted 21 March 1997 under controlled conditions confirmed that with flows over 100 cfs the crossing becomes inundated. Additionally, when flows of 500-1000 cfs occur the alternate access road is cut off because the access road elevation is very close to streambed elevation in this area. Also, large flows for several hours will cause the riverbed to shift and cover culverts of the low flow crossing which will require maintenance to uncover the culverts and restore the flows under the crossing.

d. Regulating Outlet Gates. A minimum gate opening of 6 inches has been established for the regulating outlet gates. Smaller gate openings have the potential to cause cavitation damage to gate seals. Cavitation is the successive formation and collapse of vapor pockets in low pressure areas associated with high velocity flows.

e. Low-Flow Withdrawal Gates. A minimum gate opening of 4 inches has been established for the low-flow withdrawal gates. Smaller gate openings have the potential to cause cavitation damage to gate seals. Discharges are permitted within the limits of a maximum flow of 70.0 cfs per wetwell. The low-flow system may draw from one wetwell or both simultaneously. Any combination of the water supply and low-flow discharges are permitted within the limits of a maximum flow of 70.0 cfs per wetwell (Source: Design Memorandum No. 11, Feature Design Memorandum - Cerrillos Dam Outlet Works - Volume No. 1 Report - February 1983, Paragraph 2.4.3, Page 2-3).

f. Water Supply System. The water supply system may draw from one wetwell at a time, but not both simultaneously. The maximum design flow within the 30-inch-diameter water supply pipe is 33.9 cfs (21.9 MGD). Regulation of water supply flow is done at the treatment plant. The 24-inch service ball valves should not to be used for controlling flow rates (throttling) of water supply to the City of Ponce. The emergency and service ball valves should either be fully opened or fully closed.

g. Emergency Drawdown Procedure. If an emergency rapid drawdown of the Cerrillos Reservoir is necessary, the regulating outlet works can be operated to lower the reservoir level. Reducing the reservoir pool elevation will help prevent a complete failure by relieving pressure on the structure. Releasing stored water in a planned, orderly manner can reduce the potential for massive downstream flooding if complete failure does occur. The discharge rate for any emergency reservoir drawdown should be based on the probability of an immediate failure determined by available data and educated assumptions made by experienced personnel.

The bankfull capacity of the channel from immediately downstream of the dam to the debris basin is estimated to be 2,500 cfs.

Depending on estimates of local inflow between the damsite and the debris basin, releases through the regulating outlets will be limited to a maximum of 2,500 cfs except for emergency conditions prescribed in the Emergency Action Plan. With a 2,500 cfs discharge, it would take approximately 7.5 days to lower the reservoir pool from elevation 573.00 feet, NGVD (minimum flood control pool, top of conservation pool) to elevation 349.75 feet, NGVD (top of regulating outlet). If all outlets were operated with maximum gate openings, the reservoir pool could be lowered in 7.0 days. The severity of the emergency situation would ultimately determine the drawdown rate of the Cerrillos pool. A plot of pool elevation verses time, relative to the two discharge conditions mentioned above, are presented in Plate E-1.

Assistance during duty hours for an emergency reservoir drawdown can be made by telephone to the Water Management and Meteorology Section, Jacksonville District Office (AC (904) 232-2142 or 232-2914). During non-duty hours, assistance can be achieved by contacting the persons listed at the front of this manual.

E-03. Normal Operating Conditions. During normal conditions the project structures shall be operated in accordance with the approved Water Control Plan (contained herein as Chapter VII), and in accordance with the structure design criteria as described in Exhibit A and the "Cerrillos Dam - Operation and Maintenance Manual". Deviation from normal regulation will be permitted only under special conditions. Notification for deviations shall be as outlined in the Water Control Plan or as stated below.

E-04. Abnormal Operating Conditions. If abnormal conditions in the operation of the reservoir develop, regulation assistance should be sought as outlined in the Water Control Plan (Chapter VII). Should abnormal conditions continue to develop refer to the "Cerrillos Dam and Reservoir - Emergency Action Plan", which is published under separate cover. Upon emergency situations where communication with the Damtender is interrupted, the Damtender shall take any action deemed necessary to prevent the loss of life or property. Such actions shall be documented in writing and shall be forwarded to the Jacksonville District as soon as practicable. Upon the resumption of normal communications, the Damtender shall report the sequence of events which lead to unplanned releases and receive additional instructions from higher authority.

Operational criteria for various flood situations are outlined as follows.

E-05. Reservoir Elevation below 573.0 feet, NGVD. When the reservoir is below elevation 573.0 feet, NGVD, no flood control releases are required. Discharges could be made for water supply or environmental purposes through the water supply and low-flow withdrawal system. Occasionally, releases may be made through

the outlet works to flush the downstream channels to enhance the water quality in the city of Ponce.

E-06. Reservoir Elevation between 573.0 and 611.3 feet, NGVD. Flood control releases will normally occur when the pool level is above elevation 573.0 feet, NGVD. Post flood evacuation of floodwater stored above elevation 573.0 feet, NGVD is to be accomplished as soon as possible by releasing flows that produce non-damaging stages in the downstream reaches of the river.

E-07. Reservoir Elevation between Spillway Crest 611.3 and 629.4 feet, NGVD. Whenever the reservoir elevation is between 611.3 (spillway crest) and 613.2 feet, NGVD the uncontrolled spillway will release floodwaters equal to or less than 2,500 cfs (see Emergency Spillway Discharge Rating Curve, Plate A-3). Under these conditions the outlet works may be utilized to augment spillway flows to evacuate flood control space as long as the combined releases will produce non-damaging stages in the downstream reaches of the river.

When the reservoir elevation begins to exceed 613.2 feet, NGVD the outlet works gates shall be closed. The outlet works gates shall remain closed until releases to evacuate the flood control space can be made with non-damaging stages in the downstream reaches of the river.

E-08. Reservoir Elevation Above 629.4 feet, NGVD. If the reservoir level is expected to exceed elevation 629.4 feet, the outlet works will be fully opened to pass maximum discharge regardless of downstream flow conditions. The gates shall remain completely open until the reservoir has receded below elevation 611.3 feet, NGVD, at which point the regulating outlet shall be operated according to criteria in paragraph 7-05.b., Reservoir Elevation between 573.0 and 611.3 feet, NGVD. See the Operations and Maintenance Manual for operating equipment limitations concerning gate hydraulic pressure system and special instructions.

E-09. Regulation Assistance. In the event that unusual conditions arise during duty hours, contact can be made by telephone to the Water Management and Meteorology Section, Jacksonville District Office (AC (904) 232-2142 or 232-2914). During non-duty hours, regulation assistance can be achieved by contacting the persons listed at the front of this manual. If contact is not possible, the required release from the reservoir will be made by the damtender in accordance with the flood control operations described above, or if conditions warrant, the "Cerrillos Dam and Reservoir - Emergency Action Plan" published under separate cover.

E-10. Deviation from Normal Regulation. Refer to paragraph 7-11 of the Water Control Manual for Cerrillos Dam and Reservoir for

detailed information on deviations from the normal regulation of the reservoir.

E-11. Operational Responsibilities. Normal day to day operations will be handled by Department of Natural and Environmental Resources (DNER). The DNER will be responsible for maintaining all equipment required for operation and communication in good operating condition and operate outlet gates as specified in the approved Water Control Manual.

a. Department of Natural and Environmental Resources (DNER). Under the local cooperation agreement between the Corps of Engineers and the Department of Natural and Environmental Resources of the Commonwealth of Puerto Rico that became effective on 22 July 1974, the DNER is required to operate and maintain all completed works in accordance with regulations prescribed by the Secretary of the Army.

Communication between the Jacksonville District and DNER will be done either by phone, facsimile, or in writing. Normal day to day operations will be handled by DNER with communication with the Corps on an " as need" basis. During emergencies, communications would be more frequent. (See Chapter IX - Water Control Management, within this manual for more information).

b. Corps of Engineers. The Corps of Engineers could serve in an advisory capacity to the DNER on the operation and regulation of the reservoirs and water management. All contact relating to project operations and water control decisions should be with the Chief, Water Management and Meteorology Section, Hydrology and Hydraulic Branch, Engineering Division. A list of Corps of Engineers key water control personnel are found in Table 9-1. The role of the Corps is to provide and ensure that the DNER follows these regulations and that the project is operated to meet the prescribed project purposes.