

**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

**EXHIBIT H - PLANS AND ABILITY OF APPLICANTS
TO OPERATE THE DON PEDRO HYDROELECTRIC PROJECT**



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Table of Contents

Section No.	Description	Page No.
PREFACE.....		VIII
1.0 EFFICIENT AND RELIABLE ELECTRIC SERVICE.....		1-1
1.1	Efficiency and Reliability	1-1
1.1.1	Increase in Capacity or Energy Generation	1-2
1.1.2	Coordination with any Upstream or Downstream Water Resource Projects.....	1-3
1.1.3	Coordination of Operations with Electrical Systems.....	1-8
1.2	Need for Project Electricity	1-9
1.2.1	Turlock Irrigation District.....	1-9
1.2.2	Modesto Irrigation District	1-10
1.2.3	Cost and Availability of Alternative Sources of Power.....	1-11
1.2.4	Replacement Power Costs.....	1-12
1.2.5	Effects of Alternative Sources of Power.....	1-13
1.3	Cost of Production and Alternative Sources of Power	1-13
1.3.1	Average Annual Cost of Power	1-13
1.3.2	Projected Resources Required to Meet Capacity and Energy Requirements	1-14
1.4	Use of Power for Applicant-Owned Industrial Facility.....	1-16
1.5	Need for Power if Applicant is an Indian Tribe.....	1-16
1.6	Effect on Transmission System	1-16
1.6.1	Effects of Redistribution of Power Flows.....	1-17
1.6.2	Single-Line Diagram.....	1-17
1.7	Modifications Conforming with Comprehensive Plans.....	1-17
1.8	Impact of Plan to Modify the Project.....	1-17
1.9	Financial and Personnel Resources.....	1-18
1.9.1	Financial Resources	1-18
1.9.2	Personnel Resources	1-18
1.10	Project Boundary Expansion Notification	1-20
1.11	Electricity Consumption Efficiency Improvement Program	1-20
1.11.1	Turlock Irrigation District.....	1-20
1.11.2	Modesto Irrigation District	1-21

1.12	Indian Tribe Names and Mailing Addresses.....	1-22
2.0	INFORMATION TO BE SUPPLIED BY APPLICANTS THAT ARE EXISTING LICENSEES	2-1
2.1	Safe Management, Operation, and Maintenance	2-1
2.1.1	Turlock Irrigation District.....	2-1
2.1.2	Modesto Irrigation District	2-4
2.1.3	Operations During Flood Conditions.....	2-4
2.1.4	Downstream Warning Devices	2-5
2.1.5	Operational Changes that Might Affect the Emergency Action Plan.....	2-5
2.1.6	Monitoring Devices	2-6
2.1.7	Employee Safety and Public Safety Record	2-7
2.2	Current Operations.....	2-9
2.3	Project Generation History	2-9
2.3.1	Generation Losses Due to Outages 2008 - 2013.....	2-10
2.4	Compliance with Terms and Conditions of Existing License	2-12
2.5	Actions Affecting the Public.....	2-12
2.6	Ownership and Operating Expense Reductions if the Project License was Transferred.....	2-13
2.7	Annual Fees for Federal or Indian Lands	2-13
3.0	LITERATURE CITED	3-1

List of Tables		
Table No.	Description	Page No.
Table 1.2-1.	TID customer accounts, by type of account.....	1-9
Table 1.2-2.	TID historical and projected electricity sales by customer class.	1-10
Table 1.2-3.	MID customer accounts, by type of account.	1-10
Table 1.2-4.	MID historical and projected energy sales by customer class.	1-11
Table 1.2-5.	Adopted 2011 market price referents (nominal – dollars/kWh).	1-12
Table 1.3-1.	TID total load requirements.	1-14
Table 1.3-2.	MID capacity balance - demand and supply.....	1-16
Table 2.1-1.	Serious injuries and fatalities occurring within the Don Pedro Project Boundary (1995-2013).....	2-8
Table 2.3-1.	Outage history of the Don Pedro Project 2008-2013.....	2-10

List of Figures		
Figure No.	Description	Page No.
Figure 1.3-1.	Load requirements in megawatts - January resource plan.	1-15
Figure 1.3-2.	Load requirements in megawatts - July resource plan.	1-15

List of Appendices	
Appendix H-1	Fourth Agreement
Appendix H-2	Single Line Diagram
Appendix H-3	1972 Army Corps of Engineers Flood Control Manual
Appendix H-4	Don Pedro Recreation Agency Regulations & Ordinances

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List of Acronyms

ACOE.....	U.S. Army Corps of Engineers
AED	automated external defibrillator
AF	acre-feet
AFLA	Amendment to the Final License Application
BLM.....	U.S. Department of the Interior, Bureau of Land Management
CAISO.....	California Independent System Operator
CCSF.....	City and County of San Francisco
CDFW	California Department of Fish and Wildlife
CDWR.....	California Department of Water Resources
CFR.....	Code of Federal Regulations
cfs.....	cubic feet per second
CPR.....	cardiopulmonary resuscitation
CPUC	California Public Utilities Commission
DPRA.....	Don Pedro Recreation Agency
DSE.....	Chief Dam Safety Engineer
EAP.....	Emergency Action Plan
EBMUD	East Bay Municipal Utilities District
EPA.....	U.S. Environmental Protection Agency
FERC.....	Federal Energy Regulatory Commission
FLA	Final License Application
ft	feet
kV.....	kilovolt
LSJR.....	lower San Joaquin River
M&I.....	Municipal and Industrial
mi ²	square miles
MID.....	Modesto Irrigation District
MPR	market price referents
MVA	Megavolt-ampere
MW	megawatt
MWh	megawatt hour
NEPA	National Environmental Policy Act

NERC.....	North American Electric Reliability Corporation
NGO.....	Non-Governmental Organization
NMFS.....	National Marine Fisheries Service
O&M.....	operation and maintenance
OSHA.....	Occupational Safety and Health Administration
PM&E	Protection, Mitigation and Enhancement
RM	River Mile
RPS	Renewable Portfolio Standard
SCADA.....	Supervisory Control and Data Acquisition
SED	Substitute Environmental Document
SEED.....	U.S. Bureau of Reclamation’s Safety Evaluation of Existing Dams
SJRA	San Joaquin River Agreement
SJRGAs	San Joaquin River Group Authority
SJTA	San Joaquin River Tributaries Authority
SMUD.....	Sacramento Municipal Utility District
STEP	Shave the Energy Program
SWRCB.....	State Water Resources Control Board
TID.....	Turlock Irrigation District
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
USGS	U.S. Department of the Interior, Geological Survey
VAMP.....	Vernalis Adaptive Management Plan
WQCP.....	Water Quality Control Plan

EXHIBIT H - PLANS AND ABILITY OF APPLICANT TO OPERATE THE PROJECT

The following excerpt from the Code of Federal Regulations (CFR) at 18 CFR § 5.18(c) describes the required content of this Exhibit.

- (i) *Information to be supplied by all applicants. All Applicants for a new license under this part must file the following information with the Commission:*
 - (A) *A discussion of the plans and ability of the applicant to operate and maintain the project in a manner most likely to provide efficient and reliable electric service, including efforts and plans to:*
 - (1) *Increase capacity or generation at the project;*
 - (2) *Coordinate the operation of the project with any upstream or downstream water resource projects; and*
 - (3) *Coordinate the operation of the project with the applicant's or other electrical systems to minimize the cost of production.*
 - (B) *A discussion of the need of the applicant over the short and long term for the electricity generated by the project, including:*
 - (1) *The reasonable costs and reasonable availability of alternative sources of power that would be needed by the applicant or its customers, including wholesale customers, if the applicant is not granted a license for the project;*
 - (2) *A discussion of the increase in fuel, capital, and any other costs that would be incurred by the applicant or its customers to purchase or generate power necessary to replace the output of the licensed project, if the applicant is not granted a license for the project;*
 - (3) *The effect of each alternative source of power on:*
 - (i) *The applicant's customers, including wholesale customers;*
 - (ii) *The applicant's operating and load characteristics; and*
 - (iii) *The communities served or to be served, including any reallocation of costs associated with the transfer of a license from the existing licensee.*
 - (C) *The following data showing need and the reasonable cost and availability of alternative sources of power:*
 - (1) *The average annual cost of the power produced by the project, including the basis for that calculation;*
 - (2) *The projected resources required by the applicant to meet the applicant's capacity and energy requirements over the short and long term including:*
 - (i) *Energy and capacity resources, including the contributions from the applicant's generation, purchases, and load modification measures (such as conservation, if considered as a resource), as separate components of the total resources required;*
 - (ii) *A resource analysis, including a statement of system reserve margins to be maintained for energy and capacity;*
 - (iii) *If load management measures are not viewed as resources, the effects of such measures on the projected capacity and energy requirements indicated separately;*

- (iv) *For alternative sources of power, including generation of additional power at existing facilities, restarting deactivated units, the purchase of power off-system, the construction or purchase and operation of a new power plant, and load management measures such as conservation: The total annual cost of each alternative source of power to replace project power; the basis for the determination of projected annual cost; and a discussion of the relative merits of each alternative, including the issues of the period of availability and dependability of purchased power, average life of alternatives, relative equivalent availability of generating alternatives, and relative impacts on the applicant's power system reliability and other system operating characteristics; and the effect on the direct providers (and their immediate customers) of alternate sources of power.*
- (D) *If an applicant uses power for its own industrial facility and related operations, the effect of obtaining or losing electricity from the project on the operation and efficiency of such facility or related operations, its workers, and the relate community.*
- (E) *If an applicant is an Indian tribe applying for a license for a project located on the tribal reservation, a statement of the need of such Indian tribe for electricity generated by the project to foster the purposes of the reservation.*
- (F) *A comparison of the impact on the operations and planning of the applicant's transmission system of receiving or not receiving the project license, including:*
 - (1) *An analysis of the effects of any resulting redistribution of power flows on line loading (with respect to applicable thermal, voltage, or stability limits), line losses, and necessary new construction of transmission facilities or upgrading of existing facilities, together with the cost impact of these effects;*
 - (2) *An analysis of the advantages that the applicant's transmission system would provide in the distribution of the project's power; and*
 - (3) *Detailed single-line diagrams, including existing system facilities identified by name and circuit number, that show system transmission elements in relation to the project and other principal interconnected system elements. Power flow and loss data that represent system operating conditions may be appended if applicants believe such data would be useful to show that the operating impacts described would be beneficial.*
- (G) *If the applicant has plans to modify existing project facilities or operations, a statement of the need for, or usefulness of, the modifications, including at least a reconnaissance-level study of the effect and projected costs of the proposed plans and any alternate plans, which in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.*
- (H) *If the applicant has no plans to modify existing project facilities or operations, at least a reconnaissance level study to show that the project facilities or operations in conjunction with other developments in the area would conform with a comprehensive plan for improving or developing the waterway and for other beneficial public uses as defined in Section 10(a)(1) of the Federal Power Act.*
- (I) *A statement describing the applicant's financial and personnel resources to meet its obligations under a new license, including specific information to demonstrate that*

- the applicant's personnel are adequate in number and training to operate and maintain the project in accordance with the provisions of the license.*
- (J) If an applicant proposes to expand the project to encompass additional lands, a statement that the applicant has notified, by certified mail, property owners on the additional lands to be encompassed by the project and governmental agencies and subdivisions likely to be interested in or affected by the proposed expansion.*
 - (K) The applicant's electricity consumption efficiency improvement program, as defined under Section 10(a)(2)(C) of the Federal Power Act, including:*
 - (1) A statement of the applicant's record of encouraging or assisting its customers to conserve electricity and a description of its plans and capabilities for promoting electricity conservation by its customers; and*
 - (2) A statement describing the compliance of the applicant's energy conservation programs with any applicable regulatory requirements.*
 - (L) The names and mailing addresses of every Indian tribe with land on which any part of the proposed project would be located or which the applicant reasonably believes would otherwise be affected by the proposed project.*
- (ii) Information to be provided by an applicant licensee. An existing licensee that applies for a new license must provide:*
- (A) The information specified in paragraph (c)(1) of this section.*
 - (B) A statement of measures taken or planned by the licensee to ensure safe management, operation, and maintenance of the project, including:*
 - (1) A description of existing and planned operation of the project during flood conditions;*
 - (2) A discussion of any warning devices used to ensure downstream public safety;*
 - (3) A discussion of any proposed changes to the operation of the project or downstream development that might affect the existing Emergency Action Plan, as described in subpart C of part 12 of this chapter, on file with the Commission;*
 - (4) A description of existing and planned monitoring devices to detect structural movement or stress, seepage, uplift, equipment failure, or water conduit failure, including a description of the maintenance and monitoring programs used or planned in conjunction with the devices; and*
 - (5) A discussion of the project's employee safety and public safety record, including the number of lost-time accidents involving employees and the record of injury or death to the public within the project boundary.*
 - (C) A description of the current operation of the project, including any constraints that might affect the manner in which the project is operated.*
 - (D) A discussion of the history of the project and record of programs to upgrade the operation and maintenance of the project.*
 - (E) A summary of any generation lost at the project over the last five years because of unscheduled outages, including the cause, duration, and corrective action taken.*
 - (F) A discussion of the licensee's record of compliance with the terms and conditions of the existing license, including a list of all incidents of noncompliance, their disposition, and any documentation relating to each incident.*
 - (G) A discussion of any actions taken by the existing licensee related to the project which affect the public.*

- (H) A summary of the ownership and operating expenses that would be reduced if the project license were transferred from the existing licensee.*
- (I) A statement of annual fees paid under part I of the Federal Power Act for the use of any Federal or Indian lands included within the project boundary.*

PREFACE

On April 28, 2014, the co-licensees of the Don Pedro Hydroelectric Project, Turlock Irrigation District (TID) and Modesto Irrigation District (MID) (collectively, the Districts), timely filed with the Federal Energy Regulatory Commission (Commission or FERC) the Final License Application (FLA) for the Don Pedro Hydroelectric Project, FERC No. 2299. As noted in the filing and acknowledged by FERC at the time, several studies were ongoing which were likely to inform the development of additional protection, mitigation, and enhancement (PM&E) measures. The Districts have now completed these studies and herein submit this Amendment of Application (Amendment to the Final License Application or AFLA). For ease of review and reference, this AFLA replaces the Districts' April 2014 filing in its entirety.

The Don Pedro Project provides water storage for irrigation and municipal and industrial (M&I) use, flood control, hydroelectric generation, recreation, and natural resource protection (hereinafter, the "Don Pedro Project"). The environmental analysis contained in this AFLA considers all the components, facilities, operations, and maintenance that make up the Don Pedro Project and certain facilities proposed to be included under the new license. The Don Pedro Project is operated to fulfill the following primary purposes and needs: (1) to provide water supply for the Districts for irrigation of over 200,000 acres of Central Valley farmland and M&I use, (2) to provide flood control benefits along the Tuolumne and San Joaquin rivers, and (3) to provide a water banking arrangement for the benefit of the City and County of San Francisco (CCSF) and the 2.6 million people CCSF supplies in the Bay Area. The original license was issued in 1966. In 1995, the Districts entered into an agreement with a number of parties, which resulted in greater flows to the lower Tuolumne River for the protection of aquatic resources.

Hydroelectric generation is a secondary purpose of the Don Pedro Project. Hereinafter, the hydroelectric generation facilities, recreational facilities, and related operations will be referred to as the "Don Pedro Hydroelectric Project," or the "Project". With this AFLA to FERC, the Districts are seeking a new license to continue generating hydroelectric power and implement the Districts' proposed PM&E measures. Based on the information contained in this AFLA, and other sources of information on the record, FERC will consider whether, and under what conditions, to issue a new license for the continued generation of hydropower at the Districts' Don Pedro Project. The Districts are providing a complete description of the facilities and operation of the Don Pedro Project so the effects of the operation and maintenance of the hydroelectric facilities can be distinguished from the effects of the operation and maintenance activities of the overall Don Pedro Project's flood control and water supply/consumptive use purposes.

Being able to differentiate the effects of the hydropower operations from the effects of the flood control and consumptive use purposes and needs of the Don Pedro Project will aid in defining the scope and substance of reasonable PM&E alternatives. As FERC states in Scoping Document 2 in a discussion related to alternative project operation scenarios: "...alternatives that address the consumptive use of water in the Tuolumne River through construction of new structures or methods designed to alter or reduce consumptive use of water are...alternative mitigation strategies that could not replace the Don Pedro *hydroelectric* [emphasis added] project. As such, these recommended alternatives do not satisfy the National Environmental Policy Act (NEPA)

purpose and need for the proposed action and are not reasonable alternatives for the NEPA analysis.”

1.0 EFFICIENT AND RELIABLE ELECTRIC SERVICE

Pursuant to 18 CFR § 5.18(c), the FERC requires the TID and the MID as joint licensees of the Don Pedro Hydroelectric Project (Project) to provide certain information concerning its plans and abilities to operate, maintain, and improve the Project in support of its application for a new license. Also required is a description of the Districts' record of operating, maintaining, and managing the Project under the current license.

1.1 Efficiency and Reliability

The Districts are co-licensees of the Don Pedro Hydroelectric Project on the Tuolumne River in the Central Valley area of California. Each of the Districts is authorized under California law to provide water supply for irrigation and M&I purposes and retail electric service within their designated service territories in Stanislaus and Merced counties.

The Don Pedro Project is a vital resource for the Districts' customers and to the economy of the Central Valley region. TID, as Project operator on behalf of the Districts, is responsible for the day-to-day operation and maintenance of the Don Pedro Project and has been so since completion of construction in 1971. For over 40 years, both Districts have consistently demonstrated their capability to jointly manage and maintain the Don Pedro Project in a manner that delivers efficient, reliable, renewable electricity and reliable water supplies to their service areas while consistently meeting or exceeding their responsibilities related to resource protection and recreation opportunity.

The primary purposes and needs of the Don Pedro Project are to provide reliable water supplies to the Districts' irrigation and M&I water customers, provide for flood management on the Tuolumne and San Joaquin rivers, and create a 570,000 acre-foot "water bank" for CCSF and the 2.6 million people CCSF supplies in the San Francisco Bay Area. The renewable hydropower generation provided by the Project facilities is an important, but secondary, benefit of the Don Pedro Project to the Districts' service territory. The Don Pedro powerhouse sits immediately below Don Pedro Dam and contains four turbine-generator units with a total hydraulic capacity of approximately 5,500 cubic feet per second (cfs) and a FERC-authorized installed capacity of 168 megawatt (MW). Maximum output under maximum reservoir level and favorable flow conditions can exceed 200 MW, but these conditions occur relatively infrequently.

Flow releases from the Don Pedro Reservoir through the powerhouse are scheduled based upon requirements for (1) flood flow management, including "pre-releases" in advance of anticipated high flows during wet years, (2) Districts' irrigation and M&I demands, including flows to maintain sufficient water storage in Turlock Lake and Modesto Reservoir for those purposes, and (3) anadromous fish protection in the lower Tuolumne River in accordance with the requirements of the FERC license. Once the weekly and daily flow schedules are established based on these demands, then outflows from the Don Pedro powerhouse are scheduled to deliver the appropriate flows. During periods of greater electrical demand, Don Pedro outflows may be shaped to generate more electricity during on-peak periods and less during off-peak periods, subject to meeting the requirements of the pre-established flow schedule for delivery of water supplies or pre-releases for flood flow management (see Exhibit B of this AFLA). In accordance with the Districts' "water-

first” policy, Don Pedro flow releases are scheduled to satisfy the three requirements listed above, then delivered via the generation units up to their capacity and availability.

More specifically, the Don Pedro Project serves the following primary purposes and needs:

- Provide water storage for the beneficial use of irrigation of over 200,000 acres of prime farmland served by the Districts in California’s Central Valley. Combined, the Districts supply, on average, approximately 850,000 acre-feet of irrigation water per year to their customers.
- Provide water storage for the beneficial use of M&I customers. MID provides treated water to the City of Modesto (population: 210,000), and TID and MID jointly provide treated water to the community of La Grange. The Districts provide up to a maximum of 67,500 acre-feet (AF) of water per year for M&I use. In addition, consistent with agreements between the Districts and the CCSF, the Don Pedro Project provides a water bank of up to 570,000 AF that CCSF uses to help manage the water supply from its Hetch Hetchy water system while meeting senior water rights of the Districts. CCSF’s water bank provides significant benefits to the 2.6 million people CCSF supplies in the Bay Area.
- Provide storage for flood management on the Tuolumne and San Joaquin rivers. In cooperation with the U.S. Army Corps of Engineers (ACOE), the Don Pedro Project provides up to 340,000 AF of seasonal storage for the purpose of flood control.

Other important uses supported by the water storage and water supply of the Don Pedro Project are clean and renewable hydroelectric power production, recreation at Don Pedro Reservoir, and flows to benefit aquatic resources of the lower Tuolumne River. With respect to hydropower generation, the four turbine-generator units and the balance of plant at Don Pedro have operated with consistently high reliability and performance over the 40-plus years of commercial operation. Through 2015, other than scheduled outages, there have been no prolonged forced outages. All plant equipment and materials are well maintained and serviced in accordance with manufacturer specifications.

As a demonstration of the Districts’ continuing commitment to investing in the efficiency, reliability, and performance of the Project’s hydropower generation, the Districts added a fourth generating unit in 1989, after receiving FERC approval. The addition of the fourth unit increased the authorized capacity by approximately 35 MW to the current 168 MW. This was a significant capital investment and demonstrates the Districts’ commitment to improving energy production and efficiency at the Project.

1.1.1 Increase in Capacity or Energy Generation

As explained in Exhibit B, the Districts are proposing to upgrade Units 1, 2, and 3 to improve the efficiency and capacity of the plant’s hydropower generation, subject to a final financial feasibility assessment once the terms and conditions of the new license are established. The upgrade would consist of replacing the turbine runners of Units 1, 2, and 3 with new runners and uprating the existing generators.

1.1.2 Coordination with any Upstream or Downstream Water Resource Projects

The Don Pedro Project is operated and managed as a multi-purpose water resource development providing water storage for irrigation, municipal and industrial, flood control, recreation, power generation, and fisheries protection and enhancement. TID is the Project operator and is also the majority owner holding title to 68.46 percent with MID owning the remaining 31.54 percent. The Districts are authorized and obligated under California law to provide both water supply and retail electric service. Over 200,000 acres of highly productive Central Valley farmland are dependent upon the irrigation water provided by the Districts.

The original planning and design of the Don Pedro Project, and its current operations, provide an excellent example of a coordinated plan of development for a waterway. Integrated into the design and operation of the Don Pedro Project are considerations to maximize water resource benefits for a number of public purposes and uses, including irrigation, flood control, water supply, recreation, enhancement of fish and wildlife, and hydropower generation. Operating the Don Pedro Project to satisfy multiple uses demonstrates a high degree of basin-wide cooperation and coordination.

1.1.2.1 Coordination with the City and County of San Francisco's Hetch Hetchy Water Supply System.

The planning of the Don Pedro Project fit into a comprehensive plan of water resource development on the Tuolumne River involving TID, MID, ACOE, and CCSF. The passage of the Raker Act by Congress in 1913 set the stage for a coordinated development of the waters of the Tuolumne River by the Districts and CCSF. Following passage, the Districts and CCSF entered into various agreements related to water resource development on the Tuolumne River. The two most recent of these agreements, the Third Agreement (1949) and the Fourth Agreement (1966), established the scope of and responsibilities for the cooperative development of the Tuolumne River by CCSF and the Districts. While the Third Agreement set the stage for the building of the new Don Pedro Project, the Fourth Agreement defines the allocation of the waters of the river between the Districts and CCSF and the water accounting for CCSF's water bank. The Fourth Agreement is provided in Appendix H-1 of this Exhibit.

CCSF contributed financially to the construction of the Don Pedro Project to meet its flood control obligations and to obtain water banking privileges in the new Don Pedro Reservoir. This innovative water banking arrangement allows CCSF to pre-release flows from its upstream facilities into the Don Pedro Reservoir where the flows are credited against CCSF's obligation to meet the Districts' water entitlements so that at other times, CCSF can divert water that otherwise would have to be released to satisfy the Districts' senior water rights. Both the transfer of flood management and the creation of the water bank provide CCSF and its wholesale customers in the Bay Area with improved reliability of water supply and greater flexibility with its water and power operations. Under certain circumstances, the Districts and CCSF share responsibility for meeting FERC license requirements in the lower Tuolumne River downstream of the Don Pedro Project (see Exhibit B, Article 8 on page 2-4). Therefore, changes in downstream flow requirements may affect both the Districts' and CCSF's ability to meet the water supply needs of their customers in the Central Valley and the Bay Area, respectively. The Fourth Agreement demonstrates the Districts' commitment to coordination with upstream water resource developments.

1.1.2.2 Coordination with the US Army Corps of Engineers

The Don Pedro Project was also developed in coordination with the ACOE. Joint efforts to provide additional flood control on the Tuolumne River date back to the 1930s, all resulting in an agreement between the ACOE and Districts in 1944 where the ACOE would abandon its efforts to build a separate flood control dam at Jacksonville if the Districts would build the new Don Pedro Dam and design it to provide the same amount of flood control space, 340,000 AF, as the ACOE planned for its Jacksonville reservoir. The agreement reached with ACOE led to its incorporation into the Flood Control Act of 1944 passed by Congress. By agreement, ACOE contributed financially to the construction of the Don Pedro Project in exchange for 340,000 AF of seasonal flood control storage in Don Pedro.

Flood flow management and coordination is implemented in accordance with the 1972 ACOE Flood Control Manual (see Exhibit B for more information). The management of flood flows at Don Pedro also assists ACOE with its overall mission of flood control on the entire San Joaquin River. The Flood Control Manual is provided in Appendix H-3 of this Exhibit.

1.1.2.3 Water Quality Control Plan and Vernalis Adaptive Management Plan

In addition to cooperation with in-basin water resource developments and flood management on the Tuolumne and San Joaquin rivers, the Districts have demonstrated their willingness to cooperate voluntarily with federal and state fishery resource agencies to benefit anadromous fish in the lower Tuolumne River and downstream in the San Joaquin and Bay-Delta. For example, the Districts reached an agreement with resource agencies and conservation groups in 1995 which led to FERC issuing in 1996 an amendment to the existing Don Pedro license that increased minimum and pulse flows to the lower Tuolumne River to benefit fall-run Chinook salmon. The agreement also established a strategy for further recovery of fall-run Chinook salmon; funding for habitat restoration planning, riparian improvements and other non-flow measures; a Tuolumne River biologist; a fisheries technical advisory committee; and an extensive monitoring and reporting program.

More recently, the Districts participated in the Vernalis Adaptive Management Plan (VAMP). The California State Water Resources Control Board's (SWRCB) adoption of the 1995 Water Quality Control Plan (WQCP) for the Sacramento-San Joaquin Delta and Estuary was tracked with great interest by the Districts, given that the Districts hold senior appropriative water rights on the Tuolumne River.

The Districts were particularly concerned since (1) the 1995 WQCP required additional flow for the San Joaquin River at Vernalis, and (2) it was extremely unlikely that such water could be obtained from any source other than the Districts and other San Joaquin Basin tributaries. Since there are no large tributaries to the San Joaquin River capable of providing the quantity of water necessary to meet the flows at Vernalis required by the 1995 WQCP other than the Stanislaus, Tuolumne, and Merced rivers, it was clear that the vast majority of the water necessary to meet the new Vernalis flow requirements would have to come from the Districts along with other water right holders on the Merced and Stanislaus rivers.

Given their joint interest in the water quality standards contained in the 1995 WQCP, TID, MID, and other major water right holders on the Merced and Stanislaus rivers formed the San Joaquin Tributaries Association (SJTA). The SJTA felt that there was not enough scientific evidence in the administrative record regarding the relationship of Chinook salmon survival and increased flow in the San Joaquin River to justify the adoption of the specific flow objectives for the San Joaquin River contained in the 1995 WQCP.

The SWRCB suggested that the SJTA should attempt to resolve its concerns about the adequacy of the scientific underpinnings of the Vernalis flow requirements contained in the 1995 WQCP through the development of an implementation strategy which would provide for the acquisition of data regarding the effect such flow would have on Chinook salmon survival. The SJTA's members were interested in making certain that the Vernalis flow requirements were based upon sound science.

Therefore, in response to the SWRCB's invitation to water right holders to develop and present agreed-upon implementation plans, the SJTA decided to seek a broader coalition, one which was not based solely upon senior water right holders in the San Joaquin River Basin, but one which also included other stakeholders and parties interested in issues associated with the San Joaquin River. As a result, the SJTA joined with the Friant Water Users Authority, the San Joaquin River Exchange Contractors, and CCSF to form the San Joaquin River Group Authority (SJRG), which then entered into an 18-month process of broad discussions to develop a package of scientifically based flow and non-flow actions designed to benefit outmigrating salmon smolts and other aquatic species. Such meetings and discussions brought together and included other water right holders, such as CCSF and East Bay Municipal Utilities District (EBMUD), the state and federal export contractors, the U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (CDWR), various federal and state resources agencies, including the Environmental Protection Agency (EPA), U.S. Department of the Interior, Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), California Department of Fish and Wildlife (CDFW), and private groups dedicated to the preservation of the environment, including the Natural Heritage Institute and the Bay Institute.

Two scientists, Dr. Bruce Herbold of EPA and Dr. Charles Hanson, an expert retained by the State Water Contractors, took the lead role in developing an experiment to evaluate the role that flow in the lower San Joaquin River and exports had on the survival of outmigrating Chinook salmon smolts. Development of the experiment was an iterative process. As various drafts of the experiment, which became known as the VAMP, were prepared, they were reviewed and revised by researchers and scientists from all sectors, including water users, universities, the state and federal resource agencies, and the environmental community.

In developing the experiment, Dr. Herbold and Dr. Hansen were guided by three principles. First, the experiment had to be designed and conducted in such a way as to protect salmon at least as well as would strict compliance with the 1995 WQCP. Second, the experiment had to provide scientific results that actually reflected upon the relationship between flow, exports, and salmon smolt survival during the spring out migration period. Third, the scientific results had to be verifiable, reliable, and usable so that future decisions based upon them would have the confidence

of all of the affected parties. Utilizing these three principles, the VAMP experiment was designed in two phases. The first phase was analytical and focused on identifying what the experiment should be in terms of flow and exports. The second phase was logistical and focused on the method by which the impact that the experiment had on salmon smolts could be determined.

The analytical framework of the experiment was identified by an examination of the various physical and regulatory constraints on the system. These included the existing limitation that the ratio of flow to exports be 2:1, a ceiling on flows of 7500 cfs at Vernalis due to the installation of a barrier at the head of Old River, and minimum export requirements. Once this framework was in place, additional flow to export ratios were added in an effort to avoid the problem, seen in the historical data, that the flow and export numbers would vary together. Similarly, additional flow rates were added to assist in determining the interaction between flow rate, exports and salmon smolt survival. The result was a matrix of flows and export rates that enabled an evaluation of four levels of flow and three levels of export.

Relying upon the seasonal pattern of outmigration and factors influencing such migration, including water temperature, the scientists identified April 15 through May 15 as the time during which the experiment should be conducted. During this time period, the flows and exports would be managed in accordance with the matrix discussed above. By managing the flow and exports, the reliability of the data would be increased, since variation in both was identified as a primary weakness of prior studies regarding the impact that flows and exports had on smolt survival. Further, it would enable the researchers to differentiate between the impact that flows and export rates had individually, which prior studies could not due to the variability of each.

In addition to the consistent management of flows and exports in accordance with the protocols of the experiment, the experiment relies upon the consistent installation and operation of a barrier at the head of Old River. The primary benefit of the barrier is that it directs outmigrating smolts away from the Old River channel and the state and federal export pumps, and keeps them in the main stem of the San Joaquin River, greatly increasing their chance of survival. However, while the installation and operation of the barrier is an integral aspect of the experiment, the researchers recognized that the barrier might not be installed under all conditions. As such, they developed a contingency plan for those years in which the barrier is not installed and operated which enabled the experiment to take place and to still provide valuable data utilizing the general protocols of the overall experiment.

Having identified the time frame for the experiment, as well as the flow and export rates that would be used, all that remained was the process by which the level of smolt survival could be evaluated. After reviewing past efforts and identifying their strengths and weaknesses, the researchers decided to release salmon smolts containing coded wire tags from four locations in the southern and eastern Delta during the April-May pulse flow period and to sample/recapture such smolts at two locations in the western Delta. Results of the recapture, identifying the number caught from each release location, as well as general operating and environmental conditions occurring during the recapture, were documented.

To manage the flow at Vernalis in accordance with the experiment's matrix, the participation of several water right holders located upstream of Vernalis was needed. To manage the exports, the

participation of the USBR and CDWR was needed. To install and operate the barrier at the head of Old River required the consent and cooperation of the CDWR. The transport, release and recapture of the coded-wire tagged salmon smolts required the participation and consent of the State Water Project, CDFW, and USFWS.

It was at this point that the members of the SJRGA stepped in and made an offer. They, as the holders of the largest and most senior water rights to the Stanislaus, Tuolumne and Merced rivers, would make the water available necessary to achieve the April-May pulse flow called for in the experiment as their contribution to the 1995 WQCP. In exchange, the USBR and CDWR would agree to meet all other flow related requirements of the San Joaquin Basin and to limit exports as called for in the experiment. Additionally, the CDWR would install the barrier at the head of Old River, and CDFW and USFWS would assist in the release and recapture of the test smolts. The parties agreed in concept to this idea, and began to draft an agreement that could then be presented to the SWRCB for review and consideration at the SWRCB's water right hearings. This became the San Joaquin River Agreement (SJRA).

The SJRA was a 12-year performance agreement that contained a package of flow and non-flow actions that was undertaken by the parties to implement the VAMP experiment. First, it established a schedule by which the SJRGA's members provided up to 110,000 AF of water each year, in excess of the existing flow, to meet the April-May pulse flow. Second, the SJRA required the USBR and CDWR to reduce exports during the pulse flow period, with the level of reduction based upon the flow at Vernalis. Third, the SJRA provided that CDWR install the barrier at the head of Old River each year.

In addition to providing the framework by which the VAMP experiment was conducted, the SJRA also called for additional water to be made available for environmental benefits in other parts of the year. The Merced Irrigation District and the Oakdale Irrigation District provided this water. The SJRA contained far more than just the basics of the actions taken; it created a comprehensive process by which the experiment was conducted. It established a technical committee, comprised of one technical specialist designated by each party, whose purpose was to meet each year to develop the flow and export rates, to determine the best management of flow released during the pulse flow period, and to coordinate the flow releases, export reductions, and release and recapture of salmon smolts. The technical committee was also responsible for conducting the sampling and monitoring effort, including the protocols for the transport, tagging, release, and recapture of salmon smolts, and compilation and evaluation of the data. The SJRA also included detailed requirements for dealing with any disputes. The performance of the SJRA was contingent upon approval of certain conditions by the SWRCB. Specifically, the SWRCB had to find that the USBR and CDWR were responsible for meeting all of the flow requirements for the San Joaquin Basin established in the 1995 WQCP, and that the sole responsibility of the SJRGA's members was to assist the USBR and CDWR in meeting their requirements by performing in accordance with the flow provisions of the SJRA. The SWRCB also had to agree to amend the water rights of the SJRGA's members in accordance with Water Code sections 1707 and 1735 to enable them to release water for the environmental purpose of meeting the pulse flow requirements at Vernalis. Thus, prior to becoming an enforceable contract, the parties to the SJRGA had to submit the SJRA to the SWRCB for review and consideration at its water rights hearing.

The VAMP experimental plan began in 1999 and extended through 2011. The Districts provided their share of the water to the lower Tuolumne River to support meeting the pulse flow called for of up to an additional 110,000 AF per year at Vernalis. The VAMP experiment was not extended beyond 2011.

On September 15, 2016, the SWRCB released for public comment the Revised Draft Substitute Environmental Document (SED). The SED totals over 3,500 pages of text, tables, graphs, and computer models describing and analyzing proposed Amendments to the Bay-Delta Water Quality Control Plan (Amended Plan). The geographic scope of the Amended Plan includes the lower San Joaquin River (LSJR) and the three east- side tributaries draining into the LSJR – the Stanislaus, Tuolumne, and Merced rivers.

The proposed amendments include narrative and numeric flow objectives with a required percent of unimpaired flow, expressed as a range from 30 to 50 percent of unimpaired flow, with a starting flow of 40 percent of unimpaired flow, for February-June for the Stanislaus, Tuolumne, and Merced rivers through to the LSJR near Vernalis.

The flow proposal also includes an “adaptive implementation element” consisting of a loosely-defined implementation process that allows the timing and magnitude of flows to be adjusted in an infinite number of ways, within a prescribed range of flows, if best available scientific information supports that such change would (1) be sufficient to support and maintain the natural production of viable native LSJR fish populations migrating through the Delta, and (2) meet any existing biological goals approved by the SWRCB.

In order to implement the adaptive implementation element, the SWRCB proposes the formation of a working group comprised of representatives from the SWRCB, CDFW, NMFS, USFWS, water users on the Stanislaus, Tuolumne, and Merced rivers, and any other representatives deemed appropriate by the Executive Director. The working group or SWRCB staff, as necessary, will, in consultation with the Delta Science Program, develop specific measures necessary to implement the February-June flow requirements, to monitor and periodically report on their effectiveness, and develop proposed procedures for allowing the adaptive adjustments to the February-June flow objectives.

The working group would also, within six months of approval of the plan, develop biological goals to demonstrate the reasonable protection of LSJR fish and wildlife beneficial uses, evaluate the program of implementation, the monitoring and evaluation program, future changes to the Bay-Delta Plan, and to inform adaptive implementation. The biological goals may also be changed in the future based on new information.

1.1.3 Coordination of Operations with Electrical Systems

As public utilities, the Districts provide reliable electric retail energy to homes, farms, and businesses in the Central Valley area of California. The Project switchyard is located atop the powerhouse at elevation 340 feet (ft). The switchyard provides power delivery and electrical protection to the Districts’ transmission systems. The switchyard includes isolated phase buses, circuit breakers, and four transformers that raise the 13.8 kilovolt (kV) generator voltage to 69 kV

transmission voltage. Transformers 1, 2, and 3 are rated at 55 megavolt amperes (MVA) and Unit 4 at 44 MVA. While Units 1, 2, and 4 are direct connected to TID's system and Unit 3 to the MID system, the switchyard has recently been configured to allow interconnection across the two systems when needed. This system, when operating in an interconnected fashion, acts as a pathway for electricity flows across the two systems, providing system benefits to both districts.

TID operates as its own Control Area operator responsible for meeting applicable North American Electric Reliability Council (NERC) standards. MID has contracted with the Sacramento Municipal Utility District (SMUD) to provide certain control area responsibilities through its interconnection with the California Independent System Operator (CAISO). As required by the CAISO, both districts, as power generators, must meet certain electrical system performance and monitoring requirements as part of their role in supporting the interconnected grid. Both TID and MID have fully met and complied with all such requirements.

1.2 Need for Project Electricity

The electricity production at the Don Pedro Project serves a wide customer base including residential, commercial, industrial, and agricultural customers. The need for electricity is expected to increase over the term of the new license. In January 2016, the California Energy Commission issued the California Energy Demand 2016–2026, Revised Electricity Forecast. The updated forecast presents low, mid, and high forecasts for the state: average annual growth rates for electricity consumption for 2014–2026 are 0.54 percent, 0.97 percent, and 1.27 percent, respectively (Kavalec et al. 2016).

Historical and projected numbers of MID and TID electricity sales by customer class are presented in the sections below.

1.2.1 Turlock Irrigation District

In 2013, TID served 100,345 customer accounts across 14 communities in a service area of 662 square miles (mi²) in Stanislaus, Merced, Tuolumne, and Mariposa counties. The communities served include Ballico, Ceres, Crows Landing, Delhi, Denair, Diablo Grande, Hickman, Hilmar, Hughson, Keyes, La Grange, Patterson, South Modesto, and Turlock. The composition of these accounts is shown in Table 1.2-1.

Table 1.2-1. TID customer accounts, by type of account.

Type of Account	Number of Accounts	Percent of Accounts
Residential	72,033	72%
Municipal/street lighting	16,367	16%
Commercial	6,983	7%
Agricultural	2,508	2%
Other	1,656	2%
Industrial	798	1%
Total	100,345	100%

TID's historical and projected electricity sales by customer class are presented in Table 1.2-2. As depicted in Table 1.2-2, electricity sales are projected to increase over time.

Table 1.2-2. TID historical and projected electricity sales by customer class.

Year	Residential (MWh)	Commercial (MWh)	Industrial (MWh)	Agricultural (MWh)	Other (MWh)	Total Customers (MWh)
2011	693,659	124,820	729,239	199,331	196,628	1,943,677
2012	713,915	126,608	738,693	221,584	222,577	2,023,376
2013	728,912	128,695	760,690	223,722	213,382	2,055,402
2014	742,166	130,277	776,686	226,774	214,736	2,090,639
2015	755,477	131,531	782,603	229,898	216,123	2,115,632
2016	768,819	132,798	793,937	233,091	217,605	2,146,251
2017	782,246	133,630	804,653	236,507	219,051	2,176,087
2018	795,778	134,311	815,504	240,152	220,655	2,206,400
2019	809,378	135,540	827,206	243,889	222,218	2,238,230
2020	823,016	137,603	840,016	247,717	223,807	2,272,158
2021	836,762	139,533	852,913	251,800	225,491	2,306,499
2022	850,508	140,536	864,712	255,988	227,202	2,338,947
2023	864,274	141,890	877,233	260,433	228,940	2,372,780
2024	878,099	143,733	890,359	264,857	230,707	2,407,755
2025	891,864	145,642	903,844	269,725	232,503	2,443,579
2026	905,649	147,887	917,796	274,554	234,329	2,480,215
2027	919,413	149,858	931,609	279,694	236,255	2,516,820
2028	933,138	151,593	945,377	284,979	238,141	2,253,228
2029	946,781	153,318	959,359	290,417	240,133	2,590,008
2030	960,344	155,227	973,697	296,200	242,157	2,627,625
2031	973,936	157,323	988,425	301,963	244,217	2,665,864
2032	987,447	159,470	1,003,431	308,289	246,327	2,704,965
2033	1,000,918	161,976	1,018,990	314,611	248,481	2,744,976

1.2.2 Modesto Irrigation District

MID provides electrical service to seven communities in Stanislaus and San Joaquin counties, comprising about 114,000 customer accounts in 2013 in its service territory of 560 mi². The composition of these accounts is shown in Table 1.2-3.

Table 1.2-3. MID customer accounts, by type of account.

Type of Account	Number of Accounts	Percent of Accounts
Residential	94,119	82.6%
Commercial	12,265	10.8%
Industrial	157	0.1%
Agricultural	1,819	1.6%
Other	5,571	4.9%
Total	113,931	100.0%

MID's historical and projected electricity sales by customer class are presented in Table 1.2-4. As depicted in Table 1.2-4, electricity sales are expected to increase over time.

Table 1.2-4. MID historical and projected energy sales by customer class.

Year	Residential (MWh)	Commercial (MWh)	Industrial (MWh)	Agricultural (MWh)	Other (MWh)	Total Customers (MWh)
2011	857,822	717,323	758,316	96,869	15,562	2,445,892
2012	905,523	731,011	762,398	98,208	15,698	2,512,838
2013	914,763	738,127	763,717	99,350	15,836	2,531,791
2014	927,602	744,669	770,907	100,499	15,975	2,559,653
2015	944,537	751,324	771,780	101,657	16,116	2,585,413
2016	962,513	759,147	772,023	102,822	16,259	2,612,764
2017	983,313	768,596	774,077	103,995	16,403	2,646,384
2018	1,004,089	779,604	780,928	105,176	16,548	2,686,344
2019	1,025,865	792,059	785,978	106,365	16,695	2,726,962
2020	1,047,536	805,381	790,955	107,561	16,844	2,768,277
2021	1,073,450	827,709	798,294	108,767	16,994	2,825,215
2022	1,100,794	851,359	806,292	109,980	17,146	2,885,572
2023	1,129,429	876,217	815,153	111,202	17,300	2,949,300
2024	1,159,413	902,389	824,127	112,431	17,455	3,015,816
2025	1,190,680	929,758	832,817	113,669	17,613	3,084,538
2026	1,223,331	958,646	840,826	114,916	17,771	3,155,489
2027	1,257,329	988,979	848,254	116,171	17,932	3,228,665
2028	1,292,665	1,020,921	855,405	117,434	18,094	3,304,519
2029	1,329,501	1,054,521	862,380	118,706	18,258	3,383,367
2030	1,367,764	1,089,757	869,283	119,986	18,424	3,465,214
2031	1,410,558	1,127,922	876,254	121,277	18,592	3,554,604
2032	1,455,012	1,168,402	883,361	122,576	18,762	3,648,113
2033	1,501,069	1,211,101	894,819	123,884	18,934	3,749,808

1.2.3 Cost and Availability of Alternative Sources of Power

The Don Pedro Hydroelectric Project provides reliable and affordable electricity to TID's and MID's customers in the San Joaquin River Valley area of California. In addition to renewable electricity, the Don Pedro Project provides water storage for the beneficial use of irrigation of over 200,000 acres of prime San Joaquin River Valley farmland and for the use of M&I customers in the City of Modesto.

If the Project's license is not renewed, the installed capacity of 168 MW would need to be replaced with an alternative source. One possible alternative source of power would be the construction of a combined-cycle, natural gas-fired generating facility. A combined-cycle natural gas-fired generating facility generates electricity using both a natural gas cycle and a steam cycle. Construction of a combined-cycle natural gas-fired generating facility would be expected to result in substantially greater cost than the cost of the hydropower generation at Don Pedro (Table 1.2-5).

The California Public Utilities Commission (CPUC) published market price referents (MPR) in 2011 (Table 1.2-5). The rates are set and adjusted by Time of Use factors as authorized by CPUC. The MPR in Table 1.2-5 is the predicted annual average cost of production for a combined-cycle natural gas-fired generating facility.

Table 1.2-5. Adopted 2011 market price referents (nominal – dollars/kWh).

Contract Start Date	10-Year	15-Year	20-Year	25-Year
2012	0.07688	0.08353	0.08956	0.09274
2013	0.08103	0.08775	0.09375	0.09695
2014	0.08454	0.09151	0.09756	0.10081
2015	0.08804	0.09520	0.10132	0.10464
2016	0.09156	0.09883	0.10509	0.10848
2017	0.09488	0.10223	0.10859	0.11206
2018	0.09831	0.10570	0.11218	0.11572
2019	0.10186	0.10928	0.11587	0.11946
2020	0.10550	0.11296	0.11965	0.12326

Source: CPUC 2011.

California's Renewable Portfolio Standard (RPS) was initially established in 2002 under Senate Bill 1078, accelerated under Senate Bill 107, and expanded in 2011 under Senate Bill 2. The RPS requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020 (see CA Health and Safety Code 38500-38599). To meet the 33 percent total procurement, required entities must adopt the new RPS goals of 20 percent of retail sales from renewables by the end of 2013, 25 percent by the end of 2016, and 33 percent by the end of 2020. Under California law, large hydropower such as the Don Pedro Hydroelectric Project does not qualify as a renewable. Therefore, both the existing Don Pedro generation and generation from a natural gas source would be required to purchase greenhouse gas allowances, the current price of which is about \$7/megawatt hour (MWh) (<http://arb.ca.gov/cc/capandtrade/auction/auction.htm>).

1.2.4 Replacement Power Costs

Based on Table 1.2-5, replacement power would be costly compared to the current Project power costs. Based on the 2016 total estimated annualized cost of power of \$9.3 million, the current cost of the Project power is approximately \$16.91/MWh. In accordance with California Health and Safety Code (38500-38599), Don Pedro's hydropower generation does not qualify towards meeting TID's or MID's 33 percent RPS standard established in California. Therefore, greenhouse gas allowances must be purchased as an offset. The present cost of the greenhouse gas allowances is approximately \$7/MWh, raising the cost of hydropower production to the Districts to \$23.91/MWh. Therefore, replacement power costs with a combined-cycle natural gas-fired generating facility would be approximately four to five times greater than the current cost of power, thus significantly and adversely impacting the Districts' customers. Exhibit D of this AFLA provides additional information on costs and financing.

Another potential power source to replace the generation provided by the Don Pedro hydroelectric production would be wind power. To replace the approximately 550,000 MWh per year generated by the Don Pedro hydropower facilities, the Districts estimate that a wind plant with an installed capacity of approximately 400 MW, operating at a plant factor between 15 and 20 percent, would be required. The capital cost of such a plant would be between \$1 billion and \$1.2 billion and cost of energy is estimated to be roughly \$140/MWh, exclusive of incentives. This cost would be about seven times greater than the current cost of the Don Pedro Hydroelectric Project generation.

1.2.5 Effects of Alternative Sources of Power

1.2.5.1 Effects on Customers

Alternatives to Project power would impact the local and regional economy, since alternative sources may be significantly more costly as indicated in Section 1.2.3 above. The additional direct cost to the Districts' electricity customers have not been estimated at this time. However, there are a large number of industrial, food processing, and manufacturing concerns in the Districts' service territories whose economics of operation are highly sensitive to electricity costs, especially the food processing and cold-storage businesses. These industries compete in the world market for agricultural products, a market where relatively small changes in cost can have a major effect on whether a business succeeds or fails. Employment in these industries generally requires lower skill, and therefore are lower wage. Therefore, low income families are likely to be disproportionately impacted as a result. If the hydropower generation at Don Pedro were to be replaced by gas-fired generation, a substantial quantity of greenhouse gas emissions would result.

However, it is important to note that the primary purpose of the Don Pedro Project is to provide water storage for irrigation of over 200,000 acres of high-value farmland served by the Districts; water for municipal and industrial purposes; flood control; and support for CCSF's water supply for the Bay Area. All of these Don Pedro Project functions will continue even if the hydropower generation ceased. While a low-cost source of electricity supply would be lost, overall Don Pedro Project operations will largely remain unchanged if hydropower generation is discontinued.

1.2.5.2 Effects on the Applicants' Operating and Load Characteristics

The Districts' operating and load characteristics would be minimally affected by increasing purchases of replacement power or installing a combined cycle unit. Conceivable, some flexibility could be lost because a combined cycle unit does not possess the same rapid-response characteristics (upramping and downramping capabilities) as hydropower. However, the Districts do not use the Don Pedro units as either load-following or block-loaded peaking units because water flows are determined by water system needs and constraints and, not hydropower uses.

1.2.5.3 Effects on Communities Served

Alternatives to hydropower generation at Don Pedro would impact the local and regional economy, since alternative sources may be significantly more costly. The effects on the communities served would reflect this loss of income to its citizens, potential increased unemployment, and lower tax revenues in proportion to the higher costs absorbed by local businesses.

1.3 Cost of Production and Alternative Sources of Power

1.3.1 Average Annual Cost of Power

The Project's average annual energy production from 1997 through 2016 is 550,460 MWh. Based on the 2016 total estimated annualized cost of power of \$9.3 million, the current cost of the Project power is approximately \$16.91/MWh. This increases to approximately \$24/MWh when the

current approximate cost of greenhouse gas allowances of \$7/MWh is included, as California's regulations require large hydropower facilities to purchase greenhouse gas allowances. This AFLA includes several proposed measures that would require new capital and annual costs associated with these proposed PM&E measures. Exhibit D provides further information on the description of the measures, their costs, and their effect on the cost of generation.

1.3.2 Projected Resources Required to Meet Capacity and Energy Requirements

The Districts release water from the Don Pedro Project for purposes of providing reliable water supplies, flood flow management, and meeting the downstream flow requirements of the FERC license. Through the care, custody, and control exercised in operating the Don Pedro Project, the Districts also ensure dam safety and comply with all other FERC license requirements.

1.3.2.1 Turlock Irrigation District

TID forecasts its total load requirements over the short and long term. These load requirements are identified in Table 1.3-1 through 2032.

Table 1.3-1. TID total load requirements.

Year	Total Requirement (MW)
2013	535.45
2014	545.15
2015	551.90
2016	560.06
2017	568.08
2018	576.21
2019	584.66
2020	593.53
2021	602.51
2022	611.11
2023	619.98
2024	629.10
2025	638.37
2026	647.82
2027	657.26
2028	666.64
2029	676.09
2030	685.69
2031	695.42
2032	705.32

TID meets load requirements through a variety of available resources that vary between low demand periods and high demand periods. These varying load requirements are depicted by TID's resource plan for January (Figure 1.3-1), a low demand period, and resource plan for July (Figure 1.3-2), a high demand period. TID maintains system reserve margin requirements in accordance with the Western Electricity Coordinating Council Regional Standard "BAL-STD-002-0" which states that the minimum operating reserve is the sum of regulating reserve, contingency reserve, additional reserves for interruptible imports and additional reserves for on-demand obligations. TID also complies with NERC Standard "BAL-002-1a" and is an active participant of the

Northwest Power Pool reserve sharing group. TID is required to carry enough contingency reserve to be able to properly respond to qualifying events.

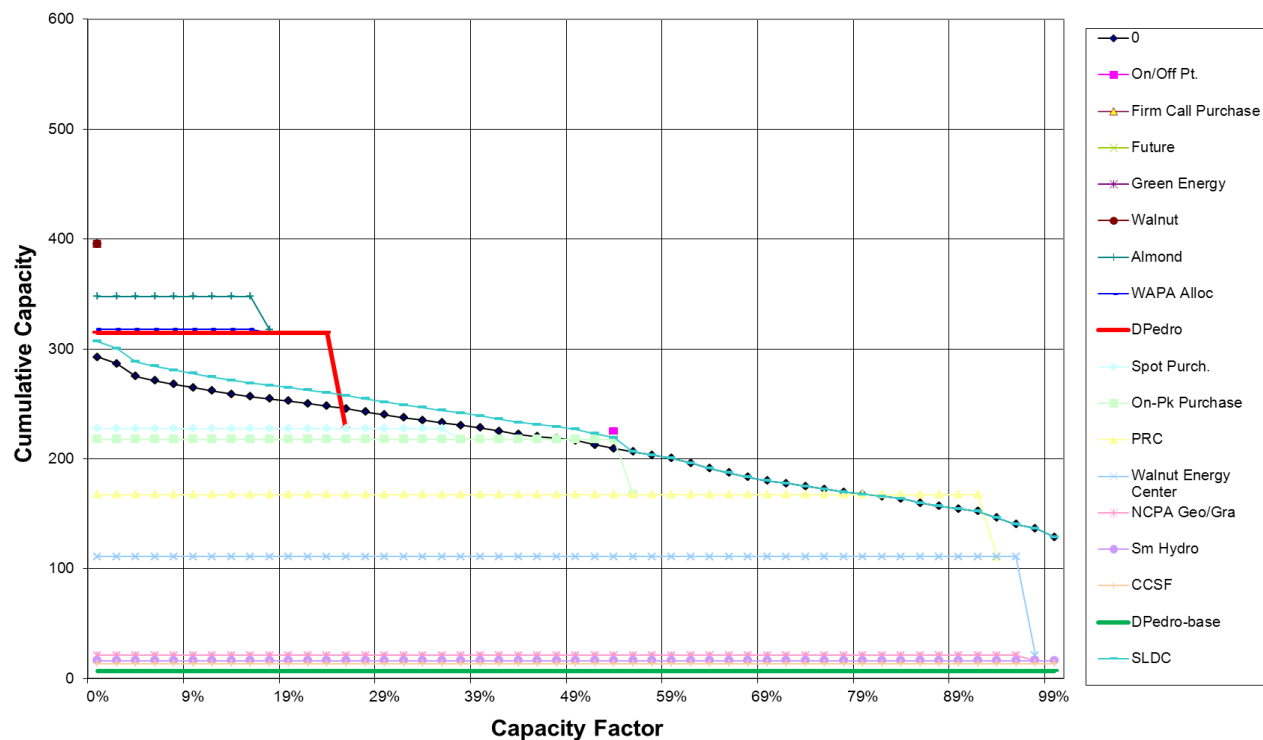


Figure 1.3-1. Load requirements in megawatts - January resource plan.

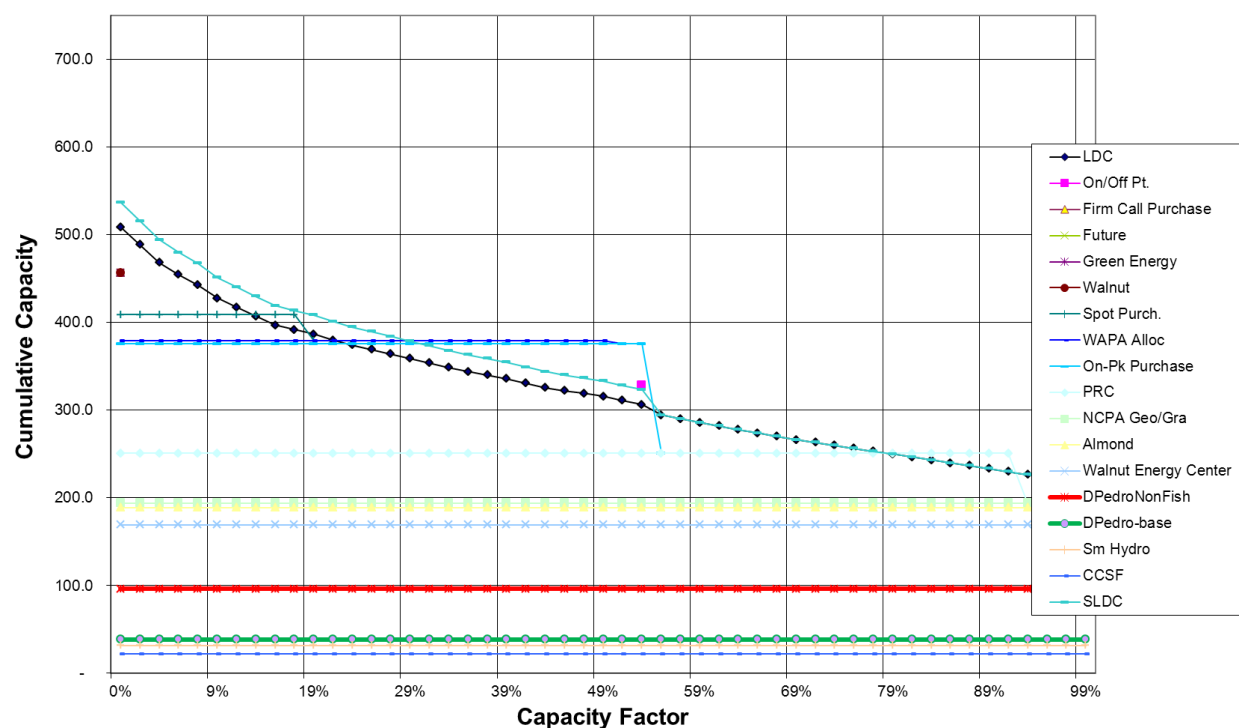


Figure 1.3-2. Load requirements in megawatts - July resource plan.

1.3.2.2 Modesto Irrigation District

MID projects gross demand, energy efficiency, net load requirements, reserves, and total load requirements over the long and short term. Total load requirement is met through a combination of short term purchases, long term purchases, hydroelectric, natural gas, and coal. Table 1.3-2 identifies these loads through 2032.

Table 1.3-2. MID capacity balance - demand and supply.

Year	Projected Gross Demand (MW)	Energy Efficiency (MW)	Reduction (Solar) (MW)	Net Load Requirement (MW)	Reserves (MW)	Total Requirement (MW)
2014	709	31	9	669	94	763
2015	722	35	10	677	96	773
2016	736	38	11	686	97	783
2017	749	40	12	698	99	796
2018	763	42	13	709	100	809
2019	778	43	14	721	102	823
2020	793	47	14	731	104	835
2021	809	48	15	746	106	852
2022	826	49	16	761	108	869
2023	844	50	17	777	110	887
2024	862	51	18	793	113	906
2025	880	52	19	809	115	925
2026	899	53	19	826	118	944
2027	918	55	20	843	120	963
2028	938	56	21	861	123	983
2029	958	58	22	878	126	1004
2030	979	60	23	896	128	1025
2031	1022	61	24	917	131	1049
2032	1026	63	25	938	135	1073

1.4 Use of Power for Applicant-Owned Industrial Facility

The Districts do not use power generated by the Project to supply their own industrial facilities or related operations. Therefore, this section is not applicable.

1.5 Need for Power if Applicant is an Indian Tribe

The Districts are not Indian tribes applying for a license for a project on a tribal reservation; therefore, this section is not applicable.

1.6 Effect on Transmission System

The Districts each own and operate transmission systems. The Project switchyard is designed to permit flexibility in how the units are interconnected to the two transmission systems. Based on previous transmission studies, contingency analysis, and the projected TID load forecast, there would be a variety of effects on the transmission system if a license was not received for continuing generation at the Don Pedro Project. If a license was not received, TID would not be able to serve

its entire customer load during June, July, August, and September whenever load exceeds 600MW. To meet customer demand, without the Project, new, firm generation of approximately 100 MW would be needed on the east side of the TID transmission system to mitigate transmission delivery shortfalls. MID would have similar issues and would need firm replacement capacity of approximately 50 MW.

1.6.1 Effects of Redistribution of Power Flows

Project generation also provides system benefits to both TID and MID due to its location near the end of their electrical systems. System stability and control is strengthened by having a significant and reliable source of generation at this location. The loss of Don Pedro generation may require some transmission system changes to maintain stability and power quality for both the TID and MID systems.

1.6.2 Single-Line Diagram

The Project's Single-Line Diagram is attached as Appendix H-2.

1.7 Modifications Conforming with Comprehensive Plans

Section 10(a)(2) of the Federal Power Act requires FERC to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by a project. The Districts are proposing certain PM&E measures and modifications to generation at the Project as part of this AFLA. None of these changes are anticipated to change the operations of the Don Pedro Project, except allowing for the release of more water through the turbines if the upgrade is completed as currently planned. The Districts have reviewed the FERC's Revised List of Comprehensive Plans dated July 2017 and identified certain plans as topically or geographically relevant to the Project relicensing. Consistency with these plans is discussed in further detail in Exhibit E, Section 6.

1.8 Impact of Plan to Modify the Project

The Districts are proposing to upgrade existing Units 1, 2, and 3. This upgrade is anticipated to increase generation by approximately 20,000 MWh/yr. The upgrade will not result in any significant changes to Don Pedro Project operations. Section 5.0 of Exhibit E fully describes the Districts' Preferred Plan, which identifies changes to Don Pedro Project facilities and operations, specific flow-related and non-flow related PM&E measures intended to benefit the resources of the lower Tuolumne River and Don Pedro Reservoir, and adaptive management provisions to inform future resource and project management. Certain of the PM&E measures address the direct Project effects of Don Pedro operations, while most of the proposed measures are resource enhancement measures proposed by the Districts to protect and improve the health of the lower Tuolumne River unrelated to any direct Project effects.

1.9 Financial and Personnel Resources

The Districts are in a superior position to continue operation and maintenance of the Don Pedro Project. The Districts have owned and operated the Don Pedro Project for over 40 years. TID was established in June 1887 and was California's first irrigation district and MID was established in July 1887. The Districts' excellent record of performance demonstrates that they possess the financial and personnel resources to meet the operation, maintenance, and capital requirements of the Project. The Districts have been producing hydroelectric power on the Tuolumne River since 1923 when the old Don Pedro facility was constructed.

1.9.1 Financial Resources

The Districts operate the Don Pedro Project in a safe, efficient, and environmentally responsible manner to provide water storage for irrigation and municipal use, flood control, recreation, fish and wildlife, and power generation. The Project's past performance demonstrates that the Districts have the financial resources to meet the operation, maintenance, and capital requirements of the Project. The financial resources of each District are described below.

1.9.1.1 Turlock Irrigation District

As a municipal public entity, TID financing is primarily through the issuance of bonds. TID's recent bond offering in 2011 was for \$206,940,000. The 2011 Bonds were issued for a variety of purposes including (1) providing funds to retire the \$190,950,000 outstanding principal amount of TID's Series 2010 notes, (2) to make a deposit into the 2011 Debt Service Reserve Fund, and (3) to fund capitalized interest on the 2011 bonds. Standard and Poor, Moody's, and Fitch have assigned ratings of "A", "A2" and "A+", respectively to TID's 2011 Bonds. TID's Don Pedro Project costs are included in TID's rate bases for water and power services.

1.9.1.2 Modesto Irrigation District

As a municipal public entity, MID financing is primarily through the issuance of bonds. MID's recent bond offering was also in 2011 for \$141,455,000 comprised of \$125,380,000 electric system refunding revenue bonds (Series 2011A) and \$16,075,000 taxable electric system refunding revenue bonds (2011B). MID also has \$32,840,000 electric system refunding revenue bonds (Series 2011C).

Standard & Poor's Ratings Services, a Standard & Poor's Financial Services LLC business and Moody's Investors Service, Inc. assigned MID's 2011 Bonds the ratings of "A+" and "A2", respectively. MID's Don Pedro Project costs are included in MID's rate bases for water and power services.

1.9.2 Personnel Resources

Employees of TID are responsible for the day-to-day operation and maintenance of the Don Pedro Project, including ensuring compliance with obligations under the current license. Both TID and MID provide management oversight through a joint operations committee. The Districts have

operated and maintained the Don Pedro Project in a safe, reliable, and efficient manner since operations began in 1971. Its superior performance during this term has demonstrated the Districts' ability to operate the Project in accordance with the license terms and conditions.

1.9.2.1 Turlock Irrigation District

As of 2013, TID employs 6 dedicated employees to support hydropower production at the Don Pedro Project. This total includes one Power Plant Supervisor and five Power Plant Technicians. Project support is also provided by various engineering, technical, and administrative departments of TID, as needed. TID's power supply administration employs a total of 81 employees. A number of these employees may at times support and coordinate Don Pedro Project operations and power supply. The following is a breakdown of power supply administration division personnel resources at TID:

- Assistant General Manager, Power Supply,
- Administrative Assistant,
- Civil Engineering Department Manager,
- Combustion Turbine Department Manager,
- Hydroelectric Department Manager,
- Energy Strategy Department Manager,
- Director of Energy Markets,
- Strategic ISS & Plan Department Manager,
- Resource Planning Department Manager, and
- Senior Electrical Engineer.

Support personnel are under the management of the above power supply administration division personnel resources.

The Don Pedro Recreation Agency (DPRA), an agency of TID, employs 48 full and part-time employees with the following breakdown:

- 1 Recreation Department Manager,
- 1 Administrative Assistant,
- 1 Customer Service Rep,
- 2 Recreation Division Managers,
- 1 Chief Ranger,
- 5 Rangers,
- 1 Park Maintenance Division Manager,
- 1 Sewer/Water Treatment Technician,
- 1 Park Maintenance Worker, and
- 34 Seasonal personnel.

These employees support and coordinate daily operations and maintenance of the recreation facilities. TID's employees are certified and trained in their relevant and appropriate fields to ensure the reliable operations. Training courses completed by personnel are discussed in further detail in Section 2.1.1 below.

1.9.2.2 Modesto Irrigation District

As of 2013, MID employed a total of 72 employees in the electric resources division. A number of these employees may at times support and coordinate Don Pedro Project operations and electricity supply and distribution. Below is a breakdown of electric division personnel resources at MID:

- 1 Assistant General Manager of Electric Resources and 1 Secretary,
- 7 employees in Resource Planning,
- 28 employees in Operations,
- 34 employees in Generation, and
- 1 Power Contract Specialist.

MID's employees are certified and trained as appropriate to ensure the reliable supply and delivery of retail electric service to its customers. Training courses completed by personnel are discussed in further detail in Section 2.1.2.

1.10 Project Boundary Expansion Notification

As described in Exhibit G to this AFLA, the Districts propose to expand the Project Boundary to include proposed Project features, such as the proposed infiltration galleries and proposed fish counting and barrier weir. The Districts have sent notification of this proposed change, by certified mail, to the owners of the new lands to be included within the Project Boundary.

1.11 Electricity Consumption Efficiency Improvement Program

The Districts offer and promote a number of energy efficiency programs to help customers save both money and energy. Both MID and TID offer customers a variety of educational materials to better understand and manage home energy use and costs. TID and MID's energy efficiency and conservation programs are described below.

1.11.1 Turlock Irrigation District

1.11.1.1 TID Energy Efficiency Rebates Program

The energy efficiency rebates program was implemented after the TID Board of Directors adopted an aggressive 10-year plan to promote conservation. TID offers rebates to residential and business customers to promote conservation. Rebates for residential customers include the following: compact fluorescent light rebate, room air conditioner rebate, refrigerator rebate, clothes washer

rebate, sun screen rebate, whole house fan rebate, solar attic fan rebate, radiant barrier and living green residential new construction rebate. Rebates available to business customers include the following: custom rebate, network PC management software rebate, commercial lighting rebate, residential new construction rebate, commercial motors rebate, commercial refrigeration rebate, dairy design assistance program, and advance power strip program.

1.11.1.2 TID Energy Audits and Meter Manager

TID offers free on-site energy audits to commercial, industrial, and agricultural customers who have concerns, questions, or an interest in implementing measures to manage their usage and reduce consumption. Energy audits are also available to residential customers. Additionally, TID offers an on-line energy management tool for business customers so they can monitor their energy usage and utilize that information to more efficiently manage their energy consumption.

1.11.1.3 Vending/Cooling Misers for Commercial Customers

TID has contracted with service providers to install cooler misers for customers with refrigerated vending machines and/or glass front coolers. Additionally, the program aids in the installation of spray valves, aerators and showerheads for customers who have electric water heating.

1.11.2 Modesto Irrigation District

1.11.2.1 MID Weatherization Program

The Weatherization Program provides energy efficient measures to rental or owner occupied low-income customer homes. Work may include replacement of broken windows, refrigerator, microwave, swamp coolers, and the installation of sunscreens, weather-stripping, and some repairs.

1.11.2.2 MID Shave the Energy Program

Shave the Energy Program (STEP) is a voluntary program for MID residential customers with central air conditioners to help reduce energy use at peak times during hot summer days. With this program, MID installs a small “load control” device on the customer’s air conditioner unit at no cost to the customer. When STEP is needed, MID will signal the air conditioner to cycle off. Overall power usage is reduced through the controlled cycling of thousands of air conditioners. Customers enrolled in STEP receive a \$5 a month discount for the four-month period June through September each year.

1.11.2.3 MID Free Energy Audit Program

MID offers free energy audits for its customers. Through this program, a MID energy specialist will visit the customer’s residence and help the customer learn ways to save energy in the home. The audit allows the customer to see how electricity is used in the home including the most and least-cost effective uses. At the conclusion of the audit, the MID energy specialist offers suggestions on ways to reduce energy consumption including no cost and low cost measures.

1.12 Indian Tribe Names and Mailing Addresses

There are no Indian reservation lands within the Project Boundary or in the immediate vicinity. Based on the Districts' outreach program to tribes as a part of relicensing, the following tribes have been identified as potentially having an interest in the FERC relicensing process:

Central Sierra Me-Wuk Cultural & Historic
Reba Fuller, Spokesperson
PO Box 699
Tuolumne, CA 95379

Chicken Ranch Rancheria of Me-Wuk
Melissa Powell, Chairperson
P.O. Box 1159
Jamestown, CA 95327

Picayune Rancheria of the Chukchansi Indians
Claudia Gonzales, Chairperson
8080 N. Palm Ave, Suite 207
Fresno, CA 93711

Picayune Rancheria of the Chukchansi Indians
Mary Motola, Cultural Specialist
8080 N. Palm Ave, Suite 207
Fresno, CA 93711

Southern Sierra Miwuk Nation
Billy Leonard, Chairperson
P.O. Box 186
Mariposa, CA 95338

Southern Sierra Miwuk Nation
Jay Johnson, Spiritual Leader
5235 Allred Road
Mariposa, CA 95338

Southern Sierra Miwuk Nation
Les James, Spiritual Leader
P.O. Box 1200
Mariposa, CA 95338

Tuolumne Band of Me-Wuk Indians
Kevin Day, Chairperson
P.O. Box 699
Tuolumne, CA 95379

Tuolumne Band of Me-Wuk Indians
Rob Cox, Cultural Resources Department
P.O. Box 699
Tuolumne, CA 95379

Tuolumne Band of Me-Wuk Indians
Vicki Stone, Cultural Coordinator
P.O. Box 699
Tuolumne, CA 95379

Tuolumne Band of Me-Wuk Indians
Reba Fuller, Spokesperson
P.O. Box 699
Tuolumne, CA 95379

2.0 INFORMATION TO BE SUPPLIED BY APPLICANTS THAT ARE EXISTING LICENSEES

2.1 Safe Management, Operation, and Maintenance

Safe management, operation, and maintenance of the Don Pedro Project are top priorities of the Districts. The Districts provide employees with appropriate and relevant training and equipment to operate all facilities safely. Specific training programs are described below.

2.1.1 Turlock Irrigation District

As the operating entity of the Don Pedro Project, TID cooperates fully with FERC during inspections of Project facilities such as the annual FERC inspections, five-year Part 12 Dam Safety Inspections, and Environmental and Public Use Inspections, and in other similar safety-related areas such as the development and provision of the appropriate Emergency Action Plan (EAP) and Public Safety Plan.

All Don Pedro Project facilities are maintained to ensure safe and reliable operations. TID operates all facilities consistent with their commitment to public and employee safety. TID achieves their safety goals by:

- 1) training operations and maintenance personnel,
- 2) inspecting all Don Pedro Project facilities regularly and monitoring indicators of condition and safety,
- 3) implementing a rigorous inspection and maintenance program for operating equipment and facilities vital to safety,
- 4) limiting public access and providing warning signs where Don Pedro Project operations could endanger the public, and
- 5) complying with all applicable local, state, and federal laws and regulations regarding the safe operation of industrial and electric utility facilities.

TID recognizes that it is important for the key individuals who are ultimately responsible for dam safety and the day-to-day operation and general maintenance to be well trained in the field of dam safety. As a result, it is the policy of TID that the Chief Dam Safety Engineer (DSE), Hydro Department Manager, and Power Plant Supervisor shall complete the USBR's Safety Evaluation of Existing Dams (SEED) training seminar. The Chief DSE, Hydro Department Manager, and Power Plant Supervisor will also attend a dam safety refresher course every five years at a minimum (Mead & Hunt 2012).

In addition to formal training discussed above, the Chief DSE, Hydro Department Manager, and Power Plant Supervisor will receive training updates and refreshers with respect to issues related to dam safety through active participation in the following exercises:

- annual EAP updates,
- annual FERC inspections,
- annual Division of Safety of Dams inspections, and
- review of Potential Failure Modes in conjunction with the Part 12D inspections.

TID encourages the sharing of information learned from outside seminars and training courses among all individuals who are accountable for dam safety. As a result, the Chief DSE, Hydro Department Manager, and Power Plant Supervisor will debrief these individuals regarding key aspects of the SEED training and refresher courses after completion (Mead & Hunt 2012).

TID recognizes the importance of plant technicians having a thorough understanding of dam safety because they observe the Don Pedro Project on a daily basis and are the first line of defense in identifying potential concerns. In addition to the information passed on by the Chief DSE, Hydro Department Manager, and Power Plant Supervisor, plant technicians shall receive hands-on dam safety training through participation in an informal mentoring program (Mead & Hunt 2012). Training includes:

- review of organizational policies regarding dam safety and regulatory compliance,
- general and site-specific training focused on dam safety awareness,
- review of project elements to be addressed during surveillance,
- potential signs of structural distress or movement, and
- purpose of instrumentation and rationale for established threshold values and action levels.

Dam safety training for new employees is administered by the Chief DSE. The Chief DSE will ensure that training of all individuals is documented with records kept to ensure that training goals and requirements are being met, and also to assure regulators, inspectors, and other responsible parties can assess the training that has taken place (Mead & Hunt 2012).

TID's employees complete a variety of training to ensure safe practices in management and maintenance of the Don Pedro Project. Training includes the following:

- accident investigation,
- accident review,
- aerial lift safety,
- American Heart Association- first aid, cardiopulmonary resuscitation (CPR), automated external defibrillator (AED),
- basic industrial electricity I and II,

- bently 3500 operation and maintenance,
- bloodborne pathogens,
- Cal/ Occupational Safety and Health Administration (OSHA) inspections,
- combi-laser operations,
- confined space,
- confined space entrant attendant and supervisor,
- confined space rescue,
- exposure and access to medical records,
- fire prevention and extinguishers,
- forklift,
- hazard communications,
- hazpower 40-hour,
- heat illness prevention,
- hot work permit,
- hydraulics training and troubleshooting,
- infra-red camera operation,
- labview training,
- ladder safety,
- lifting and rigging,
- lockout/tagout/blockout,
- machinery diagnostics - vibration,
- managers and supervisors conference,
- NERC compliance,
- overhead crane and hoist operator,
- propane handling,
- qualified electrical worker,
- qualified work training-substation,
- respirator fit test,
- respirator medical clearance,
- sexual harassment, drug free work place, and IT acceptable use,
- troubleshooting electrical control circuits, and
- valve and instrument technician.

2.1.2 Modesto Irrigation District

MID's employee trainings and dedication to employee and public safety illustrate MID's top priority for safety related to the management, operations, and maintenance of the Don Pedro Project. MID's journeyman dispatchers, dispatching shift supervisors, and power system schedulers are NERC certified as transmission operators. Additionally, all of the employees in these positions are required to receive 32 continuing education hours in emergency operations annually, as well as receive a total of 140 continuing education hours of training pertaining to NERC standards of the three year certification period. The dispatchers and dispatching shift supervisors are required to review the Don Pedro EAP each year and participate in the annual Don Pedro EAP drill.

2.1.3 Operations During Flood Conditions

The Don Pedro Project is located about four miles upstream of the town of La Grange and 30 miles east of Modesto, California in the foothills of the Sierra Nevada. The Don Pedro Dam and Reservoir are on the Tuolumne River, which rises in the high elevations of Yosemite National Park and discharges into the San Joaquin River southwest of Modesto. The reservoir is designed to reach elevation 852 ft under design flood conditions. Don Pedro Dam is constructed across a deep canyon of the Tuolumne River. The reservoir covers approximately 13,000 acres of surface area and contains 2,030,000 AF of storage at a water level of 830 ft.

Flood management operations and flood control are managed by the guidelines embodied in the 1972 ACOE Flood Control Manual (Appendix H-3). The ACOE participated financially in the building of the Don Pedro Dam in exchange for the Districts setting aside 340,000 AF of flood control storage space. This space occurs between elevations 801.9 and 830.0 ft and is kept vacant from October 7 through at least April 27 of the next year. Encroachment into the flood storage zone is allowed during the flood control period, but must be evacuated within a short period of time. The maximum reservoir level experienced to date at Don Pedro is 831.4 feet, which occurred on January 2, 1997. On February 20, 2017, the reservoir level reached 830 feet and the Don Pedro Project spilled for just the second time, with the maximum release being 19,100 cfs.

Reservoir flood management at Don Pedro allows for winter and spring capture of both rain and snowmelt floods, and is part of the ACOE system for flood control operations along the San Joaquin River which includes the other "rim reservoirs" that surround the eastern rim of California's Central Valley. Don Pedro Reservoir's flood control storage requirements increase from zero on September 8 to the maximum reservation of 340,000 AF by October 7. The flood control storage is maintained at 340,000 AF through April 27 after which, unless additional reserved space is indicated by snowmelt parameters, it can decrease uniformly to zero by June 3. Exhibit B provides a detailed graphical depiction of the flood control rule curve for the Don Pedro Project.

In addition to flood control space needs within the reservoir, downstream flow restrictions also affect flood management operations. The primary downstream flow guideline cited in the 1972 ACOE Flood Control Manual is that flow in the Tuolumne River at Modesto (as measured at the 9th Street Bridge) should not exceed 9,000 cfs. Flows in excess of 9,000 cfs have the potential to

cause significant damage to property in this area of the Tuolumne River and Dry Creek, a tributary of the Tuolumne River. Between La Grange Diversion Dam and 9th Street in Modesto, the single largest contributor of local flow to the Tuolumne River is Dry Creek. The Dry Creek watershed has its headwaters in the foothills just northeast of Don Pedro Dam. It is a flashy watershed; once the soil is saturated, any rainfall can result in a rapid increase in runoff. Significant flows, on the order of 6,000 cfs or higher, can occur when there is significant rainfall between Modesto and the upper end of the Dry Creek watershed. Because these flows from Dry Creek enter the Tuolumne River above the Modesto 9th Street USGS river gage, Dry Creek flows must be taken into account when making releases from Don Pedro designed to maintain total flow at Modesto below 9,000 cfs. Flood flow management operations are further discussed in Exhibit B.

Controlled and uncontrolled spillways are located west of the main dam on the right abutment ridge between the Tuolumne River and Gasburg Creek. The discharge capacity of the controlled spillways, with the three gates fully open, is 78,000 cfs with water surface at elevation 830 ft, and 172,500 cfs with reservoir water surface at elevation 850 ft. The discharge capacity of the uncontrolled emergency spillway is 300,000 cfs with reservoir water surface at elevation 850 ft. In addition to the main dam, the Don Pedro Project includes four dikes identified as Dikes A, B, and C and the Gasburg Creek Diike located downstream of the main spillway, southwest of the Don Pedro Dam. Gasburg Creek Diike is not an impounding structure, but was constructed to prevent flooding along Gasburg Creek during times of spill.

An EAP for the Don Pedro Project has been filed with FERC to comply with requirements of 18 CFR § 12.25. The EAP includes plant operating directives, definition of supervisor-in-charge hierarchy, and communications flowcharts to be followed during an emergency at the Don Pedro Project. The primary purpose of the EAP is to define the requirements needed to warn the public, public safety agencies, and property owners in the event of an imminent or occurring failure (Condition A); potentially hazardous situation developing (Condition B); or a non-failure flood emergency (Condition C). In general, the notification of an emergency, and the implementation of the EAP, will be made by the Senior District Official of TID. The EAP is, and will continue to be, reviewed annually, with respect to conditions both upstream and downstream on the Tuolumne River that may necessitate changes in the plan. Implementation of the plan requires cooperation and clear communication among different agencies. The Districts will continue to work in coordination with these officials to ensure that the plan is responsive to any change in uses or conditions below or in the vicinity of the Don Pedro Project.

2.1.4 Downstream Warning Devices

A floating boom is located approximately 1,000 ft downstream of the powerhouse and is in place year-round. The boom extends completely across the river channel and is labeled “Restricted Area-Keep Out.”

2.1.5 Operational Changes that Might Affect the Emergency Action Plan

No operational changes are proposed that might affect the existing EAP. The plan is reviewed and tested annually, and updated as required. There are no known or planned changes to the plant facilities that would affect the EAP.

2.1.6 Monitoring Devices

There are remote sensing instruments located throughout and downstream of the Don Pedro Project to detect abnormal conditions. Headwater level, tailwater level, and seepage weir level signals are input to the Supervisory Control and Data Acquisition (SCADA) system. This information is transmitted to the Power Control Center every ten minutes or immediately upon an event (digital alarms) or every four seconds (analog data). The Districts' engineers, hydrographers, and senior management officials evaluate the data supplied by visual observation, real-time dam instrumentation, manually inspected dam instrumentation, watershed data, and downstream river flow data. Alarms are triggered when any of the following events occur.

- When the reservoir elevation exceeds 825.0 ft, which is five feet below the top elevation of the ungated ogee spillway, the "Don Pedro Reservoir High Water Level Alarm" is sounded.
- When the reservoir level falls at a rate greater than .084 inches per minute (10 ft in a 24-hour period), the "Don Pedro Reservoir High Rate of Change Alarm" is sounded.
- When the tailwater level below the dam exceeds 304.5 ft, the "Don Pedro Tailwater High Level Alarm" is sounded.
- When the tailwater level rises at a rate greater than three feet per minute, the "Don Pedro Tailwater High Rate of Change Alarm" is sounded.
- If the seepage weir elevation is less than 0.2 ft, the "Seepage Weir Low Level Alarm" is sounded.

When any of the above alarms occur, the alarm is displayed in flashing mode on the Power Control Center screen, an audible bell is sounded in the Power Control Center, as well as at the powerhouse. The alarm stays in effect until the condition is corrected at the site. An alarm is also sounded if communication is lost between the powerhouse and the Power Control Center. This condition is known as a "response alarm" and triggers the Power Control Center to dispatch the on-site, on-call technician to the plant until communication is restored.

The current instrumentation monitoring program measures seepage, deformation, and hydrostatic pressure within the dam and foundation. Current dam safety related instrumentation at the Don Pedro Project are described below.

2.1.6.1 Piezometers

Located in the dam and in the spillway structure, the piezometer devices are used to measure the hydrostatic pressure within the dam. The piezometers are read four times each year and these results, along with reservoir elevation readings, are compared to previously collected data. The data provides information on the pore pressures in the core, the rapidity of drainage of the upstream shell under draw down conditions, the effectiveness of the downstream drain, the pore pressures along the embankment/foundation interface and the pore pressures in the foundation. Combined, the collected data evaluates the effectiveness of the grout curtain. There are 33 operating piezometers in the Don Pedro Dam and dikes and four piezometers at the spillway.

2.1.6.2 Crossarms

Located in the dam, these devices are used to measure internal settlement of the dam. The crossarms are read once a year and are compared to previous data. There are a total of seven crossarm settlement devices at the Don Pedro Project.

2.1.6.3 Surface Markers

Located on both the upstream and downstream faces of the dam, survey triangulation of these devices is used to measure dam surface movement. The surface markers are measured once each year and compared to previous data. There are a total of 63 surface markers along the dam.

2.1.6.4 Seepage Measuring Weir

Located in the powerhouse, this device measures the total flow of water through the dam and foundations. The weir is read twice each month and is continuously monitored by the Power Control Center. The flow is correlated with the reservoir elevation and rainfall, and the data is compared to previous data. In addition, the elevation of water going through the weir is read every four seconds by the SCADA and checked for alarm conditions.

2.1.7 Employee Safety and Public Safety Record

The Districts manage the Don Pedro Project consistent with their long-standing commitment to employee and public safety. This commitment begins with compliance with applicable local, state, and federal regulations regarding the safe operation of industrial and electrical facilities. As a result of the rigorous safety programs implemented, TID, the operator of the Don Pedro Project, has not received a single OSHA citation for or related to the Don Pedro Project.

The DPRA manages resources while providing for recreational opportunities at the Don Pedro Project. The DPRA promotes the safety and security of visitors and employees. In an effort to assure safety and security of visitors, all the Don Pedro recreation areas have a set of regulations and ordinances to govern its facilities addressing topics of general regulations, safety, vehicles, recreation area use, and natural resources. These regulations and ordinances are attached as Appendix H-4.

The Don Pedro Reservoir is a large and popular recreation area that supports boating, fishing, skiing and swimming within the reservoir. As described above, the Districts have various warning devices in place to inform the public of dangers relative to boating, swimming, skiing, and fishing in the immediate vicinity of any project-related facilities. Fatalities have occurred in the reservoir, the majority of which were due to boating accidents or mishaps. A record of fatalities that occurred between 1995 and 2013 is provided in Table 2.1-1.

Table 2.1-1. Serious injuries and fatalities occurring within the Don Pedro Project Boundary (1995-2013).

Date	General Location	Remarks
August 13, 2013	Lone Gulch	Fatality- drowning while attempting to tie two boats together
October 13, 2012	Stent Jacksonville Bridge	Fatality- jump from bridge, drowning
July 21, 2012	Gardner Falls	Serious injury- shoreline fall, broken wrist, laceration to abdomen
September 8, 2011	Moccasin Bay	Fatality- drowning
July 20, 2011	Fleming Meadows Campsite	Fatality- heart attack
June 28, 2011	Gardner Falls	Fatality- drowning
June 27, 2011	Green Bay	Serious injury- vessel accident
July 25, 2010	Kanaka Creek	Serious injury- fall on a houseboat
June 27, 2010	South Bay	Serious injury- vessel fall, back/neck injury
November 28, 2009	Moccasin/Tuolumne River Arm	Fatality- drowning
July 4, 2009	Lake Don Pedro Marina (Fleming Meadows)	Serious injury- hand contact with boat propeller
June 26, 2009	Graveyard Creek	Serious injury- jump from houseboat, spinal injury
May 31, 2009	Lake near Moccasin Point	Serious injury- personal water craft accident, head injury
August 8, 2008	School House Point	Fatality- drowning
August 3, 2007	Big Creek	Serious injury- high speed vessel accident, multiple injuries to driver
June 16, 2007	Lake near Fleming Meadows	Serious injury- boat/tube accident, neck injury
June 14, 2007	Middle Bay	Serious injury- personal water craft accident, head injury
July 28, 2006	Hatch Creek	Serious injury- wakeboard accident, fractured femur
June 10, 2006	Six-Bit Gulch	Serious injury- wakeboard accident, head/face injuries in collision with shore
May 31, 2006	Gardner Falls Upper Bay	Serious injury- wakeboard accident, fractured femur
June 6, 2005	Railroad Canyon	Serious injury- boat collision, head injury
June 24, 2004	Kanaka Creek	Serious injury- near drowning while swimming with friend
May 29, 2004	Blue Oaks Campground	Serious injury- fall into campfire, 2 nd and 3 rd degree burns
November 28, 2003	Highway 120/49 bridge	Fatality- jump from bridge
September 5, 2003	Gardner Falls	Fatality- jump/fall from rocks
July 20, 2003	Lake near Fleming, Private Houseboat Dock	Serious injury- contact with boat propeller, severe leg laceration
June 29, 2003	Lake near Fleming Meadows	Serious injury- wakeboard accident, profuse bleeding, concussion
September 30, 2000	Tuolumne River Arm	Fatality- presumed drowned
August 8, 2000	Moccasin	Fatality- possible heart attack
July 2, 2000	South Bay	Fatality- presumed drowned
July 24, 1999	West Bay	Fatality- drowning
July 12, 1999	Gardner Falls	Fatality- houseboat, injuries resulting from fall
July 3, 1999	Fleming Meadows	Fatality- heart attack
May 30, 1999	Blue Oaks Ramp	Fatality- possible heart attack
June 24, 1995	Blue Oaks Ramp	Fatality- heart attack

2.2 Current Operations

In general, the Don Pedro Project operates on an annual cycle consistent with managing for and providing a reliable water supply for consumptive use purposes, providing flood flow management, and ensuring delivery of downstream flows to protect anadromous fish. By October 6 of each year, the Don Pedro reservoir is currently lowered to at least elevation 801.9 ft to provide the 340,000 AF of flood control benefits acquired by the ACOE through its financial contribution to construction. Beginning on October 1 of each year, minimum flows provided by the Don Pedro Project to the lower Tuolumne River, as measured at the USGS gage at La Grange, are adjusted to meet license requirements intended to benefit upmigrating adult fall-run Chinook salmon. This includes providing a pulse flow, the amount of which varies depending on the water year type.

Minimum flows to the lower Tuolumne River are adjusted on October 16, the rate of flow dependent on water year type, and these flows are maintained through May 31 of the following year to protect egg incubation, emergence, fry and juvenile development, and smolt outmigration of fall-run Chinook salmon. A spring pulse flow is provided each year to aid smolt outmigration, the amount again depending upon water year type. Irrigation deliveries normally begin in early March, but can begin as early as February to provide early growing season soil moisture in dry winters. Irrigation deliveries ramp up considerably by April and normally reach their peak in July and August.

Throughout the winter months, operators maintain a constant assessment of snow conditions in the upper Tuolumne River watershed and, during years with heavy snow accumulation, may reduce reservoir levels to balance forecasted inflows, outflows, and reservoir storage. The goal of operations is to fill the reservoir by early June; however, greater snowpack volumes can extend this filling into early July if needed for maintenance of the required ACOE flood control space. ACOE flood control guidelines also provide for maintenance of downstream flows on the lower Tuolumne River to less than 9,000 cfs as measured at the USGS gage at Modesto River Mile (RM) 16, almost 40 miles below the Don Pedro Project.

Minimum flows to the lower Tuolumne River are adjusted again on June 1 and extend through September 30. Irrigation and M&I deliveries normally continue through October, but may also extend through November depending on soil moisture conditions. M&I deliveries occur year-round.

Delivery of Don Pedro Project benefits—irrigation water, M&I water, water for the protection of aquatic life, recreation, production of renewable energy, and flood protection—requires careful and skillful management of water. Don Pedro Project operations involve the continuous assessment of known and unknown variables, hydrologic risk assessment, coordination with other water systems, and the balancing of demands and resources. Don Pedro Project operations are discussed in further detail in Exhibit B.

2.3 Project Generation History

Construction of the Don Pedro Project began in 1967 and reservoir filling began in November 1970. Commercial operation commenced in 1971 and the reservoir first filled to the flood storage

space of 801.9 feet on March 1974. The current Don Pedro Dam was built approximately 1.5 miles downstream of the original, and much smaller, Don Pedro Dam which had been in operation since 1923.

TID provides irrigation water to 150,000 acres of land and serves approximately 100,000 electric customers in a 662 mi² electric service area (TID 2010). MID provides irrigation water to almost 60,000 acres of land and serves approximately 114,000 electric customers in a 560 mi² electric service area (MID 2010). MID also supplies treated municipal water to the City of Modesto, and TID and MID provide treated drinking water to the community of La Grange.

On behalf of both Districts, TID operates the four-unit, 168 MW Project. The original powerhouse was constructed with three 45.5 MW units; a fourth, slightly smaller unit was added in 1989. One of the three original units is directly connected to MID's transmission system and the other three units are connected to TID's transmission system. However, the Project switchyard is designed to permit flexibility in delivering Project generation to the two transmission systems.

Numerous capital improvements have occurred at the Don Pedro Project since commencement of operations in 1971. The largest single improvement was the addition of the fourth hydropower unit in 1989.

2.3.1 Generation Losses Due to Outages 2008 - 2013

Table 2.3-1 presents the unscheduled outages for the generating units. Outages are presented for a six-year period of time (2008 through 2013). In order to efficiently provide energy production from the facility, the Districts have a consistent record of addressing outages immediately and taking preventative measures to prevent future occurrences.

Table 2.3-1. Outage history of the Don Pedro Project 2008-2013.

Start Date	Duration	Unit	Cause	Corrective Action Taken
July 26, 2013	1 hour	2	Relay failure on high pressure oil lift pump circuit	Replaced relay on high pressure oil lift pump circuit
July 9, 2013	6 hours	2	Transformer nitrogen leak	Substation crew reduced the leak. TID will continue to supply nitrogen until the transformer can be brought out of service for repairs.
January 1, 2013	19 hours	4	Field flashing breaker failure to fully open	Contractor called out to service the field flash breaker for smooth operation
November 15, 2012	4 hours	1,2,3,4	Unit shutdown to facilitate an investigative dive near the power tunnel intake	No corrective action necessary
September 28, 2012	10 hours	3	Testing for autosynchronizer	Test followed new installation
May 31, 2012	24 hours	4	Make hollow jet valve fully available to reduce river flow required	No corrective action necessary
April 30, 2012	19 hours	1	Bad power setter board on mod II governor	Replaced setter board with spare

2.0 Information to be Supplied by Applicants that are Existing Licensees

Start Date	Duration	Unit	Cause	Corrective Action Taken
April 2, 2012	31 hours	3	Excessive vibration	Reduce output 15 MW until further diagnosis
February 24, 2012	2 hours	1	Water leak near the generator air cooler	Repaired the pipe fitting
November 13, 2011	Outage varies by unit from approx. 625 hours for Unit 4 to 3,200 hours for Unit 2. Not all units required for water delivery purposes.	1,2,3,4	All four units were removed from service to allow replacement of high pressure valve in the main power conduit; during powerhouse outage, an oil leak was found in the fixed wheel gate hydraulic system. Unit 4 was placed back in service on December 9; Unit 1 on January 9, 2012; Unit 3 on January 19, 2012; and Unit 2 on March 27, 2012.	High pressure valve cavitation was repaired; oil leak was repaired by fill welds and sleeving the damaged area. Runner repairs on Unit 2 were undertaken to address cavitation.
November 9, 2011	21 hours	4	Cooling water pressure regulating valve problem	Replaced faulty valve
November 4, 2011	84 hours	4	Cooling water piping leak	Removed and repaired piping
July 26, 2011	1 hour	2	Relay failure on high pressure oil lift pump circuit	Repaired relay
July 19, 2011	4 hours	4	Brush rigging carbon buildup	Cleaned the entire collector ring and brush housing
April 17, 2011	24 hours	4	Water leak on one generator air cooler	Isolate cooler, derate generation, remove and repair
April 8, 2011	8 hours	3	Abnormal air gap reading	Verify sensor installation and repair proximeter
March 21, 2011	4 hours	4	Brush rigging carbon buildup	Cleaned the entire collector ring and brush housing
February 4, 2011	82 hours	1	Carbon dioxide discharge	Change out fire detector
February 4, 2011	81 hours	4	Carbon dioxide discharge	Change out fire detector
January 14, 2011	4 hours	4	Brush rigging carbon buildup	Cleaned the entire collector ring and brush housing
November 19, 2010	22 hours	1	Excitation problem	Replaced a bad relay and timer for the field breaker
August 4, 2010	4 hours	2	Excitation problem	Reset
February 6, 2010	31 hours	2	Wicket gate shear pin	Replaced shear pin
January 25, 2010	1 hour	1,2,3	Battery charger powered down for auxiliary equipment installation	No corrective action necessary
January 5, 2010	34 hours	1,2,3	Blown seal on cooling water line	Repaired seal
November 22, 2009	2,616 hours	4	Field ground trip; stator and rotor contamination from carbon brushes	Unit was taken apart and cleaned thoroughly

Start Date	Duration	Unit	Cause	Corrective Action Taken
March 25, 2008	10.25 hours	1,2,3,4	Inverter failure	Install station power to inverter output until repair was made

2.4 Compliance with Terms and Conditions of Existing License

The Districts have consistently executed their obligations and responsibilities under the current license. Many of the FERC license articles required the Districts to undertake extensive environmental studies, often under challenging deadlines. The Districts have met every one of these requirements and schedules. The Districts maintain complete records of its operations and compliance and proactively cooperate with other river managers and users, including the ACOE, CCSF, U.S. Department of the Interior, Bureau of Land Management (BLM), CDFW, USFWS, and Non-Governmental Organizations (NGO). The Districts have been in full compliance with the terms of its FERC license throughout the initial license term.

2.5 Actions Affecting the Public

The Districts' operations and maintenance practices ensure the efficient, productive use of the Don Pedro Project's resources to satisfy a number purposes and needs. As a result, the Districts' actions related to the Don Pedro Project affect the public.

The Don Pedro Reservoir provides 2,030,000 AF of total water storage, which provides water for the beneficial use of irrigation of over 200,000 acres of prime farmland in California's Central Valley. Combined, the Districts supply, on average, approximately 850,000 AF of irrigation water per year to their customers.

The Don Pedro Project also provides water storage for the beneficial use of M&I customers. MID provides treated water to the City of Modesto (population: 210,000), and TID and MID jointly provide treated water to the community of La Grange. The Districts provide up to a maximum of 67,500 AF of water per year for M&I use. Consistent with agreements between the Districts and the CCSF, the Don Pedro Project also provides a "water bank" of up to 570,000 AF that CCSF may use to help manage the water supply from its Hetch Hetchy water system while meeting senior water rights of the Districts. CCSF's "water bank" within Don Pedro Reservoir provides significant benefits for its 2.6 million customers in the San Francisco Bay Area.

Another primary use of the Don Pedro Project is providing storage for flood management on the Tuolumne and San Joaquin rivers by providing up to 340,000 AF of storage for the purpose of flood control.

Other important uses supported by the water storage and water supply purposes of the Don Pedro Project are recreation, power generation, and protection of the downstream anadromous fishery. The Don Pedro Reservoir supports three developed recreation areas and other small recreation facilities (restrooms and buoys) outside of the developed areas. The three developed recreation areas are Fleming Meadows Recreation Area, Blue Oaks Recreation Area, and Moccasin Point Recreation Area. In addition to these developed recreation areas, there is boat-in access to much of the shoreline and to the islands within the reservoir. Water-based activities within the Project Boundary include water skiing and wake boarding, boat fishing, jet skiing, canoeing, flat water

kayaking, windsurfing, and sailing. Land-based recreation activities include camping, picnicking, and fishing.

2.6 Ownership and Operating Expense Reductions if the Project License was Transferred

If the Districts' ability to generate hydropower at the Don Pedro Project were transferred to another entity, the Districts would have to continue to operate the Don Pedro Project just as it is now in order to continue to deliver water to meet existing and future irrigation and M&I needs. The Don Pedro Project is primarily a water supply project; hydropower is a secondary function. Further, the Districts do not agree that the hydropower operating license could be transferred to another entity without interfering in the Districts' water rights. Operation and maintenance (O&M) expense reduction associated with transfer of hydropower production to another entity would be approximately \$3 million.

2.7 Annual Fees for Federal or Indian Lands

There are no Tribal reservation lands within the FERC Project Boundary. The existing Project Boundary occupies approximately 4,802 acres of federal land within the Bureau of Land Management's Sierra Resource Management Unit. The fee for this land has been \$289,168.01 annually from 2008 to 2012.

3.0 LITERATURE CITED

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**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

**EXHIBIT H - PLANS AND ABILITY OF APPLICANTS
TO OPERATE THE DON PEDRO HYDROELECTRIC PROJECT**

**APPENDIX H-1
FOURTH AGREEMENT**

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FOURTH AGREEMENT.

Between

THE CITY AND COUNTY OF SAN FRANCISCO

and

THE TURLOCK IRRIGATION DISTRICT AND THE MODESTO IRRIGATION DISTRICT

JUNE, 1966

(FULLY EXECUTED COPY)

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FOURTH AGREEMENT
TABLE OF CONTENTS

<u>Art. No.</u>	<u>Title</u>	<u>Page No.</u>
	Recitals	1
1.	Scope of Agreement	4
2.	Rights of Parties	4
3.	The Board of Review	4
4.	Fiscal Protection and Hold Harmless Clauses	5
5.	Reservoir Storage Capacity	6
6.	Flood Control Operations	6
7.	Water Accounting	7
8.	Water Releases; Apportionments	10
9.	Determination of Costs and Cost Accounting	11
10.	Responsibilities as to Project Costs	12
11.	Disposition of Contributed Funds	15
12.	License Conditions	15
13.	Bonds and Insurance	16
14.	Project Design Engineering	16
15.	Construction Contract Bids	16
16.	State Highway Relocation	17
17.	County Highway Relocation	17
18.	Recreation Plan	17
19.	Evaluation of Bids	17
20.	Reservations	18
	Signatures	19

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FOURTH AGREEMENT

Between

THE CITY AND COUNTY OF SAN FRANCISCO

and

THE TURLOCK IRRIGATION DISTRICT AND THE MODESTO IRRIGATION DISTRICT

THIS AGREEMENT, made by and between the CITY AND COUNTY OF SAN FRANCISCO, a municipal corporation, acting by and through its Public Utilities Commission, hereinafter called "City," and the TURLOCK IRRIGATION DISTRICT and the MODESTO IRRIGATION DISTRICT, organized pursuant to the Irrigation District Law of the State of California, acting by and through their respective Boards of Directors, hereinafter called "Districts,"

WITNESSETH THAT:

1. WHEREAS, Districts and City own and operate certain water conservation facilities on the Tuolumne River for the purposes of domestic, municipal and industrial water supply, irrigation, flood control and the generation of electric power, and have operated said facilities effectively and harmoniously for many years; and

2. WHEREAS, in that certain agreement dated February 29, 1940, known as the "First Agreement," Districts and City did formally agree to continue to cooperate in a program of conservation of the waters of the Tuolumne River for their mutual benefit, and to recognize the provisions of the Act of Congress of December 19, 1913, known as the Raker Act (38 Stat. 242), as applying to Districts and City without waiving any of their rights; and,

3. WHEREAS, in that certain agreement dated November 22, 1943, known as the "Second Agreement," Districts and City did formally agree to continue the development of the Tuolumne River by cooperating in the building of the Cherry

River Project and New Don Pedro Project and all appurtenant projects involving the use of Tuolumne River water; and,

4. WHEREAS, in that certain agreement dated June 30, 1949, known as the "Third Agreement," Districts and City did formally agree that the Districts have existing prior rights to the waters of the Tuolumne River and its tributaries, and agreed to provide for the storage, management and control of the waters of the Tuolumne River and its tributaries in such a manner as to assure, insofar as feasible, the availability of sufficient water to meet the requirements of Districts and City; and that toward this end City would first construct the Cherry Valley Project, after which the New Don Pedro Project, to be owned by Districts, would be constructed as provided by supplemental agreement; and did further agree upon their respective flood control responsibilities under a proposed contract with the United States through its Corps of Engineers, U. S. Army; and

5. WHEREAS, the United States of America, pursuant to the Flood Control Act of December 22, 1944, has entered into a contract with Districts and City dated August 29, 1949, and certified by the Federal Government on September 26, 1949, as supplemented by Supplemental Agreement No. 1, dated June 4, 1956, hereinafter called "Federal Contract," under which, in consideration for certain financial contributions to be made by the Federal Government, Districts and City agreed to provide for Tuolumne River flood control by making certain modifications in their then existing facilities and operations and by constructing the Cherry Valley Reservoir and the New Don Pedro Reservoir with New Don Pedro to provide not less than 340,000 acre feet for flood control; and

6. WHEREAS, the Cherry Valley Reservoir has been successfully completed by the City; and

7. WHEREAS, the Legislature of the State of California has, pursuant to Chapter 282, Statutes of 1965, authorized a Davis-Grunsky Act grant of up to Seven Million Dollars (\$7,000,000) for recreational functions and enhancement of fish and wildlife in connection with the construction of the New Don Pedro Reservoir; the above amount to be further increased by an estimated amount of Five Hundred Thousand Dollars (\$500,000) for the provision of initial water supply and sanitary facilities under the provisions of said Davis-Grunsky Act; thereby making a grant of approximately Seven Million Five Hundred Thousand Dollars (\$7,500,000) available from the State of California; and

8. WHEREAS, studies indicate that further conservation of Tuolumne River flows to provide for the needs of the Districts and the City can be accomplished by building the New Don Pedro Reservoir to its maximum capacity of approximately 2,030,000 acre feet; and

9. WHEREAS, the electors of the Districts and of the City have authorized the issuance of bonds to secure the estimated funds necessary to construct the New Don Pedro Project; and

10. WHEREAS, following application by the Districts and a hearing, the Federal Power Commission has ordered the issuance of a license to the Districts for the New Don Pedro Project (Turlock Irrigation District and Modesto Irrigation District Project No. 2299, 31 FPC510, 1128 (1964), containing certain conditions, including the filing of an agreement between Districts and City for Commission approval relating to the allocation of the total cost of the project and the acquisition of storage space in the reservoir, which proceedings have been affirmed by the United States Court of Appeals for the Ninth Circuit (California, et al. v. FPC 345 F2d 917 (1965); and

11. WHEREAS, it is now necessary to set forth the respective responsibilities of the Districts and the City in the New Don Pedro Project;

NOW, THEREFORE, the parties hereto do mutually agree as follows:

ARTICLE 1. SCOPE OF AGREEMENT

This agreement is intended to supplement and, to the extent of any inconsistency therewith, amend the provisions contained in the aforementioned First, Second and Third Agreements between Districts and City, to the end that the New Don Pedro Project, hereinafter called Project, may be constructed for the purpose of conserving water for the irrigation, domestic, municipal and industrial use requirements of the parties hereto; for flood control; for the generation of hydroelectric power; and for recreation, fish and wildlife. This Agreement shall continue in force until modified or canceled by mutual consent of the parties hereto.

ARTICLE 2. RIGHTS OF PARTIES

This Agreement does not, nor is it intended to, affect, alter, or impair in any manner the rights of the respective parties hereto in or to the waters or the use of waters of the Tuolumne River or its watershed acquired or existing under the laws of the State of California. Districts and City agree to recognize and abide by the provisions of the Raker Act as applying to Districts and City.

ARTICLE 3. THE BOARD OF REVIEW

Districts and City agree to cooperate fully to expedite the early completion of the Project, the planning and construction of which shall be under the general supervision and control of Districts. In order to keep the parties hereto fully advised regarding design progress and construction a Board of Review is hereby created. The Board shall be composed of three persons, one to be appointed by each of the parties hereto. The Board shall establish its own operating procedures. At least once each month the Board shall meet with Districts' project representatives and review progress and scheduling of the construction work, the expenditure and availability of funds, proposed contract modifications, and the matters falling within paragraphs I A, I D, and II of Appendix A of this Agreement. The Board shall arrange to have minutes kept for each of its meetings, and shall report the results of each of such meetings to the parties. The Board shall also

make such recommendations to the parties as it sees fit to the end that a high level of cooperation is maintained among the parties and each is kept fully informed.

ARTICLE 4. FISCAL PROTECTION AND HOLD HARMLESS CLAUSES

Districts shall not award any construction contracts prior to the execution of this Agreement and its certification pursuant to Section 86 of City's Charter, nor prior to City's review and approval of the plans and specifications of such construction contracts, which approval shall not be unreasonably withheld. Districts shall proceed with planning and construction expeditiously and diligently until completion thereof, and City shall cooperate with Districts at all times to that end.

It is mutually understood and agreed that the program and conditions of this Agreement are subject on the part of City and Districts to such action as may be required by law or as required by applicable fiscal budgetary provisions of law governing City and Districts or by the necessity of bond issues, and further subject to execution of the supplemental agreement to the Federal Contract provided in Article 3b therein.

Districts agree to assume any City obligations under the Federal Contract, for the construction of the New Don Pedro Project and further agree to assume all of City's obligations under the Federal Contract for flood control operation when the New Don Pedro Project is completed, provided City has made its contribution to the cost of the Project as set forth herein. Districts shall hold and save harmless City, its officers, agents, and employees, from liability of any nature or kind for and on account of any claim for damages arising as a result of the work performed or failure to meet the terms of the Federal Contract respecting the New Don Pedro Project. The New Don Pedro Project shall be owned solely by Districts, and Districts agree to maintain and operate it at their own expense, all in accordance with the terms and conditions herein.

The Districts shall have no liability for damages and shall be relieved of any obligations under this Agreement, if such damage is caused, or the performance of such obligations is prevented, by war, strikes, inability to obtain required materials, acts of God, or other causes beyond their control.

ARTICLE 5. RESERVOIR STORAGE CAPACITY

The New Don Pedro Reservoir shall be constructed to a capacity of approximately 2,030,000 acre feet; which capacity shall include 1,120,000 acre feet of Districts' storage, of which 309,000 acre feet is below minimum power pool; 570,000 acre feet storage space for use by City; and 340,000 acre feet for flood control storage space. Such portion of the 340,000 acre feet flood control storage space as is not reserved for flood control at any time shall be available 50% to Districts and 50% to City for conservation storage, thereby entitling City to a maximum of 740,000 acre feet of storage space, hereinafter called "exchange storage space."

ARTICLE 6. FLOOD CONTROL OPERATIONS

(a) Until the Project is constructed and in operation, both Districts and City agree to operate their existing reservoirs for purposes of flood control, in addition to conservation, in accordance with the provisions of the Federal Contract. City shall have the right to intercept and store water due Districts under the Raker Act and shall endeavor to maintain, insofar as feasible, sufficient storage in its reservoirs to protect Districts from loss of both irrigation and power water by reason of Districts' flood control operations. Upon demand of Districts, City agrees to release from City's reservoirs, through its powerhouses or otherwise, any or all water due Districts under the Raker Act: provided that all storage credits shall be terminated at such times as existing Don Pedro Reservoir spills or on October 31 of each year, at which time City shall own all water stored in its reservoirs.

(b) Upon completion of the New Don Pedro Reservoir, all obligations of the City and the Districts to operate any of their other reservoirs for flood control shall be terminated, and the entire flood control operation shall be transferred to the New Don Pedro Reservoir.

(c) Districts shall operate New Don Pedro Reservoir for flood control in accordance with the requirements of the Federal Contract and the applicable and valid regulations and orders of the Corps of Engineers of the United States Army. The maximum amount of space in the reservoir to be reserved for such flood control purposes is 340,000 acre feet.

ARTICLE 7. WATER ACCOUNTING

It is agreed that a principal benefit to be derived by City in return for its payment of a substantial part of the cost of the project shall be the right of City to release water to Districts when it can be stored in New Don Pedro Reservoir in advance of the time when a release thereof is required under the Raker Act and the right of City subsequently to intercept or divert equivalent quantities of water which would otherwise be required to be released to Districts, the City's advance releases being stored by Districts in New Don Pedro Reservoir and withdrawn therefrom by Districts for use in place of natural flow subsequently intercepted by City. The following provisions shall take effect upon the completion of New Don Pedro Reservoir and shall continue in effect thereafter throughout the term of this Agreement:

(a) A "Water Bank Account" shall be established and maintained by the parties in a manner to be approved by them from time to time. The Water Bank Account shall contain a detailed record of all advance releases credited to City and all debits charged to City as hereinafter provided, together with the net balance, if any, remaining to the credit of the City at all times. The Water Bank Account shall be maintained on a daily basis or such other basis as the parties may agree upon from time to time.

(b) Whenever the inflow to the New Don Pedro Reservoir from all sources exceeds whichever of the following is the smaller:

(1) The computed daily natural flow of the Tuolumne River at LaGrange Dam (as defined in the Raker Act), or

(2) The entitlement of the Districts under the Raker Act plus sixty-six (66) cubic feet per second,

then the excess shall be deemed to be natural flow of the Tuolumne River released by City to Districts in advance of the time when the release thereof is required under the Raker Act, and such excess shall be credited to City as "advance releases" and shall be treated as hereinafter provided.

(c) Whenever and to the extent that City has a credit balance in its Water Bank Account City may intercept and divert waters of the Tuolumne River above New Don Pedro Reservoir in quantities which will reduce the inflow into New Don Pedro Reservoir to less than the smaller of the two quantities hereinabove defined in paragraph (b) hereof, and the amount by which such inflow is so reduced below the smaller of said two quantities shall be charged to City in its Water Bank Account.

(d) The losses of water in storage in New Don Pedro Reservoir through evaporation and seepage shall be computed on a daily basis, and on each day when the City has a net credit balance in its Water Bank Account there shall be deducted from such balance that proportion of the day's evaporation and seepage losses which is equal to the proportion that the City's net credit balance in the Water Bank Account at the beginning of the day bears to the total volume of water then in storage in New Don Pedro Reservoir.

(e) Except with the prior consent of Districts, City shall never be entitled to have a debit balance in its Water Bank Account. With the Districts' prior approval City may create debit balances in its Water Bank Account on a temporary basis for the purpose of securing water which is necessary to maintain City's operations, but such debit balances shall be restored by City through advance releases as soon as practicable, and City shall compensate Districts in a manner to be mutually agreed upon for any damages or losses which may be suffered or incurred by Districts as a result of such action by City.

(f) The net credit balance of the City in its Water Bank Account shall never be permitted to exceed at any one time 570,000 acre feet plus one-half of the permitted encroachment in the flood control space. Whenever the City's net credit in its Water Bank Account shall equal or exceed the above, then, and so long as that condition continues, there shall be no credit to the City for advance releases pursuant to paragraph (b) hereof.

(g) Districts shall own and have exclusive control and use of all water released by City to Districts in advance pursuant to paragraph (b) hereof, may store such water in and withdraw such water from New Don Pedro Reservoir at such times and in such amounts as Districts shall see fit from time to time.

(h) For the purposes of computation, the daily natural flow of the Tuolumne River shall be deemed to be that flow which would have occurred at LaGrange Dam had no facilities of City and Districts been constructed on the Tuolumne River watershed.

(i) All computations, schedules, records and formulae used in measuring advance releases and establishing the net balance in the City's Water Bank Account from time to time shall be subject to examination and review by

authorized representatives of the parties hereto at all reasonable times. Monthly reports shall be made to the parties showing the results of all such computations and the status of the Water Bank Account on a daily basis. The correctness of each such monthly report shall be deemed to be conclusively established as between the parties in the absence of objection by any party within ninety (90) days after the delivery of such report. In the event of any objection within said period the parties shall endeavor to resolve the objection by mutual agreement, but if they are unable to do so within a reasonable time then upon request of any party the matter shall be referred to a panel of three qualified arbitrators, one appointed by City, one by Districts, and the third by the two so chosen, and the decision of a majority of the arbitrators shall be final and binding upon all parties.

ARTICLE 8. WATER RELEASES; APPORTIONMENTS.

The Districts and City recognize that Districts, as licensees under the Federal Power Commission license for the New Don Pedro Project, have certain responsibilities regarding the water release conditions contained in said license, and that such responsibilities may be changed pursuant to further proceedings before the Federal Power Commission. As to these responsibilities, as they exist under the terms of the proposed license or as they may be changed pursuant to further proceedings before the Federal Power Commission, Districts and City agree:

(a) That any burdens or changes in conditions imposed on account of benefits accruing to City shall be borne by City.

(b) That at any time Districts demonstrate that their water entitlements, as they are presently recognized by the parties, are being adversely affected by making water releases that are made to comply with Federal Power Commission license requirements, and that the Federal Power Commission has not relieved

them of such burdens, City and Districts agree that there will be a re-allocation of storage credits so as to apportion such burdens on the following basis:

51.7121% to City and 48.2879% to Districts.

In the event City and Districts cannot agree that there has been such an adverse effect and the extent thereof, these issues shall be determined by arbitration as provided in Article 7 (i) above.

(c) That in the event of such adverse effects on Districts' water entitlements, and the consequent necessity for distribution of burden therefor as provided in the foregoing subparagraph b, Districts shall forthwith seek modification by the Federal Power Commission of the water release conditions of said license.

ARTICLE 9. DETERMINATION OF COSTS AND COST ACCOUNTING

(a) Estimated Costs. Estimated Project costs made in March 1966 form the basis for the allocations of costs to the parties as made herein. The parties, however, recognize and agree that the costs to be defrayed in accordance with the allocations made shall be the actual costs of construction of the Project.

(b) Actual Costs. Actual costs of construction shall be those expenditures required in order to build the Project. In addition to the actual costs of all physical facilities, including lands, together with any relocations or replacements of facilities which Project construction may require, actual costs shall include but not be restricted to, the costs of administration, preliminary investigation, engineering, legal services and construction management.

(c) Accounting and Procedures. The Districts shall set up an accounting procedure for the Project satisfactory to the City, which shall be in accordance with the uniform system of accounts of the Federal Power Commission. Prior to awarding of any contracts for construction of the New Don Pedro Project the Districts shall select a bank or banks in which to establish accounts for all funds received and paid out in connection with the Project. Such funds shall be kept in bank accounts

separated from all other funds of the Districts. Funds covering the cost of the Project shall be deposited in these accounts by the Districts and City prior to awarding of contracts. Any interest accruing shall be credited to the City and Districts as their pro rata share of deposits earned. All payments for the Project shall be disbursed from these funds and any unused amounts at the completion of the Project shall be returned to the City and Districts as their credits indicate. The Districts shall render monthly statements to the City showing the distribution of all funds and the City's share of same. In addition, the Controller of the City shall have the right to make any investigation, inspection or audit which he may deem necessary. For the purpose of simplification, contracts awarded for construction work shall be itemized so far as practical, to separate items for City participation from items in which City does not participate.

(d) Reporting. Each party agrees that at any time, upon written request by any of the other parties, it will report the amount of funds it has available for disbursement under the terms of this Agreement. Districts agree that at any time upon written request they will furnish to City up-to-date Project cost estimates, certified statements as to Project costs actually incurred, and information as to their budgetary programs for the New Don Pedro Project.

ARTICLE 10. RESPONSIBILITIES AS TO PROJECT COSTS.

(a) Separable Costs. Of the total Project costs, Districts shall pay the costs of acquiring the site for the New Don Pedro Dam and all lands and interests in lands to be occupied by the New Don Pedro Reservoir. Districts shall also pay all costs of the Project facilities installed for the purpose of generating hydroelectric power and for operation and maintenance activity at the New Don Pedro Dam.

The costs of any modification to City's structures at Red Mountain Bar which may be necessary as a result of the construction of the New Don Pedro Project shall be borne by City. Estimates of these costs are set forth in Section I, Groups B, C and E of Appendix A incorporated herein by this reference. Each agency shall bear its own cost of interest charges during construction.

(b) Common Costs. All Project costs other than those set forth in Article 10a above shall be considered "Common Costs" to be shared by Districts and City as agreed upon herein. For purposes of cost sharing determination, common costs shall be in three general categories as follows:

(1) Construction Costs Allocated by Third Agreement - which shall include costs of: construction of a dam and appurtenances to impound a reservoir, including site clearing, of approximately 2,030,000 acre feet of capacity; including all access roads.

(2) Construction and Related Costs of Additions to Project Not Anticipated at Time of Third Agreement - which shall include costs of the relocation and reconnection, to include right of way acquisition, of all State and County highways and roads; the relocation, including right of way acquisition, or removal of any power and telephone lines, or other facilities public or private; fishery studies; utilizing or acquiring, or gaining access to public lands; a recreational use plan together with facilities provided thereunder as approved by the Federal Power Commission; and any reconstruction which may be required by State or Federal authority at some future time.

(3) Other Costs - which shall include but not be restricted to costs of: preliminary engineering, legal and administrative activity; insurance, construction bonds; taxes; permits and inspections; accounting; public relations;

and administration, engineering, legal and management of construction. Estimates of common costs, insofar as these items have been identified or are available, are set forth in Sections IA, ID and II of Appendix A.

(c) Sharing of Common Costs. The sharing of Common Costs, as defined in Article 10b, shall be as follows with regard to both "construction" and "other" costs:

(1) Construction Costs Allocated by Third Agreement - shall be shared in the ratio of the estimated cost of constructing a 1,200,000 acre foot dam and reservoir to a 2,030,000 acre foot dam and reservoir, which on the basis of past studies and cost estimates yields percentages of 82.1582% for the City and 17.8418% for the Districts.

(2) Construction and Related Costs of Additions to Project Not Anticipated at Time of Third Agreement - shall be shared in the ratio of City's additional storage achieved to Districts' additional storage achieved after deductions for original Don Pedro Reservoir and minimum power pool, which yields percentages of 51.7121% for the City and 48.2879% for the Districts. Any continuing costs to the Project which might result from the Districts' deficit operation of recreational facilities required to be constructed under terms of the Federal Power Commission license will be shared by the City and Districts in the ratio established under this section.

(3) Other Costs - shall be shared in the ratio of the estimated cost of building the Project without hydroelectric power facilities to building it with such facilities, yielding percentages of 62.0201% for the City and 37.9799% for the Districts; except that items

applicable to separable costs listed in this article, section (a) above, shall be borne separately by the individual agencies.

(d) Sharing of Project Costs. The sharing of presently estimated Project costs under sections a, b, and c of this Article 10 is anticipated by the parties to be approximately as shown in Appendix A, incorporated herein by this reference.

ARTICLE 11. DISPOSITION OF CONTRIBUTED FUNDS

The Federal payments for the 340,000 acre-feet of flood control storage space in the New Don Pedro Reservoir, as provided for under Article 3b of the Federal Contract, shall be made to City. Any payments by the State or Federal Government for acquiring lands or interests in lands, or for the demolition, abandonment, relocation, or removal of buildings, and other structures, shall be made to Districts. Any payment by the State or Federal Government for recreation and fish and wildlife benefits shall be credited to the parties in the same percentages utilized for common construction costs under Article 10c2 hereof; provided, however, that the use of any money disbursed by the State of California to Districts pursuant to the portions of the Davis-Grunsky Act which provide for grants to public agencies shall be subject to the provisions of the grant contract to be executed between Districts and the State of California under that Act which regulates the use of the grant money. Any other Federal or State payments which may be made available for the New Don Pedro Project shall be allocated to Districts and City by supplemental agreement when and if they become available.

ARTICLE 12. LICENSE CONDITIONS

As a consequence of Districts' responsibilities as licensees for the New Don Pedro Project, as such responsibilities exist or may be changed pursuant to any further proceedings, City and Districts agree:

(a) To share as provided in Article 10c2 in the costs of such studies relating to the fishery of the Tuolumne River as may be required; in any

proceedings resulting therefrom; and in the costs of any facilities or program instituted as a consequence of such fishery studies or proceedings.

(b) To share as provided in Article 10c 1, 10c2, or 10c3, as appropriate, other costs arising out of Districts' responsibilities as licensees of the New Don Pedro Project.

ARTICLE 13. BONDS AND INSURANCE

Districts agree that City will be named as an additional obligee, as its interests may appear, on all labor, material, and performance bonds obtained in construction of the subject Project, as an additional insured on liability policies in force during and after construction and as an additional insured as its interests may appear on any casualty policy covering the New Don Pedro Dam and its appurtenances.

ARTICLE 14. PROJECT DESIGN ENGINEERING

As soon as practicable, following the execution of this Agreement, the Districts shall direct Bechtel Corporation to proceed with project design engineering, and preparation of plans and specifications for (a) a single construction contract with unit prices, and (b) separate supply contracts for turbines and valves, generators and busses, transformers and circuit breakers, gantry crane and gate hoist, gates and penstock and liner, and allied work necessary for the calling for bids for the construction of the New Don Pedro Project. The estimated cost of this work by Bechtel Corporation is \$500,000.00. The City shall pay to the Districts, 82.1582% of the cost of the work contemplated by this paragraph relating to the construction of those items specified in Paragraph I A, of Appendix hereto. Such payment shall be made on demand of the Districts. The Districts shall pay 100% of the cost of the work contemplated by this paragraph relating to those items specified in Paragraph I B of said Appendix.

ARTICLE 15. CONSTRUCTION CONTRACTS, BIDS

Upon completion of the work contemplated by Article 14 hereof,

the Districts shall call for bids for the construction under a single construction contract with unit prices and separate supply contracts for the New Don Pedro Project.

ARTICLE 16. STATE HIGHWAY RELOCATION

The Districts shall enter into an agreement with the State of California, acting through the Division of Highways of the Department of Public Works, calling for a portion of the engineering and design work necessary for the State to proceed with the State highway relocations at a cost not to exceed \$160,000.00 for the first year. The City shall pay 51.7121% of the cost thereof to the Districts at the time required by the Districts pursuant to said agreement.

ARTICLE 17. COUNTY HIGHWAY RELOCATION

The Districts shall take whatever action they may deem desirable in order to more accurately estimate the cost of relocating county highways. Provided the Districts have the prior written approval of the City for any expenditures in this regard, the City agrees to reimburse the Districts on demand 51.7121% of such expenditures.

ARTICLE 18. RECREATION PLAN

The Districts shall proceed with reasonable diligence to prepare the recreation plan required by the Federal Power Commission License and to prepare a feasibility report in support of an application for construction and facilities grants under the provisions of the Davis-Grunsky Act and to make an application for such grants. The City shall reimburse the Districts upon demand for the cost of such plan, feasibility report and application to the extent of 51.7121%, provided the cost thereof does not exceed \$100,000.00.

ARTICLE 19. EVALUATION OF BIDS

Upon the receipt of bids for the construction of the New Don Pedro Project, each party shall make an estimate of the cost of the Project to it in accordance with the allocation of costs as provided herein.

In the event that (a) the estimated costs of the New Don Pedro Project to the Turlock Irrigation District, based on all factors known at that time, exceeds \$28,216,904.00, the Turlock Irrigation District, at its option, may declare that the cost of the project exceeds the benefits; (b) the estimated costs of the New Don Pedro Project to the Modesto Irrigation District, based on all factors known at that time, exceeds \$15,881,658.00, the Modesto Irrigation District, at its option, may declare that the cost of the project exceeds the benefits; (c) the estimated costs of the New Don Pedro Project to the City, based on all factors known at that time, exceeds \$48,423,538.00, the City, at its option, may declare that the cost of the project exceeds the benefits; and upon any such declaration the parties hereto agree that no party shall be bound by this agreement except as to the provisions of Articles 14 to 19 inclusive.

ARTICLE 20. RESERVATIONS

Except with respect to Articles 14 to 19 inclusive, this Agreement is subject to (a) the approval of the Federal Power Commission, (b) the approval of the California District Securities Commission, and (c) the Districts' ability with reasonable efforts to make satisfactory arrangements for necessary county highway abandonment and relocation.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be
executed by their respective officers thereunto duly authorized this 23rd

day of May, 1966.

TURLOCK IRRIGATION DISTRICT

AM. Crowell
President

R.S. Dillner
Secretary

APPROVED AS TO FORM:

W. Meikle
Chief Engineer

[Signature]
Attorney

MODESTO IRRIGATION DISTRICT

W. W. Smith
President

[Signature]
Secretary

APPROVED AS TO FORM:

Clifford E. [Signature]
Chief Engineer

[Signature]
Attorney

CITY AND COUNTY OF SAN FRANCISCO

APPROVED AS TO FORM:

THOMAS M. O'CONNOR, City Attorney

By William F. [Signature]
Public Utilities Counsel

APPROVED W. [Signature]
Accounting Accounts Bureau Director

[Signature]
General Manager
of Public Utilities

Authorized by Resolution No. 359 66
of the Board of Supervisors of the
City and County of San Francisco

Authorized by Resolution No. 66-0378
of the Public Utilities Commission
of the City and County of
San Francisco

Attest [Signature]
Secretary and Assistant
General Manager, Administrative,
Public Utilities

March, 1966
Page 1 of 4

NEW DON PEDRO ESTIMATE

APPENDIX A

I. PER THIRD AGREEMENT

TOTAL COSTS

DISTRIBUTION OF COSTS

CITY

MODESTO

TURLOCK

A. Construction Items Allocated by Third Agreement

1. Reservoir-----	\$ 1,420,000			
2. Dam-----	32,639,000			
3. Dikes-----	401,000			
4. Controlled Spillway-----	1,540,000			
5. Emergency Spillway-----	840,000			
6. Spillway Discharge Channel-----	117,000			
7. Structure Power and Lighting-----	162,000			
8. Diversions-Outlet Tunnel & Appurtenances--	6,000,000			
9. Access Roads-----	780,000			
10. Visitors and Dam Headquarters-----	250,000			
11. Direct Costs for City and Districts-----	44,149,000			
12. Omissions and Contingencies-----	4,690,000			
13. Escalations-----	4,720,000			
14. Total-----	\$ 53,559,000	\$ 44,003,110	\$ 3,013,926	\$ 6,541,964

B. Construction Items for Districts Only - Power Facilities

15. Power Plant Structures and Improvements----	\$ 2,100,000			
16. Power Tunnel, Penstock and Appurtenances---	5,170,000			
17. Tailrace-----	41,000			
18. Turbines and Generators-----	4,549,000			
19. Accessory Electrical Equipment-----	1,133,000			
20. Miscellaneous Power Plant Equipment-----	616,000			
21. Switchyard Structures-----	160,000			
22. Switchyard Equipment-----	1,416,000			
23. Communications-----	80,000			
24. Direct Costs for Districts Only-----	15,265,000			
25. Omissions and Contingencies-----	1,270,000			
26. Escalation-----	1,560,000			
27. Total-----	\$ 18,095,000		\$ 5,707,163	\$ 12,387,837

NEW DON PEDRO ESTIMATE (Cont'd.)

NEW DON PEDRO ESTIMATE (Cont'd.)		DISTRIBUTION OF COSTS		
		CITY	MODESTO	TURLOCK
<u>C. Construction Items for City Only</u>				
28.	Modification of Red Mountain Bar Siphon---	\$ 1,000,000		
29.	Omissions and Contingencies-----	100,000		
30.	Escalation-----	50,000		
31.	Total-----	1,150,000	\$ 1,150,000	
32.	Total Construction Cost of Dam, Reservoir and Power Facilities and Red Mountain Bar Mod- ification	\$ 72,804,000	\$45,153,110	\$ 8,721,089
				\$ 18,929,801
<u>D. Administrative Items Applicable to Construction Costs</u>				
<u>Allocated by Third Agreement</u>				
33.	Administration, Legal, Taxes & General Expense	1,000,000		
34.	Engineering & Management of Construction---			
35.	On Specific Construction Costs-----	5,370,000		
36.	From Project Delay-----	550,000		
37.	Total-----	6,920,000	4,291,791	828,940
38.	Total Construction & Related Costs to City and Districts	\$ 79,724,000		1,799,269
<u>E. Other Districts' Costs</u>				
39.	Reservoir Lands-----	\$ 3,406,000		
40.	Omissions, Contingencies, Engineering & Administration-----	340,600	1,181,678	2,564,922
41.	Transmission Lines (Incl. O&C, Escal., Eng. Administration)-----	4,337,000	3,215,000	1,122,000
42.	Buildings & Grounds for Project Operation & Maintenance-----	250,000	78,850	171,150
43.	Total Other Districts' Costs-----	\$ 8,333,600	\$ 4,475,528	\$ 3,858,072
<u>II. ADDITIONS TO PROJECT COSTS NOT ANTICIPATED</u>				
<u>AT TIME OF THIRD AGREEMENT</u>				
44.	Relocation of State and County Roads	\$ 8,200,000		
45.	Omissions, Contingencies, Eng. & Admin.	820,000		
46.	Recreation-----	1,250,000		
47.	Omissions, Contingencies, Eng. & Admin.	100,000		
48.	Total-----	\$ 10,370,000	\$ 5,362,545	\$ 1,579,351
49.	Net Project Estimate-----	\$ 98,427,600	\$54,807,446	\$15,604,908
				\$ 3,428,104
				\$28,015,246

NEW DON PEDRO ESTIMATE (Cont'd.)

III. <u>FINANCING COSTS</u>	<u>TOTAL COSTS</u>	<u>DISTRIBUTION OF COSTS</u>		
		<u>CITY</u>	<u>MODESTO</u>	<u>TURLOCK</u>
50. City's Interest During Construction (3%)	\$ 2,958,500	\$ 2,958,500		
51. Districts' Interest During Construction (3-3/4%)	4,100,000		\$ 1,419,000	\$ 2,681,000
52. Total Financing Cost	<u>7,058,500</u>	<u>2,958,500</u>	<u>1,419,000</u>	<u>2,681,000</u>
53. Gross Project Estimate-----	\$ 105,486,100	57,765,946	17,023,908	30,696,246
54. Flood Control-----		- 5,464,000		
55. Davis-Grumsky-----		- 3,878,408	- 1,142,250	- 2,479,342
56. Net-----		\$ 48,423,538	\$ 15,881,658	\$ 28,216,904

NOTES:

1. The ratio of 0.821582 for City participation is taken from the comparison of the 1959 Bechtel estimate of a 1,200,000 acre feet reservoir to a 2,030,000 acre feet reservoir as estimated on September 28, 1962 for the FPC hearing. ($\$35,853,000 \div \$43,639,000 = 0.821582$).
2. The ratio of 0.620201 for City participation in the administrative items applicable to construction costs allocated by Third Agreement is determined by comparison of City's participation in the construction of the dam, reservoir, power facilities and Red Mountain Bar Siphon modification to the Districts' participation in these costs. ($\$45,153,110 \div \$72,804,000 = 0.620201$).
3. The ratio of 0.517121 for City participation in Additions to Project Costs Not Anticipated At Time of Third Agreement is determined by comparison of City's additional storage achieved to Districts' additional storage achieved after deductions for original Don Pedro Reservoir, and minimum power pool. ($740,000 \div 1,431,000 = 0.517121$). ($691,000 \div 1,431,000 = 0.482879$).
4. The Legislature has authorized a Davis-Grunsky grant of up to \$7,500,000 which will accrue as a contribution to the Project. This amount will be distributed to the City and Districts in proportion to the amounts of additional storage achieved. (See Note 3 for ratios.)

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**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

**EXHIBIT H - PLANS AND ABILITY OF APPLICANTS
TO OPERATE THE DON PEDRO HYDROELECTRIC PROJECT**

**APPENDIX H-2
SINGLE LINE DIAGRAM**

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**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

**EXHIBIT H - PLANS AND ABILITY OF APPLICANTS
TO OPERATE THE DON PEDRO HYDROELECTRIC PROJECT**

**APPENDIX H-3
1972 ARMY CORPS OF ENGINEERS FLOOD CONTROL MANUAL**

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DON PEDRO LAKE

Tuolumne River, California

RESERVOIR REGULATION FOR FLOOD CONTROL

AUGUST 1972

DEPARTMENT OF THE ARMY

**SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA**

DON PEDRO DAM AND LAKE			
PERSONNEL CONCERNED WITH THE PROJECT OPERATION			
LOCATION	OFFICE PHONE(S)	NAME	HOME PHONE(S)

PROJECT OWNERS/OPERATORS			
TURLOCK IRRIGATION DISTRICT			
333 East Canal Drive Turlock CA 95381-0949	Ofc (209) 883-8210 Ofc2 (209) 883-8211	Chris L. Kiriakou Interim General Mgr.	Hm (209) 634-3294
	Ofc (209) 883-8325 Ofc2 (209) 883-8431	Robert Hondeville Energy Resources Admin.	
	Ofc (209) 883-8431	Ron Butcher Operations	Hm (209) 667-2438
	Ofc (209) 883-8214	Robert Nees Administrator	Hm (209) 632-7321
	Ofc (209) 883-8478	Tim Gormley tmgormley@tid.org	
	Ofc (209) 883-8321 Fax (209) 656-2147	Wes Monier Utility Analyst fwmonier@tid.org	Hm (209) 357-3143 Pgr (209) 341-1307 Cell (209) 602-2463
Control Center 901 N. Broadway Street Turlock CA 95380-3012	Ofc (209) 883-8480	Staffed 24 Hours	

U.S. ARMY CORPS OF ENGINEERS			
Sacramento District 1325 J Street Sacramento CA 95814-2922	Ofc (916) 557-7490*	Col. Michael J. Walsh District Engineer mw Walsh@spk.usace.army.mil	
Water Management Section	Ofc (916) 557-7101* Fax (916) 557-7863	Paul E. Pugner Chief ppugner@spk.usace.army.mil	Hm (916) 965-6669

U.S. ARMY CORPS OF ENGINEERS			
Water Management Section	Ofc (916) 557-7105* Fax (916) 557-7863	Tom Patton Water Manager tpatton@spk.usace.army.mil	Hm (916) 454-0449
	Ofc (916) 557-7110* Fax (916) 557-7863 Ofc2 (916) 557-7120	Ralph H. Johonnot Hydrologic Data rjohonnot@spk.usace.army.mil	Hm (916) 723-7252
* For Emergencies During Non-Duty Hours Call:	Emer (916) 452-1535		
EMERGENCY NUMBER			

ADDITIONAL POINTS OF CONTACT			
CALIFORNIA/NEVADA RIVER FORECAST CENTER			
3310 El Camino Ave. Ste 227 Sacramento CA 95821-	Ofc (916) 979-3056 Fax (916) 979-3067	Rob Hartman	Hm (916) 786-4697
NATIONAL WEATHER SERVICE			
3310 El Camino Ave. Ste 228 Sacramento CA 95821-	Ofc (916) 979-3051 Fax (916) 979-3067 Emer (916) 979-3049		
OFFICE OF EMERGENCY SERVICES			
1100 H Street Modesto CA 95354-	Ofc (209) 525-4650 Fax (209) 525-5008	Russ Richards For Stanislaus County	
SACRAMENTO FLOOD CENTER			
California DWR P. O. Box 219000 Sacramento CA 95821-9000	Emer (800) 952-5530	Eric Butler Chief	

Revised 10-Dec-99

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DON PEDRO DAM AND SPILLWAY

Furnished by Modesto and Turlock
Irrigation Districts.

DON PEDRO LAKE TUOLUMNE RIVER, CALIFORNIA PERTINENT DATA

GENERAL

Drainage Areas (sq. mi.)	
Tuolumne River at Don Pedro Dam	1,533
Eleanor Creek at Lake Eleanor	78
Cherry Creek at Cherry Valley Dam	117
Tuolumne River at Hatch Hetchy Dam	855
Tuolumne River at LaGrange Dam	1,537
Tuolumne River at mouth	1,958

Flow at Don Pedro Dam

Mean annual runoff (1896-1969)	1,851,000 ac-ft
Average flow (1896-1969)	2,555 c.f.s.
Minimum of record (27 Dec. 1922)	2.1 c.f.s.
Maximum of record (18 Dec. 1950)	61,000 c.f.s.
Maximum natural during record (23 Dec. 1955)	160,000 c.f.s.
Standard project peak inflow (snowmelt)	28,400 c.f.s.
Standard project peak inflow (rainflood)	260,000 c.f.s.
Spillway design peak inflow	602,000 c.f.s.

DON PEDRO DAM AND LAKE

Main Dam (Earth and Rockfill)

Crest elevation	855 ft
Crest width	40 ft
Crest length	1,900 ft
Maximum height above foundation (approx.)	585 ft
Freeboard above spillway design flood pool	5 ft
Volume of fill (approx.)	16,750,000 cu yd

Spillways

Gated, ogee section	
Crest length	135 ft
Crest elevation	800 ft
Gates (Tainter)	3 - 45'-0" x 30'-0"
Capacity (elev. 830')	78,000 c.f.s.
Capacity (elev. 850')	172,500 c.f.s.
Ungated, ogee section	
Crest length	995 ft
Crest elevation	830 ft
Capacity (elev. 850')	300,000 c.f.s.
Total capacity (elev. 850')	472,500 c.f.s.

Reservoir

Elevation	
Minimum power pool	600.0 ft
Bottom of flood control pool	802.0 ft
Gross pool	830.0 ft
Spillway design flood pool	850.0 ft

Area

Minimum power pool	3,520 ac
Bottom of flood control pool	11,260 ac
Gross pool	12,960 ac
Spillway design flood pool	14,240 ac

Storage capacity

Minimum power pool	309,000 ac-ft
Bottom of flood control pool	1,690,000 ac-ft
Gross pool	2,030,000 ac-ft
Spillway design flood pool	2,301,000 ac-ft

OUTLET WORKS

Type	Lined tunnel controlled by slide gates
Tunnel length	3,500 ft (approx.)
Tunnel diameter	12 ft concrete lined enlarging to 30 ft
Upstream inlet invert elev.	342 ft
Downstream ϕ elev. of outlet	310 ft
Outlet controls	3 parallel outlets, each with two 4'x5' slide gates in tandem
Capacity (at elev. 830')	7,370 c.f.s.

POWER CONDUIT

Length along ϕ	2,960 ft
Tunnel diameter	18'6" concrete-lined
Inlet invert elev.	16'6" and 16'0" steel-lined
Outlet portal ϕ elev.	525 ft
Bulkhead gate	299 ft
Emergency closure gate	22'0" high x 14'0" wide hydraulically operated
	21'0" high x 12'0" wide hydraulically operated fixed wheel gate

POWERHOUSE

Number of units	3
Turbines	70,000 HP at 450' NET (Francis-type)
Generators	47,900 KVA at .95 p.f.
Elevation of ϕ of distributor	299.0 ft
Maximum static head (830-299)	531.0 ft
Full gate discharge	1,500 c.f.s./gate
Maximum discharge through turbines	4,500 c.f.s.
Turbine shut-off valve	115" horiz. shaft (Butterfly-type)
Pressure regulator valve	50" fixed-cone dispersion type
Flood control valve	72" hollow-jet type
Maximum discharge through F.C. valve	3,140 c.f.s.

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

APPENDIX IV
TO
MASTER MANUAL OF RESERVOIR REGULATION
SAN JOAQUIN RIVER BASIN, CALIFORNIA

AUGUST 1972

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Subject</u>	<u>Page</u>
	Pertinent Data	
	Photo - Don Pedro Dam and Spillway	Inside Cover
	Personnel	Frontispiece
CHAPTER I - GENERAL INFORMATION		
1.	Authority and Scope	1
2.	Authorization for Flood Control Allocation	1
CHAPTER II - BASIN DESCRIPTION		
3.	Description of the Area	3
4.	Climate	4
5.	Runoff Characteristics	6
6.	Flood Characteristics	7
7.	Areas Subject to Flooding	9
CHAPTER III - FLOOD POTENTIAL		
8.	Rain-Flood Potential	10
9.	Snowmelt Flood Potential	10
10.	Seasonal Variation of Rain-Flood Potential	10
CHAPTER IV - FLOOD CONTROL DESIGN REQUIREMENTS		
11.	Reservoir Design Rain Flood	11
12.	Rain-Flood Space Requirements	11
13.	Reservoir Design Snowmelt Flood	12
14.	Snowmelt Flood Space Requirements	13
15.	Multiple Use of Reservoir Space	13
16.	Flood Control Diagram	14
17.	Credit for Upstream Storage Space	15
18.	Monthly Space Requirements Under Historical Conditions	16
CHAPTER V - PROJECT FEATURES		
19.	Description of Project	17
20.	Recreation Facilities	19
21.	Construction History	19

TABLE OF CONTENTS (Cont'd)

<u>Paragraph</u>	<u>Subject</u>	<u>Page</u>
CHAPTER VI - GENERAL PROJECT OPERATION		
22.	Responsibility for Operation	21
23.	Upstream Regulation	21
24.	Downstream Regulation	21
25.	Downstream Channel Capacities	21
26.	Flood Damages	21
27.	Conservation Operation	22
28.	Power Releases	23
29.	Relation to Other Projects	23
CHAPTER VII - OPERATIONAL CONTROLS		
30.	Hydrologic Facilities	24
31.	Forecasts of Inflow	24
32.	Coordination with Other Agencies	26
CHAPTER VIII - PROJECT ACCOMPLISHMENTS		
33.	Examples of Operation	27
34.	Operation Record	27
CHAPTER IX - STUDIES IN PROGRESS OR PLANNED		
35.	Current Studies	28

<u>Chart No.</u>	<u>LIST OF CHARTS</u>
1	General Map
2	Topography and Stream Gaging Stations
3	Tuolumne River Stream Profile
4	Normal Annual Precipitation, Climatological Stations and Snow Courses
5	Computed Natural Flow, Tuolumne River near La Grange
6	Mean Monthly Natural Flows for Period of Record Through 1969
7	Pertinent Runoff Data, Tuolumne River Basin
8	Standard Project Rain-Flood Series
9	Rain-Flood Frequency Curves, Tuolumne River near La Grange
10	Rain-Flood Frequency Curves, Dry Creek near Modesto
11	Standard Project Snowmelt Flood
12	Snowmelt-Flood Frequency Curves, Tuolumne River near La Grange
13	Routing of Reservoir Design Flood (64% of SPF)
14	Seasonal Flood Control Space Requirements
15	Routing of Standard Project Flood (Rain-Flood Series)
16	Routing of Historical Rain Floods
17	Routing of Hypothetical Snowmelt Floods
18	Routing of Historical Snowmelt Floods

TABLE OF CONTENTS (Cont'd)

Chart No.

LIST OF CHARTS (Cont'd)

19	Snowmelt Runoff versus Required Space
20	Monthly Required Flood Control Reservation
21	Plan and Section of Dam (2 sheets)
22	Spillway, General Arrangement
23	Spillway, Plan and Sections (2 Sheets)
24	Outlet Works, General Arrangements
25	Power Tunnel, General Arrangements
26	Location of Recreation Areas
27	Area and Capacity Curves, Hetch Hetchy Reservoir
28	Area and Capacity Curves, Cherry Valley Reservoir
29	Capacity Curve, Lake Eleanor
30	Flow-Damage Curves, Rain Floods (2 sheets)
31	Flow-Damage Curves, Snowmelt Floods
32	Forecast Verification Data, Natural April-July Flows
33	Snowmelt Forecast Criteria (2 sheets)
34	Rain-Flood Forecasting Criteria
35	Routing of Probable Maximum Flood
36	Stage-Duration Curves
37	Stage Frequency Curve
38	Seasonal Variation of Reservoir Storage Frequency
39	Peak Rain-Flood Frequency Curves below La Grange Dam
40	Peak Rain-Flood Frequency Curves at Modesto
41	Relation of Rain Floods at Modesto and La Grange
42	Maximum Mean Daily Snowmelt Flood Frequency Curves, Tuolumne River below La Grange Dam
43	Operation Record (Don Pedro, Cherry Valley, and Hetch Hetchy Reservoirs - Step 2 Operation 1949-1970)
44	Operation Record, Don Pedro Lake (October 1970-)
45	Monthly Reservoir Operation, Don Pedro Lake (Form)

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL
DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

CHAPTER I - GENERAL INFORMATION

1. AUTHORITY AND SCOPE

This report on reservoir regulation for flood control, Don Pedro Dam and Lake, is an appendix to the Master Manual of Reservoir Regulation, San Joaquin River Basin, California, and is prepared in accordance with instructions contained in ER 1110-2-240, EM 1110-2-3600, and EC 1110-2-67, which pertain to requirements for reports on reservoir regulation for flood control for projects subject to provisions of Section 7 of the Flood Control Act of 1944 (58 Stat. 890). The pertinent portion of that act reads as follows:

"Hereafter it shall be the duty of the Secretary of War to prescribe regulations for the use of storage allocated for flood control or navigation at all reservoirs constructed wholly or in part with Federal funds provided on the basis of such purposes, and the operation of any such project shall be in accordance with such regulations"

This report contains detailed descriptive information about the project, the method of operation, and a draft of proposed regulations for flood control operation. A portion of the material used in the preparation of this report was supplied by the Modesto and Turlock Irrigation Districts, and some of the charts showing technical features of the project were furnished by Bechtel Corporation, consulting engineers for the design and construction of Don Pedro Dam and appurtenances, for the Modesto and Turlock Irrigation Districts. Detailed hydrologic data and analysis for the Tuolumne River are contained in Appendix A, and detailed flood-control data and criteria for the Tuolumne River are incorporated as Appendix B to "Report on Cost Allocation for Flood Control, Tuolumne River Reservoirs, Tuolumne River, California" dated 10 October 1961 (Revised 1 June 1962). These appendices are referred to herein as the Hydrology Report and the Flood-Control Reservoir Operation Report, respectively.

A description of the overall San Joaquin River Basin plan of flood control is given in the Master Manual of Reservoir Regulation, San Joaquin River Basin, California.

2. AUTHORIZATION FOR FLOOD CONTROL ALLOCATION

a. The Tuolumne River Project was authorized by the Flood Control Act of 22 December 1944. The plan of improvement authorized for Tuolumne River

was specified as that plan recommended by the Chief of Engineers in Committee Document No. 2, Committee on Flood Control, House of Representatives, 78th Congress, 2d Session, which states in part as follows:

. . . "That in lieu of the construction of the proposed Jacksonville Reservoir an expenditure, to the extent justified by proportionate benefits for flood control, estimated at \$5,800,000 for the equivalent of 320,000 acre-feet in Jacksonville Reservoir, be authorized toward the first cost of the proposed New Don Pedro Reservoir or other suitable reservoirs in Tuolumne Basin, provided that local interests construct, maintain, and operate the dams and reservoirs, allocate storage for flood control, and agree to operate such storage in accordance with rules and regulations prescribed by the Secretary of War"

b. The terms of the agreement between the Irrigation Districts, the City and County of San Francisco, and the Federal Government for joint construction and use of reservoir storage in the Tuolumne River Basin are set forth in Contract No. DA-04-167-eng-38, dated 29 August 1949, as amended by Supplemental Agreement No. 1 dated 12 June 1967; the flood control accomplishments of the project being achieved in three steps as follows:

Step 1. During the period of December 1949 to March 1956, the Modesto and Turlock Irrigation Districts operated up to 100,000 acre-feet of storage space in Don Pedro Reservoir for flood control in accordance with rules specified by the Corps of Engineers.

Step 2. During the period of March 1956 to October 1970, the City and County of San Francisco operated Cherry Valley and Hetch Hetchy Reservoirs, and the Irrigation Districts operated Don Pedro Reservoir for flood control in accordance with regulations mutually agreed upon by the Corps of Engineers and the operating agencies, and published in the Federal Register.

Step 3. Since October 1970, with completion of Don Pedro Lake (to a capacity of 2,030,000 acre-feet) by local interests, the Irrigation Districts have been operating a maximum of 340,000 acre-feet of flood control reservation in Don Pedro Lake as described herein. This manual, specifically prepared for Step 3 operation, will supersede the "Reservoir Regulation Manual for Flood Control, Tuolumne River Project, California, Don Pedro, Hetch Hetchy, and Cherry Valley Reservoirs, revised July 1959."

CHAPTER II - BASIN DESCRIPTION

3. DESCRIPTION OF THE AREA

a. Tuolumne River drains an area of about 1,958 square miles located in central California between the Stanislaus River Basin on the north and the Merced River Basin on the south. A map of the area is shown on chart 1. The Tuolumne River originates in the extensive snow fields of the upper Sierra Nevada, which rise to elevations in excess of 13,000 feet m.s.l. at the higher peaks including Mt. Lyell (13,090 ft.) and Mt. Dana. It flows westward through upland meadows and then through a deep canyon nearly 80 miles long cut in solid granite. The lower end of this canyon is Hetch Hetchy Valley, which is occupied by Hetch Hetchy Reservoir. Below Hetch Hetchy Reservoir the river passes through a relatively steep canyon and flows into Don Pedro Lake. Below Don Pedro Lake the river flows westward across the valley floor and joins the San Joaquin River, about 10 miles west of the city of Modesto.

b. The area above Don Pedro Dam consists of 1,533 square miles of steep and rugged mountainous terrain. Elevations range from about 500 feet at the dam to over 13,000 feet near the crest of the Sierra Nevada, with about 60 percent of the total area above 5,000 feet. Topography of Tuolumne River Basin is shown on chart 2. The drainage system includes the main stream and numerous tributaries, the most important of which are Clavey River, Cherry and Eleanor Creeks, and the North, Middle, and South Forks of Tuolumne River. The slope of the stream above the dam averages 125 feet per mile, ranging from about 50 feet per mile in the lower reaches to more than 800 feet per mile on some of the upper tributaries. Stream profiles are shown on chart 3. Tuolumne River at Don Pedro Dam has a mean annual natural runoff (measured at the gage near La Grange) of 1,850,000 acre-feet. This represents a basin average of 22.7 inches, which is 51 percent of the normal annual precipitation of 44.5 inches.

c. The drainage area between Don Pedro Dam and the mouth of Tuolumne River includes about 167 square miles of undeveloped, hilly pasture land and about 180 square miles of valley floor land. The latter includes one of the most highly developed diversified agricultural areas in the State of California, and food processing is the main industrial activity of the area. The area below Don Pedro Dam contributing to Tuolumne River flows consists of 295 square miles, entirely upstream from the city of Modesto. Local runoff from the 52 square miles located below Modesto is considered to be inconsequential for reservoir regulation purposes. The principal foothill stream contributing to Tuolumne River below Don Pedro Lake is Dry Creek, which has an area of 196 square miles, and enters Tuolumne River from the north at the city of Modesto. The valley floor area slopes from an elevation of about 200 feet at the foothill line to an elevation of about 40 feet at San Joaquin River. This area is traversed by an extensive network of canals, which distribute Tuolumne River water to the service areas of the Modesto Irrigation District on the north and the Turlock Irrigation District on the south of Tuolumne River. The area is serviced by the main lines of the Southern Pacific and Santa Fe Railroads, by U.S. Highway No. 99, and by numerous State and County highways.

d. The vegetative cover of the basin consists of scattered sub-alpine conifers in the upper elevations, light and heavy coniferous forest in the intermediate elevations, and a light cover of deciduous trees, chaparral, and grassland in the lower elevations. The following tabulation gives a distribution of the various types of vegetation with respect to elevation.

Description	: Range of elevation : : (feet)	Percent of : basin area
Grass lands (scattered timber)	500 - 2,000	7
Brushlands (chaparral, etc.)	1,500 - 3,500	14
Deciduous forest	1,000 - 4,000	12
Light coniferous	4,000 - 10,000	30
Heavy coniferous	6,000 - 8,500	20
Sub-alpine forest	9,000 - 10,000	11
Bare rock	11,000 - 13,000	6

4. CLIMATE

The climate of the Tuolumne River Basin is characterized by moderate winters and hot summers in the valley area, wet cold winters and hot dry summers in the higher watershed areas, and severe winters with cool summers at the higher elevations. The winter storms affecting the area are caused by cyclonic wave disturbances along the polar front which usually originate in the vicinity of the Aleutian Islands. Most of the precipitation associated with these storms over Tuolumne River Basin, is concentrated by orographic effect on the western slope of the Sierra Nevada, with marked differences in precipitation amounts within short distances. The normal annual precipitation varies from about 10 inches on the valley floor to 19 inches at Don Pedro Dam, about 70 inches in the upper reaches of the watershed, and the basin mean above Don Pedro Dam is about 44.5 inches. About 88 percent of the annual precipitation occurs during the period of November through April. Isohyets of normal annual precipitation, and the location of climatological stations within and adjacent to the basin are shown on chart 4. The monthly distribution of normal annual precipitation in inches for three stations located within the basin is shown below.

Average Monthly Precipitation						
Month	Modesto (elev 91 ft)		Sonora RS (elev 1750 ft)		Hetch Hetchy (elev 3870 ft)	
	in	%	in	%	in	%
Jul	0.02	0.2	0.03	0.2	0.11	0.3
Aug	0.01	0.1	0.02	0.1	0.08	0.2
Sep	0.19	1.5	0.35	1.1	0.52	1.5
Oct	0.58	4.8	1.61	5.0	1.97	5.6
Nov	0.94	7.7	2.98	9.3	3.47	9.9
Dec	2.41	19.8	5.61	17.5	6.40	18.2
Jan	2.27	18.7	6.01	18.8	5.91	16.8
Feb	2.11	17.3	5.97	18.6	5.85	16.6
Mar	1.82	15.0	5.06	15.8	5.02	14.3
Apr	1.26	10.3	2.83	8.8	3.09	8.8
May	0.49	4.0	1.27	4.0	2.01	5.7
Jun	0.07	0.6	0.27	0.8	0.75	2.1
Annual	12.17	100.0	32.01	100.0	35.18	100.0

Precipitation usually occurs as rain at elevations below 4,000 feet and as snow at higher elevations, although snow has occurred in the valley and rain may occur at elevations above 10,000 feet. Snow cover below 5,000 feet is generally transient, and may accumulate and melt several times during a winter season. Normally the snow accumulates at higher elevations until about the 1st of April, when the melt rate exceeds snowfall. Basin 1 April snowpack data for a wet year (1969), a dry year (1961), and normal (1931-1970 average) at selected representative snow courses are given in the following tabulation.

1 April Snow Survey Data									
Snow Course		Elev.	Depth in		Water equivalent				
No.	Name	in feet	inches	inches	Inches	% normal			
			1969	1961	1969	1961	Normal	1969	1961
159	Bond Pass	9,300	193.0	62.0	85.3	20.2	43.5	196	46
161	Tuolumne Mdns	8,600	125.6	44.3	50.5	12.4	22.6	223	55
167	Paradise	7,700	163.8	69.0	85.6	22.4	40.2	213	56
172	Bell Meadow	6,500	104.9	7.4	42.2	3.2	18.1	233	18

A complete list of snow courses representative of Tuolumne River Basin, and their respective locations, is given on chart 4.

Temperatures in the mountains decrease generally with increasing elevation. Observed temperature extremes at Modesto in the valley are 15°F. and 111°F., while those at Hetch Hetchy (elev. 3,870 ft.) are -1°F. and 104°F. The monthly distribution of mean temperature is illustrated by key stations as follows:

Monthly Mean Temperatures (°F.)			
Month	Modesto (elev. 91 ft.)	Sonora RS (elev. 1,750 ft.)	Hetch Hetchy (elev. 3,870 ft.)
Jan	45.0	43.9	37.3
Feb	49.3	47.0	40.0
Mar	53.9	50.6	44.3
Apr	59.6	56.6	50.7
May	65.5	62.9	56.5
Jun	71.2	69.9	63.1
Jul	76.3	77.8	71.6
Aug	74.0	76.2	70.7
Sep	70.8	71.6	66.2
Oct	62.6	62.0	56.7
Nov	52.3	52.0	46.6
Dec	46.0	46.0	40.1
Mean	60.5	59.7	53.7

5. RUNOFF CHARACTERISTICS

Runoff on Tuolumne River varies considerably over the watershed. In the lower portion of the watershed, runoff is mostly the result of rain and is subject to considerable fluctuation during the winter season. Low flows occur from late spring through the summer and fall season, when rainfall is very light. About 75 percent of the runoff occurs during December through March. In the middle portion of the watershed, runoff is produced by either rain or snow or a combination of the two. About 40 percent of the runoff occurs during December through March. Runoff from the upper portion of the watershed is produced mainly from snow, about 20 percent occurring during the months of December through March and about 75 percent during the months of April through July. Occasionally in the early winter a heavy storm of warm rain may remove the snow cover over the entire area and produce heavy runoff. Chart 5 gives computed natural runoff (1895-1970) on monthly and annual bases, for Tuolumne River near La Grange. Charts 6 and 7 give various pertinent natural runoff data for a number of representative locations within the Tuolumne River Basin.

6. FLOOD CHARACTERISTICS

a. Flood flows on both Tuolumne and lower San Joaquin Rivers are of two types, winter rain floods and spring snowmelt floods. Winter rain floods, which occur during the period of November through March, are caused by heavy rains and are sometimes augmented by the melting of snow at intermediate elevations. Winter floods have sharp, high peak flows and are usually of short duration and comparatively small volume. Winter storms, which account for about 80 percent of the annual precipitation of the Tuolumne region, originate over the Pacific Ocean and are associated with large volumes of moist air moving inland against the mountain barriers. Usually rainfall occurs over the Coast Ranges and below 5,000 feet elevation on the Sierra Nevada, with snowfall at higher elevations. Rainfall intensities are usually moderate, but rainfall generally continues for 3 or 4 days. Up to 50 percent of the normal annual precipitation may fall in a single storm period. Above 5,000 feet elevation on the Sierra Nevada, the snow usually accumulates into a deep snow pack which does not melt until the next summer. Occasionally, the incoming moist air is sufficiently warm to cause rainfall at the higher elevations, which may melt some of the accumulated snow pack and augment the rain flood runoff. Snowmelt floods, which occur from April through July, are the result of general melting of snow in the high mountains. Although these floods have comparatively low peaks, they have large volumes and are of long duration.

b. The largest rain flood of record on Tuolumne River was that of December 1955. The series of meteorological events which culminated in this great flood began with a moderately heavy, warm type storm on 5-9 December, which deposited several inches of rain along the Sierra Nevada, melted back the abnormally low snowline which had existed before the storm, and compacted the snow at high elevations. After a storm-free period of about 5 days, a stationary-cold front developed which extended from the vicinity of the Hawaiian Islands northeastward to the northern California coast, between a massive high pressure cell off Southern California and a strong low pressure cell in the Gulf of Alaska. That system directed a persistent, fast-moving stream of air inland across the west coast. By 15 December, the snowline was at about 4,500 feet elevation, and there was about 50 inches of snow at 10,000 feet elevation. During the first cold phase of the storm, from 16 to 20 December, about 3.5 inches of precipitation fell as rain below about 6,000 feet elevation and as snow above. The snowline retreated about 500 feet in elevation, but snow depths at 10,000 feet increased to over 100 inches. Ground conditions at low elevations became moderately wet. After the 21st, temperatures and wind velocities increased greatly, and the rainfall extended almost to the highest point in the basin. During the 3-day period from 21 to 24 December, about 16.5 inches of rain fell on the basin. The snowline retreated about 800 feet in elevation, and snow depths increased about 18 inches at all elevations. On the last day of the storm, temperatures again decreased, snow fell as low as 3,500 feet elevation, and previous snow depths were generally restored. The peak inflow of 22 December

into Don Pedro Reservoir (controlled by Hetch Hetchy, Cherry Valley, and Eleanor Reservoirs) was about 100,000 c.f.s. and the outflow at La Grange was 41,700 c.f.s. The natural inflow peak would have been about 160,000 c.f.s., and the 3-day inflow volume was 420,000 acre-feet.

c. The previously recorded maximum inflow was 86,000 c.f.s. on 19 November 1950, while corresponding outflow at La Grange was 28,900 c.f.s. Maximum outflow at La Grange was 61,000 c.f.s. on 8 December 1950, only slightly less than the inflow at that time. The storm series responsible for the 1950 flood runoff began with a cool storm of moderate intensity on 13-15 November, which left a shallow blanket of snow down to about 6,000 feet elevation over the Tuolumne Basin. The entire region was then invaded by a storm of near record-breaking magnitude which brought extremely warm air inland against the entire range of the Sierra Nevada and caused intense rainfall to extremely high elevations. By 18 November the mountain watershed was very wet and had been stripped of its protective pack of snow. During the 8-day storm period 14-21 November, rainfall totaled 14.62 inches at Hetch Hetchy with a maximum 24-hour rainfall of 7.95 inches. At Lake Eleanor the total for the period was 18.32 inches, and the maximum 24-hour rainfall was estimated at 9 inches. A second storm followed on 3-4 December during which period the stations recorded 6.05 inches and 7.06 inches, respectively. After a 2-day let-up the rains came again on 7-8 December, the stations recorded 3.09 inches and 4.33 inches, respectively. This latter rainfall brought additional runoff to an almost full reservoir with the result that peak inflow on 8 December was reduced only slightly to a peak outflow of 61,000 c.f.s. on that date.

d. The largest snowmelt flood of record on Tuolumne River was that of 1906, which had a peak discharge of about 20,000 c.f.s. and an April through July runoff volume of 2,680,000 acre-feet at La Grange. This record flood volume was almost equaled by the 1969 snowmelt flood which had a computed natural April through July runoff volume of about 2,400,000 acre-feet at La Grange. The 1969 flood had a higher peak (22,000 c.f.s.) and an earlier runoff distribution, thus providing a more critical test of project accomplishments.

e. Other important flood runoff has occurred from the Tuolumne River watershed. In the pre-record period 1850 to 1896, three major floods are known to have occurred. These were the rain floods of January 1862 and December 1867, and the snowmelt flood of 1890. The peak flow of the 1862 flood has been estimated at 130,000 c.f.s. near La Grange. The 26 December 1867 stage has been reported as slightly higher than the 1862 peak. The snowmelt runoff of 1890 has been estimated as about 2,500,000 acre-feet during May, June and July.

7. AREAS SUBJECT TO FLOODING

The present valley flood plain of Tuolumne River, subject to damaging flows from both rain floods and snowmelt floods, is estimated at about 16,000 acres of highly developed agricultural land extending from the town of Waterford to the confluence with San Joaquin River. A small part of the metropolitan area of Modesto (population 100,000) also lies within this flood plain. Although an extensive levee system gives a considerable degree of protection to the Modesto urban and suburban areas, large rain floods on Tuolumne River are a significant threat to these areas. Any flood flow in excess of 40,000 c.f.s. at Modesto could cause extensive damage to residential, industrial, and commercial development.

CHAPTER III - FLOOD POTENTIAL

8. RAIN-FLOOD POTENTIAL

a. Rain-flood potential is affected by antecedent ground conditions and by the extent and condition of the snowpack over the basin. An unusually wet watershed, or a shallow initial snowpack in the basin may significantly augment the amount of flood runoff. On the other hand, a deep persistent snowpack in the basin may be capable of retaining substantial amounts of rainfall on the basin for extended periods of time.

b. The more damaging flows on Tuolumne River are caused by intense rain floods of short duration similar to that of December 1955, described in paragraph 5b. The standard project rainflood series is developed and presented in the Hydrology Report. Inflow to Don Pedro Lake and runoff from the uncontrolled area downstream, are shown on chart 8. This flood series has a peak flow of 260,000 c.f.s., a 7-day volume of 947,000 acre-feet, and a 35-day volume of 1,530,000 acre-feet at Don Pedro Lake. Frequency curves of rain-flood volumes, for Don Pedro Lake inflows under natural conditions, and similar curves of rain-floods originating in the Dry Creek area below Don Pedro Dam are shown on charts 9 and 10, respectively.

9. SNOWMELT FLOOD POTENTIAL

Snowmelt runoff in the Tuolumne River Basin begins about 1 April each year and continues into July. The April-July runoff volume averages 1,253,000 acre-feet for the period 1896 through 1970 and ranged from 382,000 acre-feet in 1924 to 2,680,000 acre-feet in 1906. The standard project snowmelt flood inflow to Don Pedro Lake, presented in the Hydrology Report, is shown on chart 11. This flood has a maximum daily flow of 28,400 c.f.s. and an April-July runoff volume of 2,880,000 acre-feet. Frequency curves of snowmelt flood volumes for Don Pedro Lake inflows under natural conditions are shown on chart 12.

10. SEASONAL VARIATION OF RAIN-FLOOD POTENTIAL

Large rain floods in the Tuolumne River Basin occur most frequently in the months of November through March, and are not known to occur in the months of June through August. For a specified ground condition, the seasonal variation of rain-flood potential is dependent on the seasonal variation of storm potential, which has been related to latitude and 10-year storm precipitation. This seasonal variation of storm potential is defined by criteria contained in office report, "Reservoir Operation Criteria for Flood Control," dated October 1959.

CHAPTER IV - FLOOD CONTROL DESIGN REQUIREMENTS

11. RESERVOIR DESIGN RAIN FLOOD

a. Provision of 340,000 acre-feet of flood control space in Don Pedro Lake is in accordance with Contract No. DA-04-167-eng-38, entered into on 29 August 1949, as amended by Supplemental Agreement No. 1 dated 12 June 1967; between the United States of America, the City and County of San Francisco, and Turlock and Modesto Irrigation Districts as referred to in paragraph 2b. This flood control space requirement was derived on the basis of experienced rain floods in the Tuolumne River Basin. More recent experience during the large rain floods of November-December 1950 and December 1955 indicates that the flood control space of 340,000 acre-feet in Don Pedro Lake (with no space in upstream reservoirs) would not be adequate to control these large floods to nondamaging flows downstream. However, based on historical record of upstream reservoir operation, about 220,000 acre-feet of incidental empty space will exist (on the average) 80 percent of the time during the rain flood season.

b. Routing studies using hypothetical rain floods patterned after the standard project rain flood series, indicate that the 340,000 acre-feet of flood control space would control about 64 percent of the standard project rain flood to nondamaging outflows if 220,000 acre-feet of incidental empty space was assumed to exist in upstream reservoirs. Such a flood, (64% SPF) is used in this report as a reservoir design flood. It was constructed to conform with the following runoff volume obtained from the rain flood volume frequency data given on chart 9.

<u>Duration</u> <u>(days)</u>	<u>Reservoir Design</u> <u>rain flood</u> <u>(acre-feet)</u>
1	234,000
5	487,000
10	612,000
20	796,000
30	938,000
35	984,000

A reservoir design rain flood series has been obtained by reducing the ordinates of the standard project rain flood series so that volume from the various durations equal those in the above tabulation. The hydrograph thus obtained is shown on chart 13.

12. RAIN-FLOOD SPACE REQUIREMENTS

a. Provision of 340,000 acre-feet of flood control space during the rain flood season would provide control of the reservoir design flood described in paragraph 11. In order to maximize the overall project accomplishments, it is desirable to allocate only as much space to flood control

as actually needed and to carefully define seasonal allocation requirements in order that space may be allocated for other project uses when there is no flood control requirement.

b. In order to determine the reservoir design rain flood potential at the beginning and end of the rain flood season, criteria relative to the seasonal variation of rainstorm potential referenced in paragraph 10 were used. Since the reservoir design flood was derived from percentages of the standard project flood and not developed as a result of a specific reservoir design storm, floods that would result from various percentages of the "reservoir design storm", on both wet and dry ground conditions, were obtained indirectly by approximate procedures described in the Flood Control Reservoir Operation Report.

c. The seasonal variation of maximum flood space requirement is based in part on the seasonal variation of ground wetness potential. Values of maximum required space, interpolated between space required for dry and wet ground conditions are indicated by the large circles on chart 14.

d. As stated in paragraph 11a, a minimum of about 220,000 acre-feet of incidental empty space in upstream reservoirs can be expected to exist 80 percent of the time in the rain flood season. A routing of the standard project flood series based on the assumed availability of 220,000 acre-feet of space in upstream reservoirs and 340,000 acre-feet of space in Don Pedro Lake is shown on chart 15. This routing is made using the emergency spillway operation criteria discussed in paragraph 5 of Appendix A and shown on chart A-9. Routings of four large rain floods through Don Pedro Lake are shown on chart 16.

13. RESERVOIR DESIGN SNOWMELT FLOOD

a. Routings of the maximum recorded snowmelt floods of 1906, 1907 and 1969 indicate that use of a maximum of 340,000 acre-feet of space at Don Pedro Lake is adequate to control these floods to channel capacity through the critical downstream Tuolumne River reach. About 260,000 acre-feet would be required to control the 1906 snowmelt flood, and about 308,000 acre-feet would be required to control the 1969 snowmelt flood if empty space does not exist in upstream reservoirs. It will be noted that in the 1906 and 1907 snowmelt flood routings, snowmelt runoff was preceded by rain floods requiring flood control space in March. It was further assumed that both 1906 and 1907 rain floods occurred under present-day conditions, and therefore, they were partially controlled by upstream reservoirs.

b. Routing of a hypothetical snowmelt flood obtained from snowmelt volume frequency data on chart 12, and patterned after the standard project snowmelt flood series indicates that use of 340,000 acre-feet of flood control space will control about 77 percent of the standard project snowmelt

flood to channel capacity below Don Pedro Lake, if such a flood is preceded by the March 1907 rain flood, the most severe of record obtained from the frequency curves on chart 12. A reservoir design snowmelt flood has been obtained by assigning ordinate values equal to 77% of the ordinates of the standard project snowmelt flood series with resulting volumes for the various durations as follows:

<u>Duration (days)</u>	<u>Reservoir design snowmelt flood (acre-feet)</u>
15	531,000
35	1,096,000
60	1,695,000
90	2,045,000
122	2,210,000

The routings of both the standard project snowmelt flood and the reservoir design snowmelt flood are shown on chart 17, and routings of the 1906, 1907 and 1969 snowmelt floods are shown on chart 18.

14. SNOWMELT FLOOD SPACE REQUIREMENTS

a. While space for snowmelt floods will be required only on a forecast basis, limits should be defined for the maximum anticipated snowmelt flood space requirement on any specified day of the year. The limiting space requirements have been based on the control of the reservoir design and recorded snowmelt floods. The maximum required space was determined by routing the reservoir design snowmelt flood using a full channel capacity release of 9,000 c.f.s. plus irrigation and aqueduct diversions.

b. The snowmelt space limits at the end of the snowmelt season were determined from back routings of the reservoir design, 1906 and 1969 snowmelt floods under the criteria referred to in paragraph 14a. The 1906 flood was the most critical on record insofar as late season snowmelt is concerned. Space requirements determined from those back routings are summarized on chart 14.

15. MULTIPLE USE OF RESERVOIR SPACE

The allocation of a portion of project costs to flood control at Don Pedro Lake is based on optimum use of reservoir space for all project purposes with space reserved for flood control use on a priority basis when needed, as defined in approved flood control regulations. Since the rainflood and the snowmelt flood potential vary seasonally, it is possible to obtain optimum usage of that portion of the reservoir space required for flood control during flood seasons by carefully defining seasonal limits and space

requirements for flood control, thus releasing the reservoir space for other uses outside the flood seasons. Furthermore, since snowmelt flood volumes can be forecast well in advance, additional space can be used for conservation purposes during the snowmelt season when forecasts indicate that a lesser amount of flood control space is required. Rain floods, however, cannot yet be adequately forecasted far enough in advance for operational purposes and rain flood space requirements cannot be decreased on the basis of a forecast.

16. FLOOD CONTROL DIAGRAM

a. The flood control diagram which provides a maximum flood control reservation of 340,000 acre-feet is shown on chart A-8.

b. Conditional use of space within the maximum snowmelt flood reservation is provided by the snowmelt parameters. These parameters were based on computed relationships between remaining runoff and required space, shown on chart 19, with a contingency allowance equal to twice the standard error of estimate, the derivation of which is explained below. With such allowance, the space provided should be adequate, on the average, an estimated 97 percent of the time.

c. The relationships of required space to remaining runoff at the beginning of each month (chart 19) were derived by back-routing snowmelt flows for each year when flood control space would have been needed. These back-routings were based on the assumption that operating contingencies will limit efficiency of operation to about 80%, and the resulting outflows are approximated by using an average assumed release of 7200 c.f.s. (80% of objective) plus the following irrigation, power and municipal demands.

Month	: Irrigation and power (acre-feet)	: Municipal (San Francisco) (acre-feet)
Feb	29,000	11,200
Mar	29,000	12,400
Apr	160,000	12,000
May	160,000	12,400
Jun	160,000	12,000
Jul	160,000	12,400

17. CREDIT FOR UPSTREAM STORAGE SPACE

a. After 1 May of each year, when the natural forecasted April-July snowmelt runoff of Tuolumne River at La Grange indicates a runoff volume of 1,450,000 acre-feet (or less) is anticipated, the required space, indicated by the snowmelt parameters (chart A-8), may be reduced when empty space is available in the upstream reservoirs. Such a reduction of flood control space requirements in Don Pedro Lake could be made only to the extent that such upstream space would be sure to be filled by the time that Don Pedro Lake fills.

b. Examination of runoff data in connection with empty space in upstream reservoirs usable for flood control indicates that credit for 80 percent of the space available for the storage of snowmelt floodwaters in reservoirs upstream of Don Pedro Lake can safely be allowed subject to conditions stated in paragraph 17a above. Because of variation of snowmelt flood potentials in the Tuolumne River Basin, and absence of close operational coordination between Don Pedro Lake and the upstream reservoirs, credit for available empty space in Cherry Valley and Hetch Hetchy Reservoirs will be subject to the following restrictions (see note 4 on chart A-8).

(1) Not more than 70 percent of the creditable portion of the requirement may be allowed for empty space in Hetch Hetchy Reservoir.

(2) Not more than 30 percent of the creditable portion of the requirement may be allowed for empty space in Cherry Valley Reservoir.

(3) No reduction of the rain flood reservation value will be permitted below 50,000 acre-feet.

Criteria established herein, for allowing credit for available empty space in Cherry Valley and Hetch Hetchy Reservoirs, are illustrated by the following examples: (After 1 June, these criteria could be further modified as per note 5 of Flood Control Diagram, chart A-8.)

	: Total	: Total	: Total	: Maximum	: Maximum	: Adjusted
	: required:	: combined	: credit for:	: credit for:	: credit for:	: required
Date	:Forecast:	: storage	: empty	: empty	: empty	: empty
	: space	: space in	: space in	: space in	: space in	: space in
	: based on:	: upstream	: upstream	: Hetch	: Cherry	: Don Pedro
	: forecast:	: reservoirs:	: reservoirs:	: Hetchy Res:	: Valley Res:	: Reservoir
(ALL VALUES IN ACRE-FEET)						
1 May	1,800,000	610,000	250,000	200,000	140,000	60,000
5 May	1,600,000	505,000	200,000	160,000	112,000	48,000
10 May	1,400,000	405,000	160,000	128,000	89,600	38,400
15 May	1,200,000	310,000	130,000	104,000	72,800	31,200
30 May	1,000,000	300,000	100,000	80,000	56,000	24,000
15 Jun	600,000	120,000	30,000	24,000	16,800	72,000
1 Jul	300,000	35,000	20,000	16,000	11,200	4,800
						35,000

18. MONTHLY SPACE REQUIREMENTS UNDER HISTORICAL CONDITIONS

Using the flood control diagram shown on chart A-8, the monthly storage space requirements based on forecasts from observed precipitation data (see paragraph 31) by use of chart 23 of Flood Control Reservoir Operation Report were determined for the period 1896 through 1958. For the period 1959 through 1970, the monthly storage space requirements are based on actual runoff forecasts made by the State of California. Computed values of the monthly space requirements are tabulated on chart 20.

CHAPTER V - PROJECT FEATURES

19. DESCRIPTION OF PROJECT

a. The Don Pedro Project, located on the Tuolumne River about 35 miles east of Modesto, includes the following major features: the dam and reservoir, gated and ungated spillway sections, outlet works, and power plant. The general layout of the project including the main units, power and diversion tunnels, access roads and other permanent features is shown on chart 1.

b. The Don Pedro Dam is located in Section 3, T3S, R14E, 1½ miles downstream from the old concrete-arch structure which since 1956, in cooperation with Cherry Valley and Hetch Hetchy Reservoirs, has provided a fair degree of flood protection to the downstream areas under step 2 of the flood control agreement. All gates have been removed from the old dam and interference with flow is now minor. The Don Pedro Dam is a combination rock and earthfill structure with maximum height of 585 feet above foundation and a length of 1,900 feet. The elevation of the top of the dam is 855 feet, providing a 5-foot freeboard above the spillway design flood pool at elevation 850 feet. Plan and section of the dam are shown on chart 21.

c. Don Pedro Lake gross pool capacity at 830.0 foot elevation is 2,030,000 acre-feet, of which 340,000 acre-feet are allocated during flood seasons for flood control storage. The minimum power pool of 309,000 acre-feet corresponds to elevation 600.0 feet. Maximum storage corresponding to the spillway design (probable maximum) flood is 2,301,000 acre-feet at elevation 850.0 feet. The water surface area at gross pool is 12,960 acres and the length of shoreline is approximately 159 miles. The maximum reservoir depth at gross pool elevation is about 550 feet. The area-capacity curves for Don Pedro Lake are shown on chart A-1, and an area-capacity table is given on chart A-2.

d. The spillway located on the abutment ridge west of the dam, as shown on chart 21, consists of two sections:

(1) A gated spillway with a 135-foot long concrete ogee section, crest at elevation 800 feet, controlled by three 45-foot long by 30-foot high radial type, hoist operated, steel gates, provides control for all normal operations of the reservoir.

(2) An ungated emergency spillway with a 995-foot long concrete ogee section, crest at elevation 830 feet, located adjacent and to the right of the controlled spillway, provides additional safety precaution for the passage of very large and infrequent flood flows.

(3) The total combined discharge capacity of the gated and emergency spillways is 472,500 c.f.s. at the maximum water surface elevation of 850 feet, with 5 feet of freeboard remaining. Plans and elevations of the spillways are shown on charts 22 and 23. Spillway discharge rating curves are given on chart A-5 (full gate opening), and on chart A-6 (partial gate opening).

e. A concrete-lined 3,500-foot long 30 feet diameter tunnel, located through the left abutment, initially constructed for diverting the river around the project during construction, is used as the outlet works for all normal reservoir release purposes. The inlet works are located near and to the left of the upstream portal of the diversion tunnel at elevation 343 feet and may be closed for inspection and maintenance by a 22-foot by 11-foot wheeled buckhead gate. Flow passes through a 12-foot diameter concrete-lined tunnel, enters the diversion tunnel through an elbow plug and continues on to a 60-foot long head reducing section before entering the outlet works. The outlet works is located in a concrete plug about 135 feet long, centered approximately on the axis of the dam. Three separate parallel outlets are provided, each controlled by two 4-foot by 5-foot high-pressure slide gates in tandem. The combined capacity of the three outlets at elevation 830 feet is 7,370 c.f.s. Plans and sections of the outlet works are shown on chart 24. Discharge rating curves for the outlet works are shown on chart A-3.

f. A 2,950-foot long power tunnel passes through the left abutment about 225 feet above present riverbed level. The intake and trashrack structure incorporates a remote controlled hydraulically operated bulkhead gate to allow unwatering of the tunnel for inspection and maintenance. From the intake the tunnel is 18'-6" in diameter and concrete-lined for about 1,615 feet including an 86-foot long transition section at the 321 foot high shaft for the 12-foot by 21-foot fixed wheel control gate. The next portion of the tunnel is 16'-6" in diameter and steel-lined for about 880 feet. The remaining 455 feet of the power conduit is 16'-0" steel-lined to the outlet portal at elevation 299 feet and is connected to the turbine branch lines by means of a steel reducing manifold encased in concrete. A hollow-jet flood control valve, located in the power house, is connected to the power conduit at the manifold and is used in conjunction with the outlet works for making reservoir releases. Plans and sections through the power tunnel works are shown on chart 25. Discharge rating curves for the flood control valve and turbines are shown on chart A-4. Chart A-7 shows stage-discharge curves for several pertinent stream gaging stations located downstream from Don Pedro Dam.

g. The power house is an outdoor type with three Francis type turbines, each rated at 70,000 HP at 450 feet net head, which drive three 47,900 KVA, 3-phase, 0.95 p.f., 60-cycle generators. The three main transformers are rated at 55,100 KVA, 13.8/69 KV, 3-phase, 60-cycle.

20. RECREATION FACILITIES

a. The Modesto and Turlock Irrigation Districts have agreed through a contract with the State of California under terms and conditions provided by the Davis-Grunsky Act to develop and maintain recreational facilities at Don Pedro Lake. The Districts have acquired multipurpose lands, needed for project operational purposes, to a distance of at least 100 feet back from the contour line defining elevation 830 feet. The total area of lands to be developed for recreation under the Davis-Grunsky grant, including multipurpose project lands to be used for recreation, is 558 acres, with 259 acres to be used exclusively for recreational purposes under the Davis-Grunsky program. In addition, lands below elevation 830 feet are seasonally available as the water level recedes. Several locations have been found suitable for recreational development. Of these locations, three, shown on chart 26, have been selected for development under the Davis-Grunsky program as follows:

(1) Fleming Meadows Recreation Area, on the south shore, will have 130 picnic units, 125 tent camping units, 87 recreation vehicle hookup units, a 7-lane boat launching ramp, a swimming lagoon, and two concession complexes.

(2) Right Abutment Recreation Area will provide 183 camping units and an observation area overlooking the dam and reservoir.

(3) Moccasin Point Recreation Area, at the upper end of the reservoir, will include 20 picnic units, 62 tent camping units, 13 recreation vehicle hookup units, and a 2-lane boat launching ramp.

Highway 49-120 and a new county road will provide good access to the three recreation areas plus a 500-acre location set aside for hunting.

b. Besides fishing, Don Pedro Lake is expected to be widely used for picnicking, boating, camping, swimming, and water skiing. The overall recreation plan calls for the development of permanent recreation facilities at all the selected sites listed above.

c. Don Pedro recreational facilities are expected to serve as many as 390,000 visitors during the first year of operation with progressive increase to 500,000 visitors by 1980. The reservoir area and the locations of the proposed recreational developments are shown on chart 26.

21. CONSTRUCTION HISTORY

a. Public access roads, and reservoir and site clearing began in August 1967. Excavation for the diversion tunnel began in September 1967, was completed in September 1968 and the tunnel was plugged in October 1970 after the outlet works were completed in July 1970. Excavation work for both the

controlled and emergency spillways started in September 1967 and the spillways were completed in November 1970. Foundation excavation for the main dam began in December 1967 and the embankment was completed in May 1970. Construction of the new power plant began in August 1968 and was completed in March 1971.

b. Dedication ceremonies were held on 29 May 1970 when the final load of fill officially completed the construction of the dam. All facilities required for the control of Tuolumne River flows were completed by October 1970 and the river outlets in the old dam were opened on 15 November 1970 to allow transfer of storage and control to the Don Pedro Dam and Lake. All remaining work was completed in May 1971 and the project was dedicated on June 11, 1971.

CHAPTER VI - GENERAL PROJECT OPERATION

22. RESPONSIBILITY FOR OPERATION

Don Pedro Lake is operated by Modesto and Turlock Irrigation Districts. Operation in the interest of flood control is in accordance with the rules and regulations prescribed by the Secretary of the Army pursuant to Section 7 of the Flood Control Act of 1944 (see Appendix A). The flood control diagram is shown on chart A-8, and the emergency spillway release diagram on chart A-9. Details concerning the responsibility for flood control operation are discussed in paragraph 7 of Appendix A.

23. UPSTREAM REGULATION

a. There are three reservoirs in the drainage basin above Don Pedro Lake. These are: Lake Eleanor (26,000 acre-feet), Hetch Hetchy (360,000 acre-feet), and Cherry Valley (Lake Lloyd 268,000 acre-feet). Although there is no longer any flood control space allocated in these reservoirs, their normal operation effectively controls small and moderate floods and has considerable influence in reducing large rain and snowmelt floods. Area and capacity curves for Hetch Hetchy and Cherry Valley (Lake Lloyd) reservoirs are shown on charts 27 and 28 respectively. A capacity curve for Lake Eleanor is shown on chart 29.

b. Although Tuolumne River runoff upstream from Don Pedro Lake is also under constant regulation by diversions leading to several power plants, the only diversion away from Tuolumne River Basin is the flow diverted into the Hetch Hetchy Aqueduct which leads to San Francisco. The capacity of this aqueduct is about 620 c.f.s. in the mountains and about 250 c.f.s. through the valley floor to San Francisco. The valley floor portion will be increased to the full 620 c.f.s. capacity when this greater supply is required.

24. DOWNSTREAM REGULATION

Water for irrigation is diverted at La Grange Dam, a masonry gravity diversion structure located about 2½ miles downstream from the Don Pedro Dam. Modesto Canal diverts into Dallas-Warner Reservoir (27,000 acre-feet) and thence into the Modesto Irrigation District canals. Turlock Canal diverts into Turlock Lake (49,000 acre-feet) and thence into the Turlock Irrigation District canals. The combined capacity of the Turlock and Modesto Canals is about 4,000 c.f.s. Since diversions for irrigations are upstream from the areas subject to flood damage, such diversions have considerable effect in reducing prolonged snowmelt floodflows. However, winter diversions are small and have practically no effect on large rain floods.

25. DOWNSTREAM CHANNEL CAPACITIES

a. Tuolumne River from Don Pedro Dam to San Joaquin River has a length of about 50 miles. The channel reach above the town of Waterford has a large capacity, and little damage results from floodflows. Below Waterford,

low intermittent levees along the stream give partial protection against flood overflow, but some agricultural damage occurs in low-lying unprotected areas when flows exceed 9,000 c.f.s., and significant damage begins when flows exceed 12,000 c.f.s. In the vicinity of Modesto, flows in the order of 35,000 c.f.s. will endanger the Modesto sewage disposal plant and may damage homes in a few areas.

b. On the average, uncontrolled flows originating below Don Pedro Lake will exceed 9,000 c.f.s. once in 25 years and will exceed 12,000 c.f.s. once in 60 years (77% SPF). Local floods of this magnitude are of short duration and the accompanying damages are minor.

26. FLOOD DAMAGES

a. Flood damages along Tuolumne River below Don Pedro Lake are caused by both rain and snowmelt floods. Rain floods, characterized by high peaks, small volumes, and short durations are damaging to both urban and agricultural areas, while snowmelt floods, characterized by low peaks, large volumes, and long durations are damaging to low-lying agricultural areas only. Damages caused by recent floods along Tuolumne River, based on prices and conditions at the time of the flood, are as follows:

<u>Floods</u>	<u>Damages (\$)</u>
November-December 1950	630,000
December 1955	550,000
March-April 1958	50,000
January 1969	1,440,000

In each flood, at least 50 percent of the total damages along Tuolumne River was to agricultural land and crops, and the remainder was to utilities, roads, bridges, canals, and to some commercial and residential establishments located in the suburban area of Modesto.

b. With 340,000 acre-feet of flood control space available in Don Pedro Lake there will be a higher degree of flood protection to the agricultural lands and to the suburban areas of Modesto than has existed before completion of the Don Pedro Dam. However, some damage may result from Tuolumne River rain floods and snowmelt floods under present conditions on the average once each 60 years as determined from charts 39 and 42, respectively. Charts 30 and 31 show the flow-damage curves for areas below Don Pedro Lake for rain floods and snowmelt floods, respectively.

27. CONSERVATION OPERATION

Operation for conservation will be as follows:

a. All inflows in excess of irrigation, municipal, and power demands will be stored to the extent that conservation space is available.

b. Releases will be in accordance with daily requirements as determined by the Modesto and Turlock Irrigation Districts.

c. Irrigation releases will be seasonally adjusted to greater or lesser amounts in accordance with forecasts of expected runoff and water in storage at the beginning of the irrigation season.

d. Releases to benefit downstream fishery will be in accordance with schedules worked out with the State Department of Fish and Game and the US Fish and Wildlife Service. Annually, these releases will vary from 123,210 acre-feet to 64,040 acre-feet depending on whether the amount of runoff in the prior water year into Don Pedro Lake exceeds or is less than 1,000,000 acre-feet.

28. POWER RELEASES

Power generation equipment at the Don Pedro Powerplant consists of three units, rated at 47,900 KVA at 0.95 p.f. This generated capacity is serving the electrical distribution system of the Modesto and Turlock Irrigation Districts. Releases of water for power generation is subordinated to releases required for irrigation and will be coordinated with the release requirements for flood control and fish life. Project releases will normally be restricted to a maximum discharge of 4,000 c.f.s. which is the contemplated combined capacity of the Districts' canal system.

29. RELATION TO OTHER PROJECTS

The flood control operation of Don Pedro Lake will be independent of the operation of all other Tuolumne River reservoirs except for credit allowed for incidental empty space in upstream reservoirs.

CHAPTER VII - OPERATIONAL CONTROLS

30. HYDROLOGIC FACILITIES

Hydrologic facilities available for operation of the project consist of the following:

- a. Recording pool gages at Don Pedro Lake, Lake Eleanor, Hetch Hetchy, and Dallas-Warner reservoirs.
- b. Non-recording pool gages (staff gages) at Lake Lloyd and Turlock Lake.
- c. Eighteen recording stream gaging stations, of which twelve are above and six below Don Pedro Lake.
- d. Twenty-eight precipitation stations in or adjacent to the basin. Of these stations, five are recording, fourteen are non-recording, and nine are seasonal storage gages.
- e. Eight snow courses.
- f. One aerial snow depth marker.
- g. Fifteen snow courses with aerial snow depth markers.

The locations of the above facilities are shown on charts 2 and 4.

31. FORECASTS OF INFLOW

a. Of primary concern in the operation of Don Pedro Dam and Lake are forecasts of the volume of snowmelt inflow that occurs each year during the months of April through July. Under step 2 operation (1949-1970), forecasts of natural runoff for Tuolumne River at La Grange were made on the basis of precipitation data and by the use of forecasting criteria specifically designed and prepared for Tuolumne River Basin by US Army, Corps of Engineers (see chart 23 of Flood Control Reservoir Operation Report). While the selection of forecast procedure is a part of the operation responsibility of the operating agency, subject to approval of the Corps of Engineers, the generally accepted forecasts of snowmelt season runoff for Sierra Nevada streams are those prepared and published by the State of California, Department of Water Resources. These forecasts have been determined to be reliable and are used in operating all major San Joaquin River Basin reservoirs; therefore use of the official published State of California forecast for operation of Don Pedro Lake is recommended. The Department prepares and publishes forecasts of April through July runoff for the Tuolumne River, inflow to Don Pedro Lake, as of 1 February, 1 March, 1 April, and 1 May of each year. Forecasts are available in the reports titled Bulletin No. 120, "Water Conditions in California," which

are published on the 10th of each month of February, March, April, and May each year. Prior to 1953, snow survey data for 1 February and 1 March were collected and published by the State of California, but no forecasts of Tuolumne River inflow to Don Pedro were made on these dates. Beginning in February 1953, the State has been making and publishing preliminary forecasts of snowmelt runoff for 1 February and 1 March. Snow survey data for 1 April and 1 May have been collected and published by the State since 1932, and forecasts of snowmelt runoff have been made and published for these dates by the State since 1936 and in earlier years. Chart 32 shows the actual April through July runoff, the forecasts of runoff made by the State, and the errors in these forecasts.

b. The forecasting procedure currently in use by the State of California, Department of Water Resources for Tuolumne River inflow to Don Pedro, is illustrated, using 1967 data, on chart 33. Figure 1 is the diagram used to solve the forecast equation. The dashed line graphically illustrates the determination of the 1 April forecast of unimpaired April - July 1967 snowmelt runoff to Don Pedro Lake (1,500,000 acre-feet). Figures 2 and 3 are the forms used to compute indexes (1967 indexes shown) required in the forecast equation. Forecasts are based upon conditions as of the date of forecast, with median precipitation and snowpack increments assumed after the date of forecast.

c. The forecast range diagram shown on figure 3 (chart 33) is used to determine the probable range of forecast departure for any forecast date during the season. For example, for the forecast of 1,500,000 April - July runoff to Don Pedro Lake made on 1 April 1967, the Forecast Range Diagram indicates a 10 percent probability that the actual runoff will exceed $1,500,000 + 260,000$, (with abnormal accretions) or 1,760,000 acre-feet, and a 90 percent probability that the runoff will exceed (or a 10 percent probability that the runoff will be less than) $1,500,000 - 140,000$ (with subnormal accretions) or 1,360,000 acre-feet. The actual forecast and departure is summarized in tabular form in the lower left hand corner of figure 3, chart 33.

d. Forecasts made by the State may be modified for operating purposes as the snowmelt season progresses when such modification is indicated by information developed after the forecast was issued, and is approved by the District Engineer, Corps of Engineers. Modification of the published forecast for operating purposes may be based on new data developed by aerial reconnaissance flights, new storm conditions, or significantly different end-of season forecasts based on current rate of runoff and normal rate of runoff recession.

e. Because rain floods which normally occur during the November-March season are far more severe and more damaging than snowmelt floods over Tuolumne River Basin, it will also be necessary to make or procure frequent forecasts of rain flood inflow to Don Pedro Lake and of local inflow downstream from the reservoir.

f. Procedures for forecasting the approximate rain flood inflow hydrograph to Don Pedro Lake have been developed by the State Federal Forecasting Center as shown by the rain flood forecasting criteria on chart 34. Forecast prepared using these procedures, subject to modification for known hydrologic deviations at the time, are considered acceptable for the flood control operation of Don Pedro Lake. Figure "b" of the criteria gives the rainfall-runoff relationship as computed by the State-Federal Forecasting Center for the area above Don Pedro Dam, and shows the total potential runoff resulting from total basin-mean-precipitation for any desired period. Figure "a" of the criteria shown on chart 34, adjusts the total potential runoff to immediate runoff caused by the rainfall during a specified period of precipitation. Thus adjustment is based mainly on the freezing level of the total contributing area above Don Pedro Dam (1,533 square miles). The approximate freezing level is usually reported during storm periods by the National Weather Service (NOAA). An average freezing level should be used whenever this level changes rapidly during a storm period.

g. The antecedent index (AI) used in the rain flood forecasts shown on chart 34 is an index of the loss potential of the basin, or an index of the relationship between rainfall and surface runoff for a selected storm period. The numerical value of this AI indicates the number of inches of rain that would be required to produce one inch of surface runoff. Antecedent indexes and freezing levels may be obtained from the State-Federal River Forecast Center. The estimated basin-mean adjusted runoff given on chart 34, along with the prestorm AI and the base flow, could be applied to the unit hydrograph ordinates and the basin AI-loss-rain relationship to determine an inflow hydrograph to Don Pedro Lake. Also, when desired, an approximate runoff volume for any specified duration can be directly computed by application of chart 34. However, in computing inflows into Don Pedro Lake allowance would be made for various degrees of regulation by empty space in the upstream reservoirs.

h. No flood forecasting procedures are available for Dry Creek drainage areas, and none are needed for snowmelt forecasting purposes from this low-lying area. During the rainflood season, when necessary peak flows and runoff volumes could be obtained from the State-Federal River Forecast Center or of unit hydrograph techniques and precipitation data.

32. COORDINATION WITH OTHER AGENCIES

In order to insure that the flood control operation of Don Pedro Lake will be as effective and reasonable as possible, in controlling floods along Tuolumne River as well as along San Joaquin River below the mouth of the Tuolumne River, it is essential that the operating districts keep advised at all times of possible flood hazards, weather conditions, inflow into the reservoir, and flows in the Tuolumne River below Don Pedro Dam and in San Joaquin River. This requires close liaison with other agencies, including the National Weather Service (NOAA), the State of California Department of Water Resources, the Bureau of Reclamation, and the Corps of Engineers.

CHAPTER VIII - PROJECT ACCOMPLISHMENTS

33. EXAMPLES OF OPERATION

Routings of four large historical rain floods through Don Pedro Lake are shown on chart 16. At the beginning of each routing, it was assumed that there was 340,000 acre-feet of empty space in Don Pedro Lake and that inflows into the reservoir were impaired by incidental regulation by upstream reservoirs. Routings of three large historical snowmelt floods (1906, 1907, and 1969) are shown on chart 18. It was assumed that at the beginning of each snowmelt flood routing, all upstream reservoirs were full and that there was 340,000 acre-feet of empty space in Don Pedro Lake. A hypothetical operation of Don Pedro Lake during the probable maximum flood (spillway design flood) is shown on chart 35. It was assumed that at the beginning of this routing all upstream reservoirs were full and there was 170,000 acre-feet of empty space in Don Pedro Lake. A maximum pool elevation of 850.0 feet (2,303,000 acre-feet) and a peak outflow of 470,000 c.f.s. were attained. Stage-duration curves are presented on chart 36, a stage frequency curve on chart 37, and a seasonal variation of reservoir storage frequency on chart 38. Peak rain-flood frequency curves under natural, preproject and project conditions for Tuolumne River below La Grange Dam are shown on chart 39. Similar frequency curves for Tuolumne River at Modesto, derived indirectly by use of the flow-relationship curve shown on chart 41, are shown on chart 40. Daily peak snowmelt-flood frequency curves for Tuolumne River below La Grange Dam, under natural, preproject and project conditions are shown on chart 42.

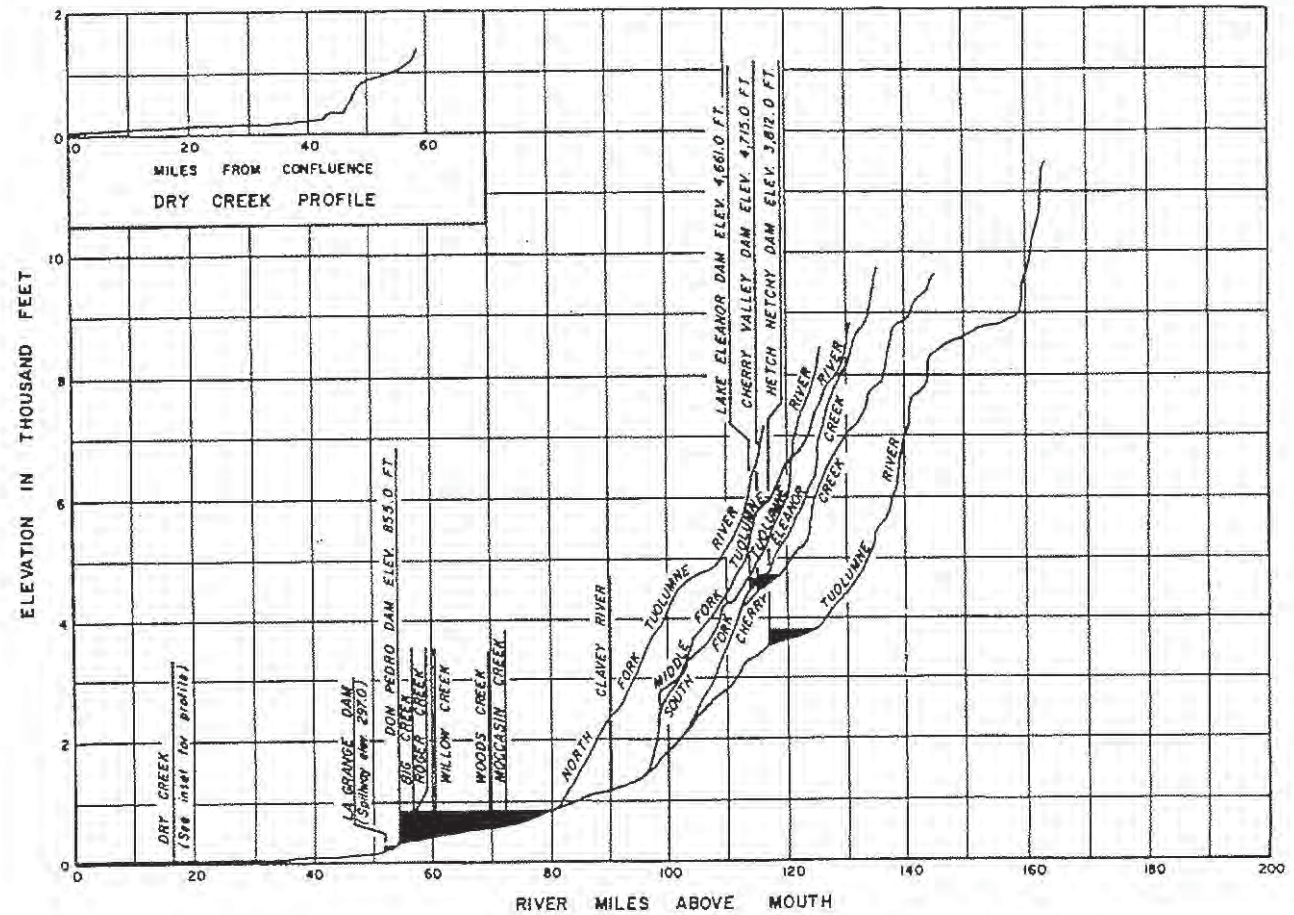
34. OPERATION RECORD

A record of storage at Don Pedro Lake and flows in Tuolumne River above La Grange Dam (corresponding to outflow from Don Pedro) is published in the Surface Water Records of the US Geological Supply. The historical record of operation for Don Pedro Lake, Hetch Hetchy, and Cherry Valley (Lake Lloyd) Reservoirs under step 2 flood control regulations (water years 1950-1970) is shown in graphical form on chart 43. The operation of Don Pedro Lake under step 3 flood control regulations began on 1 October 1970, and is shown on chart 44. A record of flood control requirements, and of storage and flow pertinent to the flood control operation is contained in the monthly reports submitted to the Chief of Engineers by the District Engineer, Corps of Engineers, Sacramento, California. A copy of this monthly report form is shown on chart 45.

CHAPTER IX - STUDIES IN PROGRESS OR PLANNED

35. CURRENT STUDIES

No studies are currently in progress or planned for the immediate future in the Tuolumne River Basin. However, it is anticipated that the "Master Manual of Reservoir Regulation, San Joaquin River Basin, California" dated 5 September 1953 will be revised and up-dated in the near future. A practicable plan for coordinating flood control operation of all facilities in the San Joaquin River Basin, including storage structures on the tributary streams, bypass and diversion facilities, coordinated reporting and dissemination of hydrologic and operating data, and necessary inter-agency operating agreements is under study and will be discussed in the Master Manual.



DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

TUOLUMNE RIVER
STREAM PROFILE

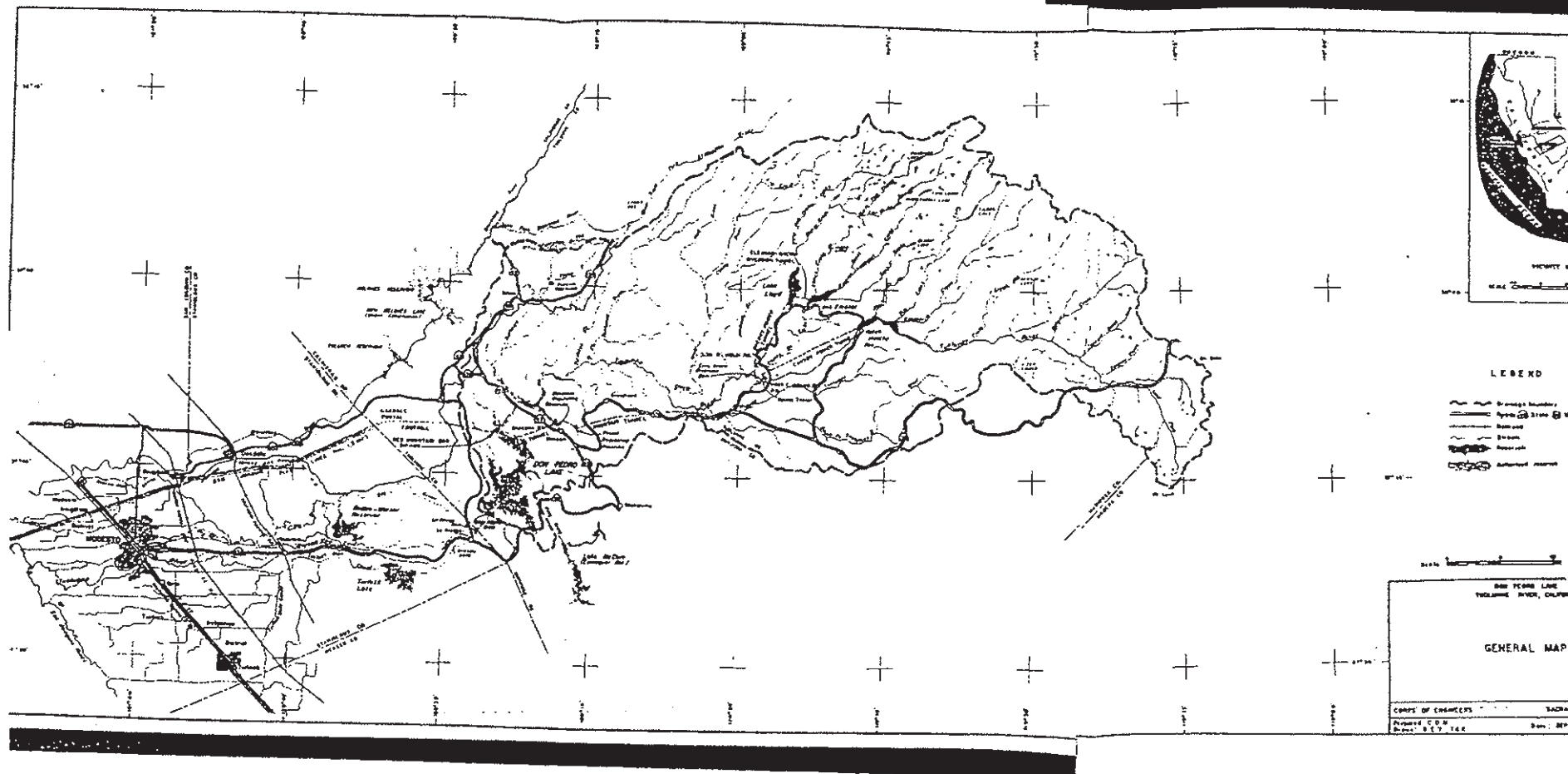
CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

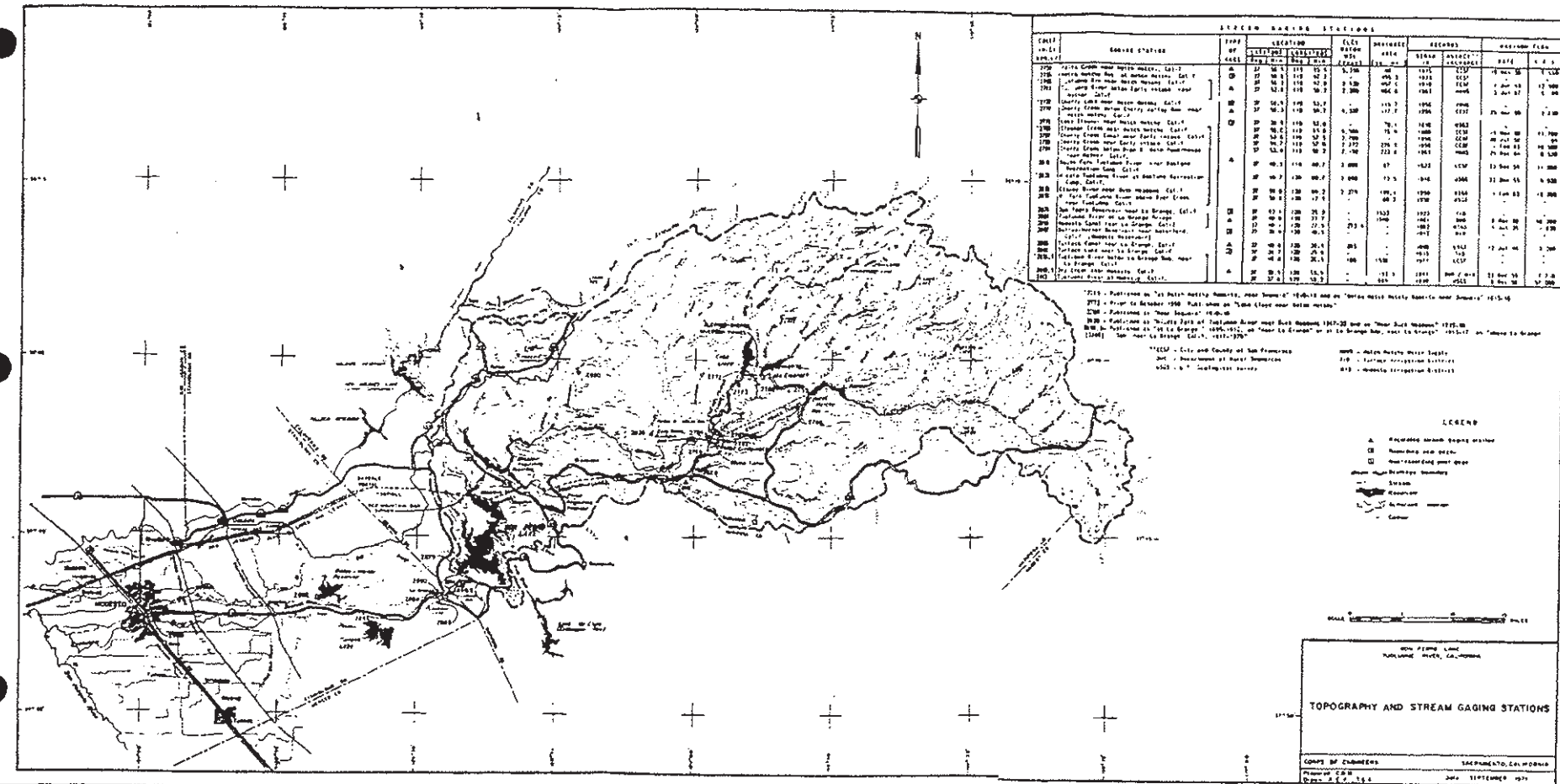
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Drawn: T.G.K.

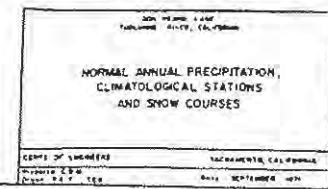
Date: SEPTEMBER 1971

CHART 3

051







COMPUTED NATURAL FLOW, TUOLUMNE RIVER NEAR LA GRANGE
 DON PEDRO LAKE
 TUOLUMNE RIVER, CALIFORNIA

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
Runoff in thousands of acre-feet													
1895-96	0.5	7.3	17.4	174.0	61.9	167.6	209.6	340.2	652.1	212.3	31.5	26.0	1,913.1
1896-97	9.3	73.8	68.2	71.3	273.3	224.1	455.7	771.4	117.9	120.9	16.4	8.3	2,413.7
1897-98	14.9	45.1	64.6	36.7	44.0	71.9	221.9	262.6	113.3	19.4	11.7	6.5	916.8
1898-99	11.1	6.9	15.9	12.7	43.3	242.3	321.4	204.5	376.7	65.2	12.9	5.4	1,432.5
1899-1900	12.6	154.1	177.2	154.4	58.2	156.3	157.3	445.2	332.4	51.2	7.3	4.3	1,751.5
1900-01	76.7	159.0	85.5	222.9	435.7	245.3	256.9	532.0	590.2	251.9	52.0	11.9	2,922.0
1901-02	13.7	35.9	96.7	22.5	83.8	138.8	292.7	397.5	403.3	64.0	27.0	6.1	1,569.0
1902-03	7.9	41.0	50.6	123.3	93.8	195.4	342.0	479.0	432.9	83.4	30.5	7.0	1,879.0
1903-04	5.4	59.1	26.6	26.1	217.4	33.3	350.6	654.3	516.9	164.1	46.6	37.6	2,439.5
1904-05	196.6	45.3	28.5	45.2	103.1	200.6	226.7	344.7	337.3	81.1	14.9	6.4	1,630.6
1905-06	4.9	6.4	0.3	179.6	120.6	453.5	400.4	697.1	851.9	731.0	133.3	27.9	3,014.7
1906-07	12.4	16.1	92.2	148.1	237.9	696.6	579.0	641.7	661.1	490.0	132.6	30.6	3,746.9
1907-08	12.9	18.6	38.6	39.1	47.6	112.2	207.0	251.1	181.0	62.4	23.9	5.4	1,027.4
1908-09	13.0	12.8	21.5	405.5	275.4	179.1	340.4	519.0	645.3	211.9	31.3	10.9	2,667.9
1909-10	13.8	154.0	237.0	197.0	108.0	241.0	419.0	465.0	207.0	51.4	16.8	16.0	2,121.6
1910-11	16.0	20.4	39.2	373.0	220.0	449.0	438.0	516.0	821.0	451.0	64.0	15.0	3,424.4
1911-12	15.4	14.1	13.9	27.7	27.7	66.6	101.0	133.0	151.0	67.0	12.4	7.1	1,061.3
1912-13	6.1	26.5	12.5	22.0	20.3	53.5	173.0	192.0	242.0	71.2	32.0	20.3	1,060.5
1913-14	0.8	13.5	15.1	416.0	193.0	235.0	313.0	508.0	541.0	259.0	52.4	11.0	2,586.6
1914-15	13.5	16.2	15.4	56.1	200.0	180.0	303.0	472.0	578.0	208.0	21.6	3.9	2,674.0
1915-16	9.2	8.9	11.1	221.0	183.0	367.0	401.0	459.0	409.0	181.0	33.6	13.9	2,399.7
1916-17	71.3	35.9	60.4	53.9	224.0	141.0	261.0	437.0	670.0	199.0	26.6	8.3	2,223.0
1917-18	4.5	5.9	11.1	12.2	54.5	366.8	280.2	347.3	415.0	45.3	5.0	13.3	1,461.5
1918-19	52.2	34.2	32.7	20.4	78.0	117.9	268.0	363.0	143.9	25.0	7.1	4.0	1,347.2
1919-20	5.9	4.2	24.7	24.3	29.0	181.6	231.0	478.6	315.0	48.5	12.4	6.0	1,342.1
1920-21	41.1	53.3	69.5	190.2	155.9	331.8	254.4	442.2	478.3	95.2	13.5	6.6	2,018.0
1921-22	6.2	5.9	37.1	71.7	49.5	181.3	260.3	717.5	751.9	194.0	27.2	10.4	2,473.8
1922-23	10.6	31.0	123.9	113.6	79.5	113.1	265.7	521.3	119.1	157.8	27.3	22.1	1,785.6
1923-24	28.5	13.6	13.8	25.3	41.6	17.9	132.9	209.4	16.9	26.5	0	0	542.6
1924-25	14.7	47.9	51.0	44.1	227.1	165.6	350.3	538.4	752.4	111.9	22.6	5.9	1,932.1
1925-26	15.1	16.2	32.8	19.0	100.0	127.4	362.3	303.8	53.0	18.9	3.3	1.4	1,110.0
1926-27	5.2	74.1	60.0	63.2	223.1	159.7	351.5	454.1	476.2	146.3	24.6	13.1	2,051.1
1927-28	15.3	87.0	44.1	51.3	82.2	343.4	263.3	447.5	152.7	27.6	7.3	2.0	1,525.1
1928-29	0	5.8	18.1	19.1	35.2	101.0	148.1	378.1	224.7	40.7	4.6	1	979.0
1929-30	2.0	0	24.7	39.0	70.1	146.6	245.9	274.5	266.2	48.8	10.0	4	1,148.1
1930-31	5.9	20.4	10.3	26.1	44.5	66.3	154.0	209.3	49.0	10.2	9.0	1.3	609.8
1931-32	1.7	6.0	93.7	79.4	240.2	173.6	245.0	524.2	530.7	175.2	32.0	12.6	2,114.3
1932-33	5.7	3.2	30.9	26.9	31.5	32.6	170.9	270.8	426.1	75.1	26.1	4.5	1,104.3
1933-34	0	8.0	40.6	64.9	90.0	150.2	186.4	149.0	95.1	12.1	6.1	4.6	807.2
1934-35	11.2	47.6	52.0	105.9	107.3	136.9	465.5	530.7	521.5	109.5	20.7	4.1	2,103.0
1935-36	11.6	19.0	18.2	104.8	352.0	207.5	392.9	520.2	390.2	120.4	17.8	2.9	2,160.1
1936-37	4.3	8.6	27.3	11.4	273.9	209.5	295.6	633.3	399.4	91.4	16.9	4.6	1,997.0
1937-38	9.2	16.8	312.6	101.9	382.7	424.8	422.4	720.2	711.6	305.2	55.5	19.5	3,424.4
1938-39	43.3	46.4	37.3	42.6	59.9	144.1	261.9	216.0	74.3	17.3	7.5	10.2	987.9
1939-40	44.9	16.6	20.2	226.5	250.0	344.1	324.9	571.1	341.6	54.2	16.8	2.1	2,206.9
1940-41	11.3	15.0	129.1	115.4	219.0	280.1	279.6	662.7	534.4	224.1	30.5	8.2	2,489.4
1941-42	7.0	37.6	161.5	164.8	142.4	145.7	337.0	472.0	597.6	253.4	30.2	3.3	2,355.5
1942-43	5.1	86.4	92.0	240.3	163.8	371.9	395.2	494.5	352.5	140.9	24.8	5.2	2,369.4
1943-44	11.0	15.6	20.9	42.7	80.4	115.2	164.6	455.8	267.2	37.0	11.2	2.4	1,295.2
1944-45	9.1	89.0	81.3	55.6	304.8	164.4	284.3	455.1	462.3	163.1	16.8	1	2,085.8
1945-46	60.3	98.3	207.7	116.9	69.9	155.8	347.3	488.5	262.7	52.5	7.9	3.4	1,873.7
1946-47	16.1	64.0	76.7	41.9	80.2	146.1	192.2	352.5	110.7	20.9	0	2.9	1,094.2
1947-48	38.2	28.1	17.2	39.7	25.9	73.0	220.7	436.2	433.8	87.7	5.2	2.5	1,408.2
1948-49	5.2	8.2	17.8	19.9	39.1	123.2	112.2	436.4	240.4	29.5	4.5	3.7	1,246.1
1949-50	3.9	14.2	13.4	77.5	124.3	126.3	329.1	467.4	319.4	62.2	6.5	0	1,546.2
1950-51	24.4	521.0	509.0	159.2	338.9	168.7	253.3	372.9	256.7	60.1	9.6	2.6	2,476.9
1951-52	9.0	30.8	121.4	212.7	347.8	219.8	466.4	791.3	594.2	291.9	54.1	16.9	2,962.3
1952-53	2.7	11.9	53.1	145.1	63.5	106.6	269.6	259.5	414.4	166.7	12.7	4.2	1,516.0
1953-54	6.0	16.5	25.7	43.5	101.0	213.7	344.8	450.2	185.3	37.7	2.1	1.9	1,428.4
1954-55	5.0	16.3	49.2	67.0	51.5	81.5	144.4	166.9	295.4	38.3	0	1.3	1,126.8
1955-56	5.7	11.1	671.4	435.8	168.7	197.8	301.0	592.5	618.2	247.8	29.4	9.3	3,288.9
1956-57	19.7	24.0	22.8	36.5	125.3	153.7	175.9	378.4	410.4	64.3	5.9	3.6	1,420.5
1957-58	14.9	20.8	43.9	61.2	180.5	251.6	403.4	718.1	555.7	230.1	57.6	21.6	2,561.6
1958-59	15.2	0.2	8.6	69.3	108.1	120.5	216.7	233.5	137.0	12.2	0	41.8	969.8
1959-60	11.3	6.6	8.5	23.5	120.7	148.4	238.1	293.3	156.6	6.3	0	0	1,033.3
1960-61	1.3	11.6	30.8	14.6	46.1	69.5	160.4	214.8	115.6	9.2	3.3	1.6	678.8
1961-62	3.9	9.5	25.3	25.3	235.0	139.2	384.9	356.5	446.0	112.4	8.8	0	1,750.8
1962-63	33.5	9.2	24.6	60.6	336.0	111.2	247.9	534.0	464.4	171.4	26.3	14.2	2,021.8
1963-64	16.8	105.4	50.8	60.4	53.7	71.1	167.1	318.8	222.4	34.6	6.3	1.7	1,109.1
1964-65	6.6	54.2	495.3	310.6	142.5	141.0	320.7	437.1	474.0	227.3	95.8	19.9	2,715.6
1965-66	2.3	128.4	85.1	91.9	77.2	143.6	295.2	353.2	82.9	18.0	7.0	8.7	1,284.5
1966-67	8.3	59.4	218.5	134.5	118.4	300.2	290.2	647.3	733.2	490.0	72.2	17.9	3,098.1
1967-68	9.1	12.3	30.9	44.0	132.8	121.5	184.1	267.1	143.0	18.3	8.0	4.2	996.5
1968-69	13.2	78.1	80.8	558.5	266.7	229.3	443.6	809.7	721.4	313.5	95.3	1.9	3,651.7
1969-70	42.6	41.7	103.2	388.6	135.7	155.3	160.6	395.1	341.0	90.7	13.9	16.3	1,914.7
Mean	17.7	42.4	78.4	112.0	139.3	168.5	266.4	451.6	384.2	131.1	23.7	9.1	1,865.6

CHART 5

MEAN MONTHLY NATURAL FLOWS FOR PERIOD OF RECORD THROUGH 1969

TUOLUMNE RIVER BASIN

Station	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
<u>Acre-feet</u>													
Tuolumne River near Hetch Hetchy	5,900	11,900	20,000	18,500	23,000	37,000	90,400	216,300	222,200	77,800	13,300	4,400	740,700
Cherry Creek below Cherry Valley Dam, near Hetch Hetchy	3,400	7,900	13,100	10,600	14,400	21,400	45,600	82,600	68,300	18,700	1,900	1,200	289,100
Eleanor Creek near Hetch Hetchy	1,200	4,400	7,700	7,500	9,100	14,800	26,900	39,800	25,600	6,500	800	500	144,800
Middle Tuolumne River at Oakland Recreation Camp	300	900	2,300	2,400	3,700	4,800	9,500	18,300	10,600	1,900	400	200	55,300
South Fork Tuolumne River near Oakland Recreation Camp	700	1,800	4,100	5,100	7,000	9,500	13,700	16,000	7,600	1,900	800	600	68,800
Tuolumne River at La Grange	17,400	42,400	78,000	108,900	139,300	188,600	288,500	452,600	384,800	131,700	23,800	9,000	1,865,000
*Dry Creek near Modesto	3,300	2,100	6,100	10,100	8,200	6,800	7,100	5,100	4,500	3,400	3,400	3,700	63,800
*Tuolumne River at Tuolumne City	50,400	68,800	102,100	114,700	128,500	137,600	134,100	151,300	153,600	50,400	25,200	29,800	1,146,500
<u>Percent of Annual Runoff</u>													
Tuolumne River near Hetch Hetchy	0.8	1.6	2.7	2.5	3.1	5.0	12.2	29.2	30.0	10.5	1.8	0.6	100.0
Cherry Creek below Cherry Valley Dam, near Hetch Hetchy	1.2	2.7	4.5	3.7	5.0	7.4	15.8	28.5	23.6	6.5	0.7	0.4	100.0
Eleanor Creek near Hetch Hetchy	0.8	3.1	5.3	5.2	6.3	10.2	18.6	27.5	17.7	4.5	0.5	0.3	100.0
Middle Tuolumne River at Oakland Recreation Camp	0.5	1.6	4.2	4.4	6.7	8.6	17.2	33.1	19.2	3.5	0.7	0.3	100.0
South Fork Tuolumne River near Oakland Recreation Camp	1.1	2.6	5.9	7.4	10.2	13.8	19.9	23.3	11.0	2.8	1.2	0.8	100.0
Tuolumne River at La Grange	0.9	2.3	4.2	5.8	7.5	10.1	15.5	24.3	20.6	7.0	1.3	0.5	100.0
*Dry Creek near Modesto	5.1	3.3	9.5	15.8	12.9	10.7	11.1	8.0	7.1	5.4	5.3	5.8	100.0
*Tuolumne River at Tuolumne City	4.4	6.0	8.9	10.0	11.2	12.0	11.7	13.2	13.4	4.4	2.2	2.6	100.0

* Flows affected by storage, diversion, and return flow.

USCE000261

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CHART 6

PERTINENT RUNOFF DATA

TUOLUMNE RIVER BASIN

Station	Source of data	Drainage area (sq miles)	Yrs. of record to 1969	Yearly Average Natural Flow				Maximum flow (Through 1969)	
				April-July		Annual		cfs	cfsm
				inches	ac-ft	inches	ac-ft		
Tuolumne River near Hetch Hetchy	b	457	59	24.9	606,700	30.4	740,700	12,900	28d
Cherry Creek below Cherry Valley Dam, near Hetch Hetchy	b	118	59	36.3	215,200	48.8	289,100	16,100	153d
Eleanor Creek near Hetch Hetchy	b	78.4	59	23.6	98,800	34.6	144,600	11,700	149d
Middle Tuolumne River at Oakland Recreation Camp	b	73.5	44	10.3	40,300	14.1	55,300	4,920	67
South Fork Tuolumne River near Oakland Recreation Camp	b	87	46	8.5	39,200	14.8	68,800	11,900	137
Tuolumne River at La Grange	a	1,540	74	15.3	1,257,600	22.7	1,865,000	61,000	40d
Dry Creek near Modesto	c	192.3	26	2.0	20,100d	6.2	63,800d	7,710	40d
Tuolumne River at Tuolumne City	c	1,896	33	4.8	489,400d	11.3	1,146,500d	44,000	23e

- a City of San Francisco (computed natural flows)
b U.S.G.S.
c State of California
d Flows affected by storage and/or diversions
e Mean daily flows

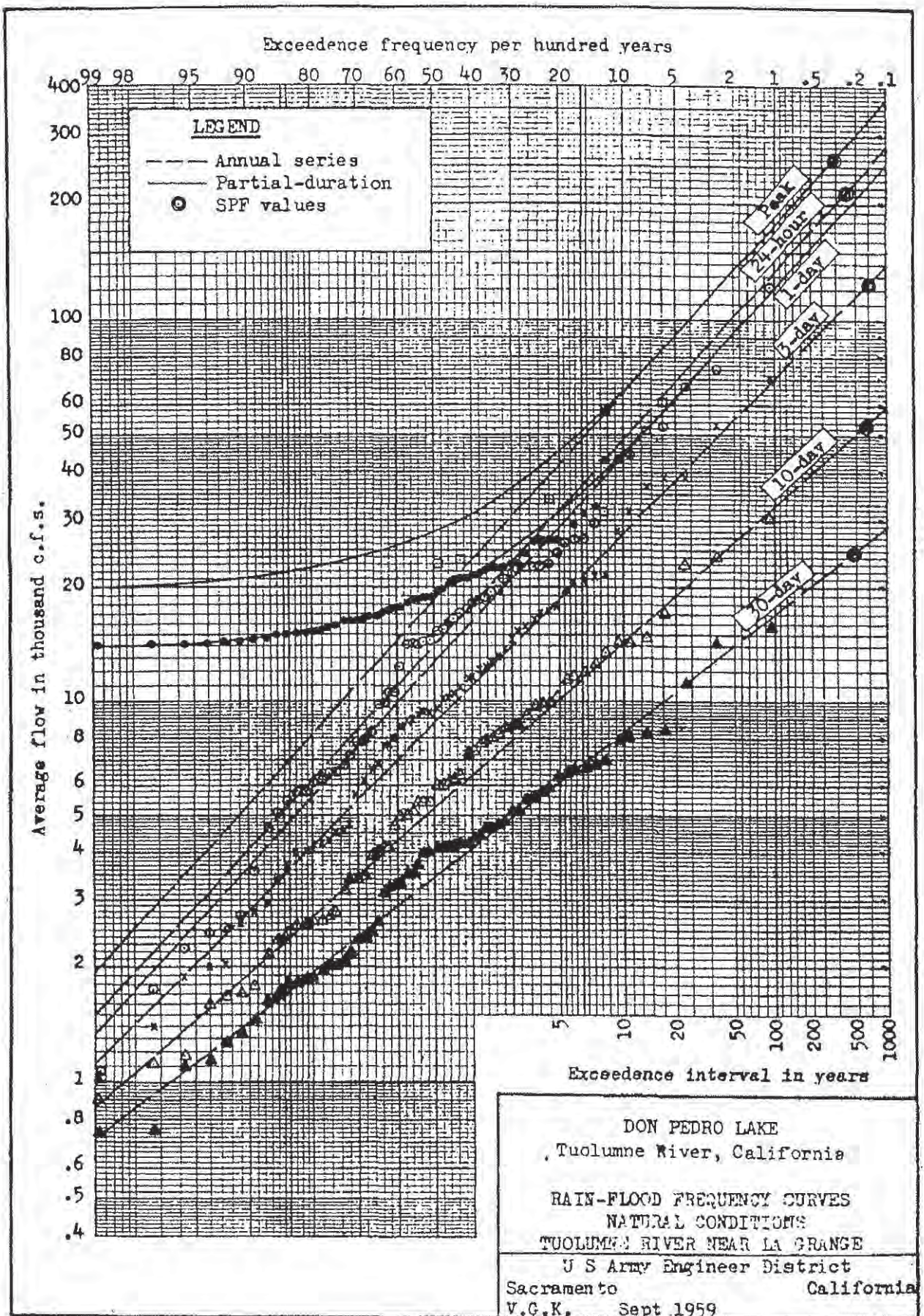
STANDARD PROJECT RAIN-FLOOD SERIES
TUOLUMNE RIVER BASIN

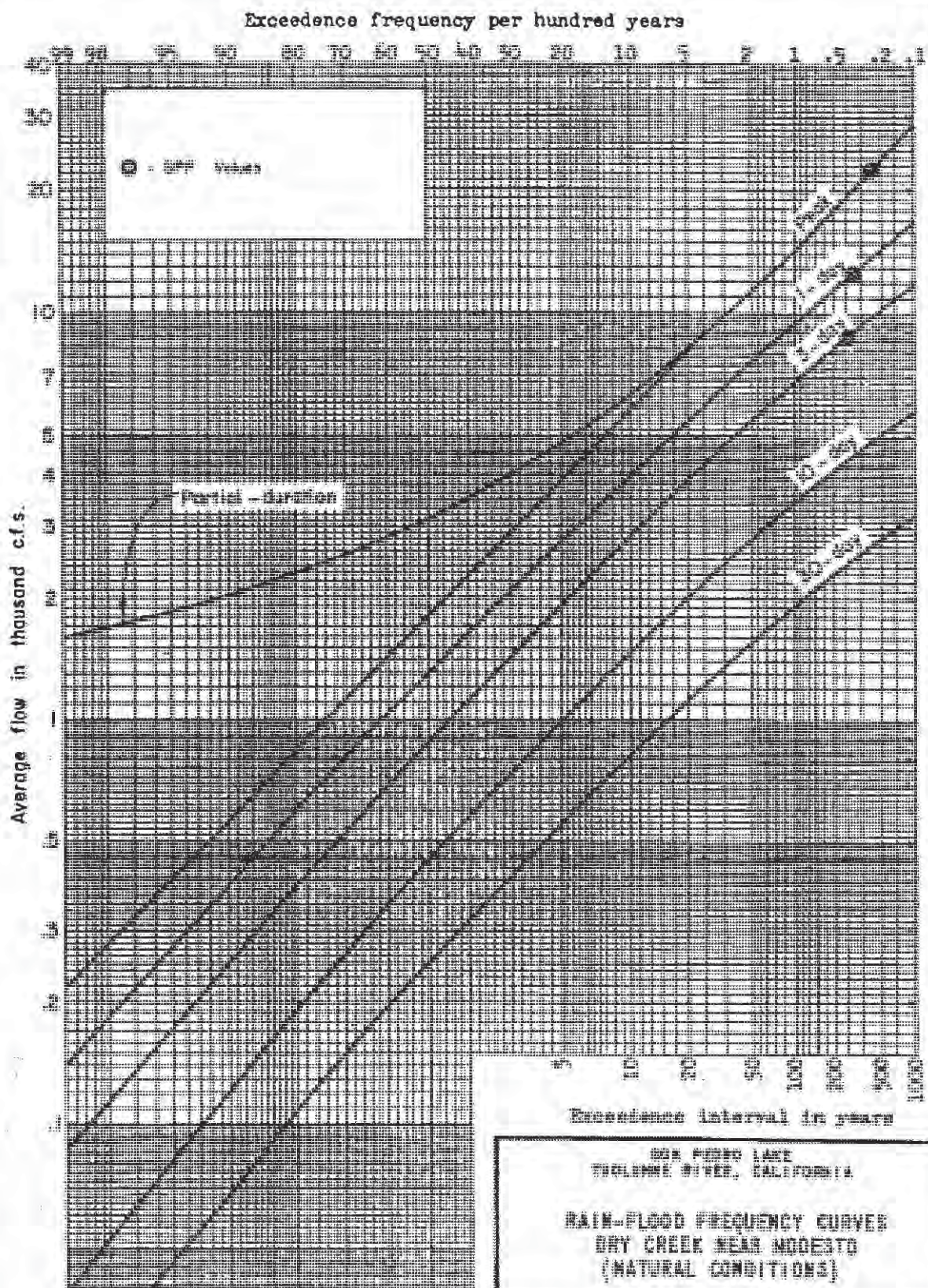
6-hour average flows in thousand c.f.s.

Period Ending	New Don Pedro Inflow	Down- stream Runoff	Period Ending	New Don Pedro Inflow	Down- stream Runoff	Period Ending	New Don Pedro Inflow	Down- stream Runoff	Period Ending	New Don Pedro Inflow	Down- stream Runoff
1-6	3.9	.1	10-18	1.2	.1	20-6	58.3	9.5	29-18	18.4	3.7
12	8.8	.4	24	1.0	.1	12	45.1	6.2	24	12.8	2.6
18	12.4	1.4	11-6	8.3	.2	18	36.9	4.1	30-6	9.1	1.7
24	16.8	2.1	12	18.7	1.1	24	30.6	2.8	12	6.2	1.1
2-6	22.7	3.1	18	26.6	2.4	21-6	26.2	2.0	18	4.8	.8
12	23.1	4.1	24	35.9	3.8	12	20.9	1.5	24	3.9	.5
18	17.1	3.5	12-6	48.5	5.6	18	17.4	1.1	31-6	3.2	.4
24	12.0	2.5	12	49.4	7.3	24	14.6	.8	12	2.8	.3
3-6	8.1	1.6	18	36.4	6.4	22-6	12.2	.7	18	2.3	.2
12	5.4	1.1	24	21.6	4.4	12	10.2	.5	24	2.2	.2
18	4.2	.7	13-6	17.3	2.9	18	8.5	.4	32-6	2.2	.1
24	3.7	.5	12	11.7	1.9	24	7.1	.3	12	2.2	.1
4-6	2.8	.4	18	9.0	1.3	23-6	6.0	.2	18	2.2	.1
12	2.5	.3	24	7.4	.9	12	13.5	.8	24	2.2	.1
18	2.0	.2	14-6	6.1	.7	18	19.1	1.9	33-6	2.9	.1
24	1.6	.2	12	5.2	.5	24	25.6	2.9	12	6.4	.4
5-6	1.4	.1	18	4.2	.4	24-6	34.2	4.3	18	9.0	1.2
12	1.1	.1	24	3.5	.3	12	34.9	5.7	24	11.1	1.8
18	1.0	.1	15-6	2.9	.2	18	25.6	5.0	34-6	14.9	2.7
24	.8	.1	12	2.4	.2	24	18.1	3.5	12	15.1	3.6
6-6	5.0	.1	18	2.0	.2	25-6	12.3	2.3	18	10.7	3.1
12	11.1	.7	24	1.7	.2	12	8.4	1.5	24	6.2	2.2
18	15.8	1.7	16-6	2.0	.1	18	6.5	1.0	35-6	5.5	1.4
24	21.3	2.6	12	9.2	.1	24	5.3	.7	12	4.0	.9
7-6	28.8	3.8	18	51.6	.1	26-6	4.4	.5	18	3.1	.6
12	29.3	5.0	24	100.2	.1	12	3.8	.4	24	2.5	.5
18	21.7	4.3	17-6	62.1	.3	18	3.0	.3	36-6	2.2	.3
24	15.1	3.0	12	34.3	1.9	24	2.5	.2	12	2.2	.3
8-6	10.2	2.0	18	26.3	2.6	27-6	2.2	.2	18	2.2	.2
12	6.9	1.3	24	41.8	1.8	12	2.2	.1	24	2.2	.1
18	5.4	.9	18-6	93.8	1.2	18	2.2	.1	37-6	2.2	.1
24	4.4	.6	12	132.9	1.1	24	2.2	.1	12	2.2	.1
9-6	3.6	.5	18	179.8	2.7	28-6	4.4	.2	18	2.2	.1
12	3.1	.4	24	242.7	5.2	12	9.9	.4	24	2.2	.1
18	2.5	.3	19-6	247.2	8.1	18	14.1	1.4			
24	2.1	.2	12	182.5	12.0	24	18.7	2.2			
10-6	1.7	.2	18	127.7	15.6	29-6	24.6	3.3	Total	3082.0	263.1
12	1.4	.1	24	86.1	13.6	12	25.0	4.3	ac-ft	1531.0	130.3

NOTE:

Downstream runoff includes that tributary between Don Pedro Dam site and the mouth of Tuolumne River. Quantities shown are reduced quantities that can coincide with full standard project flood quantities above Don Pedro Reservoir. For days 16-22, timing shown hereon has been corrected and flows for downstream runoff are 1 day later than shown in Table IV of Hydrology Report.





BOX PLOT LANE
TULUMNE RIVER, CALIFORNIA

RAIN-FLOOD FREQUENCY CURVES
DRY CREEK NEAR MODESTO
(NATURAL CONDITIONS)

Corps of Engineers, Sacramento, Calif.

Prepared: O.O.O.

Date: September 1971

CHART 10

STANDARD PROJECT SNOWMELT FLOOD

TUOLUMNE RIVER AT DON PEDRO DAM

24-hour average flows in thousand c.f.s.

April	Flow	May	Flow	June	Flow	July	Flow
1	2.4	1	8.8	1	22.2	1	15.3
2	3.6	2	11.3	2	24.3	2	13.2
3	4.6	3	12.3	3	23.9	3	13.0
4	3.3	4	13.3	4	24.1	4	13.9
5	2.9	5	15.5	5	24.2	5	14.1
6	3.3	6	13.2	6	25.9	6	13.3
7	3.7	7	10.4	7	28.4	7	11.4
8	3.4	8	8.6	8	25.1	8	10.1
9	3.3	9	8.5	9	21.3	9	8.4
10	3.4	10	9.6	10	20.8	10	8.3
11	3.5	11	11.1	11	21.2	11	7.5
12	3.6	12	12.8	12	21.4	12	7.0
13	3.5	13	17.9	13	20.9	13	7.1
14	3.5	14	18.4	14	19.2	14	6.5
15	4.2	15	16.5	15	17.3	15	6.3
16	4.8	16	17.0	16	15.9	16	5.8
17	4.0	17	19.5	17	16.0	17	5.6
18	4.5	18	22.4	18	17.2	18	5.0
19	4.9	19	23.3	19	18.3	19	4.3
20	3.7	20	23.0	20	16.9	20	3.9
21	4.1	21	20.6	21	17.5	21	3.6
22	4.6	22	19.2	22	17.8	22	3.5
23	5.9	23	18.3	23	18.8	23	3.3
24	5.7	24	16.0	24	20.4	24	3.1
25	5.5	25	11.9	25	20.3	25	2.8
26	5.1	26	11.6	26	19.9	26	2.6
27	4.9	27	13.1	27	21.2	27	2.5
28	5.5	28	17.0	28	21.6	28	2.4
29	7.0	29	18.6	29	21.6	29	2.3
30	7.9	30	21.4	30	19.4	30	2.2
		31	22.2			31	2.1
Total	130.3		483.3		623.0		210.4

Tuolumne River Project, California, March 1961

D.D.D.

CHART 11

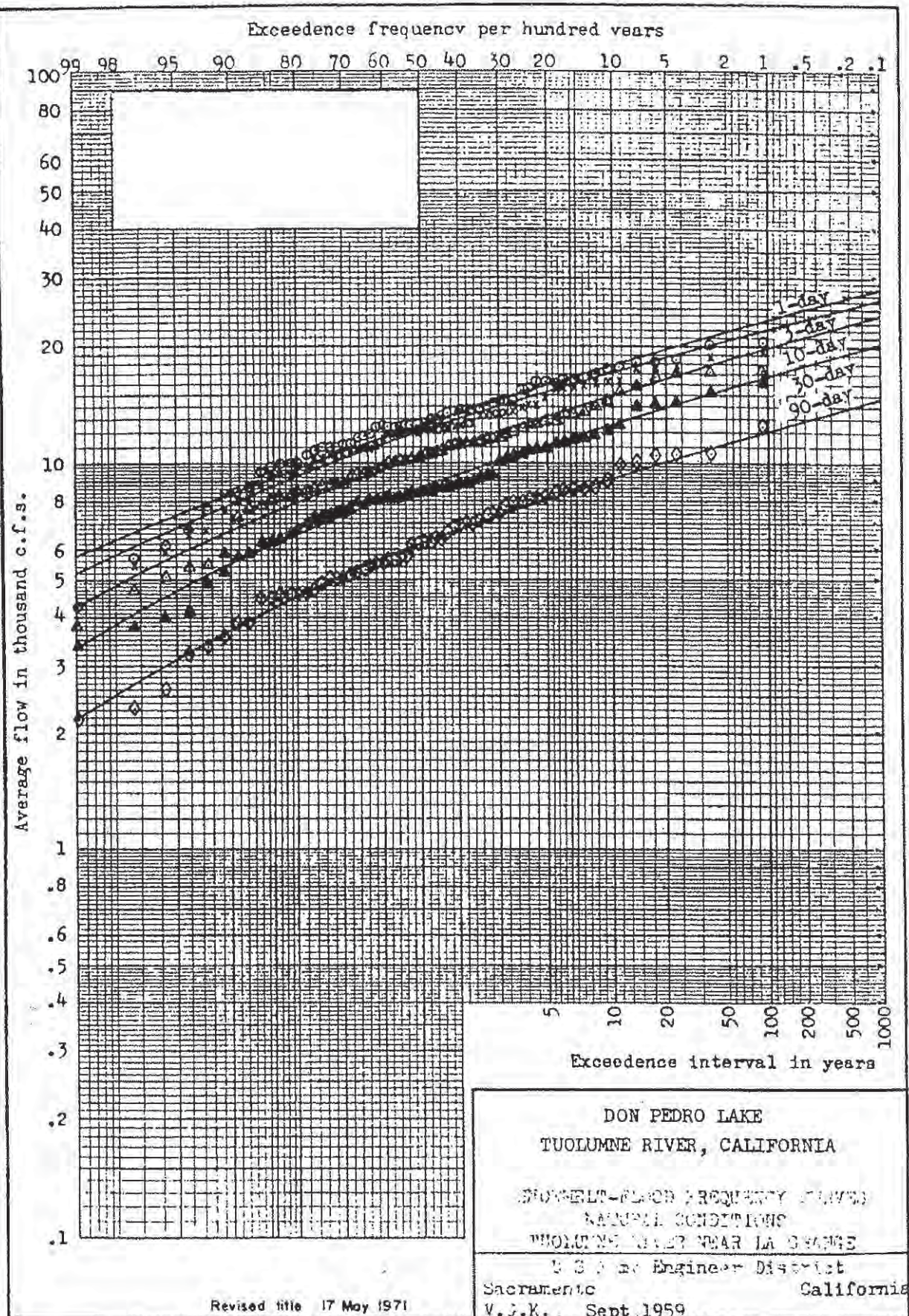
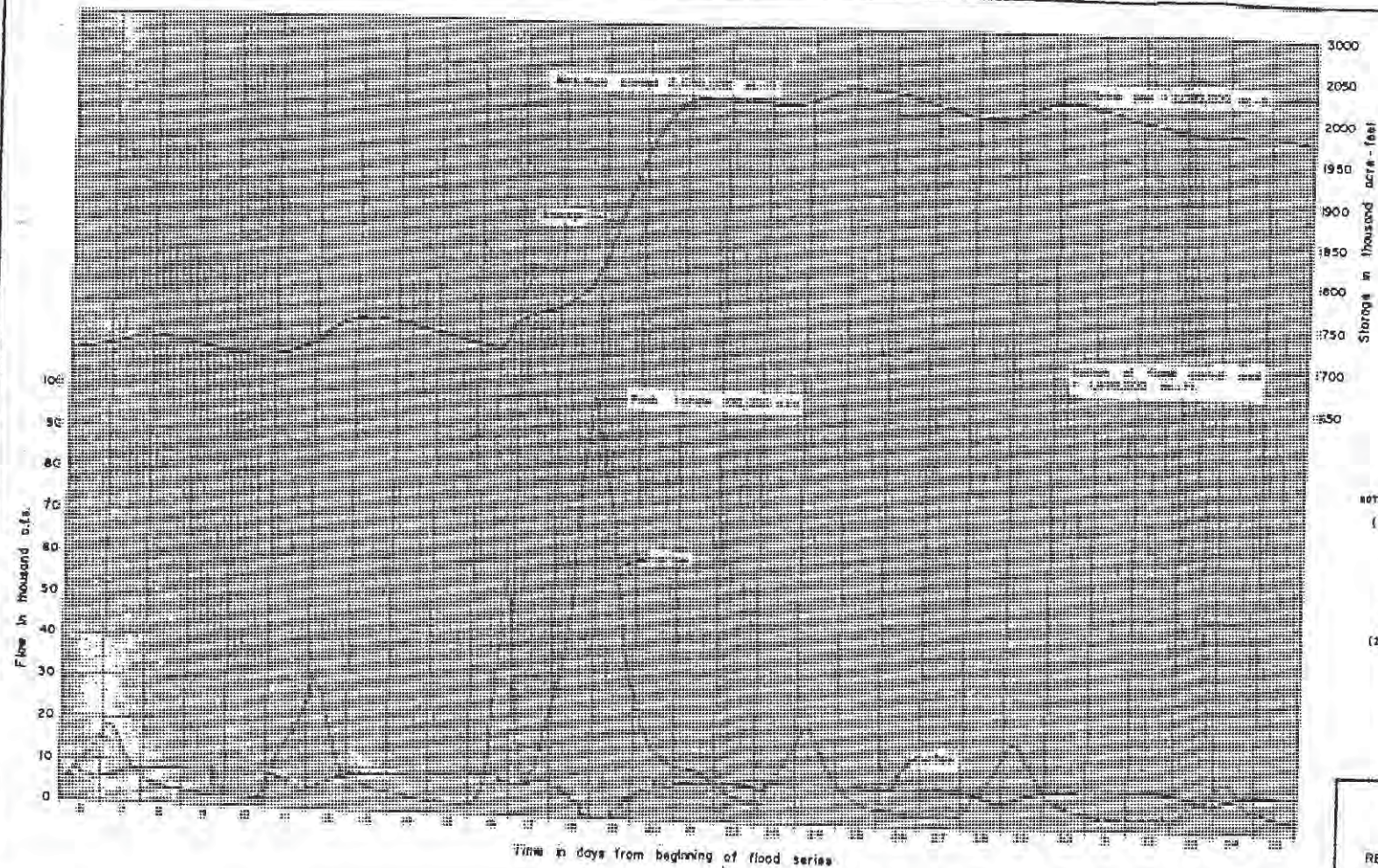


CHART 12

USCE000267

061



NOTES:

- (1) For this routing it was assumed that 120,000 acre-feet of empty space was available in upstream reservoirs at the beginning of the Reservoir Design Flood Series, a maximum of 300,000 acre-feet of empty space was assumed available in Don Pedro Lake.
- (2) Don Pedro Lake outflows were determined in accordance with criteria shown on the Flood Control Diagram, chart A-6, and the Emergency Spillway Release Diagram, chart A-8.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

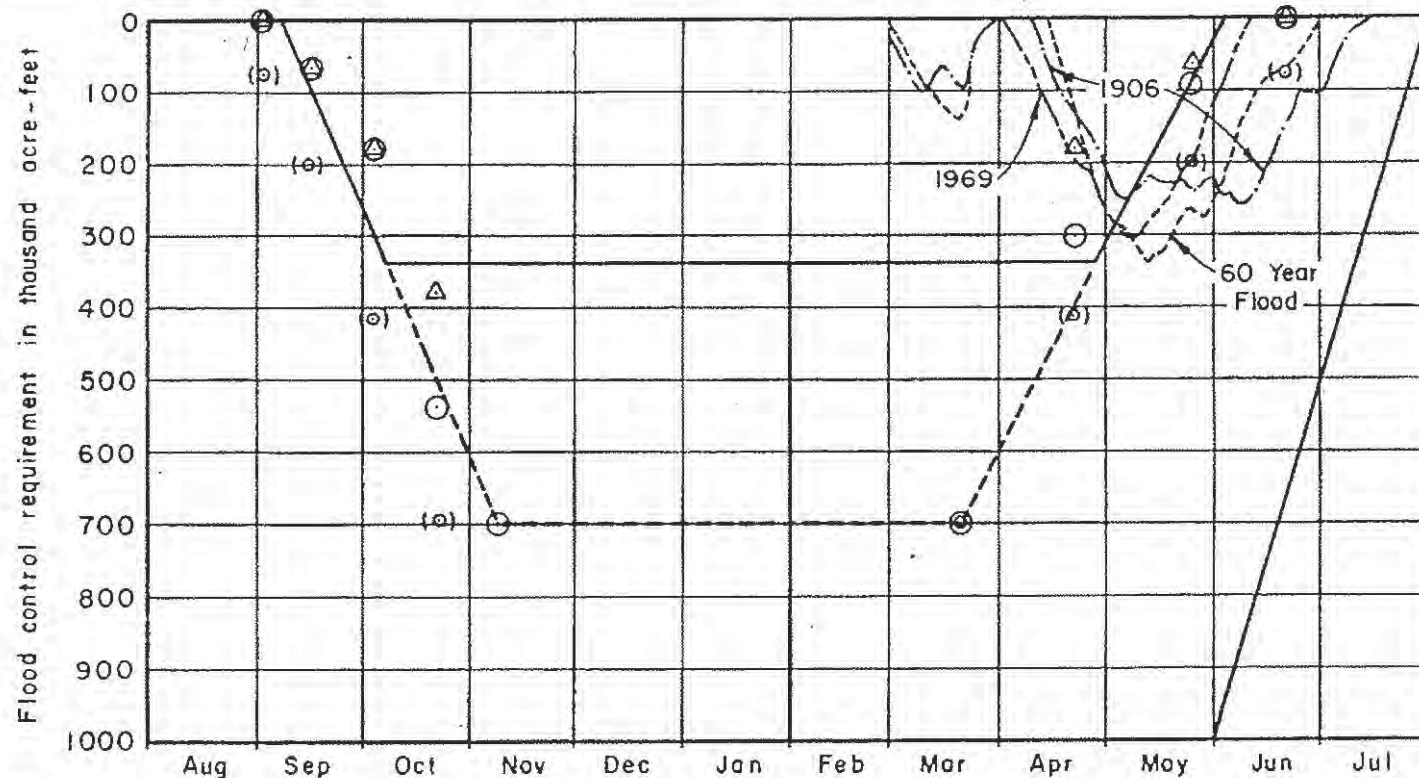
ROUTING OF
RESERVOIR DESIGN RAINFLOOD
(64% of S.P.F.)

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D.
Drawn: T.G.E.

Date: SEPTEMBER 1971

CHART - 1



LEGEND

- Requirement to control runoff from reservoir design storm (seasonally adjusted for flood potential) on wet ground to 7200 c.f.s. (80 percent of project flows) at Modesto. Values in parenthesis used for interpolation only.
- △ Requirement to control runoff from reservoir design storm (seasonally adjusted for flood potential) on dry ground.
- Requirement to control runoff from reservoir design storm, with seasonal adjustment of both storm potential and ground-wetness potential.

Minimum reservation required to control indicated snowmelt floods to 9,000 c.f.s. (100 percent of project flows).

————— 1906; - - - - - 60 Year Flood; - - - - - 1969.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

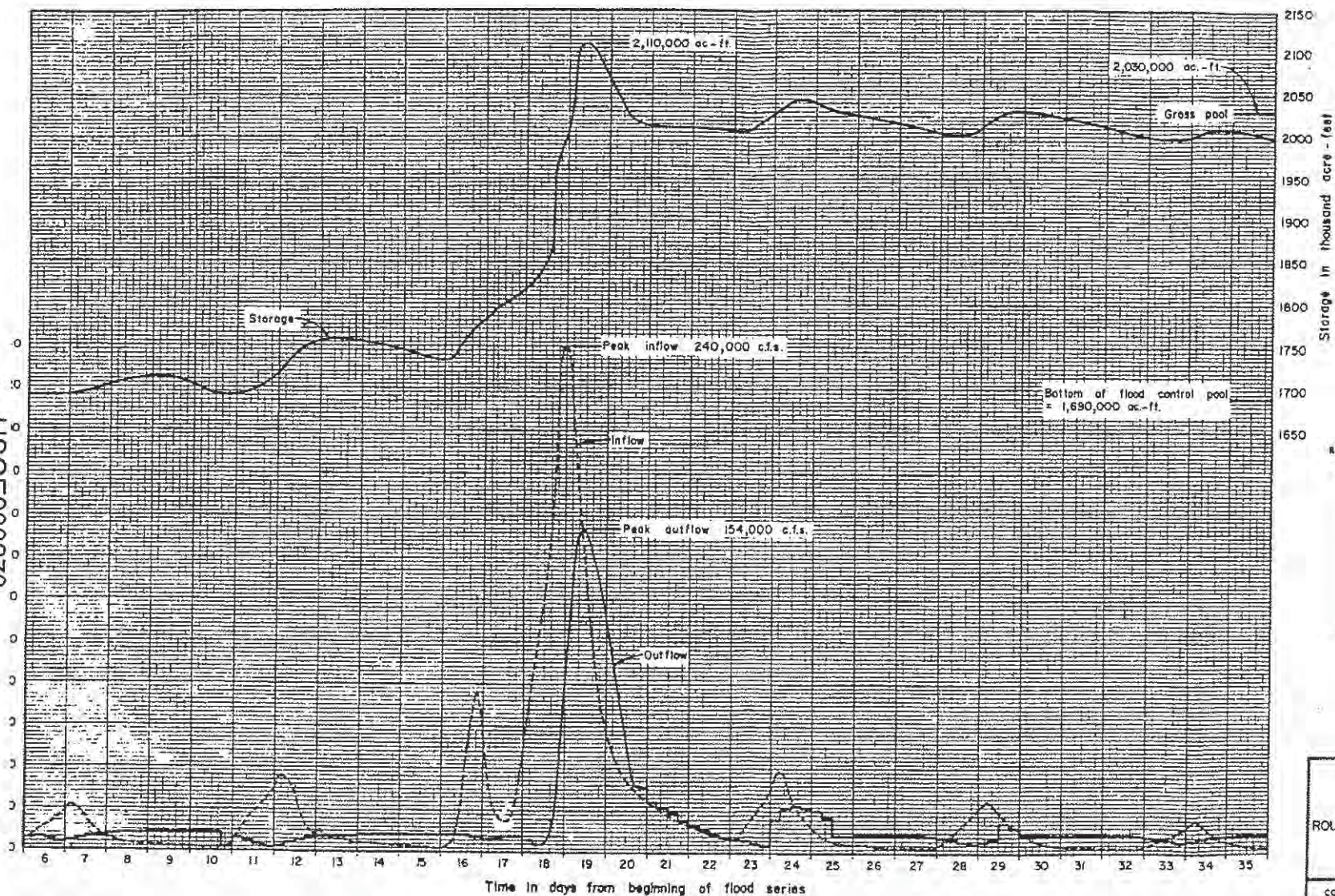
SEASONAL FLOOD CONTROL SPACE REQUIREMENT DON PEDRO LAKE

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R.F.C.

Date: SEPTEMBER 1971

Drawn: T.G.K.



NOTES:

- (1) For this routing it was assumed that 220,000 acre-feet of empty space was available in upstream reservoirs at the beginning of the Standard Project Flood Series, and inflow hydrograph is, therefore, modified from that shown on chart 8. A maximum of 340,000 acre-feet of empty space was assumed available in Don Pedro Lake.
- (2) Don Pedro Lake outflows were determined in accordance with criteria shown on the Flood Control Diagram, chart A-8, and the Emergency Spillway Release Diagram, chart A-1.

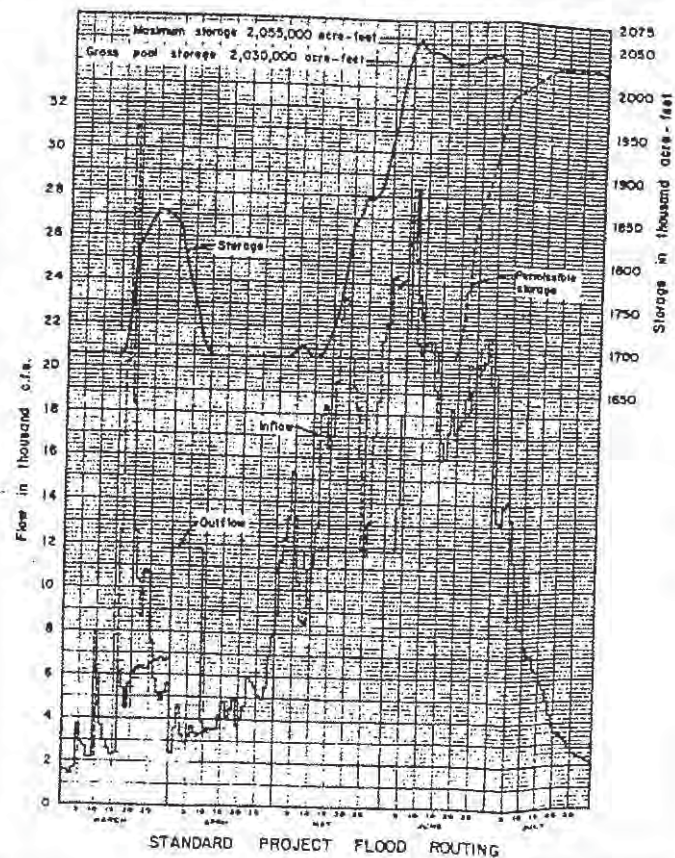
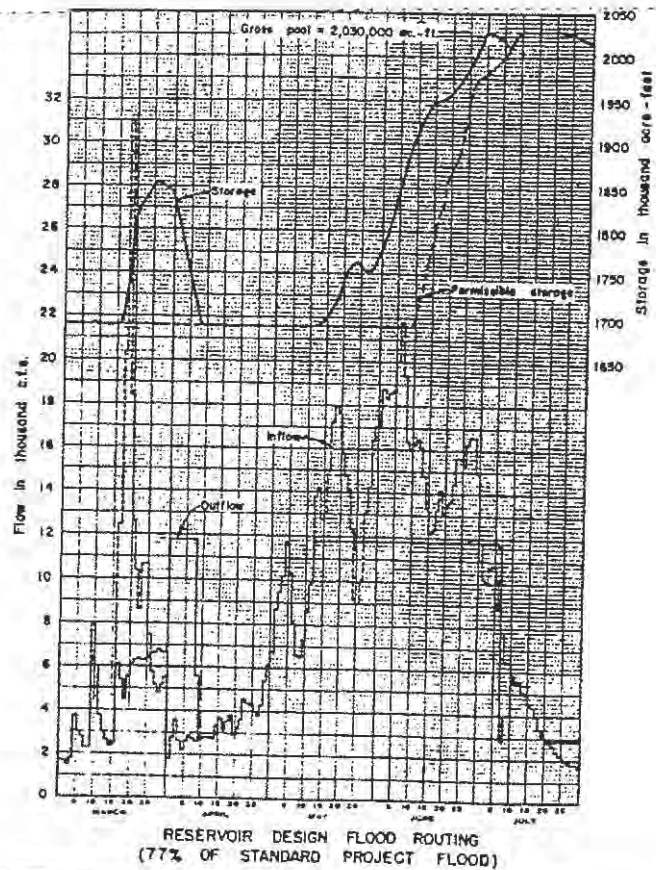
DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

ROUTING OF STANDARD PROJECT I
(RAIN-FLOOD SERIES)

CORPS OF ENGINEERS, SACRAMENTO, CALIF.

Prepared: S.D.D.
Drawn: T.G.K.

Date: SEPTEMBER



NOTES:

- (1) All upstream reservoirs were assumed to be full at the beginning of each flood routing.
- (2) In both routings, the forecast and actual run-off volumes were assumed to be identical.
- (3) Permissible storage was determined by using the criteria shown on the Flood Control Diagram, chart A-6.
- (4) The April thru July inflows shown are hypothetical flood flows. The March inflows are the highest March flows of record (March 1907) modified for present conditions of upstream reservoir storage.

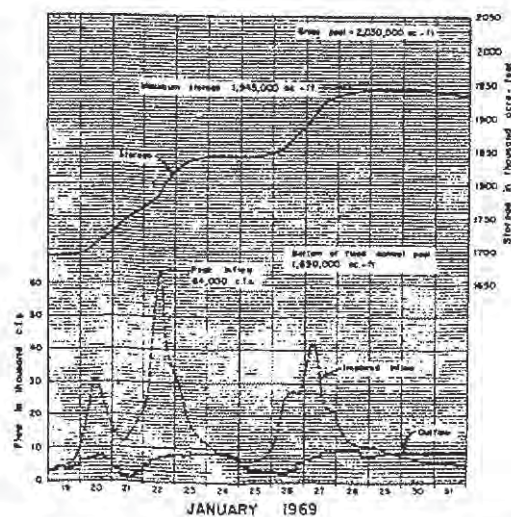
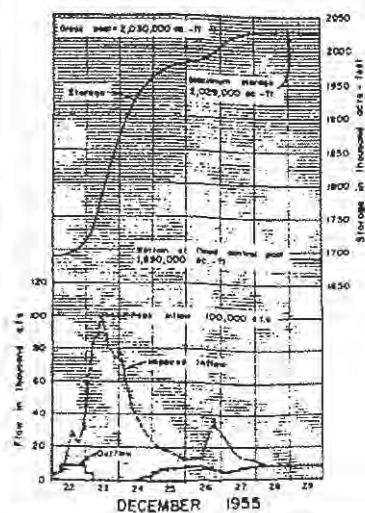
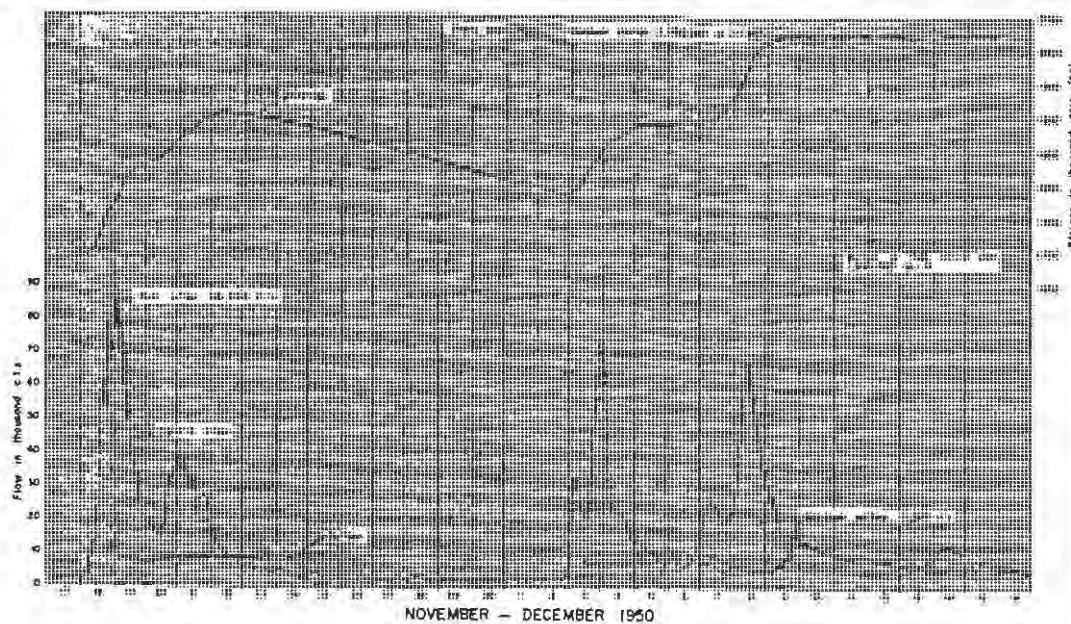
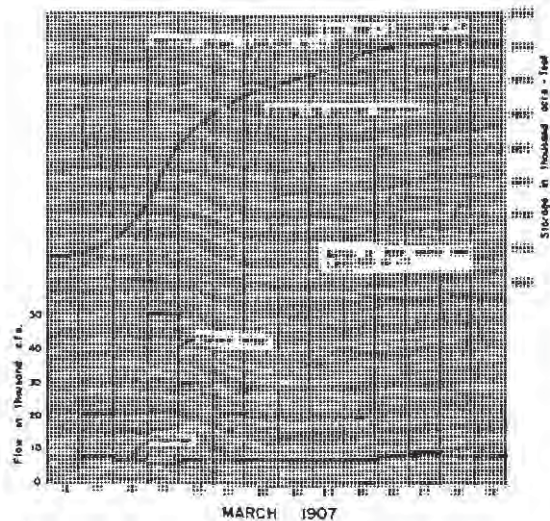
DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

ROUTING OF
HYPOTHETICAL SNOWMELT FLOWS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.B.D.
Drawn: T.S.K.

Date: SEPTEMBER 1971



447551

- (1) At the beginning of each flood routing, it was assumed that there was 240,000 acre-feet of water stored in San Joaquin Lake.
- (2) Storage remaining in the upstream reservoirs are shown just prior to the start of the beginning of each respective flood period as follows:
- (a) March 1907 flood - inflow to San Joaquin Lake was assumed, since there were no upstream reservoirs.
 - (b) November-December 1950 flood - inflow to San Joaquin Lake were assumed by routing Delta Valley Reservoir and Lake Shasta.
 - (c) December 1955 flood - inflow to San Joaquin Lake were assumed by routing Delta Valley Reservoir, and to a portable extent by routing Cherry Valley Reservoir. There was other construction at the time.
 - (d) January 1969 flood - inflow to San Joaquin Lake were assumed by routing Delta Valley Reservoir, and to a portable extent by routing Cherry Valley Reservoir.
- (3) All routings are based on criterion on chart and, with exception in Delta Valley Reservoir, are based on the same.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

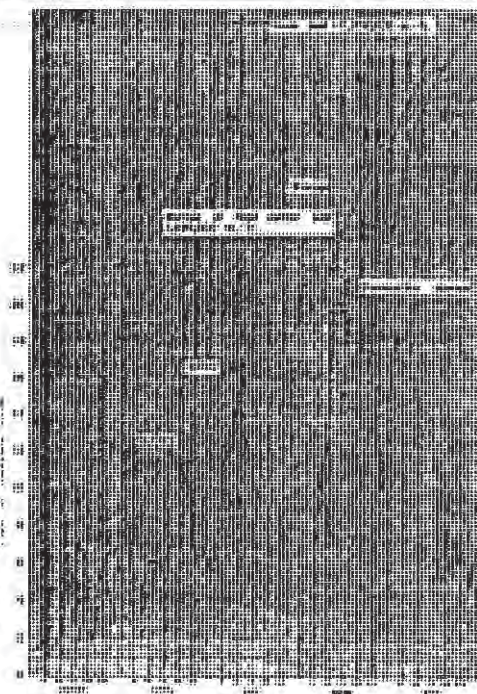
ROUTING OF HISTORICAL RAIN FLOODS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

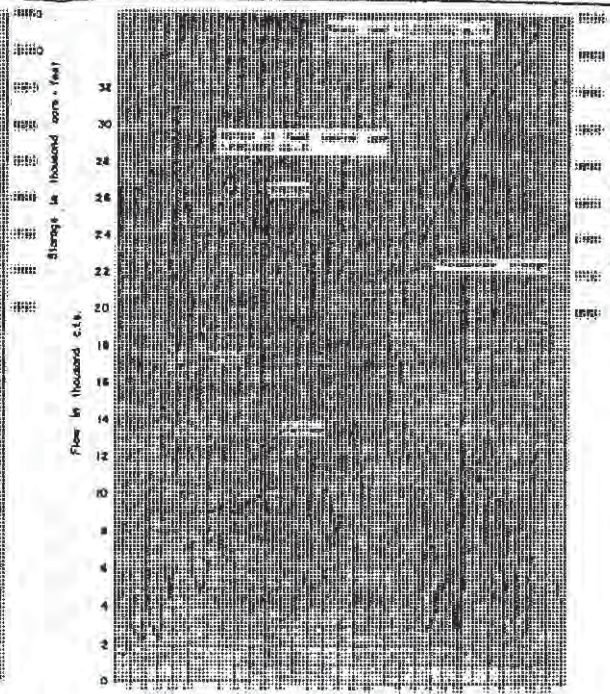
Prepared by D.D.
Drawn by T.C.H.

Date: SEPTEMBER 1971

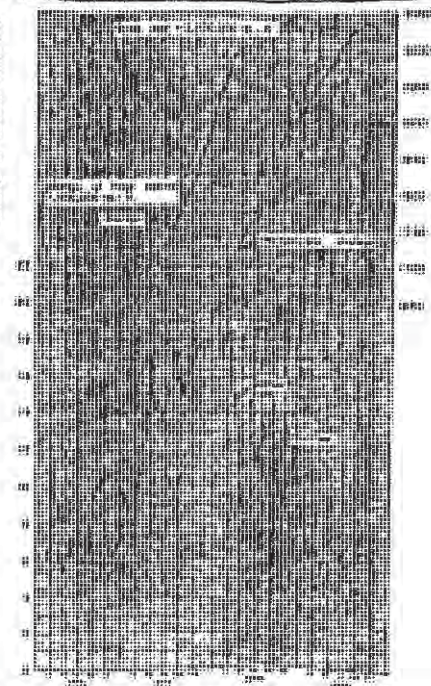
Chart 16



1906 FLOOD ROUTING



1907 FLOOD ROUTING



1969 FLOOD ROUTING

NOTES

- (1) Outstream reservoirs full at beginning of routing.
- (2) Feasible storage based on Flood Control Diagram, sheet 1-4, section 4, available published by the State of California Dept. of Water Resources for 1966, and forecasts obtained by use of precipitation data and criteria shown on chart 12 of the Flood-Control General Operation Report for 1966 and 1967.

FOR PIEDRO LAKE
(VOLCANIC RIVER, CALIFORNIA)

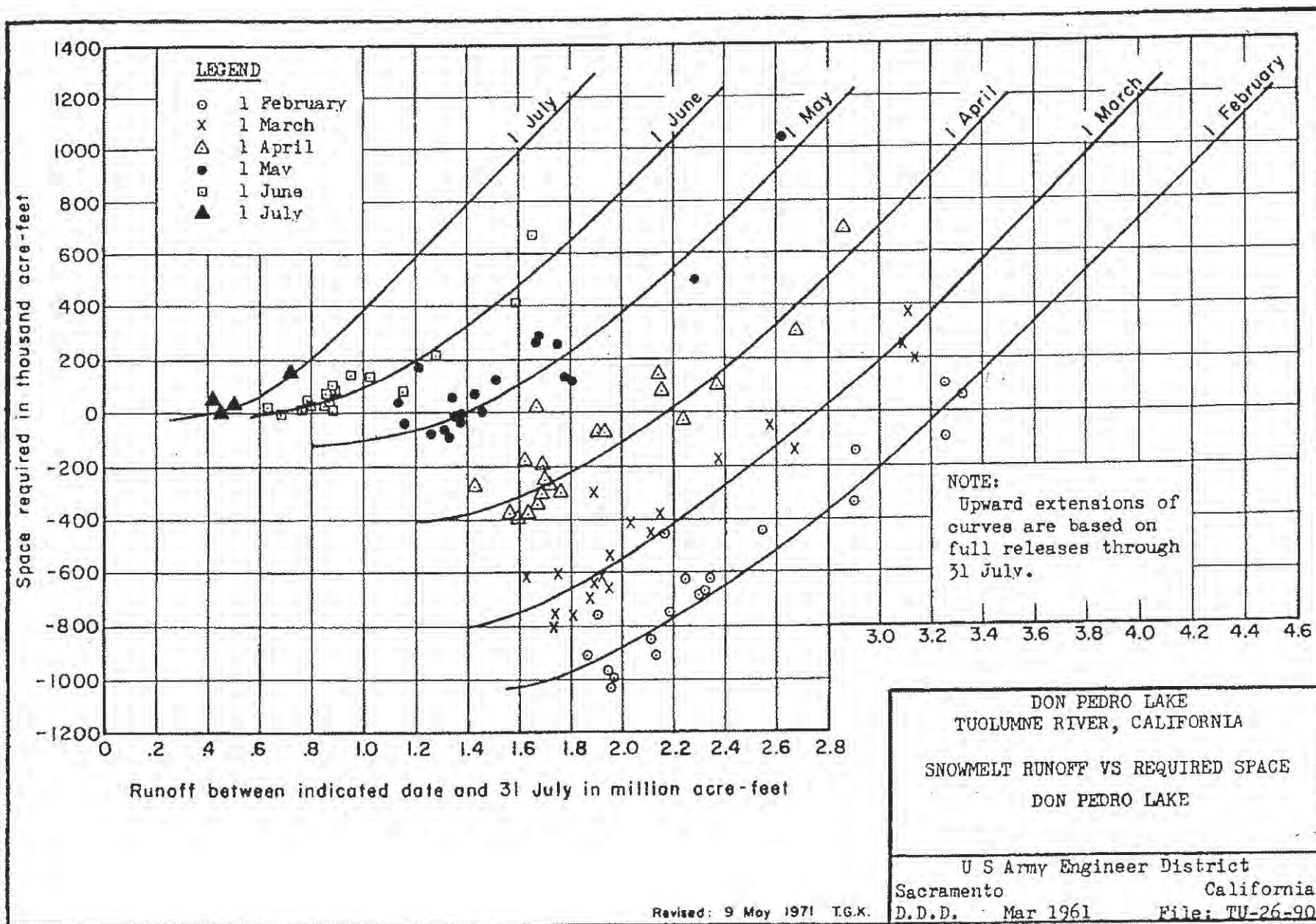
ROUTING OF
HISTORICAL SNOWMELT FLOODS

COMPTON ENGINEERS, SACRAMENTO, CALIFORNIA

Project: U.S.D. Date: SEPTEMBER 1971

Draw: T.E.S. Sheet: 18

CHART 18



MONTHLY REQUIRED FLOOD CONTROL RESERVATION

DON PEDRO LAKE

(See footnote for adjustment)

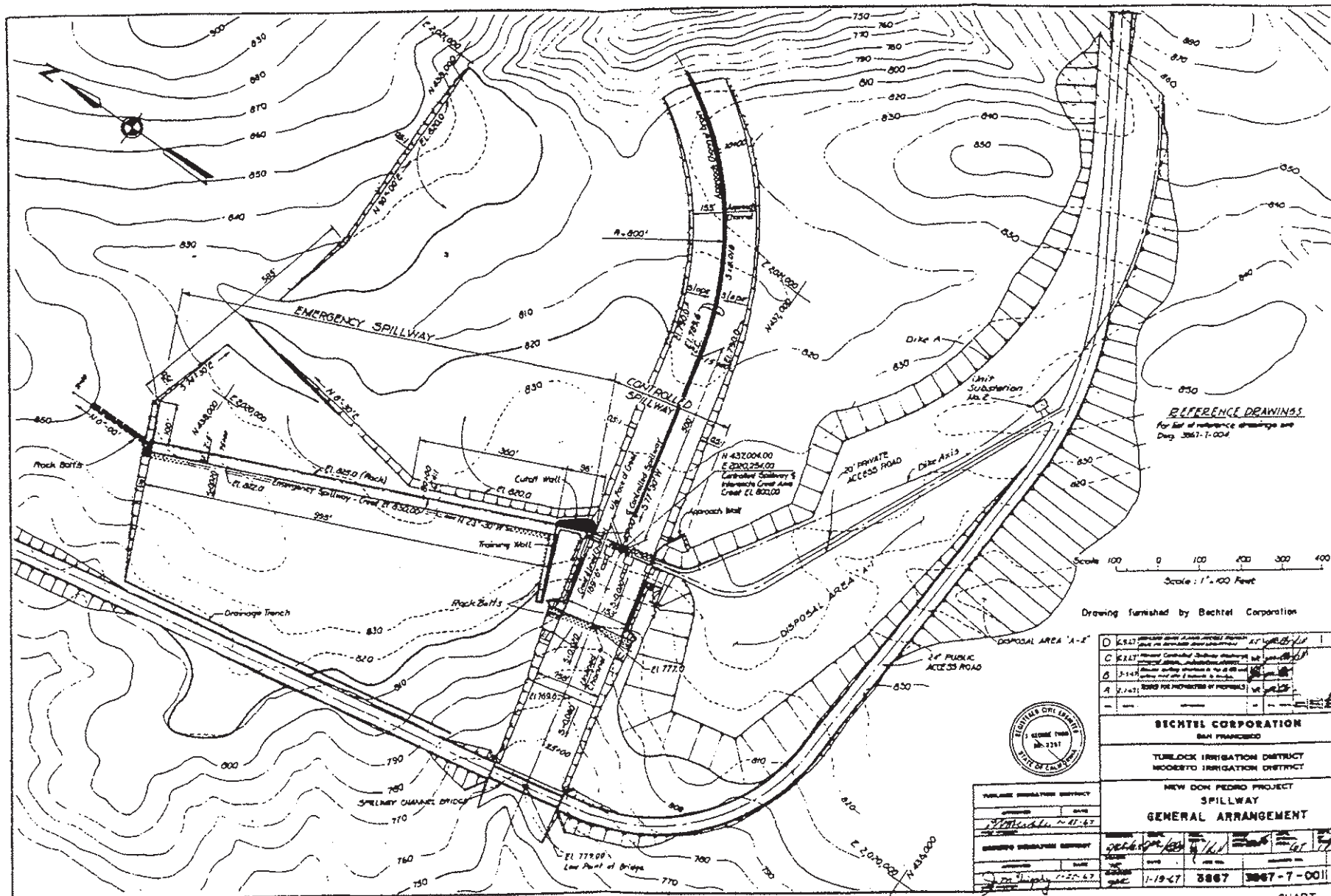
Year :	Required space in thousand-acre feet at end of month											
	Jan :	Feb :	Mar :	Apr :	May :	Jun :	Jul :	Aug :	Sep :	Oct :	Nov :	Dec :
1906	340	340	340	340	340	260	0	0	257	340	340	340
1907				340	340	100						
1908				317	28	0						
1909				317	135	0						
1910				317	28	0						
1911				340	240	0						
1912				317	28	0						
1913				317	28	0						
1914				317	175	5						
1915				317	280	15						
1916				317	28	0						
1917				317	130	0						
1918				317	30	0						
1919				317	28	0						
1920				317	28	0						
1921				317	60	0						
1922				317	28	0						
1923				317	28	0						
1924				317	28	0						
1925				340	250	95						
1926				317	28	0						
1927				317	160	0						
1928				317	70	15						
1929				317	28	0						
1930				317	40	0						
1931				317	28	0						
1932				317	50	0						
1933				317	40	0						
1934				317	28	0						
1935				317	135	0						
1936				317	70	0						
1937				317	40	0						
1938				340	300	5						
1939				317	28	0						
1940				317	40	0						
1941				340	200	0						
1942				317	265	3						
1943				317	60	0						
1944				317	40	0						
1945	340	340	340	317	55	0	0	0	257	340	340	340

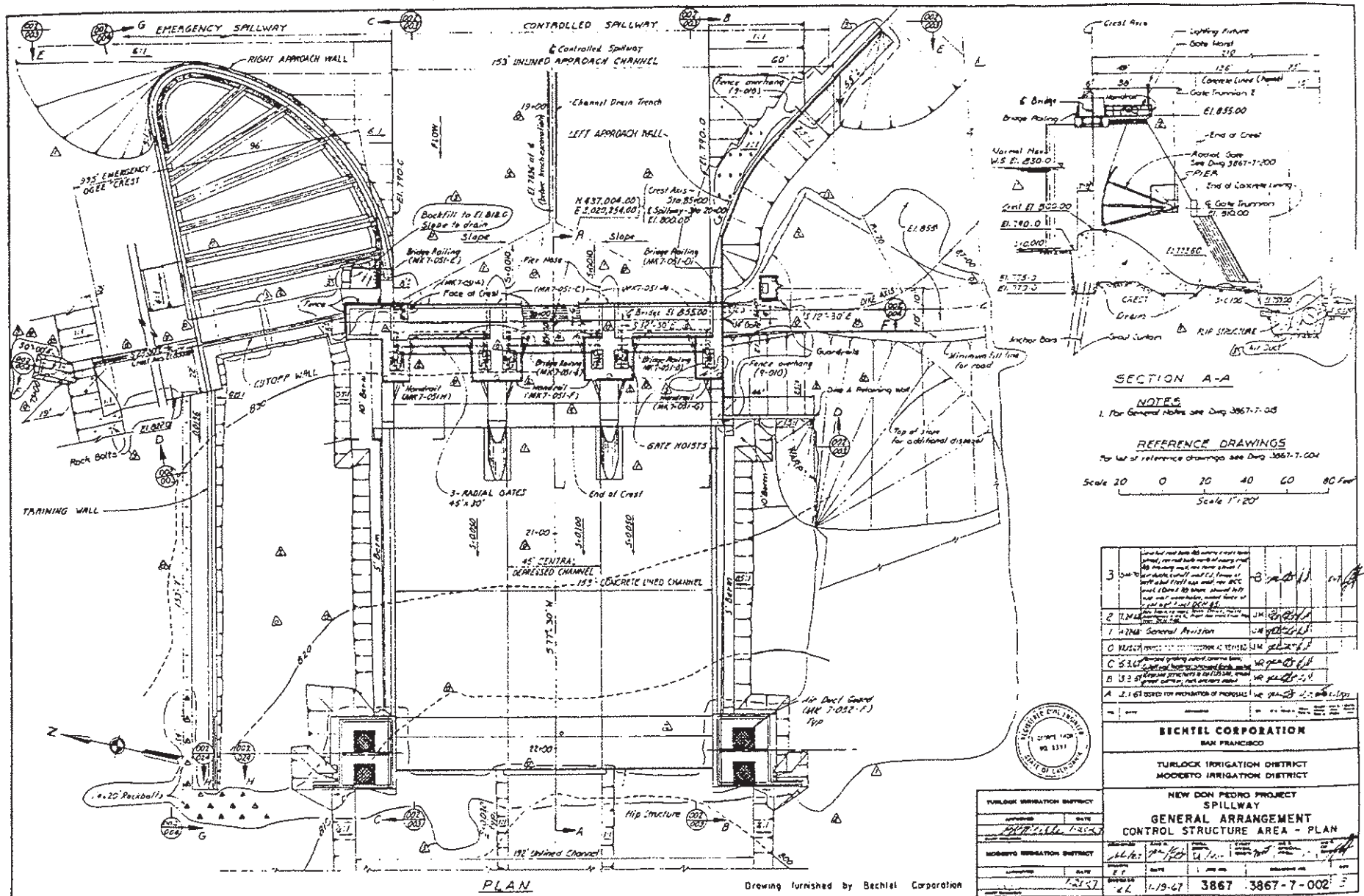
MONTHLY REQUIRED FLOOD CONTROL RESERVATION

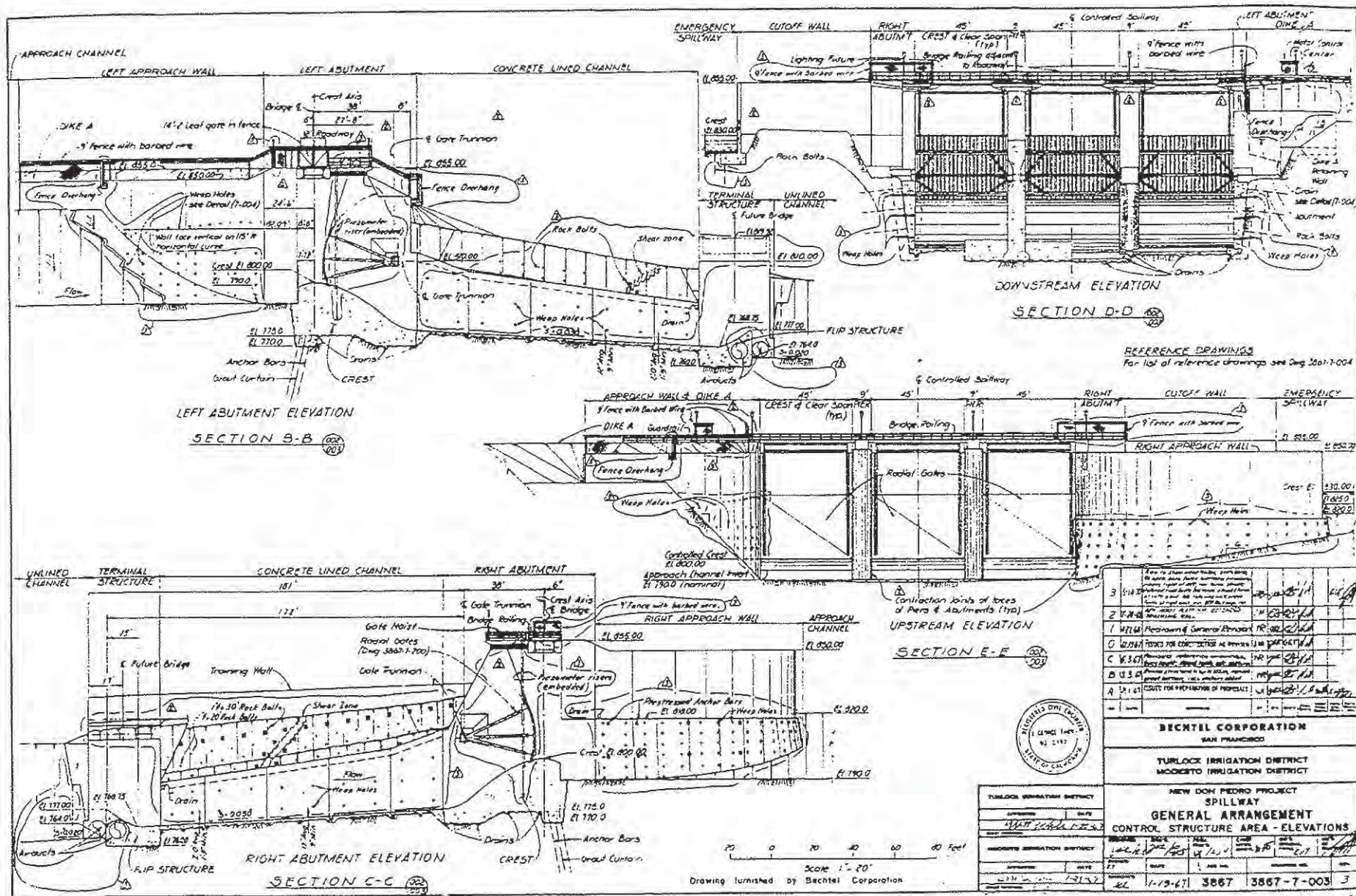
DON PEDRO LAKE

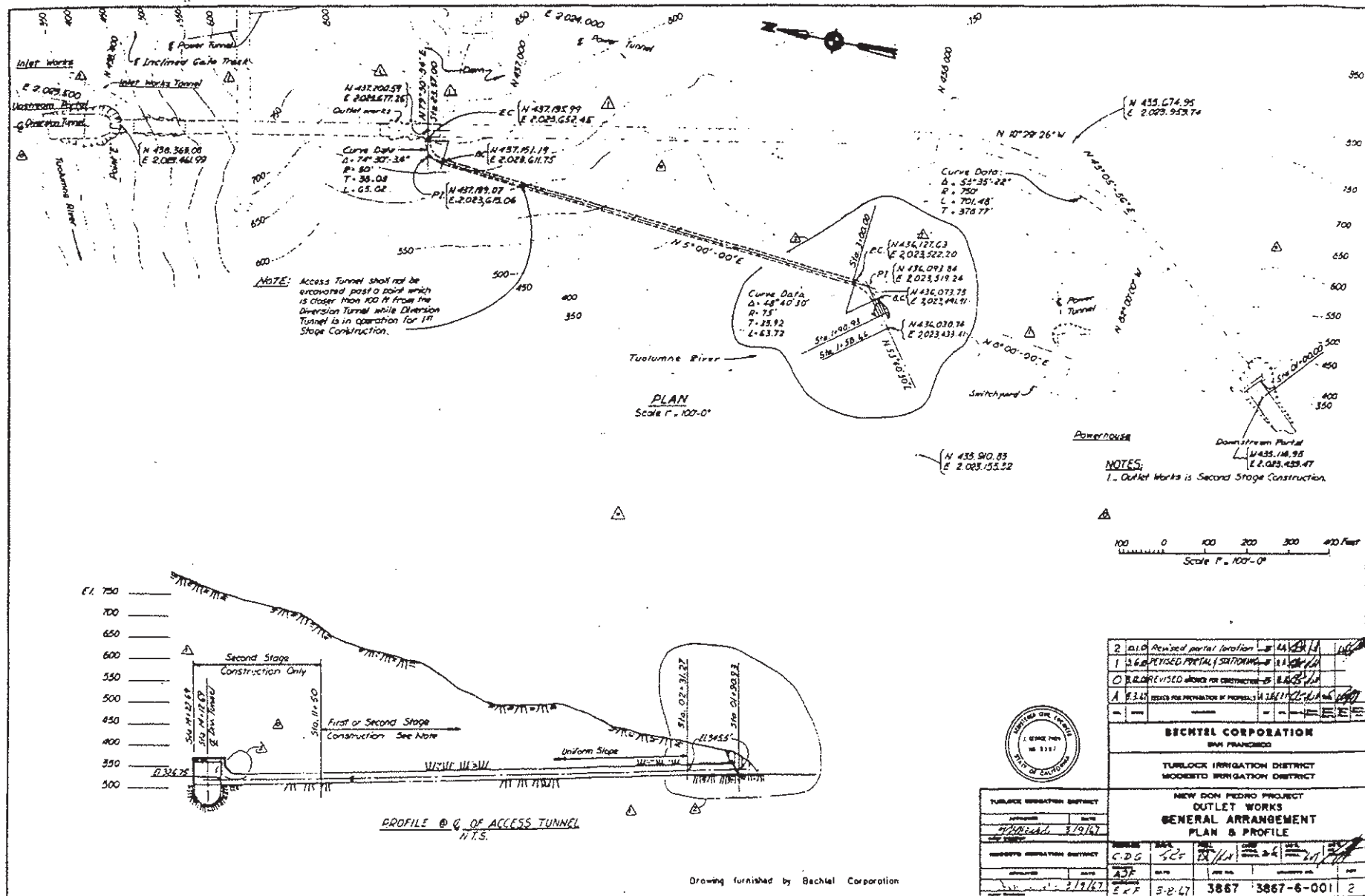
Required space in thousand acre-feet at end of month												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1946	340	340	340	317	55	0	0	0	257	340	340	340
1947				317	28	0						
1948				317	80	0						
1949				317	28	0						
1950				317	28	0						
1951				317	75	0						
1952				340	135	0						
1953				317	40	0						
1954				317	28	0						
1955				317	28	0						
1956				317	115	0						
1957				317	55	0						
1958				340	120	0						
1959				317	28	0						
1960				317	28	0						
1961				317	28	0						
1962				317	28	0						
1963				317	50	0						
1964				317	28	0						
1965				317	130	0						
1966				317	28	0						
1967				340	150	0						
1968				317	28	0						
1969				340	100	0						
1970	340	340	340	317	28	0	0	0	257	340	340	340

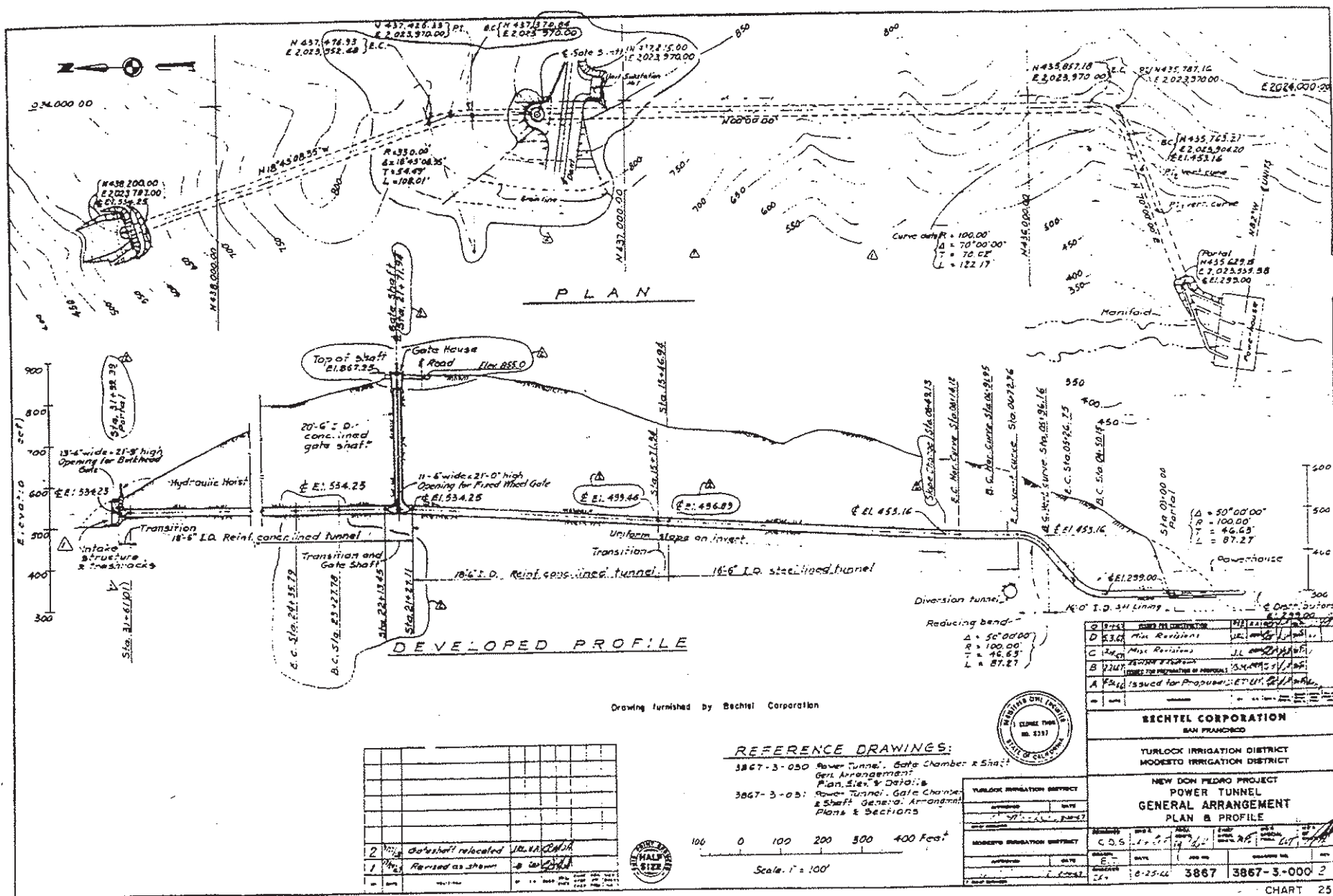
Note: The required flood control space shown on the above table is based on the maximum available flood control reservation in Don Pedro Lake (340,000 acre-feet). During some wet years the space needed for flood control is actually greater than this maximum available space of 340,000 acre-feet. The flood control space requirements shown above are based on the flood control diagram shown on chart A-8 in conjunction with snowmelt forecasts obtained by use of historical precipitation data and forecast criteria shown on chart 23 of Flood Control Reservoir Operation Report for all years from 1906 through 1958. Forecasts made by the State of California were used for all years from 1959 through 1970.

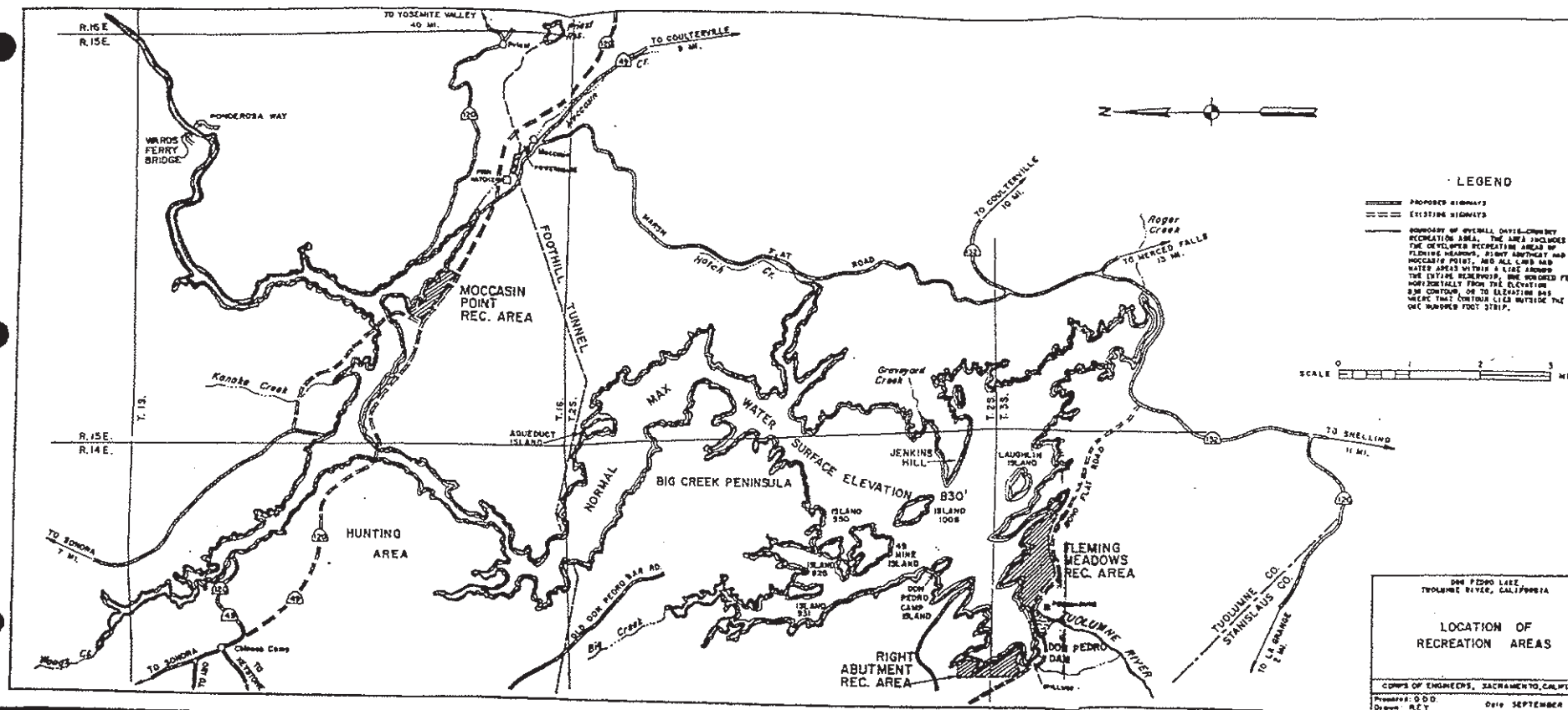


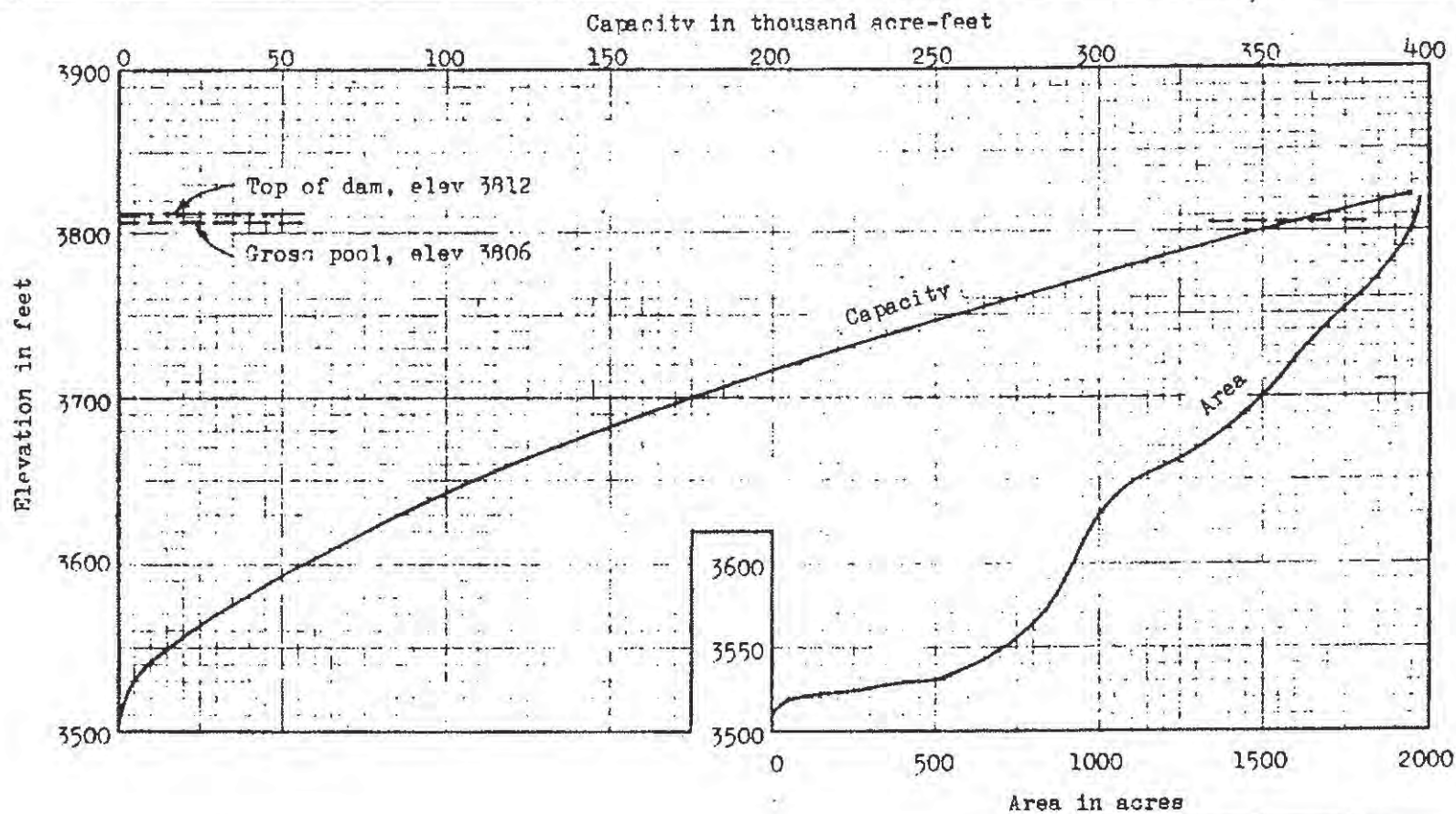










**NOTE:**

Data furnished by the City
and County of San Francisco

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

AREA AND CAPACITY CURVES
HETCH-HETCHY RESERVOIR

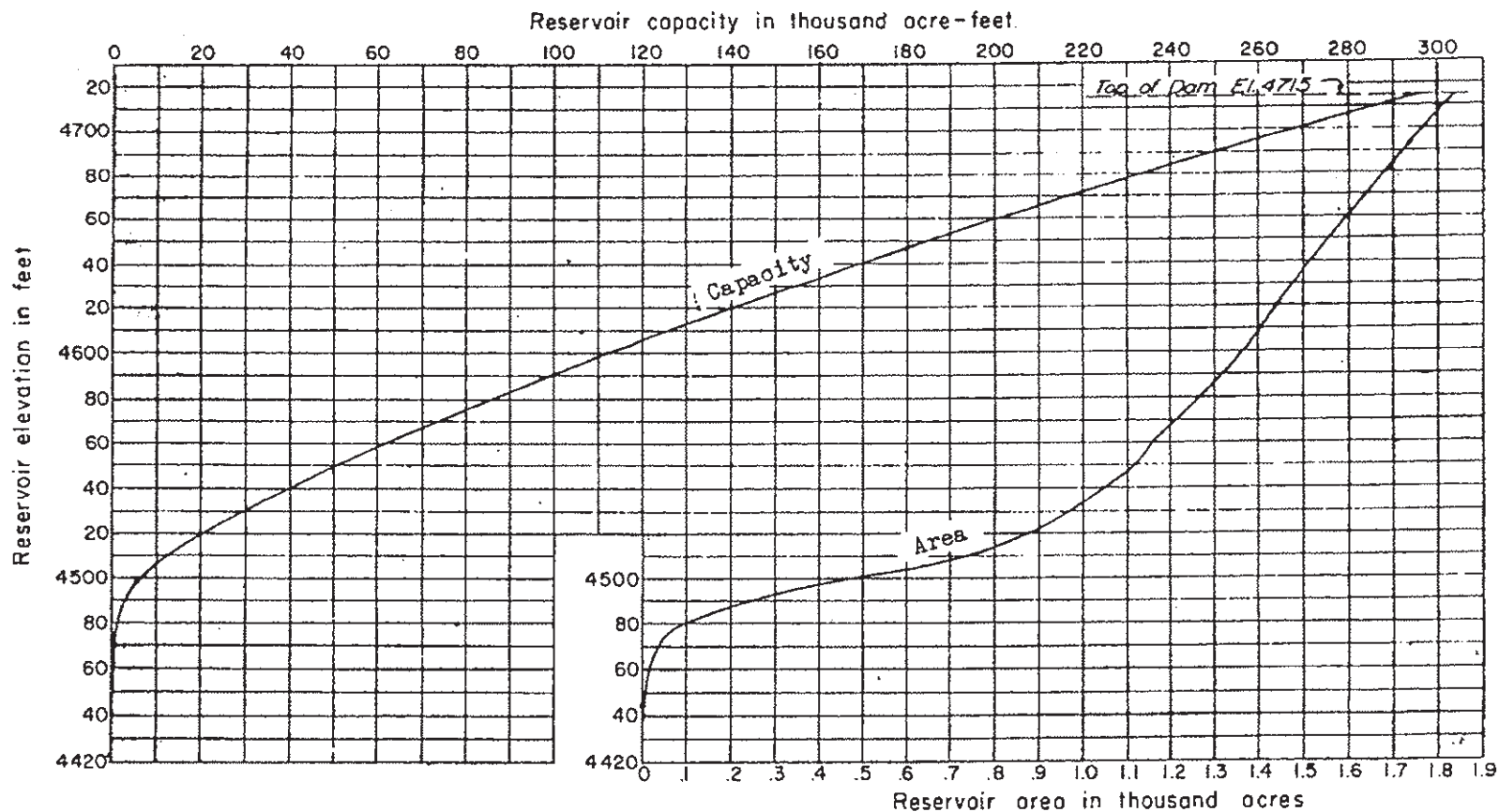
U S Army Engineer District
Sacramento California
V.G.K. July 1959 File: TU-26-42

Revised title 17 May 1971

USCE000285

079

CHART 28



NOTE:

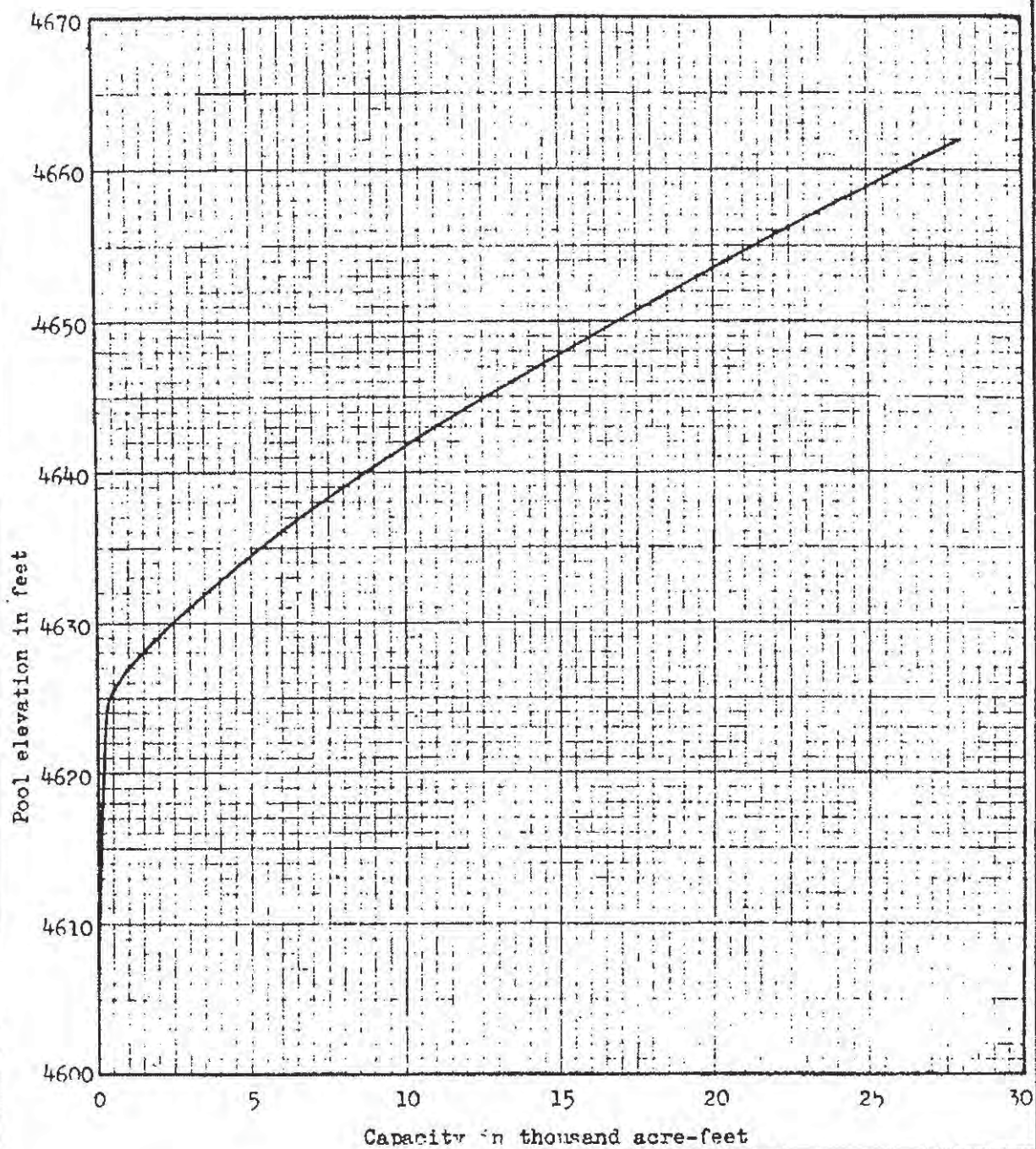
Data furnished by the City
and County of San Francisco

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

AREA AND CAPACITY CURVES
CHERRY VALLEY RESERVOIR
(LAKE LLOYD)

U S Army Engineer District
Sacramento California
I.R.B. August 1954 File: TH-26-52

Revised title 17 May 1971



Note:

Data furnished by City and
county of San Francisco.

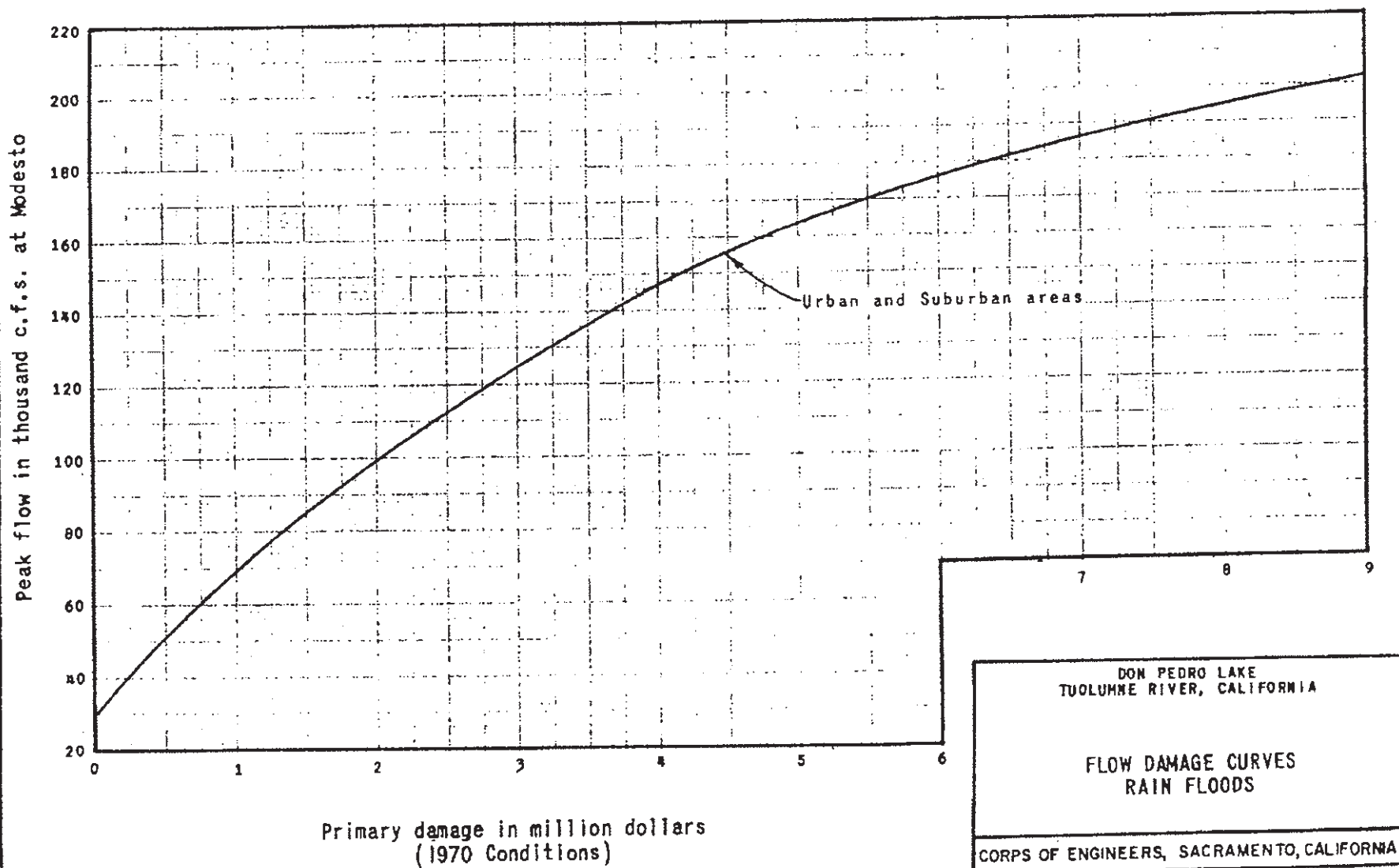
DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

CAPACITY CURVE
LAKE ELEANOR

U S Army Engineer District
Sacramento California
A.G.C. 9 June 54 File: TU-26-47

Revised title 17 May 1971

CHART 29



DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

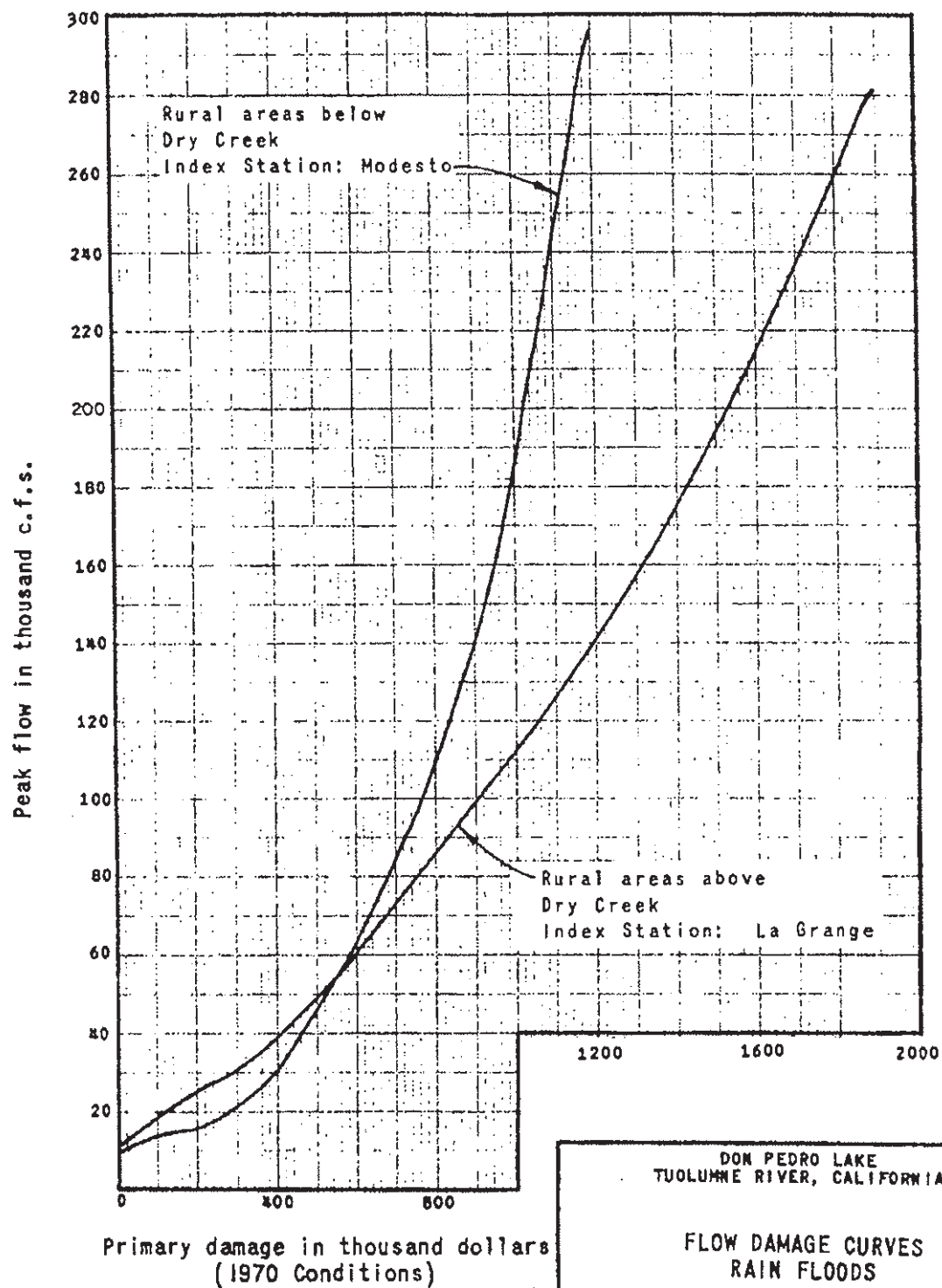
FLOW DAMAGE CURVES
RAIN FLOODS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R.L.C.

Drawn: R.E.Y.

Date: September 1971



DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

FLOW DAMAGE CURVES
RAIN FLOODS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R.L.C.

Drawn: R.E.Y.

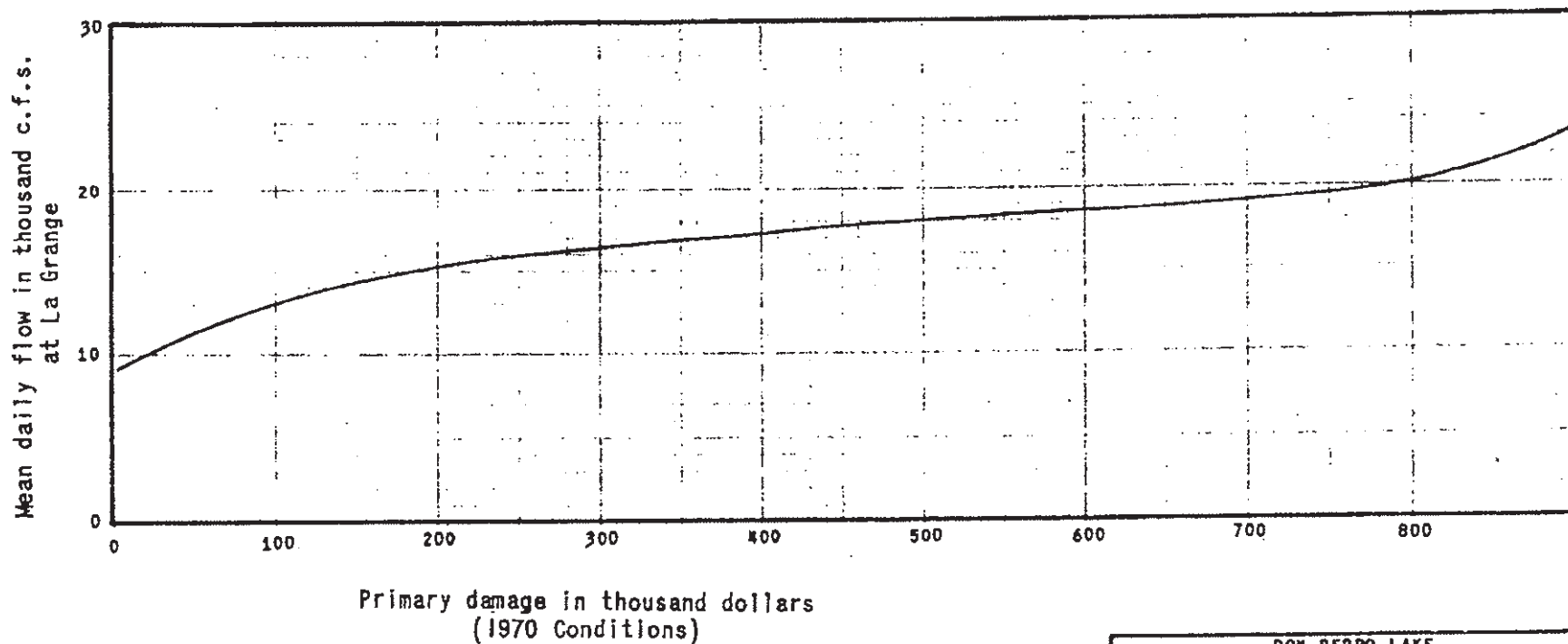
Date: September 1971

Sheet 2 of 2 CHART 30

USCE000289

083

CHART 31



DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

FLOW-DAMAGE CURVE
SNOWMELT FLOODS

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: R.L.C.

Drawn: R.E.Y.

Date: September 1971

FORECAST VERIFICATION DATA
NATURAL APRIL-JULY FLOWS
TULUMNE RIVER AT LA GRANGE

(Values in thousand acre-feet)

Year	Unimpaired runoff April-July	1 February		1 March		1 April		1 May	
		Fore- cast	Error	Fore- cast	Error	Fore- cast	Error	Fore- cast	Error
1936	1431					1412	-18		
1937	1418					1636	218	1636	218
1938	2164					1800	-364	1800	-364
1939	584					600	16	540	-44
1940	1301					1150	-151	1150	-151
1941	1706					1800	94	1900	194
1942	1671					1400	-271	1550	-121
1943	1372					1350	-22	1350	-22
1944	979					1070	91	1070	91
1945	1370					1450	80	1350	-20
1946	1156					1350	194	1225	69
1947	680					770	90	730	50
1948	1183					650	-533	950	-223
1949	1026					1250	224	1100	74
1950	1180					1150	-30	1210	30
1951	947					750	-197	750	-197
1952	2145					2400	255	2400	255
1953	1118					900	-218	900	-218
1954	1028	950	-78	950	-78	1150	122	1050	22
1955	846	1200	354	1020	174	750	-96	850	4
1956	1668	2300	632	2000	332	1650	-18	1780	112
1957	1027	900	-127	820	-207	820	-207	800	-227
1958	1902	1080	-822	1230	-672	1900	-2	1800	-102
1959	615	850	235	960	345	670	55	600	-15
1960	721	660	-61	800	79	750	29	720	-1
1961	528	700	172	500	-28	520	-8	480	-48
1962	1317	750	-567	1260	-57	1440	123	1340	23
1963	1418	700	-718	640	-778	850	-568	1140	-278
1964	762	920	158	640	-122	600	-162	550	-212
1965	1483	1560	77	1370	-113	1260	-223	1440	-43
1966	767	1160	393	1020	253	760	-7	680	-87
1967	2161	1320	-841	1100	-1061	1425	-736	2060	-101
1968	648	880	232	830	182	740	92	640	-8
1969	2405	2000	-405	2500	95	2450	45	2500	95
1970	920	1300	380	1170	250	1080	160	1030	110
Average			368		284		163		109
Extreme			-841		-1061		-736		-364

Note: All forecasts prepared and published by State of California.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
DIVISION OF RESOURCES DEVELOPMENT
CALIFORNIA COOPERATIVE SNOW SURVEYS
FORECAST COMPUTATION FORM
TUOLUMNE RIVER, INFLOW TO DON PEDRO
APRIL - JULY UNIMPAIRED RUNOFF

OCTOBER - MARCH PRECIPITATION

Station	Precipitation (in)	Observed	October - March		April - June		July - September		October - March		April - June		July - September	
			Observed	Forecast	Observed	Forecast	Observed	Forecast	Observed	Forecast	Observed	Forecast	Observed	Forecast
DUDLEY	2559	25.62	0	7.68	7.68	4.87	1.14	1.14	1.14	1.14	1.14	1.14	1.14	
HETCH HETCHY	3939	32.03	0	6.80	6.80	7.00	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
PRECREST	8893	26.51	0	10.19	10.19	8.84	0.78	0.78	0.78	0.78	0.78	0.78	0.78	
SONORA	4353	21.51	0	6.97	6.97	7.87	7.18	7.18	7.18	7.18	7.18	7.18	7.18	
YOSEMITE	9855	23.61	0	7.12	7.12	10.87	8.08	8.08	8.08	8.08	8.08	8.08	8.08	
Total														
Oct - Mar														
Apr - Jun														
Jul - Sep														

Total
Oct - Mar
74

Total
Apr - Jun
18
Total
Jul - Sep
217
Total
Oct - Mar
74
Total
Apr - Jun
18
Total
Jul - Sep
217

APRIL - JUNE PRECIPITATION

Station	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean
DUDLEY	3.24	0	0	0	0	0	0	0	0	0	0	0
HETCH HETCHY	3.17	0	0	0	0	0	0	0	0	0	0	0
PRECREST	3.88	0	0	0	0	0	0	0	0	0	0	0
SONORA	2.80	0	0	0	0	0	0	0	0	0	0	0
YOSEMITE	3.25	0	0	0	0	0	0	0	0	0	0	0
Total												
Apr - Jun												

Total
Apr - Jun
0

Total
Apr - Jun
0

Total
Apr - Jun
0

PRECIPITATION INDEXES

Station	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean
DUDLEY	74	74	74	74	74	74	74	74
HETCH HETCHY	20	20	20	20	20	20	20	20
PRECREST	20	20	20	20	20	20	20	20
SONORA	20	20	20	20	20	20	20	20
YOSEMITE	20	20	20	20	20	20	20	20
Total								
Apr - Jun								

Fig. 2

SNOW PACK INDEX

Station	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean
DUDLEY	12	12	12	12	12	12	12	12	12	12	12	12
HETCH HETCHY	10	10	10	10	10	10	10	10	10	10	10	10
PRECREST	12	12	12	12	12	12	12	12	12	12	12	12
SONORA	12	12	12	12	12	12	12	12	12	12	12	12
YOSEMITE	12	12	12	12	12	12	12	12	12	12	12	12
Total												
Apr - Jun												

HETCH HETCHY

PRECREST

Total
Apr - Jun
32

Total
Apr - Jun
16

Total
Apr - Jun
16

Total
Apr - Jun
16

OCTOBER - MARCH RUNOFF

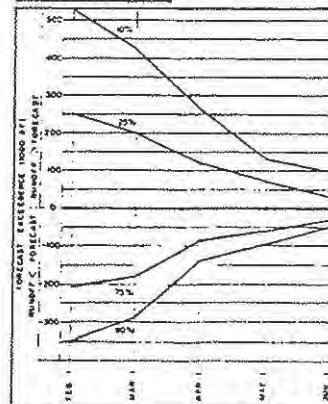
Station	Observed	Forecast	Range	Mean
DUDLEY	128	128	128	128
HETCH HETCHY	152	152	152	152
PRECREST	152	152	152	152
SONORA	152	152	152	152
YOSEMITE	152	152	152	152
Total				
Oct - Mar				

FORECAST SUMMARY

Station	Observed	Forecast	Range	Mean	Observed	Forecast	Range	Mean
DUDLEY	128	128	128	128	128	128	128	128
HETCH HETCHY	152	152	152	152	152	152	152	152
PRECREST	152	152	152	152	152	152	152	152
SONORA	152	152	152	152	152	152	152	152
YOSEMITE	152	152	152	152	152	152	152	152
Total								
Apr - Jun								

Fig. 3

FORECAST RANGE DIAGRAM

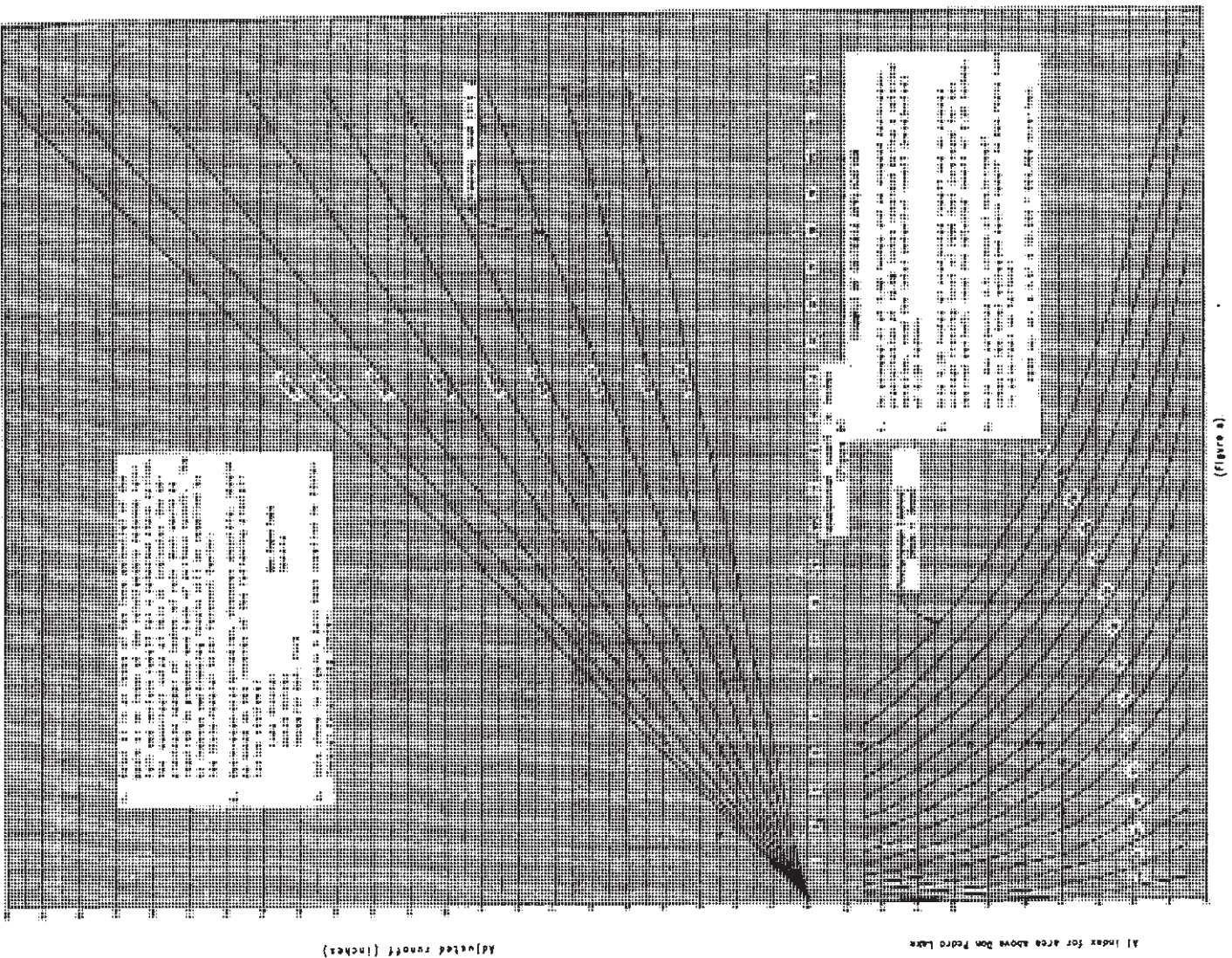


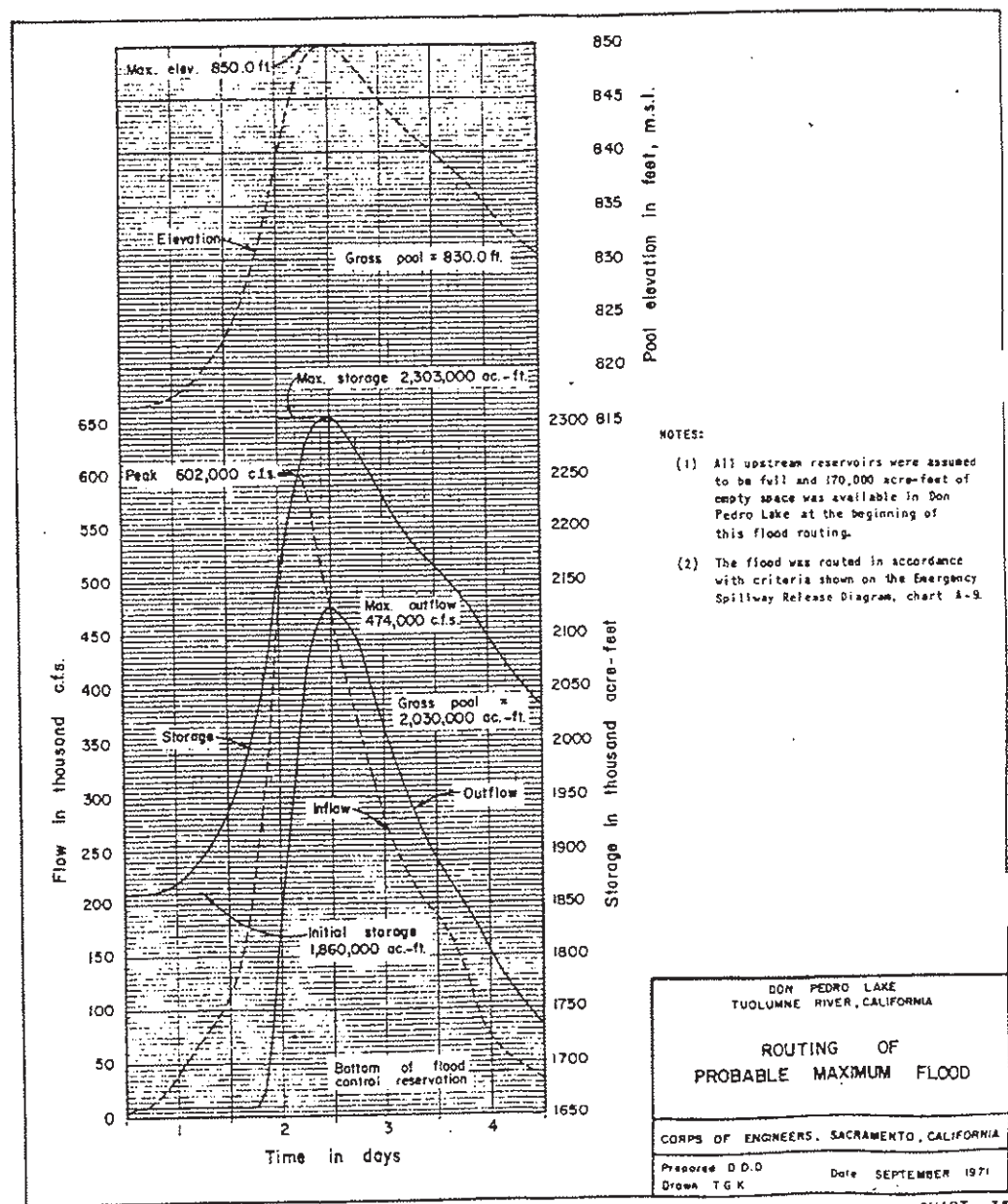
NOTE:
Data shown
snowmelt fore.

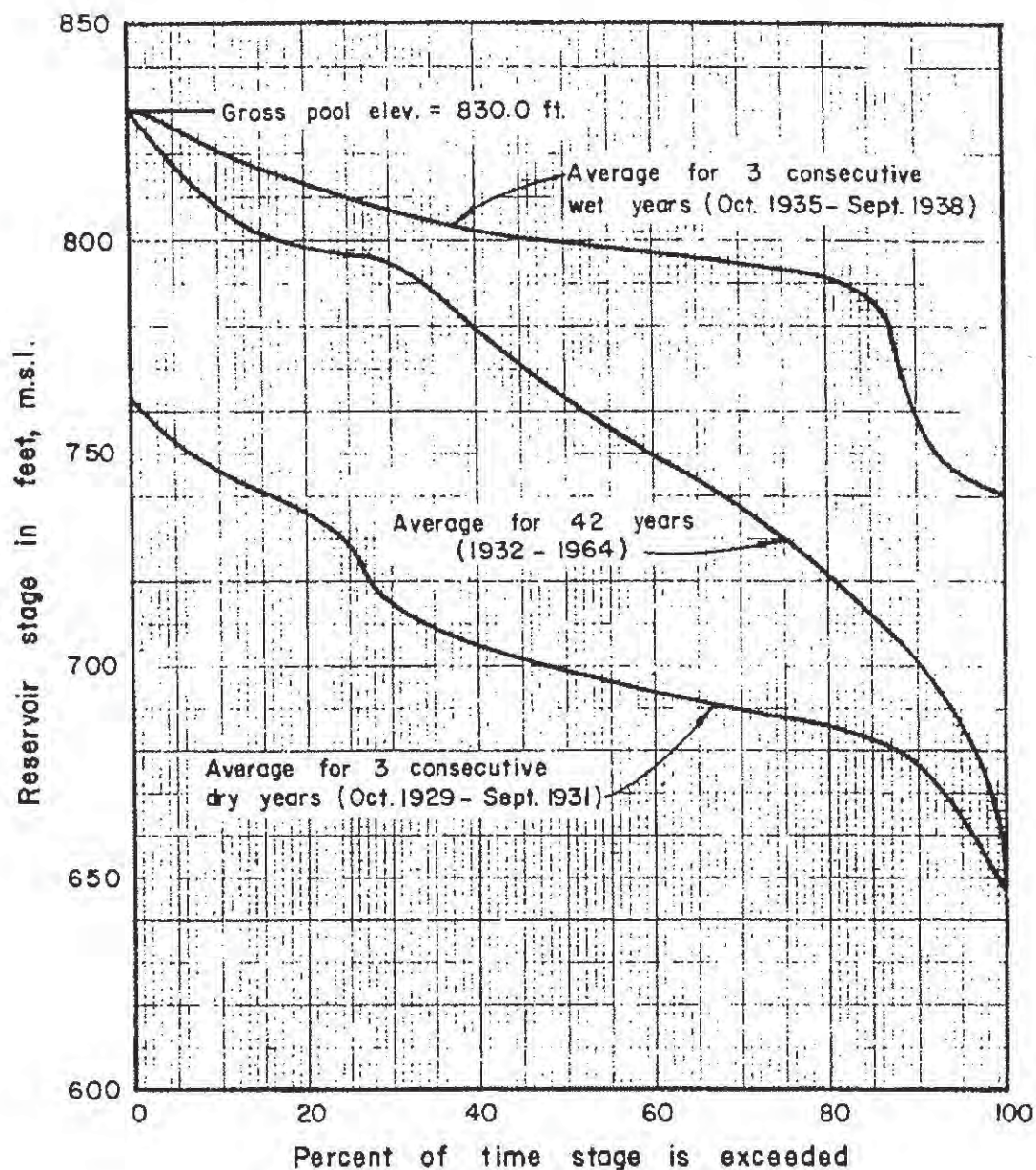
DOR
TUOLUMNE
SNOWMELT FO

CORPS OF ENGINEERS,
Prepared: D.D.D.
Drawn: T.G.K.

DON FLENN LANE TUPOLINE E RIVER, CALIFORNIA	
RAIN FLOOD FORECASTING CRITERIA	
CORPS OF ENGINEERS	SACRAMENTO, CALIFORNIA
Prepared: R.E.H. Date: R.E.T. & S.E.H.	Date: September 1971







NOTE:

Curves based on hypothetical monthly routings, furnished by Modesto and Turlock Irrigation Districts.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

STAGE - DURATION CURVES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D.
Drawn: T.G.K.

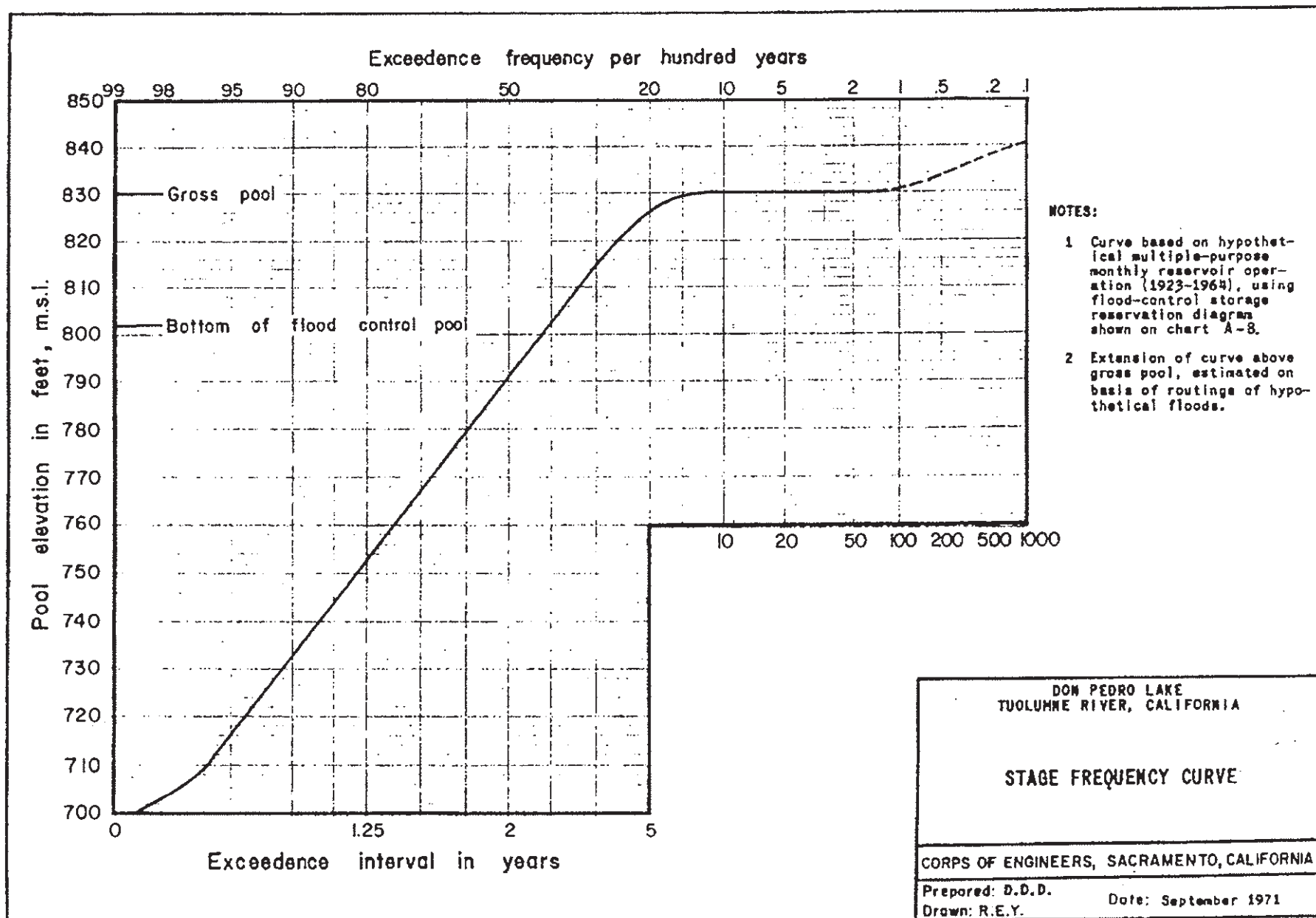
Date: September 1971

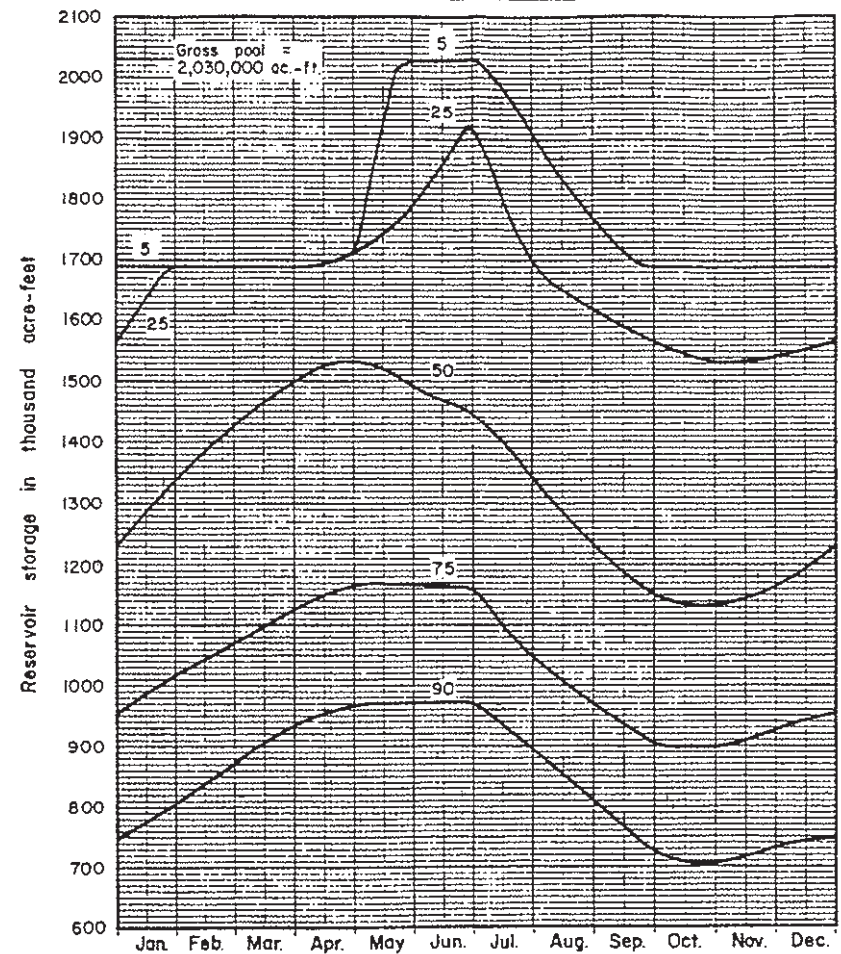
CHART 36

USCCE000296

090

CHART 37





NOTES:

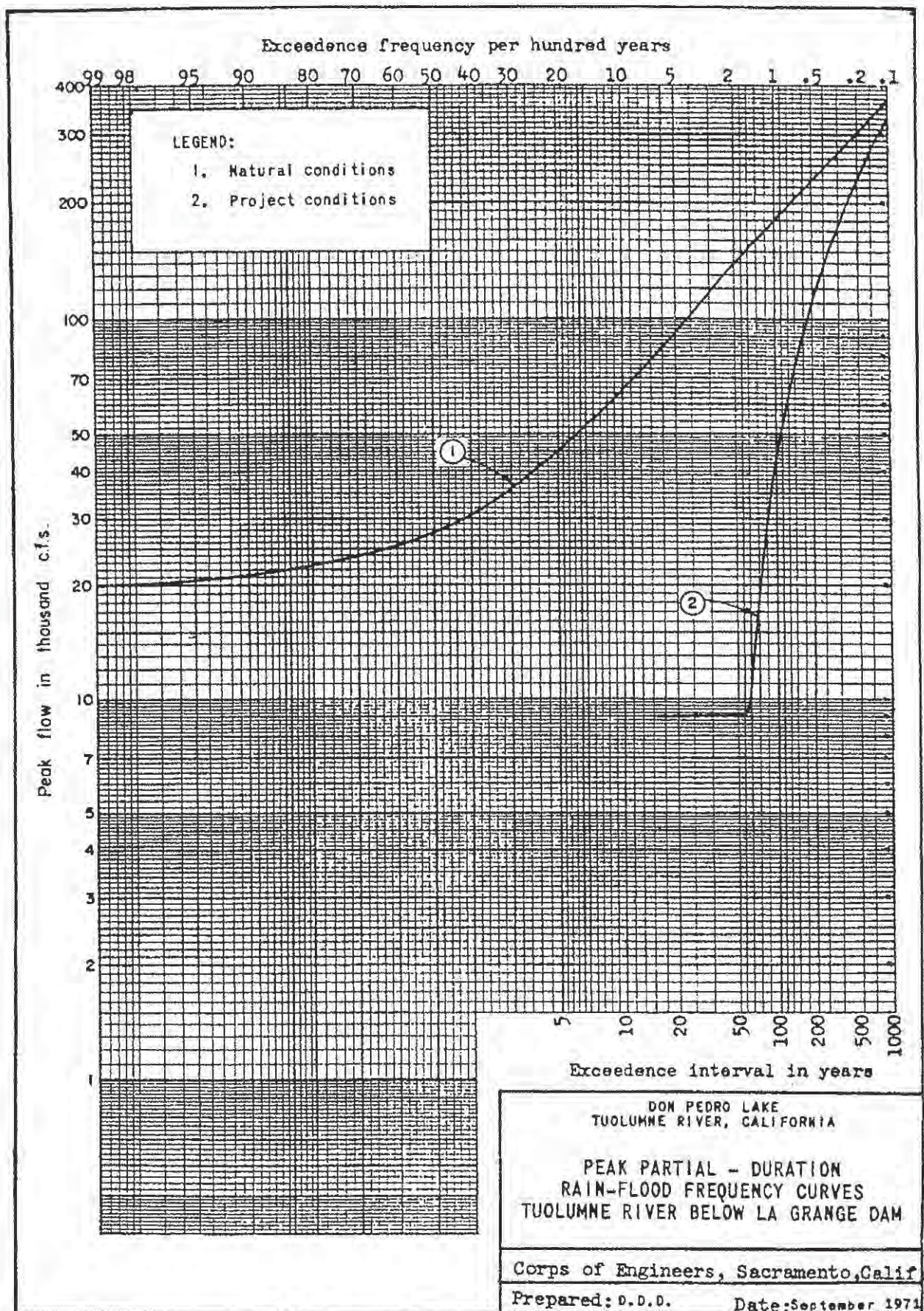
- (1) Indicated value is percentage of years that storage is exceeded on given date. (Based on total storage at end of month.)
- (2) Curves computed from data furnished by Modesto and Turlock Irrigation Districts.

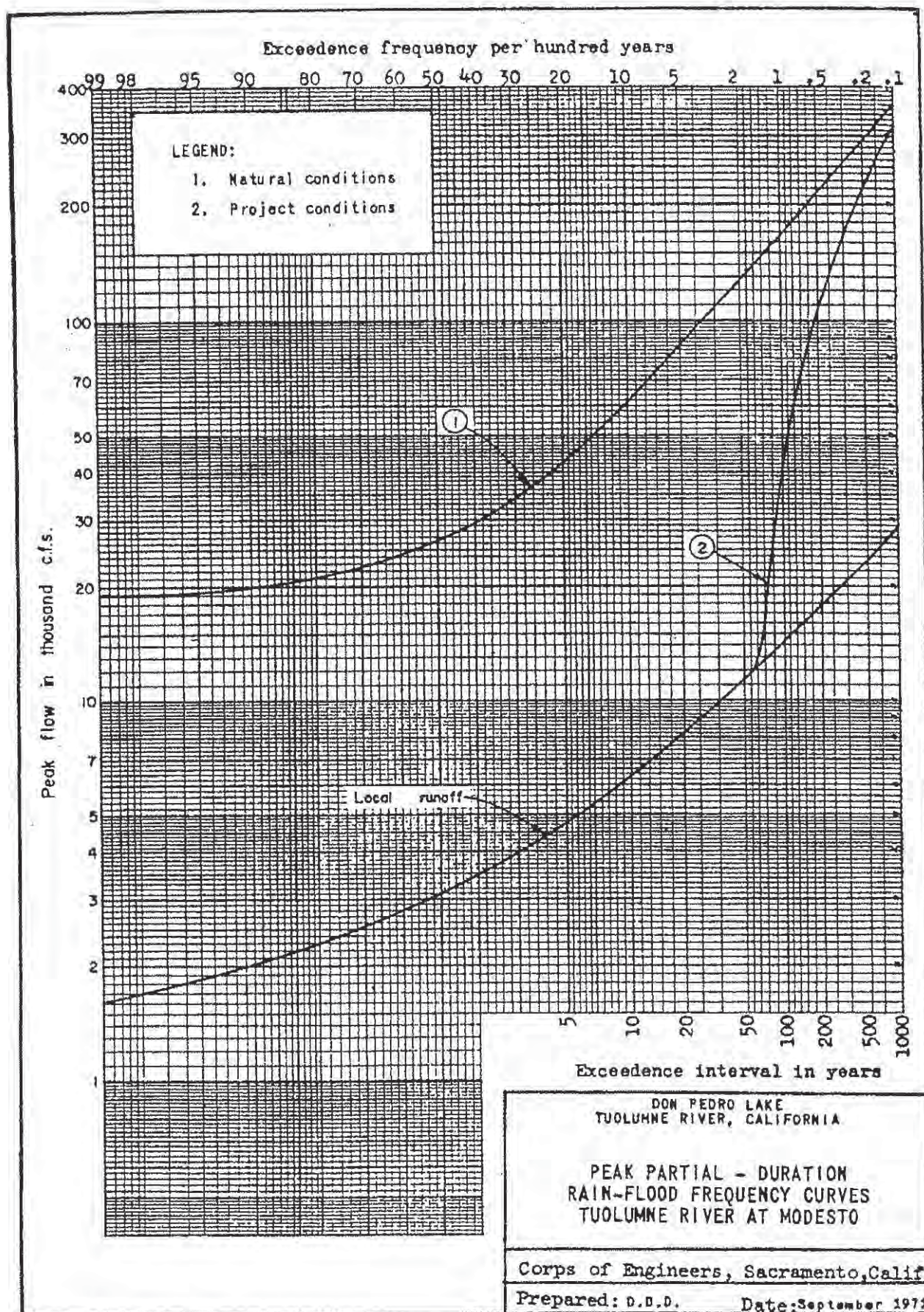
DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

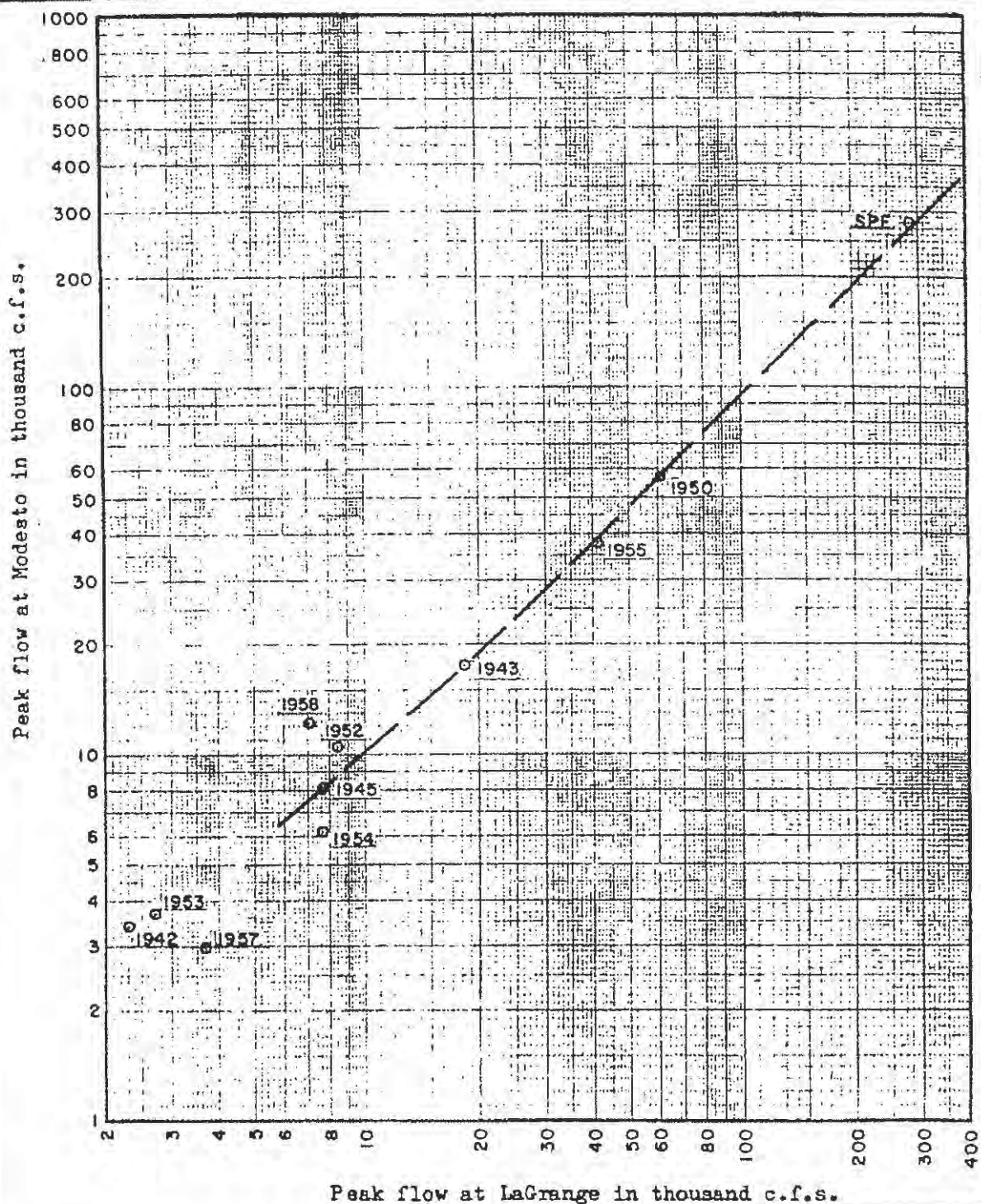
SEASONAL VARIATION
OF
RESERVOIR STORAGE FREQUENCY

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D. Date: SEPTEMBER 1971
Drawn: T.G.K.







Note:

Values are observed rain-flood flows

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

RELATION OF RAINFLOODS
AT MODESTO AND LAGRANGE

U S Army Engineer District
Sacramento California
V.G.K. Mar 1961 File: TU-26-107

Revised title 17 May 1971

CHAP 41

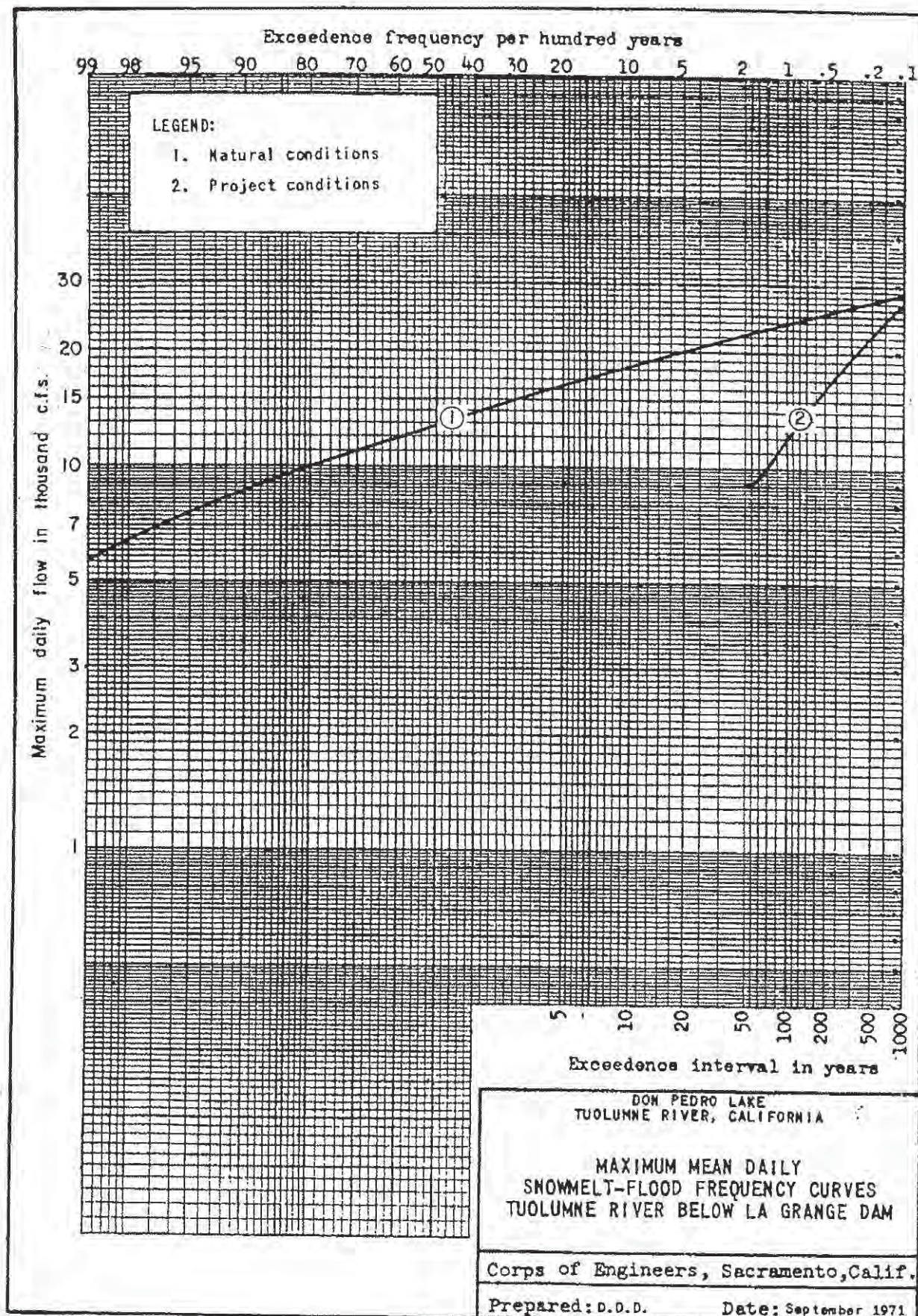
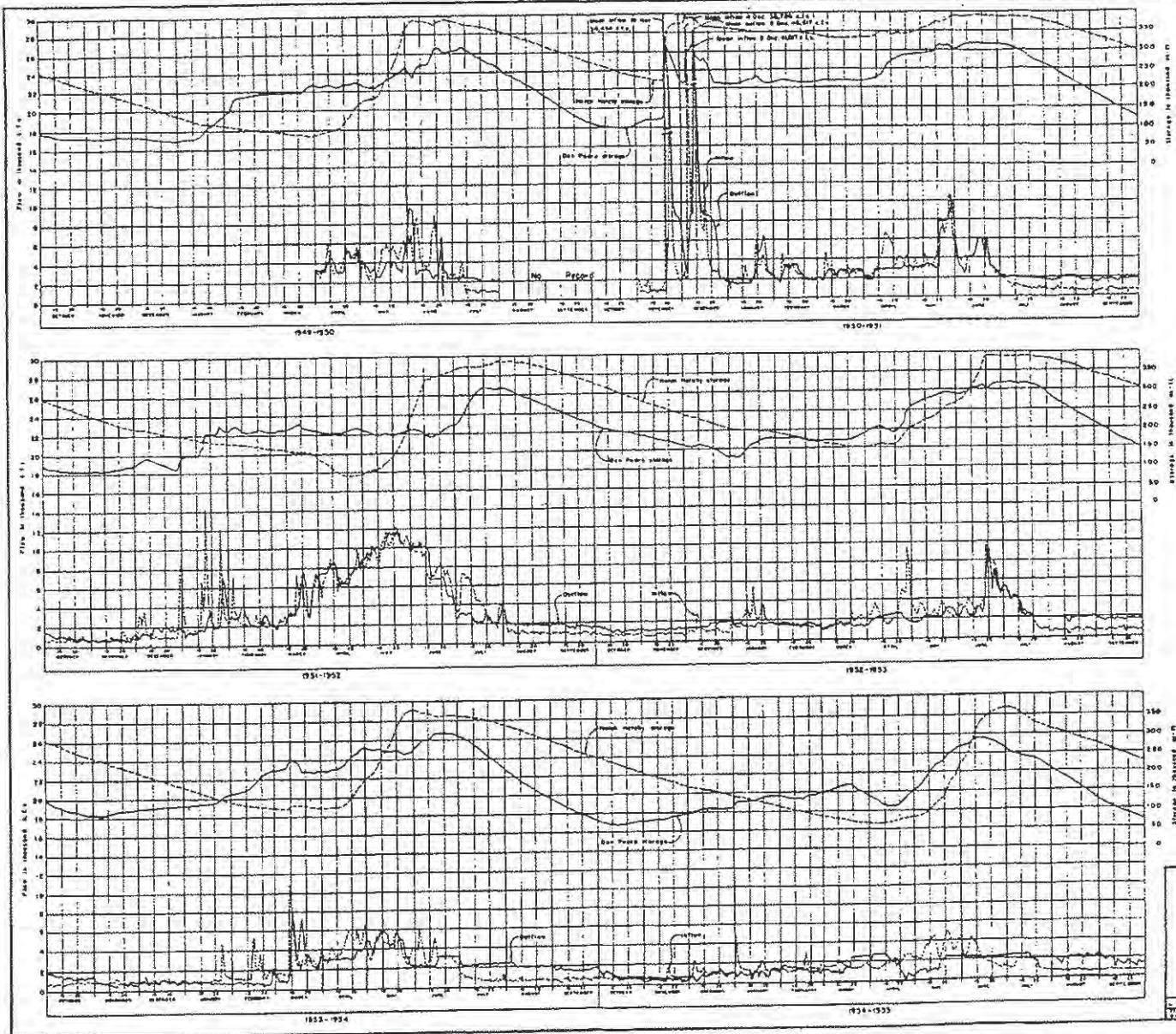


CHART 42

094

USCE000301



NOTES

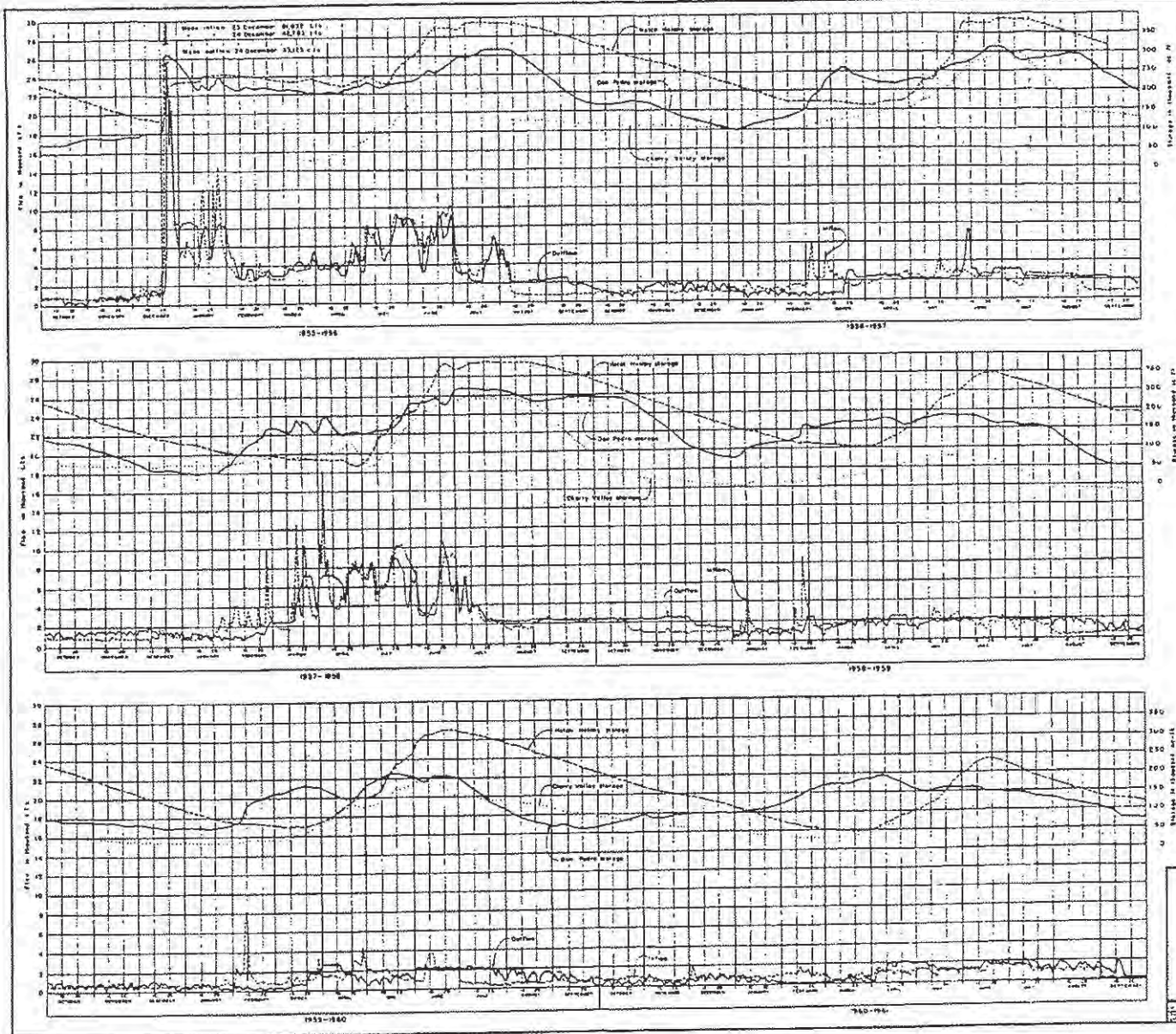
1 Data furnished by Messrs. J. H. Tamm and J. H. Tamm, Jr., California State Engineer.

2 Inflow and outflow measurements are for San Pedro Reservoir.

RESERVOIR OPERATION RECORD
(1949-1970)

San Pedro Reservoir
San Pedro, California

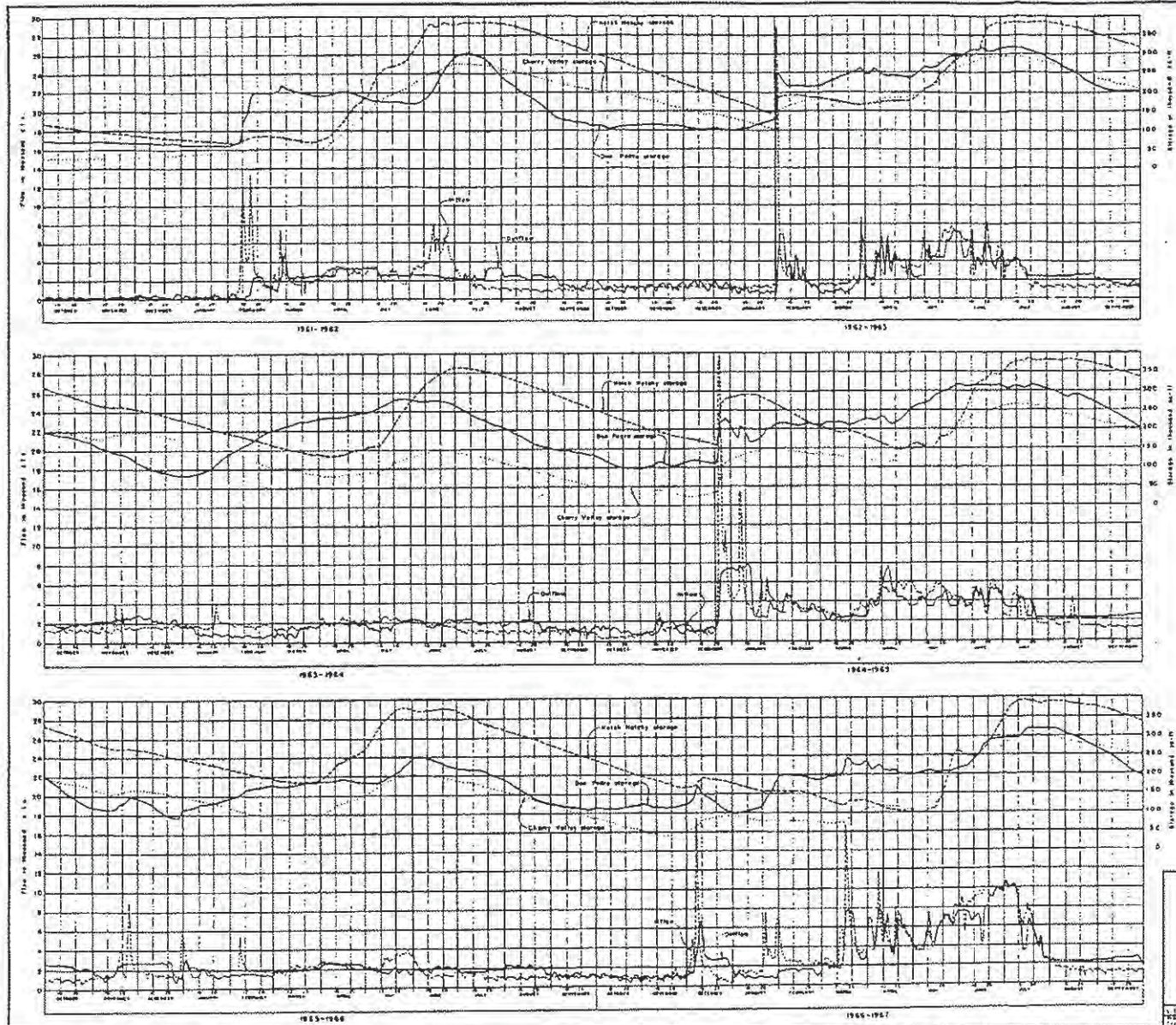
Sheet 1 of 1



NOTE:
 1. Data furnished by Mulliken and Turner
 2. Other and official hydrographs are to
 San Pedro Reservoir

RESERVOIR OPERATION RECORD
 (1949-1970)

Sheet 2 of 43

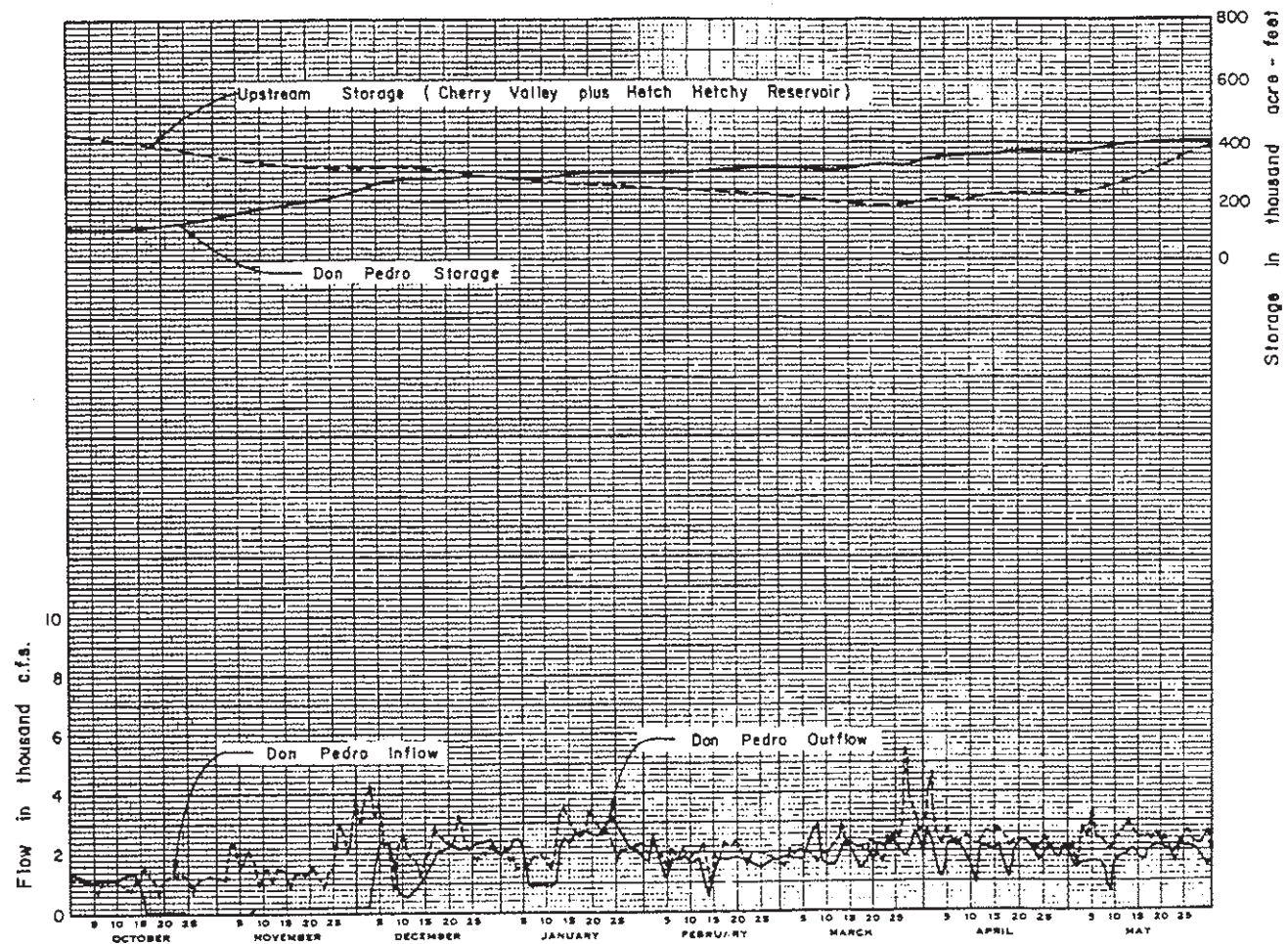


NOTES
 1. Data furnished by Western and Pacific
 2. Data for surface operations are for
 San Pablo Reservoir

RESERVOIR OPERATION RECORD
 (1969-1970)

San Pablo Lake
 Tule Lake, California
 U.S. Army Engineer District
 PREPARED BY: DATE: 10/1/69
 10/1/69

Sheet 1 of 43



1970 - 1971
DON PEDRO LAKE

NOTE:
Inlarged Don Pedro Lake began
operation October 1970.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

OPERATION RECORD
DON PEDRO LAKE

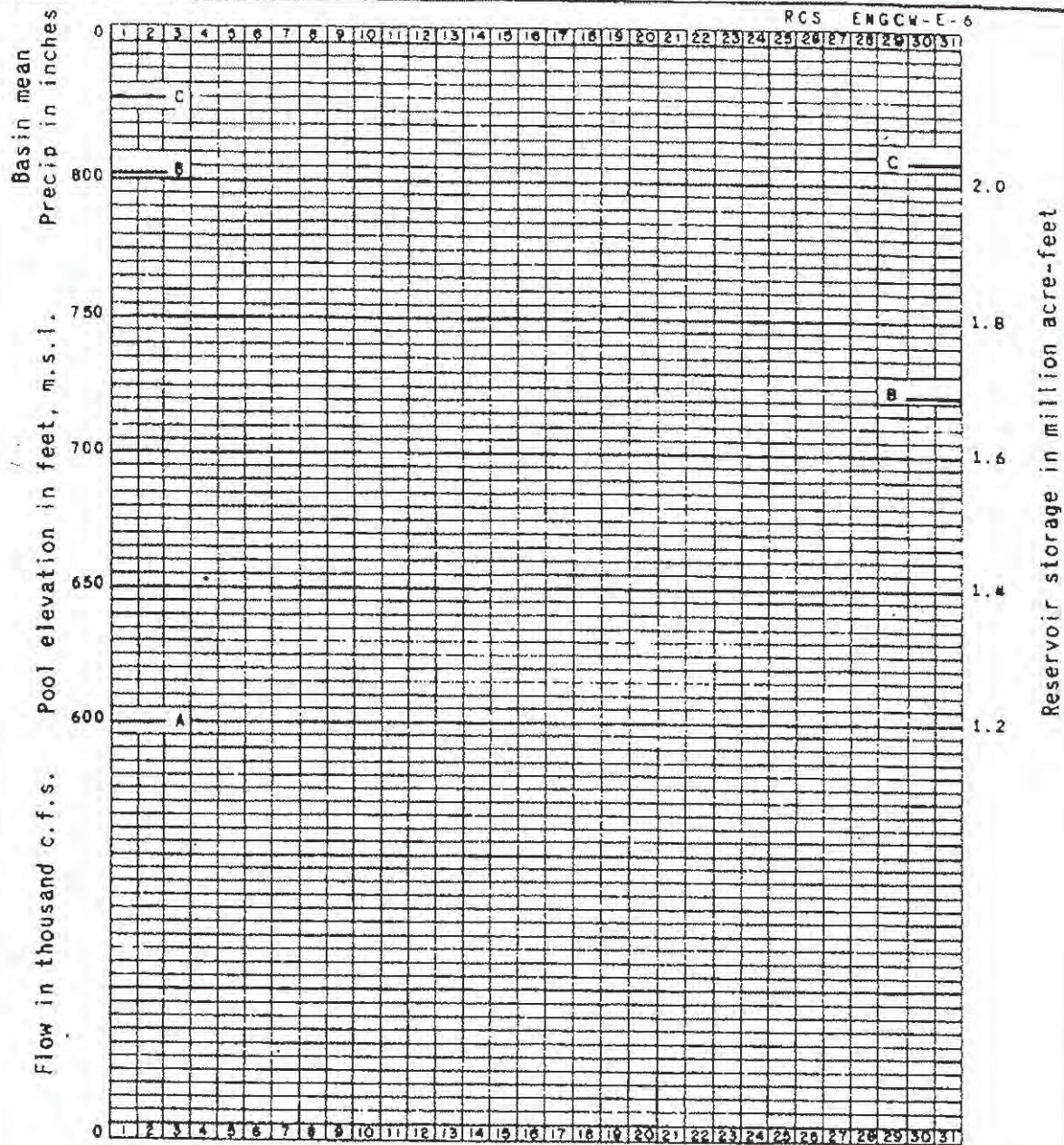
CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D.

Drawn: T.G.K.

Date: SEPTEMBER 1971

CHART 44



- A. Min. power pool elev: 600.0 ft.
storage: 309,000 ac-ft
- B. Bottom flood-control reservation:
elev: 802.0 ft.
storage: 1,690,000 ac-ft
- C. Gross pool elev: 830.0 ft.
storage: 2,030,000 ac-ft

Release capacities @ pool elev. 830.0 ft.
Outlet works - - - - - 7,370 c.f.s.

Powerhouse:
Flood control valve - - 3,140 c.f.s.
Turbines - - - - - 4,500 c.f.s.

MONTHLY RESERVOIR OPERATION

DON PEDRO LAKE

(OPERATED JOINTLY BY TURLOCK AND
MODESTO IRRIGATION DISTRICTS)

TUOLUMNE RIVER, CALIFORNIA

DRAINAGE AREA: 1,533 SQ. MILES

SOUTH PACIFIC DIVISION
SACRAMENTO DISTRICT
SACRAMENTO, CALIFORNIA

SPK FORM 359
1 JUL 66

CHART 45

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

APPENDIX A
STANDING INSTRUCTIONS TO DAMTENDERS
INCLUDING EMERGENCY SPILLWAY OPERATIONS
AND FLOOD CONTROL REGULATIONS

AUGUST 1972

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

APPENDIX A
STANDING INSTRUCTIONS TO DAMTENDERS
INCLUDING EMERGENCY SPILLWAY OPERATIONS
AND FLOOD CONTROL REGULATIONS

TABLE OF CONTENTS

<u>Paragraph</u>	<u>Subject</u>	<u>Page</u>
	PART I - STANDING OPERATING INSTRUCTIONS	
1.	GENERAL	1
2.	FLOOD CONTROL OPERATION REQUIREMENTS	1
3.	LIMITATIONS ON STORAGE	2
4.	LIMITATIONS ON RELEASES	2
5.	EMERGENCY OPERATION OF GATED SPILLWAY	3
6.	STANDING INSTRUCTIONS DURING FLOOD EMERGENCY	4
7.	OPERATIONAL REQUIREMENTS	4
8.	OPERATION REPORTS	6
9.	MODIFICATION OF REGULATIONS	7

PART II - FLOOD CONTROL REGULATIONS

LIST OF CHARTS

Chart No.

A-1	Area and Capacity Curves
A-2	Area and Capacity Tables (15 sheets)
A-3	Discharge Rating Curves (River Outlet Works)
A-4	Discharge Rating Curves (Flood Control Valve and Turbines)
A-5	Spillway Rating Curves (Gates fully open)
A-6	Spillway Rating Curves (Gates partially open)
A-7	Stage Discharge Rating Curves
A-8	Flood Control Diagram
A-9	Emergency Spillway Release Diagram

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

APPENDIX A
STANDING INSTRUCTIONS TO DAMTENDERS
INCLUDING EMERGENCY SPILLWAY OPERATIONS
AND FLOOD CONTROL REGULATIONS

PART I - STANDING OPERATING INSTRUCTIONS

1. GENERAL

a. This appendix to the "Report on Reservoir Regulation for Flood Control, Tuolumne River Basin, California" is prepared in accordance with instructions contained in EM 1110-2-3600, paragraph 4-07, (Standing Instructions to Damtenders) and pertains to duties and responsibilities of the damtender in connection with the functional operation of Don Pedro Dam and Lake, and the reporting of required hydrologic data.

b. Operational instructions to the damtender are briefly outlined with specific emphasis on his duties and responsibilities during extreme flood emergencies when communication facilities between him and his operating office (Modesto and Turlock Irrigation Districts) may have been disrupted. It is designed to be used independently as an emergency flood control regulation guide, or in conjunction with the "Report on Reservoir Regulation for Flood Control, Don Pedro Dam and Lake, Tuolumne River, California".

2. FLOOD CONTROL OPERATION REQUIREMENTS

a. Don Pedro Dam and Lake will be operated for flood control in accordance with flood control regulations prescribed by the Secretary of the Army, a copy of which is contained in this appendix. Accompanying the regulations are the flood control diagram, chart A-8, and the emergency spillway release diagram, chart A-9, which together define the requirements for flood control operation of Don Pedro Lake. The flood control objectives for Don Pedro Lake are to restrict flows in Tuolumne River downstream of Don Pedro Dam to non-damaging rates, insofar as possible and to minimize damage along Lower San Joaquin River.

b. A maximum of 340,000 acre-feet of space is dedicated to flood control during the winter rain flood season as shown on the flood control diagram. During the snowmelt season, flood control space requirements are defined by the parameter lines on the flood control diagram in terms of space required versus predicted snowmelt runoff. Capacity curves are shown on chart A-1 and area and capacity tables are listed on chart A-2.

runoff downstream to recede, maximum releases should be regulated as closely as possible by gradually closing the river outlet gates and thereafter restricting outflows according to the induced-surge curve of the emergency spillway release diagram. Accordingly, it is essential that such releases be made immediately in order that it will not subsequently become necessary to make larger releases. For this reason the reservoir operators at the dam should be thoroughly familiar with the emergency spillway release diagram and should be authorized to initiate use of the diagram, if required, when communication with Modesto and Turlock Irrigation Districts office is disrupted.

6. STANDING INSTRUCTIONS DURING FLOOD EMERGENCY

Whenever communications between the Turlock and Modesto Irrigation Districts office and the damtender are broken during a flood period, the damtender shall continue to operate in accordance with the latest instructions until communications are restored or until emergency spillway operation, in accordance with paragraph 5 above, becomes necessary.

7. OPERATIONAL REQUIREMENTS

a. Don Pedro Lake is operated by Turlock and Modesto Irrigation Districts and these districts are jointly responsible for:

- (1) Accomplishing the physical operation of the reservoir and associated facilities in accordance with the official regulations.
- (2) Advising the District Engineer, Sacramento District, Corps of Engineers, of any need for emergency change in operation.
- (3) Reporting to the District Engineer, Sacramento District, Corps of Engineers, any unusual condition in the reservoir or along downstream channels that might temporarily interfere with the planned flood control operation of the reservoir.
- (4) Keeping downstream interests advised of impending changes in flood control releases which may affect them.
- (5) Reporting by telephone to the Reservoir Regulation Section, Sacramento District, Corps of Engineers, the data outlined in paragraph 8-a below, and other data that may be requested from time to time.
- (6) Keeping informed of the rules and regulations contained in this report and bringing to the attention of the District Engineer, Sacramento District, Corps of Engineers, any features contained herein that may require clarification or revision.

- (1) Daily inflow, outflow, elevation, and storage at Don Pedro Lake.
- (2) Daily storage at upstream reservoirs (Hetch Hetchy, Lake Lloyd, and Lake Eleanor).
- (3) Daily diversion at La Grange Dam (Modesto and Turlock Canals).
- (4) Daily flow in Tuolumne River below La Grange Dam.
- (5) Daily precipitation amounts at Don Pedro, Hetch Hetchy, Sonora and Yosemite.

9. MODIFICATION OF REGULATIONS

a. The official regulations are subject to temporary modification by the District Engineer, Corps of Engineers, during flood emergencies. Permanent changes in the regulations may be made by reissuing them in the same manner as originally prescribed.

b. The Turlock and Modesto Irrigation Districts may temporarily suspend application of the flood control regulations for Don Pedro Lake in the event this is deemed necessary for emergency reasons to protect the safety of the dam, or to avoid other severe hazards. Revision of the flood control diagram for Don Pedro Dam and Lake may be made when necessary with the mutual consent of the Corps of Engineers and the Turlock and Modesto Irrigation Districts.

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

REPORT ON RESERVOIR REGULATION
FOR FLOOD CONTROL

AUGUST 1972

APPENDIX A
FLOOD CONTROL REGULATIONS

Department of the Army
Sacramento District, Corps of Engineers
Sacramento, California

CODE OF FEDERAL REGULATIONS

TITLE 33 - NAVIGATION AND NAVIGABLE WATERS

Chapter II - Corps of Engineers
Department of the Army

PART 208 - FLOOD CONTROL REGULATIONS

DON PEDRO DAM AND LAKE
TUOLUMNE RIVER, CALIFORNIA

Pursuant to the provisions of Section 7 of the Act of Congress approved December 22, 1944 (58 Stat. 890; 33 U.S.C. 709), and of contract no. DA-04-167-Eng-38 dated August 29, 1949, as amended by Supplemental Agreement No. 1 dated 12 June 1967, between the United States of America and the City and County of San Francisco, California, the Modesto Irrigation District, Modesto, California and the Turlock Irrigation District, Turlock, California, the following Part #208 _____ regulations are hereby prescribed to govern the operation of Don Pedro Dam and Lake on Tuolumne River, California, in the interest of flood control:

PART 208. - DON PEDRO DAM AND LAKE, CALIFORNIA.

The Modesto Irrigation District, Modesto, California and Turlock Irrigation District, Turlock, California, hereinafter referred to as the Districts, shall operate or otherwise effect the operation of Don Pedro Dam and Lake in the interest of flood control in accordance with instructions furnished by the Department of the Army, represented by the District Engineer in charge of the locality, hereinafter referred to as the District Engineer, as follows:

- a. Storage space in Don Pedro Lake of 340,000 acre-feet below

elevation 830.00 feet, shall be kept available for flood control purposes on a seasonal basis in accordance with the Flood Control Diagram currently in force. The Flood Control Diagram in force as of the promulgation of this section is that dated _____, File No. TU-1-19-9.

b. Except when greater releases are required as prescribed in paragraph (c) of this section, releases from Don Pedro Lake shall be restricted insofar as possible to quantities which will not cause flows in the Tuolumne River below Dry Creek to exceed the controlling flow rates specified on the Flood Control Diagram currently in force. Any water temporarily stored in the flood control space indicated by the Flood Control Diagram shall be released as rapidly as can be safely accomplished without causing downstream flows to exceed the rates of flow shown thereon.

c. In the event the water level at Don Pedro Lake exceeds the top of flood control pool, elevation 830, and is rising, subsequent operation shall be in accordance with the Emergency Spillway Release Diagram currently in force. When the lake level again recedes to elevation 830, subsequent operation shall be in accordance with the Flood Control Diagram. The Emergency Spillway Release Diagram in force as of the promulgation of this section is that dated _____, File No. TU-1-13-11.

d. Except as necessary in order to comply with the provisions of the Emergency Spillway Release Diagram under paragraph (c) above, the regulations of this section shall not be construed to require dangerously

rapid changes in magnitudes of release or that releases be made in a manner that will be inconsistent with requirements for protecting the dam and reservoir from major damages.

e. The Districts shall procure such current basic hydrologic data and make such current determinations of required flood control space and releases at the lake as are required to accomplish the flood control objectives prescribed in this section.

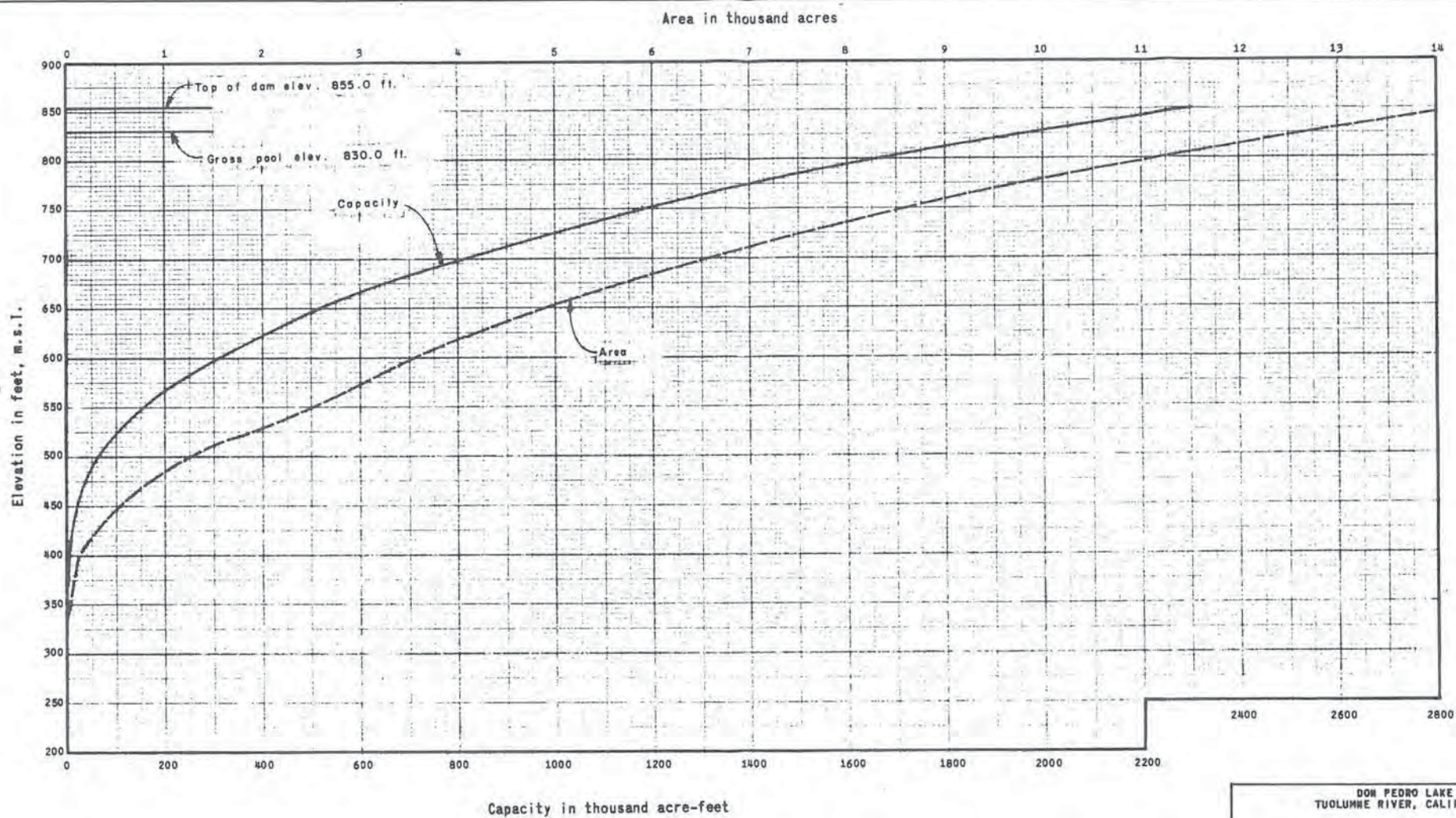
f. The Districts shall keep the District Engineer currently advised of lake storage and such other operating data as the District Engineer may request.

g. The flood control regulations of this section are subject to temporary modification by the District Engineer if found necessary in time of emergency. Requests for and action on such modifications may be made by any available means of communication, and the action taken by the District Engineer shall be confirmed in writing under date of same day to the office of the Districts.

h. The Districts may temporarily suspend application of the flood control regulations of this section in the event it is deemed necessary for emergency reasons to protect the safety of the dam, or to avoid other serious hazards. Such action shall be immediately reported by any available means of communication, and confirmed in writing under date of same day to the District Engineer.

i. Revision of the Flood Control or Emergency Spillway Release Diagrams requires approval of the Chief of Engineers, or his duly authorized representative, and the Modesto and Turlock Irrigation

Districts. Each such revision shall be effective upon the date specified in the approval, and from that date until replaced shall be the diagram in force for the purpose of this section. The Flood Control and Emergency Spillway Release Diagrams are on file in the Office, Chief of Engineers, Department of the Army, Washington, D. C., and the offices of the Modesto Irrigation District, Modesto, California and Turlock Irrigation District, Turlock, California. Copies of the diagrams currently in force shall be kept on file in and may be obtained from the offices of the District Engineer, Corps of Engineers, Sacramento, California, and the Modesto Irrigation District, Modesto, California and Turlock Irrigation District, Turlock, California.



NOTE:

Curves based on data furnished by Bechtel Corp.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

AREA AND CAPACITY CURVES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: C.D.M. Date: August 1970
Drawn: R.E.Y. & S.K.W.

CHART A-1

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA 0	CAP AREA 1	CAP AREA 2	CAP AREA 3	CAP AREA 4	CAP AREA 5	CAP AREA 6	CAP AREA 7	CAP AREA 8	CAP AREA 9
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
290.0	0 0	0 0	0 0	1 1	1 1	3 2	5 3	8 3	12 4	17 6
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
300.0	35 7	42 7	50 8	57 8	65 8	74 8	82 9	91 9	100 9	110 10
310.0	120 10	130 10	140 10	150 11	161 11	172 11	183 11	194 11	206 12	218 12
320.0	229 12	242 13	255 13	268 14	283 15	297 15	313 16	330 17	347 17	364 18
330.0	383 19	402 20	423 21	444 22	466 22	489 23	512 24	537 25	563 26	589 27
340.0	617 28	645 28	673 29	702 29	732 30	762 30	792 30	822 31	853 31	885 32
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
350.0	916 32	949 33	982 34	1016 35	1051 35	1087 36	1124 37	1162 38	1200 39	1240 40
360.0	1280 41	1322 42	1365 44	1409 45	1455 46	1502 48	1551 49	1600 51	1652 52	1705 54
370.0	1759 55	1815 57	1872 59	1932 60	1993 62	2056 64	2121 66	2188 68	2257 70	2328 72
380.0	2401 74	2477 76	2554 79	2634 81	2717 84	2802 87	2890 89	2981 92	3074 94	3170 97
390.0	3268 100	3370 104	3476 108	3587 112	3701 117	3820 121	3943 125	4071 130	4203 135	4340 139

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA 0	CAP AREA 1	CAP AREA 2	CAP AREA 3	CAP AREA 4	CAP AREA 5	CAP AREA 6	CAP AREA 7	CAP AREA 8	CAP AREA 9
400.0	4481 144	4629 151	4783 158	4944 165	5113 172	5289 180	5472 187	5663 195	5862 203	6069 211
410.0	6283 219	6507 227	6738 236	6978 244	7226 253	7483 262	7749 271	8025 280	8309 289	8603 298
420.0	8906 308	9218 316	9538 324	9865 332	10201 340	10545 348	10898 357	11259 365	11628 374	12006 382
430.0	12393 391	12787 399	13190 407	13601 415	14020 423	14447 431	14882 439	15325 448	15777 456	16237 464
440.0	16706 473	17184 482	17670 491	18166 500	18671 510	19185 519	19709 528	20242 538	20785 548	21337 557
450.0	21899 567	22471 577	23054 588	23647 598	24251 609	24865 620	25490 631	26126 642	26774 653	27432 664
460.0	28101 675	28782 686	29473 697	30175 708	30888 719	31613 730	32348 741	33095 752	33853 764	34623 775
470.0	35404 787	36198 802	37008 817	37832 832	38672 847	39527 863	40397 878	41284 894	42186 910	43103 926
480.0	44037 942	44987 957	45952 973	46932 986	47928 1004	48940 1019	49967 1035	51010 1051	52070 1067	53145 1084
490.0	54237 1100	55344 1115	56466 1129	57603 1144	58754 1159	59921 1174	61102 1189	62298 1204	63510 1219	64737 1235
500.0	66110 1250	67371 1272	68654 1294	69960 1317	71288 1340	72639 1363	74014 1386	75411 1409	76832 1432	78276 1456
510.0	79744 1480	81232 1496	82735 1511	84254 1527	85789 1543	87340 1559	88907 1575	90490 1591	92090 1607	93705 1624
520.0	95337 1640	96992 1671	98679 1702	100396 1733	102145 1765	103925 1796	105738 1829	107582 1861	109460 1894	111370 1927
530.0	113313 1960	115290 1993	117299 2026	119341 2059	121417 2093	123527 2127	125671 2161	127848 2195	130061 2230	132308 2265
540.0	134591 2300	136902 2323	139236 2345	141592 2368	143971 2391	146374 2414	148799 2437	151247 2460	153718 2483	156213 2507
550.0	158731 2530	161269 2546	163823 2562	166393 2577	168978 2593	171579 2609	174197 2625	176830 2641	179480 2658	182146 2674
560.0	184827 2690	187529 2713	190253 2735	192999 2758	195769 2781	198561 2804	201376 2827	204215 2850	207076 2873	209961 2897
570.0	212870 2920	215797 2936	218741 2952	221701 2968	224676 2983	227668 2999	230675 3015	233699 3032	236738 3048	239794 3064
580.0	242866 3080	245957 3102	249069 3123	252204 3145	255360 3167	258538 3189	261738 3211	264960 3233	268204 3255	271471 3278
590.0	274760 3300	278070 3322	281403 3343	284757 3365	288134 3387	291532 3409	294952 3431	298394 3453	301858 3475	305345 3498

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
600.0	308960 3520	309312 3522	309665 3525	310017 3527	310370 3529	310723 3531	311076 3534	311430 3536	311784 3538	312138 3540
601.0	312492 3543	312846 3545	313201 3547	313556 3549	313911 3552	314266 3554	314621 3556	314977 3559	315333 3561	315689 3563
602.0	316046 3565	316402 3568	316759 3570	317116 3572	317474 3575	317831 3577	318189 3579	318547 3581	318905 3584	319264 3586
603.0	319623 3588	319982 3591	320341 3593	320700 3595	321060 3597	321420 3600	321780 3602	322140 3604	322500 3607	322861 3609
604.0	323222 3611	323583 3613	323945 3615	324307 3618	324669 3620	325031 3623	325393 3625	325756 3627	326118 3629	326482 3632
605.0	326845 3634	327208 3636	327572 3639	327936 3641	328300 3643	328665 3646	329029 3648	329394 3650	329759 3653	330125 3655
606.0	330490 3657	330856 3659	331222 3662	331589 3664	331955 3666	332322 3669	332689 3671	333056 3673	333424 3676	333791 3678
607.0	334159 3680	334527 3683	334896 3685	335264 3687	335633 3690	336002 3692	336371 3694	336741 3696	337111 3699	337481 3701
608.0	337851 3703	338221 3706	338592 3708	338963 3710	339334 3713	339706 3715	340077 3717	340449 3720	340821 3722	341193 3724
609.0	341566 3727	341939 3729	342312 3731	342685 3734	343059 3736	343432 3738	343806 3741	344180 3743	344555 3745	344929 3748
610.0	345310 3750	345679 3752	346055 3755	346430 3757	346806 3760	347182 3762	347559 3765	347935 3767	348312 3770	348689 3772
611.0	349067 3775	349444 3777	349822 3780	350200 3782	350578 3785	350957 3787	351336 3789	351715 3792	352094 3794	352474 3797
612.0	352854 3799	353234 3802	353614 3804	353995 3807	354375 3809	354756 3812	355138 3814	355519 3817	355901 3819	356283 3822
613.0	356665 3824	357048 3827	357431 3829	357814 3832	358197 3834	358581 3837	358964 3839	359348 3842	359733 3844	360117 3847
614.0	360502 3849	360887 3852	361272 3854	361658 3857	362044 3859	362430 3862	362816 3864	363202 3866	363589 3869	363976 3871
615.0	364363 3874	364751 3876	365139 3879	365527 3881	365915 3884	366304 3887	366692 3889	367081 3892	367471 3894	367860 3897
616.0	368250 3899	368640 3902	369030 3904	369421 3907	369812 3909	370203 3912	370594 3914	370985 3917	371377 3919	371769 3922
617.0	372162 3924	372554 3927	372947 3929	373340 3932	373733 3934	374127 3937	374521 3939	374915 3942	375309 3944	375703 3947
618.0	376098 3949	376493 3952	376889 3954	377284 3957	377680 3959	378076 3962	378472 3965	378869 3967	379266 3970	379663 3972
619.0	380060 3975	380458 3977	380856 3980	381254 3982	381652 3985	382051 3987	382450 3990	382849 3992	383248 3995	383648 3997

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELFV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
620.0	384060 4000	384461 4003	384861 4006	385262 4009	385663 4011	386064 4014	386466 4017	386868 4020	387270 4023	387672 4026
621.0	388075 4029	388478 4031	388881 4034	389285 4037	389689 4040	390093 4043	390497 4046	390902 4049	391307 4051	391712 4054
622.0	392118 4057	392524 4060	392930 4063	393336 4066	393743 4069	394150 4072	394557 4074	394965 4077	395373 4080	395781 4083
623.0	396189 4086	396598 4089	397007 4092	397416 4095	397826 4097	398236 4100	398646 4103	399056 4106	399467 4109	399878 4112
624.0	400290 4115	400701 4118	401113 4121	401525 4123	401938 4126	402351 4129	402764 4132	403177 4135	403591 4138	404005 4141
625.0	404419 4144	404833 4147	405248 4150	405663 4152	406079 4155	406494 4158	406910 4161	407327 4164	407743 4167	408160 4170
626.0	408577 4173	408995 4176	409412 4179	409830 4182	410249 4184	410667 4187	411086 4190	411505 4193	411925 4196	412344 4199
627.0	412764 4202	413185 4205	413605 4208	414026 4211	414448 4214	414869 4217	415291 4219	415713 4222	416135 4225	416558 4228
628.0	416981 4231	417404 4234	417828 4237	418252 4240	418676 4243	419100 4246	419525 4249	419950 4252	420375 4255	420801 4258
629.0	421227 4261	421653 4263	422080 4266	422506 4269	422933 4272	423361 4275	423789 4278	424216 4281	424645 4284	425073 4287
630.0	425510 4290	425931 4293	426361 4296	426790 4299	427221 4302	427651 4305	428081 4308	428512 4311	428944 4314	429375 4317
631.0	429807 4320	430239 4323	430671 4325	431104 4328	431537 4331	431970 4334	432404 4337	432838 4340	433272 4343	433707 4346
632.0	434141 4349	434576 4352	435012 4355	435447 4358	435883 4361	436320 4364	436756 4367	437193 4370	437630 4373	438068 4376
633.0	438505 4379	438943 4382	439382 4385	439820 4388	440259 4391	440699 4394	441138 4397	441578 4400	442018 4403	442458 4406
634.0	442899 4409	443340 4412	443782 4415	444223 4418	444665 4421	445107 4424	445550 4427	445993 4430	446436 4433	446879 4436
635.0	447323 4439	447767 4442	448211 4445	448656 4448	449101 4451	449546 4454	449992 4457	450437 4460	450884 4463	451330 4466
636.0	451777 4469	452224 4472	452671 4475	453119 4478	453567 4481	454015 4484	454463 4487	454912 4490	455361 4493	455811 4496
637.0	456261 4499	456711 4502	457161 4505	457612 4508	458063 4511	458514 4514	458965 4517	459417 4520	459869 4523	460322 4526
638.0	460775 4529	461228 4532	461681 4535	462135 4538	462589 4541	463043 4544	463498 4547	463952 4550	464408 4553	464863 4557
639.0	465319 4560	465775 4563	466231 4566	466688 4569	467145 4572	467603 4575	468060 4578	468518 4581	468976 4584	469435 4587

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
640.0	469910 4590	470370 4593	470829 4596	471289 4600	471749 4603	472210 4606	472671 4609	473132 4613	473593 4616	474055 4619
641.0	474517 4622	474979 4626	475442 4629	475905 4632	476369 4636	476832 4639	477296 4642	477761 4645	478225 4649	478690 4652
642.0	479156 4655	479621 4658	480087 4662	480554 4665	481020 4668	481487 4671	481955 4675	482422 4678	482890 4681	483359 4685
643.0	483827 4688	484296 4691	484765 4694	485235 4698	485705 4701	486175 4704	486646 4707	487117 4711	487588 4714	488059 4717
644.0	488531 4721	489004 4724	489476 4727	489949 4731	490422 4734	490896 4737	491370 4740	491844 4744	492318 4747	492793 4750
645.0	493268 4754	493744 4757	494220 4760	494696 4763	495173 4767	495649 4770	496127 4773	496604 4777	497082 4780	497560 4783
646.0	498039 4787	498517 4790	498997 4793	499476 4797	499956 4800	500436 4803	500917 4807	501397 4810	501878 4813	502360 4816
647.0	502842 4820	503324 4823	503806 4826	504289 4830	504772 4833	505256 4836	505740 4840	506224 4843	506708 4846	507193 4850
648.0	507678 4853	508164 4856	508649 4860	509136 4863	509622 4866	510109 4870	510596 4873	511084 4876	511571 4880	512060 4883
649.0	512548 4886	513037 4890	513526 4893	514015 4897	514505 4900	514995 4903	515486 4907	515977 4910	516468 4913	516959 4917
650.0	517450 4920	517943 4923	518436 4926	518929 4929	519422 4932	519915 4935	520409 4938	520902 4941	521397 4944	521891 4947
651.0	522386 4950	522881 4953	523377 4956	523872 4958	524368 4961	524865 4964	525361 4967	525858 4970	526355 4973	526853 4976
652.0	527350 4979	527849 4982	528347 4985	528846 4988	529345 4991	529844 4994	530343 4997	530843 5000	531343 5003	531844 5006
653.0	532345 5009	532846 5012	533347 5015	533849 5018	534351 5021	534853 5024	535355 5027	535858 5030	536361 5033	536865 5036
654.0	537369 5039	537873 5042	538377 5045	538882 5048	539387 5051	539892 5054	540397 5057	540903 5060	541409 5063	541916 5066
655.0	542423 5069	542930 5072	543437 5075	543945 5078	544452 5081	544961 5084	545469 5087	545978 5090	546487 5093	546997 5096
656.0	547506 5099	548016 5102	548527 5105	549037 5108	549548 5111	550060 5114	550571 5117	551083 5120	551595 5123	552108 5126
657.0	552620 5129	553133 5132	553647 5135	554160 5138	554674 5141	555189 5144	555703 5147	556218 5150	556733 5153	557249 5156
658.0	557765 5159	558281 5162	558797 5165	559314 5168	559831 5171	560348 5174	560866 5177	561384 5180	561902 5184	562420 5187
659.0	562939 5190	563458 5193	563978 5196	564497 5199	565017 5202	565538 5205	566058 5208	566579 5211	567100 5214	567622 5217

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG. 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
660.0	568150 5220	568673 5223	569195 5226	569718 5229	570241 5233	570764 5236	571288 5239	571812 5242	572337 5245	572861 5248
661.0	573386 5252	573912 5255	574437 5258	574963 5261	575489 5264	576016 5267	576543 5271	577070 5274	577598 5277	578126 5280
662.0	578654 5283	579182 5286	579711 5290	580240 5293	580770 5296	581299 5299	581829 5302	582360 5305	582890 5309	583422 5312
663.0	583953 5315	584485 5318	585016 5321	585549 5325	586081 5328	586614 5331	587148 5334	587681 5337	588215 5340	588749 5344
664.0	589284 5347	589819 5350	590354 5353	590889 5356	591425 5360	591961 5363	592498 5366	593034 5369	593571 5372	594109 5376
665.0	594647 5379	595185 5382	595723 5385	596262 5388	596801 5392	597340 5395	597880 5398	598420 5401	598960 5404	599501 5408
666.0	600041 5411	600583 5414	601124 5417	601666 5420	602208 5424	602751 5427	603294 5430	603837 5433	604380 5437	604924 5440
667.0	605468 5443	606013 5446	606558 5449	607103 5453	607648 5456	608194 5459	608740 5462	609286 5466	609833 5469	610380 5472
668.0	610927 5475	611475 5478	612023 5482	612571 5485	613120 5488	613669 5491	614218 5495	614768 5498	615318 5501	615868 5504
669.0	616419 5508	616970 5511	617521 5514	618073 5517	618624 5521	619177 5524	619729 5527	620282 5530	620835 5534	621389 5537
670.0	621950 5540	622497 5543	623051 5546	623606 5549	624161 5552	624716 5555	625272 5558	625828 5561	626384 5564	626941 5567
671.0	627497 5570	628055 5573	628612 5576	629170 5579	629728 5582	630286 5584	630845 5587	631403 5590	631963 5593	632522 5596
672.0	633082 5599	633642 5602	634202 5605	634763 5608	635324 5611	635885 5614	636447 5617	637009 5620	637571 5623	638133 5626
673.0	638696 5629	639259 5632	639823 5635	640386 5638	640950 5641	641515 5644	642079 5647	642644 5650	643209 5653	643775 5656
674.0	644340 5659	644906 5662	645473 5665	646039 5668	646606 5671	647174 5674	647741 5677	648309 5680	648877 5683	649446 5686
675.0	650014 5689	650583 5692	651153 5695	651722 5698	652292 5701	652863 5704	653433 5707	654004 5710	654575 5713	655147 5716
676.0	655718 5719	656290 5722	656863 5725	657435 5728	658008 5731	658582 5734	659155 5737	659729 5740	660303 5743	660878 5746
677.0	661452 5749	662028 5752	662603 5755	663179 5758	663755 5761	664331 5764	664907 5767	665484 5770	666061 5773	666639 5776
678.0	667217 5779	667795 5782	668373 5785	668952 5788	669531 5791	670110 5794	670690 5798	671270 5801	671850 5804	672430 5807
679.0	673011 5810	673592 5813	674174 5816	674755 5819	675338 5822	675920 5825	676502 5828	677085 5831	677669 5834	678252 5837

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
680.0	678950 5840	679535 5843	680120 5847	680705 5850	681290 5853	681875 5857	682461 5860	683047 5863	683634 5867	684221 5870
681.0	684808 5874	685395 5877	685983 5880	686571 5884	687160 5887	687749 5890	688338 5894	688928 5897	689517 5900	690108 5904
682.0	690698 5907	691289 5911	691880 5914	692472 5917	693064 5921	693656 5924	694249 5927	694842 5931	695435 5934	696028 5938
683.0	696622 5941	697217 5944	697811 5948	698406 5951	699001 5955	699597 5958	700193 5961	700789 5965	701386 5968	701983 5971
684.0	702580 5975	703178 5978	703776 5982	704374 5985	704973 5988	705572 5992	706171 5995	706771 5999	707371 6002	707971 6005
685.0	708572 6009	709173 6012	709774 6016	710376 6019	710978 6022	711581 6026	712183 6029	712787 6033	713390 6036	713994 6039
686.0	714598 6043	715202 6046	715807 6050	716412 6053	717018 6056	717624 6060	718230 6063	718836 6067	719443 6070	720050 6074
687.0	720658 6077	721266 6080	721874 6084	722482 6087	723091 6091	723701 6094	724310 6098	724920 6101	725530 6104	726141 6108
688.0	726752 6111	727363 6115	727975 6118	728587 6122	729199 6125	729812 6128	730425 6132	731038 6135	731652 6139	732266 6142
689.0	732880 6146	733495 6149	734110 6152	734725 6156	735341 6159	735957 6163	736574 6166	737191 6170	737808 6173	738425 6177
690.0	738950 6180	739661 6183	740280 6187	740899 6190	741518 6194	742137 6197	742757 6201	743378 6204	743998 6208	744619 6211
691.0	745240 6215	745862 6218	746484 6221	747106 6225	747729 6228	748352 6232	748975 6235	749599 6239	750223 6242	750847 6246
692.0	751472 6249	752097 6253	752723 6256	753349 6260	753975 6263	754601 6267	755228 6270	755855 6274	756483 6277	757111 6281
693.0	757739 6284	758367 6287	758996 6291	759626 6294	760255 6298	760885 6301	761515 6305	762146 6308	762777 6312	763409 6315
694.0	764040 6319	764672 6322	765305 6326	765937 6329	766571 6333	767204 6336	767838 6340	768472 6343	769106 6347	769741 6350
695.0	770377 6354	771012 6357	771648 6361	772284 6364	772921 6368	773558 6371	774195 6375	774833 6378	775471 6382	776109 6385
696.0	776748 6389	777387 6392	778026 6396	778666 6399	779306 6403	779947 6406	780587 6410	781229 6413	781870 6417	782512 6420
697.0	783154 6424	783797 6428	784440 6431	785083 6435	785727 6438	786371 6442	787015 6445	787660 6449	788305 6452	788950 6456
698.0	789596 6459	790242 6463	790888 6466	791535 6470	792182 6473	792830 6477	793478 6480	794126 6484	794775 6487	795423 6491
699.0	796073 6495	796722 6498	797372 6502	798023 6505	798673 6509	799324 6512	799976 6516	800628 6519	801280 6523	801932 6526

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
700.0	802500 6530	803154 6534	803807 6537	804461 6541	805116 6545	805770 6548	806425 6552	807081 6556	807736 6559	808392 6563
701.0	809049 6567	809706 6570	810363 6574	811021 6578	811679 6581	812337 6585	812995 6589	813655 6592	814314 6596	814974 6600
702.0	815634 6603	816294 6607	816955 6611	817616 6614	818278 6618	818940 6622	819602 6625	820265 6629	820928 6633	821592 6636
703.0	822255 6640	822920 6644	823584 6647	824249 6651	824914 6655	825580 6658	826246 6662	826912 6666	827579 6669	828246 6673
704.0	828914 6677	829582 6680	830250 6684	830918 6688	831587 6692	832257 6695	832926 6699	833597 6703	834267 6706	834938 6710
705.0	835609 6714	836281 6717	836952 6721	837625 6725	838297 6729	838970 6732	839644 6736	840318 6740	840992 6743	841666 6747
706.0	842341 6751	843016 6754	843692 6758	844368 6762	845044 6766	845721 6769	846398 6773	847076 6777	847754 6780	848432 6784
707.0	849111 6788	849790 6792	850469 6795	851149 6799	851829 6803	852509 6807	853190 6810	853871 6814	854553 6818	855235 6821
708.0	855917 6825	856600 6829	857283 6833	857966 6836	858650 6840	859334 6844	860019 6848	860704 6851	861389 6855	862075 6859
709.0	862761 6863	863447 6866	864134 6870	864821 6874	865509 6878	866197 6881	866885 6885	867574 6889	868263 6893	868952 6896
710.0	869700 6900	870332 6904	871023 6908	871714 6912	872405 6916	873097 6920	873789 6924	874482 6928	875175 6932	875868 6936
711.0	876562 6939	877256 6943	877951 6947	878646 6951	879341 6955	880037 6959	880733 6963	881429 6967	882126 6971	882824 6975
712.0	883521 6979	884219 6983	884918 6987	885617 6991	886316 6995	887016 6999	887716 7003	888416 7007	889117 7011	889819 7015
713.0	890520 7019	891222 7023	891925 7027	892628 7031	893331 7035	894035 7039	894739 7043	895443 7047	896148 7051	896853 7055
714.0	897559 7059	898265 7063	898971 7067	899678 7071	900386 7075	901093 7079	901801 7083	902510 7087	903219 7091	903928 7095
715.0	904638 7099	905348 7103	906058 7107	906769 7111	907480 7115	908192 7119	908904 7123	909616 7127	910329 7131	911042 7135
716.0	911756 7139	912470 7143	913185 7147	913900 7151	914615 7155	915330 7159	916047 7163	916763 7167	917480 7171	918197 7175
717.0	918915 7179	919633 7183	920351 7187	921070 7191	921790 7195	922509 7199	923229 7203	923950 7207	924671 7211	925392 7215
718.0	926114 7219	926836 7223	927558 7227	928281 7231	929005 7235	929728 7239	930453 7243	931177 7247	931902 7251	932627 7255
719.0	933353 7259	934079 7264	934806 7268	935533 7272	936260 7276	936988 7280	937716 7284	938445 7288	939174 7292	939903 7296

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9

720.0	940700 7300	941431 7304	942162 7308	942893 7312	943624 7316	944356 7320	945088 7324	945821 7328	946554 7332	947287 7336
721.0	948021 7341	948756 7345	949490 7349	950225 7353	950961 7357	951697 7361	952433 7365	953170 7369	953907 7373	954644 7377
722.0	955382 7381	956120 7385	956859 7389	957598 7393	958338 7397	959078 7401	959818 7406	960559 7410	961300 7414	962042 7418
723.0	962784 7422	963526 7426	964269 7430	965012 7434	965756 7438	966500 7442	967244 7446	967989 7450	968734 7454	969480 7459
724.0	970226 7463	970972 7467	971719 7471	972466 7475	973214 7479	973962 7483	974711 7487	975460 7491	976209 7495	976959 7500

725.0	977709 7504	978459 7508	979210 7512	979962 7516	980714 7520	981466 7524	982218 7528	982971 7532	983725 7536	984479 7541
726.0	985233 7545	985988 7549	986743 7553	987498 7557	988254 7561	989010 7565	989767 7569	990524 7573	991282 7578	992040 7582
727.0	992798 7586	993557 7590	994316 7594	995076 7598	995836 7602	996596 7606	997357 7611	998118 7615	998880 7619	999642 7623
728.0	1000405 7627	1001168 7631	1001931 7635	1002695 7640	1003459 7644	1004223 7648	1004988 7652	1005754 7656	1006520 7660	1007286 7664
729.0	1008052 7668	1008820 7673	1009587 7677	1010355 7681	1011123 7685	1011892 7689	1012661 7693	1013431 7698	1014201 7702	1014971 7706

730.0	1015700 7710	1016513 7714	1017285 7718	1018057 7722	1018829 7727	1019602 7731	1020375 7735	1021149 7739	1021923 7743	1022698 7747
731.0	1023472 7751	1024248 7756	1025024 7760	1025800 7764	1026576 7768	1027353 7772	1028131 7776	1028909 7781	1029687 7785	1030466 7789
732.0	1031245 7793	1032024 7797	1032804 7801	1033585 7806	1034365 7810	1035147 7814	1035928 7818	1036710 7822	1037493 7826	1038275 7831
733.0	1039059 7835	1039842 7839	1040627 7843	1041411 7847	1042196 7852	1042981 7856	1043767 7860	1044553 7864	1045340 7868	1046127 7872
734.0	1046914 7877	1047702 7881	1048491 7885	1049279 7889	1050068 7893	1050858 7898	1051648 7902	1052438 7906	1053229 7910	1054020 7914

735.0	1054812 7919	1055604 7923	1056397 7927	1057190 7931	1057983 7935	1058777 7940	1059571 7944	1060365 7948	1061160 7952	1061956 7956
736.0	1062752 7961	1063548 7965	1064345 7969	1065142 7973	1065939 7978	1066737 7982	1067536 7986	1068334 7990	1069134 7994	1069933 7999
737.0	1070733 8003	1071534 8007	1072335 8011	1073136 8016	1073938 8020	1074740 8024	1075543 8028	1076346 8032	1077149 8037	1077953 8041
738.0	1078757 8045	1079562 8049	1080367 8054	1081173 8058	1081979 8062	1082785 8066	1083592 8071	1084399 8075	1085207 8079	1086015 8083
739.0	1086824 8087	1087633 8092	1088442 8096	1089252 8100	1090062 8104	1090873 8109	1091684 8113	1092495 8117	1093307 8121	1094120 8126

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
740.0	1094900 8130	1095715 8134	1096528 8139	1097342 8143	1098157 8147	1098972 8152	1099787 8156	1100603 8160	1101419 8165	1102236 8169
741.0	1103053 8173	1103871 8178	1104689 8182	1105507 8187	1106326 8191	1107145 8195	1107965 8200	1108785 8204	1109606 8208	1110427 8213
742.0	1111248 8217	1112070 8221	1112893 8226	1113716 8230	1114539 8235	1115362 8239	1116187 8243	1117011 8248	1117836 8252	1118662 8256
743.0	1119487 8261	1120314 8265	1121140 8270	1121968 8274	1122795 8278	1123623 8283	1124452 8287	1125281 8291	1126110 8296	1126940 8300
744.0	1127770 8305	1128601 8309	1129432 8313	1130263 8318	1131095 8322	1131928 8327	1132761 8331	1133594 8335	1134428 8340	1135262 8344
745.0	1136097 8349	1136932 8353	1137767 8357	1138603 8362	1139440 8366	1140276 8371	1141114 8375	1141951 8379	1142790 8384	1143628 8388
746.0	1144467 8393	1145307 8397	1146147 8401	1146987 8406	1147828 8410	1148669 8415	1149511 8419	1150353 8424	1151195 8428	1152038 8432
747.0	1152882 8437	1153726 8441	1154570 8446	1155415 8450	1156260 8454	1157106 8459	1157952 8463	1158799 8468	1159646 8472	1160493 8477
748.0	1161341 8481	1162189 8486	1163038 8490	1163887 8494	1164737 8499	1165587 8503	1166438 8508	1167288 8512	1168140 8517	1168992 8521
749.0	1169844 8525	1170697 8530	1171550 8534	1172404 8539	1173258 8543	1174112 8548	1174967 8552	1175823 8557	1176679 8561	1177535 8566
750.0	1178300 8570	1179249 8575	1180107 8579	1180965 8584	1181823 8588	1182683 8593	1183542 8597	1184402 8602	1185262 8606	1186123 8611
751.0	1186985 8615	1187846 8620	1188709 8625	1189571 8629	1190434 8634	1191298 8638	1192162 8643	1193027 8647	1193892 8652	1194757 8656
752.0	1195623 8661	1196489 8666	1197356 8670	1198223 8675	1199091 8679	1199959 8684	1200828 8688	1201697 8693	1202566 8698	1203436 8702
753.0	1204307 8707	1205178 8711	1206049 8716	1206921 8720	1207793 8725	1208666 8730	1209539 8734	1210413 8739	1211287 8743	1212161 8748
754.0	1213036 8753	1213912 8757	1214788 8762	1215664 8766	1216541 8771	1217418 8776	1218296 8780	1219174 8785	1220053 8789	1220932 8794
755.0	1221812 8798	1222692 8803	1223572 8808	1224453 8812	1225335 8817	1226217 8822	1227099 8826	1227982 8831	1228865 8835	1229749 8840
756.0	1230633 8845	1231518 8849	1232403 8854	1233289 8858	1234175 8863	1235061 8868	1235948 8872	1236836 8877	1237724 8881	1238612 8886
757.0	1239501 8891	1240390 8895	1241280 8900	1242170 8905	1243061 8909	1243952 8914	1244844 8919	1245736 8923	1246628 8928	1247521 8932
758.0	1248415 8937	1249309 8942	1250203 8946	1251098 8951	1251993 8956	1252889 8960	1253785 8965	1254682 8970	1255579 8974	1256477 8979
759.0	1257375 8983	1258274 8988	1259173 8993	1260072 8997	1260972 9002	1261873 9007	1262774 9011	1263675 9016	1264577 9021	1265479 9025

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
760.0	1266400 9030	1267304 9035	1268208 9040	1269112 9045	1270017 9050	1270922 9055	1271828 9060	1272734 9065	1273641 9070	1274548 9074
761.0	1275456 9079	1276364 9084	1277273 9089	1278182 9094	1279091 9099	1280002 9104	1280912 9109	1281823 9114	1282735 9119	1283647 9124
762.0	1284560 9129	1285473 9134	1286387 9139	1287301 9144	1288215 9149	1289131 9154	1290046 9159	1290962 9164	1291879 9169	1292796 9174
763.0	1293714 9179	1294632 9184	1295550 9189	1296469 9194	1297389 9198	1298309 9203	1299230 9208	1300151 9213	1301072 9218	1301995 9223
764.0	1302917 9228	1303840 9233	1304764 9238	1305688 9243	1306612 9248	1307538 9253	1308463 9258	1309389 9263	1310316 9268	1311243 9273
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
765.0	1312170 9278	1313099 9283	1314027 9288	1314956 9293	1315886 9298	1316816 9303	1317746 9308	1318678 9313	1319609 9318	1320541 9323
766.0	1321474 9328	1322407 9333	1323340 9338	1324275 9343	1325209 9348	1326144 9353	1327080 9358	1328016 9364	1328953 9369	1329890 9374
767.0	1330827 9379	1331765 9384	1332704 9389	1333643 9394	1334583 9399	1335523 9404	1336463 9409	1337405 9414	1338346 9419	1339288 9424
768.0	1340231 9429	1341174 9434	1342118 9439	1343062 9444	1344007 9449	1344952 9454	1345897 9459	1346844 9464	1347790 9469	1348737 9474
769.0	1349685 9479	1350633 9484	1351582 9490	1352531 9495	1353481 9500	1354431 9505	1355382 9510	1356333 9515	1357285 9520	1358237 9525
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
770.0	1359200 9530	1360143 9535	1361097 9540	1362051 9545	1363006 9551	1363961 9556	1364917 9561	1365873 9566	1366830 9571	1367788 9576
771.0	1368746 9581	1369704 9587	1370663 9592	1371622 9597	1372582 9602	1373543 9607	1374504 9612	1375465 9617	1376427 9623	1377390 9628
772.0	1378353 9633	1379316 9638	1380280 9643	1381245 9648	1382210 9654	1383176 9659	1384142 9664	1385108 9669	1386075 9674	1387043 9679
773.0	1388011 9685	1388980 9690	1389949 9695	1390919 9700	1391889 9705	1392860 9710	1393831 9716	1394803 9721	1395776 9726	1396748 9731
774.0	1397722 9736	1398696 9742	1399670 9747	1400645 9752	1401620 9757	1402596 9762	1403573 9767	1404550 9773	1405527 9778	1406506 9783
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
775.0	1407484 9788	1408463 9793	1409443 9799	1410423 9804	1411404 9809	1412385 9814	1413366 9819	1414349 9825	1415331 9830	1416315 9835
776.0	1417298 9840	1418283 9846	1419267 9851	1420253 9856	1421239 9861	1422225 9866	1423212 9872	1424199 9877	1425187 9882	1426176 9887
777.0	1427165 9893	1428154 9898	1429144 9903	1430135 9908	1431126 9913	1432118 9919	1433110 9924	1434102 9929	1435096 9934	1436089 9940
778.0	1437084 9945	1438078 9950	1439074 9955	1440069 9961	1441066 9966	1442063 9971	1443060 9976	1444058 9982	1445056 9987	1446055 9992
779.0	1447055 9997	1448055 10003	1449055 10008	1450056 10013	1451058 10018	1452060 10024	1453063 10029	1454066 10034	1455069 10039	1456074 10045

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
780.0	1457100 10050	1458106 10055	1459111 10061	1460118 10066	1461125 10071	1462132 10077	1463140 10082	1464148 10087	1465157 10093	1466167 10098
781.0	1467177 10103	1468188 10109	1469199 10114	1470210 10119	1471223 10125	1472235 10130	1473249 10135	1474263 10141	1475277 10146	1476292 10152
782.0	1477307 10157	1478323 10162	1479340 10168	1480357 10173	1481374 10178	1482392 10184	1483411 10189	1484430 10194	1485450 10200	1486470 10205
783.0	1487491 10211	1488512 10216	1489534 10221	1490556 10227	1491579 10232	1492603 10237	1493627 10243	1494651 10248	1495676 10254	1496702 10259
784.0	1497728 10264	1498755 10270	1499782 10275	1500810 10280	1501838 10286	1502867 10291	1503897 10297	1504926 10302	1505957 10307	1506988 10313
785.0	1508020 10318	1509052 10324	1510084 10329	1511117 10334	1512151 10340	1513185 10345	1514220 10351	1515256 10356	1516291 10361	1517328 10367
786.0	1518365 10372	1519402 10378	1520440 10383	1521479 10389	1522518 10394	1523558 10399	1524598 10405	1525639 10410	1526680 10416	1527722 10421
787.0	1528764 10427	1529807 10432	1530851 10437	1531895 10443	1532939 10448	1533984 10454	1535030 10459	1536076 10465	1537123 10470	1538170 10475
788.0	1539218 10481	1540266 10486	1541315 10492	1542365 10497	1543415 10503	1544465 10508	1545516 10514	1546568 10519	1547620 10524	1548673 10530
789.0	1549726 10535	1550780 10541	1551834 10546	1552889 10552	1553944 10557	1555000 10563	1556057 10568	1557114 10574	1558172 10579	1559230 10585
790.0	1560300 10590	1561348 10596	1562408 10601	1563468 10607	1564529 10612	1565591 10618	1566653 10623	1567715 10629	1568778 10634	1569842 10640
791.0	1570906 10645	1571971 10651	1573036 10656	1574102 10662	1575169 10668	1576236 10673	1577303 10679	1578372 10684	1579440 10690	1580510 10695
792.0	1581579 10701	1582650 10706	1583721 10712	1584792 10718	1585864 10723	1586937 10729	1588010 10734	1589084 10740	1590158 10745	1591233 10751
793.0	1592308 10756	1593384 10762	1594460 10768	1595537 10773	1596615 10779	1597693 10784	1598772 10790	1599851 10796	1600931 10801	1602011 10807
794.0	1603092 10812	1604174 10818	1605256 10823	1606339 10829	1607422 10835	1608506 10840	1609590 10846	1610675 10851	1611760 10857	1612846 10863
795.0	1613933 10868	1615020 10874	1616107 10879	1617196 10885	1618284 10891	1619374 10896	1620464 10902	1621554 10907	1622645 10913	1623737 10919
796.0	1624829 10924	1625922 10930	1627015 10936	1628109 10941	1629203 10947	1630298 10952	1631394 10958	1632490 10964	1633586 10969	1634683 10975
797.0	1635781 10980	1636880 10986	1637978 10992	1639078 10997	1640178 11003	1641278 11009	1642380 11014	1643481 11020	1644584 11026	1645686 11031
798.0	1646790 11037	1647894 11042	1648998 11048	1650103 11054	1651209 11059	1652315 11065	1653422 11071	1654529 11076	1655637 11082	1656746 11088
799.0	1657855 11093	1658965 11099	1660075 11105	1661185 11110	1662297 11116	1663409 11122	1664521 11127	1665634 11133	1666748 11139	1667862 11144

DON PEDRO LAKE, TUOLUMNE RIVER, CALIFORNIA - AREA AND CAPACITY TABLE

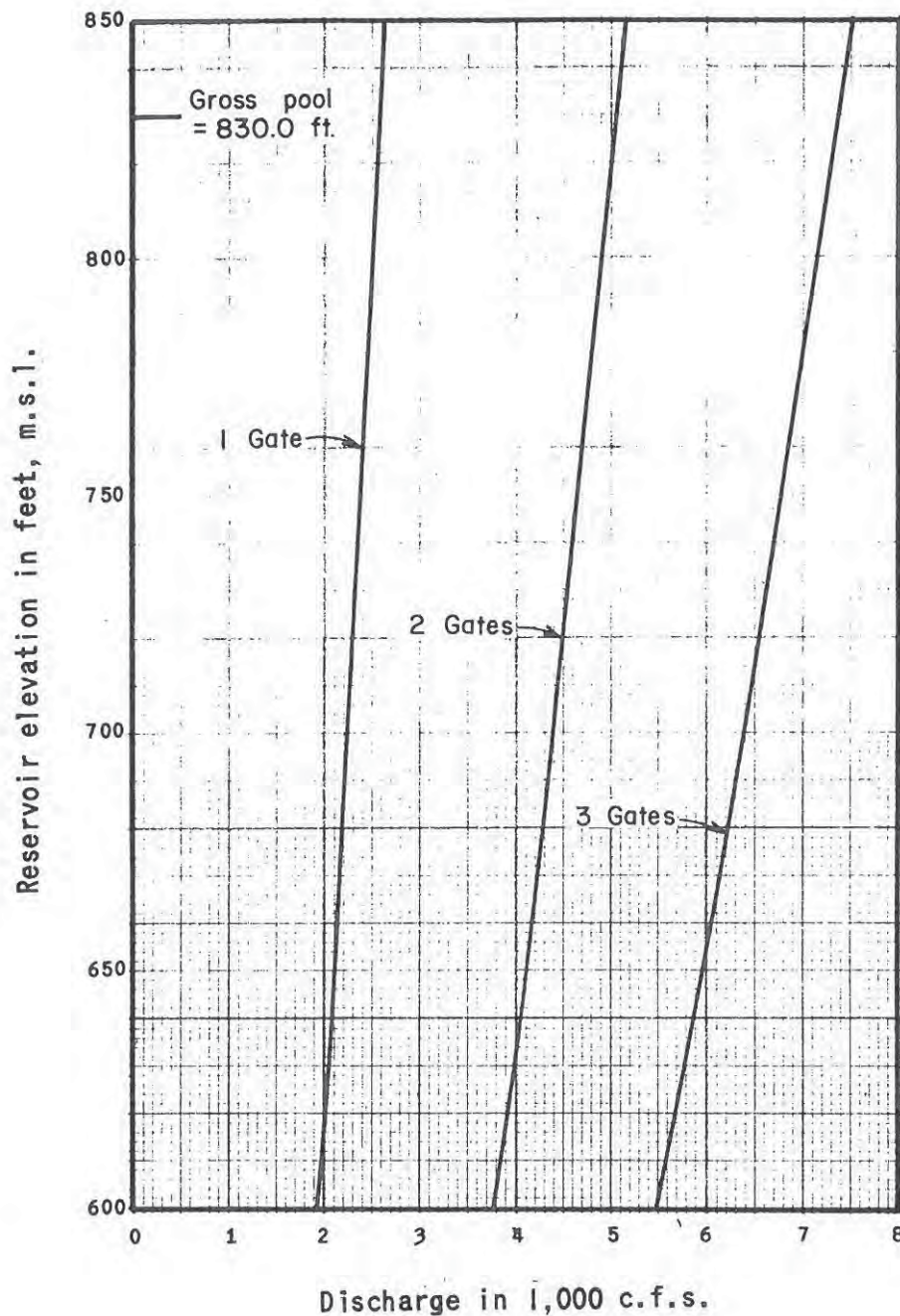
AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
800.0	1669000 11150	1670118 11156	1671234 11161	1672350 11167	1673467 11173	1674585 11178	1675703 11184	1676822 11189	1677941 11195	1679061 11201
801.0	1680181 11206	1681302 11212	1682423 11218	1683545 11223	1684668 11229	1685791 11235	1686915 11240	1688039 11246	1689164 11252	1690290 11257
802.0	1691416 11263	1692542 11269	1693669 11274	1694797 11280	1695925 11286	1697054 11291	1698184 11297	1699313 11303	1700444 11308	1701575 11314
803.0	1702707 11320	1703839 11325	1704972 11331	1706105 11337	1707239 11342	1708374 11348	1709509 11354	1710644 11359	1711781 11365	1712917 11371
804.0	1714055 11376	1715193 11382	1716331 11388	1717470 11393	1718610 11399	1719750 11405	1720891 11410	1722032 11416	1723174 11422	1724316 11428
805.0	1725459 11433	1726603 11439	1727747 11445	1728892 11450	1730037 11456	1731183 11462	1732330 11467	1733477 11473	1734624 11479	1735772 11485
806.0	1736921 11490	1738071 11496	1739220 11502	1740371 11507	1741522 11513	1742674 11519	1743826 11525	1744978 11530	1746132 11536	1747286 11542
807.0	1748440 11548	1749595 11553	1750751 11559	1751907 11565	1753064 11570	1754221 11576	1755379 11582	1756537 11588	1757696 11593	1758856 11599
808.0	1760016 11605	1761177 11611	1762338 11616	1763500 11622	1764663 11628	1765826 11634	1766990 11639	1768154 11645	1769319 11651	1770484 11657
809.0	1771650 11662	1772816 11668	1773984 11674	1775151 11680	1776319 11685	1777488 11691	1778658 11697	1779828 11703	1780998 11708	1782169 11714
810.0	1783300 11720	1784513 11726	1785686 11732	1786860 11738	1788034 11744	1789209 11750	1790384 11756	1791560 11762	1792736 11768	1793913 11774
811.0	1795091 11780	1796270 11786	1797448 11792	1798628 11798	1799808 11804	1800989 11811	1802170 11817	1803352 11823	1804535 11829	1805718 11835
812.0	1806902 11841	1808086 11847	1809271 11853	1810457 11859	1811643 11865	1812830 11871	1814017 11877	1815205 11883	1816394 11889	1817583 11895
813.0	1818773 11901	1819963 11907	1821154 11914	1822346 11920	1823538 11926	1824731 11932	1825925 11938	1827119 11944	1828313 11950	1829509 11956
814.0	1830705 11962	1831901 11968	1833098 11974	1834296 11980	1835494 11986	1836693 11993	1837893 11999	1839093 12005	1840294 12011	1841495 12017
815.0	1842697 12023	1843900 12029	1845103 12035	1846307 12041	1847511 12047	1848716 12054	1849922 12060	1851128 12066	1852335 12072	1853543 12078
816.0	1854751 12084	1855959 12090	1857169 12096	1858379 12102	1859589 12109	1860800 12115	1862012 12121	1863225 12127	1864438 12133	1865651 12139
817.0	1866865 12145	1868080 12152	1869296 12158	1870512 12164	1871729 12170	1872946 12176	1874164 12182	1875382 12188	1876601 12194	1877821 12201
818.0	1879042 12207	1880262 12213	1881484 12219	1882706 12225	1883929 12231	1885153 12238	1886377 12244	1887601 12250	1888827 12256	1890053 12262
819.0	1891279 12268	1892506 12274	1893734 12281	1894962 12287	1896191 12293	1897421 12299	1898651 12305	1899882 12311	1901113 12318	1902345 12324

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AUG 1970

ELEV FEET	CAP AREA .0	CAP AREA .1	CAP AREA .2	CAP AREA .3	CAP AREA .4	CAP AREA .5	CAP AREA .6	CAP AREA .7	CAP AREA .8	CAP AREA .9
820.0	1903600 12330	1904834 12336	1906068 12342	1907302 12349	1908538 12355	1909773 12361	1911010 12367	1912247 12374	1913484 12380	1914723 12386
821.0	1915962 12392	1917201 12399	1918441 12405	1919682 12411	1920924 12417	1922166 12424	1923408 12430	1924652 12436	1925895 12442	1927140 12448
822.0	1928385 12455	1929631 12461	1930877 12467	1932124 12474	1933372 12480	1934620 12486	1935869 12492	1937119 12499	1938369 12505	1939620 12511
823.0	1940871 12517	1942123 12524	1943376 12530	1944629 12536	1945883 12542	1947138 12549	1948393 12555	1949649 12561	1950905 12568	1952162 12574
824.0	1953420 12580	1954678 12586	1955937 12593	1957197 12599	1958457 12605	1959718 12612	1960979 12618	1962241 12624	1963504 12630	1964768 12637
825.0	1966032 12643	1967296 12649	1968561 12656	1969827 12662	1971094 12668	1972361 12675	1973629 12681	1974897 12687	1976166 12693	1977436 12700
826.0	1978706 12706	1979977 12712	1981249 12719	1982521 12725	1983794 12731	1985067 12738	1986341 12744	1987616 12750	1988891 12757	1990167 12763
827.0	1991444 12769	1992721 12776	1993999 12782	1995277 12788	1996557 12795	1997836 12801	1999117 12807	2000398 12814	2001680 12820	2002962 12826
828.0	2004245 12833	2005528 12839	2006813 12845	2008098 12852	2009383 12858	2010669 12864	2011956 12871	2013243 12877	2014531 12884	2015820 12890
829.0	2017109 12896	2018399 12903	2019690 12909	2020981 12915	2022273 12922	2023565 12928	2024859 12934	2026152 12941	2027447 12947	2028742 12954
830.0	2030000 12960	2031334 12966	2032631 12972	2033928 12979	2035226 12985	2036525 12991	2037825 12997	2039125 13004	2040425 13010	2041727 13016
831.0	2043029 13022	2044331 13029	2045634 13035	2046938 13041	2048243 13047	2049548 13054	2050853 13060	2052160 13066	2053466 13072	2054774 13079
832.0	2056082 13085	2057391 13091	2058700 13097	2060010 13104	2061321 13110	2062632 13116	2063944 13122	2065257 13129	2066570 13135	2067884 13141
833.0	2069198 13147	2070513 13154	2071829 13160	2073145 13166	2074462 13173	2075780 13179	2077098 13185	2078417 13191	2079736 13198	2081056 13204
834.0	2082377 13210	2083698 13216	2085020 13223	2086343 13229	2087666 13235	2088990 13242	2090315 13248	2091640 13254	2092965 13261	2094292 13267
835.0	2095619 13273	2096946 13279	2098275 13286	2099604 13292	2100933 13298	2102263 13305	2103594 13311	2104925 13317	2106257 13324	2107590 13330
836.0	2108923 13336	2110257 13343	2111592 13349	2112927 13355	2114263 13361	2115599 13368	2116937 13374	2118274 13380	2119613 13387	2120952 13393
837.0	2122291 13399	2123631 13406	2124972 13412	2126314 13418	2127656 13425	2128999 13431	2130342 13437	2131686 13444	2133031 13450	2134376 13456
838.0	2135722 13463	2137069 13469	2138416 13475	2139764 13482	2141113 13488	2142462 13495	2143811 13501	2145162 13507	2146513 13514	2147865 13520
839.0	2149217 13526	2150570 13533	2151923 13539	2153278 13545	2154632 13552	2155988 13558	2157344 13565	2158701 13571	2160058 13577	2161416 13584



NOTES:

Outlet controls: 3 parallel outlets, each with two 4'x5' slide gates in tandem.

Curves based on data furnished by Modesto and Turlock Irrigation Districts.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

DISCHARGE RATING CURVES
(Through river outlet works)

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

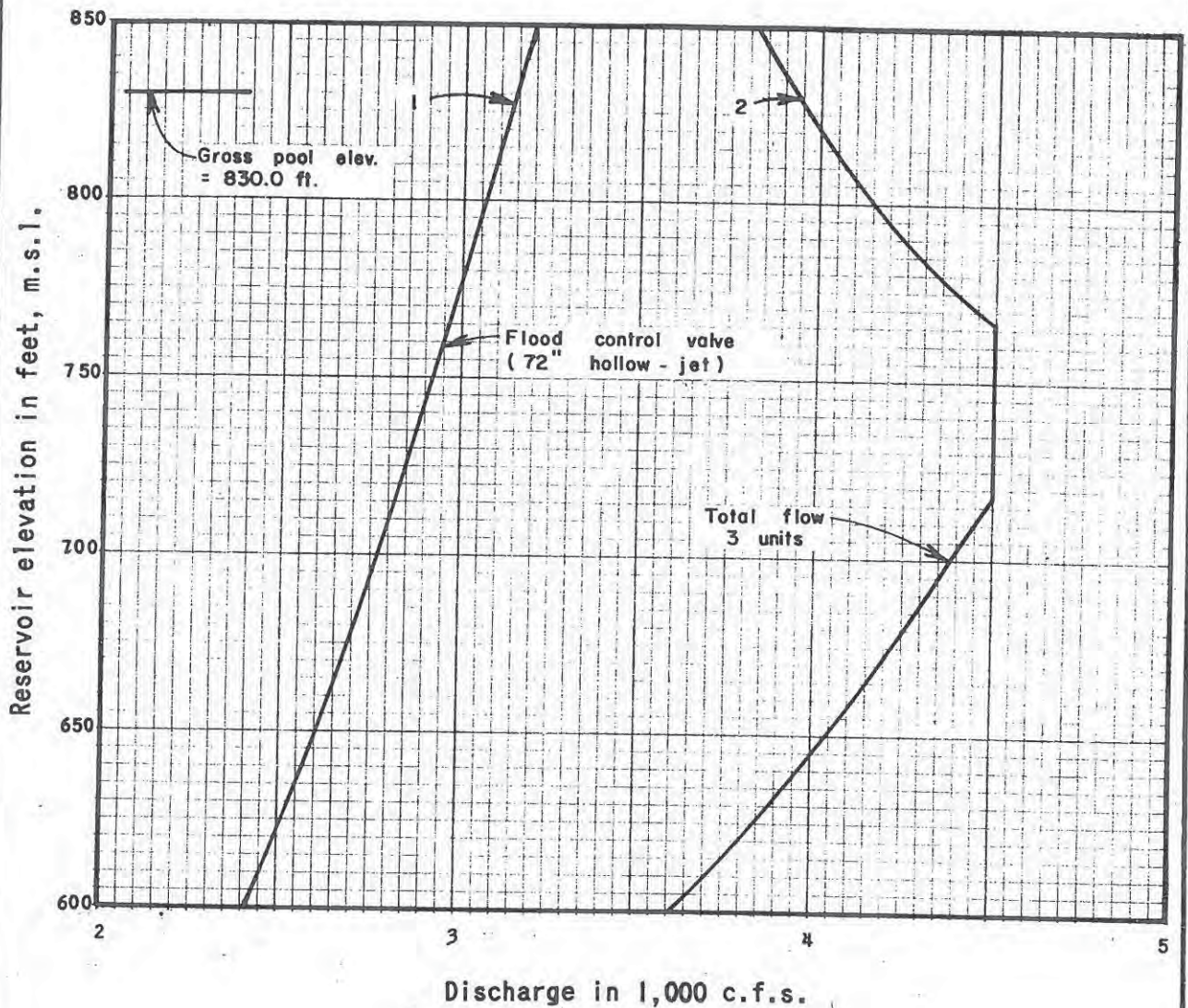
Prepared: D.D.D.

Drawn: R.E.Y. & S.K.N.

Date: August 1970

Revised title 26 May 1971

CHART A-3



NOTE:

Curves furnished by Modesto and Turlock Irrigation Districts.

LEGEND

1. Discharge through flood control valve, with no releases through the turbines.
2. Total discharge through all 3 units, with no discharge through flood control valve.

**DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA**

**DISCHARGE RATING CURVES
(FLOOD CONTROL VALVE AND TURBINES)**

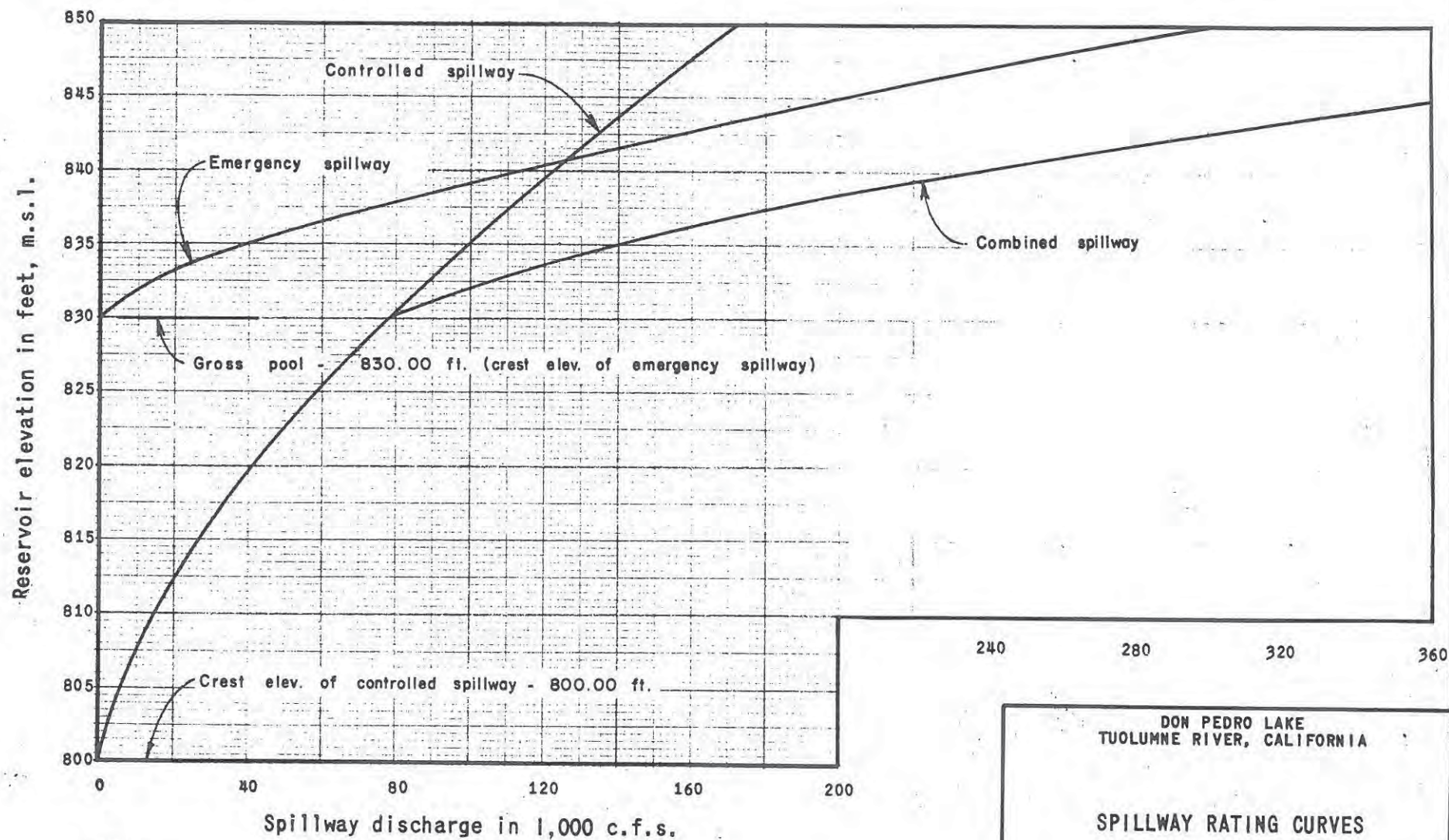
CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D.

Drawn: R.E.Y. & S.K.N.

Date: August 1970

Revised title 26 May 1971



NOTES:

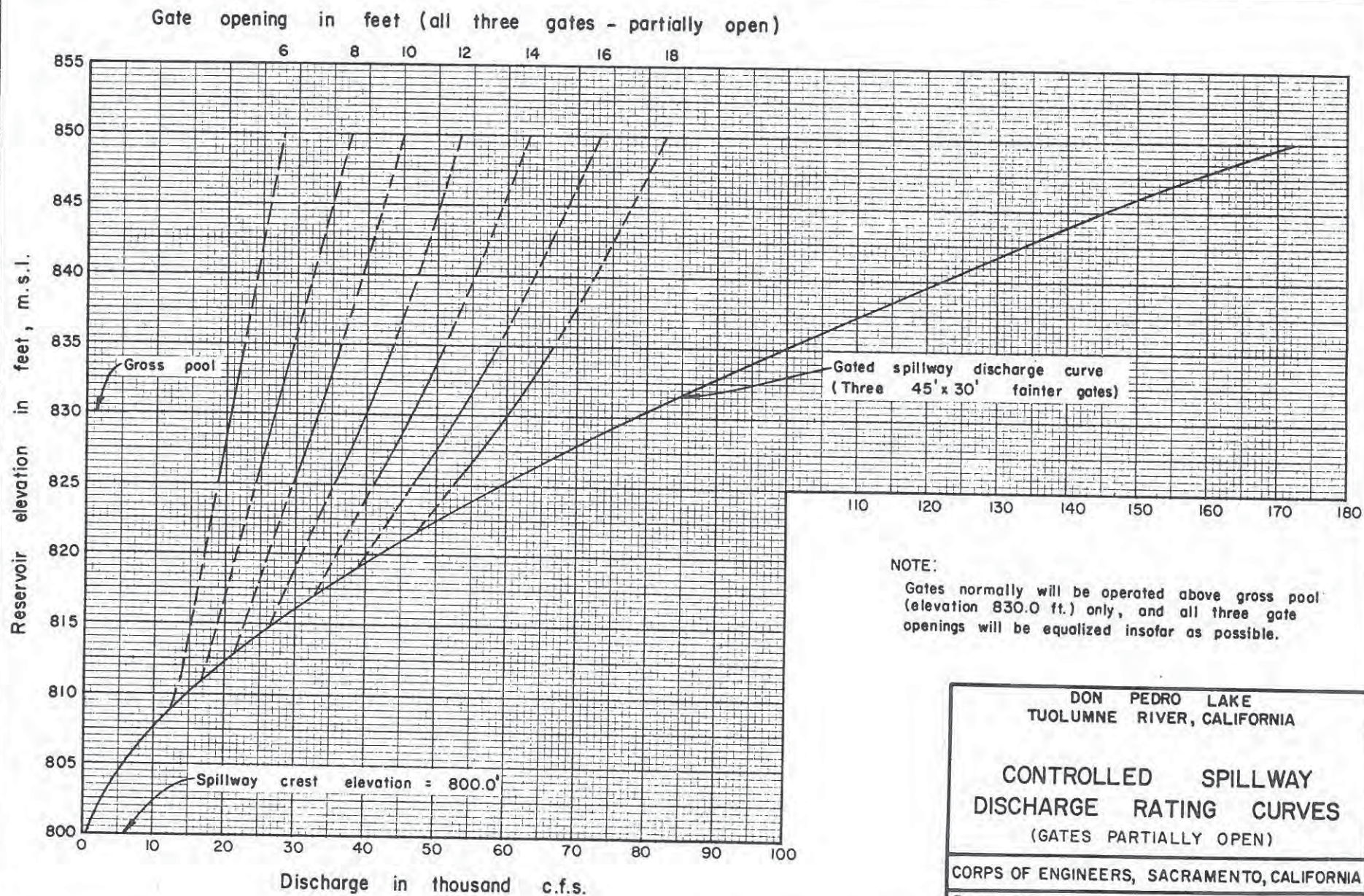
1. Controlled spillway - 135.0 ft. (3-45 ft. x 30 ft. radial gates)
2. Curves based on data furnished by Modesto and Turlock Irrigation Districts.

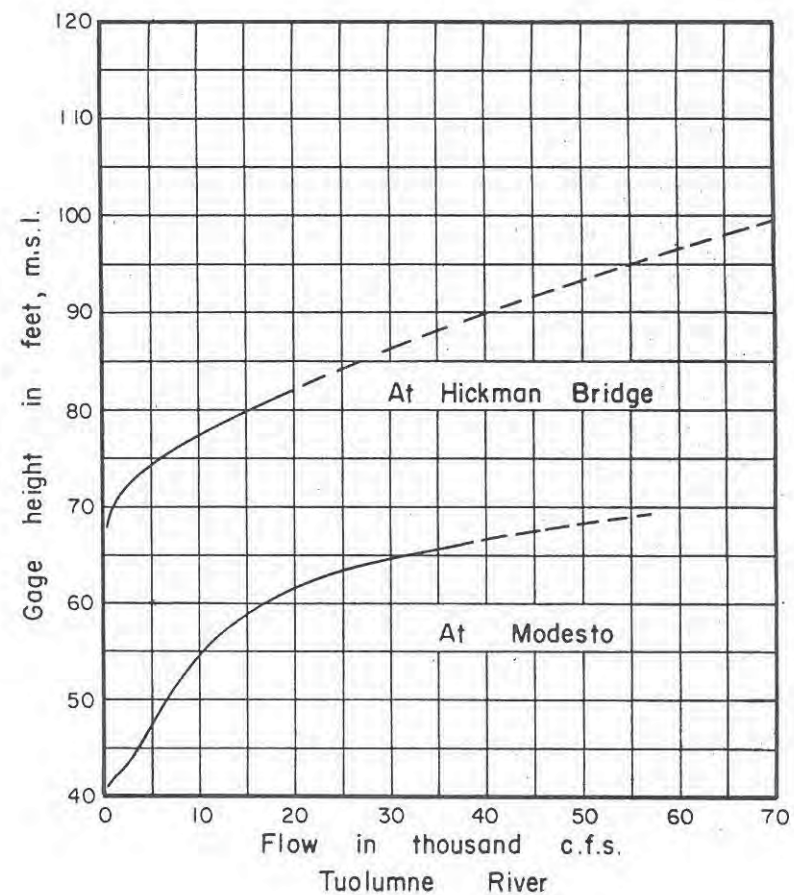
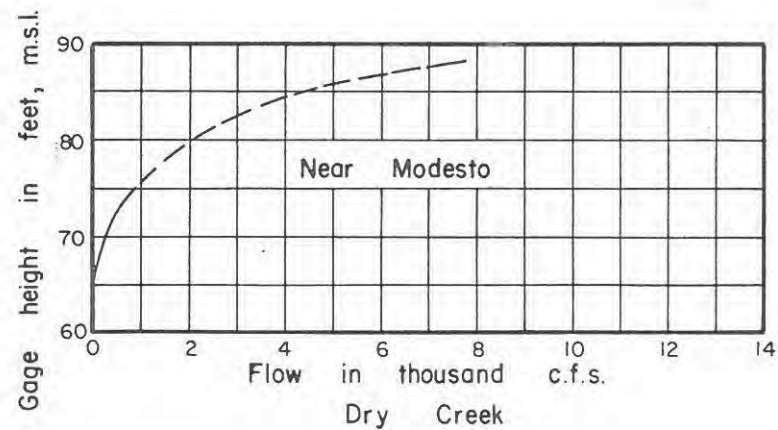
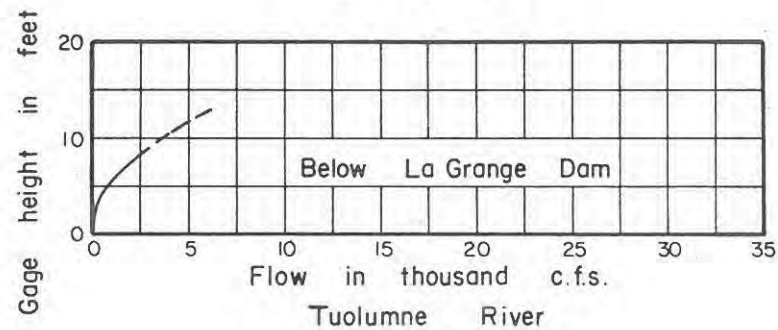
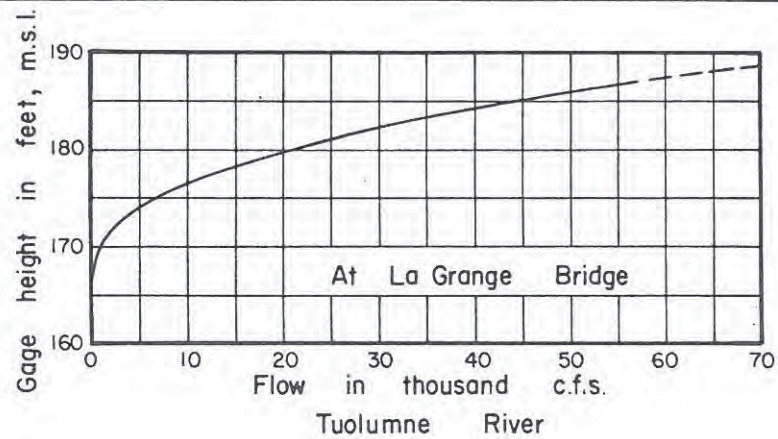
DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

SPILLWAY RATING CURVES
(GATES FULLY OPEN)

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: D.D.D. Date: August 1970
Drawn: R.E.Y. & S.K.N.





DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

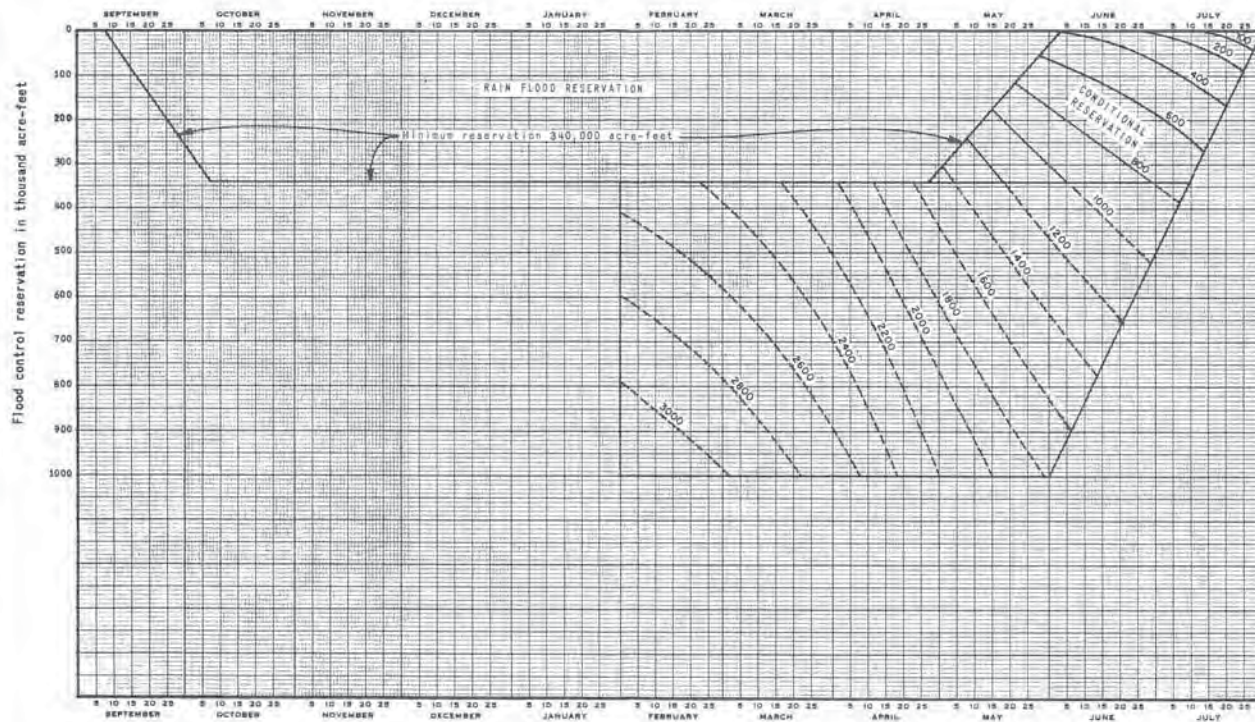
STAGE-DISCHARGE CURVES

CORPS OF ENGINEERS, SACRAMENTO, CALIFORNIA

Prepared: B.D.M.

Drawn: T.G.K.

Date: DECEMBER 1971



NOTES

1. Don Pedro Lake shall be operated for flood control in accordance with this flood control diagram and the accompanying emergency spillway release diagram. Reservoir releases shall be made in accordance with the diagram requiring greater release.
2. Flood control reservation increases uniformly at a rate of 11,700 acre-feet per day from zero requirement on 8 September to the maximum reservation of 340,000 acre-feet by 7 October. The reservation is maintained at 340,000 acre-feet through 27 April after which, unless additional reservation is indicated by the snowmelt parameters, it will decrease uniformly at a rate of 9,200 acre-feet per day to zero requirement by 3 June.
3. Snowmelt parameter value is the forecasted natural runoff in thousand acre-feet of Tuolumne River inflow to Don Pedro Lake between the given date and 31 July. Dash line parameter extensions below maximum reservation line are used for computation purposes to define gross reservation requirement (before reduction for empty space in upstream reservoirs.)
4. The flood control reservation in Don Pedro Lake determined from snowmelt parameters may be decreased by 80 percent of the available empty space in each of Hatch Hatchy and Cherry Valley Reservoirs, respectively, but no reduction will be permitted below 50,000 acre-feet or the rain flood reservation value, and not more than 70% of the creditable portion of the requirement may be allowed for empty space in Hatch Hatchy Reservoir nor more than 30% for empty space in Cherry Valley Reservoir.
5. When space available for flood control is less than that indicated by the diagram (after allowing credit for empty space in upstream reservoirs), water shall be released as rapidly as possible without causing flows in Tuolumne River below Dry Creek to exceed 9,000 c.f.s.
6. Releases shall not be increased more than 2,000 c.f.s. or decreased more than 1,000 c.f.s. in any 2-hour period.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

FLOOD CONTROL DIAGRAM

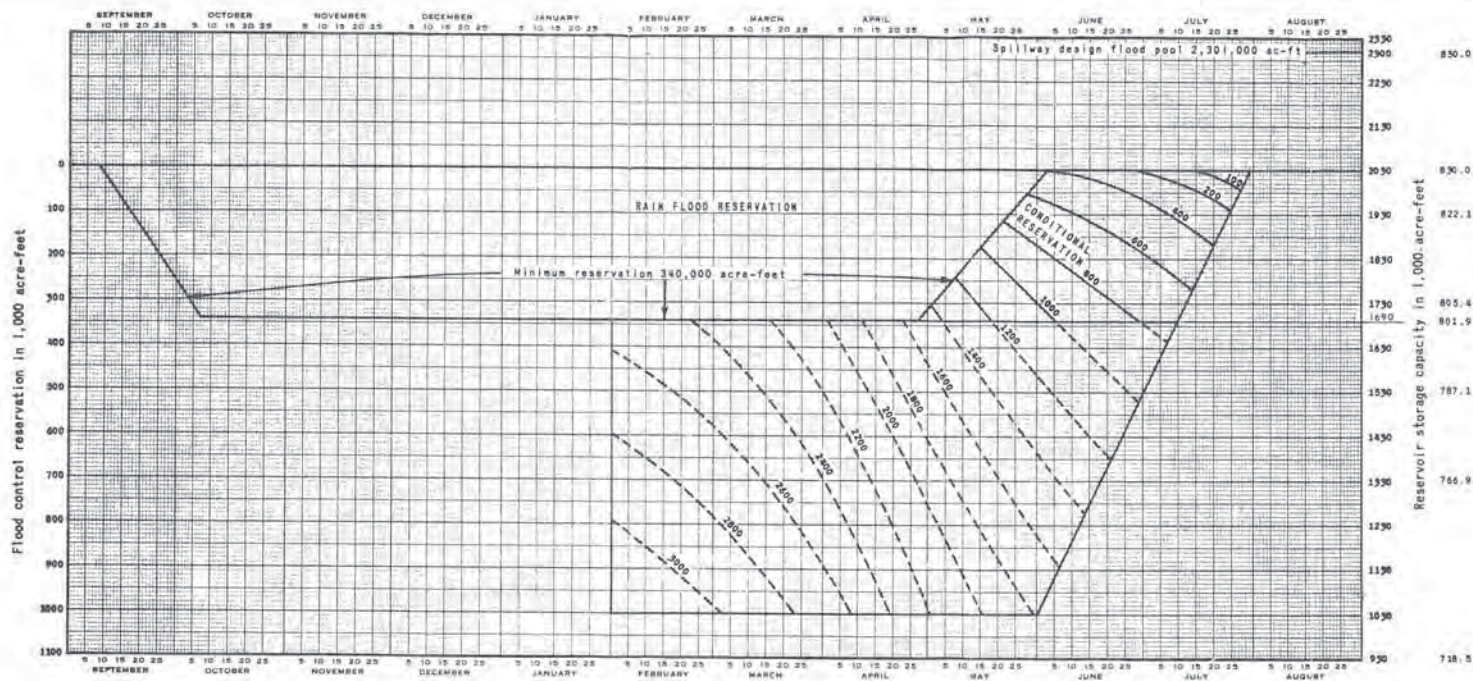
Prepared Pursuant to Flood Control Regulations
for Don Pedro Dam and Lake

APPROVED: _____
Major General, USA, Director of Civil Works

APPROVED: _____
Chief Engineer, Modesto Irrigation District

APPROVED: _____
Chief Engineer, Turlock Irrigation District

Effective Date: _____ File No: TU-1-19-8



NOTES

1. Don Pedro Lake shall be operated for flood control in accordance with this Flood Control Diagram and the accompanying Emergency Spillway Release Diagram. Reservoir releases shall be made in accordance with the diagram requiring greater release.
2. Flood control reservation increases uniformly at a rate of 11,700 acre-feet per day from zero requirement on 8 September to the maximum reservation of 340,000 acre-feet by 7 October. The reservation is maintained at 340,000 acre-feet through 27 April after which, unless additional reservation is indicated by the snowmelt parameters, it will decrease uniformly at a rate of 9,200 acre-feet per day to zero requirement by 3 June.
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5. When space available for flood control is less than that indicated by the diagram (after allowing credit for empty space in upstream reservoirs), water shall be released as rapidly as possible without causing flows in Tuolumne River below Dry Creek to exceed 9,000 c.f.s.
6. Releases shall not be increased more than 2,000 c.f.s. or decreased more than 1,000 c.f.s. in any 2-hour period except as required by the Emergency Spillway Release Diagram.

Reservoir elevation in feet m.s.l.

Reservoir storage capacity in 1,000 acre-feet

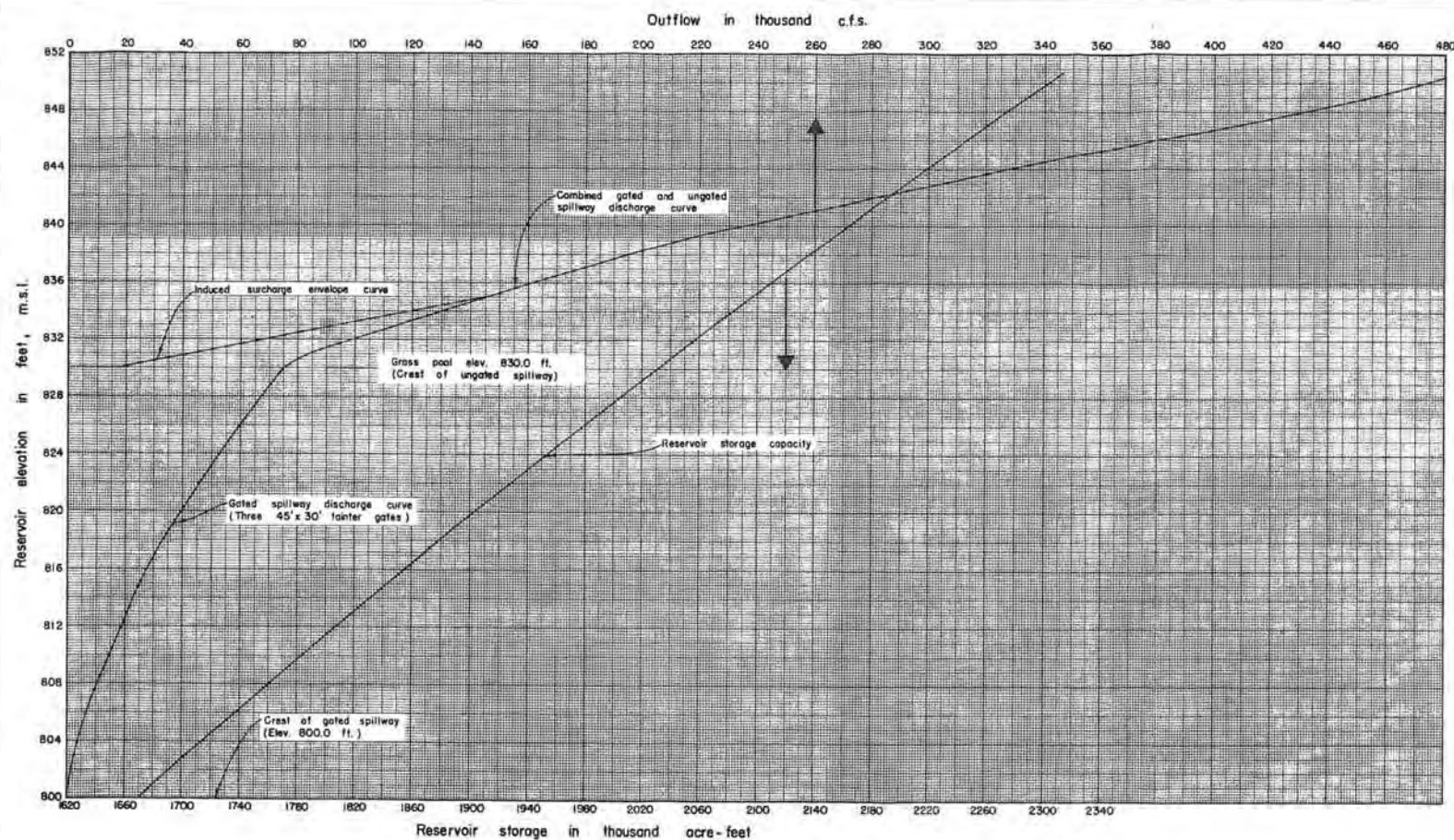
DON PEDRO LAKE TUOLUMNE RIVER, CALIFORNIA

FLOOD CONTROL DIAGRAM

Prepared Pursuant to Flood Control Regulations for Don Pedro Dam and Lake in accordance with the Code of Federal Regulations Title 33 Part 208.11

APPROVED: _____
 APPROVED: *M. N. Bennett*
 APPROVED: _____
 Effective Date: 27 JUL 1978 File No. TU-1-19-8

CHART 4-R



OPERATING INSTRUCTIONS

1. Follow regular flood control regulation schedule until gross pool elevation 830.0 feet has been reached.
2. Above elevation 830.0 feet, minimum permissible releases are those indicated by the induced surcharge envelope curve. Gate openings (all three gates) shall be adjusted at least once each hour in order for the reservoir elevation to conform with the induced surcharge envelope curve as closely as possible.
3. When the reservoir water surface is dropping, maintain current gate openings until the water surface has reached elevation 830.0 feet (gross pool). Once the pool has dropped below elevation 830.0 feet releases should be reduced each hour by 0.3 of the difference between inflow and outflow until releases are reduced to rates required by the flood control diagram.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

EMERGENCY SPILLWAY RELEASE DIAGRAM

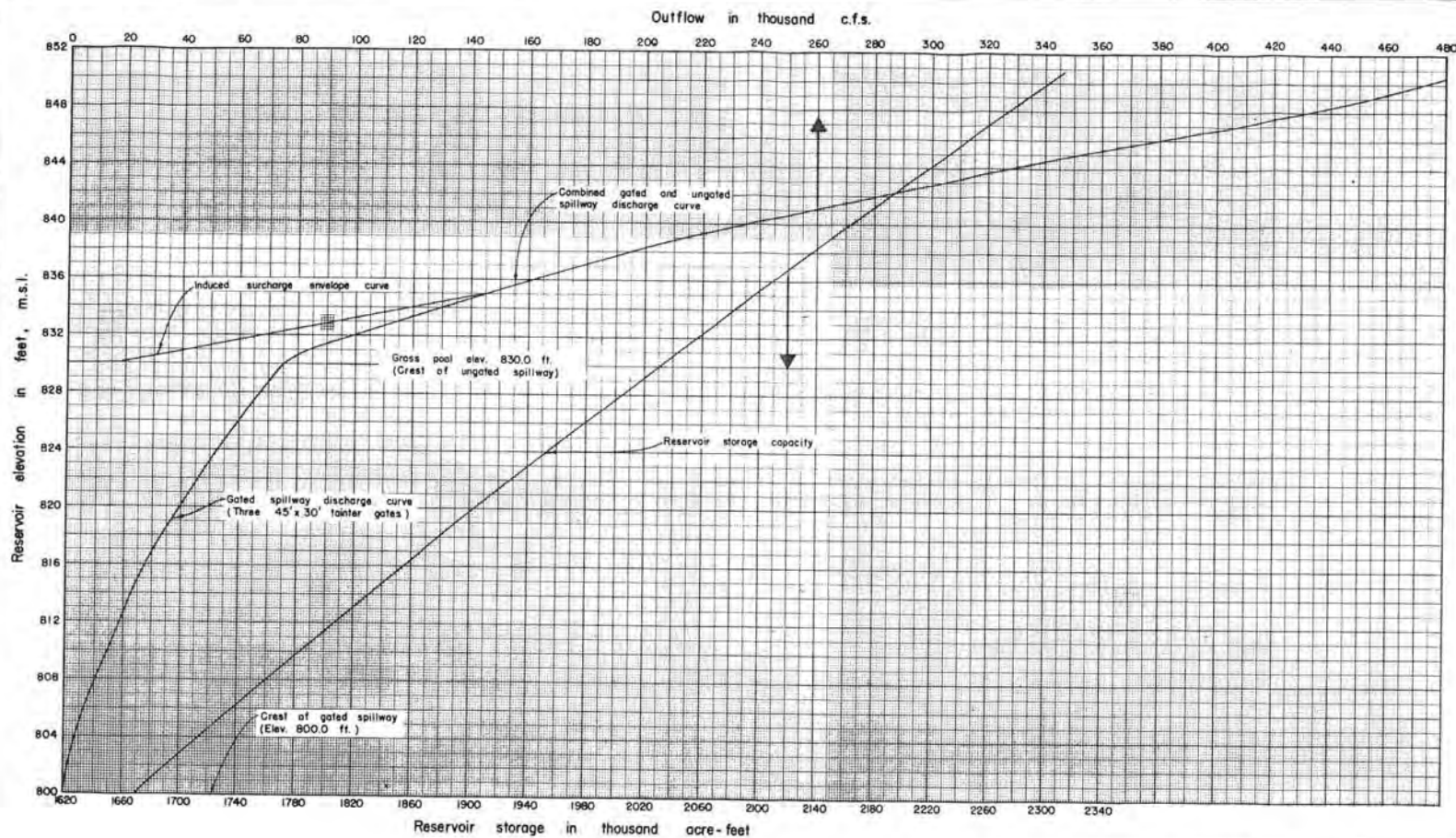
Prepared Pursuant to Flood Control
Regulations for Don Pedro Dam and Lake

APPROVED: _____ MAJOR GENERAL, USA, DIRECTOR OF CIVIL WORKS

APPROVED: _____ CHIEF ENGINEER, MODESTO IRRIGATION DISTRICT

APPROVED: _____ CHIEF ENGINEER, TURLOCK IRRIGATION DISTRICT

Effective Date: _____ File No: TU-I-13-11



OPERATING INSTRUCTIONS

1. Follow regular flood control regulation schedule until gross pool elevation 830.0 feet has been reached.
2. Above elevation 830.0 feet, minimum permissible releases are those indicated by the induced surcharge envelope curve. Gate openings (all three gates) shall be adjusted at least once each hour in order for the reservoir elevation to conform with the induced surcharge envelope curve as closely as possible.
3. When the reservoir water surface is dropping, maintain current gate openings until the water surface has reached elevation 830.0 feet (gross pool). Once the pool has dropped below elevation 830.0 feet releases should be reduced each hour by 0.3 of the difference between inflow and outflow until releases are reduced to rates required by the flood control diagram.

DON PEDRO LAKE
TUOLUMNE RIVER, CALIFORNIA

EMERGENCY SPILLWAY RELEASE DIAGRAM

Prepared Pursuant to Flood Control Regulations for
Don Pedro Dam and Lake in accordance with
the Code of Federal Regulations Title 33 Part 208.11

APPROVED: *William C. L. L. L.*
Colonel, USA, Division Engineer,
South Pacific Division

APPROVED: *M. H. Bennett*
Chief, Administrative Officer,
Modesto Irrigation District

APPROVED: *Don Keller*
Manager, Corlock Irrigation District

Effective Date 27 JUL 1978 File No. TU-1-13-11

FIELD WORKING AGREEMENT
BETWEEN
THE MODESTO AND TURLOCK IRRIGATION DISTRICTS
AND
DEPARTMENT OF THE ARMY, CORPS OF ENGINEERS
FOR
FLOOD CONTROL OPERATION
OF
DON PEDRO DAM AND LAKE
ON
TUOLOMNE RIVER, CALIFORNIA

THIS agreement, made and entered into this 11th day of July, 1978, between the Modesto Irrigation District, and the Turlock Irrigation District hereinafter referred to as Irrigation Districts, and the Department of the Army, Corps of Engineers, hereinafter referred to as the Corps of Engineers.

WITNESSETH THAT:

WHEREAS, under the terms of contract number DA-04-167-eng-38 entered into 29 August 1949, and amended by Supplemental Agreement No. 1 dated 12 June 1967, by the United States of America, the Irrigation Districts and the City and County of San Francisco, the Irrigation Districts agreed to provide 340,000 acre-feet of flood space in Don Pedro Lake, and

WHEREAS, the Irrigation Districts, as owners and operators are responsible for the normal operation and structural safety of Don Pedro Dam and Lake, and

WHEREAS, the Department of the Army, acting through the Corps of Engineers, represented by its appropriate District and Division Engineers, is responsible for the flood control operation plan of said dam and lake in accordance with Section 7 of the 1944 Flood Control Act (33 U.S.C. 709) and as promulgated in Code of Federal Regulations, Title 33, Part 208.11, 15 May 1976, and

WHEREAS, there is a need for a working agreement to insure a clear understanding of the flood control regulations and information exchange required.

NOW, THEREFORE, it is mutually understood and agreed by and between the parties hereto that the Don Pedro Dam and Lake will be operated in accordance with the following criteria:

(a) Conservation operations shall be in accordance with the Irrigation Districts criteria.

(b) Storage space in the Don Pedro Dam and Lake Shall be made available on a seasonal basis and operated for flood control in accordance with the Flood Control Diagram currently in force.

(c) Emergency operations shall be in accordance with the procedure set forth on the Emergency Spillway Release Diagram or procedures currently in force.

(d) The Irrigation Districts are responsible for the safety of the dam and appurtenant facilities and for regulation of the Don Pedro Dam and Lake during surcharge storage utilization. Emphasis upon the safety of the dam is especially important in the event surcharge storage is utilized, which results when the total storage space reserved for flood control is exceeded. Any assistance provided by the Corps of Engineers concerning surcharge regulation is to be utilized at the discretion of the Irrigation Districts, and does not relieve the Irrigation Districts of the responsibility for safety of the Don Pedro Dam and Lake.

(e) Revisions of the Flood Control or Emergency Spillway Release Diagrams and procedures may be developed as necessary by parties of this agreement. Each such revision shall be effective on the date specified.

(f) Except as necessary in order to comply with Emergency Operation procedures, the flood control regulations shall not be construed to require dangerously rapid changes in magnitude of releases. Releases will be made in a manner consistent with requirements for protecting the dam, lake and appurtenances from major damages.

(g) Any water impounded in the flood control space defined by the Flood Control Diagram shall be evacuated as rapidly as can be safely accomplished without causing downstream flows to exceed the controlling rates; i.e., releases from the reservoir shall be restricted insofar as practicable to quantities which, in conjunction with uncontrolled runoff downstream of the dam, will not cause water levels to exceed the controlling stages currently in force. Although conflicts may arise with other purposes, such as hydropower, the plan or regulation may require releases to be completely curtailed in the interest of flood control or safety of the project.

(h) The Irrigation Districts shall procure such current basic hydrologic data and make such current determinations of required flood control space and releases at the reservoir as are required to accomplish the flood control objectives.

(i) The Irrigation Districts shall keep the District Engineer advised of such currently available hydrometeorological reservoir operating data as the District Engineer may request. The minimum data required is reservoir storage, inflow, releases and streamflow at control points designated by the Flood Control Diagram on a daily basis.

(j) The flood control regulations are subject to temporary modification by the Corps of Engineers if found necessary in time of emergency. Requests for and action on such modifications may be made by the fastest

means of communication available. The action taken shall be confirmed in writing the same day to the offices of the Irrigation Districts and shall include justification for the action.

(k) The Irrigation Districts may temporarily deviate from the flood control regulations in the event an immediate short-term departure is deemed necessary for emergency reasons to protect the safety of the dam, or to avoid other serious hazards. Such actions shall be immediately reported by the fastest means of communication available. Actions shall be confirmed in writing the same day to the Corps of Engineers and shall include justification for the action. Continuation of the deviation will require the express approval of the Division Engineer.

IN WITNESS WHEREOF, the parties hereto have caused this memorandum of agreement to be executed as the day and date first above written.

CORPS OF ENGINEERS

By: William E. Vandenberg
Division Engineer
South Pacific Division

MODESTO IRRIGATION DISTRICT

By: M. N. Burnett
Chief, Administrative Officer

TURLOCK IRRIGATION DISTRICT

By: [Signature]
General Manager

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**DON PEDRO HYDROELECTRIC PROJECT
FERC NO. 2299**

AMENDMENT OF APPLICATION

**EXHIBIT H - PLANS AND ABILITY OF APPLICANTS
TO OPERATE THE DON PEDRO HYDROELECTRIC PROJECT**

**APPENDIX H-4
DON PEDRO RECREATION AGENCY REGULATIONS
AND ORDINANCES**

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DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

Section I
AUTHORITY AND ENFORCEMENT

1.1 AUTHORITY:

The Agency will use all applicable laws to carry out its duties including the following specific sections.

1.1.1 §12970 California Water Code

"Water Agency", as used in this part means any public corporation, district, political subdivision, or any other agency or authority now or hereafter organized under the laws of this state which develops, stores, distributes or supplies water.

1.1.2 §12973 California Water Code

The governing body of a water agency may adopt regulations binding upon all persons covering the use of such recreational facilities. Any violation of such regulations is a misdemeanor.

1.1.3 § 830.31 California Penal Code

The following persons are peace officers whose authority extends to any place in the state for the purpose of performing their primary duty or when making an arrest pursuant to Section 836 as to any public offense with respect to which there is immediate danger to person or property, or of the escape of the perpetrator of that offense, or pursuant to Section 8597 or 8598 of the Government Code. These peace officers may carry firearms only if authorized, and under the terms and conditions specified, by their employing agency...

(b) A person designated by a local agency as a park ranger and regularly employed and paid in that capacity if the primary duty of the officer is the protection of park and other property of the agency and the preservation of the peace therein...

1.1.4 §53069.4 (a) (1) California Government Code

The legislative body of a local agency, as the term "local agency" is Defined in Section 54951, may by ordinance make any violation of any ordinance enacted by the local agency subject to an administrative fine or penalty.

1.1.5 §54951 California Government Code

As used in this chapter, "local agency" means a county, city, whether general law or chartered, city and county, town, school district, municipal corporation, district, political subdivision, or any board, commission or agency thereof, or other local public agency.

1.1.6 §54952. California Government Code

As used in this chapter, "legislative body" means:

(a) The governing body of a local agency or any other local body created by state or federal statute.

1.2 ENFORCEMENT:

Violations of applicable laws may result in any or multiples of the following:

1.2.1 Issuance of Warnings

1.2.2 Administrative Citations

1.2.3 Criminal Citations/Notices to Appear

1.2.4 Revocations of use permits

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

- 1.2.5** Evictions from the Recreation Area
- 1.2.6** Personal property towing/impoundment
- 1.2.7** Restitution for damages to and clean-up of the Recreation Area and its facilities
- 1.2.8** Other actions deemed appropriate by the Director to carry out the enforcement of these Regulations and Ordinances

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

**Section II:
GENERAL**

2.1 INTERFERING WITH AGENCY EMPLOYEES

- 2.1.1 No person shall interfere with, harass, intimidate or threaten any Agency employee during the course of the employee's duties as charged by the Agency.

2.2 PERMITS

- 2.2.1 No person shall utilize the Recreation Area for any purpose without a valid permit from the Agency, except that permits are not required for authorized activities in dispersed areas accessed by non motorized means.
- 2.2.2 No person shall utilize the Recreation Area without paying all applicable fees for required permits.
- 2.2.3 No person shall utilize the Recreation Area without displaying required permits in the designated location.
- 2.2.4 No person shall refuse to show their permit to Agency personnel upon request.
- 2.2.5 No person shall transfer their permit to another person without prior Agency approval.

2.3 DOMESTIC ANIMALS

- 2.3.1 No person shall bring or possess a domestic animal in the developed facilities of the Recreation Area, unless the animal is specifically a seeing eye, signal or service animal as defined by the Americans with Disabilities Act, under the immediate control of the disabled person.
- 2.3.2 No person shall allow domestic animals to run loose in areas of the Recreation Area where their presence is permitted.
- 2.3.3 No person shall place their domestic animal on a leash more than six (6) feet in length in the Recreation Area where their presence is permitted.
- 2.3.4 No person shall be allowed to bring a dog into the Recreation Area where their presence is permitted without proof of current rabies vaccination or current license.
- 2.3.5 No person shall deposit or leave any domestic animal unattended for any length of time within the Recreation Area.
- 2.3.6 No person shall fail to clean up, seal in a bag, and properly dispose of waste deposited by their domestic animal where the animal's presence is permitted.

2.4 FIRES

- 2.4.1 No person shall build or light a charcoal or other type of fueled fire directly on the ground or outside of an appropriate device designed for this purpose (such as the furnished campsite fire ring).

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

- 2.4.2** No person shall use a portable camp stove, barbecue, candle or lantern without clearing away all vegetation and combustible materials around the unit to a minimum of ten (10) foot plus the height of any device used to elevate the stove, candle, lantern etc. (or greater when conditions warrant).
- 2.4.3** No person shall fail to observe any fire safety order issued by any authorized Agency representative.
- 2.4.4** No person shall possess firewood in the dispersed area of the Recreation Area.
- 2.4.5** No person shall build a fire using wood for fuel in the dispersed area of the Recreation Area.
- 2.4.6** No person shall add to a fire any fuel that exceeds in size the length, width or height of the container being used.
- 2.4.7** No person shall leave any fire unattended at any time without complete extinguishment.
- 2.4.8** No person shall leave or dispose of charcoal briquettes, ashes or other burned materials outside of the furnished campsite fire ring or a designated ash disposal receptacle.

2.5 FIREWORKS

- 2.5.1** No person shall possess, discharge, set off, or cause to be discharged, in or into any portion of the Recreation Area any firecrackers, torpedoes, rockets, fireworks, explosives, or similar type substances.

2.6 WEAPONS

- 2.6.1** No person shall discharge in or across the developed facilities of the Recreation Area any weapon, except for Sworn Peace Officers or persons authorized by the Agency in the performance of official duties.
- 2.6.2** No person shall possess any weapon within the developed facilities of the Recreation Area that is not deactivated, except for Sworn Peace Officers or persons authorized by the Agency in the performance of official duties.
- 2.6.3** No person shall use any weapon, except for hunting or fishing purposes in accordance with applicable laws, within the Recreation Area.
- 2.6.4** No person shall possess any weapon in the dispersed facilities that is not deactivated, except for persons hunting in accordance with applicable law, Sworn Peace Officers or persons authorized by the Agency in the performance of official duties.
- 2.6.5** No person may brandish, display or use any object that may be deemed to have the potential of serving as a weapon in any manner that may be deemed threatening or that may raise a level of public concern that such an item may be used as a weapon.

2.7 MINOR CHILDREN

- 2.7.1** No person under the age of eighteen (18) shall camp in the Recreation Area without being accompanied by a parent or legal guardian.
- 2.7.2** No person under the age of eighteen (18) shall be outside of their campsite between the hours of 11:00 p.m. and 5:00 a.m. unless they are accompanied by a parent or legal guardian.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

2.8 CONDUCT

PEACE AND QUIET

- 2.8.1** No person shall fail to observe the quiet time hours of 10 p.m. to 7 a.m.
- 2.8.2** No person shall, at any time, use electronic equipment, including but not limited to powered speakers or other machinery within the 5 MPH zone at any launch ramp, in the launch ramp preparation area, in or near any parking or developed camping and day use areas or vessel mooring areas of the Recreation Area at a volume which emits sound beyond the immediate individual camp, picnic site, vehicle, vessel or vessel mooring location. This prohibition does not apply to authorized emergency vessels or when equipment is being operated to request assistance or warn of a hazardous situation.
- 2.8.3** No person shall operate an engine driven electrical generator which emits sound beyond the immediate limit of the campsite or vessel mooring location between the hours of 10 p.m. and 7 a.m.

DISORDERLY CONDUCT

- 2.8.4** No person(s) shall engage in fighting in the Recreation Area.
- 2.8.5** No person shall communicate in such a manner that is threatening, verbally offensive, or derisive.
- 2.8.6** No person shall make statements or actions toward another person that incites or produces imminent lawless action and is likely to incite or produce such action.
- 2.8.7** No person shall urinate or defecate in public.
- 2.8.8** No person over the age of five (5) shall appear, swim, bathe, sunbathe, walk or otherwise be in the Recreation Area in such a manner that the genital/pubic hair area of the body and the breast of any female person at or below the areola is exposed to public view.

2.9 SANITATION

- 2.9.1** No person shall litter or leave refuse of any type within the Recreation Area except in a receptacle or area designated for that purpose.
- 2.9.2** No person shall place or burn litter or refuse in fire rings or barbecues.
- 2.9.3** No person shall import any refuse from outside the Recreation Area and deposit such refuse within the Recreation Area.
- 2.9.4** No person shall place debris, construction materials and refuse including chemicals and containers resulting from the construction, remodeling or maintenance of houseboats, vessels, vehicles and concessionaire facilities in Agency waste receptacles or within the Recreation Area.
- 2.9.5** No person shall remove recyclable materials from Agency waste receptacles or designated Agency recycling containers.
- 2.9.6** No person shall rummage through or remove any items that are placed in or around any refuse or recycling receptacles.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

- 2.9.7** No person shall deposit waste, water, sewage or effluent from vehicles, vessels, wastewater holding tanks, sinks, portable toilets, or any other source into or onto anything other than an appropriate disposal site as designated by the Agency.
- 2.9.8** No person shall deposit human waste in any location other than a restroom facility toilet, portable toilet or appropriate disposal site as designated by the Agency.
- 2.9.9** No person shall fail to cooperate in maintaining restrooms in a neat and sanitary condition.
- 2.9.10** No person shall use restrooms set apart for the opposite gender.

2.10 TRESPASSING

- 2.10.1** No person, vessel or vehicle shall enter any area after posted closure hours or that has been posted by the Agency as closed.
- 2.10.2** No person shall open, drive around a closed gate or through a fence or remove, unlock, destroy or tamper with any door on any building or lock on any gate that has been placed by the Agency.
- 2.10.3** No person shall violate any Agency order posting conditions and limitations for the use of any facility or area, or operation, use, size, type, permissible equipment, beaching, landing, launching, mooring, docking, or berthing of a vessel, boat, vehicle, or any other object.
- 2.10.4** No person shall establish, build, install, leave, tie-up or secure any kind of developed improvement including but not limited to docks, permanent vessel mooring devices, trails, roadways, buildings, etc. within the Recreation Area land or waters.
- 2.10.5** No person shall access Recreation Area land or water from adjacent property by use of a motorized vehicle.
- 2.10.6** No person shall leave a vehicle, trailer or vessel that is inoperable or has expired registration in the Recreation Area.

2.11 VANDALISM

- 2.11.1** No person shall willfully deface, mar, paint, damage, destroy, dismantle, remove, modify, or relocate any developed improvement or natural resource within the Recreation Area.

2.12 SOLICITING/OUTSIDE VENDORS

- 2.12.1** No person shall engage in soliciting, selling, or peddling any goods or services within the Recreation Area.
- 2.12.2** No person shall distribute, throw or deposit any handbills, circulars, pamphlets or advertisements, or affix to any tree, fence or structure any such handbill or advertisement.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

**Section III:
VEHICLES**

3.1 MOTOR VEHICLE OPERATION

- 3.1.1 No person shall drive any vehicle off of designated roadways and parking pads or into any dispersed area of the Recreation Area.
- 3.1.2 No Person shall operate, nor shall an owner permit the operation of, a motor vehicle in a manner likely to cause malicious or unnecessary damage to the land, wildlife, wildlife habitat or vegetative resources.
- 3.1.3 No person shall operate within the Recreation Area any motorized vehicle or other mobility device in violation of applicable laws.
- 3.1.4 No person shall fail to observe posted regulatory traffic signs roadway markings or any other temporary sign installed by the Agency.
- 3.1.5 No person shall operate their vehicle in an unsafe manner.
- 3.1.6 No person shall ride in or upon any trailer in tow, in any truck bed or upon any tailgate, hood, or other external portion of any vehicle not designed to legally carry passengers except when a trailer carrying or designed to carry a vessel is engaged in the immediate launching or retrieval of a vessel.
- 3.1.7 No person shall operate any vehicle without the appropriate driver license or learner permit.
- 3.1.8 No person shall operate any vehicle under the influence of alcohol or other substance which impairs ability to drive.
- 3.1.9 No person shall operate any vehicle with an open container of alcohol in the vehicle.

3.2 PARKING

VEHICLES

- 3.2.1 No person shall park any vehicle in any area posted "No Parking" or in any location other than a designated parking area.
- 3.2.2 No person shall park any vehicle in a signed handicapped parking place without displaying the proper handicapped placard/license on their vehicle.
- 3.2.3 No person shall park any vehicle in a manner to block or obstruct the exit of another vehicle already legally parked.
- 3.2.4 No person shall park any vehicle in a time restricted parking zone for longer than the posted time allowance.

TRAILERS

- 3.2.5 No person shall leave any unattached/unattended boat trailer in any place other than a designated trailer parking area or campsite.
- 3.2.6 No person shall leave any unattached/unattended boat trailer in any designated trailer parking area without a boat trailer parking permit.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

3.3 OPERATOR PROPELLED DEVICES

- 3.3.1** No person shall ride any operator propelled device within the Recreation Area without proper personal safety equipment as required by applicable law.
- 3.3.2** No person shall ride any operator propelled device in an unsafe or discourteous manner or in a way to potentially cause property damage.
- 3.3.3** No person on any operator propelled device shall fail to observe posted use limitation signs, regulatory traffic signs, roadway markings or any other temporary sign posted by the Agency.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

**Section IV
RECREATION AREA USE**

4.1 CAMPING AND PICNICKING

- 4.1.1 No person shall camp within the Recreation Area except in designated camping areas.
- 4.1.2 No person shall camp in the dispersed area of the Recreation Area where dispersed area camping is prohibited.
- 4.1.3 No person shall register for any campsite and then allow the overnight campsite occupancy limit of 8 persons per campsite to be exceeded.
- 4.1.4 No person shall occupy a campsite and/or vehicle parking pad other than the one to which they have been registered.
- 4.1.5 No person shall arrive to occupy a campsite for the coming night prior to the 4 p.m. check-in time (unless approved in advance by the Agency) without acquiring the previous night's camping permit.
- 4.1.6 No person shall occupy a campsite past the check out time of 2 p.m. (unless approved in advance by the Agency) if they have not acquired a permit to camp in that site for the coming night.
- 4.1.7 No person shall occupy a campsite for more than 14 consecutive nights between May 1 and September 30 of any given year, or more than 90 consecutive nights between October 1 and April 30 of any given year.
- 4.1.8 No person shall occupy a campsite for a maximum length of time and then for a consecutive stay without observing the defined break in occupancy.
- 4.1.9 No person shall move any Agency provided campsite or picnic site furnishing from one camp or picnic site to another.
- 4.1.10 No person shall picnic in a developed camping area.
- 4.1.11 No person shall leave any campsite furnishings or other personal property unattended for more than 12 hours in any dispersed area.
- 4.1.12 No person shall use the electrical outlets (other than those located in an individual's assigned hook-up or group site) in any restroom or other Agency facility for the purpose of plugging in an extension cord, electric appliance used for food or beverage preparation, and/or other electric device not needed for personal grooming.
- 4.1.13 No person shall leave a hose connected to any water faucet in any camping area or restroom, other than in an individual's assigned hook-up campsite.
- 4.1.14 No person shall set up portable swimming/wading pools within the Recreation Area.

4.2 GROUP USE

- 4.2.1 No person shall exceed a maximum number of 200 persons per group campsite or 100 persons per group picnic site.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

4.3 DAY USE

- 4.3.1 No person shall exceed the day use hours of 5 a.m. to 10 p.m. without acquiring the appropriate additional day's use permit.
- 4.3.2 No person shall leave any day use furnishings in any dispersed area or other day use facility (such as swimming lagoon, lakeshore or picnic area) overnight (outside of the day use hours).

4.4 NIGHT FISHING

- 4.4.1 No person shall exceed the night fishing use hours of 5 p.m. to 10 a.m. without acquiring the appropriate additional day's use permit.

4.5 AQUATIC AND BOATING

VESSEL REQUIREMENTS AND RESTRICTIONS

- 4.5.1 All vessels that require registration numbers pursuant to applicable laws are required to have a current use permit from the Agency.
- 4.5.2 No person shall bring into the Recreation Area any vessel that is 10 feet or greater in width (during transport on land) other than an Agency permitted houseboat.
- 4.5.3 No person shall leave their vessel (except houseboats) unattended for more than 12 consecutive hours beached, moored, stored, or parked within the Recreation Area outside of an Agency authorized, assigned campsite, mooring or storage facility.
- 4.5.4 No person shall moor their vessel to or hang on with a vessel to any regulatory buoy, lake regulatory sign, hazard buoy, hazard marker, mooring buoy, supporting structures or beacon placed by the Agency or its authorized agents within the Recreation Area.
- 4.5.5 No person shall leave a vessel moored to an Agency or Marina courtesy dock, special use dock or floating restroom facility in excess of a posted maximum time limit.
- 4.5.6 No person shall moor any houseboat, private or rented, to an Agency courtesy dock, floating restroom facility, or to any buoy clearly marked "No Houseboats".
- 4.5.7 No person shall leave, moor, beach, or tie up any houseboat or sleeping capacity vessel on the shoreline of the developed Recreation Area facilities overnight during the time period of April 1 through September 30 of any year.
- 4.5.8 No person shall leave, moor, beach, or tie up any houseboat or sleeping capacity vessel in a manner during the day that creates congestion in a heavy use area (such as the launch ramp).
- 4.5.9 No person shall leave, moor, beach, tie up or secure any vessel in a manner which obstructs the navigation or access to any navigable water by any vessel.
- 4.5.10 No person shall leave, moor, tie up or secure any vessel to, otherwise use, or obstruct access to any Agency special use dock in conflict with a posted authorized reservation time period.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

VESSEL OPERATION

4.5.11 No person shall operate or use any vessel, aquatic vehicle, or manipulate water-skis, aquaplane, or similar device in a reckless or negligent manner so as to endanger the life, limb or property of any person.

4.5.12 655.2 Harbors and Navigation Code

(a) Every owner, operator, or person in command of any vessel propelled by machinery is guilty of a misdemeanor who uses it, or permits it to be used, at a speed in excess of five miles per hour in any portion of the following areas not otherwise regulated by local rules and regulations:

(1) Within 100 feet of any person who is engaged in the act of bathing. A person engaged in the sport of water skiing shall not be considered as engaged in the act of bathing for the purposes of this section.

(2) Within 200 feet of any of the following:

(A) A beach frequented by bathers.

(B) A swimming float, diving platform, or lifeline.

(C) A way or landing float to which boats are made fast or which is being used for the embarkation or discharge of passengers.

(b) This section does not apply to vessels engaged in direct law enforcement activities which are displaying the lights prescribed by Section 652.5. Those vessels are also exempt from any locally imposed speed regulation adopted pursuant to Section 660.

4.5.13 No person shall tow any aquaplane behind or alongside a vessel in an area posted "No Ski" by means of authorized regulatory buoys or signs.

4.5.14 HOUSEBOAT RULES

No person who is permitted to place their houseboat on Don Pedro Lake shall fail to follow the rules set forth in the DPRA Houseboat Rules (see appendix A).

4.6 TRAILS

4.6.1 No person shall fail to observe posted trail use regulations or restrictions.

4.6.2 No person shall operate any motorized vehicle on trails except for power driven mobility devices operated by persons with mobility disabilities in accordance with applicable laws.

4.6.3 No person shall block any trail or set up campsite and/or day use furnishings on any trail.

4.6.4 No person shall use trails for the purpose of accessing or trespassing upon adjacent private property.

4.6.5 No person shall create their own trail or cut their own switchbacks or shortcuts.

4.6.6 No bicyclist shall fail to yield to pedestrian, mobility disabled or other non-motorized trail users.

4.6.7 No bicyclist, pedestrian, mobility disabled or other non-motorized trail user shall fail to yield to any equestrian where equestrian trail use is permitted.

4.6.8 No bicyclist shall fail to announce their presence by voice or other audible signal to other trail users prior to passing them.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

Section V
NATURAL RESOURCES

5.1 MINING AND PANNING

- 5.1.1 No person shall engage in the act of mining within the Recreation Area.
- 5.1.2 No person shall engage in panning in any developed facility of the Recreation Area.
- 5.1.3 No person shall leave any panning site in the dispersed area of the Recreation Area prior to restoring the area in which the panning took place to its original, natural condition.

5.2 METAL DETECTING

- 5.2.1 No person shall enter the developed facility of the Recreation Area for the purpose of metal detecting.
- 5.2.2 No person shall keep personal property found during the act of metal detecting in the dispersed areas of the Recreation Area without first having abided by the Agency Lost and Found policy.
- 5.2.3 No person shall leave any metal detecting site in the dispersed area of the Recreation Area prior to restoring the area in which the metal detecting took place to its original, natural condition.

5.3 WILDLIFE, PLANTS, SOILS, MINERALS, AND WATER

- 5.3.1 No person shall maliciously, intentionally or negligently molest, hunt, disturb, injure, trap, net, poison, harm, kill, feed, touch, tease or spotlight any wild animal except for persons hunting or fishing in accordance with applicable law.
- 5.3.2 No person shall introduce any non-native wild species or domestic animal into the Recreation Area.
- 5.3.3 No person shall willfully or negligently pick, dig up, cut, mutilate, destroy, injure, disturb, move, molest, burn or carry away any tree, plant or any portion thereof except that which is needed to clear away vegetation or combustible material in compliance with these rules, FIRES section 2.4.2.
- 5.3.4 No person shall disturb the soils (except as otherwise permitted in these regulations and ordinances), archaeological, historical or geological resources within the Recreation Area.
- 5.3.5 No person shall engage in any work or repairs or other activity that would introduce into the waters or soil of the Recreation Area any substance which is or becomes defined as a hazardous waste, hazardous substance, pollutant, or contaminant under any federal, state, or local statute, regulation, rule, or ordinance or amendment thereto, or that would result in the violation of the Porter-Cologne Water Quality Act (Cal. Water Code Sec. 13100 et seq.) or the Clean Water Act (33USC 1251-1376).

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

**Section VI
DEFINITIONS**

The following definitions will be used for the purpose of these regulations and ordinances, whether or not they are initially capitalized.

AGENCY:

The Don Pedro Recreation Agency (also referenced DPRA), which is the organization charged with the responsibility for the operation and maintenance of the Recreation Area. The Agency has the jurisdiction to enforce Applicable Laws within the Recreation Area. Agency includes all authorized Agency representatives acting within the scope of their authority.

ANNUAL BOAT PERMIT:

A permit that allows day use, storage or moorage of a boat that does not have sleeping capacity in the Recreation Area and is valid for a calendar year. Required for boats that are stored or moored in the Recreation Area for greater than 15 consecutive days.

ANNUAL LAKESHORE CAMPING PERMIT:

A permit that allows lakeshore camping use of the Recreation Area and is valid for a calendar year.

ANNUAL PW PERMIT:

A permit that allows day use, storage or moorage of a personal watercraft in the Recreation Area and is valid for a calendar year. Required for personal watercraft that are stored or moored in the Recreation Area greater than 15 consecutive days.

ANNUAL SC PERMIT:

A permit that allows day use, storage or moorage of a boat with sleeping capacity in the Recreation Area and is valid for a calendar year. Required for boats with sleeping capacity that are stored or moored in the Recreation Area greater than 15 consecutive days.

ANNUAL SECOND VEHICLE PERMIT:

A permit that allows vehicle day use of the Recreation Area and is valid for a calendar year, sold at a reduced rate when the vehicle's registered owner has already purchased an Annual Vehicle Permit or Annual Senior Citizen Vehicle Permit for another vehicle registered in his/her name.

ANNUAL SENIOR CITIZEN VEHICLE PERMIT:

A permit that allows vehicle day use of the Recreation Area and is valid for a calendar year, sold at a reduced rate for a vehicle whose registered owner is age 62 or over.

ANNUAL VEHICLE PERMIT:

A permit that allows vehicle day use of the Recreation Area and is valid for a calendar year.

APPLICABLE FEES:

All Agency approved Recreation Area permit and use fees.

APPLICABLE LAWS:

All Laws, Codes, Ordinances, Rules, Regulations (including these Regulations and Ordinances) and Standards currently in effect that pertain to or are relevant to the use of and/or the activities that take place within the Don Pedro Recreation Area.

AQUAPLANE:

All forms of water skiing, wakeboarding, barefoot skiing, skiing on skim boards, knee boards or other contrivances, parasailing, ski kiting, or any activity where a person is towed behind or alongside a boat with the exception of a vessel in tow.

BOAT:

Any vessel that is less than 10' in width and requires numbering and registration per State Law.

Adopted 8/3/99

Amended 5/29/01, 8/31/10, 8/16/11

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

BREAK IN OCCUPANCY:

48 hour vacancy time period required before a camper may occupy a given campsite again after occupying that campsite for the maximum number of nights.

BOAT TRAILER PARKING PERMIT:

Permit provided at developed facility for the purpose of leaving an unattended vessel trailer in any designated parking area while camping, houseboating, or otherwise using the Recreation Area. Permit does not cover parking of unattended trailers if owner is not utilizing the Recreation Area facilities at the time the trailer is being left in the designated parking area.

CAMPING:

Overnight use of Recreation Area land other than for the sole activity of fishing. May include but is not limited to erecting a tent or shelter, arranging bedding, or using a parked or standing vehicle for staying overnight.

CAMPSITE:

Area established with Agency provided or user provided furnishings and utilized for the purpose of camping.

DAY USE:

Use of Recreation Area for parking and daytime activities.

DAY USE FURNISHINGS:

All portable structures that are brought in to facilitate day use activities.

DEACTIVATED WEAPON:

A weapon that is rendered temporarily inoperable by being cased, packed away, or stored in such a manner that will prevent ready use.

DESIGNATED PARKING AREA:

Paved or other area established for the purpose of parking vehicles and trailers. May be indicated by signage, proper striping, or obvious applicability for parking (such as for paved campsite parking pads).

DEVELOPED CAMPSITE:

Designated area (by number) that includes some or all of the following: Tent pad, site furnishing pad, and vehicle parking pad.

DEVELOPED FACILITY:

Designated area(s) within the Recreation Area that has been developed with permanent structures for Recreation use and is accessible only by Agency provided roadways.

DEVELOPED IMPROVEMENT:

Any structure or other object constructed or installed within the Recreation Area. Includes but is not limited to regulatory and hazard buoys, buildings, site furnishings, building furnishings, courtesy docks, floating restrooms, roadways, signs and utility connections.

DISPERSED AREA:

Areas within the Recreation Area that are available for recreation use but have no Agency provided roadways.

DOMESTICATED ANIMALS:

Any animal that is referred to as a pet or that has been "tended" by humans, such as, but not limited to cats, dogs, potbellied pigs, rabbits, horses, and cows.

FIREWORKS:

Includes all fireworks described as "Safe and Sane" and all illegal fireworks as described by applicable law.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

GROUND FIRE:

Any fire that is built and ignited directly on the ground outside of an Agency provided fire ring.

HOUSEBOAT:

Private or concessionaire owned vessels that are 10' or greater in width, have sleeping capacity, are limited by a specific number of houseboat permits and are subject to specific Agency Houseboat Rules.

LAKESHORE CAMPING:

Camping in designated dispersed areas.

LEGAL GUARDIAN:

Parent or legal guardian (as defined by law) of a minor or adult over the age of 25 with a note from the minor's parents authorizing that adult to act in their stead.

MINING:

The process of disturbing the soil for the purpose of removing soil, ore, rock or minerals from the Recreation Area other than through the activity of panning.

NIGHT FISHING:

Use of the Recreation Area solely for the activity of fishing at night.

OCCUPANCY:

Authorized utilization of a given facility, location or area.

OPERATOR PROPELLED DEVICE:

Any device that is propelled by the person operating it, such as bicycles, skateboards, roller skates, and in-line skates.

OUTSIDE VENDOR:

Any person or entity that is or will be performing any type of work/duties for hire within the Recreation Area that does not fall within established Concessionaire Contract or other contract with the Agency.

PANNING:

Activity for the purpose of finding gold, accomplished by use of a pan no more than 18" in diameter and no motorized means of excavation.

PERMIT:

Authorization from the Agency to utilize the Recreation Area for a specific activity or purpose.

PERSON:

Any human being of any age.

PERSONAL WATERCRAFT (also PWC, PW):

A boat that is 13' in length or less, propelled by machinery, that is designed to be operated by a person sitting, standing, or kneeling on the vessel, rather than in the conventional manner of sitting or standing inside of the vessel.

PERSONAL SAFETY EQUIPMENT:

Any equipment worn or to be worn by persons engaged in operator propelled device activities - bicycling, skateboarding, roller skating, in line skating, etc. - that may or may not be required by applicable law.

RECREATION AREA:

All lands and water available for recreation use that fall within the Federally Licensed New Don Pedro Project Boundary - FERC License #2299.

REFUSE:

Any material, organic or inorganic, that is deposited or left within the Recreation Area.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

RULES:

Term used to reference regulations, ordinances, and other applicable laws.

SLEEPING CAPACITY (also SC):

Equipped with built-in plumbing.

SPECIAL USE PERMIT:

Permit authorizing a use of the Recreation Area that may temporarily alter its normal operation, require special authorization for activities that would otherwise be prohibited, or exceed the realm of family camping or individual water oriented use.

TOWING/IMPOUNDMENT:

Lawful seizure of specific personal property associated with a failure to comply with applicable laws.

TRAILERS:

Any non-motorized mode of transportation on land to tow behind a vehicle for purpose of transporting living quarters, gear, supplies, vehicles or vessels.

UNATTENDED:

Any personal property that has not been watched, maintained, checked on or operated by the owner or authorized operator within a specific time period established by the Agency.

VEHICLE:

Any mode of motorized transportation for use on land.

VESSEL:

Any mode of motorized or non-motorized transportation for use on water with the exception of floating aircraft.

WEAPON:

Any object having potential to injure or kill, threaten injury or death to any living creature or to damage any public or private property. Includes but is not limited to firearms, archery equipment, gas or spring activated devices, slingshots, knives, laser pointers, traps, nets, vehicles, and vessels.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

1. GENERAL RULES^{*1}

- 1.01. The Primary Purpose for Houseboating on Don Pedro Lake shall be for Recreation.
- a. Any use of Houseboats found to be contrary to this purpose will not be permitted.
 - b. Houseboats shall not be used as a residence.
 - c. The Houseboat Permit Holder shall not rent, lease or assign Houseboat to others.
- 1.02. No Houseboat shall be in the Recreation Area without a valid Houseboat Permit from the Agency.
- a. Only the Registered owner(s) of a Houseboat may apply for an Agency Houseboat Permit or for the renewal of an Agency Houseboat Permit.
 1. Individuals with ownership rights to Houseboats with Non-Person Specific Registration will be considered the Registered Owners of that Houseboat.
 2. Official documentation listing all individuals with ownership rights to Houseboats with Non-Person Specific Registration shall be provided to the Agency before a Houseboat Permit will be issued or renewed.
 - b. A Houseboat Permit may not be transferred without the sale or transfer of ownership of the permitted vessel.
- 1.03. Houseboat Permit Holders and Persons using or having charge, care or control of the Houseboat must comply with Applicable Laws.
- a. The Agency is authorized to inspect each Houseboat at all times for compliance with Applicable Laws.
 - b. Houseboat Permit Holders may be held responsible for the actions of those Persons authorized to use or operate their Houseboat.
- 1.04. Houseboat Permit Holders must sign an Agency approved mooring agreement with the Assigned Concessionaire.
- a. All applicable requirements listed under section 2 of these Rules shall be met before a Houseboat mooring agreement is signed with a concessionaire.
 - b. Permitted Houseboats left Unattended on Don Pedro Lake for a period of 24 hours or more must be in an assigned slip or moored to an assigned mooring buoy operated / maintained by an Agency approved concessionaire.
 - c. A Houseboat Permit Holder(s) may not change their Assigned Concessionaire without prior Agency approval.
- 1.05. Houseboat Permit Holders must maintain in good standing Applicable Fees due the Agency and the Assigned Concessionaire.
- 1.06. **INSURANCE REQUIREMENT**
- Houseboat Permit Holders shall procure and at all times maintain general liability insurance, which will provide coverage for limits of not less than \$300,000.
- a. Such insurance shall be obtained from an insurer and in a form satisfactory to the Agency.
 - b. The Don Pedro Recreation Agency, the Turlock Irrigation District, the Modesto Irrigation District, and their governing boards shall be named as additional insureds under the Houseboat Permit Holder's insurance policy.
 - c. A certificate of insurance evidencing coverage shall be provided to the Agency when the Houseboat Permit is issued or when it is renewed.
 - d. Coverage shall not be canceled nor materially altered without at least thirty (30) Days written notice to the Agency.

2. HOUSEBOAT PERMITTING PROCEDURES

2.01. HOUSEBOAT PERMIT RESTRICTIONS

- a. Except as otherwise allowed by this section 2.01, a Houseboat Permit Holder and his or her spouse may own an interest in no more than one Houseboat on Don Pedro Lake.

^{*1} Appendix A, which is incorporated into these Rules, defines capitalized terms (other than section and subsection titles) used in these Rules.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

1. A current Houseboat Permit Holder and his or her spouse may acquire an interest in a second Houseboat for the purpose of modifying Houseboat size and or quality only, provided that only one Houseboat may be operated on Don Pedro Lake at any time.
2. A second Houseboat may be moored on Don Pedro Lake while it is for sale, but shall be operated only with permission of the Agency.
- b. Prior Agency approval is required before the purchase of a second Houseboat with a permit for Don Pedro Lake.
 1. Interests in second Houseboat Permits may be owned for a maximum of two Years from the purchase date when the purpose is for remodeling, repair or New Construction of a Houseboat.
 2. Interests in second Houseboat Permits may be owned for a maximum of one Year only when no remodeling, repair or New Construction of a Houseboat is to take place.
- c. No Person or Persons who have ever had a Houseboat Permit revoked or have ever been subject to non-renewal of their Houseboat Permit shall be eligible to apply for a Houseboat Permit again.

2.02. HOUSEBOAT PERMIT WAITING LIST.

- a. The Agency at its discretion may open or close the Waiting List to new applicants.
- b. Applicants for Houseboat Permits must submit a written request to the Agency to have their names added to the Waiting List.
- c. No current Houseboat Permit Holder will be placed on or shall remain on the Waiting List.
- d. Priority on the Waiting List will be ranked in order of the date and time each written request is received by the Agency with the oldest receipt date having the highest priority.
- e. When a Houseboat Permit is available, the highest applicant on the Waiting List will be offered the Houseboat Permit subject to these Rules:
 1. Applicants will be sent a "Notice of Houseboat Permit Availability" by certified mail to the address listed on the request.
 2. Applicants must accept or decline the offer for a Houseboat Permit in writing received by the Agency within 30 Days after the date of "Notice of Houseboat Permit Availability." If an acceptance is not received within the 30 Day time period, the offer will be deemed declined and the applicant will be removed from the waiting list.
 3. The required "First Year Permit Fee" must be paid to the Agency within five Days of the date of the applicant's acceptance of the permit. Failure to pay the required First Year Permit Fee to the Agency within this five-Day period, for whatever reason, will result in the denial of the Houseboat Permit and removal of the Applicant(s) from the Waiting List.
 4. Failure of the Applicant(s), for whatever reason, to receive a Notice of Houseboat Permit Availability shall not entitle the Applicant(s) to any relief from the Agency's denial of the Houseboat Permit or from removal from the Waiting List.
- f. Applicant(s) on the Waiting List cannot sell, trade, give, assign, or otherwise transfer their position on the Waiting List to another Person or entity.
- g. The Houseboat Registration at the time the Houseboat Permit is issued must include all Applicants names as shown on the Waiting List.

2.03. NEW APPLICATIONS

Applicant(s) will be issued a new Houseboat Permit upon meeting all of the following requirements:

- a. Applicants must obtain an authorized mooring space from the applicable Marina Concessionaire and shall pay in advance to the Marina Concessionaire monthly mooring fees for three (3) months.
- b. Applicants must pay the required "First Year Permit Fee" to the Agency.
- c. Applicants must complete an Application for Houseboat Permit, which meets the approval of the Agency.
- d. Applicants must submit a current copy of their Houseboat Registration to the Agency.
- e. Applicants must submit a certificate of insurance evidencing coverage as described in section 1.06 of these Rules and regulations to the Agency.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

- f. Applicants must place their Houseboat on Don Pedro Lake within two Years of issuance of the Houseboat Permit.

2.04. RENEWAL APPLICATIONS

An existing Houseboat Permit will be renewed upon meeting all of the following requirements:

- a. Applicable Fees must be in good standing.
- b. It is the renewal applicant(s) responsibility to pay the Annual Renewal Fee(s), and complete an Application for Houseboat Permit form signed by all registered owner(s), which meets the approval of the Agency, before February 1st of the renewal Year. Failure to receive a renewal reminder or application form does not absolve the renewal applicant from this responsibility.
- c. A current copy of the renewal applicant(s) Houseboat Registration must be on file with the Agency before February 1st of the renewal Year.
- d. A certificate of insurance evidencing coverage as described in section 1.06 of these Rules must be on file with the Agency before February 1st of the renewal Year.
- e. Houseboat Permit Holders that fail to meet all of the requirements of section 2.04.a. through d. before February 1st will be required to pay the Non-discount Annual Renewal Fee.

2.05. CHANGE OF OWNERSHIP

When a Change of Ownership occurs, the following must be done:

- a. The current Houseboat Permit Holder(s) must notify the Agency within fourteen (14) Days of the date of the Change of Ownership and provide the following information:
 1. The type of Change of Ownership that occurred [sale, transfer, change or addition or deletion of name(s)].
 2. The names, addresses and telephone numbers of the new owners or the Persons added or deleted.
 3. A "Permit Release Form" that has been signed by all current Houseboat Permit Holders who are releasing their interest in the Houseboat.
 4. The current Houseboat Permit Holder(s) shall provide the new owner(s) with current copies of these Rules and the D.P.R.A. Rules and Regulations and notify the new owner(s) that they must file a completed Application for Houseboat Permit and pay the required Change of Ownership Fee to the Agency within fourteen (14) Days of the date of the Change of Ownership.
- b. The new owner(s) must file with the Agency a completed Application for Houseboat Permit form and must pay to the Agency, the required Change of Ownership Fee, all within fourteen (14) Days of the date of the Change of Ownership.
- c. The new owner(s) must provide to the Agency a copy of the current Houseboat Registration within fourteen (14) Days of the date of Change of Ownership.
- d. When registration is by United States Coast Guard Documentation the following will be required:
 1. If proof of USCG documentation cannot be secured within fourteen Days, the new owner(s) shall submit a copy of their USCG National Vessel Documentation Center application to the Agency within fourteen Days.
 2. The new owner(s) shall submit a copy of their official USCG Certificate of Documentation to the Agency no later than three months from the date of the Change of Ownership.
- e. The new owner(s) must provide to the Agency a certificate of insurance evidencing coverage as described in section 1.06 of these Rules within fourteen (14) Days of the date of Change of Ownership.

2.06. CHANGE OF ASSIGNED CONCESSIONAIRE

Houseboat Permit Holders wishing to change the authorized mooring location of their Houseboat from one marina concession area to another must make a written request to the Agency identifying the permit Holder's new preferred location. The Agency will maintain a Relocation List of all Houseboat Permit Holder(s) desiring to relocate their Houseboats.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

- a. Relocation applicants will be ranked on the Relocation List in order of the date that their respective written requests were received by the Agency with the oldest requests having the highest priority.
- b. Relocation requests received on the same Day will be ranked in order of the length of time each relocation applicant has held his Houseboat Permit with the most senior Houseboat Permit Holder having the highest priority of the relocation requests received on the same Day.
- c. When a mooring space is available at the marina concession area of choice, the Agency will notify by mail the requesting Houseboat Permit Holder having the highest priority on such list.
- d. The Houseboat Permit Holder will then notify the respective marinas, sign a mooring agreement with the new Assigned Concessionaire and pay the Agency the required Change of Assigned Concessionaire Fee.
- e. Location change will not take place until written notification from the Agency is given to the Houseboat Permit Holder stating the designated relocation date.

3. HOUSEBOAT REPAIR, REPLACEMENT, CONSTRUCTION AND MAINTENANCE

3.01. *HOUSEBOAT REMOVAL AND LAUNCH*

Houseboat Permit Holder(s) must obtain prior authorization from the Agency to use launch ramps for Houseboat removal and Houseboat launch.

- a. Houseboat Permit Holders shall notify the Agency a minimum of seven Days in advance of the date when a Houseboat is to be removed from Don Pedro Lake for repairs or replacement, except in emergencies.
- b. Houseboat Permit Holders shall notify the Agency and arrange for a pre-launch inspection of their Houseboat a minimum of fourteen Days in advance of the planned launch date.
- c. All Houseboats must pass the Agency inspection prior to launch.
- d. Vendors hired to remove or launch Houseboats shall be subject to Applicable Laws, vendor permit and insurance requirements.
- e. Permitted Houseboats removed from Don Pedro Lake shall re-launch within five Years from the date of their removal.
- f. Permitted Houseboats already removed from Don Pedro Lake shall have a maximum of five Years from the effective date of these Rules to re-launch.

3.02. *REPAIR FACILITIES*

The Agency has established facilities within the Recreation Area for repair of Houseboats moored on Don Pedro Lake.

- a. Only Houseboats with valid Houseboat Permits are authorized to use the Blue Oaks Houseboat Repair Yard
- b. The Agency Board of Control shall adopt Regulations for operation of the Repair Yard with which all Houseboat Permit Holders must comply.

3.03. *REPAIR OR REPLACEMENT REQUIREMENT*

The Houseboat Permit Holder shall repair or replace the Houseboat in the event the Houseboat is damaged, destroyed, the motor inoperable, or the Houseboat is removed from the Recreation Area.

- a. All such repairs or replacement shall commence within ninety (90) Days after the Houseboat has been damaged, destroyed, rendered inoperable, or removed from the Recreation Area.
- b. Houseboat Permit Holders will notify the Agency of any intent to construct or acquire a replacement Houseboat.
- c. During repairs and/or replacement all Houseboat Permit owners must maintain in good standing all applicable Agency and Concessionaire fees, including but not limited to, Assigned Concessionaire mooring/buoy fees.
- d. Liability insurance as prescribed by section 1.06 of these Rules shall be maintained on all Houseboats that remain within the Recreation Area during repairs and / or replacement.
- e. With prior approval of the Agency, replacement Houseboats for current Houseboat Permit Holders may be constructed in the Blue Oaks Houseboat Repair Yard prior to removal of the currently owned and permitted Houseboat from the lake.
- f. Houseboats being replaced shall be removed from the Recreation Area and the permit transferred to the replacement Houseboat prior to launch.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

3.04. *HAZARDOUS MATERIALS*

- a. At no time shall any work or repairs be made on any Houseboat while on the lake that involves the following:
 1. Any work or repair that involves structural alteration or modification without prior Agency approval.
 2. Any work or repair or any by-product of such work or repair that could result in the introduction of any materials into the waters of Don Pedro Lake.
- b. At no time shall any work or repairs be made on, or other activity take place on any Houseboat that would introduce into the waters or soil of the Recreation Area any substance which is or becomes defined as a hazardous waste, hazardous substance, pollutant, or contaminant under any federal, state, or local statute, regulation, rule, or ordinance or amendment thereto, or that would result in the violation of the Porter-Cologne Water Quality Act (Cal. Water Code Sec. 13100 et seq.) or the Clean Water Act (33USC 1251-1376).
- c. Houseboat Permit Holders, their agents, employees, or contractors are required, at their sole cost and expense, to promptly take all actions to remediate the release of any substance prohibited by this section into the Recreation Area and to immediately notify the Agency of any violation of this section. If Houseboat Permit Holders, their agents, employees, or contractors fail to perform the duties required by this section, Agency reserves the right to perform the remediation at Houseboat Permit Holder's cost.
- d. All Houseboat Permit Holders shall be responsible for the proper disposal of hazardous wastes, hazardous substances, pollutants, or contaminants resulting from the operation, repair or maintenance of their Houseboat.
- e. Battery Disposal: The Houseboat Permit Holder is responsible for proper disposal and or recycling of their Houseboat's batteries.
 1. A battery drop off area will be provided at each campground for proper disposal and recycling of batteries.
 2. Campground personnel can be contacted for the location of this battery drop-off area.

3.05. *USE OF OFF-SITE VENDORS WITHIN THE RECREATION AREA*

- a. Agency approved Marina concessionaires hold exclusive rights to provide certain approved services within their assigned concession lease agreement areas.
- b. The hiring of any vendors, contractors or entities other than approved marina concessionaires by Houseboat Permit Holder(s) to perform any work or service within the Recreation Area shall be subject to all applicable Agency regulations, vendor permit and insurance requirements.
- c. Outside vendors shall not be restricted from performing services for any Houseboat Permit Holder when the marina concessionaires are incapable or cannot perform the desired work or service required in a timely manner.

3.06. *MAINTENANCE AND CONSTRUCTION STANDARDS*

- a. All Houseboats shall be maintained in a good and proper state of repair and shall be aesthetically neat in appearance.
- b. All Houseboat propulsion systems shall be maintained in a safe and operable condition at all times.
- c. All Houseboats shall be kept maintained, painted, stained, coated or other wise protected so as to present a neat and well-kept appearance and to furnish protection against weathering and corrosion.
 1. Colors shall blend with the surroundings.
- d. All Houseboats shall be constructed and maintained in conformance with Applicable Laws.
 1. The Houseboat Permit Holder is responsible for ensuring that all construction standards are met.
- e. All decking and roofs shall be protected from weathering or constructed with a suitable weather proofed material. Carpeting and other deck and roof coverings shall remain firmly attached and kept free of tears, mildew and other forms of deterioration.
- f. A general description of all proposed New Construction must be submitted to the Agency for its approval prior to the start of such work. Routine repair and maintenance of the cabin, roof, deck(s), fascia, pontoons,

APPENDIX A

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

holding tank, connected plumbing and railing alone will not be considered New Construction and will not require submission of such a description.

- g. All newly constructed Houseboats and newly constructed replacement railings shall meet or exceed the following railing requirements:
 - 1. Upper deck - full railing, 36-inch height, 6-inch spaces.
 - 2. Bottom deck - optional, none, full, or partial is acceptable, recommend 36-inch height, 6-inch spaces.
- h. With the exception of those Agency Houseboat construction standards established for New Construction Only those Houseboats on Don Pedro Lake as of the effective date of these Rules which are not in compliance with these construction standards must be corrected and in full compliance prior to first re-entry to the lake after a takeout.

3.07 ***REQUIRED EQUIPMENT***

- a. Houseboats shall carry or be equipped with all equipment required by Applicable Laws.
- b. Houseboats shall be equipped with permanently and properly installed operable navigation and anchor lights.
- c. Houseboats shall display all required numbers, letters, names and stickers in accordance with Applicable Laws.
- d. All Mechanical Compartments used for propulsion of the Houseboat that extend below the water line shall be equipped with an operable bilge pump and an Agency approved bilge absorbent material or filtration system that prevents pollutants from entering the lake when the bilge pump is operated.

3.08. ***FLOTATION DEVICES***

- a. Flotation Devices including Monohull design flotation shall be fitted with transverse and/or longitudinal Watertight bulkheads that provide Compartmentation sufficient to keep the fully loaded vessel afloat with positive stability, with any one main compartment flooded.
- b. When pontoons are used for flotation, no single compartment in a pontoon shall comprise more than 20% of the total available flotation volume.
- c. Flotation Devices shall be constructed of metal, wood that has been covered with fiberglass or other materials as approved by the Agency. Barrels and other containers will not be acceptable as Flotation Devices.
- d. The exterior surfaces of all Flotation Devices shall be Watertight (Weathertight hatch covers are permitted when applicable) and thoroughly protected from rust, corrosion, solvents, and weather.
- e. Flotation Devices shall be structurally sound and securely fastened to the main Houseboat structure.
 - 1. The Agency reserves the right to require Houseboat Permit Holders (at their expense) to perform reasonable tests in order to determine the structural condition of questionable Flotation Devices.
 - 2. Those Flotation Devices found to be structurally unsound as a result of such tests shall be promptly replaced or repaired when applicable at permit holder's expense.
- f. All Hatch Covers leading to Storage or Mechanical Compartments in a Houseboat's Flotation Devices shall be at least Weathertight, preferably Watertight and Mechanically Fastened down.
 - 1. Hatch Covers on Mechanical Compartments that are hinged on one side and deemed sufficiently secured by other means (such as heavy weight) may, at the Agency's discretion, be exempted from this Mechanically Fastened requirement.
- g. *New Construction only:*
The following requirements shall apply to Flotation Devices (including replacement Flotation Devices) constructed after the effective date of these regulations:
 - 1. Flotation Device Storage Compartments may be ventilated but the outlet of the vent must be a minimum of 15" above the deck and will be capped with a 180-degree elbow.
 - 2. Vents for Mechanical Compartments in Flotation Devices shall comply with the Standards and Recommended Practices for Small Craft and any other applicable State or Federal standards.
 - 3. All new hollow Flotation Device compartments that do not contain Storage or Mechanical Compartments shall be fitted with Watertight pressure test fittings.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

4. All new hollow Flotation Device compartments that do not contain Storage or Mechanical Compartments shall be pressure tested prior to their launch and shall be capable of holding positive pressure.
5. Metal Flotation Devices:
All new Flotation Devices constructed of metal shall meet or exceed the following requirements:
 - ◆ Minimum of ten gauge (1/8 inch) thickness for all mild steel construction.
 - ◆ Minimum of ten gauge (1/8 inch) thickness for all aluminum construction.
 - ◆ Minimum of twelve gauge (3/32 inch) thickness 304 grade stainless steel, or other twelve gauge 300 series stainless steel with characteristics equal to or greater than the characteristics of 304 grade.
 - ◆ All mild steel and aluminum Flotation Devices shall be fitted with appropriate anti-electrolysis "anode" plates or other Agency approved systems that protect against electrolysis.
6. A plan detailing Flotation Device dimensions, displacement, and boatload capacity shall be submitted to the Agency prior to completion of any new Houseboat construction or Flotation Device reconstruction.
- h. The minimum lower (main) deck height (excluding swim decks) of all Houseboats when fully loaded shall not be less than 12 inches above the water line.

3.09. SANITARY FACILITIES.

Each Houseboat's Wastewater system shall be maintained in strict compliance with Applicable Laws.

- a. All Wastewater shall be delivered into on-board holding tanks.
- b. All Wastewater holding tanks shall be emptied only by pumping into an Agency approved Wastewater system.
- c. No Wastewater of any type shall at any time be in any way discharged into the lake.
- d. All Houseboats shall be provided with a toilet facility and Wastewater holding tank.
- e. The Wastewater holding tank and connected plumbing shall be constructed and maintained in such a manner that the tank can be emptied only by pump-out equipment.
- f. No drain plugs shall be installed below the bottom of the toilet level.
- g. Any Houseboat having a sink, shower, washbasin or other facility must provide plumbing so that all Wastewater from these facilities is piped to the holding tank(s).
- h. Holding tanks may be constructed of stainless steel, mild steel, aluminum, reinforced fiberglass or Wastewater grade reinforced plastic.
 1. All new holding tanks are subject to the New Construction requirements so set forth in section 3.09.k.
 2. Holding tanks shall be painted, coated or otherwise fully protected from rust, corrosion and weathering.
 3. Holding tanks shall be Watertight and free of any leaks.
 4. The Agency reserves the right to require replacement of holding tanks believed to be in a state of deterioration.
- i. Holding tanks shall have a combined minimum total capacity of 100 gallons.
- j. Holding Tank Attachments and Fittings:
 1. Openings to pump-outs, vents, clean-outs, etc., must be a minimum of 15" above the lower deck.
 2. Pump-outs for more than one holding tank shall be located together.
 3. All fittings to holding tanks shall be glued, welded or otherwise permanently sealed and attached.
 4. Where attachments and fittings are clamped, a permanent clamp shall be used whenever possible.
 5. Prior Agency authorization is required to use screw clamps on any Wastewater plumbing.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

- k. *New Construction Only:* In addition to the requirements in 3.09.a. through j., the following requirements shall apply to all new holding tanks constructed or replaced after the effective date of these regulations:
1. All new holding tanks shall have a combined minimum total capacity of 200 gallons.
 2. All new holding tanks shall not exceed a combined maximum total capacity of 600 gallons.
 3. The interior surfaces of all new holding tanks (including replacement tanks) unless constructed of chemically resistant stainless steel, fiberglass or Wastewater grade reinforced plastic shall be sandblasted and lined / coated with a suitable impervious material such as Coal Tar Epoxy or equivalent prior to installation.
 4. Any new or replacement holding tank installed so that it is in contact with lake water shall meet or exceed the following New Construction requirements:
 - ◆ Minimum of twelve gauge (3/32 inch) thickness 304 grade stainless steel or other twelve gauge 300 series stainless steel with characteristics equal to or greater than the characteristics of 304 grade will be permitted for single wall holding tanks.
 - ◆ Holding tanks constructed of other materials shall be a separate tank constructed of chemically resistant materials that is located within an approved outer flotation wall. Such tanks shall be equipped with a Watertight fitting that would permit inspection for leakage between this outer flotation wall and the inner tank.
 5. Center mount holding tanks that are constructed and installed in a manner so that they will ride above the Waterline when the Houseboat is fully loaded may be of single wall mild steel or other approved material construction.

3.10. *SIZE LIMITATIONS.*

- a. The following size limitations shall be in effect for all Houseboats unless an exception or exemption is listed:
1. *Minimum Size:*
 - ◆ 10 feet width, 20 feet length.
 2. *Absolute Maximum Size:*
 - ◆ 22 feet width, 56 feet length (all inclusive).
 - ◆ Out-drives, motor gear, swim decks and all other parts of the Houseboat shall remain within these dimensions whenever the Houseboat is left Unattended and is moored at its assigned mooring location.
 - ◆ With prior Agency approval, bumpers or similar devices attached to the perimeter of the Houseboat for protection purposes only may exceed these dimensions.
 - ◆ With prior Agency approval, Houseboats owned by an Agency approved concessionaire for the purpose of rental to the public may vary from the size limitations in this section.
 3. *Maximum Height:*
 - ◆ The Agency recommends one story with open upper deck.
 - ◆ No enclosed structures shall be permitted to extend beyond 15 feet above the Waterline.
 - ◆ The upper deck may be covered by use of open frame and awning provided that the awning is firmly attached, maintained in good condition, is constructed of flame resistant materials and allows for the passage of wind.
 - ◆ Those Houseboats with existing permanent structures (excluding add-on walk-in storage buildings) that exceed these height limits that were constructed prior to August 13, 1999 shall be exempted from this rule.
- b. Houseboats, which exceed the size limitations under section 3.10.a., may not be reconstructed to exceed those size limitations.

3.11. *HOUSEBOAT TO MOORING BUOY HOOKUP.*

- a. A Primary Mooring (connecting) device between the Houseboat and mooring buoy is required.
1. This Primary Mooring Device when attached between the Houseboat and its mooring buoy shall be of sufficient size and strength to hold the Houseboat no further than thirty-six (36) inches away from its mooring buoy.
 2. The Primary Mooring Device shall conform to all standards established by the Assigned Concessionaire.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

- ◆ The Assigned Concessionaire shall provide these standards in writing to all Houseboat Permit Holders assigned to that marina.
 - b. In addition to the Primary Mooring device, a Secondary Safety Mooring Device between the Houseboat and the mooring buoy is also required.
 - 1. The Secondary Safety Mooring Device shall be of chain, cable or wire rope of sufficient size and strength to hold the Houseboat to the mooring buoy in the event of the failure or disconnection of the Primary Mooring Device.
 - 2. The Secondary Safety Mooring Device shall conform to all standards established by the Assigned Concessionaire.
 - ◆ The Assigned Concessionaire shall provide these standards in writing to all Houseboat Permit Holders assigned to that marina.
 - c. All Houseboats shall be equipped with the Primary Mooring Device and the Secondary Safety Mooring Device however; those Houseboats, which are moored in slips at a Marina, need not use these devices while moored there.
 - d. The Moccasin Marina Concessionaire shall provide written specifications for "rear tie-up" to Houseboat Permit Holders assigned to mooring buoys at Moccasin whose Houseboats cannot free swing and must be tied end to end.
 - 1. A minimum of 5/8" poly- propylene or equivalent rope shall be used for all rear tie-ups.
- 3.12. *PRECEDENCE OF STATE AND FEDERAL REQUIREMENTS OVER AGENCY CONSTRUCTION STANDARDS*
- a. While every effort is made to ensure that Agency construction standards are consistent with Applicable Laws, there can be no guarantee that compliance with the Agency construction standards will assure compliance with applicable Federal and State requirements.
 - 1. The Federal and State requirements, to the extent they are inconsistent with the Agency construction standards, will supersede the Agency standards.
 - 2. Agency requirements may exceed State and Federal requirements.
 - b. Houseboat Permit Holders should consult the manual of Standards and Recommended Practices for Small Craft published by the American Boat and yacht Council as well as the U.S. Coast Guard and the Tuolumne County Sheriff's Boat Patrol for Federal and State Standards.

4. ENFORCEMENT OF HOUSEBOAT RULES

4.01. *ADMINISTRATION.*

- a. The Agency may make inspections and take actions to enforce the provisions of these Rules.
- b. The Agency may inspect any Houseboat at any time for the purpose of insuring compliance with Applicable Laws.
 - 1. Right of Entry: No Houseboat Permit Holder or any other Person using or having charge, care or control of any Houseboat shall fail or neglect, after an authorized Agency representative has identified himself or herself, to promptly permit entry therein by the Agency representative for the purpose of such an inspection.
 - 2. All Houseboat Permit Holders shall make all Persons using their Houseboat aware of the Agency's right of entry, as specified in this section 4.01.

4.02. *COMPLIANCE.*

- a. After any order of the Agency or decision of the Houseboat Appeals Board made pursuant to these Rules, no Person to whom any such order or decision is directed shall fail, neglect, or refuse to obey any such order.
- b. If, after any order or decision made pursuant to these Rules, the Person or Persons to whom such order or decision is directed shall fail, neglect or refuse to obey such order or decision, the Agency may institute any appropriate action under Applicable Laws.
- c. The Agency may issue Warnings, assess Non-Compliance Fines, seek restitution if applicable, issue Notice and Orders, Red Tags and any combination thereof and may also revoke or not renew a Houseboat Permit for violations of Applicable Laws.
- d. All Non-Compliance Fines, restitution sought, Notice and Orders and Red Tags will be directed to the designated Houseboat Permit Holder contact Person(s) listed on the completed Application for Houseboat Permit.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

4.03. *WARNINGS.*

The Agency may issue verbal or written Warnings to Houseboat Permit Holders and the Person or Persons using or having charge, care or control of the Houseboat for violations of Applicable Laws. Documented warnings may be used as evidence to support further punitive action against Houseboat Permit Holders.

4.04. *NON-COMPLIANCE FINES AND RESTITUTION.*

The Agency may assess Non-Compliance Fines against Houseboat Permit Holders and seek restitution if applicable for violations of these Rules. A Non-Compliance Fine and restitution procedure shall be established.

- a. Houseboat Permit Holders will be notified of Non-Compliance Fines and / or applicable restitution in accordance with the Notice and Order procedures set forth in section 4.05.
- b. Failure to pay Non-Compliance Fine(s) and / or applicable restitution pursuant to the conditions set forth in the Notice and Order may result in the assessment of additional Non-Compliance Fines, Red Tag and / or Revocation of the Houseboat Permit.

4.05. *NOTICE AND ORDERS.*

Whenever the Agency has determined that any Houseboat or Houseboat Permit Holder is in violation of any Applicable Laws, a Notice and Order will be issued to the record Houseboat Permit Holder(s) of the Houseboat under the following circumstances:

- a. Non-Compliance Fines are to be assessed and / or restitution sought (if applicable) against the Houseboat Permit Holder(s).
- b. The Houseboat is to be Red Tagged.
- c. The Houseboat Permit is to be revoked or not renewed.
- d. The Notice and Order shall contain:
 1. The Houseboat Registration identification number and Agency Houseboat Permit number.
 2. A statement that the Agency has found the Houseboat to be in violation of Applicable Laws and a brief and concise description of the conditions found to render the Houseboat in violation of these Applicable Laws.
 3. A statement of the action required to be taken by the Houseboat Permit Holder.
- e. If the Notice and Order is for a Houseboat Permit Revocation or Houseboat Permit Non-Renewal it shall additionally contain:
 1. A statement advising that the Houseboat Permit Holder and any Person having any record title or legal interest in the Houseboat may appeal to the Houseboat Appeals Board, provided the appeal is made in writing as provided in Section 5 of these Rules, and filed with the Director within twenty-one (21) calendar Days of service of such Notice and Order.
 2. A statement advising the Houseboat Permit Holder that failure to appeal will constitute a waiver of all right to a hearing and determination of the matter.
- f. Service of Notice and Orders:
 1. Each Notice and Order shall be served upon the record Houseboat Permit Holder either personally or by certified mail sent to the address indicated for such Houseboat Permit Holder in the Houseboat Permit records of the Agency.
 2. The failure of the Houseboat Permit Holder to receive such notice actually mailed shall not affect the validity of any proceedings taken under this section.
 3. No other Persons are required to be served with the Notice and Order.
 4. Service by certified mail in the manner provided herein shall be effective on the date of mailing.

4.06 *RED TAGS, PERMIT REVOCATION AND PERMIT NON-RENEWAL*

The Agency may issue Red Tags pursuant to these Rules which:

- a. Immediately revoke or prohibit renewal of a Houseboat Permit or
- b. Immediately prohibit the operation and use of a Houseboat.
- c. A Red Tag immediately revoking a Houseboat Permit, prohibiting renewal of a Houseboat Permit or immediately prohibiting the operation and use of the Houseboat in question may be issued with a Notice and Order under any one of the following circumstances:
 1. The Houseboat Permit Holder has failed to comply with any lawful Agency order or requirement made pursuant to these Rules.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

2. The Houseboat is in such condition as to make it immediately dangerous to the life, limb, property or safety of the public or to any Person operating or using the Houseboat.
3. The Houseboat is in such condition as to indicate that its permit holder or Person or Persons using or having charge, care or control of the Houseboat have intentionally, willfully, or negligently failed to maintain the Houseboat Wastewater system in strict compliance with Applicable Laws.
4. The Houseboat Permit Holder or Person or Persons using or having charge, care or control of the Houseboat have intentionally, willfully, or negligently failed to comply with Applicable Laws.
5. Whenever any ordered repair made pursuant to these Rules is not commenced within thirty (30) calendar Days of the order or is not pursued with sufficient diligence to enable the ordered repair to be completed within a reasonable period of time.
6. If pursuant to section 2.03 of these Rules, the applicant's Houseboat is not placed on Don Pedro Lake within two Years of the issuance of the permit.
 - (a) The First Year Permit Fee shall also be forfeited unless a written extension of time is granted by the Agency.
 - (b) If the Houseboat is not placed on Don Pedro Lake at the expiration of any such extension of time, then the permit shall be automatically revoked.
7. If pursuant to section 2.04 of these Rules, the Non-discount Annual Renewal Fee and or a Completed Application for Houseboat Permit are not received within thirty (30) Days of the mailing date of the Agency's delinquency notice to the renewal applicant.
8. If the Houseboat is damaged, destroyed, inoperable or removed from the Recreation Area and the Houseboat Permit owner has not commenced repairs or replacement within ninety (90) Days after the Houseboat was damaged, destroyed, inoperable, or removed.
- d. When possible a Red Tag stating the purpose for the Red Tag shall be posted on the affected Houseboat.
- e. When a Houseboat Permit is revoked all paid Permit Fees shall be forfeited to the Agency and all paid moorage fees shall be forfeited to the assigned Marina Concessionaire.
- f. Upon revocation or the non-renewal of a Houseboat Permit, the Houseboat owner(s) shall remove the Houseboat at their own expense from the Recreation Area within thirty (30) Days of the revocation or non-renewal. If the Houseboat is not removed, the Agency may dispose of the Houseboat pursuant to the Boaters Lien Law, Harbors and Navigation Code Section 500 et seq.

5. APPEAL OF NOTICE AND ORDERS

5.01 HOUSEBOAT APPEALS BOARD.

A Houseboat Appeals Board (sometimes referred to as the "Appeals Board") has been established by resolution of the Board of Directors of the Turlock Irrigation District and the Board of Directors of the Modesto Irrigation District.

- a. The Appeals Board shall consist of two members:
 1. One member who shall be the Chairperson of the Appeals Board shall be appointed by the Board of Directors of the Turlock Irrigation District.
 2. The other member shall be appointed by the Board of Directors of the Modesto Irrigation District.
 3. Each District may designate one or more alternates to act as its representative on the Appeals Board in the absence of the regular member.
- b. The presence of both members of the Appeals Board shall constitute a quorum for the transaction of business.
 1. Less than a quorum may adjourn meetings of the Appeals Board from time to time.
 2. Any action or determination of the Appeals Board requires a unanimous vote of both members.
- c. The Appeals Board shall review the history, evidence, actions and decisions of the Agency regarding Houseboat Permit Holder appeals and determine if the Agency has acted in accordance with Applicable Laws.
- d. The Appeals Board is not empowered to set forth or establish its own conditions or requirements in regards to Houseboat Permit Holder appeals.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

5.02 *RIGHT TO APPEAL.*

Any Houseboat Permit Holder and any Person having any record title or legal interest in the Houseboat may appeal Notice and Orders issued for the purpose of Houseboat Permit Revocation or Houseboat Permit Non-Renewal by filing at the office of the Director a written appeal in the form specified in Section 5.03.

a. *Staying of Permit Revocation and Non-Renewal Orders Pending Appeal:*

1. Enforcement of any Houseboat Permit Revocation or Houseboat Permit Non-Renewal order issued under these Rules shall be stayed during the pendency of an appeal there from which is properly and timely filed.
2. Except that unless specifically authorized in writing by the Agency, a Houseboat issued a Red Tag may not be operated or used (other than to be removed from Don Pedro Lake) pending the appeal.

5.03 *FORM OF APPEAL.*

All appeals must be in writing and contain the following:

- a. A heading in the words: "Before the Houseboat Appeals Board of the Recreation Area".
- b. A caption reading: "Appeal of _____," giving the names of all appellants participating in the appeal.
- c. A brief statement setting forth the legal interest of each of the appellants in the Houseboat involved in the appeal.
- d. A brief statement in ordinary and concise language of the specific order protested, together with all material facts claimed to support the contentions of the appellant.
- e. A brief statement in ordinary and concise language of the relief sought, and the reasons why it is claimed the Agency did not act in accordance with Applicable Laws.
- f. The signatures of all parties names as appellants, and their official mailing address.
- g. The verification (by declaration under penalty of perjury) of at least one appellant as to the truth of the matters stated in the appeal.

5.04. *TIME FOR FILING APPEAL.*

The appeal shall be filed within twenty-one (21) calendar Days from the date of the service of such order.

5.05 *PROCESSING OF APPEAL.*

Upon receipt of any appeal filed pursuant to this section:

- a. The Director shall present it at the next regular or special meeting of the Appeals Board.
- b. As soon as practicable after receiving the written appeal, the Appeals Board shall fix a date, time, and place for the hearing of the appeal by the Board.
- c. Written notice of the date, time, and place of the hearing shall be given at least ten (10) calendar Days prior to the date of the hearing to each appellant by the Secretary of the Board either by causing a copy of such notice to be delivered to the appellant personally or by mailing a copy thereof, postage prepaid, addressed to the appellant at his address shown on the appeal.

5.06 *EFFECT OF FAILURE TO APPEAL.*

- a. Failure of any Person to file an appeal in accordance with the provisions of this Section 5 shall constitute a waiver of his right to a hearing and adjudication of the Notice and Order, or any portion thereof.
- b. The order becomes final upon expiration of the appeal period specified in Section 5.04 above.

5.07 *SCOPE OF HEARING ON APPEAL.*

Only those matters or issues specifically raised by the appellant shall be considered in the hearing of the appeal.

5.08. *CONDUCT OF HEARING.*

- a. Hearings need not be conducted according to the technical Rules relating to evidence and witnesses.
- b. Oral evidence shall be taken only on oath or affirmation.
- c. Any relevant evidence shall be admitted if it is the type of evidence on which responsible Persons are accustomed to rely in the conduct of serious affairs regardless of the existence of any common law or statutory rule which might make improper the admission of such evidence over objection in civil actions in courts of competent jurisdiction in this state.
- d. Irrelevant and unduly repetitious evidence shall be excluded.

Adopted 8/3/99

Amended 5/29/01, 8/31/10, 8/16/11

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Last revised: February 7, 2007

- e. Each party shall have these rights, among others:
 - 1. To call and examine witnesses on any matter relevant to the issues of the hearing;
 - 2. To introduce documentary and physical evidence;
 - 3. To cross-examine opposing witnesses on any matter relevant to the issues of the hearing;
 - 4. To impeach any witness regardless of which party first called him to testify;
 - 5. To rebut the evidence against him; and
 - 6. To represent himself or to be represented by anyone of his choice who is lawfully permitted to do so.

5.09. *BASIS FOR APPEALS BOARD DECISIONS*

- a. If the Appeals Board finds that the Agency has acted appropriately and in accordance with Applicable Laws, the Appeals Board shall uphold the Houseboat Permit Revocation or Houseboat Permit Non-Renewal.
- b. If the Appeals Board finds that the Agency has not acted appropriately and in accordance with Applicable Laws, the Appeals Board shall include the specific reason(s) for this finding in their statement of decision. Only then may the Appeals Board rescind the Houseboat Permit Revocation or Houseboat Permit Non-Renewal.

5.10. *FORM OF DECISION AND FINALITY OF THE DECISION.*

- a. The decision of the Appeals Board shall be in writing and shall contain findings of fact, a determination of the issues presented and the effective date of the decision.
- b. A copy of the decision shall be delivered to the appellant personally or mailed to him, postage prepaid, addressed to the address shown on the appeal.
- c. The decision of the Appeals Board becomes final on the effective date of the decision.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Appendix A - Glossary of Terms Used

Last revised: February 7, 2007

Agency	The Don Pedro Recreation Agency, which is the organization charged with the responsibility for the operation and maintenance of the Don Pedro Recreation Area. The Agency has the jurisdiction to enforce Applicable Laws within the Recreation Area. Citations/Notices to Appear may be issued by authorized personnel, and / or personal property towed / impounded in accordance with State law for violations of these regulations, ordinances, and laws. The term "Agency" as used in these Rules shall include all authorized Agency representatives acting within the scope of their authority.
American Boat and Yacht Council (ABYC)	A non-profit, public service, membership organization incorporated in 1954 with worldwide membership that is dedicated to boating safety. The ABYC is a recognized authority in the area of technical practices and engineering standards for small vessels. They are the publishers of the manual of "Standards and Recommended Practices for Small Craft".
Annual Renewal Fee	An approved yearly fee required of all Houseboat Permit Holders due and payable to the Agency prior to February 1 st of every calendar Year.
Applicable Fees	First Year Permit Fees, Annual Renewal Fees, Change of Ownership Fees, Change of Assigned Concessionaire Fees, Mooring Fees, use fees including annual permit fees for all vehicles and vessels stored or moored within the Recreation Area, Monthly Blue Oaks Houseboat Repair Yard fees, and other fees that the Agency may adopt from time to time. Not included as Applicable Fees, are charges for personal services, sundries, beverages, fuels and oils, repairs and other miscellaneous supplies.
Applicable Laws	All Laws, Codes, Ordinances, Rules (including these Rules), Regulations and Standards currently in effect that pertain to or are relevant to Houseboat Permit Holders, their guests and all Houseboats that are operated, moored, stored, occupied, maintained or constructed within the Don Pedro Recreation Area. (examples: U.S. Coast Guard Requirements, California Boating Law, Tuolumne County Ordinances and Codes, ABYC Standards and Recommended Practices for Small Craft, the D. P. R. A. Rules and Regulations).
Application for Houseboat Permit	A form requiring proof of current Houseboat Registration and proof of insurance as described in section 1.06 that shall be signed by all Registered Owners of a Houseboat before any renewal, Change of Ownership or issuance of a Houseboat Permit can take place.
Assigned Concessionaire	The Agency authorized marina concessionaire that maintains and operates the mooring facilities for all private permitted Houseboats assigned to their concession area.
Blue Oaks Houseboat Repair Yard	Facilities subject to Applicable Laws established within the Don Pedro Recreation Area for the maintenance, repair or replacement of permitted Don Pedro Lake Houseboats.
Change of Assigned Concessionaire	A change in the authorized concessionaire mooring location of a permitted Houseboat from one marina concession area to another subject to the terms of Section 2.06 of these Rules.
Change of Assigned Concessionaire Fee	An approved fee due and payable to the Agency before any "Change of Assigned Concessionaire" can take place.
Change of Ownership	Any sale, transfer or release of a permitted Houseboat, any deletion, change or addition of any name(s) on a Houseboat Registration or any deletion, change or addition of any Person with rights to ownership of a Houseboat except in the case of death of a spouse when that deceased spouse's name is removed from the permit and permit application.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Appendix A - Glossary of Terms Used

Last revised: February 7, 2007

Change of Ownership Fee	An approved fee due and payable to the Agency that is required when any Change of Ownership takes place.
Coal Tar Epoxy	A two-part coating comprised of a combination of coal-tar and epoxy resin designed to provide protection and waterproofing to steel and other materials.
Compartmentation	Divided into completely separate sections.
Day	Shall mean a calendar day, including Saturdays, Sundays, and holidays.
Director	The Don Pedro Recreation Agency Director.
Don Pedro Lake	All water available for Houseboat operation and use that falls within the Federally licensed New Don Pedro Project Boundary – FERC License #2299.
D.P.R.A. Rules and Regulations	The general Agency rules and regulations that are binding upon all Persons utilizing the Don Pedro Recreation Area.
First Year Permit Fee (New Permit Fee)	An approved fee due and payable to the Agency within 5 Days after the date of applicant(s) acceptance of an available Houseboat Permit.
Flotation Device	Watertight pontoons, floats, the hull or any other device used to keep a Houseboat afloat or aid in its flotation. Motor compartments, holding tanks, fuel tanks, water tanks or any other part of a Houseboat that displace lake water and effect flotation will be considered a Flotation Device and must comply with all applicable Flotation Device requirements.
Houseboat	Private or concessionaire owned vessels that are 10' or greater in width, 20' or greater in length, have sleeping capacity (built in plumbing), limited by a specific number of Houseboat Permits and subject to Applicable Laws.
Houseboat Appeals Board	A Review Board (sometimes referred to as the "Appeals Board") that can be convened in accordance with these rules for the purpose of hearing the appeals of Houseboat Permit Holders (and any person having any record title or legal interest in the Houseboat). (9.01)
Houseboat Permit	Authorization from the Agency to place and utilize a Houseboat within the Recreation Area. Validity of permit is subject to Applicable Laws.
Houseboat Permit Holder(s)	The registered owner(s) of an Agency permitted Houseboat subject to Applicable Laws.
Houseboat Permit Non-Renewal	The non-renewal or non-reissue of a Houseboat Permit pursuant to Applicable Laws.
Houseboat Permit Renewal	The annual renewal or reissue of a Houseboat Permit pursuant to Applicable Laws.
Houseboat Permit Revocation	The withdrawal or cancellation of authorization from the Agency to place and utilize a Houseboat within the Recreation Area pursuant to Applicable Laws.
Houseboat Registration	Official documentation of a Houseboat provided by the California State Department of Motor Vehicles or the United States Coast Guard.
Mechanical Compartment	Any compartment on a Houseboat containing permanently installed mechanically operated, fuel powered, electrical or battery powered devices, appliances and / or batteries.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Appendix A - Glossary of Terms Used

Last revised: February 7, 2007

Mechanically Fastened	Firmly secured by means of an automatic or manual, external or internal fastening device. (examples: latches, locks, screws, hydraulic openers and closers, etc.)
Monohull	A type of vessel flotation where the line of intersection of the water surface and the vessel at any one of its operating drafts forms a single closed curve.
National Vessel Documentation Center	The Department of the USCG that is responsible for documenting vessels and providing USCG Certificates of Documentation.
New Construction	The replacement of the entire Houseboat or replacement, reconstruction, structural alteration or modification of: the cabin and its supporting members, (2) the roof, (3) the deck(s), fascia and their supporting members, the pontoons or other Flotation Devices, (5) the holding tank and connected plumbing and, (6) the railing around the upper and lower decks. Routine repair and maintenance of the cabin, roof, deck(s), fascia, pontoons, holding tank(s), connected plumbing and railing alone will not be considered New Construction.
Non-Compliance Fines	Approved penalty fees that may be assessed against Houseboat Permit Holders for violations of the Rules.
Non-discount Annual Renewal Fee	An approved fee, due and payable to the Agency, required of Houseboat Permit Holders that fail to pay the Annual Renewal Fee or submit a Completed Application for Houseboat Permit before February 1st.
Non-Person Specific Registration	Official documentation of a Houseboat provided by the California State Department of Motor Vehicles or the United States Coast Guard that does not specify individual names of Persons such as but not limited to: beneficiary type registration (i.e. family trust, living trust), business owned registration or partnership registration.
Notice and Order	A written notification to Houseboat Permit Holders, in accordance with section 4.05 of these Rules, that informs them of required Non-Compliance Fines, Red Tag issue, Houseboat Permit Revocation or Houseboat Permit Non-Renewal.
Notice of Houseboat Permit Availability	A written notice sent by certified mail to applicants on the waiting list informing them of the availability of a houseboat permit
Permit Release Form	An Agency approved form signed by the Houseboat Permit Holder(s) that relinquishes a Houseboat Permit back to the Agency. Required for any change of ownership.
Person	Any human being of any age
Primary Mooring Device	A primary connecting device that holds the Houseboat to its mooring buoy pursuant to the requirements of Section 3.11 of these Rules.
Recreation Area	All lands and water available for recreation use that fall within the Federally licensed New Don Pedro Project Boundary – FERC License #2299.
Red Tag	A written notice issued by the Agency pursuant to sections 4.05 and 4.06 of these Rules that immediately revokes a Houseboat Permit, prohibits renewal of a Houseboat Permit, or prohibits the operation and use of a Houseboat.
Registered Owners (of a Houseboat)	All registered owner(s) of a Houseboat as listed by either the official records of the California State Department of Motor Vehicles or a valid United States Coast Guard Certificate of Documentation. All individuals with ownership rights to Houseboats registered in Non-Person Specific form will be considered the Registered Owners of that Houseboat.

DON PEDRO RECREATION AGENCY
REGULATIONS AND ORDINANCES

APPENDIX A

§ 4.5.14 - HOUSEBOAT RULES

Appendix A - Glossary of Terms Used

Last revised: February 7, 2007

Relocation List	A listing maintained by the Agency of Houseboat Permit Holder(s) desiring to relocate the authorized concessionaire mooring location of their Houseboat from one marina concession area to another.
Rules	These Don Pedro Houseboat Rules that are binding upon all privately owned Agency permitted houseboats and when applicable, Agency permitted concessionaire owned houseboats.
Secondary Safety Mooring Device	A secondary connecting device, pursuant to the requirements of Section 3.11 of these Rules, that is of sufficient size and strength to hold the Houseboat to the mooring buoy in the event of the failure or disconnection of the Primary Mooring Device.
Standards and Recommended Practices for Small Craft	A manual published by the American Boat and Yacht Council that provides generally applicable technical practices and engineering standards for small vessels. These standards and practices are voluntary for the general public. Those standards within this manual that are applicable to Houseboats will be required by the Agency. The Agency keeps a current (continuously updated) copy of this manual at its headquarters. This manual is available for Houseboat Permit Holder reference.
Storage Compartments	Any compartment on a Houseboat containing only temporarily stored items and no permanently installed mechanically operated, fuel powered, electrical or battery powered devices, appliances and / or batteries.
Unattended	Any Personal property that has not been watched, maintained, checked on or operated by the owner or authorized operator within a specific time period established by the Agency.
Uniform Building Code	Sections of the Building Code applicable to Houseboat construction as defined by the Tuolumne County Building Department.
USCG Certificate of Documentation	A certificate proving that a vessel has been documented by the United States Coast Guard.
USCG Documentation	A national form of vessel registration administered by the United States Coast Guard available only to vessels of at least 5 net tons that are owned by U.S. citizens. California State law does not require Dept. of Motor Vehicles Registration of vessels that are documented by the U.S. Coast Guard.
Waiting List	A waiting list maintained by the Agency as a basis for awarding any Houseboat Permits that the Agency may make available to applicants.
Warning	A written or verbal notification issued to Houseboat Permit Holders and or the Person or Persons using or Having charge, care or control of the Houseboat for violations of Applicable Laws.
Wastewater	All sewage and non-sewage liquid discharges from a vessel including but not limited to black water (human body wastes, wastes from toilets) and gray water (liquid discharges from sinks, showers, baths etc.). Non-polluting vessel wash down water or non-polluting water discharges necessary for the propulsion or stability of a vessel will not be included in this definition.
Waterline	The line to which the surface of the water comes up to on the Flotation Device(s) of a Houseboat.
Watertight	Constructed to effectively resist the passage of water.
Weathertight	Constructed to provide effective protection against seepage when exposed to rain or spray.
Year	365 calendar Days

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