ORIGINAL

Decision No. 31861

BEFORE THE RAILROAD COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the Application of THE SAN JOAQUIN & KINGS RIVER CANAL & IRRIGATION COMPANY, INCORPORATED, a corporation, for an Order Authorizing it to Enter into a Certain Contract, known as the "Exchange Contract," with the United States of America, the Columbia Canal Company, San Luis Canal Company, and Firebaugh Canal Company, Mutual Water Companies; and for an Order Authorizing it to Enter into a Contract with the Columbia Canal Company, San Luis Canal Company and Firebaugh Canal Company, Mutual Water Companies, for the Division of Water Between Them.	Application No. 22391.

J. E. Woolley and Vincent J. McGovern for applicant.

Stephen P. Galvin, City Attorney, for City of Los Banos.

J. J. Deuel and I. H. Pfaffenberger for California Farm Bureau Federation.

A. D. Edmonston, Gerald H. Jones, and Spencer Burroughs for the Water Project Authority of the State of California.

RILEY, COMMISSIONER:

O P I N I O N

The San Joaquin & Kings River Canal & Irrigation Company Incorporated, a corporation(1), is engaged in the public utility business of diverting water from the San Joaquin River and distributing and selling such water for irrigation, municipal, domestic and commercial purposes throughout an area comprising

(1) Hereinafter referred to as the Canal Company.

146,700 acres more or less of lands in Fresno, Merced and Stanislaus Counties, in the State of California. In this proceeding the Canal Company asks the Commission for authority to execute a contract(2) with The United States of America, Columbia Canal Company, a corporation, San Luis Canal Company, a corporation, and Firebaugh Canal Company, a corporation, providing among other things for an exchange of the Canal Company's San Joaquin River water for a supply of water from the Sacramento River and other sources, such substituted waters to be delivered to the Canal Company's distribution system by the United States through facilities to be constructed and operated by the Department of the Interior, Bureau of Reclamation. The Commission further is asked to authorize the execution of a certain contract by and between the Canal Company and the said Columbia Canal Company, San Luis Canal Company and Firebaugh Canal Company, which latter three corporations are mutual water companies(3), providing for the division of the water to be delivered to these parties by the United States in accordance with the allocation of such water as set out in a flow schedule which has been agreed upon by the four contracting parties. The Commission also is requested to authorize the execution by the Canal Company of a document consenting and agreeing to the terms and provisions of that certain contract(4) (Exhibit No.23) entered into by and between The United States of America and Miller & Lux Incorporated(5), a corporation, and Gravelly Ford Canal Company, a corporation, providing among other things for the purchase by United States of certain water rights privately owned by said Miller & Lux, said rights including appropriative rights usually known locally

(2) Referred to hereinafter as the Exchange Contract.
(3) Hereinafter referred to as Mutual Companies.
(4) Hereinafter referred to as the Purchase Contract.
(5) Referred to hereinafter as Miller & Lux.

as "grass land rights" and riparian rights, all thereof now being used and applied primarily for the irrigation of certain pasture lands. This said document further provides for the disclaimer by the Canal Company and the Mutual Companies of all right, title or interest in and to the water, water rights and use of water agreed to be sold to the United States under the terms and provisions of said purchase contract and further provides for the use of the storage, transportation, and other facilities of the Canal Company and Mutual Companies for the waters to be sold to the United States as now and in the past obtaining and until such time as Friant Dam and diversion works have been constructed and are able to impound therein the above waters.

Public hearings in this proceeding were held at Los Banos in the County of Merced.

The filing of the petition herein marks the initial and most vital step in the procedure of The United States of America and the Water Project Authority of the State of California to acquire the major water rights in the San Joaquin River and its tributaries necessary for the successful and practicable operation of The Central Valley Project of California. This great development is now in course of construction at a total cost estimated to be not more than one hundred seventy million dollars, under direct control and supervision of the Bureau of Reclamation, and in scope embraces the harnessing of the Sacramento River by the construction of the Shasta Dam in the upper reaches of the river at a point a few miles above the City of Redding, a structure second only to the Boulder Dam on the Colorado River in height and storage capacity but actually larger in mass of concrete. This dam will control the run-off of the Sacramento River from a point immediately below its confluence with the Pit River and will provide for improved navigation,

regulation of the Sacramento and San Joaquin Rivers, protection against floods, irrigation, reclamation, salinity control and other beneficial uses, and for the generation and sale of electric energy. Under present unregulated conditions of the Sacramento River vast quantities of water each year run idly and unused into the Pacific Ocean, while large portions of the fertile San Joaquin Valley are suffering an insufficiency of water from surface stream-flow, and an annually increasing depletion in underground water productivity. To relieve this parched condition in the central and southern sections of the San Joaquin Valley the waters stored behind Shasta Dam from winter stream run-off will be released and transported from the Sacramento Valley through and by means of canals and pumping lifts into the San Joaquin River watershed, and exchanged in certain areas thereof for existing waters derived from the San Joaquin River and its tributaries. Water from these latter sources will be stored behind a dam to be constructed at Friant on the main river and transported to areas now wholly without a usable water supply, the longest distance being some 160 miles more or less to juncture with the Kern River near the City of Bakersfield in Kern County.

History of Water Problems of the Central Valleys of California.

Agriculture is the largest and the basic industry of California, upon its successful continued operation rests the stability of the entire State. By reason of the climatic conditions in the great central valleys irrigation is absolutely essential to the maturing of practically all major crops. The necessity of development and conservation of the water resources of these valleys to this end was recognized by the first Legislature of the State of California which in 1850 passed an act requiring and directing the Surveyor General to prepare plans for the improvement of navigation, provide drainage, and furnish water for irrigation purposes. The devastating floods

of 1861 and 1879 early presented the urgent necessity of flood control. Hydraulic mining, commenced in 1856, was prohibited in the Sacramento Valley in 1884, except where tailings were impounded to prevent further injury to and interference with navigation of streams through silting of the channels and water courses by the "slickens." The State Legislature in 1893 created the California Debris Commission, charged with the duty among others of preparing plans for restoring the navigability of the Sacramento and San Joaquin Rivers. In 1878 the first State Engineer, William Hamilton Hall, instigated the initial comprehensive study into the problem of river control and water conservation under an act "to provide a system of irrigation, promote rapid drainage and improve navigation of the Sacramento and San Joaquin Rivers." From this time until the year 1921 no appropriations were made by the State Legislature to further studies of water conservation.

The water problems of interior California received first recognition from the Federal Government in 1873 when Congress directed and authorized appointment by the Secretary of War of a commission to study irrigation of and in the Sacramento, San Joaquin and Tulare Valleys. Since this time a considerable number of important and exhaustive investigations have been made by various agencies of the Federal Government into different phases of water conservation and uses in the State of California.

Investigations in the upper Sacramento River areas were begun in 1904 by the Bureau of Reclamation. Construction of the Orland Project on Stony Creek was commenced by this Bureau in 1908. Investigations and reports were made on a project at Iron Canyon on the upper Sacramento River started in 1914 and later a report was made in 1915 on a development on the Lower Pit River. Investigations were made by the Bureau into the feasibility of the erection of a saltwater barrier on the lower Sacramento River and recently the

Corps of Engineers, United States Army, has been conducting a series of investigations for the improvement of navigation and flood control in and of the Sacramento and San Joaquin Rivers and for flood control of other streams including the Kern River.

In 1919 Colonel Robert Bradford Marshall presented his scheme for the development of the water resources of the Sacramento and San Joaquin Valleys generally called the "Marshall Plan" which embraced the construction of storage reservoirs on major streams and transportation of surplus waters from the Sacramento Valley to the lands located in the San Joaquin River Drainage Basin.

In 1921 as the result of an act of the Legislature of the State of California a series of exhaustive investigations were conducted under the Division of Water Resources for the recommendation of a plan for the ultimate practicable development of the water resources of the two great northern and central California river basins. The final report of the Division resulted in the adoption of its proposed Central Valley Project, approved by referendum vote of the Electorate of the State of California held December 19, 1933. This project was to be administered by the State Water Project Authority invested with power and duty to construct and operate the development, the cost thereof to be not in excess of $170,000,000. Difficulties in financing this gigantic undertaking solely as a state enterprise led to the necessity of seeking assistance from the Federal Government resulting finally in passage of the Rivers and Harbors Act of August 30, 1935, authorizing an appropriation of $12,000,000 toward construction of Shasta Dam. The project(6) was placed under the provisions of the Reclamation Law by the first Deficiency Appropriation Act approved June 22, 1936. By the Rivers and Harbors Act of August 26, 1937, the Central Valley Project was reauthorized by Congress and placed under the direct control of the Secretary of the Interior. Appropriations amounting to $34,600,000 have been made

(6) Attached to this Opinion and Order will be found a map, copy of Exhibit No. 7, showing the two great valleys of California and delineated thereon the major units of the Central Valley Project.

available for this undertaking to December 31, 1938. Contracts already have been awarded to the extent of $42,350,000 with actual disbursements of $6,697,563 to the end of the year 1938.

The engineering plans and designs at present embrace the following principal features to be completed at a cost estimated to be $170,000,000:

"Shasta Dam on the upper Sacramento River 12 miles north of Redding--560 feet high from the lowest foundation to the top, 3,500 feet long on the crest and 580 feet thick at the base, requiring 5,600,000 cubic yards of concrete, and creating a storage reservoir of 4,500,000 acre-feet.

Shasta power plant at the base of the dam-initial installation of four 75,000-kilowatt generators driven by four 103,000-horsepower turbines, and ultimate installation of a fifth unit of same size, providing a total generating capacity of 375,000 kilowatts with a total annual power production of about 1,500,000,000 kilowatt-hours.

Transmission Line from Shasta Dam--extending about 200 miles to a substation at Antioch.

Delta Cross Channel at easterly edge of Sacramento-San Joaquin Delta--under investigation.

Contra Costa Canal, Rock Slough to near Martinez--46 miles long with initial capacity of 350 second-feet.

San Joaquin Pumping System from the Delta to Mendota--under investigation.

Friant Dam on the upper San Joaquin River 20 miles northerly from Fresno--on the basis of flood control studies in the San Joaquin Valley, consideration is being given a plan to increase the proposed height of the dam by 15 feet to provide 70,000 acre-feet of flood control storage in the reservoir, thereby making the dam about 300 feet high and 3,500 feet long, and the reservoir capacity of 520,000 acre-feet.

Madera Canal, Friant to Chowchilla River--40 miles long with initial capacity of 1,000 second-feet.

Friant-Kern Canal, Friant to Kern River--160 miles long with initial capacity of 3,500 second-feet.

This bold and remarkable engineering undertaking outlined above and now just commencing and in the initial stages of construc-

tion therefore represents the final and successful culmination of more than eighty-nine years, since at least 1850, of continuous and cumulative efforts to develop, coordinate and conserve for all possible beneficial uses the vast water resources of the northern, the central and the south-central basins of California. It is in the exercise of its jurisdiction and control over the public utility operations of the San Joaquin & Kings River Canal & Irrigation Company, Incorporated, that this Commission is asked to approve and authorize the execution of certain contracts and agreements providing for the transfer and exchange of specific rights to divert, store and distribute waters of the San Joaquin River, without which authorization the entire Central Valley Project as now contemplated would doubtless be unsound.

In the instant case the Railroad Commission primarily is concerned with the effects of the various proposals herein upon the service rights of the utility consumers, their continued rightful enjoyment of an adequate water supply and the ability of the Canal Company to fulfill its obligations to the public without unreasonable restrictions or restraint.

San Joaquin & Kings River Canal & Irrigation Company, Incorporated.

The Canal Company is a corporation subsidiary to Miller & Lux and is engaged primarily in the diversion, sale and distribution of water for agricultural irrigation purposes in a gross service area(7) of 146,700 acres located along the west side of the San Joaquin River in Fresno, Merced and Stanislaus Counties. During the year 1938 a total of 100,000 acres were irrigated. The Company also supplies to a minor extent water for industrial, domestic

(7) Following this page is a copy of a map attached to the application herein showing the service areas of the Canal Company and the Mutual Companies with reference to the San Joaquin River.

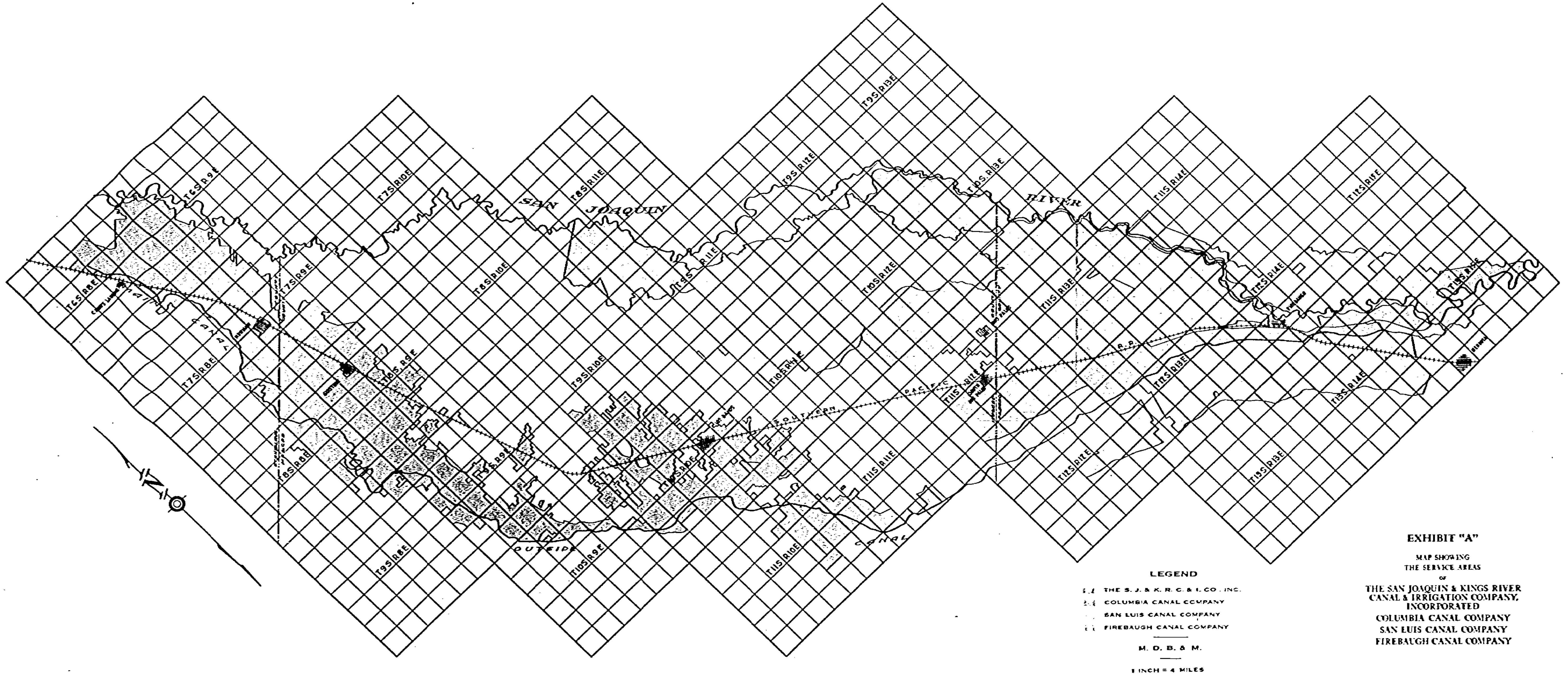


EXHIBIT "A"

MAP SHOWING
THE SERVICE AREAS
OF

THE SAN JOAQUIN & KINGS RIVER CANAL & IRRIGATION COMPANY, INCORPORATED
COLUMBIA CANAL COMPANY
SAN LUIS CANAL COMPANY
FIREBAUGH CANAL COMPANY

and municipal uses in various portions of its service area. The Canal Company has the prior right to the first 1,360 cubic feet of water per second in the San Joaquin River, subject only to the intrusion of the Chowchilla Canal right[8] to 120 cubic feet of water per second coming into entitlement between the river stages of 775 and 895 second feet. This Company along with Miller & Lux and the Mutual Companies derives a considerable benefit from waters released from storage under contracts with two power companies operating impounding dams and reservoirs on the upper tributaries of the San Joaquin River. San Joaquin Light and Power Corporation and Southern California Edison Company Ltd. have constructed storage facilities amounting to a total capacity of 336,000 acre feet. The Canal Company diverts water from the San Joaquin River at the Mendota Weir in Fresno County and maintains a distribution system consisting of about 204 miles of primary canals and lateral ditches. The Main Canal runs from the diversion dam near the Town of Mendota in Fresno County through Merced County to Crows Landing in Stanislaus County, a distance of 71 miles. The Outside Canal is 50 miles in length.

The Mutual Canal Companies.

The Firebaugh Canal Company diverts water from the San Joaquin River at Mendota Weir. It takes water to the extent of 300 second feet under the existing operating flow Schedule "D," established by the Railroad Commission[9] and furnishes irrigation service to a gross area of 23,375 acres of land through a series of large capacity pumping plants.

The San Luis Canal Company supplies water for irrigation purposes to a gross area of 47,300 acres of land. This Company

(8) Now owned by Chowchilla Farms, Inc., a corporation.
(9) Decision No. 26153, dated July 17, 1933, 38 C.R.C. 851.

diverts 500 second feet of water under flow Schedule "D" at Temple Slough, downstream from the Mendota Weir. The Columbia Canal Company serves approximately 16,560 acres of land, gross, diverting from the San Joaquin River through Lone Willow Slough which is above Mendota Weir. It now operates under a right to 156 second feet of water under said Schedule "D." Each of these three canal companies are mutual water companies serving lands all of which are now or formerly were lands owned by Miller & Lux.

Miller & Lux.

Miller & Lux Incorporated is the owner of large tracts of lands in Fresno, Madera, Merced and Stanislaus Counties which lands are situate downstream from the Friant damsite and are riparian to either the San Joaquin River, or Fresno Slough, or both, and riparian also to various sloughs, channels and water courses naturally carrying a portion of the waters of said river. Miller & Lux has acquired and is now the owner of certain rights to appropriate, divert and use waters of the San Joaquin River and Fresno Slough, and is also the owner of certain riparian rights, all such rights being used and applied primarily for the irrigation of lands devoted to the cultivation of various kinds of crops and for pasture. The total yield of these rights is about 350,000 acre feet per annum.

Gravelly Ford Canal Company, a corporation, operates a canal system carrying waters diverted for use upon lands of its parent corporation Miller & Lux.

Purchase Contract.

Miller & Lux and the Gravelly Ford Canal Company, being the two signatories with The United States of America of the Purchase Contract, have agreed therein for good consideration to sell, convey and confirm to the United States, and as against their lands, canals,

and other properties, the right to divert, store and use by means of Friant Dam and appurtenant works, all waters of the San Joaquin River as they would flow in the absence of operation by the United States, in excess of the aggregate 24-hour mean flows thereof as specified in Schedules One (1) and Two (2), more particularly circumscribed and set forth in the said purchase agreement. Attached to this Purchase Contract is a document executed jointly by the Mutual Companies and the Canal Company, which is in the nature of a disclaimer, renouncing certain rights which might interfere with the performance of the various parties under the Purchase Contract and at the same time granting certain privileges for the use of canal facilities in the transportation and distribution of waters to be acquired by the United States until completion of Friant Dam.

Substitutional Water Supply Adequacy.

In order to permit the proper and economic functioning of the Central Valley Project in the induction of certain stored waters from the Sacramento Valley into the foreign watershed of the San Joaquin River, it is absolutely essential to acquire and control various water rights appurtenant to the San Joaquin River and its tributaries. Under the Exchange Contract now before the Commission, one of the principal and elemental requirements thereof necessitates the substitution, in adequate quantities and of satisfactory quality, of the existing waters now used by the Canal Company and the Mutual Water Companies for Sacramento River water. The United States has agreed to deliver to the Mendota Pool and/or other places of convenient access along the various systems, a sufficient quantity of water to meet the mean average annual requirements of these various companies as set out in Schedule No. 1 of the Purchase Contract, and the United States guarantees that even during periods of subnormal run-off and stream-flow it will deliver a minimum quantity of water

equivalent to 72 per cent of such requirements. To maintain this percentage the United States may make up whatever deficiencies occur, by the release of waters stored in Friant Reservoir.

The evidence shows that the annual requirement of the service area of the Canal Company based upon normal demand of the various crops grown was estimated to be 505,001 acre feet. The average yield under the Canal Company rights to water under existing flow Schedule "D" for the period 1910 to 1937, inclusive, under present power company contractual storage limitation of 3,000 second feet, amounts to 510,800 acre feet. Through the Exchange Contract the United States proposes to deliver such additional quantities of water as will amount to 544,300 acre feet per annum. Although the actual net acreage under irrigation for the year 1938 was 100,000 acres, there is a possibility of a demand for water for irrigation purposes within the present service area of the Canal Company as now defined, to the extent of 115,000 net acres. An insistent demand exists for the extension of water service to adjoining farming sections. The Exchange Contract contains certain provisions which place a limitation upon the extensions of the utility canals into new areas located above the Main and Outside Canals as follows:

> "The San Joaquin & Kings River Canal & Irrigation Company may use said San Joaquin River flows or substituted waters in its present service area, or in its service area as it may be revised, altered or increased in its discretion; provided, that that portion of its present service area above (westerly and southerly of) its Outside Canal and above (westerly and southerly of) that portion of its Main Canal commencing at a point near the south line of Section 26, Township 7 South, Range 8 East, and extending to the termination thereof, shall not be increased by more than fifteen thousand (15,000) acres, and no part of its service area shall be extended north of the north boundary of its present service area."

The testimony of Mr. Thomas C. Mott, Chief Engineer and General Manager for Miller & Lux, the Canal Company and the various

mutual companies affiliated with Miller & Lux indicates that in his opinion the water supply as proposed in the Exchange Contract will be adequate to cover all reasonable future demands upon the system including the increase of 15,000 acres and that the restrictions placed upon extensions in one specific region and also beyond the northerly boundary of the existing service area will not be detrimental to the interests of the Company or its consumers. There is now considerable room for expansion within the external boundaries of the present utility service area as well as in certain adjoining territory unrestricted by the contract provisions. The ultimate plans of the United States aim at the sale and distribution of water for agricultural irrigation and other purposes in and to the areas contiguous to its own proposed transmission canals as one of the principal means of recoupment for expenses incurred by project operations. Such reservations as are contained in those provisions of the contract set out in the extract above do not appear to be unreasonable under existing conditions and circumstances.

Summarized below are the total annual quantities of water in acre feet deliverable or actually delivered under present flow Schedule "D" and showing also the increased quantities which would have been distributed to the Canal Company by the United States under the proposed new flow Schedule "E" for 1924, 1931 and 1934, being years of excessive drought throughout the territory supplied by this canal system. In view of the fact that flow Schedule "D" was not in operation during 1924, the total quantity of water for that year has been estimated:

	1924 (Estimated) Acre Feet	1931 Acre Feet	1934 Acre Feet
Schedule "D"	315,100	331,600	412,800
Schedule "E"	488,300	490,200	517,500
Increase	173,200	158,600	104,700

In connection with the quantity of water to be delivered under the terms of the Exchange Contract, it appears conclusively evident that through the arrangements proposed therein the consumers not only under the utility Canal Company system but under the mutual systems also will receive throughout the entire irrigation season and without extra costs to any of them a substantially increased water supply for their lands and, in addition, will receive in the future an assured and guaranteed delivery during the most critical years of drought of at least 72 per cent of the average normal available water supply. The record shows that under normal operating conditions all consumers receiving water from the Canal Company and the mutual companies will enjoy performance at a service factor of 96 per cent.

Substituted Water Supply Quality.

The next major item of concern to the consumers under all systems is the quality of the water to be furnished by the United States from Sacramento River sources. The water now used for irrigation from the San Joaquin River is of the highest quality, averaging a total content of dissolved solids of 40 parts per million. The waters in the lower section of the Sacramento River show a characteristically higher content of solids, at times and in certain parts thereof becoming so saline that use of such waters would be seriously detrimental to the raising of agricultural crops. During the extremely dry year of 1924, in which the Sacramento Valley suffered from an extremely subnormal run-off in its main and tributary streams, there was an encroachment of salt water from the Pacific Ocean into the Delta Region which produced a maximum salinity of 65 per cent of sea water at the Town of Pittsburg situate on the lower Sacramento River. The Exchange Contract calls for

limitations upon the quality of the waters to be supplied to the Canal Company from the Sacramento River in that total solids are not to exceed 200 parts per million of the weighted average of dissolved solids in waters delivered from October first of any year to June thirtieth of the following year and that from July first to September thirtieth in any year such waters shall not exceed 300 parts per million. The testimony indicates that, through operation of the project as proposed, the United States will be able to deliver at the Mendota Pool waters having a content of total dissolved solids varying from 65 to 170 parts per million during dry cycles such as the critical years 1927 to 1935, both inclusive.

General Plan of Central Valley Project.

The salient features in the construction and operating requirements of the Central Valley Project were outlined by Walker R. Young, Supervising Engineer of the Central Valley Project of California under the Bureau of Reclamation. Shasta Dam to be constructed under his direction in the upper Sacramento Valley near Redding will have a capacity of 4,500,000 acre feet. A hydroelectric power plant will be operated in conjunction with the dam and for this purpose a dead storage of 500,000 acre feet will be retained to maintain sufficient power head for its operation. As a cushion for flood control purposes, there will be storage capacity reserved to the extent of 500,000 acre feet. The water level will not be permitted to invade the storage plane held for flood control purposes during the winter season, except to reduce flood water peaks. Releases of water from the reservoir created by Shasta Dam will be made to the extent of 6,000 second feet of water to meet the irrigation requirements of lands in the Sacramento Valley and

such extra quantities as may be required to maintain a constant flow of 5,000 second feet of water at Knights Landing for the purpose of navigation. In addition, waters may be spilled to the extent of 3,300 second feet to repel the intrusion of excessive salinity in the waters of the Delta and a maximum of over 4,000 second feet of water will be required to provide for the irrigation and consumptive use of water in the Delta Region. Furthermore, 350 second feet of water will be released to supply the demands under the Contra Costa Canal unit and under present plans 3,000 second feet of water must be released to fulfill the obligations of the United States for the exchange of waters of the Sacramento River for those rights relinquished in the San Joaquin Valley in satisfaction of the terms and obligations of the Exchange Contract herein.

In order to secure a safe and usable water supply free from excess salinity, released waters from the Shasta Dam will be recaptured in the Sacramento River at or near its confluence with Snodgrass Slough, situate approximately twenty miles downstream from the City of Sacramento, and conveyed across the Delta Region through or along said slough and certain cross channels to a point near Mossdale Bridge on the San Joaquin River where the first stage of the series of pumping plant lifts will be installed. From the initial lift at Mossdale Bridge, a carrier canal will be constructed, designed to deliver under present plans 3,000 second feet of water at the Mendota Pool and/or at various selected points along certain of the main canals of the Canal Company and Mutual Water Companies, if such delivery points can be mutually acceptable to the interested parties. According to the testimony the final location of this transmission conduit has not as yet been determined. One proposal provides for a high line canal located along the west side of the

San Joaquin River, embracing installation of fourteen pumping plants to lift the water to an elevation of 225 feet, thereafter to be delivered by gravity at or near Mendota Weir at elevation 160 feet. This installation will require 115 miles of canals. An alternative proposal embraces the construction of a main conduit located along the east side of the San Joaquin River, delivering water through a series of pumping plants to and near Mendota Pool. Annual power demand for the operation of these pumping plants is estimated at 250,000,000 kilowatt hours under the east side location and 300,000,000 kilowatt hours for the high line canal, based upon an estimated annual average delivery of 850,000 acre feet of exchange water.

The Friant Dam as now proposed is to be constructed at a point on the San Joaquin River some twenty miles from the City of Fresno and will provide for flood control protection and water for irrigating lands not now irrigated and certain areas heretofore partially, but inadequately, supplied. The water now used by Miller & Lux for its grass lands and by the parties to the Exchange Contract will be stored at Friant Reservoir. Distribution will be made northerly through the Madera Canal, some forty miles more or less to the Chowchilla River, and in a southerly direction through Tulare County and portions of Kern County, a distance of approximately 160 miles to the Kern River. This canal should aid in the replenishment of the underground water supply which throughout this territory for a period of many years last past has been receding to such an alarming extent as to have necessitated the abandonment of more than 20,000 acres of once highly productive crop lands. This reservoir will have a storage capacity of 520,000 acre feet under present plans and will provide for flood control storage to the extent of 70,000 acre feet. Under the terms and provisions of the Exchange

Contract the United States has agreed, should necessity demand, to release certain waters into the San Joaquin River from the Friant Reservoir to maintain its guaranteed percentage of 72 per cent water supply to the Canal Company and the Mutual Water Companies.

Testimony was introduced by Oscar G. Boden, Division Engineer on the Delta Division of the Central Valley Project under the Bureau of Reclamation, now in charge of the construction of the main Contra Costa Canal, to the effect that no abnormally serious obstacles appear to present themselves in connection with the construction of the diversion works and carrier canals under any of the plans now proposed by the Bureau's engineers for the delivery of water to or in the vicinity of Mendota Pool.

Functional Feasibility of Central Valley Project.

Mr. E. B. Debler, Hydraulic Engineer for the Reclamation Bureau, presented testimony concerning the performance of the Shasta Reservoir and the ability of the Central Valley Project to operate in a manner which will permit of the complete fulfillment of the terms and provisions of the obligations imposed upon the United States in the Exchange Contract. Upon the basis of the studies made by the Bureau of Reclamation of the available stream flow and diversion records of the Sacramento River and other investigations concerning navigation, flood and salinity control, and power development, Mr. Debler declared that in his opinion the Project is feasible and in its operation it can supply the water to the Canal Company and the Mutual Water Companies in complete satisfaction of the terms of the Exchange Contract. The Bureau studies were based upon the actual irrigated acreage for the maximum irrigation year 1931, amounting to 172,500 acres from Red Bluff to Knights Landing and 147,300 acres from Knights Landing to Sacramento. Provision was made for the irrigation of an additional

100,000 acres with an allowance therefor of 440,000 acre feet of water. This makes a total net irrigated area of 419,800 acres in the Sacramento Valley requiring a maximum flow during seasons of peak demand of 6,000 second feet. The maximum net irrigated acreage of the Delta Region was taken to be 475,000 acres, including an estimated increase of 125,000 acres. With due allowance for the consumptive use of water in the open slough and water course areas as well as upon the land, an estimated allowance for the Delta Region was provided to the extent of 1,250,000 acre feet of water per year. For the total combined net irrigated acreage of 894,800 for the Sacramento Valley and the Delta, provision was made for a maximum flow during the period of peak seasonal demand to the extent of slightly more than 10,000 second feet. The Contra Costa Canal area was allocated 150,000 acre feet of water per year and upon the assumption of a use of 850,000 acre feet of water, an allowance of 1,020,000 acre feet was assigned for the use of the irrigation companies that are parties to the Exchange Contract to be delivered at or in the vicinity of Mendota Pool. In addition an allowance has been made for the release of 3,300 second feet of water to repel the invasion and encroachment of excess salinity into the Delta area. All of the above requirements, of course, are subject to the necessity of maintaining a constant flow of 5,000 second feet of water at Knights Landing for the protection of the interests of navigation.

The plans for the ultimate development of hydro-electric power at Shasta Dam call for the generation of 375,000 kilowatts. The proposed initial unit installation will provide a capacity of 300,000 kilowatts. From the testimony of Mr. Debler it appears that in operation of the project production of power will be wholly subordinated to the interests of navigation, irrigation, flood and salinity control, etc. The testimony of this witness further indi-

cates that during years of extreme subnormal stream run-off power production may decline to an amount not in excess of 10 per cent to 15 per cent of the capacity of the initial unit installation, resulting in the generation of firm power estimated to approximate 30,000 continuous kilowatts without standby installations.

Mr. J. B. Lippincott, consulting engineer with whom was associated Stanley A. Kerr, consulting engineer, in behalf of Miller & Lux and the Canal Company, made exhaustive investigations of the entire Central Valley Project for the determination of the feasibility thereof and for the purpose of advising the above parties in connection with the negotiations leading to the agreements accepted under the Purchase and Exchange contracts. Two comprehensive reports were made by Mr. Lippincott, one as of January, 1938, and the other as of January, 1939, both reports having been submitted in evidence in this proceeding and designated as Exhibit No. 16 and Exhibit No. 17, respectively. To determine the functional feasibility of the Central Valley Project, with special reference to the ability of the United States reasonably to fulfill the terms and provisions of the Exchange Contract herein, the performance of Shasta Reservoir was tested under all available data, including records supplied by the offices of the State Engineer of California and the Bureau of Reclamation. Although their methods differ, the basic determinations and assumptions adopted by Mr. Lippincott are substantially in accord with the findings of Mr. Debler. Mr. Lippincott determined the critical period of low stream-flow yields to be the years 1927 to 1935, both inclusive, and, using a fundamental assumption of 40.9 per cent for returned water into the Sacramento River, arrived at the conclusion that the United States could reasonably fulfill its contractual obligations under the terms of the Exchange Contract in the delivery of waters into the Mendota Pool, and so recommended to this Commission. In arriving at the above conclusions

irrigation requirements throughout the Sacramento Valley and in the Delta region were conceded maximum performance and the Canal Company and the Mutual Companies in the San Joaquin River area were given 100 per cent fulfillment of their entitlements under Schedule (1) of the Purchase Contract with the guaranteed minimum of 72 per cent of said schedule. Mr. Lippincott made no final determination of the firm power to be produced at Shasta Dam through the final proposed methods of operation but upon the foregoing basic assumptions of deliveries for irrigation and other purposes recognized a substantial reduction in firm power output relegating the amount thereof to the then remaining available waters.

Stanley A. Kerr made an intensive investigation into the quality of the waters of the Sacramento River throughout its various stages and during critical years of minimum run-off, covering a number of years last past. These studies resulted in a determination by him that the content of total dissolved solids in the river water during the year 1931, which was the driest year of the critical period 1927 to 1935, would have reached a minimum of 105 parts per million and a maximum of 170 parts per million under assumed operation of Shasta Reservoir as proposed by the United States Government. In testing the performance ability of Shasta Reservoir for other years of the said critical period, the quality of the water would have been as set out below. The figures under the column "Mean" represent the mean annual weighted average content of total dissolved solids in parts per million; the others, the direct ratio.

Dissolved Solids in Parts per Million

Year	Low	Mean	High
1927	65	113	158
1928	67	127	162
1929	121	143	161
1930	77	133	162
1931	135	157	170
1932	90	130	168
1933	120	143	165
1934	110	150	168
1935	67	116	158

Dr. Frank M. Eaton, Plant Physiologist of the United States Regional Salinity Laboratory at Riverside, California, testified that water containing the above mean weighted average content of total dissolved solids would be excellent for agricultural irrigation purposes and that water of the above maximum content for a limited period would not injuriously affect the crops or lands irrigated with it. However, on the basis of the contractual obligations of maximum salinity fixed at 300 parts per million as the "weighted average of the dissolved solids in waters delivered to the contracting companies from July first to September thirtieth of any year," Dr. Eaton testified that such waters would be good but not necessarily excellent for agricultural irrigation, and, if used for a limited period during the irrigating season, would seriously injure neither the crops raised nor the lands producing them. In general, he found that, although containing a higher percentage of total dissolved solids than the San Joaquin River water, the Sacramento River supply does not contain any concentration of toxic constituents which would be seriously injurious to either crops or lands.

Conclusions.

Discussed above is a brief summary only of the more vital phases of this case. It is of prime and utmost importance to all parties concerned that prompt action be taken in the disposition of the issues raised herein. The record in this matter contains no protest or opposition of any kind presented against the requests prayed for in the application.(10) It is therefore apparent that no useful purposes or needs will be served by going into any further detail in dealing with the problems arising in connection with the Purchase and Exchange Contracts other than matters pertaining to the Flow Schedule Agreement following. Facts have been submitted

(10) After submission of this matter for decision, the Commission has received both oral and written requests, from parties other than those joining in the Exchange Contract, to impose certain conditions to any authorization granted to execute the agreement. A request thus presented, which may have the effect of materially altering the intent of the agreement, cannot be considered by the Commission without opportunity accorded all parties to present testimony and argument thereon. No request for a reopening has been presented, and the representations made informally and subsequent to submission do not warrant a reopening on the Commission's own motion.

through evidence and testimony by expert witnesses of pre-eminent authority in their respective professions throughout the entire United States. This Commission primarily is interested in preserving and protecting the rights and interests of the water users and the Canal Company serving them, at the same time recognizing its responsibility to all other interests involved. A review of the record made in this proceeding clearly and conclusively indicates that through reasonable and efficient methods in operation of the Central Valley Project the United States can completely fulfill its obligations under the terms and provisions of the Exchange Contract, with the possible exception of a few minor deficiencies which may occur only in years of most extreme drought.

In authorizing the execution of certain of these contracts and agreements, it is obvious from the evidence that by so doing none of the vast and varied interests which may be affected by operation of the Central Valley Project as now proposed will be seriously injured or in any respect substantially damaged. In the event of cancellation of the Exchange Contract, the Canal Company and the Mutual Companies will be no worse off than at present and, without suffering loss of any of their respective existing rights, would revert to their present status. These companies are each receiving an increased water supply, the dependability of which is guaranteed from both the Sacramento River and from the San Joaquin River, in which latter instance protection is afforded by agreement of the United States to preserve the said companies' prior rights to the release and use of waters to be stored by Friant Dam in language as follows:

> "(k) Whenever the United States is unable for any reason or for any cause to deliver to Contracting Companies substitute water of the quality and in the amounts herein provided, the Contracting Companies shall

"receive the water reserved to them in said Purchase Contract dated _____, 1938, from the San Joaquin River, and the United States agrees to release at all such times said water at Friant Dam, and the United States further promises and agrees that with respect to any contract between it and third parties for the use of the water of the San Joaquin River, it either will notify said parties in writing, prior to the execution of said contract, of the rights reserved herein to the Contracting Companies, or will specifically provide for the recognition of said rights in any such contracts.

"(1) The term 'substitute waters' as used in this contract, refers to all waters delivered to the Contracting Companies pursuant to the terms of this contract regardless of source."

During the hearings of this proceeding a controversy arose over the intent and purposes of certain portions of paragraph 7 of the Exchange Contract. A stipulation was entered into by J. E. Woolley, Chief of Counsel for Miller & Lux, the Canal Company and the Mutual Water Companies, with Spencer Burroughs, Counsel for the Water Project Authority of the State of California, as follows:

"MR. WOOLLEY: I am willing to stipulate that, in interpreting the paragraph 7 of the exchange contract, down to and including the words '--and if less than that quantity of water so reserved would be flowing in the San Joaquin River, the United States shall deliver to the Contracting Companies, by the means aforesaid, a water supply equal in quantity to that which would be flowing in said River at said gauging station--' that all reference therein to the obligation of the United States to deliver water to the Contracting Companies is limited to the waters to which the Contracting Companies have title and are entitled to divert from the River, and have no reference (to?) waters owned by others, such as Chowchilla Farms and others, and which might be flowing at the White House Gauging Station. I stipulate further the Commission, when it renders its decision, may take into consideration that interpretation of the paragraph and may include it in its order if it so desires."

Flow Schedule.

The Commission is asked to authorize the execution of an agreement entered into by and between The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, Columbia Canal Company, San Luis Canal Company and Firebaugh Canal Company which, in general terms, may be said to provide for the distribution of the waters which are to be supplied by the United States to these parties as a substitutional water supply, mainly from the Sacramento River sources, as provided for in the Purchase Contract and in the Exchange Contract as heretofore referred to.

As a result of certain prior formal proceedings heretofore held before this Commission in connection with the sale and distribution of waters derived from the San Joaquin River by the Canal Company and the above Mutual Water Companies, the Commission suggested that, in the interests of conservation of water and in the promotion of more efficiency in the distribution thereof, these same parties should, by agreement, adopt a flow schedule to regulate and control the deliveries of waters to each other and to their consumers. The original flow schedule devised for this purpose was known as Schedule "A" and was first placed in effect as the result of such recommendations made in Decision No. 22228, dated March 19, 1930, (34 C.R.C. 473). Adjustments became advisable as indicated by the results of practical operation and modifications were made in Schedule "A" by and through formal approval of the Commission in Decision No. 26153, dated July 17, 1933 (38 C.R.C. 851), establishing the present Schedule "D," under which operations are now conducted. In view of the fact that the Exchange Contract will make available for sale and distribution by the Canal Company and the Mutual Companies some water in excess of the present supply and in order to prevent unfavorable discrimination as between the various water users under the different canal systems when the exchange

waters are delivered for general distribution, it becomes advisable to provide for suitable modification of the existing flow Schedule "D." To this end, a new schedule has been designed to take care of these changed conditions and is presented herewith as Schedule "E," effective in the future when exchange water service is in operation. As in the other flow schedules, allocation of water to the various canal companies is based primarily upon a theoretical demand curve showing the monthly and annual requirements in acre feet per acre for the different crops grown throughout the service areas concerned. According to the record, additional water to be acquired by operation of the Exchange Contract will be allocated to the various irrigation companies, eliminating to the greatest extent reasonably possible existing deficiencies of service based upon the crop requirements determined from a survey of past irrigating experience. Under Schedule "E" it appears that all parties will receive a reasonably adequate supply of water which during most of the time throughout average and normal years should result in a one hundred per cent delivery factor. Under no circumstances will operation under this flow schedule result in unreasonable or unfair discrimination to any of the consumers served thereunder.

Set out below is a tabulation showing the performance actually realized under existing Schedule "D" (except for the year 1924 which was estimated) compared with the results of operation which would have obtained under proposed Schedule "E" with use of the exchange water during the critical summer months for the extremely dry years of record - 1924, 1931 and 1934. The figures are upon a monthly basis and indicate the differences in percentages from maximum delivery. The benefits to be derived thereunder would insure a utility water service seldom paralleled in irrigation operation in this State.

Comparative Percentage Deliveries
In Critical Months in Low Flow Years

	1924		1931		1934	
	"D"	"E"	"D"	"E"	"D"	"E"
June	24	82	67	86	77	87
July	20	82	19	83	36	82
August	26	84	15	84	28	84
September	53	88	22	88	38	88

The agreement providing for this flow Schedule "E" will be approved in the following Order with the distinct understanding, however, that the Commission must, of course, reserve the right to modify, alter or amend any and all of the terms and provisions of this agreement as may be deemed fit and proper at any time in the future in the exercise of its jurisdiction.

The following form of Order is recommended.

O R D E R

Application having been made as entitled above, public hearings having been held thereon, the matter having been submitted, and the Commission now being fully advised in the premises,

IT IS HEREBY ORDERED that The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, be and it is hereby authorized to execute that certain contract entitled "Contract for Exchange of Waters" and referred to in the Opinion above as the "Exchange Contract" with The United States of America, the Columbia Canal Company, San Luis Canal Company, and Firebaugh Canal Company, in accordance with the terms and conditions as set forth in the form of contract marked Exhibit "A" and attached to the application herein and which is hereby made a part of this Order by reference, provided that such authority shall be effective only to and including the thirty-first (31st) day of December, 1939.

IT IS HEREBY FURTHER ORDERED that The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, be and it is hereby authorized to sign and execute that certain document joined in with Columbia Canal Company, Firebaugh Canal Company, and San Luis Canal Company as such document is set out on pages 29 and 30 of the "Purchase Contract," said contract being by and between The United States of America and Miller & Lux Incorporated and Gravelly Ford Canal Company and being designated Exhibit No. 23 in this proceeding, which exhibit is hereby made a part of this Order by reference, provided that such authority shall be effective only to and including the thirty-first (31st) day of December, 1939.

IT IS HEREBY FURTHER ORDERED that The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, be and it is hereby authorized to enter into a certain contract with the Columbia Canal Company, San Luis Canal Company, and Firebaugh Canal Company for the division of water between said parties in accordance with the terms and conditions as set forth in the form of contract marked Exhibit "B," attached to the application herein and hereby made a part of this Order by reference, subject, however, to the following further terms and conditions:

1. The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, shall notify this Commission in writing sixty (60) days before the Flow Schedule "E" provided for in the Contract and marked Exhibit "1" attached to Exhibit "B" of the application herein is placed in actual operation.

2. The Commission reserves the right to revise, alter, modify or amend from time to time any and all terms and conditions of the Contract marked Exhibit "B" attached to the application herein as may be considered necessary and proper in the exercise of its jurisdiction.

IT IS HEREBY FURTHER ORDERED that The San Joaquin & Kings River Canal & Irrigation Company, Incorporated, shall file or cause

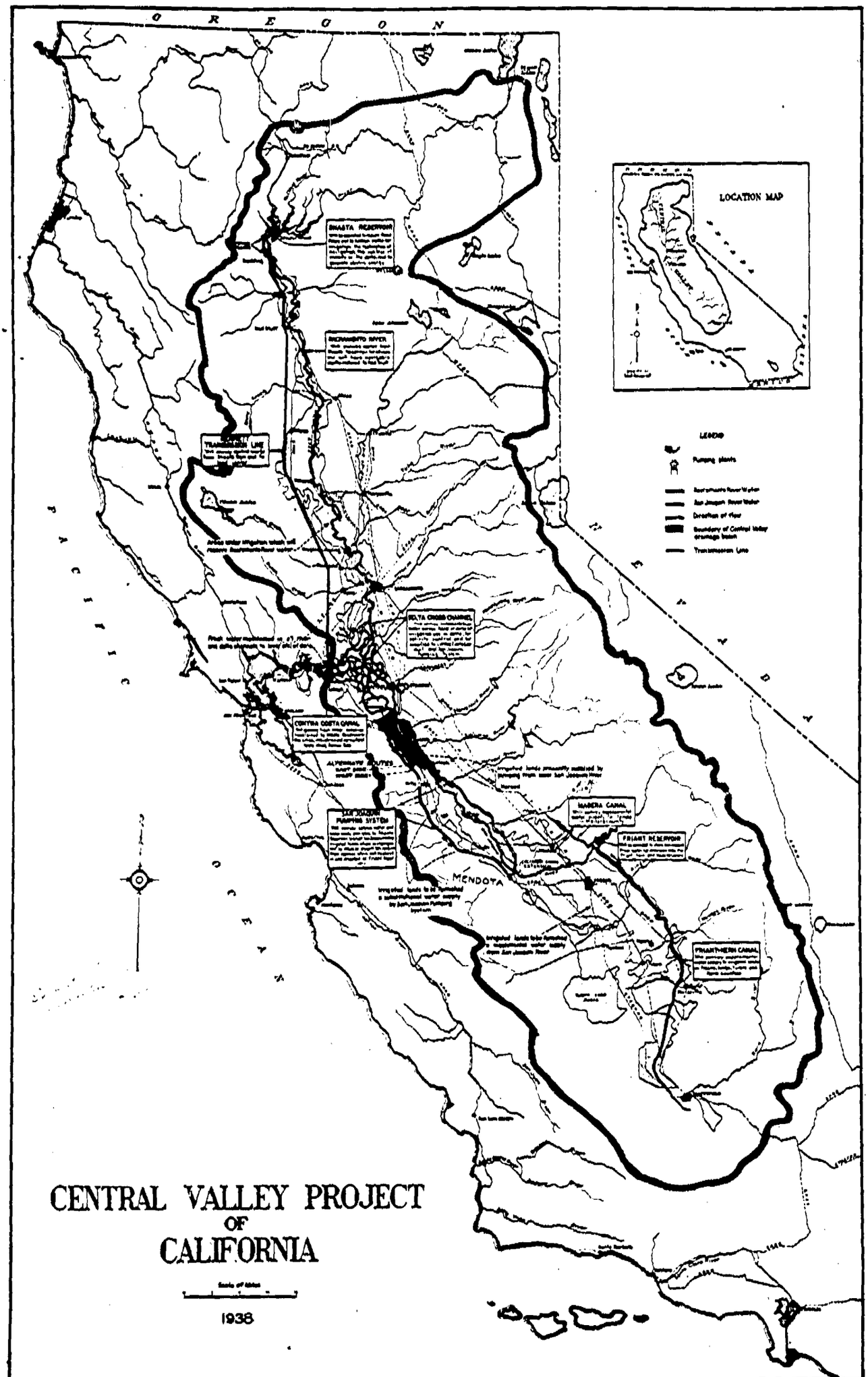
to be filed with this Commission within sixty (60) days after execution thereof two certified copies of the final agreements of all the contracts authorized to be executed by this Order and also, within the same period of time, two certified copies of the said "Purchase Contract" by and between The United States of America and Miller & Lux Incorporated and Gravelly Ford Canal Company as finally executed.

For all other purposes, the effective date of this Order shall be twenty (20) days from and after the date hereof.

The foregoing Opinion and Order are hereby approved and ordered filed as the Opinion and Order of the Railroad Commission of the State of California.

Dated at San Francisco, California, this 20th day of March, 1939.

COMMISSIONERS.


OREGON
LOCATION MAP
SHASTA RESERVOIR
SACRAMENTO RIVER
DELTA CROSS CHANNEL
CENTRA COSTA CANAL
MADERA CANAL
FRIANT RESERVOIR
MENDOTA
SAN JOAQUIN VALLEY
CENTRAL VALLEY PROJECT
OF
CALIFORNIA
1938