

1976

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OPINION AND ORDER

OF

DIVISION OF WATER RIGHTS

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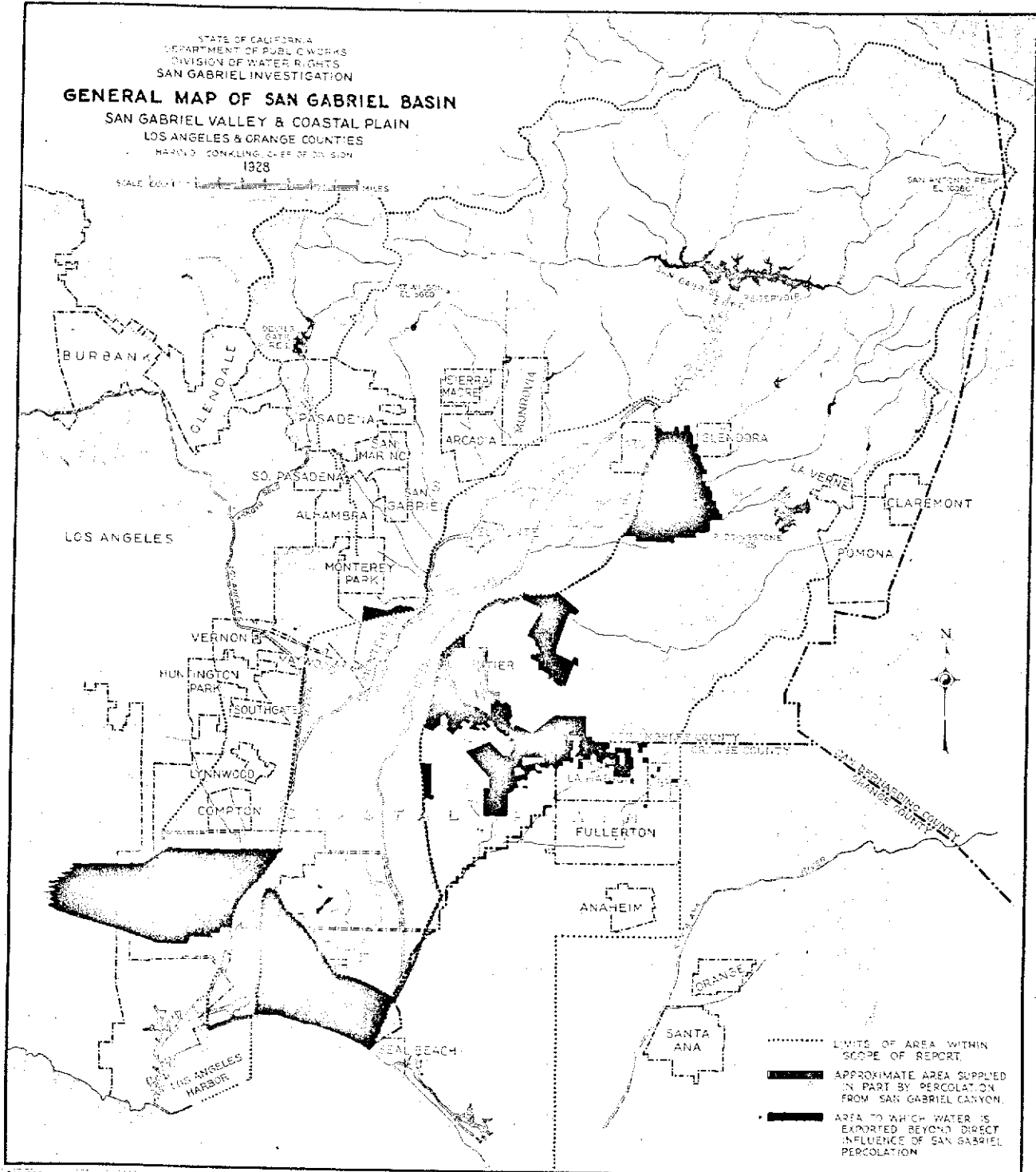
DECISION A. 3328, 3329, 3330, 3331, 3741, 4014, 4049,  
4447, 4448, 4534, 4582, 4590, 4604, 4860,  
5290 and 5699 - D 199.

Decided July 5, 1928.

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STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF WATER RIGHTS  
 SAN GABRIEL INVESTIGATION  
**GENERAL MAP OF SAN GABRIEL BASIN**  
 SAN GABRIEL VALLEY & COASTAL PLAIN  
 LOS ANGELES & ORANGE COUNTIES  
 HARVEY D. CONKLING, CHIEF OF DIVISION  
 1928

SCALE 1:50,000



- ..... LIMITS OF AREA WITHIN SCOPE OF REPORT.
- ▬ APPROXIMATE AREA SUPPLIED IN PART BY PERCOLATION FROM SAN GABRIEL CANYON.
- ▬ AREA TO WHICH WATER IS EXPORTED BEYOND DIRECT INFLUENCE OF SAN GABRIEL PERCOLATION.

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APPLICATIONS BEFORE DIVISION OF WATER RIGHTS  
FOR APPROPRIATION FROM SAN GABRIEL RIVER

SECTION I.

SUMMARY OF DECISION

(1) As to physical features and water supply this decision is based almost entirely on data gathered during the investigation of San Gabriel Valley water supply which has been under way by the Division of Water Rights since July 1923. All data gathered prior to September 30, 1926, both by the Division and by previous investigators have been published in Bulletin 5 of the Division and the salient items gathered since have been made available to the contestants. The investigation consisted of stream flow measurements to determine percolation at all stages of flow from San Gabriel Canyon, measurements of depth to water at wells, measurements of rainfall and geological studies together with a coordination of all past available data. These data have been analyzed for this decision and the results of such analysis are made a part of the decision. No other data were furnished by protestants especially, at hearings held. Their presentation was limited to denial of jurisdiction or to statements largely unsupported by data or based on partial data.

(2) The decision is summarized in the following:

PHYSICAL FEATURES OF SAN GABRIEL BASIN

(3) San Gabriel River and also its tributaries flow across the porous detrital fill of San Gabriel Valley. At times of flood most of the water does not percolate into the stream bed but reaches Whittier Narrows. Most of that reaching Whittier Narrows is lost into the ocean. The water which percolates from the river becomes part of the underground supply of the central part of San Gabriel Valley (that portion of San Gabriel Basin

above Whittier Narrows) and also of the central part of the Coastal Plain. The major part of San Gabriel River water which supplies the Coastal Plain reaches it by overflow of rising water at Whittier Narrows from San Gabriel Valley. The rising water is supplied from the underground basin of San Gabriel Valley which in turn gets its supply by percolation from streams and percolation from rainfall on the valley floor. It has no direct connection with the mountain flows. The object of the investigation was to make general inquiry into the water supplies of the region and methods for their control, and also to determine a rule applicable to any flow from San Gabriel Canyon by which the proportion which would percolate into the stream bed and the proportion which would waste into the ocean can be determined.

(4) The immediate object of the study of the data made for this decision is to determine what part of the water from San Gabriel Canyon is subject to appropriation. Before giving the results of the analysis of data gathered the legal aspects of the matter will be discussed.

#### LEGAL QUESTIONS

(5) Under the Water Commission Act unappropriated water is defined as water flowing in a stream and not being put or not in process of being put to beneficial use and not reasonably needed for beneficial use on lands riparian thereto. Under that definition the Division of Water Rights is authorized or more accurately, it is made mandatory on the Division, to issue permits for diversion to an applicant who asks to use this wasted water and who can show beneficial use for it. The investigation has not only disclosed the presence of unappropriated water but has also resulted in a rule by which the wasted water for any flow can be calculated.

However the present matter is complicated legally by the presence of the Los Angeles County Flood Control District, by the rulings of the courts on underground water supplies which are in part derived from percolation from streams, and by interpretations of the courts as to reasonable use by riparian rights different than that noted as the definition of the Water Commission Act. Hence an extensive inquiry has been made into the rulings of the courts pertinent to the situation and also into the act under which the Flood Control District functions. The essence of the results of the inquiry are as follows:

- (1) Underground water users overlying a basin are entitled to the entire natural percolation or an equivalent amount if the sum of their needs present or future equals the total percolation from all sources. They cannot dictate the means by which this percolation shall be insured. From analogy to cases which have allowed exporters to draw water from a basin when it could not be shown that depletion is caused by such exportation, underground water users are not entitled to the entire percolation from a stream when this together with all other sources of supply to the underground waters of the basin is greater than the total needs of the basin.
- (2) Underground water users are not entitled to the percolation which might have been if the Flood Control District had not constructed its works confining the channel inasmuch as this was done by common consent and the present condition has existed so long that the statute of limitations runs against the protestants.

- (3) Riparian rights do not exist to flood flows which are not beneficial to the riparian owner.
- (4) An appropriator may take water to any point in or out of the watershed provided prior and vested rights are not harmed.
- (5) No rights to use or appropriate water exist in the Flood Control District nor can the benefits of the works of the District be regarded as appurtenant to any one class or area. The work of the Flood Control District so far as its conservation features are concerned merely makes it easier for any one who has or who can secure a right to the water conserved to take that water. There is no conflict between the District and appropriators.

#### FINDINGS OF THE INVESTIGATION

- (6) From data gathered during the investigation a rule was found which can be expressed in curves or by tabulation by which percolation or waste with any daily flow of San Gabriel River at the canyon mouth can be calculated with what is believed to be a large margin of safety on the side of percolation as noted in succeeding paragraph. If reservoirs are built the daily flow which would have passed the canyon mouth can be ascertained by change in content of reservoir or reservoirs.
- (7) As a check on the accuracy of the curves, waste which would have occurred each day since 1904 was calculated from them and from this the average annual waste. This was possible because beginning with 1904 approximate elevation of water plane in San Gabriel Valley as well as daily flows are known with considerable accuracy and these are two of the major variables which determine the percolation which occurs. This cal-

ulation was made in order to compare waste thus found with the waste which was found to have occurred in the same period by two entirely different methods of estimating not in any way dependent on the rule of percolation as found in the investigation. Both of these latter methods gave a waste much larger than the calculation which was made from daily flows. This indicates that there are conditions which decrease percolation to a smaller amount than can be determined from data gathered during the investigation and therefore that the division between percolation and waste as calculated by use of the curves derived from the investigation give results too favorable to percolation. In other words, application of the rule will not deprive underground users of any accustomed benefit from the stream flow by a wide margin. This check also indicates that controversy over the decrease in percolation which it is claimed has been caused by channel control works of the Flood Control District is not in point if the curves are used to calculate waste inasmuch as the waste is less from data derived from the investigation which began after the construction of most of such works, than apparently actually occurred before construction of the works as determined by the two calculations noted above.

(8) Analysis of the data derived in the investigation indicates also that:

- (1) Underground supplies for San Gabriel Valley have been too great in the past.
- (2) The Coastal Plain can absorb only a limited amount of rising water.
- (3) Flood waters are not beneficial to the riparian owner. "Riparian" means bordering on the stream.



- (4) Rising water at Whittier Narrows has in the past been greater than the Coastal Plain can absorb.
- (5) There is sufficient water supply tributary to San Gabriel Valley to supply the entire floor of the Valley or its equivalent.
- (6) After the entire Valley floor is supplied there will still be a much larger amount of rising water at Whittier Narrows than can be absorbed at present by the Coastal Plain and if the present waste is conserved, as much or more rising water will flow as calculations indicate has flowed on the average since 1904.
- (7) Benefit would result and water be saved, if the water plane in the Coastal Plain were lowered.
- (8) Practically no storage space exists underground in the Coastal Plain but large underground storage space exists in San Gabriel Valley at some distance from the Narrows.
- (9) The water supplies of the region can be salvaged best by diversion of the river to the minor basins near the foothills as the first step after construction of reservoirs.
- (10) The only possible way to completely conserve the water supplies is by storage underground.
- (11) Long periods of wet years which occur and which alternate with long periods of dry years make it necessary that every available unit of underground storage space in San Gabriel Valley be utilized.
- (12) Practically all of Pasadena Basin is tributary to Whittier Narrows underground and 64% of it on the surface.

- (13) Rainfall on the valley floor is a very large factor in the water supplies of the region never fully appreciated. After subtracting all the immediate discharge out of the Valley from rain on the valley floor, the amount of precipitation retained in San Gabriel Valley equals the entire present consumption of water in the Valley while a discharge equal to or greater than the mountain runoff escapes from the valley. This is based on an estimate that 25,000 acre feet annually escapes through the Narrows underground.
- (14) In the process of manipulating the mountain runoff for spreading some of it will be lost by evaporation and also some of the water held in reservoirs will be lost in the same way. Again, it is impractical to construct works which will salvage the entire waste from the mountains in extreme years. After allowing for such losses and also for the unavoidable waste from immediate runoff of rainfall on the valley floor and hills in a cycle like 1905-26 it is believed that works can be constructed at feasible cost which will increase the present percolation so that almost 90% of the total water reaching the floor of San Gabriel Valley (above Whittier Narrows) whether runoff from hills or mountains or rainfall on the valley floor can be conserved in the Valley whence the residue will discharge to the Coastal Plain in an equated stream of rising water.
- (15) The total supply to San Gabriel Valley is estimated to be 423,000 acre feet annually. The present consumption in the valley is found to be 191,000 acre feet. The consumption

when all the valley floor is irrigated is estimated to be less than 227,000 acre feet. The total unavoidable waste during storms and loss by evaporation is estimated to be 50,000 acre feet. The remaining equated outflow through Whittier Narrows should therefore be 146,000 acre feet.

(9) Analysis of these points was made as a check on the desirability from the broad standpoint of diversion of water in accordance with the applications. All tests indicate that the curves give less than actual waste but even if the opposite were the case it is believed that if diversion is made to the subbasins in accordance with the restrictions imposed by the curves, the benefits from the return flow to Central San Gabriel Valley will outweigh any loss which could be caused by such error. And further, if a reservoir proposed by the Flood Control District in San Gabriel Canyon is constructed and the water properly conserved, the supplies to the lands affected by water from San Gabriel Canyon are more than sufficient for irrigation use.

(10) It is also apparent from the analyses made that diversions to the areas lying distant from the Narrows and along the foothills will be beneficial and necessary to conservation of the water supplies because from them is the greatest distance to the Narrows and the slow travel underground will serve to smooth out the irregularities of the supply. Diversion at the canyon mouth to areas in the Coastal Plain or to areas at or near the Narrows will be detrimental to the conservation of the water supplies.

#### UNAPPROPRIATED WATER AND PERMITS

(11) The findings as to unappropriated water are as follows: By the calculation based on the results of the investigation, that is by applying to each days flow from San Gabriel Canyon the coefficient found during the investigation by which the amount of water which would waste with any days flow and with any elevation of the water plane can be

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#### UNAPPROPRIATED WATER AND PERMITS

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determined, the waste for the 23 years from 1904 to 1927 was found to average 62,000 acre feet annually. By two other methods it was found to average a great deal more. The smallest of the three results is accepted for the purpose of this decision.

(12) While 62,000 acre feet is accepted as the estimate of past waste it is concluded that the spreading of water at the canyon mouth if it had been carried on in the past as it is at present would have reduced the waste to an average annual amount of 57,000 acre feet. It is on the basis of prior right of present spreading that unappropriated water shall be calculated.

(13) Under Section 20 of the Water Commission Act applications for permit by municipalities shall be considered first in right irrespective of whether they are first in time. This therefore transposes the priorities of the non-municipal applicants and makes them subsequent to all municipalities.

(14) The prior applicant is the City of Pasadena and to this applicant is given a permit so restricted that it allows a diversion of 150,000 acre feet from unappropriated water to the City in any five year period if that amount would have wasted under natural conditions and requires that all water which would have percolated as defined by the curves of percolation shall be caused to percolate. No diversion is allowed when the water plane is at the highest point of record in Central San Gabriel Basin, if the Canyon discharge is less than 110 second feet and when the water plane is at the lowest point of record, if the discharge is less than 500 second feet both in addition to discharge of the Edison Conduit. The proportion of other flows which may be diverted is shown on Plate 3.

(15) The applications of the City of Long Beach, City of Whittier and City of Compton for storage at Pine Canyon Reservoir site are not granted

as this reservoir will be fully utilized by the prior applicant, City of Pasadena.

(16) None of the applications which depend on equated flow from the proposed reservoir of Los Angeles County Flood Control District at the Forks site in San Gabriel Canyon are granted inasmuch as the reservoir has not been started, the time of beginning its construction is uncertain and none of the applicants, as such, have any legal control over the progress of the reservoir.

(17) Application 5699 of the City of Sierra Madre is cancelled for failure to complete.

(18) All of the foregoing applications to which permits are not granted at this time, are with the exception of that of the City of Sierra Madre, held in their present status for future action.

(19) The table following shows the discharge of San Gabriel River for the past 23 years; the amount of waste under present spreading conditions as calculated from the curves; the amount which would have been diverted to Pasadena under the terms of the permit to be issued if the proposed works had been constructed and diversions made as expected about 25 or 30 years from now; and the residue. The total subject to appropriation in the 23 years by this calculation is 1,301,000 acre feet of which 71% comes in the 12 years 1905-16 and 73% comes in the six years of highest runoff. The following short table shows the amount of water available in different years.

Acre Feet Subject to Appropriation	Number of Years	Total acre feet appropriable in all years of pre- ceding column	Percent of total for 23 years 1905-27
0	3	0	0
0 - 10,000	6	37,000	3
10 - 20,000	2	32,000	2
20 - 50,000	3	119,000	9
50 -100,000	3	167,000	13
100,000 - up	6	946,000	73
	<u>23</u>	<u>1,301,000</u>	<u>100</u>

(20) From the foregoing it is apparent that even with a comparatively small appropriation there are few years when the prior appropriator will not take all the surplus. As a matter of fact numerous studies were made with various limitations on diversion by the City of Pasadena and in all, the surplus water was found in practically the same years as shown by the succeeding table, although for less diversion during the five year period there was a small amount of water available for later appropriators in one or two additional years.

(21) It is of interest to note that the water available for appropriation as given in this table is smaller than the actual waste during each of the four years since 1923 during which the investigation was under way.

Table 1

DISTRIBUTION OF WATER - SAN GABRIEL RIVER AT CANYON

LIMITATIONS:

Not more than 40,000 ac.ft. diverted to Pasadena in one season from storage.  
 " " " 150,000 " " diverted to Pasadena in five seasons from all sources.  
 " " " 65,000 " " into storage by Pasadena in one season.  
 " " " 80 sec.ft. to Pasadena when available as direct flow.

Acre Feet

Season	Discharge San Gabriel Canyon	Percolation and Prior Rights	Waste Available for appro- priation	To Pasadena (reservoir or conduit)	Remaining Unappro- priated
1	2	3	4	5	6
1904-05:	160,000	108,000	52,000	52,000	0
05-06:	232,000	127,000	105,000	69,000	36,000
06-07:	350,000	186,000	164,000	62,000	102,000
07-08:	77,500	73,500	4,000	4,000	0
08-09:	180,000	118,000	62,000	27,000	35,000
1909-10:	139,000	84,000	55,000	19,000	36,000
10-11:	273,000	135,000	138,000	53,000	84,000
11-12:	77,100	68,100	9,000	9,000	0
12-13:	50,300	46,300	4,000	4,000	0
13-14:	296,000	130,000	166,000	65,000	102,000
1914-15:	132,000	113,000	19,000	19,000	0
15-16:	279,000	122,000	157,000	52,000	105,000
16-17:	92,000	82,000	10,000	10,000	0
17-18:	132,000	81,000	51,000	51,000	0
18-19:	38,900	38,900	0	0	0
1919-20:	117,000	100,000	17,000	17,000	0
20-21:	70,500	65,500	5,000	5,000	0
21-22:	410,000	188,000	222,000	89,000	132,000
22-23:	75,900	68,900	7,000	7,000	0
23-24:	27,900	27,900	0	0	0
24-25:	23,700	23,700	0	0	0
25-26:	111,000	73,000	38,000	38,000	0
26-27:	129,000	95,000	34,000	34,000	0
	151,000	94,000	57,000	30,000	27,000

NOTE: Pasadena Reservoir empty to start.

27-28	0	0
28-29	0	0
29-30	0	0
30-31	0	0
31-32	0	0



## SECTION II.

JURISDICTION OF DIVISION OF WATER RIGHTS

(23) Four parties or groups of parties, towit, the City of Monrovia, the City of Long Beach, The Arroyo Ditch and Water Company et al, and the proposed San Gabriel Mission Water District et al, including the cities of Alhambra and San Gabriel have formally objected to the jurisdiction of the Division of Water Rights to hear and act upon the applications under consideration.

(24) These objections to jurisdiction are the same for the most part and may well be considered together.

(25) It is claimed that there are no unappropriated waters in the source. Such an objection is not jurisdictional as the authority to consider and find relative to that question of fact and of law is expressly conferred upon the Division of Water Rights by the Water Commission Act. (Sections 1d and 10). Especially specific is Section 10 wherein it is declared:

"The State Water Commission is hereby authorized\*\*\*\* to investigate\*\*\*\*take testimony\*\*\*\*and to ascertain whether\*\*\*\*water\*\*\*\*is appropriated under the laws of this state."

(26) The determination as to whether or not there is unappropriated water is necessarily a principal consideration in acting upon every application filed before the Division and if the Division has not jurisdiction because that question is involved then the Act is an absurdity and confers no jurisdiction. If in a given case the Division concludes that there is no unappropriated water its jurisdiction has been exercised and acting within that jurisdiction it denies a permit and rejects the application.

(27) The objection that there is no jurisdiction over the subject matter of any applications for allocation or distribution of water is of no moment. The applications objected to are not for allocation or distribution of water, they are for permits to appropriate unappropriated waters and as such are expressly provided for in the Water Commission Act (Sections 11, 16, and 17) and the jurisdiction relative to such applications is likewise vested in the Division.

(28) The contention that any attempt to allow filings or to allocate or distribute waters constitutes an attempt to take or damage property without due process of law, and the contention that a determination by the Division that there are unappropriated waters will necessitate a determination of the quantum of vested rights, are so similar that they will be treated together. As heretofore said there are no applications pending to allocate or distribute waters. The applications are to appropriate unappropriated waters. Furthermore the granting of a permit constitutes but the approval of an application for unappropriated waters and consequently does not and cannot take away or detract from vested rights. If in fact there are no unappropriated waters, the approval or permit is of no effect. It is futile and unavailing. In order to further emphasize the effect of a permit, every permit is expressly issued "subject to vested rights". Furthermore the permit or approval and the "application to appropriate unappropriated waters" constitute one document.

(29) As to the permit itself constituting a judicial determination of the quantum of vested rights it does not pretend to accomplish such a result. No determination of the relative rights of the various parties is attempted, no decree is rendered setting forth and adjudicating such rights. Insofar as the Division forms an opinion or conclusion as

to the scope and extent of the total vested rights of others, said opinion or conclusion is but incidental to the performance of the administrative duties of said body as a part of the executive department of the State government as contrasted with the duties performed by the legislative and judicial departments.

(30) Innumerable executive boards, bodies and officials perform quasi-judicial functions incidental to the performance of their administrative duties without being chargeable with an exercise of that judicial power which is reserved unto the courts by the various State constitutions.

A few of many cases which might be cited will suffice. (Suckow v. Alderson, 182 Cal. 247, 250; Doble Steam Motors Corp. v. Daugherty, 195 Cal. 158, 165, 166; Breechen v. Riley, 187 Cal. 121, 125; Bergman v. Kearney, 241 Fed. 844).

(31) That the Division of Water rights does not act judicially in the unconstitutional sense but does act non judicially or administratively in passing upon an application to appropriate unappropriated water has been determined by the Supreme Court of this State. (Tulare Water Company v. State Water Commission, 187 Cal. 533 and Mojave River Irrigation District v. Superior Court, 74 Cal. Dec. 711).

(32) If in fact riparian owners, overlying owners and prescriptive right owners have vested rights in and to all the waters of the source, the consequence is that there are no unappropriated waters. If in fact there are no unappropriated waters the issuance of a permit is an erroneous exercise of jurisdiction but as heretofore shown the mere allegation that there are no unappropriated waters does not operate to deprive the Division of jurisdiction.

(33) Finally it is urged that pending litigation relative to the proposed dam of the Los Angeles Flood Control District renders it uncertain as to the quantities of water which may be made available.

(34) In the matter of certain of the applications involved, the storage proposed is independent of that proposed by the Flood Control District and as to those which contemplate usage of waters released from the Flood Control Reservoir action is not contemplated at this time for reasons elsewhere stated.

(35) Such other so called objections to jurisdiction as may have been alleged but reiterate in one way or another those objections above considered, except in regard to the apparent objection of the City of Monrovia that water cannot be appropriated for use beyond the watershed of the source. This objection has no foundation in law and will be fully considered hereinafter.

## SECTION III.

BEFORE THE DIVISION OF WATER RIGHTS  
DEPARTMENT OF PUBLIC WORKS  
STATE OF CALIFORNIA

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In the Matter of Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena to appropriate from the San Gabriel River and the West Fork of the San Gabriel River in Los Angeles County for Municipal Purposes; Application 4014 of Rubio Canon Land and Water Association and Las Flores Water Company to appropriate from the San Gabriel River in Los Angeles County for Domestic Purposes; Application 4049 of the City of Monrovia to appropriate from the San Gabriel River in Los Angeles County for Domestic Purposes; Applications 4534 and 5290 of the City of Alhambra to appropriate from the San Gabriel River in Los Angeles County for Municipal and Domestic Purposes; Application 4582 of the Glendora Consolidated Mutual Irrigating Company to appropriate from the San Gabriel River in Los Angeles County for Domestic and Irrigation Purposes; Application 4590 of the City of Long Beach to appropriate from the San Gabriel River in Los Angeles County for Municipal Purposes; Application 4604 of the City of Whittier to appropriate from the San Gabriel River in Los Angeles County for Municipal and Domestic Purposes; Application 4860 of the City of Compton to appropriate from the San Gabriel River in Los Angeles County for Municipal and Domestic Purposes and Application 5699 of the City of Sierra Madre to appropriate from the San Gabriel River in Los Angeles County for Municipal Purposes.

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DECISION A 3328, 3329, 3330, 3331, 3741, 4014, 4049, 4447, 4448, 4534, 4582, 4590, 4604, 4860, 5290 and 5699 D 199.

Decided July 5, 1928.

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APPEARANCES AT HEARING HELD August 9, 1927

For Applicants

City of Pasadena  
Rubio Canyon Land & Water Assn.  
and Las Flores Water Company  
City of Monrovia

City of Alhambra  
Glendora Consolidated Mutual  
Irrigating Company  
City of Long Beach

City of Whittier  
City of Compton

J. H. Howard, S.B. Morris, Claud Sopp

Chas. H. Morse  
H. S. Gierlich, W. N. Treadwell,  
W. F. Palmer

T. B. Downer, Walter Haas

H. C. Warren  
C. H. Shaw, Burt Harmon, W.M. Brown,  
N. M. Reid

M. R. Bowen, A. G. Wray  
No appearance

For Protestants

Southern California Edison Company	G. C. Larkin, J. G. Andree
Arroyo Ditch and Water Company )	
La Puente Cooperative Water Company )	W. F. Haas, J. A. Anderson
and their associated protestants )	T. G. Anderson
Henry Hay, Trustee Valencia Heights )	
Water Company and Hollenbeck Street )	A. M. Pence
Water Company )	
Roger P. Dalton	No appearance

EXAMINER: Edward Hyatt, Jr., Chief of Division of Water Rights, assisted  
by Harold Conkling, Hydraulic Engineer, Division of Water Rights.

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APPEARANCES AT HEARING HELD November 14th and 15, 1927.

For Applicants

City of Pasadena	J. H. Howard, S. B. Morris, Claud Sopp, J. B. Scott
Rubio Canon Land & Water Assn.) and Las Flores Water Company )	Chas. H. Morse
City of Monrovia	H. S. Gierlich, W. N. Treadwell, W. F. Palmer, R. C. Wygant
City of Alhambra, et al	T. B. Downer, E. A. Thompkins
Glendora Consolidated Mutual Irrig. Co.	H. C. Warren
City of Long Beach	C. H. Shaw, Burt Harmon, W. M. Brown, C. A. Windham
City of Whittier	No appearance
City of Compton	No appearance
City of Sierra Madre	No appearance

For Protestants

Southern California Edison Company	G. C. Larkin, J. G. Andree Geo. E. Trowbridge
Arroyo Ditch and Water Company, et al)	
La Puente Cooperative Water Co., et al)	W. F. Haas, James A. Anderson,
Azusa Irrigating Company, et al )	T. G. Anderson

For Protestants (Continued)

Valencia Heights Water Company, and)	
Hollenbeck Street Water Company )	Henry Hay
(Henry Hay, Trustee) )	

Roger P. Dalton

No appearance

EXAMINER: S. T. Harding, Consulting Engineer, for Harold Conkling, Chief of Division of Water Rights, Department of Public Works, State of California.

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O P I N I O N

(36) The applications filed by the City of Pasadena comprise a comprehensive development for a municipal water supply for the city.

(37) It is proposed to divert to storage at the Lower Pine Canyon Dam Site No. 2, 65,000 acre feet per annum of which 20,000 acre feet is included in Application 3328, 35,000 acre feet in Application 3329 and 10,000 acre feet in Application 3331 and to draw from storage and convey to the City of Pasadena 40,000 acre feet annually of which 20,000 acre feet are included in Application 3328, and 20,000 acre feet in Application 3329. The difference of 25,000 acre feet between diversion to storage and draft from storage is to be used as hold-over storage. Applications 3328, 3329 and 3331 provide for storage in Pine Canon Reservoir. The continuous draft upon the reservoir to supply the domestic needs of the City during the period of collection will make possible the diversion to storage of 65,000 acre feet, whereas the capacity of the Pine Canon Reservoir is 64,200 acre feet.

(38) Under Application 3331 it is also proposed to store 90,000 acre feet per annum in the Flood Control or Forks Reservoir, 65,000 acre feet of which will be diverted in order to make provision for the refilling of the Pine Canon Reservoir when its storage has been exhausted during a dry period.

(39) Under Applications 3330 and 4448 the City provides for the storage of 48,200 acre feet per annum in the Rincon Reservoir and 20,800 acre feet per annum in the Edison Reservoir.

(40) The Rincon Reservoir is in conflict with the Forks Reservoir of the Los Angeles County Flood Control District, therefore it will not be utilized if the Forks dam is constructed.

(41) Under Application 3741 the City provides for the storage of 15,000 acre feet per annum in the Bonita Reservoir. It is proposed to draw from the reservoir 10.7 second feet, or an equivalent amount, during the period of collection. This draft will permit the diversion to storage of 15,000 acre feet whereas the capacity of the reservoir is 10,500 acre feet.

(42) In addition to the contemplated storage the City under its Application 4447 proposes the direct diversion of 80 second feet from the San Gabriel River at the Lower Pine Canon Damsite No. 2 which may be regarded as supplemental to Applications 3328 and 3329 which did not specify any direct diversion. Pine Canon Reservoir being the lowest project of the City of Pasadena on the San Gabriel River, is to be used as the diversion works for storage at Pine Canon Reservoir (Applications 3328, 3329 and 3331), Edison Reservoir and Rincon Reservoir (Applications 3330 and 4448), The Forks Reservoir of the Los Angeles County Flood Control District (Application 3331), Bonita Reservoir (Application 3741), and thereafter the same conduit can be used for any or all of these projects in addition to the Pine Canon project.

(43) The applications of the City of Pasadena were protested by the following parties:



San Gabriel Protective Association and Water Rights  
 Association of San Gabriel Valley  
 Southern California Edison Company  
 City of Monrovia  
 City of Alhambra, et al  
 Valencia Water Company Corporation ( Applications 3328,  
 3329 and 3331 only)  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigation Company, et al  
 City of Long Beach  
 Roger P. Dalton

(44) Under Application 4014 the Rubio Canon Land and Water Association and Las Flores Water Company propose the diversion of 30 second feet from the San Gabriel River at the Lower Pine Canon Dam Site No. 2 and the diversion to storage of 10,000 acre feet per annum from the same source to be diverted to storage temporarily in the Forks Reservoir of the Los Angeles County Flood Control District. The water as it is released will be allowed to flow down the natural channel to the diversion works of the City of Pasadena at its Pine Canon reservoir. The applicants are negotiating with the City of Pasadena for the joint construction of diversion works and conduit. The applicants will pump their proportion of the flow from the main conduit at the point where it crosses El Molino Avenue, to their distribution reservoir at a higher elevation, from where it will be distributed to 3,200 acres of land comprising the unincorporated territory called Altadena lying north of, and contiguous to the City of Pasadena, which area is to be subdivided and devoted to residential purposes and the water will be used for domestic purposes.

(45) This application was protested by the following:

Southern California Edison Company  
 City of Monrovia  
 City of Pasadena  
 Roger P. Dalton  
 City of Long Beach

(46) Under Application 4049 the City of Monrovia proposes to divert 6,000 acre feet of either the natural flow or regulated flow of the San Gabriel River resulting from the operation of the Forks Reservoir of the Los Angeles County Flood Control District under one or more of the following plans, the gross diversion not to exceed 6,000 acre feet per annum.

PLAN I. Proposes the diversion of 8.3 second feet from the upper dam site of the Pine Canon Reservoir Site throughout the entire year.

PLAN II. Proposes to store 6,000 acre feet per annum in the Forks Reservoir from about November 1st to about April 1st of each season.

PLAN III. Proposes to divert 8.3 second feet from the vagrant, unappropriated and natural flow waters from about November 1st to about April 1st of each season and diversions from regulated flow, supplied by waters collected in the Forks Reservoir between November 1st and April 1st of each season, will be made as same may become available. The point of direct diversion will be at the upper dam site of the Pine Canon Reservoir.

The application was protested by the following:

City of Pasadena  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigation Company, et al  
 City of Long Beach  
 Roger P. Dalton

(47) Under Application 4534 the City of Alhambra proposes to divert 25 second feet from the San Gabriel River throughout the entire year for municipal purposes in the City of Alhambra. The water thus diverted is water made available by storage by the Los Angeles County Flood Control District in its Forks Reservoir.

(48) The City of Alhambra also proposes under its Application 5290 to divert 41.4 second feet from the waters of the San Gabriel River,

either natural flow or regulated flow resulting from the operation of the Forks Reservoir proposed by the Los Angeles County Flood Control District. Diversion is sought throughout the entire year for municipal and domestic use in the City of Alhambra. The gross diversion under this application will not exceed 30,000 acre feet per annum.

(49) These two applications were protested by the following:

City of Monrovia  
 City of Pasadena  
 City of Long Beach  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigation Company, et al  
 Roger P. Dalton

(50) Under Application 4582 the Glendora Consolidated Mutual Irrigating Company proposes the diversion of 10 second feet from the San Gabriel River throughout the entire year at the Lower Pine Canon Dam Site No. 2 for domestic and irrigation purposes on 2463.95 acres lying within T 1 N, R 10 W, T 1 N, R 9 W and T 1 S, R 9 W, S.B.B. & M.

(51) The application was protested by the following:

Southern California Edison Company  
 City of Pasadena  
 City of Long Beach  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigating Company, et al  
 Roger P. Dalton

(52) Under Application 4590 the City of Long Beach proposes to divert either the natural flow, or the regulated flow of the San Gabriel River resulting from the operation of the Forks Reservoir proposed by the Los Angeles County Flood Control District. The amount of water which applicant desires to appropriate is as follows:

- a. Direct diversion 155 second feet
- b. Diversion to storage 112,000 acre feet per annum.

(53) The gross diversion under this application will not exceed 112,000 acre feet per annum. Diversions from natural flow will be made throughout the entire year and diversions from regulated flow collected in the reservoir of the Los Angeles County Flood Control District will be made throughout the entire year as same may become available.

(54) The application was protested by the following:

Southern California Edison Company  
 City of Monrovia  
 City of Pasadena  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigating Company, et al  
 Roger P. Dalton

(55) Under Application 4604 the City of Whittier proposes to divert 20 second feet from the San Gabriel River and 31,500 acre feet per annum from the same source from about November 1st to about June 1st to be used for general municipal and domestic purposes in the City of Whittier. The water to be stored will be stored in the City of Whittier Reservoir which has a capacity of 30,300 acre feet.

(56) This application was protested by the following:

Southern California Edison Company  
 City of Monrovia  
 City of Pasadena  
 Arroyo Ditch Company, et al  
 La Puente Cooperative Water Company, et al  
 Azusa Irrigating Company, et al  
 Roger P. Dalton

(57) Under Application 4860 the City of Compton proposes to divert 10,950 acre feet per annum of the waters of the San Gabriel River to storage in the Pine Canon Reservoir from about November 1st to about July 1st of each season. The water thus stored will be used for domestic and municipal purposes in the City of Compton.

(58) The application was protested by the following:

Southern California Edison Company  
City of Monrovia  
City of Pasadena  
Arroyo Ditch Company, et al  
La Puente Cooperative Water Company, et al  
Azusa Irrigating Company, et al  
Roger P. Dalton

(59) Under Application 5699 the City of Sierra Madre proposes to divert 14.5 second feet of the waters of the San Gabriel River throughout the entire year for municipal purposes in the City of Sierra Madre. The total amount of water applied for under this application is 5,500 acre feet per annum.

(60) The application was protested by the following:

City of Alhambra  
City of Long Beach  
The City of Pasadena  
Arroyo Ditch and Water Company  
La Puente Cooperative Water Company  
Azusa Irrigating Company, et al  
City of Monrovia

APPLICATIONS SET FOR PUBLIC HEARING

AS PROVIDED FOR IN SECTION 16 OF THE WATER COMMISSION ACT

(61) With the exception of Application 5699 of the City of Sierra Madre these several applications were completed in accordance with the Water Commission Act and the requirements of the Rules and Regulations of the Division of Water Rights and being protested were set for public hearings as follows:

At Assembly Room of Exposition Building, Los Angeles, on August 9, 1927 at 10:00 o'clock A.M.

At Sun Finance Building, Los Angeles, on November 14, 1927, at 10:00 o'clock A.M.

Of these hearings applicants and protestants were duly notified.

(62) Since the hearing held on August 9, 1927, Application 5699 of the City of Sierra Madre was filed upon which advertisement was started but not completed prior to the second hearing. A few protests being filed against this application it was included by stipulation at the hearing held on November 14, 1927 and it was agreed in this proceeding to consider the record that was made at this hearing in connection with this application so that duplication of testimony might be avoided in case the application was set for hearing.

PROTESTS

Protests filed prior to hearings.

(63) Protests of Southern California Edison Company against Applications 3328, 3329, 3330, 3331, 3741, 4447, 4448 of the City of Pasadena.

The proposed reservoir would flood protestant's intake works and a portion of the conduit leading therefrom to protestant's Azusa power

plant and would also flood a large area of land owned by protestant, thereby preventing operation of said power plant.

Against Application 4014 of Rubio Canon Land & Water Association and Las Flores Water Company

Application 4049 of City of Monrovia

Applications 4534 and 5290 of City of Alhambra

Application 4582 of Glendora Consolidated Mutual Irrigating Company

Application 4590 of City of Long Beach

Application 4604 of City of Whittier

Application 4860 of City of Compton

Application 5699 of City of Sierra Madre

Applicants proposed appropriation would interfere with and reduce the natural flow of the San Gabriel River thereby reducing the output of power at protestant's Azusa Power Plant.

(64) Protests of San Gabriel Valley Protective Association and Water Rights Association of San Gabriel Valley

Against Applications 3328, 3329, 3330, 3331, 3741, 4447, 4448 of the City of Pasadena.

(1) There are no unappropriated surface waters in the San Gabriel River.

(2) The areas, both irrigated and non-irrigated, overlying the water plane of the ground waters of the San Gabriel River Valley have a first and prior right to the use of the waters from said water plane.

(3) Protestants abandoned their opposition to the construction of the Forks Reservoir of the Los Angeles County Flood Control District on being informed that the reservoir would not only be used for flood control purposes but also for conservation purposes for the benefit of the persons entitled to the use of the waters of the San Gabriel River.

(4) The proposed appropriations would prevent the necessary replenishment of the underground water supply by preventing the

flood waters from flowing over the various washes of the San Gabriel River.

- (5) Under the laws of the State storm waters which feed the underground waters of a basin are not deemed surplus or waters subject to appropriation until the same shall have passed over such lands or in the case presented here, just before they reach the ocean.
- (6) The lands which overlie the general water plane of the San Gabriel basin have first right to any so called excess waters over and above the right of the City of Pasadena to these waters as the City of Pasadena lies within a watershed separate and distinct from the watershed of the San Gabriel River above the mouth of the San Gabriel Canyon.
- (7) Further consideration of the applications will result in further delay of the much needed flood control dam which is required not only for flood control but the preventing of the silting of the Los Angeles and Long Beach Harbor.
- (8) If applications are granted the result will be a long and bitter contest on behalf of the farmers and land owners within the district fed by the waters of the San Gabriel River against the City of Pasadena.

- (65) Azusa Irrigating Company  
Azusa Foothill Citrus Company  
Azusa Agricultural Water Company  
Mrs. Kate S. Vosburg  
Mrs. Louise S. Macneil  
Covina Irrigating Company  
Contract Water Company  
Duarte Mutual Irrigation & Canal Company  
Beardslee Water Ditch Company  
City of Azusa

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena.



Against Application 4049 of City of Monrovia  
 Applications 4534 and 5290 of City of Alhambra  
 Application 4582 of Glendora Consolidated Mutual Irrigating Company  
 Application 4590 of City of Long Beach  
 Application 4604 of City of Whittier  
 Application 4860 of City of Compton

- (1) Approval of applications will result in interference with diversions of water from San Gabriel River to which protestants are entitled.
- (2) Demands may be increased by reason of increase in area irrigated or by reason of more intensive cultivation and irrigation of lands.
- (3) There are no waters of the San Gabriel River subject to appropriation.

(66) Arroyo Ditch Company  
Banta Ditch Company  
California Domestic Water Company  
The Cate Ditch Company  
Citrus Grove Heights Company  
La Herba Water Company  
Los Nietos Irrigating Company  
Rincon Ditch Company  
Standefer Ditch Company  
Walnut Irrigation District  
Whittier Water Company  
La Habra Heights Water Company

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena.

Against Application 4049 of City of Monrovia  
 Applications 4534 and 5290 of City of Alhambra  
 Application 4582 of Glendora Consolidated Mutual Irrigating Company  
 Application 4590 of City of Long Beach  
 Application 4604 of City of Whittier  
 Application 4860 of City of Compton

- (1) Approval of applications will result in causing the diversion of large quantities of water from the main San Gabriel River to lands which are not in the watershed of said River and thereby greatly diminish the necessary water supply of protestants.

(2) In addition to the irrigated lands protestants have extensive acreage which has not yet been irrigated but which is susceptible of irrigation and which overlies the underground water of the San Gabriel River and which is entitled to the use thereof.

(3) That there are no waste waters of the San Gabriel River or any flood or other waters therein which are subject to appropriation.

(4) All the waters of the River are required to sustain the underground waters of the upper and lower basins of the River in order to supply the irrigation needs of protestants and others who are entitled to use the same.

(67) La Puente Cooperative Water Company  
Whittier Extension Mutual Water Company  
Kwis Light and Water Company  
Glendora Consolidated Mutual Water Company

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena.

Against Application 4049 of City of Monrovia  
 Applications 4534 and 5290 of City of Alhambra  
 Application 4582 of Glendora Consolidated Mutual Irrigating Company  
 Application 4590 of City of Long Beach  
 Application 4604 of City of Whittier  
 Application 4860 of City of Compton

- (1) May result in diversion by applicant of water of the San Gabriel River which protestants are entitled to use and thereby reduce the amount to which they are entitled.
- (2) There are no waste waters of the San Gabriel River or any flood or other waters therein which are subject to appropriation.
- (3) Lands which have not yet been irrigated but which are susceptible to irrigation and which overlie the underground waters

of the San Gabriel River are entitled to the use of the underground waters fed by the river.

- (4) All the waters of the River are required to sustain the underground waters of the upper and lower basins of the river in order to supply the irrigation needs of the protestants and others who are entitled to use the same.

(68) Valencia Water Company, Corporation

Against Applications 3328, 3329, 3331 of the City of Pasadena.

If applications are approved, during years of ordinary rainfall there would not be sufficient water left to maintain the present underground water level in the San Gabriel Basin and thereby increase cost of protestant's pumping, and as protestant's wells are in the edge of San Gabriel Basin, the lowering of the water level may entirely deprive protestant of water.

That several hundred acres of undeveloped land in the vicinity of said wells cannot be developed unless the owners are permitted to take water from the San Gabriel Basin, which land the protestants have reason to believe will be developed.

(69) City of Alhambra

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena.

Against Application 5699 of City of Sierra Madre

Depletion of underground water in the upper basin of the San Gabriel Valley due to the exportation of water to lands to which the San Gabriel River water is not tributary and the ground waters underlying which are not augmented by the natural flow from the San Gabriel basin and the surface of which lands drains into the Los Angeles River Basin.

(70) City of Long Beach

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of City of Pasadena.

Against Application 4014 of Rubio Canon Land & Water Association and Las Flores Water Company  
 Application 4049 of City of Monrovia  
 Applications 4534 and 5290 of City of Alhambra  
 Application 4582 of Glendora Consolidated Mutual Irrigating Company  
 Application 5699 of City of Sierra Madre

The diversion of any of the waters of the San Gabriel River, whether natural flow or storm or flood waters, from the San Gabriel Basin into another or wholly different drainage basin, as proposed would result in a depletion of underground storage in the gravel beds of San Gabriel Basin, from the lower end of which Long Beach derives its water supply.

(71) City of Monrovia

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of City of Pasadena

Against Application 4014 of the Rubio Canon Land & Water Association and Las Flores Water Company  
 Applications 4534 and 5290 of the City of Alhambra  
 Application 4590 of City of Long Beach  
 Application 4604 of the City of Monrovia  
 Application 4860 of the City of Compton

Will result in an eventual depletion of the underground waters in the upper reaches of the main basin of the San Gabriel Valley.

(72) City of Pasadena

Against Application 4014 of Rubio Canon Land and water Association and Las Flores Water Company  
 Application 4049 of the City of Monrovia  
 Applications 4534 and 5290 of the City of Alhambra  
 Application 4582 of the Glendora Consolidated Mutual Irrigating Company  
 Application 4590 of the City of Long Beach  
 Application 4604 of the City of Whittier  
 Application 4860 of the City of Compton

As protestant has prior applications for water from the same source, injury will result to the protestant from the granting of such

inconsistent subsequent applications to the extent of the inconsistency.

(73) Roger P. Dalton

Against Applications 3328, 3329, 3330, 3331, 3741, 4447 and 4448 of the City of Pasadena

Against Application 4014 of Rubio Canon Land & Water Association and  
Los Flores Water Company  
Application 4049 of the City of Monrovia  
Applications 4534 and 5290 of City of Alhambra  
Application 4582 of Glendora Consolidated Mutual Irrigating  
Company  
Application 4590 of the City of Long Beach  
Application 4860 of the City of Compton

Any undue draft on the waters of the San Gabriel River would mitigate detrimentally to and prejudice the values of his properties in that the underground waters from which he derives his supply would be diminished as the underground basin is dependent on the yearly floods of the river for its replenishment.

TABLE 3

TABLE SHOWING PROTESTANTS AND PROTESTED APPLICATIONS

	3320	3329	3330	3331	3741	4014	4049	4447	4448	4534	4532	4590	4604	4960	5290	5399
San Gabriel Protective Association and Water Rights Association of San Gabriel Valley	x	x	x	x	x			x	x							
Southern California Edison Company	x	x	x	x	x	x		x	x		x	x	x	x		
City of Monrovia	x	x	x	x	x	x		x	x	x		x	x	x	x	x
City of Alhambra	x	x	x	x	x			x	x							x
Valencia Water Company, Corporation	x	x		x												
Arroyo Ditch Company, et al	x	x	x	x	x			x	x	x	x	x	x	x	x	x
La Puente Cooperative Water Company, et al	x	x	x	x	x			x	x	x	x	x	x	x	x	x
Azusa Irrigation Company, et al	x	x	x	x	x			x	x	x	x	x	x	x	x	x
City of Long Beach	x	x	x	x	x	x	x	x	x	x	x					x
Roger P. Dalton	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
City of Pasadena								x	x		x	x	x	x	x	x

(74) Protests Presented Through Medium of Transcript

At the hearing held at Los Angeles on November 14th and 15, 1927 the Arroyo Ditch and Water Company, et al, La Fuente Cooperative Water Company, et al, The Azusa Irrigating Company, et al, the San Gabriel Mission Water District, the City of Alhambra, City of San Gabriel, San Gabriel County Water District, Sunnyslope Water Company, Rosemead District and Unincorporated Territory and City of Alhambra as trustee for the San Gabriel Mission Water District for the City of San Gabriel, et al, the City of Long Beach and the City of Monrovia submitted general protests the substance of which are as follows:

- (1) The Division of Water Rights has no jurisdiction in the matter of any applications, filings or requests for the allocation of or distribution of the waters of the San Gabriel River and any such attempt on its part would be unconstitutional and would constitute an attempt to take or damage property without due process of law.
- (2) There are not and will not be any unappropriated waters of the San Gabriel River as those who own lands riparian to the stream or overlie the waterplane in contact therewith, or fed by the same, or who have acquired and now have the right to take the same by appropriation or prescription have the vested rights in the whole of the waters of the San Gabriel River and the needs of such do and will greatly exceed the total flow of the stream both surface and subterranean.
- (3) Legal proceedings are pending and undetermined relative to the building of the so-called "San Gabriel Dam" by the Los Angeles County Flood Control District, which makes the question of the amount of water that may be stored behind such dam uncertain until a final adjudication of said matter.

## SECTION IV.

PHYSICAL DESCRIPTION OF SAN GABRIEL BASIN

(75) San Gabriel Basin has three main subdivisions:

- (1) San Gabriel range of mountains in which originate most of the streams which traverse San Gabriel Valley. The slopes of these mountains are precipitous and this fact is a factor in the sudden violent floods which are characteristic of the winter discharge of the streams.
- (2) San Gabriel Valley, lying immediately below the mountains and bounded on all sides by hills or mountains. At two places, Arroyo Seco and Whittier Narrows or Paso de Bartolo, the streams from the mountains have cut through the range of hills which bound the Valley on the south and reach the Coastal Plain. By far the largest share of the water passes through Whittier Narrows. At Monterey Park Pass a small amount of the runoff from the valley floor passes through the hills.
- (3) Coastal Plain, below San Gabriel Valley and separated from it by the range of hills just noted. While the name is given to all the territory between the above noted range of hills and the ocean, yet geologically the only part of the area which can be truly called coastal plain is that between the ocean and the Signal-Dominguez range of hills which are close to the ocean and which parallel the hills separating San Gabriel Valley from the lower areas. Above this outer range, the area involved, while flat and characterless as to topography, is an intermediate detrital filled valley similar geologically to San Gabriel Valley but with less complexity of geology. This is supplied in part by water from San Gabriel mountains which flows through the passes



above mentioned and is drained by similar passes through Signal-Dominguez Hills. The true coastal plain is limited in area and lies south of these hills. From it water drains directly into the ocean either on or below the surface.

(76) The foregoing describes in brief the broader physical features of San Gabriel Valley. These are of profound importance on the hydrology of the valley which is described in succeeding sections. There are certain physical features of the basin which can be discussed most intelligently in connection with the hydrology and these are brought out in what follows.

(77) San Gabriel Valley is filled to unknown depths by detritus from the hills and mountains washed down by the sudden and violent floods of the winter season. The soil texture is coarse near the mountains particularly, and water, whether from the mountains in the form of stream flow or from the rain which falls on the valley floor, readily sinks into it and becomes a part of the underground water supply from the reservoir of which the majority of the water supplies of the region are drawn by means of pumps. During the larger part of the year water flows from the mountain canyons in small streams which either sink into the stream bed almost immediately or are diverted for use in the vicinity of the canyon. The flow of the tributaries only in the larger floods and then for short periods of time, maintains itself across the valley fill to the Narrows. San Gabriel River itself which supplies 76% of the mountain runoff maintains a stream from the mountains to the ocean for much longer periods.

(78) The underground formations of San Gabriel Valley as compared to the Coastal Plain are complex. It is not one simple basin but around the rim are several minor basins caused by dikes or faults, by unconformity in the alluvial strata due perhaps to being laid down in different geological ages, or by the existence of bedrock at a comparatively

close distance to the surface. The effect of these is one and the same-- the water plane in these minor basins is held much higher than in the central basin and water is impeded in its passage through or from the minor basins. This makes these subbasins valuable in regulating the water supply of Main Basin because from them there moves underground a supply of water at a comparatively uniform rate. The minor or subbasins are Raymond, Canyon, Glendora, San Dimas and San Jose. The last is not important in the present case as it is entirely separated from the remainder of the Valley.

(79) These minor basins occur around the periphery of Main Basin and are supplied with water in part by percolation from the tributaries, the flow of which except in the larger floods is entirely absorbed before crossing the margin of the basin. Only Raymond Basin has a line of demarcation from the Main Basin which is visible on the surface. Main Basin occupies the entire central part of San Gabriel Valley and across it San Gabriel river flows southwest from the mountains to Whittier Narrows and thence to the sea. The river divides in two half way across the valley and each distributary thence pursues its independent way into the ocean. This is not important to this discussion. The stream follows the broad fiat trough of the valley, the surface sloping upward from it on both east and west toward the minor basins. The slope of the water plane is in the same direction as that of the ground but is less steep. This upward slope of the water plane on both east and west confines water which percolates from the river and prevents it from travelling eastward and westward away from the central part of Main Basin. In this central part of Main Basin, deposition of detritus has been acimated by San Gabriel River and because of the comparatively large flows from the river the central area from the mountains to the Narrows has been kept comparatively

free from fine material. The limits of influence of San Gabriel River coincide closely with the limit of the finer materials which have been laid down on each side by the tributaries, leading to the belief that during the major part of the time during which the fill has been forming, to the usual depth of well drilling at least, San Gabriel River was dominant in the same areas as it now is and that its domination has extended very little out of that area. In short its cone is well defined down the central part of the valley and the part dominated by it is here called Central Main Basin, and is differentiated in this way from East Main Basin and West Main Basin lying on either side of the central part. The underground supplies of these latter are not fed by percolation from San Gabriel River but from local rainfall, inflow from the minor basins and return flow from irrigation.

(80) In building up its cone, a stream of the character under discussion flows in different channels at different times and deposits the material in such a way that there exists all through the cone, underground channels of more open material in the direction of the flow. The result is that water moves underground through such a cone more rapidly and freely in the direction of the flow of the stream which has formed it than it moves in a direction transverse to the course of the stream. In the present case it means that water which reaches the water plane in the cone of San Gabriel River will move more rapidly toward the Narrows along these old buried channels than it will move to the sides. This has a far reaching result in the hydrology as it tends to make Central Main Basin less efficient in holding water back than are other parts of the basin.

(81) Practically all the underground water in Main Basin converges at Whittier Narrows. Because of the range of barrier hills which here exists and through which the surface stream has cut its way, and because the passage way underground is too small for the amount of water which must move

through the Narrows the water is here forced to the surface, causing a perennial stream which varies in amount with elevation of water plane in the Central Main Basin of San Gabriel Valley. It is to be presumed that the underground flow is constant but the surface flow has an annual variation as well as a variation over a long period of years which may be called a "cyclic" variation.

(82) Thus there exists in San Gabriel Valley a group of reservoirs underground, the hydraulic function of each being to hold back the water which percolates into it and feed it slowly to the next reservoir below. Each of the minor basins is a reservoir which feeds underground to Main Basin and the Narrows forms a spillway over which water escapes from Main Basin equated to a fairly uniform flow, to the Coastal Plain. There is only this difference between the outflow at the Narrows and the outflow from any minor basin to Main Basin, that the amount of water reaching the Narrows is so much greater, proportionate to the area through which it must flow, than the water passing from the minor basins that at the Narrows it is forced to the surface. The underground flow from the minor basins is believed to change with elevation of waterplane above in the same way that the flow through the Narrows changes, although in less degree.

(83) The water which rises at the Narrows is diverted by various companies but out of irrigation season it all sinks into the ground again below the Narrows unless the flow is so great in amount that a stream is sustained across the percolating area noted in the next sentence. Below the Narrows for about 4 miles on San Gabriel and 6 miles on the Hondo there is a percolating area in the stream channels and the underground reservoir at this point is a forebay for the series of artesian strata which exist over most of the Coastal Plain from approximately the point of last percolation mentioned above southward to the barrier formed by Signal-Dominguez hills.

(84) Percolation downstream from this percolating area is practically negligible and none of it is believed to reach the artesian strata from which the water supplies of the Coastal Plain are drawn. The surface water plane is here ten feet or less below the surface and large losses may occur from evaporation.

(85) At the barrier of the Signal-Dominguez hills a small amount of water is flowing on the surface in both streams. It is believed that water also escapes beneath the surface and that it may find its way into the ocean underground.

(86) The situation may be again briefly summarized as follows: In San Gabriel Valley there exists several small underground reservoirs which equate the water which has percolated from the tributaries and from rainfall on the margin of the valley floor to Main Basin. Main Basin absorbs and equates the percolation from the river, from rainfall and also from such tributary streams as have passed the limits of the minor basins. This is then delivered through the narrows to the Coastal Plain and such as is not used in the Coastal Plain is lost into the ocean or dissipated by evaporation from the land surface. There is no essential difference in the processes which take place in each basin but the one great difference in results is that water which flows out of the Coastal Plain into the ocean and the water which is evaporated from the seeped lands cannot be again used and is lost.

(87) These same conditions undoubtedly have existed for past ages. Records obtained late in the last century show that the minor basins were then more fully charged than now and that the major basins, Central San Gabriel Valley (Main Basin) and Coastal Plain, were also more fully charged. Consequently there must have been a greater underground flow than now exists from each basin or reservoir to the one below.

(88) This outward underflow probably did not fluctuate rapidly but the input from stream flow and rainfall had a wide annual variation then as now. Consequently the water plane must have been in a constant state of fluctuation just as it now is. Over any long period of years in which rainfall had been average, however much it varied from average in any individual year, the outflow underground over or through the barrier must have equalled the percolating water which reached the underground reservoir whether from stream flow or direct rainfall, and a state of equilibrium existed. When cultivation began there was added to the natural underground outflow or draft on any basin, the draft due to irrigation demand. As the reservoir could not sustain a draft greater than the input, a new state of equilibrium was brought about by a lowering of the water plane to a level at which the underground outflow would be reduced by the same amount as the draft which had been added by pumping for irrigation. Such adjustment is still in progress. In this there is a matter of importance to the water supply of Main Basin and Coastal Plain. The supply to underground waters of the Main Basin by percolation from the river and other streams which cross it has a very wide annual and cyclic variation, the supply by percolation from rainfall on the valley floor also has wide variation but possibly less in amount than that from stream flow because the variation of rainfall is less than the variation of stream flow. The supply to the underground waters of Main Basin from the minor basins is presumably more constant and steady than either of the former two. Its amount must be less when the minor basins are depleted than when they are full. As development has gone on in the minor basins it has lowered the water plane and decreased the underflow from them. Thus the Main Basin is in process of losing or has lost its most valuable, because most regular, supply which enters the Basin at the furthest possible distance from

the Narrows. To take the place of this it is supplied with a greater amount of the more spasmodic percolation from streams and rain. It is to be expected therefore that a recurrence of the same precipitation as has occurred in the past 22 years would give more irregularity in the elevation of groundwater than actually did exist and that rising water at Whittier Narrows would also show this irregularity.

(89) Thus the increase in use by man in the minor basins in San Gabriel Valley has caused a decrease in equated outflow to Main Basin, this decrease of equated flow to Main Basin together with the pumping draft on that basin, has caused a decrease in rising water at the narrows. The decrease in rising water at the narrows together with pumping in the Coastal Plain has decreased the waste which is taking place from the Coastal Plain into the ocean and perhaps also the waste by evaporation from the seeped lands of the Coastal Plain.

(90) All of this has been accompanied by a general lowering of the water plane. As may be inferred from the foregoing, a general lowering of the water plane is not prima facie evidence that the underground reservoir is overdrawn, it may mean only that the water plane is being drawn low enough so that waste of water is reduced or will be stopped entirely and that the water which formerly wasted underground is now being beneficially used.

(91) While, so far as an individual basin is concerned, any water which escapes underground is wasted, yet this waste is useful to the next lower basin and so on, and therefore, as to the entire San Gabriel basin, it is only the waste from the underground water of the Coastal Plain into the ocean, which is lost irrevocably.

(92) Summarizing the foregoing: Accompanying the gradual increase of use for irrigation and domestic supply in San Gabriel Basin there has been a lowering of the water plane which has reduced underground waste, for which

use by irrigation has been substituted. A lowered water plane therefore does not necessarily indicate overdraft, it may merely indicate a new state of equilibrium caused by change in method of draft.

(93) It is evident from the above that in arriving at a conclusion as to overdraft in any basin it is not sufficient merely to study the lowering of the water plane but it is necessary also to have data on input and output and arrive at a conclusion from a balancing of these two. Lowering of water plane is only one item of a number necessary before a conclusion can be reached.

(94) There remains to briefly state the underground storage possibilities of San Gabriel Basin and to describe the meteorology and consequent runoff regime of the region with comment on the methods of which water is disposed of.

(95) The earliest wide spread examination of the underground reservoir was made in 1902-1904 by Mendenhall for the United States Geological Survey. Since then depths to water at certain wells have been observed consistently by the Geological Survey. In 1914 a series of observations by Willis Jones was made at wells in parts of San Gabriel Valley. In 1922 the Division of Engineering and Irrigation, Department of Public Works, State of California made a general investigation of the underground reservoirs throughout Southern California. This included both San Gabriel Valley and Coastal Plain. In 1923 the Division of Water Rights, Department of Public Works, State of California, started an investigation of San Gabriel Basin which included well measurements over the entire Valley and Coastal Plain. This is still in progress.

(96) All these data have been summarized in Bulletin 5, Division of Water Rights. It is from these unusually complete data that knowledge of the fluctuation of the water plane with progress of the cycle of precipita-



tion changes has come. These measurements also show a lowering of the water level plane or water pressure plane in practically the entire basin over the 22 year period.

(97) Before going further the above expressions "water level plane" and "water pressure plane" should be explained. In parts of San Gabriel Basin the detrital mass is stratified with layers of impervious material alternating with pervious material. These impervious strata may extend over large areas and be continuous. When a well is drilled to one of the pervious layers, water will rise in the well until it reaches the level induced by the level of water plane in the fountain head or forebay which supplies it. The level thus induced is the resultant of the head or elevation of the water in the forebay reduced by such forces as may use up its energy between the well and the forebay. If there is movement of the water through the pervious strata or aquifer, the water level at the well will not rise to the same elevation as that at the forebay because part of the pressure or energy created by the head of water in the forebay will be lost in the friction created by the movement of the water. If there is no movement the two will stand at the same level. If the well is pumped or allowed to flow, movement is created in the aquifer and the water in the well cannot rise to the same elevation as the water in the forebay. If additional wells are drilled and water used therefrom, the rate of movement through the aquifer is increased, friction is increased and there is a decreased pressure at each well. An apt analogy is a city water main. The pressure is reduced as more taps are opened but the main is just as full of water when all are open as when all are closed.

(98) It is apparent therefore that a lowering of pressure level at an artesian well does not mean a reduction in underground storage at that point. It merely means that the forebay which supplies the artesian aquifer

is being drawn on more rapidly than before, inasmuch as a decrease in pressure level indicates more rapid travel of water away from the forebay.

(99) It is the changes of water level at the forebay only which indicate change in storage.

(100) Where there are no continuous impervious strata, change of water level as measured by wells in that area indicate change of storage at that immediate point.

(101) Non artesian and artesian conditions gradually merge one into the other over the alluvial areas of the Basin. The Coastal Plain is predominantly artesian and therefore except at the forebays of the artesian strata, change in elevation of the level at wells indicates nothing as to change of storage. Except at these forebays, which so far as San Gabriel water is concerned, is believed to be limited to a small area just below Whittier Narrows, there is no opportunity for underground storage and even here at the lowest point ever recorded, the water plane is not more than 40 feet below the surface at the deepest point and becomes shallower than this up and downstream.

(102) In the discussion in Paragraph 92 it was shown that average water levels might lower as pumping for irrigation increased and yet that this change might mean only a decrease of waste from a basin and not an actual overdraft on the basin. It was also noted that other information was necessary before it could be determined whether there were an overdraft. This discussion was meant to apply to an area or basin in which the material was open and porous and in which impervious strata which might cause artesian conditions did not exist. The determination of condition of overdraft is difficult even in such an area. When, however, the lowering of the wells is caused only by a lowering of pressure in an artesian strata as is the case over most of the Coastal Plain, this lowering becomes even

less an index of actual depletion. And as may be noted now, the matter is further complicated by the fact that periods of drought in Southern California may last for many years in succession and during such periods or during any one year of subnormal precipitation the water plane and pressure plane will lower without indicating anything except that water levels do lower in periods of subnormal precipitation.

(103) In San Gabriel Valley there are large opportunities for underground storage in Main Basin at some distance from the Narrows and also in all the minor basins except San Jose Valley. The water plane is at the surface at the Narrows but the depth to water is as much as 200-300 feet at the boundary of Main Basin and varies from nothing to 200 feet or more in the minor basins. San Gabriel Valley has much less artesian area comparatively than the Coastal Plain and especially is this true in the Central Main Basin.

(104) There exists therefore this condition: Additional water can be stored underground in large quantity only in San Gabriel Valley and there, only in those parts distant from Whittier Narrows. If more than can be immediately used goes into the Coastal Plain it must be lost after the small opportunities for its storage are filled. All areas in San Gabriel Valley are not equally efficient in storing surplus waters for any long period because differences in porosity mean differences in rate of speed at which water travels underground. Central Main Basin has the greatest porosity of any part of San Gabriel Valley and because San Gabriel River flows directly from the mountains to the Narrows there exist certain more pervious underground channels approximately paralleling the present direction of the river and formed as an incident to the building up of the cone. Through these, water moves more directly and rapidly toward the Narrows than it moves laterally across the direction of the ancient underground channels. Furthermore there exist no barriers such as divide the

minor basins from Main Basin and hence no retardation of the flow such as occurs to water seeking its way from the minor basins to Main Basin.

(105) As to the general physical situation it remains to describe Raymond Basin and the unique situation which exists in its western end. Raymond Basin may be separated into two, Santa Anita on the east and Pasadena Basin on the west. Pasadena Basin is again separated into Monk Hill Basin on the north and Lower Basin on the south. About 35 percent of Pasadena Basin drains to Arroyo Seco which has cut its own pass through the southern range of hills and the surface waters of which join San Gabriel River water after having flowed into Los Angeles River. The unique situation exists in this: While the surface stream flows southerly through its own pass, the water which percolates into the underground basin as far south as Colorado Street is cut off from southerly travel in the same direction as the surface stream by two dikes, the upper of which is called Monk Hill Dike and the lower Sheep Corral Dike. By them it is deflected southeastward so that its flow is toward Whittier Narrows, at which point unless abstracted by pumps it eventually arrives. Water south of Sheep Corral Dike and flowing underground in the direction of the surface stream is obstructed by the bedrock of the hills which form the southern boundary of San Gabriel Valley and rises to the surface with very little probable underflow. At this point pumps of the City of South Pasadena are located and the water is pumped to or toward the general underground basin which drains toward Whittier Narrows. The entire area of the valley floor draining to Arroyo Seco below Sheep Corral Springs or Dike and above the dike at which South Pasadena pumps, comprises 600 acres approximately. Most of the area of Pasadena Basin drains toward Whittier Narrows on the surface and all of it with the exception of about 600 acres as above noted overlies a waterplane which flows toward Whittier Narrows.

(106) Briefly summarized there exists the following situation as to the hydrology of San Gabriel Basin: San Gabriel Valley consists of a central underground reservoir with five minor underground reservoirs around its periphery which regulate the underground water which flows from them to the central reservoir. The central reservoir is so full that it overflows and delivers water to the Coastal Plain on the surface. The Coastal Plain is another underground reservoir. From this in turn the flow of underground water is regulated to the ocean. There exists at the present time practically no unused underground capacity in the Coastal Plain. In other words ground water is near the surface and if water arrives at the Coastal Plain through Whittier Narrows faster than it can be utilized immediately it cannot be stored for the future in any large amount but must waste either directly or indirectly into the ocean. On the other hand there is large storage capacity in San Gabriel Valley. In other words the water plane at some distance from the Narrows is from 100 to 300 feet below the ground surface and water stored in any part of the underground basin of San Gabriel Valley except the 600 acres in Lower Pasadena Basin will naturally gravitate to Whittier Narrows. Water stored under this 600 acres is being directed toward Whittier Narrows by artificial means. Water travels at different rates through the underground strata toward the Narrows. The fastest rate is believed to be in the direction of the river from Foothill Boulevard to the Narrows, the slowest from the outlying margin on the west and east between which and the Narrows there exist underground formations which impede the movement.

(107) The spillway of the central reservoir is Whittier Narrows. As the water plane in the middle of Main Basin rises the water rising at the Narrows increases until it becomes greater than can be immediately used in the Coastal Plain and water is therefore wasted--in other words the

central reservoir becomes less efficient as the water plane rises because the comparatively greater porosity of the detrital cone in the center of the central basin allows so rapid a movement of the water to the Narrows.

(108) There remains to mention the characteristics of the stream flows of the region. Precipitation is confined to the winter time. Within a few hours after a heavy rain begins violent floods emerge from the precipitous mountain canyons and then rapidly recede. Diversions from the stream during these floods is impossible and in fact diversions are attempted only after the stream has fallen to a comparatively low flow. After the last flood has passed, the size of the stream gradually diminishes throughout the summer. Diversions are made only at the mouths of the canyons.

(109) At the Narrows is a perennial stream originating in the groundwater of the valley which is supplied in part by the percolation from each stream and in part by rainfall on the Valley. Except during times of violent floods and for a period thereafter, the flow at the Narrows has no connection with or relation to the flow from the mountains at that particular time. It is only in occasional years that the irrigation season begins before the flow from the mountains has so decreased that it is not large enough to go across the valley fill to the Narrows, hence there is little of the time that the ditches at the Narrows have opportunity to take water from the mountains and even at such times as opportunity exists, rising water is at its maximum, and is approximately sufficient for the needs of canals at the Narrows without recourse to the water from the mountains.

(110) The foregoing has briefly described the salient features of the region which have an influence on its hydrology. Knowledge of these is derived from the present and past investigations and have been set out to clearly define the characteristics of the Basin without recourse to figures

on water supply, etc. In following pages is given a numerical exposition of the findings of the investigation but before this is taken up it seems well to discuss the legal principles involved in the present controversy particularly those laid down by the courts.

SECTION V.LEGAL PRINCIPLESUnderground Waters

(111) The physical situation has been outlined in preceding pages but it may be here very briefly recapitulated. San Gabriel River debouches from a mountain watershed out of a narrow canyon into a broad valley or basin, through which the river flows on the surface during a portion of the year and out of which the river empties in a narrow pass onto a broad coastal plain which is shut off from the ocean by a low range of hills through which the river passes and then flows a short distance into the ocean.

(112) Applicants before the Division of Water Rights desire to store in the mountains and divert from the river above the canyon mouth, to which users below object.

(113) The objections of those whose lands overlie the underground waters of the San Gabriel Valley or basin and pump therefrom will first be considered. These protestants claim that the San Gabriel River is the main source from which the basin out of which they pump is supplied and that the overlying owners will be injured both as to present and future use if any portion of the river is diverted away and thus prevented from flowing down into the valley and percolating underground into San Gabriel valley catchment basin.

(114) Probably the nearest case to the instant problem in point of fact and parties plaintiff and defendant which is reported in the decisions of the courts of California is that of Miller v. Bay Cities Water Company, 157 Cal. 256. That case involved the Coyote River which flows out of a large mountain watershed through Upper Gorge into upper Santa



Clara Valley ("Coyote" Valley) and thence about eight miles along the eastern edge of said valley to and through Lower Gorge and out into and through the main Santa Clara Valley to San Jose and San Francisco Bay.

(115) That portion of Santa Clara Valley through which Coyote River flows from Upper to Lower Gorge is a narrow detritus filled valley of almost uniform width. The river flows over, into and through the gravels of this valley to Lower Gorge. Lower Gorge is only about 400 yards wide and is filled by gravel which extends to bed rock a depth varying from 35 to 165 feet. Taking out of the Lower Gorge and the enormous bed of gravel which extends out of and for several miles below Lower Gorge, are numerous subterranean gravel channels which form a net work under the Santa Clara Valley. The plaintiff irrigated his lands about four miles below Lower Gorge from a well which penetrated a stratum of clay and tapped one of these gravel channels.

(116) Defendant water company had installed pumps and driven tunnels at Lower Gorge for the extraction of water, was planning to sink a dam or barrier through the gravels to bed rock at Lower Gorge, and was threatening to divert from the river above and below Upper Gorge and to carry said waters out of the watershed to San Francisco.

(117) The trial court found that if defendants extracted no more water than the pumps then installed would handle, that the water plane in the gravels would be lowered below the intake of plaintiff's gravel stratum and that defendants proposed diversions would deprive plaintiff of water. The trial court granted the plaintiff an injunction and upon appeal the judgment of the trial court was affirmed.

(118) Defendant contended upon appeal that it should not be enjoined from diverting flood waters which rushed in great volumes and velocity down the channel and out of Lower Gorge and on to San Francisco Bay and were wasted and lost therein.

(119) The trial court found that the waters ordinarily flowing through the gravels of Lower Gorge were not adequate to keep the subterranean gravel channels of the main valley full, that even as supplemented by the waters forced down into these channels by the weight and pressure of flood flows these channels had not been filled to capacity since a season of unusual rains in the years 1861 and 1862, and that hence the flood flows could not be said to constitute waste or surplus waters insofar as plaintiff was concerned.

(120) Clearly the basis of this decision was that any diversions by defendant either of surface or sub-surface flows of the river, whether in flood season or not, would deprive plaintiff of water necessary for the supply of the subterranean gravel channel from which he pumped in the valley below. Hence defendant was enjoined from initiating a right by appropriation which would deprive plaintiff of water used by him.

(121) While there are important differences in physical conditions involved in this case and the case under consideration, it is applicable to the instant case insofar as to establish that the pumpers from San Gabriel Basin have a right to protection from appropriations by storage or otherwise from the San Gabriel Canyon which will injure their water supply. In other words this case is more apropos to establish the right of said pumpers in the source of their supply even though they are not riparian owners, than are other cases because this is the only case in the reports of this state wherein a non-riparian well owner in a valley has sued and enjoined an appropriator from a stream which flows into the valley. But only in this circumstance is this case found to be more in point than such cases :

McClintock v. Hudson, 141 Cal. 275  
Cohen v. La Canada W. Co., 142 Cal. 437  
Hudson v. Dailey, 156 Cal. 617

In McClintock v. Hudson, plaintiff as a riparian owner on the stream was declared entitled to prevent defendant from intercepting percolations on their way to the stream. Thus the riparian right was held to extend beyond the stream and to protection of the source of its supply. In Cohen v. La Canada W. Co. plaintiff riparian was held entitled to prevent a taking from springs tributary to a stream. Defendant had driven tunnels near said springs. Thus again the riparian right was held entitled to protection of its source even though the stream itself was not tampered with. In Hudson v. Dailey, non riparian pumpers were not enjoined because the riparian owner on the stream below the valley failed to prove that defendants were using more than their reasonable share from the common source of supply. And in these cases and others which might be cited such as Katz v. Walkinshaw, 141 Cal. 116, Newport v. Temescal W. Co., 149 Cal. 531, Burr v. Macley Rancho Co., 154 Cal. 428, for instance, is found the doctrine of rights in a common source of supply. Briefly the water right of a plaintiff is entitled to protection against injury by diversion which would deplete the supply which reaches him, it being immaterial by what means or methods or indirection a defendant is unlawfully depleting that supply to the injury of a plaintiff.

(122) The case of Hudson v. Dailey is especially noteworthy in that it establishes the law relative to the rights of overlying owners as against riparian owners on a stream which empties into a broad valley filled with detritus and then rises again at a narrows and flows out of the valley. While the court held that owners of land overlying the underground reservoir or basin filled with gravels and water were not riparian to the stream from which the valley gravels received their water supply, yet it held that the river and underground reservoir comprised a common source of supply in which such overlying owners and riparians were each entitled to a reasonable share as against each other and among themselves.

(123) Cases heretofore cited definitely establish the fact that overlying owners who pump from a basin supplied from stream percolations are not by that fact riparian to the stream (Hudson v. Dailey and Miller v. Bay Cities Water Co.) It is also definitely established by cases heretofore cited that owners overlying an underground basin have only the right to enjoin a diversion out of the basin by another pumper which either injures a present use or threatens permanent depletion of the basin. Also a declaratory injunction will issue to protect a future use. But diversion out of the basin is allowable to the extent that it does not materially injure a present use or permanently impair the source of supply, or until a future time when overlying owners need all the supply.

(124) It thus being established that an overlying owner pumping from an underground basin has not absolute right to enjoin a diversion by pumping out of the valley gravels to another watershed, it seems to follow that neither has such an owner an absolute right to enjoin a diversion from a stream which flows into the valley. Injunctions to such owners are granted only to protect them against actual injury either to their source of supply or to their present use and prospective inadequacy of supply when future overlying uses are made will not prevail further than to secure a declaratory injunction which permits exportation by pumping from the basin until the overlying user needs additional water for use within the valley and is faced with injury unless the exportation is stopped or decreased.

(125) The cases referred to have thus established a doctrine relative to the use of underground waters which is calculated to allow the greatest beneficial utilization possible and it is thought that a logical and proper application of that doctrine would deny to underground users in a valley the right to absolutely enjoin appropriations from a stream supply-

ing the basin. Applying the reason of the rule as to injunctions against exportation from a basin to appropriations from a stream supplying the basin, such appropriations should be allowed to the extent that they occasion no depletion of the vested rights of the overlying users. An injunction would therefore be denied in case of no present or prospective injury and in case of prospective injury a declaratory injunction should issue.

(126) Protestants against the applications under consideration urge Miller v. Bay Cities Water Company, supra, as a parallel case. The cases though similar are not parallel, the great difference in fact being that in this case storage reservoirs in the mountains will control the floods which are useful in facilitating percolations into San Gabriel Basin and a substitution of artificial conditions can be made to bring about all percolation which would naturally occur. In other words the great factor of difference between the Miller case and the present case is that herein a detailed and elaborate engineering investigation over a period of five years, conducted by the State Division of Water Rights and costing about \$105,000 has been undertaken and the facts as to percolation under existing conditions have been ascertained. The question is now that of issuing permits which will enable the beneficial use by applicants of the flood flows which have heretofore wasted into the ocean and under such conditions and restrictions as will not deprive the protestants of any waters which they have heretofore received by percolation from these floods and caused by these floods. Briefly the public welfare involved in the maximum utilization of the water resources of this state is not to be denied in such a case as the present. Herein, without injury to the rights of protestants, applicants propose to use waters which are at present useful only as they by covering a larger area of wash, assist percolation

of other waters. If these waters can be taken by applicants and applied to beneficial use and artificial regulations of flow made which will result in protestants securing all the water they can secure under existing conditions, there is no injury to protestants and there is a great benefit to applicants. As has been many times declared in the opinions of our courts, the maximum utilization of the waters of this state is vital to its progress and development and is demanded by the public welfare.

(Pabst v. Finmand, 190 Cal. 124, 135; Antioch v. Williams, 188 Cal. 451, 460, 461, 462; Northern Calif. Power Co. v. Flood, 186 Cal. 301, 305, 306; Lindblom v. Round Valley W. Co. 178 Cal. 450, 456; E. C. Horst Co. v. New Blue Pt. Min. Co., 177 Cal. 631, 637; Gallatin v. Corning Irr. Co. 163 Cal. 405, 412, 413; San Joaquin etc. Co. v. Fresno Flume Co., 158 Cal. 626, 628, 629, Smith v. Hawkins, 110 Cal. 122, 127)

If then permits can be issued to applicants containing restrictions and conditions of use by them which will guarantee to protestants in their character of users overlying the basin fed in part by San Gabriel River all the water they can secure under existing and established conditions of stream flow, a beneficial use to applicants is secured, no injury to protestants is done, and the public welfare is promoted by a utilization of waters which otherwise waste into the ocean without real or substantial use thereof.

(127) So far as this decision is concerned one of the objects of the Division's investigation has been to determine if any waters are available for appropriation and, if so, under what conditions they can be taken without injury to the water supply. There are certain pointed indications in decisions heretofore rendered as to the attitude of the courts in this connection. Reference is made to Montecito etc. Co. v. Santa Barbara, 144 Cal. 578; and same case 151 Cal. 377; Pomona etc. Co. v. San Antonio etc. Co., 152 Cal. 618; and Wiggins v. Mascupiabe L. & W. Co., 133 Cal. 182.

(128) In Wiggins v. Muscupiabe Co., the company, an upper riparian owner, was permitted to install a pipe line in lieu of the natural channel, convey the lower riparian's water to him through the pipe line, and itself use the waters saved thereby from evaporation and seepage. This salvage of water was permitted over the objections of the lower riparian owner who was plaintiff. Here then is a case wherein a riparian owner was denied the right to have his water delivered by means of the natural channel and in lieu thereof an artificial method and means of delivery was substituted. The consideration uppermost in the minds of the court in this case was that plaintiff was given all the water he was entitled to through the pipe and did not get any less water than he would have gotten through the natural channel. Said the court;

"The plaintiff could under no circumstances be entitled to the use of more water than would reach his land by the natural flow of the stream, and, if he receives this flow upon his land, it is immaterial to him whether it is received by means of the natural course of the stream or by artificial means. On the other hand, if the defendant is enabled by artificial means to give to the plaintiff all of the water he is entitled to receive, no reason can be assigned why it should not be permitted to divert from the stream where it enters its land and preserve and utilize the one hundred inches which would otherwise be lost by absorption and evaporation."

(129) The reasoning of the court in the case just quoted from is just as applicable to the instant problem. What detriment is it to the rights of pumpers from San Gabriel Basin if there is supplied to their pumps all the water that can reach them by existing and established conditions?

(130) In general, decisions have been that any waters salvaged belong to the entity making the salvage so long as a means is found to protect other users in their rights. This is manifestly reasonable and in accordance with public welfare, otherwise no salvage would be made. Further support of this principle is found in the following cases.

(131) In Pomona etc. Co. v. San Antonio etc. Co., supra, plaintiff and defendant by agreement were dividing the waters of the stream at a dam. Defendant owned the lands through which the stream flowed to the dam and having ascertained losses occurring in the channel substituted a pipe line through his lands and to the dam. Defendant was taking the waters so saved from channel loss and also waters developed by him in the creek bed from gravels therein. Said the court:

"It may not successfully be disputed that if, in fact, all the water to which plaintiffs were entitled was the one half of the natural flow of the stream as it reached the division dam, and that if in fact they receive this water, then the nineteen, or any other percentage, which was saved by the economical method of impounding the water above, and the twenty-five inches, more or less, which were rescued as developed water from the bed of the stream, were essentially new waters, the right to use and distribute which belonged to defendant. This principle has been enunciated by this court as early as Butte Company v. Vaughn, 11 Cal. 143, and has been reaffirmed, however varying the forms may have been, whenever it has been presented".

(132) The court commented on Wiggins v. Muscupiabe Company quoted from that case as we have already done and said that "this same doctrine is recognized by all the courts which have been called upon to consider it", citing cases and authorities. Further said the court relative to the pipe line substituted for the channel of the creek:

"All this may be quite true, and yet afford no argument to support plaintiffs' claim to this water, nor yet any reason why there should be a return to the old system of diversion. It might be that it required a thousand inches of water to fill the voids and to support a surface flow of fifty inches. Yet, as in the Muscupiabe case, if the owner of the fifty inches received that amount of water, he could not assert any title to the thousand inches of water which, BY A CHANGE IN THE MODE OF DELIVERY, NOT TO HIS INJURY WAS PRESERVED FROM WASTE. So here, if plaintiffs get the one half of the natural flow to which they are entitled delivered, unimpaired in quantity and quality, through a pipe line, they are not injured by the fact that OTHER WATER, WHICH WOULD GO TO WASTE, AS MERELY SUPPORTING THE SURFACE FLOW, was rescued. Nor can they lay claim to any of the water so saved."



(133) There is no distinction between a right to water to support other water which so supported is enabled to reach a party and a right to a flood flow to press underground other water which therefore reaches a party's well. In the one case the supporting water is useful only in rendering other water available, and just so, the flood flow in the other case is only useful in rendering other water available. If the supporting water may be taken for use by some one else when another means of conveyance is substituted, there is no reason why the flood flow may not likewise be taken for use by some one else if a substitution is made which will render water available as formerly to the pumper from the underground water.

(134) The case being discussed is also of especial interest wherein the court holds it necessary to decide the salvage water to which defendants are entitled despite the difficulties involved in making such a determination. In other words, the defendants are not to be denied because it will be difficult to determine amounts of water which may be taken under variable stream flow conditions. This expresses the courts attitude and recognizes the necessity of a determination although the data before it may be faulty but not so faulty as to preclude a fair decision.

"We thus come to the question of how much water was actually saved by the pipe-line; that is to say, how much water in excess of that which would reach the division dam does the pipe-line carry, for to that excess defendant is clearly entitled. The defendant contends for nineteen per cent, and put in evidence the elaborate measurements which it made by clock-work, covering a period of some four months, and the testimony of competent engineers in explanation and support of those measurements. Upon this question the court found that the defendants have not saved nineteen per cent of the water; that the average measurement showed a saving of nineteen per cent; that the measurements did not show any uniform percentage of loss, but by many it appeared that the loss was greater than nineteen and by others that it was less, and that the percentages claimed to be saved varied from thirteen percent to twenty-two percent, and that no fixed percentage would fairly represent the so-called salvage;

and that to determine the amount saved at all the various stages of water in different seasons, and different times in the same season, could only be ascertained by constant measurements every year and throughout the year. This finding amounts to a mere negation, but in the view which the court took, that whatever water was saved belonged in equal portions to plaintiffs and defendants, an exact finding as to the amount saved was immaterial. Under the views here expressed, that defendant is entitled to the water saved, it becomes necessary for the court to find specifically upon this matter. The difficulty which the court experienced in arriving at the facts is not an unusual one, but it is one which nevertheless must always be met. As was said in the early case of Butte v. Vaughn, 11 Cal. 143, (70 Am. Dec. 769): 'There may be some difficulty in cases like the present, in determining with exactness the quantity of which parties are entitled to divert. Similar difficulty exists in the case of a mixture of wheat and corn. The quantity to be taken by each owner must be a matter of evidence. The courts do not, however, refuse the consideration of such subjects because of the complicated and embarrassing character of the questions to which they give rise. If exact justice cannot be obtained, an approximation to it must be sought, care being taken that no injury is done to the innocent party.' It will, therefore, be the duty of the trial court, upon a rehearing of this matter, with the evidence before it, to determine with such exactness as may be possible the percentage of salvage water."

(135) In Montecito Valley Co. v. Santa Barbara, supra, plaintiff riparian owner diverted out of the watershed to supply water for domestic use in Montecito and defendant city drove tunnels parallel with and to a point below the creek bed and diverted its waters out of the watershed for the domestic use of its inhabitants. Defendant by means of his tunnels was draining from the creek a small amount of water to which plaintiff had a superior right and in lieu of approving an injunction which would have prohibited the use of any water by defendant, the court held that defendant should restore to plaintiff and deliver into plaintiff's diversion works that amount of water which defendant was taking to the injury of plaintiffs superior right. Said the court:

"By this we mean that in such a case as this the extraordinary remedy of a prohibitive injunction should be granted only if it shall appear that no other relief is adequate. \*\*\* It is disclosed that of all the waters which the tunnel takes but 4.16 inches are from the flow of the stream. If that amount of water could be made good to the plaintiff, the

judgment, in common equity, should provide accordingly. It would be a manifest hardship and injustice to deprive the defendant by injunction of the right to take any of the water when only a small part of that which it does take is subject to the claim of plaintiff, and plaintiff could be fully compensated by a restoration of it." (144 Cal. at page 592)

(136) When this case was again before the Supreme Court upon appeal by one of the defendants other than the city of Santa Barbara but who was injuring plaintiff in like manner, the court said:

"The court required appellant to deliver this two and a half inches to respondent 'out of the waters conveyed by defendant from his said tunnel in his said flume or conduit into the box or appliance connected with the pipe line constructed, or to be constructed by plaintiff,' etc.\*\*\*\*\* appellant's contention then amounts to this, that, notwithstanding he is a wrongdoer, he should be permitted to dispose of the waters, of which he has unlawfully deprived respondent, in such a manner as to do neither himself nor the respondent the slightest good. The judgment which the court rendered contained a wise provision for the conservation of these waters, and the direction for their disposition by appellant was not only clearly within the equitable powers of the court, but wholly just."

(137) Finally as to Miller v. Bay Cities, supra, which has been cited many times in briefs of the protestants there is nothing therein adverse to the doctrine of salvage as substitution of an equivalent supply established by Montecito etc. Co. v. Santa Barbara; Pomona etc. Co. v. San Antonio etc. Co., and Wiggins v. Muscupiabe L. & W. Co. In Miller v. Bay Cities defendant upon appeal for the first time raised the question as to whether or not it should not be allowed to store waters and release an equivalent to that amount which would have percolated from or by reason of the flood waters. The supreme court very properly refused to decide whether such a decree could be rendered were the issue raised and tried before the trial court. Said the supreme court:

"\*\*\*\*\*Asserting that plaintiff had no right to have these waters supply his artesian stratum under nature's plan, they now ask that the decree of the trial court be reversed because that tribunal did not adopt an artificial plan which was not suggested by the pleadings, to which no proof was particularly addressed, nor the trial court asked to make,

and which is, for the first time in the case, suggested here and then, as ground for reversal. Under the circumstances stated the appellants, if they had been entitled to such a decree under proper pleadings and proof, are in no position now to complain because it was not made by the trial court. As the appellants did not assert any right to impound the storm waters and release them in any given quantity to the gravels below the gorge so as to supply plaintiff's and the other artesian strata, but asserted that plaintiff had no right to any of these waters, but that appellants had a perfect right to divert and use them all, they cannot be heard to complain that the court did not embrace in its decree a plan which they had never asserted a specific right to or asked to be made." (Huffner v. Sawdry, 153 Cal. 86, 93, (94 Pac. 424.)).

(138) The Division of Water Rights is not in the position in which the Supreme Court found itself when this question of supplying an equivalent by artificial methods was presented in Miller v. Bay Cities but to the contrary that very question is now presented before the Division by the applicants and placed in issue before it as it might have been placed before the trial court in that case. The Division has carried forward an intensive investigation extending over a period of five years with one of its objects that of ascertaining whether flood waters might be withheld and an equivalent supply caused to percolate or furnished the underground basin by artificial methods without depriving it of water which the floods rendered available to the basin by percolation from the stream.

#### EFFECT OF FLOOD CONTROL WORKS

(139) Relative to the rights of these overlying owners it is contended that formerly more water percolated with a given flow and that the confinement of the channel by flood control works has restricted the area of the wash through which percolation occurs. It is thus argued that present existing conditions of percolation do not constitute a guide but that the overlying users are entitled to that greater quantity of percolation which occurred prior to the restriction of the channel by flood control works.

The confinement of the channel within flood control embankments had been completed prior to the beginning of the investigation of the Division of Water Rights hence it was not possible for the Division to measure percolations under the conditions which obtained prior to the establishment of the present flood control works and no measurements are available of percolation under conditions which obtained prior to said flood control works which are adequate to determine quantities which would percolate under varying stream flows. There is no reason, however, to believe that the quantity of percolation which obtained previously has been materially lessened by reason of the flood control embankments. The present channel is believed sufficiently extensive to cause practically a maximum of percolation, the difference being that whereas the flood flows previously changed their courses from time to time throughout a wider area, they are now restricted to the narrower area within the embankments which have been built.

(140) At any rate, whether or not the quantity of percolation has been reduced by the building of flood control embankments, is immaterial in that present and existing conditions have been established by a district of which these overlying owners are a part, and have been acquiesced in and permitted to obtain over a period in excess of that of the statute of limitations and in legal contemplation have become natural conditions.

(San Gabriel V. C. Club v. County of Los Angeles, 182 Cal. 392, 397; Horner v. City of Baxter Springs, 226 P. 779, 780; Miller & Lux v. Enterprise C. etc. Co., 169 Cal. 415, 445; Paige v. Rocky Ford Canal etc. Co. 83 Cal. 84, 93, 94, Hough v. Porter, 98 Pac. 1083, 1101, head note 26; 1 Weil 59, 60, Third Edition; 1 Kinney 804, 910).

(141) In the first case cited above the supreme court was dealing with a flood control and drainage channel constructed in a wash tributary to San Gabriel Valley itself. Said the court:

"We have referred to the Rubic Canyon Wash and the continuation of it through the plaintiff's land as a natural water channel. In one sense it is not that. It did not exist as a definite watercourse, at least as far as the plaintiff's land, before the region was settled up, but was created as the result of settlement. Nevertheless, it is natural in the sense that it was originally made by the waters themselves and not by man, although it is possible that except for the acts of man, the waters would not have been kept together so as to make a channel. In any event, it has now existed for such a length of time as the channel for the natural drainage of the watershed tributary to it, that the manner of its creation is not material, and it has all the attributes of a water channel wholly natural in origin. (City of Reading v. Althouse, 93 Pa. St. 400.)"

In Horner v. City of Baxter Springs, supra, it is said:

"A stream does not lose the attributes of a water course by the fact that a part of its channel may have been artificially created. The straightening of a crooked water course in order to facilitate the flow and avoid the flooding of bordering lands is not uncommon. The diversion of a stream by substituting an artificial channel for part of a natural one, by common consent, running in the same general direction, which has existed for a considerable time, may have the characteristics of a water course, to which riparian rights would attach."

In Hough v. Porter, supra, it is said:

"Between the years 1878 and 1882 the heads of Island, Bunyard, and Conley branches were artificially opened.\*\*\*\*\* The opening of these channels was acquiesced in by all on the stream and since the year 1882 the water has naturally run through them in about the proportion indicated. Having flowed in this manner for more than the period prescribed by the statute of limitations, they have become fixed. Cottel v. Berry, 42 Or. 593, 72 Pac. 584; Harrington v. Demaris, 46 Or. 111, 77 Pac. 603, 82 Pac. 14. Therefore since about the year 1880 each of these branches have been well defined and recognized as a part of Silver Creek, and so far as riparian rights can be applied to the main channel they attach with equal force to the branches named."

In Kinney on Irrigation and Water Rights it is stated:

"Upon the other hand, however, the authorities hold that a water course, although constructed artificially, may have originated under such circumstances as to give rise to all the rights that riparian proprietors have in a natural and permanent stream, or have been so long used as to be deemed by prescription natural water courses. Such is the case where the whole stream is diverted into the new channel, and thereby the artificial channel is substituted for the

natural. Where this is done under such circumstances as to indicate that it is to be permanent, riparian rights may attach to the artificial channel. And it is further held that where the artificial watercourse was not created by joint action of the owners, it may become such a one to which riparian right may attach, if the various owners along its course have always treated it as such." (1 Kinney 804).

"As we have seen in a previous section, there are circumstances under which riparian rights may attach to artificial water courses. One of these is when the artificial channel is entirely substituted for the natural channel. When this is the case there is no reason on principle, in those Western States which still adhere to the common law, why an owner of land through which or adjoining which the artificial stream runs may not, by virtue of his ownership, have the right to make a reasonable use of the water for irrigation. Such a stream, however, must be created under such circumstances as to indicate that it is to be permanent the same as though it was created by nature. \*\*\*\*The Oregon Court, in a very recent case, (referring to Hough v. Porter, supra,) has taken a rather advanced position in this respect, and holds that after channels are artificially opened, and as such are acquiesced in, as branches of the main stream for the period prescribed by the statute of limitations, they have become fixed and the owners of lands adjacent thereto are entitled to the same consideration and to the same rights as are those on the main and unquestioned natural channel." (1 Kinney 909, 910).

In Miller & Lux v. Enterprise C. etc. Co., supra, it is said:

"Again, the tenor of the court's findings as to the three sloughs--Aliso, Brown, and Lone Willow--seems to be that because they were deepened, and because their waters were controlled by weirs or floodgates, and because some of their waters by ditches and canals were carried to lands not riparian to the sloughs, and therefore not riparian to the San Joaquin River, their whole character as natural watercourses was changed, with the result that these lands which still lay along their natural channels ceased to be riparian, and those lands strictly riparian to the San Joaquin River and which were supplied by its waters through the ditches and canals leading out of these sloughs also ceased to be riparian in character. This of course could not be. Moreover, the deepening of the sloughs so that they could and did take water from the San Joaquin at lower stages than their natural state permitted, did not change their character as natural water courses, nor can it be said that to control the water of such sloughs by dams, weirs, and floodgates can have the effect of destroying their natural character so as to render the lands fronting on them non-riparian. Logically, if this were so, the dam which plaintiffs have maintained for many years across the San Joaquin River would have the effect of destroying the riparian character of all the lands below."

In Paige v. Rocky Ford Canal etc. Co., supra, it is said:

"In the case of riparian owners the rule has been held to be, that 'when a stream flowing through a person's land is diverted into a new channel, either artificially or by a sudden flow affecting the rights of other riparian proprietors favorably, and the owner acquiesces in the new state of the stream for so long a time that new rights accrue, or may be presumed to have accrued, such acquiescence is binding, like a public dedication, and the stream cannot be lawfully, turned to its former channel.' (Gould on Waters, Sec. 159; Woodbury v. Short 17 Vt. 386; 44 Am. Dec. 344.)"

(142) Also it is contended by certain of the protestants that there is a contractual obligation on the part of the Los Angeles County Flood Control District to wit, that in consideration of the District being allowed to construct works it is to conserve water for said owners.

(143) There is no showing that the parties complaining have in anywise been affected other than beneficially by the channel embankments. Furthermore it appears that the flood control works were undertaken and bonds therefor voted long prior to the consideration of flood control reservoirs. Finally, in voting bonds for flood control embankments an electorate has no authority to contract relative to or dispose of property rights of individuals. (San Bernardino v. Riverside, 186 Cal. 7, 28). Also, having no right to acquire the ownership of water by appropriation or otherwise as will be hereinafter more fully discussed, the Flood Control District would be unable to perform such a supposed contract with the overlying owners.

#### SURPLUS UNDERGROUND SUPPLY

(144) Relative to the protests of overlying owners in the San Gabriel Valley it but remains to observe that of those waters which would naturally percolate it may be that there is a surplus over present needs and perhaps over future or ultimate needs thereof and that insofar as such a surplus exists the same is subject to appropriation, temporarily and until needed



inssofar as such a surplus does not exceed ultimate needs and permanently inssofar as it does exceed ultimate needs. (Newport v. Temescal W. Co., supra; Burr v. Maclay Rancho Co., supra; San Bernardino v. Riverside, supra.)

Whether or not natural percolation is sufficient or more or less than sufficient for all overlying land seems to be immaterial in case it is compensated for by water from works to be built by the Los Angeles County Flood Control District or other agency and said natural percolation it seems would be appropriate to the extent of such compensation. However as to the instant case waters which do not percolate are sufficient to supply the only appropriator who proposes to construct a reservoir for conservation and inasmuch as such Flood Control District reservoir is not yet constructed it is unnecessary at this time to make the determination of to what extent such compensation as above noted will take place.

#### RIPARIAN RIGHTS

(145) Coming now to a consideration of the rights of those who are riparian to the surface flow of the San Gabriel River, it is contended that said owners are entitled to the full flow undiminished in quantity and unimpaired in quality as against appropriators who are trespassers against the riparian owners who are not limited by any measure of reasonableness as against such trespassers. To this contention there are two replies. Waters not used are not within the riparian right. Section 11 of the Water Commission Act raises a conclusive presumption that waters unused for ten consecutive years upon lands riparian thereto are not needed upon said lands for any useful and beneficial purpose and are therefore unappropriated inssofar as claims thereto are based upon riparian ownership. such is the law under which the Division of Water Rights functions but even in the absence of this provision of the Water Commission Act the decision would be the same for riparian rights do not attach to flood waters which are of no benefit to the riparian owner. It must not be overlooked that in the case under consideration the stream is torrential in character and exceedingly variable and uncertain in flow not only from year to year but from day to day. A stream the flood flows of which have been so damaging to the lands of riparian owners bordering thereupon as to have

resulted in the creation of a flood control district by legislative enactment, and which district acting under the authority of law has erected at great expense embankments to ward off and keep the floods of said stream from the riparian lands which before said works were built were subjected to torrents which left tremendous destruction in their wake and which were wont to swoop down upon said lands at irregular periods and with practically no warning of their imminence. As further proof, if any be needed, of the devastation which such floods threaten and have wrought upon riparian lands is the fact that bonds for flood control reservoirs have been authorized by vote and in an amount of \$35,000,000.

(146) Such flood waters obviously are not of the character dealt with in the case of Herminghaus v. Southern California Edison Co., 200 Cal. 81 wherein the waters of the San Joaquin River were found to periodically rise and overflow depositing silt and naturally irrigating lands bordering thereon. These waters were found to be beneficial to the riparian plaintiffs (page 8) and to be of seasonal occurrence. It was said:

"These annually occurring accretions in the amount and flow of said river are natural and regular, and occur in their usual, expected and accustomed seasons and result in an increased amount and flow of the waters of said river as they proceed by, along and across the lands of said plaintiffs, lasting through several months in the annual change of seasons of every year\*\*\*\*\*The waters of the San Joaquin river annually flowing therein before and during and after these regularly occurring accretions in the volume thereof constitute the usual and ordinary flow of said river and are in no sense 'storm' or 'flood' or 'vagrant' or 'enemy' waters as these terms are understood in law." (pages 4 and 5)

(147) The vast difference in fact between waters which regularly and gradually rise and subside throughout a season of the year conferring benefit upon lands overflowed and waters which irregularly and suddenly rise and subside and leave havoc and devastation in their wake is no less a difference than exists in the law applicable thereto. Waters of the

former type are such as are treated of in Herminghaus v. Southern California Edison Co., supra and Miller and Lux v. Madera Canal etc. Co., 155 Cal. 59 whereas waters of the latter type, the type we are herein dealing with are governed by the law as declared in Gallatin v. Corning, 163 Cal. 405, 411, 412, 413, 414, 419. Said the court in the case last cited:

"These facts present the question whether or not flood waters, of the character proposed to be diverted from South Elder Creek by the company, may lawfully be taken from the stream for use upon nonriparian lands and outside of the watershed of the stream, without the consent of the riparian owners and without compensating them therefor. In other words, whether the right to have such flood waters flow down the stream in its usual course, under the circumstances here disclosed, is one of the riparian rights attached to lands abutting upon the stream, as parcel thereof, which the owner of such lands may enforce against one who proposes to divert the same to nonriparian lands, where no use is made of such waters on the riparian land and no benefit accrues to riparian land from their passage over the bed of the stream, and no drainage is caused to the riparian land from the proposed diversion.

"The question is not entirely new in this state. In Miller v. Bay Cities Water Co., 157 Cal. 256, 107 Pac. 115; Miller & Lux v. Madera etc. Co., 155 Cal. 59, 99 Pac. 502, and Miller & Lux v. Enterprise Co., 145 Cal. 652, 79 Pac. 439, the question of the right to divert flood waters was considered in cases where the trial court had decided that they formed a part of the regularly recurring flow of the stream during a considerable period of each season, or where it appeared that such flood waters were necessary to supply the gravel and artesian basins under the lands of a valley, from which water was obtained to supply the overlying lands. These cases are not parallel to the case at bar. The case of Anaheim etc. v. Fuller, 150 Cal. 327, 88 Pac. 978, is cited by the appellant. It does not decide anything at all concerning flood waters. The portion of the opinion in which such waters are mentioned merely declares the rule that a riparian owner may enjoin a diversion of the ordinary flow without a showing of present damage. This is decided in many other cases, but none of them lays down any rule with respect to riparian rights in flood waters such as those involved here.

"In Edgar v. Stevenson, 70 Cal. 280, 11 Pac. 704; Heilbron v. Land & Water Co., 80 Cal. 194, 22 Pac. 62; Modoc etc. Co. v. Booth, 102 Cal. 151, 36 Pac. 431; Fifield v. Spring Valley W.S., 130 Cal. 552, 62 Pac. 1054; and San Joaquin etc. Co. v. Fresno Flume Co., 158 Cal. 626, 112 Pac. 182, the court was dealing directly with the question of riparian rights in flood waters.

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"These decisions in effect establish the just rule that flood waters which are of no substantial benefit to the riparian owner or to his land, and are not used by him, may be taken at will by any person who can lawfully gain access to the stream, and conducted to lands not riparian, and even beyond the watershed, without the consent of the riparian owner and without compensation to him. They are not a part of the flow of the stream which constitutes 'parcel' of his land, within the meaning of the law of riparian rights.

"This rule does not conflict with the decisions in the Bay Cities and Miller & Lux cases first above cited. In those cases the water, in question, although in a sense high water, or flood water, was nevertheless a part of the regular and usual flow of the stream for a considerable part of each year and at a time when such flow was of substantial use and benefit to the riparian lands, or the flow of such waters in their accustomed place was necessary to the gathering of water in subterranean strata from which the owners of overlying land were entitled to take it. The decisions were based on these facts, neither of which exists here, according to the findings.

\*\*\*\*\* "During ordinary rains and for a considerable time between such rains it carries what may be called the usual and ordinary flood water, but at the time of any hard rain and for a short period thereafter very large additions are made to the water in the stream, and these are carried on to the river without contributing anything whatever in the way of benefit to the lands of the plaintiffs or any other person. It is a part of this water which the defendant company proposes to take and which the judgment awards to it. It is clear from the evidence that the amount proposed to be taken will seldom include all of this flood water and frequently not even a large proportion of it. We think the evidence sufficiently sustains the finding of the court that five thousand miner's inches will include all of the ordinary and usual flow of flood waters during the winter season, but that the finding as to the exact number of inches is immaterial."

(148) Under the authority of the foregoing decisions it is apparent that damaging flood flows of the type which occur in the San Gabriel River are subject to appropriation inasmuch as they are not usually and regularly recurring high flows beneficial to riparian owners and are not part and parcel of the riparian right.

(149) Furthermore those who pump from San Gabriel basin and those who divert from the waters rising and flowing out through the narrows and those who pump from the underground waters of the coastal plain have no

right or interest in the waters until they reach the basin underneath their lands or the stream where it flows past or through their lands and are not concerned with uses or manipulations above as long as they continue to receive the waters which they would have received in a state of nature or by the continuance of those conditions which have become the fixed conditions which obtain and in effect and law are natural conditions. The right of protection to their source of supply is, of course, undeniable but equally undeniable is the proposition that, if applications granted by the Division of Water Rights are conditioned not only to insure the availability of all that water which is useful and beneficial to riparian owners and part and parcel of their right but also to render all waters to percolate which would have percolated under natural or existing conditions, then said source of supply is protected and said riparian and overlying claimants have no cause of complaint or injury to be redressed. In other words the fullest possible measure of their rights will have been accorded to them and the storage of water under conditions aforesaid will be of benefit to applicants without injury to protestants.

(150) It remains to consider the claims of protestants that water may not be diverted out of the watershed by an appropriator. That such is not the law is established by cases heretofore cited and commented upon nor do protestants substantiate this contention with any authorities or cases. Such has been the practice in this and other states from the days of '49 to the present and many permits by the State Water Commission and the Division of Water Rights have heretofore been granted for diversions beyond the watershed. Under appropriative rights initiated prior to the Water Commission Act the City of Los Angeles is diverting from Owens Valley and San Francisco is in the course of completing appropriative water rights initiated prior to the Water Commission Act which will bring Tuolumne River

water to that city. The East Bay Municipal Utility District is now constructing works under permits granted to divert from the Mokelumne River to Oakland and neighboring cities. In 2 Kinney on Irrigation and Water Rights, 2nd Ed., p. 1521 it is said:

"#866 Change of water from one watershed to another.  
There is no question now as to the right of an appropriator to divert the water from a stream flowing in one watershed and by any means conduct it for the irrigation of lands in another watershed. Yet in an early case in Colorado the validity of the appropriation and use of the water by this method was questioned, but the court upheld the right (Coffin v. Left Hand D. Co., 6 Colo. 443.) under a similar state of facts to those in the Colorado case, the Supreme Court of Washington in a very recent case also upheld the right. (Miller v. Wheeler, 103 Pac. 641)\*\*\*\*\*  
The general rule is that under the law of appropriation, as contrary to the law of irrigation as a riparian right, the water may be used in any locality, however remote from the stream from which it is taken. Therefore, it may be used on the lands of the valley of the stream from which it is taken, or it may be carried over or through the intervening ridge to land lying in another watershed, and there used, provided that the vested rights of others are not injured thereby."

(151) The Colorado case of Hammond v. Rose, 19 Pac. 466 affirms the prior Colorado decision in the Coffin case, supra, as does the Wyoming case of Wiley v. Decker, 73 Pac. 210, 220.

(152) Some of the California cases wherein uses beyond the watershed have been in issue are;

Armstrong v. Payne, 188 Cal. 585  
San Bernardino v. Riverside, 186 Cal. 730  
Helmes v. Nay, 186 Cal. 231  
E. C. Horst Co. v. New B. Pt. M. Co., 177 Cal. 631  
Gallatin v. Corning Irr. Co., 163 Cal. 405, 413  
San Joaquin etc. Co. v. Fresno Flume Co., 158 Cal. 626  
Burr v. MacLay etc. Water Co., 154 Cal. 428  
Montecito etc. Co. v. Santa Barbara, 151 Cal. 377  
Wutchumna W. Co. v. Pogue, 151 Cal. 105, 111  
Paige v. Rocky Ford C. Co., 83 Cal. 85  
Creighton v. Kaweah C. & I. Co., 67 Cal. 221  
Burnett v. Whitesides, 15 Cal. 35  
Butte Canal & D. Co. v. Vaughn, 11 Cal. 143  
Hoffman v. Stone, 7 Cal. 46

(153) In Gallatin v. Corning Irr. Co., supra, the defendant under notices of appropriation posted by it was proceeding to construct its works to divert water out of the watershed of South Elder Creek. As a lower riparian owner the plaintiff sought to enjoin this diversion. The court held that the waters involved were flood waters to which the plaintiffs' riparian right did not attach and affirmed judgment for the defendant appropriator.

(154) The court said:

"These decisions in effect establish the just rule that flood waters which are of no substantial benefit to the riparian owner or to his land, and are not used by him, may be taken at will by any person who can lawfully gain access to the stream, and conducted to lands not riparian, and even beyond the watershed, without the consent of the riparian owner and without compensation to him. They are not a part of the flow of the stream which constitutes 'parcel' of his land, within the meaning of the law of riparian rights."

(155) The case of Burr v. Maclay, supra, is in point by analogy in that in that case it was first held in California that one might appropriate from an underground basin and export water to distant lands not overlying the basin.

(156) Also that place of use whether within or without the watershed, is not of fundamental concern in the matter of rights by appropriation is emphasized by the numerous cases allowing changes in place of use subject to no injury to others. Where the water is to be used is immaterial except insofar as it may be determinative of whether others are injured. It is injury to others and not whether the place is within or without the watershed that is the material consideration.

RIGHTS OF LOS ANGELES COUNTY FLOOD CONTROL DISTRICT

(157) As to the rights of the various parties involved with reference to the Los Angeles County Flood Control District, this district was created

by act of the legislature, Statutes of 1915, Chapter 755, page 1502. The following quotations are pertinent:

"Sec. 2. The objects and purposes of this act are to provide for the control of the flood and storm waters of said district, and to conserve such waters for beneficial and useful purposes by spreading, storing, retaining or causing to percolate into the soil within such district, or to save or conserve in any manner, all or any of such waters, and to protect from damage from such flood or storm waters the harbors, waterways, public highways and property in said district.

"Sec. 16. \*\*\*\*\*provided, however, that nothing in this act contained shall be deemed to authorize said district, or any person or persons, to divert the waters of any river, creek, stream, irrigation system, canal or ditch, from its channel to the detriment of any person or persons having any interest in such river, creek, stream, irrigation system, canal or ditch, or the waters thereof or therein, unless previous compensation be first ascertained and paid therefor, under the laws of this state authorizing the taking of private property for public uses; and provided, further, that nothing in this act contained shall be construed as in any way affecting the plenary power of any incorporated city, city and county, or town, or municipal or county water district, to provide for a water supply of such public corporation, or as affecting the absolute control of any properties of such public corporations necessary for such water supply, and nothing herein contained shall be construed as vesting any power of control over such properties in said Los Angeles County Flood Control District, or in any officer thereof, or in any person referred to in this act."

(158) It is thus manifest that this district has been created to control flood and storm waters, first, in such a manner as to conserve and render same available for beneficial use and, secondly, so as to prevent same from damaging property in the district. Furthermore, it is manifest that in so controlling flood and storm waters the district is not to divert waters to the detriment of vested owners without compensation to them as provided by law and is not to interfere with the acquirement and control of municipal supplies by cities.

(159) There is no authorization in the act whereunder the district may acquire water rights or itself apply water to beneficial use. The authority of the district to conserve by "spreading, storing, retaining or



causing to percolate" does not authorize the district to appropriate water or make a beneficial use thereof. That storage is not in and of itself a beneficial use has been decided in the case of Lindblom v. Round Valley Water Co., 178 Cal. 450, 456. As said in that case, "It is a mere means to the end of applying the water to such use." Obviously analogous to retaining or storing is spreading or causing to percolate and the purport of Section 1, Chapter 423, Statutes of 1919, p. 826 is that storage underground or spreading to accomplish such storage is a reasonable, economic and beneficial method provided that actual beneficial use is thereafter made of water so spread and stored. Since an appropriation of water consists not only in the taking of possession of the water but also in its application to beneficial use and the district is not authorized to do more than take possession, it is not and cannot be an appropriator. Furthermore the district in order to acquire an appropriative water right would have to file an application and comply with the terms and conditions of the water commission act. (Sections 1c and 38 of said act.) This it has not done. Nor does the district claim any ownership in and to the waters of the San Gabriel River.

(160) It is apparently contemplated that the district is to exercise control over flood and storm waters in such a manner as to respect and serve water right owners and users and subject to their rights insofar as flood control is consistent therewith and it is expressly provided that the district shall not interfere with cities in providing a municipal supply.

(161) There is no conflict between the interests of the district and those who would acquire rights to appropriate unappropriated water for the district is not concerned as to who uses the water but is only concerned in regulating flood and storm waters so as to prevent damage and so as to make a maximum amount of water available to beneficial use by others entitled thereto.

(162) Insofar as the City of Pasadena is concerned its proposed storage will be of benefit and assistance to the district in its task of flood regulation and insofar as that city spreads water it will also aid the district in its work of conservation.

(163) Finally, the district's right to control water is limited to flood and storm waters and it is with protection against damage by such waters and relative to conservation of such waters that the district is concerned. Having no right in and to the water it stores, said stored water must be released consistent with flood control regulation and so as to serve those who are entitled thereto and those who may become entitled to such of such stored water as may be unappropriated and for which permits may be granted as provided in the water commission act.

(164) As to flood control storage it is not beneficial use of water, as heretofore explained, and does not therefore constitute an appropriation of water and does not constitute the subject matter of an application for a permit to appropriate water. The right to store the flood and storm waters of the San Gabriel River for flood control is conferred upon the Los Angeles County Flood Control District by the act creating said district and is not a storage which need conflict with the rights of others or with the jurisdiction of the Division of Water Rights to grant permits to appropriate unappropriated water. The two acts may be given force and effect without conflict. Likewise the conservation of flood and storm waters, authorized by the flood control district act does not constitute an appropriation of water and may also be performed by the district without conflict with the rights of others or the jurisdiction of the Division of Water Rights.

(165) The flood control district act evidently and specifically intends an exercise of the functions of the district subject to the water rights of others except insofar as a temporary storage may be necessary to prevent

flood damage. Thus it is concluded that the district is not authorized to interfere with rights which now exist or may hereafter be acquired according to law except insofar as is necessary to guard against flood control damage and it is very evident that such interferences as may be necessary for this purpose will be nominal only. As to conservation for beneficial use it is certainly not the intent of the legislature that the district shall conserve for any one class of users as against those who are or may become entitled to water so conserved or may be ready and entitled to use water so conserved or who may be able and ready to themselves conserve. In other words insofar as waters stored in the reservoirs of the flood control district will be waters to which the rights of others have not attached, said waters will remain as formerly unappropriated and no title or ownership will have been acquired by the district which has but a mere right to take possession and withhold same as necessary to protect from floods and to conserve for those who are or may become entitled thereto.

(166) Finally as to what waters of the San Gabriel are "flood and storm" waters within the meaning of the flood control district act, it is not easy to satisfactorily determine. Flood or storm waters may include waters which remain within the banks of the stream as well as those which escape from the stream and flow at random or with variable courses from time to time. (Armstrong v. Payne, 188 Cal. 600, 601). There may be a well defined flood channel as well as a low water channel. (Horton v. Goodenough, 184 Cal. 451, 457, 458 citing Ventura etc. Co. v. Mainers, 136 Cal. 284, Gray v. Reclamation District 174 Cal. 622, 647 citing Miller & Lux v. Madera etc. Co., 155 Cal. 59. The decisions also speak of "ordinary" and "extraordinary" floods (1 Kinney 519, 520, 2nd Ed; Gallatin v. Corning, 163 Cal. 405, 418, 419)

(167) If it were the sole object of the flood control district to protect from damage it might be concluded that the flood or storm waters referred to were of the variety which escape from the stream channel which confines the ordinary flows of the stream and thereby cause damage. On the other hand conservation being an object it seems reasonable to conclude that all waters which rise during storms and continue as a high flow following storms and occasioned thereby and which would unless restrained and stored escape application to beneficial use, are intended.

(168) However, as to what waters may or may not be the "flood and storm" or the "flood or storm" waters referred to in the flood control district act is not material as concerns the action of the Division of Water Rights upon the applications pending before it. The question with which the Division is concerned is whether or not there is unappropriated water and the facts gathered during the investigation disclose the existence of a large amount of such water both under the definition of the Water Commission Act and the decisions of the Supreme Court.

## SECTION VI.

HYDROLOGY AND METEOROLOGY

(169) Records of rainfall began at Los Angeles in 1878, at Glendora in San Gabriel Valley in 1881 and at various other stations in the valley since then. From these it is found that the average rainfall varies from a maximum of 26" annually near the foothills on the west side of the Valley to about 17" near Whittier Narrows. The average over the entire valley is estimated at 19.56" annually from records at 45 rainfall stations in the valley and vicinity. The total average number of acre feet of precipitation on the valley floor (San Gabriel Valley above Whittier Narrows) is on this basis, 211,000 acre feet.

(170) Discharge from mountains: Records have been kept at the mouth of San Gabriel Canyon since and including 1896. Records began at the mouths of the other smaller canyons in the period from 1916 to 1918 generally but on Arroyo Seco a record was begun in 1910. The discharge of all but the smallest streams is measured and it is estimated that almost 94% of the mountain discharge is now measured. San Gabriel River supplies 76% of the entire mountain runoff.

(171) Mountain runoff is extremely erratic. San Gabriel River has varied from 9600 acre feet in the minimum year of record to 410,000 acre feet in the maximum year.

(172) The average runoff from San Gabriel River since the record began in 1896 is 121,000 acre feet, which from the foregoing estimate that it comprises 76% of the entire mountain runoff, indicates a total average mountain runoff during the entire period since then of 159,000 acre feet. This includes the period 1896-1904 in which the precipitation averaged lower than at any other time during the record. During that time the precipitation was 73% of the average during the succeeding 22 year period and

also 73% of the average for the entire period of record covering 50 years. Precipitation in the just prior period 1864-94 was 34% above normal--that is, the first 9 years of runoff record includes the dry part of the most severe cycle of precipitation recorded, and had the runoff record extended back to 1884 it must be assumed that since the rainfall for the period 1884-1904 which includes both phases of the weather cycle was approximately the same as for 1905-26, runoff must have been the same. And as precipitation for the entire 50 year period of record is also almost the same as for 1905-26 it is concluded that the normal runoff (50 years) is approximately equal to that of 1905-26.

(173) This average runoff for the period 1905-1926 from San Gabriel River was 152,000 acre feet which indicates that for the entire mountain watershed tributary to the valley it was 200,000 acre feet and it is concluded that this is the normal runoff.

(174) Runoff from Hills. This is impossible to measure in San Gabriel Valley but from records which are kept of rainfall on similar hills near San Francisco and from the records made of discharge from them at the same time it is concluded that the average runoff from the hills to San Gabriel Valley floor is 12,000 acre feet.

(175) Total water tributary to San Gabriel Valley is the sum of the above three quantities.

Mountain runoff .	200,000	acre feet
Hill runoff	12,000	" "
Rainfall on valley floor	211,000	" "
	<u>423,000</u>	acre feet

(176) Periodical or cyclic variation of water supply. Records of precipitation at Los Angeles which were started in 1878, and at all other nearby places where records have been kept long enough to be determinative show that long periods in which most of the years had excessive precipita-

tion, have alternated with long periods in which most of the years had deficient precipitation, the total cycle having been approximately 22 years in length.

(177) The following tabulation shows the relative precipitation and runoff for the different periods.

	<u>1878-83</u>	<u>1884-93</u>	<u>1894-04</u>	<u>1905-16</u>	<u>1917-26</u>
No. Years	6	10	11	12	10
Prec. Index.	96	134	73	109	85
Runoff Index			31*	122	72

\*Runoff of years 1893-94 and 1894-95 estimated.

(178) The above shows that the last cycle (assuming that it was ended in 1926) had only small variation between the wet and dry semicycles as compared to the previous cycle. Data are not sufficient to determine whether the years previous to 1884 gave such definite semicycles but do show that the record of the period which extends back six years to 1878, had a smaller than average precipitation.

(179) When worked out in acre feet which arrived on the valley floor it is found that from precipitation and mountain runoff together, approximately 500,000 acre feet annually arrived on the floor of San Gabriel Valley in the period 1905-16 and 330,000 acre feet annually in the period 1917-26. During these periods stream flow and precipitation records are sufficient to make estimates reliable. Over the entire wet period 1905-16 approximately 2,000,000 acre feet more reached the floor of San Gabriel Valley than reached it in the succeeding dry period. In the preceding cycle from 1884-1904 the variation between the wet and dry cycles was greater and gave probably 6,000,000 acre feet more in the wet than in the dry semicycle.

(180) Water Discharging from San Gabriel Valley. Water passes out of San Gabriel Valley as (1) naturally regulated water, (2) water at present

unregulated but subject to regulation, and (3) water unregulated but not subject to regulation.

(181) The naturally regulated water is the underflow through Whittier Narrows, the rising water at Whittier Narrows and the slow outflow which occurs for a period after storms and which is believed to come from the saturated ground above the Narrows. This last might also be called rising water but is differentiated here. The naturally regulated water is the major portion of the water from San Gabriel Valley which is now usable in the Coastal Plain. Rising water has been measured systematically during the past four and one-half years and a few measurements made in prior years are available. Underflow cannot be measured nor is there a reliable method for estimating it. Its amount can be approached by different processes of thought. In Bulletin 5 it is taken at 25,000 acre feet annually.

(182) Water at present unregulated but subject to regulation is practically all from San Gabriel Canyon. Other sources of this class of water are the tributaries of the river but the amount is so small as to be negligible in the present problem. Dams on the tributaries will decrease waste from this class of water very little. In traversing the percolating area below Whittier Narrows whatever part of this at present unregulated water percolates becomes usable or regulated water. The amount of this class of water so percolating is small however since most of the percolation in the Coastal Plain is supplied by uncontrolled tributaries which enter at or immediately above the Narrows or by rising water.

(183) Water not subject to regulation is the water from the hills and mountain streams other than San Gabriel Canyon which reaches the Narrows (not considering the small amount of water from mountain tributaries which can be regulated) and also the runoff from rainfall on the Valley floor. Runoff through Arroyo Seco and Monterey Park Pass is in this class but the



amount is small. A part of this water percolates into the stream bed below the Narrows and above Downey thereby becoming potentially usable. As this class of water is not subject to regulation and will flow no matter what is done toward regulation of the water of the second class, percolation in the foregoing area is first chargeable to water which cannot be regulated-- that is, to this class.

(184) Measurements at the Narrows have been made consistently and continuously during the past four and one-half years together with other measurements. Data for the year 1926-27 are the best and as it is believed that the uncontrollable outflow for that year is close to the average over a long period the various sources are shown in the following table.

TABLE 4

WATER PASSING OUT OF SAN GABRIEL VALLEY

Acre Feet

October 1st - September 30th

<u>Naturally Regulated</u>	<u>1926-27</u>
Sewage	5320
Slow Outflow from rains	4310
Rising Water	57200
Underflow	25000
Pumpage	12200
	<u>104930</u>
 <u>Unregulated but Subject to Regulation</u>	
San Gabriel Canyon Water	43500
 <u>Unregulated and not Subject to Regulation</u>	
From hills, valley floor and mountains except San Gabriel Canyon	<u>34100</u>
THROUGH WHITTIER NARROWS.....	182000
THROUGH OTHER PASSES.....	3000
	<u>185000</u>

(185) It is believed that the water from the valley floor, mountains other than San Gabriel Canyon, and hills, totalling 37,100 acre feet is greater than the average of the 22 year period because the rainfall was 19% above average on the valley floor and hills and the runoff from this more than normal precipitation made up the deficiency of the runoff from the mountains which was 87% of mean. It is believed that 35,000 acre feet is a reasonable and conservative estimate of the average total water which will waste from the above sources. This is about 8% of the total water reaching the valley.

(186) Water consumed in San Gabriel Valley. This is found by subtracting total outflow from total inflow and adding the amount of water withdrawn from underground storage if the water plane has fallen or subtracting the amount stored if it has risen. All the inflows have been measured since 1913 except hill runoff and 6% of the mountain runoff. Error in this estimate of 6% will not cause appreciable error in the final result. The outflow underground cannot be measured. If larger than here estimated consumption in San Gabriel Valley is smaller than here calculated, if smaller the reverse is true. A serious error is possible in estimates of change of underground storage which must be based on estimates of void space in the underground material. However such an estimate is self-checking, if, during the investigation, the water plane has both raised and lowered in different years. If the voids have been taken too large the estimate of water consumed will be too large in those years when the water plane has fallen because the amount withdrawn from underground storage will be given larger than the actual withdrawal. When the water plane rises however, the amount consumed as calculated from the estimated voids will be too small because the amount added to underground storage will be given larger than the actual increase and if the variation in amount con-

sumed is great it will be apparent that a mistake has occurred. The reverse is the case when voids have been estimated too small. If they have been estimated with approximate accuracy the estimate of consumption should check from year to year after allowing for other factors no matter whether the water plane rises or falls.

(187) During the present investigation the average water plane over the valley fell during the first two years, remained almost stationary in the third and rose during the fourth so that conditions necessary to an approximate check of this item were encountered. The results are consistent after allowing for other factors and are shown in the following tabulation.

TABLE 5

CONSUMPTION OF WATER - SAN GABRIEL VALLEYAcre Feet

	23-24	24-25	25-26	26-27	Average
INFLOW					
Measured inflow					
Mountain runoff	32,470	30,060	141,000	163,000	91,600
Precipitation on valley floor	114,000	128,000	218,000	251,000	178,000
Total measured	146,470	158,060	359,000	414,000	269,600
Unmeasured inflow					
Mountain runoff	2,200	2,100	9,700	11,200	6,300
Hill runoff on surface	1,860	1,960	7,260	8,590	4,920
Lateral percolation from hills	0	0	5,750	6,610	3,090
Total unmeasured	4,060	4,060	22,710	26,400	14,310
TOTAL INFLOW	150,530	162,120	381,710	440,400	283,700
OUTFLOW					
Measured outflow					
Storm water thru Narrows	2,380	4,530	52,800	81,900	35,300
Storm water thru Arroyo Seco	0	0	240	1,000	310
Pumpage thru Narrows	14,800	14,500	12,900	12,200	13,600
Rising water thru Narrows	73,200	56,000	49,000	57,200	58,850
Sewer Discharge thru Narrows	70	4,220	5,130	5,320	3,680
Total measured	90,370	79,250	119,870	157,620	111,790
Unmeasured outflow					
Storm water thru Monterey Park	200	200	2,000	2,000	1,100
Underflow thru Narrows	25,000	25,000	25,000	25,000	25,000
Total unmeasured	25,200	25,200	27,000	27,000	26,100
TOTAL OUTFLOW	115,600	104,450	146,900	184,600	137,900
TOTAL INFLOW	151,000	162,000	382,000	440,000	284,000
CHANGE IN UNDERGROUND STORAGE	-113,000	-129,000	+ 2,400	+58,700	-45,000
TOTAL SUPPLY TO VALLEY ABOVE NARROWS	264,000	291,000	380,000	382,000	329,000
TOTAL OUTFLOW	116,000	104,000	147,000	185,000	138,000
APPARENT CONSUMPTION	148,000	187,000	233,000	197,000	191,000

(188) The terms "consumption of water" and "consumptive use" are used in this decision and this is the criterion by which requirements are measured rather than pumpage or gravity diversions. The physical situation is such that the return flow or deep percolation from irrigation goes to the underground water basin and can be immediately pumped or it reaches Whittier Narrows as rising water and can be used below. Only a part of the water used to irrigate an acre of land is consumed. Whatever part gets below the root zone of the crops is not consumed but will be again usable. The same is true of rainfall and in the present case because of the prevailing method of obtaining water supplies by pumping, deep percolation from rain and from irrigation are recoverable. Consumptive use is a different quantity than irrigation use. Consumptive use is the total water transpired from the growing crop plus the total water evaporated from the ground incidental to the process of irrigation or when wet by rains.

(189) This indicates that the water consumed in San Gabriel Valley from mountain and hill runoff and from rainfall averaged 191,000 acre feet annually during the four year investigation. It is believed that this figure is close to the average consumption over a long term of years as against a supply of 423,000 acre feet. The 191,000 acre feet supplied the needs of 85,000 acres of irrigated land and also the precipitation consumed by 47,800 acres not now irrigated. Of this last 33,200 acres are irrigable.

(190) Relation of elevation of water plane in Central San Gabriel Valley to amount of rising water. This has a fairly definite relation although there is variation in the relation with time of year. From data gathered in the investigation and from other data gathered in former years the relation has been established. As the elevation of water plane is known with considerable consistency for the period since 1904 the rising water has been calculated from it for each year and is shown in the following table.

TABLE 6

RISING WATER AT WHITTIER NARROWS

YEAR	Average Elevation Well 294	ESTIMATED RISING WATER	
		Second Feet from Curve	Acre Feet
1903-04	291*	96	69,500
-05	289	91	66,900
-06	297	109	79,000
-07	311	141	102,000
-08	311	141	102,000
-09	312	143	103,000
-10	313	145	105,000
-11	316	152	110,000
-12	313	145	105,000
-13	303	123	89,000
-14	313	145	105,000
-15	318	157	114,000
-16	321	164	119,000
-17	319	159	115,000
-18	315	150	109,000
-19	309	137	99,100
-20	300	116	84,000
-21	295	105	76,000
-22	309	137	99,100
-23	308	134	97,000
-24	293	101	73,200**
-25	283	77	56,000**
-26	278	68	49,000**
-27	285	79	57,200**

\*Estimated

\*\*From Measurements.

Period 1905-16	Average =	100,000
" 1905-27	"	92,000
" 1905-26	"	93,000
" 1924-27	"	59,000

(191) It should be noted that the average for the last four years which is the period covered by the investigation is 63% of the grand average and 59% of the average for the high semicycle of 1905-16.

(192) Water conditions during investigation. Precipitation has been abnormally low during the investigation.

	<u>1923-24</u>	<u>1924-25</u>	<u>1925-26</u>	<u>1926-27</u>	<u>Average</u>
Precipitation Index	52	62	106	119	85
Runoff Index	18	15	70	87	48
Precipitation - acre feet	114,000	128,000	213,000	251,000	178,000
Runoff-Hills and mountains Acre Feet	<u>37,000</u>	<u>34,000</u>	<u>164,000</u>	<u>189,000</u>	<u>106,000</u>
Total water reaching San Gabriel Valley	151,000	162,000	382,000	440,000	284,000
% of average	36	38	90	104	67

(193) The average of the last three seasons mountain runoff has been 59% of normal, yet water levels in Central Main Basin have practically held their own. Precipitation has averaged 94% of normal during that period.

(194) Water demand in Coastal Plain. In the year 1927 water levels in the forebay below the Narrows raised several feet while pressure levels over the artesian area raised in almost all wells observed. This is for the period from January 1927 to January 1928. In all other years of the investigation water plane levels and pressure levels have fallen.

(195) The total amount reaching the water plane of the Coastal Plain in the form of rising water and by percolation below the Narrows is about as shown by the following table. Underflow is not considered because it is constant nor is pumpage through the Narrows because the pumped water is delivered to the east of the area affected by San Gabriel River.

TABLE 7

WATER REACHING COASTAL PLAIN  
FROM PERCOLATION AND RISING WATER

	<u>Acre Feet</u>			Change in Well 814-D-6	Prec. Index at L.A.	Est. Prec. Coastal Plain
	Percolation from runoff	Rising Water Oct. to Oct.	Total			
1923-24	237	73,200	73,400	-8.0	44	5.3"
1924-25	1,170	56,000	57,000	-3.5	52	6.2"
1925-26	7,820	49,000	56,800	-4.0	115	13.8"
1926-27	8,710	57,200	65,900	+5.0	116	13.9"
	4,400	58,900	63,300		82	

\*Approximate only.

(196) The above table indicates that for present conditions of water level and for a year of normal precipitation, rising water of 60,000 to 65,000 is sufficient to supply the present demands of that portion of the Coastal Plain influenced by San Gabriel River. While rising water in 1923-24 was more than this, precipitation was abnormally low, being only 44% of normal at Los Angeles. This necessitated more pumping than usual in the winter and there was not the usual chance for levels to recover in the winter time. It is believed that pumping was 20% more than normal. The same condition applies also to the winters of all the first three years.

(197) If, as is indicated, 60,000 - 65,000 acre feet of rising water is sufficient for the Coastal Plain, larger amounts through the Narrows will be wasted until there is more demand than at present because there is little storage space available for it in the Coastal Plain. The large quantities of rising water of the past 22 years are believed to have resulted only in waste by evaporation or perhaps by underground flow into the ocean.

(198) Future requirement of San Gabriel Valley. Present consumption is found to be 191,000 acre feet. In addition there are 33,000 acres of valley floor which can be irrigated and which when irrigated will increase present consumption. This unirrigated area is now consuming part of the rain which falls upon it. Average rainfall is estimated to be 19.56" and it may be



assumed that half of this is consumed by the native vegetation on fallow land. It was estimated ("Memorandum of June 15th", Division of Water Rights) that the average consumption of all crops in San Gabriel Valley is 23" including both rainfall and irrigation water and therefore that each acre now fallow will, when irrigated, consume something over 13" of water more than it now does. On this basis in terms of acre feet the additional consumption for 35,000 acres is estimated at 36,000 acre feet making the total future consumption 227,000 acre feet provided consumption per acre remains the same as now. Additional data on consumptive use indicate that for some types of native vegetation the amount of additional water consumed when the land is placed under cultivation and reaches full production will be smaller than the foregoing estimate.

(199) Although amount of water used may be the same yet consumption of water in most urban communities is probably less per acre than on farm land, thus the assumption that consumption will remain the same may give too large a figure for future ultimate consumption since there is going on a gradual change from farm land to urban settlement. However, making the assumption that consumption on urban land will be the same as on farm land, and accepting the estimated 25,000 acre feet underflow as correct, if the entire San Gabriel Valley were irrigated there would still flow out of the valley 196,000 acre feet on the same basis of additional consumption used in Paragraph 198.

(200) Of this, from data gathered during the investigation an estimated 35,000 acre feet could not be controlled artificially (Par. 185) but it would still contribute to the usable water by percolation into the Coastal Plain. Perhaps 5,000 acre feet of it would there percolate. In addition to the 35,000 acre feet of uncontrollable water, perhaps 15,000 acre feet of controllable water--that is, San Gabriel water--would be lost because it would not be feasible to erect works to control it, and also by evaporation from reservoirs and in spreading manipulations. This would leave 146,000 acre feet of controlled, usable water leaving the valley when the time arrives that the entire valley floor has been placed under irrigation or is using water. Adopting the same estimate of 25,000 acre feet underflow and assum-

ing 12,000 acre feet of exportation to La Habra and Whittier leaves 114,000 acre feet of rising water which still would arrive at the Narrows after all the valley floor above had been irrigated. This is 25% more than the estimated average since 1904, 91% more than the average during the past four years and 77-91% more than the investigation indicates can be absorbed at present in the Coastal Plain in average years.

(201) Shortages in San Gabriel Basin. During the year 1926-27 the water plane over the entire San Gabriel Valley and Coastal Plain rose except in Lower Pasadena Basin and West Main Basin where it continued to drop. The total amount of water reaching San Gabriel Valley was 440,000 acre feet which is 104% of the average supply for period 1905-26 (22 years) which period is considered to have given normal supply. The waste out of the Valley from San Gabriel Canyon was calculated to be 43,500 acre feet, the total calculated rise in underground storage was 58,700 acre feet of which 38,000 was in Central Main Basin which is that part influenced by percolation from San Gabriel River. In other words with a supply 17,000 acre feet greater than normal the entire valley was supplied, and if waste from San Gabriel Canyon had been saved there would have been added to the usable water resources of the valley, 102,000 acre feet beyond the needs of the valley for the year.

(202) Although no shortage is shown for the basin as a whole yet a possibility exists that any or all of the outlying basins of San Gabriel Valley has a shortage. Indications are, however, that with reduction in water levels, underground outflows have been reduced and that the minor basins are retaining a greater proportion of their supplies than in the past.

(203) The data in Paragraph 201 indicates that after the entire acreage of valley land in San Gabriel Valley or its equivalent amount of hill and foothill land is irrigated there will still be a great deal more water passing out of Whittier Narrows than can be used under present conditions.

(204) Future shortages in parts of basin. As the water plane rises in the minor basins, underflow to Main Basin will increase, hence a raise in water level in the minor basins will cause a greater draft on them. With the same inflow as that of 1926-27 a balancing of inflow and outflow would show a greater shortage if the water plane were higher because there would be a greater outflow underground. If the water plane were lower than this year the same inflow would show less shortage. Danger lies however in depleting the minor basins so low that the outflow is diminished, because the remaining storage might not be sufficient to tide over a period of low years. In addition, the expense of pumping and the forced abandonment of wells as their yield was reduced would be uneconomical and might cause serious temporary shortage in the minor basins. In addition thereto the equated outflow to Main Basin would be reduced to a minimum and the most desirable supply to Main Basin thus cut off.

#### PERCOLATION

(205) The principal percolation from San Gabriel River takes place in the cone from El Monte up. Below Whittier Narrows most of the percolation is supplied by rising water and the tributaries which enter opposite or below El Monte but above the Narrows. Good measurements were secured during the period in which San Gabriel Investigation was being carried on which give amount of percolation for different flows ranging from almost the highest daily average which has ever occurred according to U. S. Geological Survey records to the lowest. These when plotted define a curve and this fact indicates the consistency of the results attained. This gives the percolation for any flow at elevation of water plane at that time, which is the lowest ever recorded. As the water plane rises it intercepts the channel further upstream and opportunity for percolation decreases, hence to apply the results of the investigation to the percolation which will occur

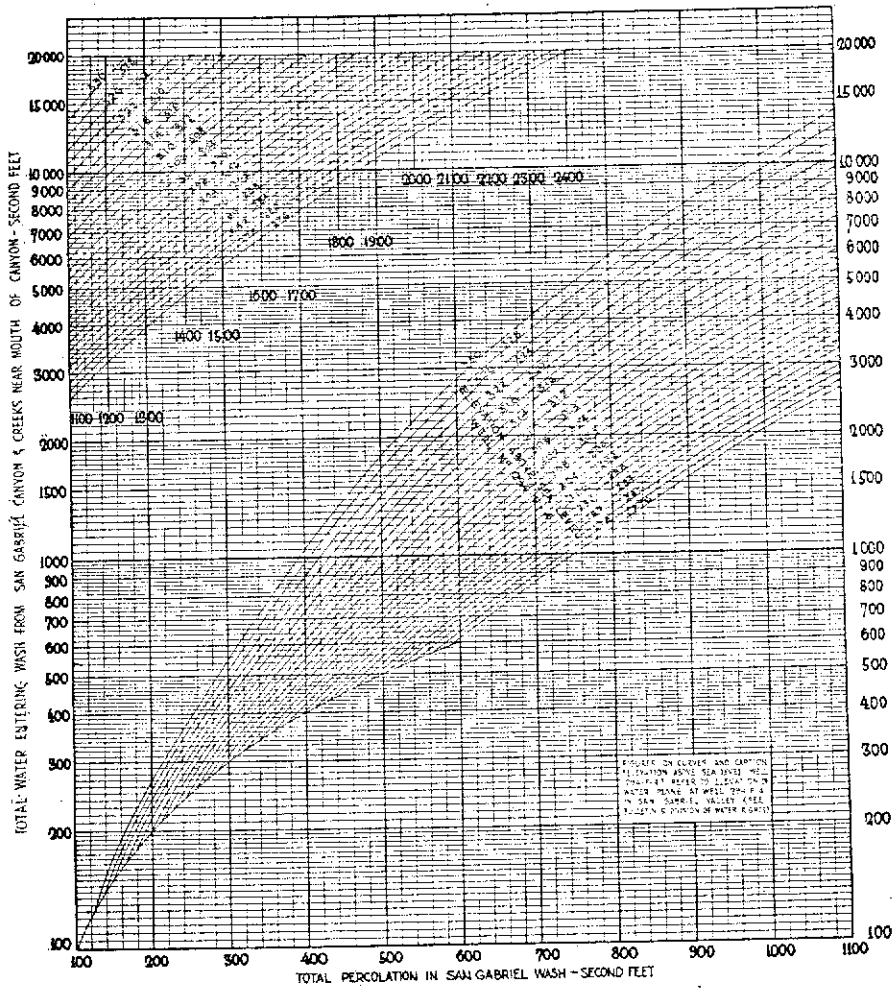
with a higher water plane an adjustment must be made. During the investigation gaging stations were maintained from the measurements at which was calculated the percolation which occurred below the point where the highest water plane recorded intercepted the river bed and cut off percolation. By proportion the percolation at any intermediate height between the highest and lowest water plane was also calculated. Thus the curves give percolation for any flow and for any height of water plane.

(206) With these curves and with the data as to elevation of water plane and from the record of daily flows from San Gabriel Canyon an estimate may be made of the percolation and waste from San Gabriel Canyon for the 23 years from 1904-05 to 1926-27. This estimate gives an average of 62,000 acre feet annual waste into the ocean.

(207) The quantity wasting has been checked by two other methods both of which give much larger amounts of waste than found by using the curves. These methods are entirely different from the calculation in which the curves are used and are valuable in indicating that the use of the curves is conservative. This is also indicated by the fact that the actual waste from San Gabriel Canyon as observed during each year of the investigation was considerably greater than the waste calculated from the curves and given in Table 1.

(208) Derivation of Curves. The curves which are made a part of the permit issued to the City of Pasadena to define the amount and times when diversion may be made from the discharge of San Gabriel Canyon are derived as follows and from the considerations noted in the following: There are three areas in which percolation takes place. The amount of percolation which will occur in any one of these areas varies with rise and fall of the water plane beneath that area. The amount of water flowing from the Canyon is the other major variable.

# Plate 2



STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF WATER RIGHTS  
 SAN GABRIEL INVESTIGATION  
**PERCOLATION  
 IN  
 SAN GABRIEL WASH**  
 THESE CURVES SHOW FOR ALL DEGREES  
 OF PERCOLATION IN THE  
 SAN GABRIEL WASH AND WITH CANYON  
 PERCOLATION, THE TOTAL PERCOLATION  
 WHICH WOULD BE IN THE WASH AND  
 THE TOTAL WATER ENTERING THE  
 WASH FROM SAN GABRIEL CANYON AND  
 SANTA ANITA CREEKS.  
 HAROLD CHAPMAN, CHIEF OF DIVISION  
 1923

(209) The three areas above mentioned are Canyon Basin, from the mouth of San Gabriel Canyon to about Foothill Boulevard; Main Basin from Foothill Boulevard to the point where water begins to rise in the stream; and the basin from Whittier Narrows down to the point where percolation ceases near Downey. During the entire period when the data on which the curves were based were collected the water level was the lowest in history and therefore percolation opportunity, as affected by this variable, was the greatest. Percolation in Canyon Basin and Main Basin was obtained by measurements at the Canyon Mouth and at the lower end of the percolating area in Main Basin. However Canyon Basin is small and fills frequently. At such times percolation into Canyon Basin will cease while continuing in Main Basin. Percolation in Main Basin will decrease as the water plane in Central Main Basin rises because the water plane intercepts the stream bed further upstream. Percolation in the area below Whittier Narrows will decrease also as the water plane beneath it rises. As before stated the movement of these different water planes is independent of one another. The problem presented was to devise a simple method by which these variables could be given due weight and the amount of water which would percolate from the discharge of San Gabriel Canyon be calculated for any days flow with certainty that not less than the actual percolation over a period of time would be thus given.

(210) Reference to the measurements which were made shows immediately that percolation in Main Basin in San Gabriel Valley is by far the largest part of all the percolation which takes place and it was therefore logical to make this percolation and the variations in that basin the basis for the plan or rule to be followed. It was not possible to tie the variations in percolation in the other two basins directly to this but keeping in mind that what was sought was the percolation in San Gabriel Wash chargeable to water from San Gabriel Canyon and not the total percolation in the wash,

there is a basis for varying the percolation in the basin below Whittier Narrows with the rise and fall of the water plane in Central Main Basin and this was done as follows:

(211) Besides water from the Canyon, there arrives at Whittier Narrows during floods the flow from the entire remaining mountain area, the hills, and the valley floor. In addition there is a continued flow of rising water which changes with change in water plane in Central Main Basin. During the periods when water was flowing into the ocean the percolation in this lower percolating area was measured and it was found, after subtracting the percolation chargeable to the tributary waters and rising water that percolation chargeable to Canyon water averaged 100 second feet. That figure was then adopted to add to the amount of percolation found in Main Basin and Canyon Basin for such a condition of water plane in Main Basin as existed during the investigation. On page 92, Table 6 shows the variation in rising water with elevation of water plane in Central Main Basin. That for the highest elevation is given as 164 second feet while that for the lowest is given at 68 second feet, a difference of 96 second feet. If this greater rising water had been present during the floods which occurred during the investigation the 100 second feet chargeable to the canyon would have been practically extinguished. However such an addition would not give correct results in those periods when tributary flow is not large and it is believed more conservative to subtract 50 second feet--that is percolation chargeable to the Canyon is 50 second feet at highest water plane and 100 second feet at lowest water plane in Central Main Basin. This does not give any effect to rise of water plane in the Coastal Plain Basin but this would also act to reduce percolation.

(212) In the measurements of percolation in San Gabriel Valley above El Monte it was found that when the flow divided in such way that a larger percentage went into the Hondo, percolation decreased, and that as the percentage into the Hondo increased percolation still further decreased. As the material and percolation rates per unit of area in the two streams are practically the same the explanation would seem to be in the law of hydraulics which causes the same amount of water flowing in two channels to cover a greater area than when flowing in one and also in the greater length of the San Gabriel or east channel. Data were sufficient to determine the division between the streams which would give the greatest percolation and the percolation which actually occurred was increased to this new figure.

(213) Change in percolation for changes in water level were calculated as described in Paragraph 205. To the percolation so calculated was added 50 second feet for the highest water plane and 100 second feet for the lowest to provide for percolation in the Coastal Plain as heretofore described. Curves were then platted with percolation on the horizontal axis and total discharge at and near the mouth of San Gabriel Canyon on the vertical axis. The result is the series of curves shown on Plate 2. These show the total percolation which would occur in San Gabriel Wash above El Monte if Canyon Basin were not full, plus the total percolation chargeable to San Gabriel Canyon water which takes place in the percolating area below Whittier Narrows.

(214) It will be noted that these curves show the total percolation in the Wash with Canyon Basin not full. From data gathered during the investigation the quantity of water necessary to fill the basin in 1926 and 1927 was found and this quantity was used as applying to other years although in future years it may be expected that Canyon Basin is more likely to be filled than in the past and it is also probable that the use of the 1926 and 1927



results for past years is not fully applicable because pumping draft was not so great in the past as in 1926 and 1927. It is believed, therefore, that it would have taken less water to fill it and therefore that percolation in this Basin would have been cut off more quickly than was the case on the 1926 and 1927 basis.

(215) It was found that Canyon Basin would have been full sufficient of the time when water was wasting into the ocean to reduce percolation as given by the curves on Plate 2 by 5.5%. The full or empty condition does not correlate with elevation of water plane in Central Main Basin and therefore the reduction must be used as an average reduction in percolation, applicable to all conditions of water plane in Central Main Basin.

(216) When such reduction is made there results the total percolation from San Gabriel Wash in San Gabriel Valley plus the total chargeable to San Gabriel Canyon in the Coastal Plain. It still remains to determine what part of this percolation is chargeable to San Gabriel Canyon and to what extent percolation from tributaries may supply the total percolation in the wash if water from San Gabriel Canyon is cut off by storage.

(217) Rogers, Fish, Sawpit and Santa Ahita Creeks are those remaining which have not been allowed for as noted in previous paragraphs. The water from Sawpit and Santa Ahita will reduce percolation only when the water plane is below the highest elevation recorded in San Gabriel Valley since they enter the wash at about the point where the water plane will intercept the stream channel when the water plane is high. The effect is not large even when the water plane is low and may be neglected.

(218) For Fish and Rogers Creeks it was found from stream measurements begun in 1917 that their discharges into the Wash bore a quite definite relation to the discharge at the mouth of the Canyon and that it was sufficiently accurate to calculate their discharge from this relation.

(219) The relation is as shown in the following table:

Discharge of San Gabriel Canyon (Power conduit not included ) <u>Second Feet</u>	<u>Percent Creeks of Canyon</u>
200 - - - - -	2.75
300 - - - - -	3.00
400 - - - - -	3.1
500 - - - - -	3.3
600 - - - - -	3.5
700 - - - - -	3.6
800 - - - - -	3.8
900 - - - - -	4.0
1,000 - - - - -	4.2
1,500 - - - - -	4.7
2,000 - - - - -	5.2
3,000 - - - - -	6.0
4,000 - - - - -	6.6
5,000 - - - - -	7.1
6,000 - - - - -	7.5
7,000 - - - - -	7.9
8,000 - - - - -	8.3
9,000 - - - - -	8.7
10,000 - - - - -	9.0
12,000 - - - - -	9.6
14,000 - - - - -	10.0
16,000 - - - - -	10.5
18,000 - - - - -	11.0
20,000 - - - - -	11.4

(220) If it required a flow of 500 second feet from the combined flow of San Gabriel Canyon and from Fish and Rogers Creeks to cause waste into the ocean under natural conditions it will require 500 second feet from Fish and Rogers Creeks alone to do the same thing if Canyon water is retained in a reservoir and not allowed to discharge into the wash. The result of storage of Canyon water will be to give greater opportunity for the two upper tributaries to percolate. The situation is much the same as when a diversion exists below the junction of two streams. A reservoir on one of the two streams above the diversion may store all the water reaching it so long as the water from the other stream is sufficient for the diversion. The object

in the present instance is to find a method by which the water reaching the water plane from percolation in San Gabriel Wash will not be reduced by operation of a reservoir in the Canyon above.

(221) Percolation chargeable to the Canyon is the item sought and to determine this it is necessary to determine what part of the total percolation in the wash is supplied by the tributaries. This is then subtracted from the total percolation, this total percolation is reduced 5.5% to allow for "Canyon Basin full" and the result is shown by a series of curves shown on Plate 3 in the order concerning permit terms in the last pages of this opinion and order.

(222) It will be observed that these curves are more irregular than those shown on Plate 2. Percolation from small flows is a large percentage of the total while percolation from large flows is a small percentage. When the stream is flowing a discharge of 5,000 second feet for instance, the increase in percolation for an increase of 1,000 second feet is small while if the stream is discharging 1,000 second feet the increase in percolation for an increase of 1,000 second feet is comparatively large. Consequently it is found that at certain flows from the Canyon the increase in percolation for each unit of increase in flow is smaller than the increase in percolation for each similar unit of increase of flow from the tributaries alone inasmuch as the tributary flow at any certain flow from the Canyon is small as compared to the Canyon flow. In fact almost all the time, the entire flow of the tributaries would percolate if they were flowing alone so that percolation from tributaries alone up to a certain discharge increases as fast as the discharge from them. Above that discharge some of the water from tributaries will waste even if they were flowing alone and

increase in flow from them has less effect than at lower discharges, in decreasing percolation chargeable to the Canyon.

(223) These facts account for the greater irregularity found in the curves on Plate 3 which give for any flow from the Canyon the percolation chargeable to the Canyon as compared to the regular curves on Plate 2 which as before stated give total percolation in the wash.

(224) Some of the reasons why the curves do not give as large a waste as calculated by the two other methods are evident from the foregoing. Other than those there are believed to be three other principal reasons as follows:

(a) The curves are based on percolation when the channel is swept clear of silt and cementing material deposited between floods. It was found during the investigation that unless a flood peak of more than 6,000 second feet occurred, the rate of percolation was less than that on which the curves are based. It may be that the peak must be much more than 6,000 second feet to produce the percolation on which the curves are based but the actual figure is not known and it can only be said from present information that a peak of 6,000 second feet did not unseal the channel, while a peak of 14,900 second feet did. There are entire years in which a peak as large as 6,000 second feet was not discharged and others in which such a discharge did occur only after minor peaks from previous storms had passed. It may be concluded, therefore, that the waste in at least some of those times was larger than indicated by the curves used.

(b) During the investigation there was never more than one flood in a runoff year. When water percolates from a stream bed it piles up in a ridge underneath the stream and flows laterally to the general water plane. The height to which the water beneath the stream will rise above the general

level is the resultant of the relation between the porosity of material in the valley fill and the total amount of percolation taking place along any unit length of the stream. This depends on the area covered and various other factors unknown at present. In any event this piling up would act to reduce the percolation below the figures which were obtained in the investigation because in the estimates of past years the ground water level at Well 294-F-4 was used as the criterion to determine the length of channel in which no percolation could take place with that level and as this well is about two miles from the channel it could not show that such a ridge had been built up, nor was it possible to determine how much this ridge would be built up or how much its building up would affect percolation because as stated, only one flood occurred in a season during the investigation. Had there been a second flood the effect would have shown up in the percolation measurements.

(c) The effect of the varying percentage of discharge in either channel was discussed in Paragraph 212. If the stream during the period since 1905 actually divided in the percentage which gives maximum percolation, the waste, so far as it is affected by this particular item, as calculated from the curves derived as above, would be correct. However, the history of floods so far as available shows that the maximum water has followed the west channel for many years and other data indicate that the river has been on the west side of the cone during the 23 years covered by the estimate. This would tend to crowd it into the west channel and decrease percolation opportunity. The same would be the result if it were crowded into the east channel as it must have been at times, evidenced by the fact that Rio Hondo has not always been open. As the calculation was made, it allows for a maximum percolation which

has probably occurred, if at all, only infrequently, as it can occur only during one particular division of the stream between the two channels, while there are many other possible divisions.

(225) Results in 1926-27. This was the second year of slightly above normal rainfall. From the data which were obtained in this and other investigations it is believed that rainfall which has penetrated past the root zone travels slowly to the water plane, more or less impeded by impervious strata. In a year of subnormal precipitation following a year of normal precipitation, water drains from this zone between the surface and the water plane more rapidly than it is supplied and in a wet year following a dry one more water penetrates into it than drains from it to the water plane. It may take two or more years of approximately the same rainfall to establish equilibrium. As stated the year 1926-27 was the second of two years of slightly above normal rainfall so that assuming a state of equilibrium in the travel of rainfall from the surface to the water plane to have been established or approximately so, this source of error in attempting to find out what happened to the water supplies of that year is treated as negligible. In 1926-27 rising water was 57,200 acre feet, an increase of 8,200 over the previous year. The water plane over most of San Gabriel Valley rose and the estimated equivalent storage increase was 58,700 acre feet of which 38,000 was in Central San Gabriel Valley which is the area affected by San Gabriel River. The total mountain runoff was 174,000 acre feet or 87% of normal and the surface outflow from the valley was 160,000 acre feet of which 37,000 was uncontrollable, that is, was from rainfall on the valley floor from the hills or from the small tributaries. As noted, a part of the surplus water was held back as underground storage. If there had not been an increase in underground storage the water held back would

have appeared as rising water and in that case the outflow on the surface only would have been greater than the mountain runoff. Even if the uncontrollable surface outflow of 37,000 acre feet were deducted from the total outflow of 160,000 acre feet the same would have been true, accepting the estimated acre feet of increased storage as correct. In other words the controlled and controllable surface outflow would have been greater than the mountain runoff.

(226) For the present stage of development in San Gabriel Valley the 1926-27 results would seem to indicate that if the rainfall is approximately normal for a period of years the surface runoff out of San Gabriel Valley exclusive of the surface runoff from rain on the valley and hills and exclusive of that from the tributaries originating in the mountains will be found to be almost as great as the mountain runoff. In addition to the surface outflow there is the underflow through the Narrows. This large total outflow after deducting the immediate runoff from rain on the valley indicates the large contribution rainfall on the valley floor which has percolated makes to the water supplies of the region.

SECTION VII.DISCUSSION OF APPLICATIONS

(227) In the foregoing, general engineering and legal matters have been discussed. It remains to discuss the applications specifically in relation to the physical features.

(228) Pasadena Basin is apparently somewhat overdrawn at present water level. Part of this overdraft is believed due to unavoidable outflow underground toward Whittier Narrows. If the water plane were higher it is believed that the underflow would be greater and therefore that the overdraft would be larger.

(229) Any plan of utilization of the water of San Gabriel River in Pasadena Basin must provide for bringing in the water of the years of large runoff and causing the water plane to rise so that there will be a reserve for the possibly long series of dry years. As stated this higher water plane will, it is believed, cause greater underground escape toward Whittier Narrows and enough additional water must be brought in to take care of this as well as the increase in pumping.

(230) In the analysis of the situation made by the Division of Water Rights it was estimated that at the same use per acre as at present it will require 16,000 acre feet more than the present draft to water the entire acreage of valley floor in Pasadena Basin. In addition there are many acres of hill and foothill land as yet very little settled and it is to be anticipated that all of this will be taken within the city limits eventually. It is therefore believed that the City can use 30,000 acre feet of water from San Gabriel Canyon in the next 25 or 30 years and in view of the leakage above noted it may be imperative to have this entire quantity come from foreign



water in addition to local supplies. If the draft does not develop to that figure the surplus will merely escape underground toward the Narrows in an equated stream or will not be diverted from the river.

(231) Approaching the matter in another way the City of Pasadena estimates an increase of draft on the basin of 21,000 acre feet by 1950. Using the average elevation of the water plane since 1916 the city finds a present overdraft of 10,000 acre feet making a total supply of 31,000 acre feet of outside water necessary by 1950.

(232) All applicants except the City of Pasadena and the City of Long Beach propose to divert from San Gabriel River without building storage for themselves but will depend on being able to divert from discharge regulated by a reservoir to be constructed at the Forks site on San Gabriel River by Los Angeles County Flood Control District. Construction of the reservoir has not been begun, it has been in litigation, it is still a matter of dispute and final plans have not been settled. No assurance exists that it will be built in the near future. None of the applicants, as such, have any legal power to advance the construction of the reservoir.

(233) Permits issued in response to such applications at the present time might remain unconsummated for an indefinite time because the permittee could not be required to construct diversion works and conduit in advance of assurance that water would be available. The Division of Water Rights could not cancel such permits for failure to complete inasmuch, if issued, they would be issued with full knowledge that their consummation depended on another organization than the applicant, and lack of completion could not be ascribed to lack of diligence on the part of the applicant. In addition most of the projects thus proposed are of doubtful feasibility, which fact, while not determinative, yet lends weight to the considerations just enumerated.

(234) The Cities of Long Beach, Compton and Whittier ask permission for storage at Pine Canyon but this site is to be utilized by the prior applicant City of Pasadena under permits which will be granted. Obviously two cannot occupy the same site unless the feasible capacity is much greater than is shown by maps filed. There is however the possibility that the City of Pasadena will not construct the reservoir and if so the site will be available to another applicant.

FINDINGS

(235) The following conclusions are the result of a critical analysis of the data gathered in an investigation costing \$105,000 and covering a period of five years, and a large amount of information gathered previous to that time.

- (1) Large quantities of water waste into the ocean in the majority of years from San Gabriel Canyon.
- (2) The amount so wasting has a relation to the amount which discharges from the canyon and the elevation of water plane in central San Gabriel Valley.
- (3) This relation can be expressed by a series of curves or by a tabulation from which the amount of water which would waste with any flow and with any elevation of water plane can be calculated.
- (4) The average waste thus calculated is smaller by a wide margin than the waste calculated by two other methods and is therefore believed to be conservative.
- (5) The use of these curves in calculating waste in any future flows and the diversion of this waste will not deprive the underground basin of water which normally would reach it over a period of time.
- (6) After allowing for all possible variations from observed conditions which would decrease the calculated waste and after allowing for increased spreading at the mouth of San Gabriel Canyon there would be as calculated from the curves, if the cycle of runoff and water plane fluctuations since 1904 were to reoccur, an average annual waste of 57,000 acre feet.

- (7) Use in Pasadena Basin will increase so that 30,000 acre feet on the average each year from an outside source can be beneficially used.

O R D E R

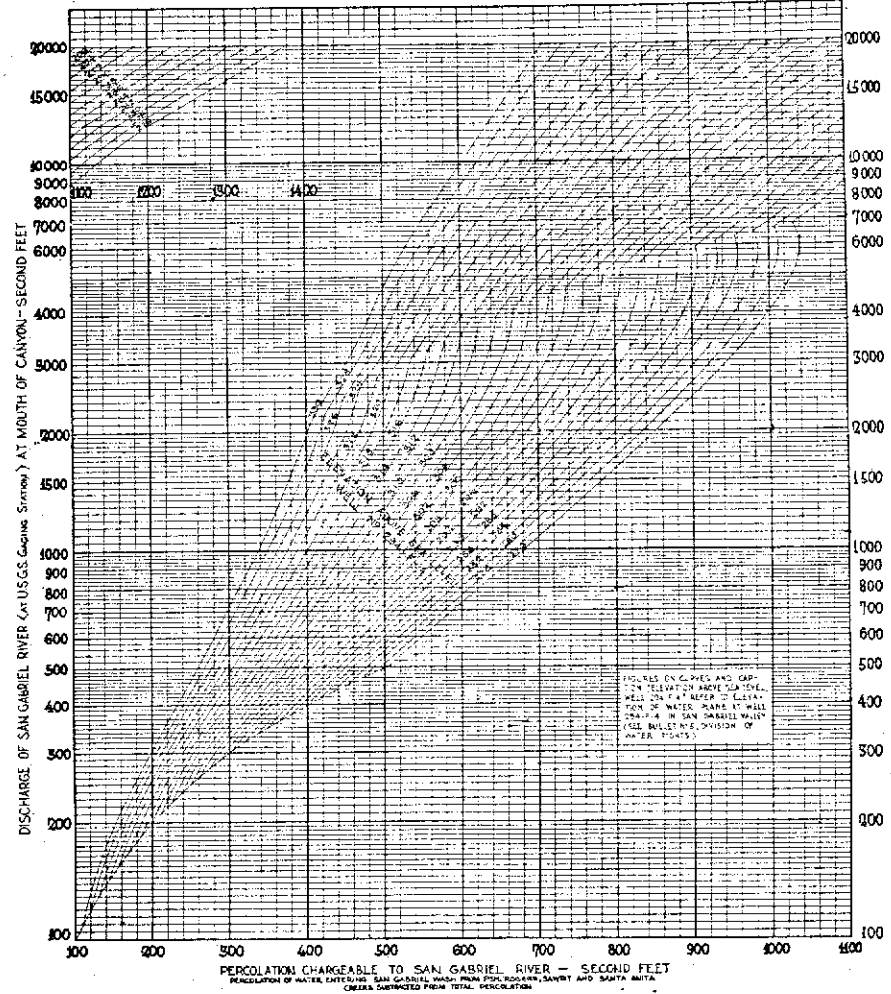
Applications 3328, 3329, 3330, 3331, 3741, 4014, 4049, 4447, 4448, 4534, 4582, 4590, 4604, 4860, 5290 and 5699 for permits to appropriate water having been filed with the Division of Water Rights as above stated, protests thereto having been received, a field investigation having been made and a public hearing having been held and the Division of Water Rights now being fully informed in the premises:

IT IS HEREBY ORDERED that Applications 3328, 3329 and 4447, and Application 3331 insofar only as the latter refers to storage at Pine Canyon Reservoir, be approved and that permits be issued thereon to the City of Pasadena subject to the usual terms and conditions and the following special terms and conditions, to wit:

- (a) Combined diversions to storage under Applications 3328, 3329, and 3331 shall not exceed 65,000 acre feet in any one year.
- (b) Permittee may withdraw water from storage and convey such water to Pasadena at any time, but shall not so withdraw more than 40,000 acre feet in any 12 month period beginning October 1st and shall not take by direct diversion to Pasadena and/or withdraw from storage and convey to Pasadena in the aggregate more than 150,000 acre feet under this and all other permits granted concurrently herewith, in any five year period beginning October 1st.
- (c) The permittee shall impound and/or divert water hereunder only when, under existing conditions, water is undiverted and

unregulated would discharge into the Pacific Ocean from San Gabriel Canyon, and (except as hereinafter provided with reference to temporary impounding of water subject to release for percolation) shall impound and/or divert only that part of the flow which if undiverted and unregulated, would reach the said ocean. When under existing conditions no water flowing in the San Gabriel Canyon would reach the Pacific Ocean, all water flowing into permittee's reservoir shall be permitted to pass the said reservoir undiminished in quantity.

- (d) Existing conditions herein referred to shall mean those conditions of the San Gabriel River system which now obtain by virtue of natural conditions as modified by existing diversion, channel, protective, and control works and do not refer to height of water plane, which is naturally variable.
- (e) The right herein granted to permittee shall be to appropriate and use water from the source and with the limitations herein fixed which would, under existing conditions, as above defined, reach the Pacific Ocean; and as to such water permittee has, and so long as the conditions of this permit are met will have, priority. For the purpose of calculating what proportion of any future flood flow would so reach the ocean and what proportion would percolate into the gravels, curves have been developed which are the result of an intensive five year investigation by the Division of Water Rights; and as it has been found that impounding and/or diversions based upon limitations fixed by said curves will not decrease the percolation occurring under existing conditions as herein defined, said curves



PERCOLATION CHARGEABLE TO SAN GABRIEL RIVER - SECOND FEET  
 PERCOLATION OF WATER ENTERING SAN GABRIEL WASH FROM FLOODPLAIN, MOUNTAIN AND SANTA ANITA  
 CREEKS SUBTRACTED FROM TOTAL PERCOLATION

STATE OF CALIFORNIA  
 DEPARTMENT OF PUBLIC WORKS  
 DIVISION OF WATER RIGHTS  
 SAN GABRIEL INVESTIGATION  
**PERCOLATION IN SAN GABRIEL WASH  
 CHARGEABLE TO WATER FROM  
 SAN GABRIEL CANYON**  
 THESE CURVES SHOW ALL RECORDS LOCATION OF  
 PERCOLATION IN SAN GABRIEL WASH. THE  
 PERCOLATION IN SAN GABRIEL WASH CHARGEABLE TO THE  
 SAN GABRIEL RIVER IS THE PERCOLATION IN SAN GABRIEL WASH  
 MINUS THE PERCOLATION CHARGEABLE TO THE  
 FLOODPLAIN, MOUNTAIN AND SANTA ANITA CREEKS.  
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 FLOODPLAIN, MOUNTAIN AND SANTA ANITA CREEKS.  
 HAROLD CONKLING, CHIEF OF DIVISION  
 1928

shall be used in calculating amounts of water which may be impounded and/or diverted from any given flow. Said curves are attached hereto and made a part hereof and are more fully set out and explained in the opinion and order of the Division of Water Rights in the matter of this application and permit. Said opinion and order is hereby referred to as explanatory of the terms and conditions of this permit and as setting forth the facts found by the Division in the matter of this application and permit.

- (f) In the use of said curves and in all calculations involving discharge of water at the mouth of the San Gabriel Canyon, such discharge shall be taken to be the mean daily flow from midnight to midnight which, under existing conditions as herein defined, would pass the present United States Geological Survey gaging station at the mouth of the San Gabriel Canyon. Whenever storage facilities are provided in the San Gabriel Canyon by the permittee, or others such as to interrupt the flow of water in the river above its mouth, quantities of water stored or released shall be so determined as to enable accurate calculations to be made of discharge at the mouth of the San Gabriel Canyon which would have occurred under said existing conditions if such storage facilities had not been constructed. Such calculations and determinations shall be subject to the approval of the Division of Water Rights.

- (g) Percolation varies with the elevation of the water plane in the central San Gabriel Valley and for the purpose of ascertaining the water level to be used in conjunction with said curves, the elevation of the static water plane as determined by a well designated as 294-F-4 in Bulletin No. 5 "San Gabriel Investigation, Division of Water Rights, Department of Public Works", or some other well located in the vicinity thereof, and approved by the Division of Water Rights shall be used. Elevation of water plane shall be based upon United States Geological Survey datum.
- (h) Permittee may retain temporarily in Pine Canyon Reservoir described in Applications 3328, 3329 and 3331, all water which reaches said reservoir during the periods when permittee is authorized thereunder to impound and/or divert water, including that which would have percolated, determined as hereinbefore set out, except that part which may be diverted by others for direct use. Permittee shall release prior to May 1st succeeding, such water as would have percolated, in quantities such that it will percolate into San Gabriel Wash above Telegraph Road on the San Gabriel River, and Vernon-Downey Road on the Rio Hondo. Provided however, that such time shall be extended to a date not later than July 1st in years in which the unregulated flow would have wasted into the ocean after March 15th. Whenever at any time percolation in the San Gabriel Wash in the amount which occurs under existing conditions as hereinbefore defined shall be provided from waters originating in San Gabriel Canyon, the permittee shall be permitted to divert and/or impound water hereunder without having to cause any additional percolation.

- (i) When and if the water plane at Well 294-F-4 shall have receded to a lower elevation than 276 feet above sea level (U.S.G.S. datum) or shall have risen to a higher elevation than 330 feet above sea level (U.S.G.S. datum) an investigation shall be undertaken by the permittee under the supervision of the Division of Water Rights to determine what amount of waste would under such conditions take place if no reservoirs had been constructed in San Gabriel Canyon and permittee's diversion under such condition shall be regulated in accord with findings made by the Division of Water Rights at that time.
- (j) In addition to the release of water hereinbefore referred to, permittee shall release all water which, if unobstructed, would pass underground through permittee's dam site.
- (k) Leakage from permittee's reservoir which appears in the stream below the reservoir shall be treated as release from the reservoir.
- (l) Permittee shall install and operate requisite instruments to observe change in stage of water in reservoir, release from reservoir, evaporation from reservoir, inflow to reservoir, rainfall at reservoir, and elevation of water plane in central San Gabriel Basin. Supervision of such installations and operation of such equipment shall be with the Division of Water Rights and shall be performed to the satisfaction of the Division. All records so obtained shall be open to access by the public at all times.



IT IS HEREBY ORDERED that action be held in abeyance on Applications 3330, 3741, 4014, 4049, 4448, 4534, 4582, 4590, 4604, 4860 and 5290 until further order is entered, and

IT IS HEREBY ORDERED that action be held in abeyance on that phase of Application 3331 proposing storage at the Forks Reservoir Site until further order is entered, and

IT IS HEREBY ORDERED that Application 5699 be denied and cancelled upon the records of the Division of Water Rights.

Dated at Sacramento, California, this fifth day of July, 1928.

*Harold Conkling*  
(Harold Conkling)  
CHIEF OF DIVISION OF WATER RIGHTS

HC:MP