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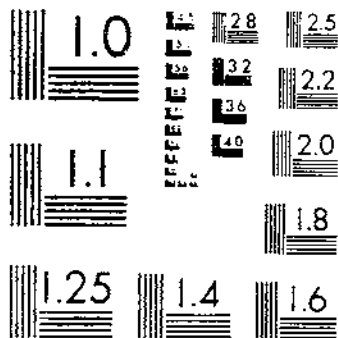
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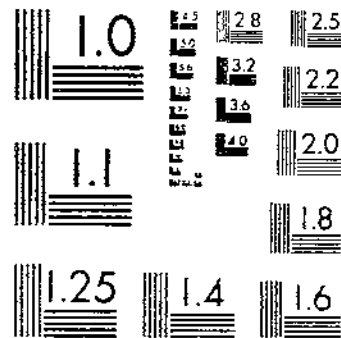
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UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

COMMERCIAL IRRIGATION COMPANIES¹

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INTRODUCTION

The commercial irrigation company is an organization designed to construct and operate irrigation works for the profit of persons who build the works and retain temporary or permanent ownership. It thus differs essentially from the mutual irrigation company and the irrigation district, which are nonprofit community enterprises.

Commercial irrigation companies in 1919, according to the Fourteenth Census, were irrigating 1,822,001 acres and reported a total capital investment of \$85,735,470. Commercial companies for years, however, have been giving place to community organizations, important transfers having taken place since 1919. In view of this, the present study was undertaken to determine (1) whether the com-

¹ Prepared under the direction of W. W. McLaughlin, Associate Chief, Division of Agricultural Engineering.

mercial company is useful mainly as a phase in the development of community enterprises, and what promise, if any, it still holds as a permanent operating organization, and (2) the influence upon its usefulness of public regulation, which is mainly a development of the past 15 years. Whatever part the commercial company may play in future development of new irrigation projects, it unquestionably represents at the present time a considerable investment and is the means of serving many water users. This connection presents some serious problems in administration and public regulation upon which it is hoped the discussion in this bulletin may throw light.

Data were secured for this study from some 40 projects, 13 of which are located in California and the others scattered throughout the West, mainly by visits to company headquarters and in some cases from records of State commissions; in addition, a considerable amount of detached information was obtained from various sources concerning many other enterprises. Of these 40 projects, 1 suffered disaster to its irrigation works which has not been repaired, 5 have recently been acquired by the water users, and 34 are being operated by commercial companies.

Commercial irrigation companies are to be sharply distinguished from domestic-water companies, of which there are many in the United States. The two groups are on entirely different economic footings, and the comments and conclusions presented in this bulletin as to the character, usefulness, and financial returns of commercial companies furnishing water for irrigation are not intended to apply to those furnishing water to municipalities for domestic and industrial purposes.

CONCLUSIONS AS TO PRESENT USEFULNESS OF COMMERCIAL COMPANIES

AS A MEANS OF IRRIGATION DEVELOPMENT

The commercial company's chief value in irrigation development is in combined land and irrigation enterprises. It is not a medium for acquiring large profits and is best adapted to projects which depend for profits primarily upon the increment in land values resulting from irrigation and in which selling prices to settlers are placed low enough to encourage individual success. When the need for new development again arises and land-settlement conditions improve, sound projects of this type may offer reasonable profits to speculative capital, with, of course, the risk incident to any new enterprise.

Capital stock of commercial companies is on the whole the only suitable means of financing new irrigation construction privately. Bonds are not suitable, for their value depends wholly upon future settlement and improvement of lands at a fairly rapid rate, and they are, therefore, speculative rather than income-producing investments. Capital stock, however, taken by a group of individuals familiar with the situation and prepared to take either substantial profits or heavy losses, purports to represent nothing else than speculative ownership and consequently offers a more legitimate means of attracting capital for new development.

The commercial company is not so well adapted as the irrigation district to financing extensions, improvements, or increase of water supply of an established irrigation community.

AS A PERMANENT IRRIGATION UTILITY INVESTMENT

IN GENERAL

Experience under public-utility regulation has shown rather conclusively that so far as the present and immediate future are concerned, standards used in fixing rates of domestic water, power, and gas utilities can not be applied unqualifiedly to irrigation companies. The income of an irrigation utility is more closely identified with the occupational industry of the average consumer than is the case with other utilities. The quantity of irrigation water used by a farmer largely governs the volume of crop production; hence the value of irrigation-utility service to the farmer depends more upon his profits and losses than the value of service to consumers of other utilities depends upon their profits and losses, and consequently the irrigation-utility income is more subject to violent depressions. The irrigation-utility income, furthermore, owing to larger payments from individuals and greater difficulty in taking on substitute consumers, suffers more when consumers discontinue service. An irrigation company is ordinarily more affected by competition from individuals and can not always claim a monopoly. Finally, the welfare of the irrigation utility is based upon a hazardous industry which for some years past has not expanded in step with many urban pursuits upon which the growth of other utilities depends.

For these reasons investors in irrigation-utility stocks have not been receiving the 7 or 8 per cent return on valuation set as the standard in many rate-fixing cases and can neither expect to receive it nor substantiate a claim that a much lower return is necessarily confiscatory, so long as the present agricultural situation persists. Even under very favorable circumstances an annual return of 8 per cent is difficult to secure from an irrigation project; hence the added difficulty, where farmers are receiving 3 per cent on their own farm investments may be readily appreciated. In reporting on 2,598 irrigated farms investigated in 1924 Teele (9)² shows that an average of \$594 was available from farm income for payment of interest on debts and for reduction of indebtedness, or 3.55 per cent of the total farm value. Of this the amount available for reduction of indebtedness was \$300, or 2.46 per cent of the farmer's net investment after deducting indebtedness. Out of this return must come capital irrigation charges, such as profit to irrigation-utility owners.

The practical result of this situation is that utility owners in a number of cases have endeavored to dispose of their irrigation systems to the water users, and failing this, have instituted drastic operation economies.

OWNERSHIP ADVANTAGES IN SPECIAL CASES

Advantages of irrigation-utility ownership, other than that of earning a fair return upon capital invested in irrigation works,

² Italic numbers in parentheses refer to Literature Cited, page 39.

tend in exceptional cases to offset operation deficits. Several examples follow:

(1) Assurance of water supply for large tracts of land, or development of additional supplies. This has actuated acquisition or continued possession of otherwise clearly losing enterprises, particularly where 40 to 50 per cent of irrigable land belonged to one concern not willing to risk its fortunes in a community organization. Earnings from land are being made to compensate for lack of irrigation profits in several such cases.

(2) Improvement of service to land close to a city and development of back country to augment the labor supply for a large stock-raising industry.

(3) Protection of water rights from encroachment by hostile owners. This was an important reason for the purchase of the Northern Colorado Irrigation Co. system by the city of Denver.

(4) Protection of a sugar company's interests by assuring an adequate acreage in sugar beets and discouraging competitors from entering the territory.

(5) Settlement of conflicting local interests. Several years ago a group of interests in southern California about to take over their carrier canal voluntarily assumed a public-utility status. They were suspicious of each other at that time and would not organize as a mutual company but were willing to trust the matter of rates and service to the railroad commission.

(6) Combined irrigation and power development. This feature, however, has very little force at present, in view of the tendency of power companies to sell out their irrigation business and to cooperate with irrigation districts. Furthermore, under public-utility regulation, irrigation losses can not be saddled upon power consumers, as was done in certain instances in the past. The situation differs fundamentally from recoupment of public-service losses through a purely private enterprise such as a land-development company.

AS A MEANS OF BEST SERVING THE INTERESTS OF WATER USERS

During an agricultural depression water users may be individually better off under a utility than under a community organization, if they can convince the rate-fixing commission that existing charges are higher than the lands can stand. Reduced rates, however, will probably mean poorer service. Aside from this doubtful advantage, the water user ordinarily has little reason to prefer the public utility to the district or mutual company from the standpoint of operating the system serving him or improving its facilities, provided he chooses the directors of his community enterprise wisely and is willing to spend the money necessary to hire an able executive. With equal managerial ability and authority, an irrigation district can be operated more economically than a utility, because of its power to spread charges over all irrigable areas and for other reasons discussed herein, and is therefore more desirable from the rate-payer's standpoint. District and mutual company charges, furthermore, include amortization of the cost of construction, rather than a perpetual profit to outsiders on capital invested. District bond

markets have been active at certain periods during the present century, whereas money for commercial enterprises has been increasingly difficult to obtain. Consequently the possibility of financing needed storage, extension, and improvement work through district bond issues has been a most important inducement to water users to buy commercial systems serving them, districts being preferred to mutual companies primarily because of their better bond markets. In view of these conditions, the trend from commercial to district ownership of irrigation works has been marked, especially during the past 12 to 15 years; and with the district's superiority for operation and supplemental development purposes established, there is no apparent reason why the trend should not continue.

CLASSIFICATION OF COMMERCIAL COMPANIES

CONSTRUCTION OR DEVELOPMENT COMPANIES

Construction or development companies are designed for construction of irrigation systems, sale of so-called "water rights" at a profit and retirement from business upon disposal of all rights. They have often been promoted in connection with subdivision and sale of land, in which case the profit is expected to accrue largely from enhanced value of land due to irrigation, rather than from sale of rights to the use of water alone. The two methods of passing control to settlers are: (1) Provision in contracts that when the company shall have sold rights equal to the carrying capacity of the canal it will transfer the system without further consideration to the water users; and (2) formation of a mutual irrigation company prior to land sales and transfer of stock to land purchasers, control automatically passing to water users when more than one-half the acreage has been sold.

COMPARATIVE FEATURES

Temporary life; expected profits from initial sales of "water rights" or of land and rights; water users acquire proportional interests in the irrigation system; irrigation rates usually not subject to public regulation.

PRIVATE-CONTRACT COMPANIES

These companies construct irrigation systems and sell rights to the use of water therefrom to land purchasers or other selected individuals under contracts providing for perpetual service at rates usually limited by the contracts and payable whether water is used or not. These contracts do not provide for assumption of ownership or control by water users.

*The term "water right" is often applied loosely in connection with commercial companies. A water right, strictly speaking, is a right to the use of water, either originally acquired by appropriation and perfected by beneficial use, or derived through ownership of riparian land. If acquired by appropriation, it may vest in the company making the diversion or in the individual to whose land water is delivered, depending upon the statutes and court decisions of the State involved. The term is used frequently, however, to denote the water user's interest in the irrigation system or his right as against the company, which is more properly a right to the continued delivery of water through that system. When such usage is intended in this bulletin, "water right" is shown for convenience and clarity in quotation marks.

COMPARATIVE FEATURES

Permanent life; expected profits from initial sales of "water rights" or of land and rights and from annual rates; users acquire no interest in the irrigation system; rates usually not subject to public regulation.

PUBLIC-UTILITY COMPANIES

These enterprises devote all or part of their water supply to public use, "holding themselves out" as ready and willing to serve all applicants to the extent of the available supply. Contracts regarding rates made with consumers after dedication to public use are subject to modification by the State. Consumers, therefore, may be either contract holders or annual renters of water service.

COMPARATIVE FEATURES

Permanent life; expected profits from annual rates; users acquire no interest in the system; rates subject to public regulation.

CONTRIBUTION OF COMMERCIAL ENTERPRISES TO IRRIGATION DEVELOPMENT

The rapid advances in large irrigation construction in the seventy's and eighty's which marked a sharp departure from earlier small-scale individual and community work, were financed mainly by outside capital attracted by the prospect of great increases in land values, resulting from irrigation as well as profits from sale of "water rights." Failure in so many of these ventures to induce settlers to buy "water rights" compelled recognition of the absolute interdependence of land and water, and led on the one hand to passage of the Carey Act and on the other to many land-development schemes in which irrigation construction has been necessary but often more or less incidental. In the meantime other systems now usually classed as public utilities were being developed, in some cases from very small beginnings, for the purpose of obtaining continuous profit from water deliveries to customers on an annual-rental basis. From this commercial irrigation in the West has grown a large number of settled agricultural communities, of which many now own their irrigation systems free from material indebtedness, others have bonded for purchase of the systems, and still others are being served by commercial enterprises. The number of older commercial enterprises is constantly decreasing, mainly by transfer to the district form of organization, and few new ones are being organized except those identified with land subdivisions, mostly on a small scale.

WHY COMMERCIAL-COMPANY INVESTMENTS HAVE BEEN GENERALLY UNPROFITABLE

Commercial-irrigation investments, while contributing substantially to the agricultural development of the West, have been so generally unprofitable to investors that little new capital has been available for such purposes for some years past. Certain causes of trouble, common to all types of irrigation organizations—commercial and nonprofit alike—are as follows: Lack of complete financing, re-

sulting in inefficient works and contraction or loss of original investment; overcapitalization, due largely to high promotion costs, faulty engineering, and extravagant construction; failure of water supply to measure up to expectations; poor soils, overoptimism regarding crop yields and prices, and inaccessibility of profitable markets; inadequate colonization of irrigable lands; disaster to irrigation works, and to other property from operation of works; high capital charges, in some cases unavoidable because of necessarily expensive character of irrigation works and roughness of country traversed by canals; poor management and extravagance in administration; expensive litigation, frequently in connection with water rights; and heavy delinquencies in payment of water charges during periods of agricultural depression.

Some troubles, then, resulted from mistakes or dishonesty in original financing or construction of systems, whereas others arose in connection with subsequent operations. While often disastrous to the particular investments involved, these troubles alone should not weigh heavily against commercial developments, especially as many of them grew from conditions the effect of which is being constantly lessened by increasing knowledge and experience. On the other hand, as shown below, there are other features which have an important bearing upon the desirability of commercial investments as distinguished from community irrigation obligations, and therefore call for special consideration.

CONSTRUCTION OR DEVELOPMENT COMPANIES

INABILITY TO INDUCE LANDOWNERS TO BUY "WATER RIGHTS"

Many early projects failed on account of inability to induce landowners to buy "water rights." Canals were built by promoters, frequently with borrowed money, to serve both public and private lands on the assumption that on completion of construction entrymen and owners would buy "water rights" promptly. Unfortunately there was no way of compelling them to do so. Consequently lands were often acquired by speculators who refused to purchase "water rights" but held out in the hope of selling their lands to others at high prices. So much land speculation and so little settlement by bona fide farmers meant ruinous delays to canal promoters in meeting obligations, with the result that creditors often had to foreclose and in turn dispose of the systems on the best terms obtainable. An insurance company that had made several such loans was compelled to take over six canals in one State, two of which it is still operating through subsidiary companies pending final disposal of all contract rights, the original investment having been written off many years ago. After such experiences it was realized that prevention of this particular trouble rested upon securing control of land as well as water, or assurance of a substantial demand for water, before undertaking construction.

DELAYS IN SELLING IRRIGABLE LANDS

Acquisition of large tracts of dry land, construction of irrigation works, and resale of subdivided tracts with "water rights" attached has been the program followed by some who appreciated the need of

identity in control of land and water. Such developments have proved profitable when colonization proceeded rapidly, the water supply proved ample, irrigation works adequate, soils fertile, and economic conditions such that settlers were able to make their payments year after year. They have been disappointing where settlement was slow or where the cost to settlers was so high as to result in widespread failures and abandonments. Where such conditions are general, forfeiture of payments already made by settlers on land purchases is poor solace to the company. New people must be obtained to take their places, and this is made more difficult by the existence of numerous abandoned farmsteads. Promoters of certain projects, with the sole idea of selling land, have yielded to the temptation to build irrigation works as cheaply as possible, trusting to be out of the way before replacements should become necessary. Protracted delays in selling the land have reduced expected profits in a number of undertakings to little or nothing. In attempting to avoid such situations neither rapid land settlement nor favorable economic conditions can be assured, but certainly it is advantageous to design such projects with the idea of success to the settlers.

INSUFFICIENT OPERATION CHARGES

"Water-right" contracts offered by development companies usually provided that the settler pay, in addition to purchase-price installments, an annual operation and maintenance charge while the company operated the project. To attract purchasers this charge was often made very small on the assumption that the project would soon be sold out and the few seasons' operation deficits easily absorbed. Delays in selling "water rights" and lands, however, led to heavy accumulations of annual deficits which frequently affected profits seriously.

PRIVATE-CONTRACT COMPANIES

Returns on investments in private-contract companies are expected primarily from sale of "water rights" or of land with "water rights" attached, and are, therefore, subject to much the same hazards as investments in development companies. Comments made above, particularly on delays in selling irrigable lands, are applicable here. The annual operation charge, however, requires further discussion.

INFLEXIBLE CONTRACT OPERATION CHARGES

An added margin of profit is anticipated by owners of contract companies to accrue perpetually from the annual operation or service charge exacted from "water-right" purchasers; otherwise there would clearly be no inducement to continue indefinitely in the irrigation business after selling all "water rights." This annual service charge, to fulfill its purposes, should be high enough to defray operation and maintenance costs, provide for replacement of worn-out or obsolete works, and yield in addition a reasonable profit to the owners of the system. Actually the charge was often set at \$1 or \$2 per acre, was fixed perpetually by contract, and was therefore unalterable—with certain exceptions noted under "Companies subject to regulation" (p. 28) without consent of the water user.

Time has developed several fatal weaknesses in these contract charges: (1) Predication upon economic conditions existing when the contracts were signed, (2) inclusion of little or no margin for protection against future changes in economic or operating conditions, and (3) inflexibility. Consequently such contract rates have almost invariably proved insufficient in the face of increasing operation costs, and the owners have found themselves not only without their annual margin of profit, but on the contrary compelled to make up operation deficits themselves. Transfer of most of such systems to the water users has inevitably resulted—in some cases at reasonable compensation and in others as a gift, depending upon the bargaining position of the parties.

It is to be emphasized that this condition has nothing to do with the ability of water users to pay the contract rate, and is therefore to be sharply distinguished from the main trouble with irrigation-utility rates, discussed later. The water users under private-contract companies, because of their contractual rates, simply hold the whip hand. Determination of the question of whether a given company is a private-contract company or a public utility is consequently often a vital matter to owners and water users alike.

PUBLIC-UTILITY COMPANIES

Public-utility irrigation companies—called for convenience “irrigation utilities”—normally derive their income almost entirely from annual rates paid by water users. The fact that owners of a given utility may have resources connected with the utility's functions—such as earnings from operation or sale of irrigated land—from which deficits incurred in operating the irrigation system may be recouped, is simply a fortunate combination of circumstances that may make it possible or even desirable to continue in the irrigation business in the face of inadequate irrigation returns, but that ordinarily has no bearing upon irrigation rates fixed by a public-utility commission. Many of the important irrigation utilities have no such outside resources. Consequently the rate question is vital in irrigation-utility finance, and is in fact the outstanding question facing these companies to-day.

INSUFFICIENCY OF ANNUAL RATES

That rates of irrigation utilities are all too frequently inadequate is shown by Table 2 relating to California companies, which comprise a very large proportion of irrigation utilities in the West. This table is presented because the exact figures upon which it is based are available and because it is a graphic representation of the general situation in which irrigation utilities are found throughout the West.

The table shows that for the 14 years ended with 1926 an average of 28 companies reporting to the railroad commission showed net incomes aggregating \$424,734 per annum (averaging \$15,169 each), while 33 reported net losses aggregating \$315,403 per annum (averaging \$9,558 each). That the companies with resources other than proceeds from sales of irrigation water fared better, on the whole, is indicated by the fact that the ratio of average irrigation earnings

to average total revenues was 59 per cent for companies reporting net incomes and 78 per cent for those with net losses.

The most significant fact brought out by this table is that the excess of yearly average net incomes over net losses for all companies—\$109,331—is but 0.38 per cent of the total nominal capitalization of all companies. Even assuming that to approximate real value the aggregate nominal capitalization should be cut in half, which would undoubtedly be a much too drastic reduction, still the annual net return to owners of California irrigation utilities, considered as a whole, would average for these 14 years less than 1 per cent on the value of their investments.

The table shows further that not over five companies paid dividends in any year. Annual dividends averaged 3.82 per cent of the capital stock of companies paying them. The averages have been especially low during the past six years, except in 1923, when 70 per cent of dividends paid was derived from revenue other than irrigation sales.

Complete information from other States is not available, but data on hand show the situation to be in line with that in California. Of the commercial companies in other States doing primarily an irrigation business which were studied in connection with this project, very few were found to be actually making money under existing rates.

WHY RATES ARE INADEQUATE

Existing irrigation rates as a whole not only fail to give utility owners a 6 to 8 per cent return, but in some cases are barely sufficient to provide properly for operation and maintenance. Why, then, has public-utility regulation not corrected this condition? Mainly for three reasons, discussed in the following pages: (1) With some companies rate increases can not be legally forced upon the water users, (2) with others increases are legally and economically possible but inadvisable for psychological reasons, (3) with still others increases are legally possible but out of the question economically.

NO AUTHORITY TO CHANGE RATES

In several States there is no statutory authority for regulation of irrigation rates, and little or no demand for it, as only a few companies are affected. A more serious matter in some other jurisdictions has been the existence, on portions of utility systems, of private-contract rates which public authority is powerless to disturb. Such contracts were necessarily entered into before the companies devoted the balance of their water supplies to public use. Lack of legal power to increase these contract rates deprives the company of a portion of the income to which it would otherwise be entitled. Much friction among water users likewise ensues because of the apparent discrimination in rates.

INCREASES NOT ADVISABLE

Threatened loss of custom due to competition from individual pumping plants has deterred several companies from asking for needed rate raises.⁴ The effect of this condition is intensified by the tendency of so many prospective pump owners, in figuring pumping costs, to overlook interest and depreciation on the plant and the inevitable increase in operating cost when extensive pumping over a large area shall have lowered the underground water level.

Other reasons in this category for not seeking or allowing higher rates have been: (1) Probable retarding effect upon disposal of further "water rights"; (2) shift of intending settlers to neighboring projects, due to their lower water charges; (3) increase in already existing friction between private-contract holders and public-utility users on the same system, due to rate differentials; and (4) antagonism which might defeat pending negotiations for sale of systems to water users. In this last group of cases the owners' original purposes in building or acquiring the systems had been accomplished, and continuance of control even with adequate rate levels was no longer desired, because of reorganizations or other changes in ownership personnel or because needed storage or drainage works could be more successfully financed by district organizations.

USERS UNABLE TO PAY HIGHER RATES

In a large number of cases inadequate rates are due to inability of users to pay more for the service rendered and are maintained at such levels by companies or utility commissions through recognition of the fact that insistence upon higher payments would threaten the company's main source of income.

WHAT USERS CAN PAY

A study was undertaken by the Department of Agriculture in 1924-25 to determine how much farmers can pay for water. This study covered a number of irrigation projects or communities reflecting the principal interests in western agriculture and included 2,593 farms operated by their owners. The results, as reported by Teele (9), showed that the average net return over expenditures for farm and living purposes available for capital irrigation charges (amortizing district bonds, buying private-contract rights, or paying returns to utility owners) was \$3.70 per acre. These returns varied widely and were not at all proportionate to outstanding obligations for "water rights."

Table 1, which was suggested by the leaders in this study, shows the construction charge which will be amortized under the terms required or permitted by State irrigation district laws, based upon an annual available farm income of \$3.70 per acre. There is also included a comparison of charges under permissible public-utility returns.

⁴This led the California Railroad Commission in one case to fix a rate comparable with the cost of pumping at that time, which was lower than a rate based upon value of the system would have been. (4)

TABLE 1.—Construction charge per acre on which available farm income will amortize district bonds or pay permissible returns to public-utility owners

Annual farm income	Capital invested in irrigation works, or construction charge	Term in which district bonds bearing 6 per cent interest will be amortized	Maximum return to public-utility owners ¹	Annual rate required to provide return to public-utility owners of 8 per cent on capital invested
Dollars per acre	Dollars per acre	Years	Per cent	Dollars per acre
3.70	27	10	8	2.16
	36	15	8	2.88
	42	20	8	3.36
	47	25	7.9	3.70
	51	30	7.3	4.08
	54	35	6.9	4.32
	56	40	6.6	4.48

¹ 8 per cent is usually the maximum permissible return upon which public-utility rate revisions are based

Three conclusions may be drawn from Table 1:

(1) The limit upon valuation of irrigation works for rate-making purposes, beyond which public-utility owners could not expect to obtain 8 per cent under average conditions prevailing throughout these projects during the past few years, was well under \$35 to \$50 per acre.

(2) A net return of \$3.70 per acre per annum from farm operations will enable water users on a project capitalized at \$55 an acre to buy the works free and clear in periods authorized by district laws of some States, yet will not enable them to pay the annual rate necessary to give utility owners the maximum return they expect under favorable conditions.

(3) The margin available for capital irrigation charges or other purposes under present conditions is very narrow on many projects and therefore materially limits the value of service to the utility consumer. In view of this, a variation in an annual public-utility rate of \$1 or \$2 per acre is sufficient in many cases to measure the difference, on the one hand, between ability and lack of ability of users to pay and, on the other, between satisfactory and unsatisfactory performance from the utility owner's point of view. Particularly is this true since, as shown below, these figures are based on total irrigable areas from which the district, but not necessarily the utility, can count on revenue.

ABILITY TO PAY AS AFFECTED BY CHARACTER OF ORGANIZATION

Limitation of rate-paying ability by the narrow margin just discussed affects utility revenues more severely than those of districts or mutual companies and offers an explanation as to why nonprofit community organizations under parallel conditions have been better able to withstand the postwar agricultural depression.

The average irrigation project includes areas seldom or never irrigated but which benefit from their location through enhancement of market value or from subirrigation from adjoining lands. An

irrigation district usually includes and assesses such tracts, but a public utility can not force them to contribute revenue. On some utility systems, reasonably capitalized from the standpoint of potentially irrigable lands and which apparently would be feasible as districts, the value of service to lands actually irrigated is not sufficient to cover the entire overhead. The result is that rates are necessarily insufficient.

Some projects include areas in crops requiring water only in dry years, or in annual crops planted only when markets are promising, with resulting fluctuations in demand for water. Here, again, the public utility suffers by comparison with the district or mutual company or even with the private-contract company—which is entitled to an annual payment from each customer regardless of whether water is used or not—inasmuch as the utility has insufficient recourse or none at all to its idle noncontract users. Liens against contract lands acquired by public utilities prior to commission regulation have been left undisturbed by State commissions in some rate-fixing cases, but usually these cover only part of the lands served and therefore afford only partial protection. Stand-by charges furthermore (see "Public regulation of irrigation utilities," p. 23) can not cover the entire range of expenses. Consequently losses from lack of demand must be (1) anticipated by fixing rates estimated to be adequate when averaged over a series of years; or (2) included in subsequent years' rates and paid wholly or partly by these occasional users; or (3) absorbed by utility owners. Where the first course is feasible the utility may well be on a sound basis, but the difficulty in so many actual situations is that higher rates necessary to cover lack of revenue from temporarily idle lands are found impracticable when measured by ability of irrigated lands to pay. Increased rates required by the second course are often equally impracticable, whether applied to regularly irrigated lands or to those occasionally irrigated. However, crops subject to extreme fluctuations in price, such as rice, are capable of carrying heavy loads in some years.⁵ Revenue losses due to lack of demand that can not be carried by actual users must necessarily be written off by the utility.

Temporary shortages of water cause loss of revenue which can be recouped by districts and mutual companies through assessments upon all land or stock and against which private-contract companies are usually protected by contract provisions for prorating water. Public utilities may have similar provisions in contracts; but these, as stated above, usually apply to only part of their users. Recovery of these losses is subject to much the same difficulties as those outlined in the preceding paragraph; in other words, is impracticable where higher rates would exceed the value of service.

Water users are apt to be very antagonistic toward a public-service corporation representing outside capital—much more so than where stock is owned locally. They dislike to pay a profit to outsiders,

⁵ This fact led the Texas Board of Water Engineers in fixing rates of a rice irrigation company in 1919 to include 6 per cent on valuation as the owners' normal return and an additional 7 per cent as "estimated reasonable profits"—subject to modification whenever necessary—in order to compensate the owners for losses in other years due to reductions in area served. (J. E. Broussard et al. v. The Anahuac Canal Co., July 16, 1919.) Disaster to the irrigation system in question prevented a thorough test of this set-up.

who may have no interest in local matters aside from making money out of the irrigation system, and they are not readily convinced of absence of profits. With a heritage of bitterness from the days when water disputes often meant bloodshed, real or fancied grievances against the company are likely to be perpetuated and to result in a permanent attitude of hostility. The practical results are lack of cooperation from users in paying bills promptly and in effecting operation economies, general unpleasantness in administration, the importance of which is not to be minimized, and a multiplicity of damage suits which in the aggregate are very costly to the company irrespective of outcome.⁶

This expensive hostility toward the management is, on the whole, much less pronounced in community enterprises.

Other advantages of the district over the utility that have a bearing upon operation costs are ability to obtain cheaper money; lower cost of financing; exemption from local taxation, which is granted to commercial companies in only a few States;⁷ possibility of correlating irrigation and drainage activities under one management; and amortization of replacement charges after they become necessary, rather than in advance, as utility consumers are required to do—a point of considerable importance to a project in course of development.

The fact is to be emphasized that these several causes, while often of little importance in individual cases, have in the aggregate materially influenced the fortunes of irrigation utilities.

This question of ability of users to pay, which is the crux of the irrigation-utility situation, may be summed up as follows: Irrigation projects are capitalized on the basis of potentially irrigable lands; incomes of irrigation utilities are nevertheless derived from payments by actual rather than potential water users, because of the impracticability of holding unirrigated lands liable; deficits due to failure of irrigable lands to take water must therefore be written off by the utility or provided against by actual users of water to the extent of the value of service to them, which in the last analysis is measured by their ability to pay from proceeds of farm operations; the margin of available farm income for some years past has been very small; irrigation-utility owners have therefore been limited to generally unsatisfactory profits or required to take net losses; and generally adequate irrigation-utility rates will be neither possible nor justified until such marked improvement in the agricultural economic situation has taken place that available income from actually irrigated farms will more than pay capital charges on all lands for which service is made available.

⁶The local point of view on this matter may be illustrated by a case against a California irrigation utility in which the jury, after watching the plaintiff's attorney display on a blackboard calculations from which he argued that judgment should be given for \$1,700, returned a verdict for over \$1,000.

⁷This is a very substantial advantage. Taxes paid by the California companies concerned in Table 2 averaged 10 per cent of total operating expenses for the years 1913 to 1926, inclusive, being lowest, with 7.7 per cent, in 1916, and increasing with considerable regularity to 13.2 per cent in 1926.

INTERNAL FEATURES OF COMMERCIAL COMPANIES

CHARACTER OF ORGANIZATION

Commercial companies are usually incorporated, for reasons common to many industrial enterprises—namely, to effect a business organization which may enter into contracts, incur obligations, appear in court, and hold property in the corporate name rather than by joining all individual owners; to limit liability of owners; to secure perpetual succession; to compel assent of disaffected minorities to expenditures for needed improvements; and to attract capital by issuance of stock and bonds. However, incorporation is not essential, even to a public-utility status, for a system owned solely by one person is classed by law as a utility if it performs public-service functions.

Commercial enterprises engaged in other than purely irrigation service are frequently organized into two or more companies under common ownership. For example, Kern County Canal & Water Co., California, which holds most or all of the capital stock of 17 subsidiary irrigation companies, is controlled by the interests owning Kern County Land Co., which in turn owns a very large percentage of lands served by the combined systems. Associated land and irrigation enterprises have been numerous. Other combinations include irrigation and livestock, power, or packing companies. Segregation of functions under different companies in the early history of a development paves the way for the eventual disentanglement of physical assets and accounts that accompanies transfer of the irrigation system to water users or submission to public-utility regulation.

SECURITIES

Capital stock of commercial irrigation companies represents ownership of the system only, and not, as with mutual companies, the right to receive water. A majority of stock of a commercial company is sometimes held by a majority of water users, as is the case with Hagerman Irrigation Co., New Mexico; and a mutual company may acquire public-utility status by delivering water to other than stockholders at cost. These, however, are exceptional phases. Commercial-company stock is acquired primarily in expectation of profits through dividends on enhanced market values or to obtain control of the irrigation system for some specific purpose. Very rarely, since the advent of public-utility regulation, do consumers acquire stock to obtain special privileges. In fact, lower rates to stockholders have been specifically denied by the California Railroad Commission in several irrigation cases on the ground that they constitute discrimination. Such advantages as priorities in water service or lower annual charges are now due, in most cases, to character of water rights held by the individual or to private-contract requirements which may be coincident with stock ownership yet not derived through it.

Bonds were sold extensively to finance Carey Act and private land and water development, especially during the early years of the present century, few such issues being sold after 1913. These

bonds were secured by first mortgages upon all irrigation works to be constructed, and by deposits of settlers' purchase-money contracts for rights to water delivery or for lands and attached rights. Deferred payments on contracts were secured in turn by first liens upon lands or, in case of reclamation of public lands, upon the settlers' equity therein. For reasons given above, defaults upon both Carey Act and private-company bonds were heavy.

Stocks, bonds, and short-term notes have all been issued by public-service enterprises to finance construction work. Extensions of going projects to reach new consumers have been financed by new security issues, by assessments upon outstanding capital stock, and by advances from consumers in the form of "water-right" contracts, prepayments upon rates, or outright donations. Indebtedness of utilities for capital expenditures can not be amortized through normal rates paid by consumers; therefore maturing bond issues or notes must be refunded by new obligations or paid from proceeds of stock assessments or sale of new stock. Seven per cent cumulative preferred stock of Sutter Butte Canal Co., California, was exchanged at par several years ago for maturing notes bearing 8 per cent interest. The principal motive in choosing preferred stock rather than bonds in refunding this particular indebtedness was to provide a more elastic financial structure than would have been possible by issuing all interest-bearing obligations in the form of bonds, inasmuch as a large refunding bond issue was arranged for at the same time.

Bond issues of a small number of irrigation utilities in several States, principally California, are now outstanding. The largest issue of a utility delivering water primarily for irrigation purposes known to the author is that of Sutter Butte Canal Co. In that case \$945,000 of 6½ per cent bonds were sold at various times during the past five years to refund earlier bond issues. A much larger issue of another California company sold in Europe about 15 years ago was foreclosed in 1927.

Commercial companies borrow money for operation and maintenance purposes on short-term notes as a matter of ordinary business procedure.

WATER RIGHTS

Water rights vest in the consumers in some States, and in others may vest in either the company or consumers, depending upon the statutes and court decisions involved. Where the title actually lies, as indicated under "Water charges and collections" (p. 18), has a bearing upon remedies against delinquent ratepayers, and furthermore becomes important when the water supply is insufficient for the needs of all consumers. That is, when water is scarce and consumers are themselves regarded as the appropriators, as is the case, for example, in Colorado, any priorities among them must be respected. On the contrary, if the company is the appropriator, consumers are on the same basis regardless of date of their first service by the company, and the water supply must be prorated among them all.

Statutes of some States⁸ provide that water shall be prorated in time of scarcity, and contracts between commercial companies and consumers frequently include provisions to the same effect. The effect of title to the water rights upon valuation of public-utility properties for rate-making purposes is discussed below under "Public regulation of irrigation utilities."

Water delivered by commercial companies is appurtenant to land as a result of law in some States and as a result of contracts with consumers in some others. Appurtenance is a decided advantage to a company which disposes of rights to water delivery by contract, in protecting its future market for sale of rights against transfers to new lands from lands already under contract. It is also advantageous to a company selling lands with rights to water delivery attached, in that the company is protected against alienation of water rights from lands on which it holds mortgages to secure deferred purchase payments. On the other hand, while a company in some States could legally refuse to deliver water to a delinquent landowner whose water right is appurtenant, its right to deliver that particular water to other land prior to forfeiture of the delinquent's water right by nonuse—and hence its opportunity to secure revenue therefrom—would be questionable.

Water rights acquired by appropriation entitle the user to divert definite quantities of water, the maximum being set by law in some States. Contracts between commercial companies and users almost invariably provide for delivery of specific quantities, such as 1 second-foot for each 160 acres throughout the irrigation season or, in case of stored water, 2 acre-feet per acre per annum, with the usual provision for proportionate reductions in case of shortage.

QUALIFICATIONS OF CONSUMERS

Irrigation companies which do not dedicate their water supply to public use may select their own consumers to the same extent that any other business organization may select individuals with whom it will make private contracts. The usual prerequisites to service in such cases are purchase of a perpetual right to water delivery or purchase of land with contract right attached.

Public-service companies, on the other hand, are required to serve consumers without discrimination and without imposition of unreasonable restrictions, to the extent of their ability and capacity of plant. This is a well-established principle.⁹ Any member of the public, therefore, who desires water for the irrigation of land lying within reach of the canal system, or within the area to which service has been dedicated, is entitled to service upon tender of established rates, provided the water is physically and legally available for his use. Irrigation utilities, from the nature of their industry, may limit service to particular areas of land or be required by regulatory

⁸ For example, the California act (*l. sec. 6, p. 86*) states that "as between consumers who have been voluntarily admitted to participate by the corporation in its supply of water or been required to be supplied by an order of the railroad commission, in times of shortage there shall be no priority or preference, and such corporation in times of shortage shall be required to apportion such supply ratably among its consumers."

⁹ For details see Wiel (*ib. sec. 1289, footnote 5*).

commissions to do so, in view of the fact that spreading a given supply of water over an area larger than justified by local water requirements is bound to impair its usefulness to that extent.

RIGHTS OF CONSUMERS UPON TRANSFER OF UTILITY PROPERTIES

The irrigation utility's obligation to serve the public, once assumed, can not be divested by transfer of the irrigation system to another public-service company. The new owner, if itself a public-utility company, takes the property impressed with the same duty of serving all persons who were being served by, or who could have required service from, the preceding owner.

An irrigation district, upon purchasing utility properties, succeeds to the obligation of continuing to render service to persons already receiving it, whether located within or without the district boundaries. Several cases support this principle. A point raised in connection with a proposed transfer of utility properties is whether a district will be required to serve persons outside the district boundaries who at the time of the transfer had not demanded and were not receiving service from the utility but were entitled to it. Apparently the courts have not yet definitely passed on this point.

Possible "dilution" of utility consumers' water supplies on transfer of utility properties to a water-storage district covering a much larger service area, with plans to develop additional water and assess the lands considerably more than they had been paying in the form of public-utility rates, was involved in a recent California case. The railroad commission in approving the contract of sale of the irrigation system refused to pass upon a suggested allocation of the utility water to lands theretofore served by the utility or upon reasonableness of the price which the district had agreed to pay. The ground for this action was that affairs of the district, including determinations of feasibility, were covered solely by the storage district law and were the concern of the State engineer and the land-owners, the railroad commission's only concern being to safeguard the interests of those former consumers located outside the district boundaries. The commission's action was upheld by the court.²⁰

WATER CHARGES AND COLLECTIONS

BONUS OR INITIAL CHARGE FOR PUBLIC-UTILITY "WATER RIGHT"

The widespread practice among irrigation companies of exacting a bonus as a condition precedent to obtaining water, which, however, conveyed to the purchaser no interest in the physical works, was prohibited in 1879 by the Colorado Legislature and later by that of Idaho and was declared illegal by the California Railroad Commission after an extended review of more or less conflicting court decisions (3). In some States there are no statutes prohibiting the practice and no court or utility-commission decisions holding it illegal, and on certain projects it is still being done. Obviously the illegality of the practice (where it is illegal) applies only to contracts made by public-service companies and not to essentially private-contracts for sale of "water rights" entitling purchasers to share eventually in proportionate ownership of the irrigation works.

²⁰ Baldwin et al. v. Railroad Commission of California, 77 Calif. Dec. 380, 275 P. 425.

Fundamental objections to the bonus have been:

It is a charge for service over and above the "reasonable rate" which a utility is entitled to receive from the public it is required to serve.

It often purported to be only a charge for a "water right." In jurisdictions in which the real water right vests in the user rather than the carrier, and is perfected by applying water to beneficial use, the charge was therefore for something to which the company had no claim and hence could not sell.

It frequently covered much or all of the first construction cost. Hence, as the company retained title to the irrigation works, consumers were often placed under an unfairly heavy burden, which would have been even more serious if after paying the entire cost they had been required to pay further, in the form of annual rates, a return on the value of the system. In actual practice, however, this has not been altogether the case. Bonus payments went far toward reimbursing original builders of some systems, but in the long run have represented only a small part of capital expenditures on others. Therefore, in many instances they may be considered in much the same light as those donations which other development enterprises have been allowed by commissions and courts to capitalize and without which the developments might not have taken place. Furthermore, earnings of public-utility irrigation companies on the whole have not been such as to include excessive profits on these bonus payments.

It has undoubtedly complicated subsequent public-utility regulation. A number of companies have charged different amounts to different users—for example, in the case of Dawson County Irrigation Co., Nebraska, first \$5 per acre, then \$3.50, \$8, and finally \$10 per acre—these amounts usually increasing with added construction costs. In other cases declaration of illegality of the practice has led to service to later consumers who paid no bonuses. These real or fancied discriminations tend to promote discord among consumers and have led to setting up of rate differentials in order to equalize the burden. The case of Sutter Butte Canal Co. is in point. Contracts outstanding in 1918 which had carried initial payments ranging from \$5 to \$10 per acre required some users to pay an annual charge of \$1 and others \$2 per acre. The railroad commission in that year fixed an annual rate of \$2 per acre for all contract lands and authorized noncontract applicants to secure water for \$2.50 per acre, or for \$2 if they chose to pay an initial charge of \$10 per acre, which few or none of them did. After subsequent revisions the commission in 1924 abolished the rate differential between contract and noncontract users, the company, however, still retaining liens under the original contracts for the minimum annual charge per acre, and by a decision in 1925 removed this final difference in an attempt to end the friction between classes of users, which the 1924 decision had failed to accomplish.

The bonus, then, viewed as a payment for individual water rights, is legally unsound in some jurisdictions and in some cases specifically forbidden. As a return upon capital invested it is unnecessary in any case where public regulation is effective in insuring adequate rates, although it might with reason be regarded as compensation for

revenue losses due to temporary idleness of irrigated lands.¹¹ Viewed as a donation in aid of construction, where legal, it has a definite practical value, mainly at present in connection with extensions of already established systems. If in such cases the fact of outright donation is agreed to by all parties, it is difficult to see anything wrong in the transaction, and acquiescence of the regulating commission should minimize the chances of resulting rate complications.

STATE SUPERVISION OVER CHARGES

Public-utility regulation, which on account of its importance is treated separately hereinafter, involves supervision by State agencies over all charges made by public-service companies.

State supervision over sale of "water rights" by other than public-utility companies is provided by laws accepting the terms of the Carey Act, under which no new development has taken place for many years, and in certain States by statutes covering other private development. The most extensively followed of the latter laws is that passed in 1909 by Idaho (*6, v. 1, secs. 3061-3068*), requiring State approval of sale of "water rights" by companies or parties not operating under the Carey Act. Early Carey Act development was actually subjected to "little more than nominal supervision" (5), which in many instances probably did more harm than good in misleading investors and settlers alike. Later developments received more careful attention from State officials, with beneficial results.

Annual operation and maintenance charges on Carey Act projects still operated by development companies prior to being turned over to the farmers—which is the status of many of them to-day—were fixed by contract between these companies and the State at extremely low rates to insure payment by the development company itself of that proportion of expense properly chargeable to undeveloped lands. On other projects operating under supervisory laws such as those of Idaho, charges were set out in settlers' contracts the form of which was approved by the State. Finances of the development companies, and the resulting quality of service to water users, have suffered severely from inadequacy of these contract rates to cover mounting operation costs.

TIME OF PAYMENT

Installments of purchase price of "water rights" are usually payable annually and sometimes carry interest on deferred payments. Annual operation charges vary widely as to time of payment. Experience has brought out the advisability under certain circumstances of dividing the annual rate into two or more installments, with dates of payment depending mainly upon character of crops grown and consequent times of receipts from sale of farm products and upon operation necessities. Charges based upon quantity of water delivered are often payable immediately or shortly after each irrigation,

¹¹ Wiel (*13, p. 3232*) makes this point, stating further that "from a financial point of view it is difficult to establish any new irrigation system where the distributors do not receive, in addition to the rates, some profit from the creation of the system, such profit coming either from ownership by the company of irrigable land in the vicinity reaping the benefit of its increased value or else from a special initial charge, usually called the 'water-right' charge." As stated heretofore, most commercial systems originating in recent years have been built in connection with land-development enterprises.

sometimes with a cash payment at the time of making application for service at the beginning of the season. Interest, often 8 to 10 per cent per annum, usually attaches to delinquent payments.

METHODS OF ENFORCING COLLECTIONS

SUIT TO RECOVER

This remedy is always available, but frequently unsatisfactory on account of the expense involved, for delinquencies large in the aggregate are often made up of many small claims against individuals.

CANCELLATION OF PRIVATE CONTRACT FOR PURCHASE OF "WATER RIGHT"

Contracts often provide that failure to pay any installment of the purchase price shall entitle the company to declare the "water right" forfeited. In a jurisdiction in which the real water right belongs to the user rather than the company and is perfected by application to beneficial use, it is doubtful if the company by this process could sever the water right from a delinquent's land and transfer it to other land. Deprivation of right to use the company's system, however, would lead to eventual forfeiture of water right, inasmuch as the delinquent landowner would be very unlikely to have other means of conveying the water to his land. The right to cancel the contract is therefore a powerful instrumentality.

Consumers under a public-service irrigation system probably could not be deprived of water service by cancellation of contracts, inasmuch as their right to water delivery rests primarily upon the company's duty to furnish water to the public, rather than upon any contractual relationship.¹²

ENFORCEMENT OF LIEN ON LAND OR ON CROPS

Liens upon land are provided in contracts of many development and some public-service companies, to secure not only installments upon purchase of land and "water rights", but annual operation and maintenance charges as well. Some States grant statutory liens. For example, Idaho provides that a charge "for the delivery of said water, which amount may be fixed by contract, or may be as provided by law, is a first lien upon the land for the irrigation of which said water is furnished and delivered" (*6 v. 2, sec. 5631*), while Texas gives parties supplying water for irrigation "a preference lien superior to every other lien upon the crop or crops raised upon the land thus irrigated" (*10, art. 7596*).

REFUSAL OF WATER DELIVERY

This is a simple, widely practiced, and most effective remedy. It is not, however, legal in all jurisdictions. For example, on the one hand a recent Washington decision is to the effect that a "water-right" purchaser delinquent in payment of annual installments can not have damages for failure to furnish irrigation water, the court stating: "No user of water can refuse to pay his delinquent bills and still demand service." A decision of the United States District

¹² See discussion by Kinney (8, sec. 1526).

Court (District of Idaho, Southern Division) relating to the Federal Boise project is to the same effect. On the other hand, several cases in the Idaho State Supreme Court, not arising on Federal projects, hold that delivery of water may not be withheld for nonpayment of past-due assessments, the company's authority to refuse delivery extending only to current charges and its remedy for past delinquencies being suit to collect.¹²

REQUIRING PAYMENT IN ADVANCE OF WATER DELIVERY

An irrigation company is obliged to deliver water to users upon tender of legal charges or in some jurisdictions upon furnishing reasonable security, and conversely may require this prior condition to be fulfilled. One important company requires renters (who may be gone from the project within a year) to prepay irrigation charges, but bills landowners with charges incurred by themselves and refuses water delivery until all accounts are settled.

Necessarily adequate enforcement of collections depends in the last analysis upon ability of users to pay. In times of financial stress, when lawsuits are of little avail and refusal to deliver water would result in materially smaller diversions by the company and possible forfeiture or compromise of part of the water right, there is no alternative other than to continue deliveries and to await better times to clear up accumulated delinquencies. The several remedies listed above are of greatest value against individuals willful or careless in payment of bills.

MANAGEMENT

Management of a commercial company, if incorporated, is in the hands of a board of directors elected by the stockholders, and if not incorporated, rests upon the will of the owners. Active management of business affairs and superintendence of operation and maintenance, including water delivery, are delegated to one or more regular employees.

The quality of management necessarily varies widely. The larger companies in good financial circumstances are apt to be well managed, because of availability of funds for needed expenditures and the realization on the part of owners that proper maintenance of works and careful administration pay in the long run. On the other hand, systems of companies struggling for existence become run down, operation is effected with inadequate forces, the temptation to economize unduly in salaries is great, and service becomes constantly poorer. There seems to be little extravagance in administration at the present time. Incomes of commercial companies in recent years have not been such as to encourage it, and it is frowned upon by regulatory commissions; therefore there is no incentive to owners to countenance obviously useless expenditures which must come out of their own pockets.

Methods of water delivery do not differ from those of other irrigation organizations. So far as contacts with water users go, the

¹² These three examples are found, respectively, in *Holmes et ux. v. Whitestone Irrigation & Power Co.*, 138 Wash. 261, 244 P. 679; *Mower v. Bond*, 8 F. (2d) 518; and *Reynolds v. North Side Canal Co. (Ltd.) et al.*, 36 Idaho 622, 218 P. 244.

main point of difference between commercial and community organizations is that friction develops much more easily under the former, and unreasonable demands, complaints, and damage suits by users are consequently more numerous.

PUBLIC REGULATION OF IRRIGATION UTILITIES

The several State constitutions and statutes and court decisions construing them are far from uniform (1) as to whether irrigation companies are to be regulated at all; (2) if regulation is provided for, what the test of an irrigation utility is to be; and (3) what activities are to be regulated. Rates and service most immediately concern the consuming public and therefore are most generally subject to regulation. California is typical of States exercising most extensive control and has produced the largest number of court and commission orders involving irrigation companies.

POWER OF STATE TO REGULATE

The State's power to regulate public-service irrigation companies, and particularly their rates, whether previously fixed by contract or otherwise, has been established many years. The prior-contract question has been disposed of on the ground that regulation of public utilities is an inherent attribute of sovereignty, and that rate contracts between utilities and consumers must therefore be deemed to have been entered into subject to possible revision by the State. If no definite provision is made in the constitution or statutes for fixing rates of irrigation companies, as is the case in several States, the consumer must look to the courts for relief from unreasonable rates.

COMPANIES SUBJECT TO REGULATION

Regulation of irrigation utilities is usually provided for by including irrigation companies within the statutory definition of "public utility" or "public-service company."¹⁴ Within any State which has authorized such regulation, the question of whether a given irrigation company is a public utility, and therefore subject to commission control, is largely a question of fact, determination of which in some States has involved many controversies and some very fine distinctions. Most of these companies in fact originated before commission control was extended to irrigation companies and before the differences between public and private service were widely understood. Early promoters did not know that they were engaging in public service if they did one thing and in private service if they did something else; so that while dedication of water to public use presumes a positive intention to dedicate, and while the courts

¹⁴ For example, the Utah law (*Ut. acc. 3782, p. 306*) defines "public utility" as including every "water corporation," which in turn includes every corporation or person owning or operating a "water system" for compensation, excepting companies distributing water only to their own stockholders. The California act (*l.*) states in some detail the circumstances under which a water company is a public utility. The Montana Supreme Court decided that the language "company . . . furnishing . . . water for business," as used in the public utilities act of that State, does not include irrigation companies. (*State ex rel. Thatcher et al. v. Boyle et al.*, Pub. Serv. Com., 82 Mont. 97, 204 P. 378.)

scrutinize closely the acts upon which an alleged dedication is based, nevertheless these people as a matter of fact often simply drifted into one status or the other, and they or their successors subsequently either made or resisted efforts to be declared public utilities, depending upon the eventual desirability of being engaged in public or private service. This is particularly exemplified by the many California cases in which the principle that dedication of water to public use constitutes an irrigation company a utility has been put to test under a wide range of circumstances.

Principles derived from court and utility-commission decisions declaring companies subject or not subject to public regulation may be summed up as follows:

Irrigation companies engaged in public service are subject to regulation when and to the extent provided by State constitutions and statutes, as construed by the courts. Those in private service are subject to only such supervision as the State may exercise over other private enterprises, which does not extend to alteration of rates fixed by contract.

Companies which appropriate water for distribution to all who may apply, and actually carry out such purpose, or otherwise "hold themselves out" as ready and willing to serve the public indiscriminately, are engaged in public service. Incorporation for such purpose does not in itself constitute such dedication. Fulfillment of contract provisions that rates shall be such as may be fixed by law constitutes engaging in public service. Requirement by the company that consumers purchase permanent "water rights" does not render the enterprise a private-contract company exempt from regulation.

Companies may be engaged simultaneously in public service as to part of their water supply and private service as to the balance. After a given supply of water has been devoted to the public, however, private rights can not be carved out of it. Water contracted privately to individuals may, with their consent, be devoted to public use by submission of the company to public rate-fixing authority, but can not thereafter revert to private use unless all public beneficiaries consent.

Companies may engage in service to a given class of the public, such as those farming lands within a defined geographical area, to the exclusion of other classes. They may engage in one kind of public service, such as delivery of water appropriated by themselves, without being required to perform some other public service, such as carrying water for independent appropriators.

Mutual companies serving their own members only at cost are not engaged in public service and are therefore not subject to rate or service regulation; but those supplying water to outsiders for compensation are subject to regulation, at least to the extent of such outside service. Irrigation districts are not subject to this kind of regulation; but upon the transfer of utility properties to an irrigation district, rights of consumers located outside the district boundaries are defined and protected in the commission's order approving the transfer.

Construction or development companies are subject to regulation in some States and not in others. Such companies while under con-

tract to deed their systems eventually to the purchasers of "water rights" have been considered common carriers in Nebraska and their rates regulated accordingly, and have been declared public-service companies in Idaho in a case in which no rate question was involved. Those companies operating under the Carey Act are not subject to this kind of regulation. Development companies which form mutual irrigation companies and transfer mutual stock to land buyers are not public-service companies, although jurisdiction over service of mutual companies while still controlled by the development company has been retained by the Arizona corporation commission.

Companies which serve land with "water rights" attached, sold by themselves or by associated enterprises, are held in certain States, notably California and Oregon, to be private-contract companies, on the ground that they are serving only individuals selected by themselves; but in Texas such companies are considered "quasi public service corporations" subject to rate regulation.

REGULATING AGENCIES

Regulation of irrigation rates in several States was formerly left to boards of county commissioners or supervisors and to city councils, whose authority was usually limited to fixing maximum rates. Irrigation rate fixing in Colorado is still handled by county commissioners, but in most States has been given to State commissions having jurisdiction over other public utilities, which determine not maximum but specific rates. Exceptions are Texas, which places this duty upon the board of water engineers; Oklahoma, which formerly placed it upon the State engineer but has recently transferred the State engineer's duties pertaining to irrigation to the conservation commission; and Montana, New Mexico, and South Dakota, which have not provided for irrigation-company regulation.

Regulation by local boards frequently proved unsatisfactory, partly because it was a purely incidental function and partly because board members included the water users among their constituents and were themselves sometimes users of irrigation water, with resulting difficulties in maintaining an entirely impartial attitude. A state-wide body, by contrast, has a much broader point of view in the matter and necessarily is considerably more scientific in its determinations.

PROCEEDINGS

Proceedings relative to rate changes and service requirements may usually be initiated by (1) the commission on its own motion; (2) complaint made by civic or municipal bodies or by some minimum number of consumers, such as 25; or (3) by the utility itself, in some States on petition for a hearing and in others on filing new rate schedules or rules and regulations which will stand as filed unless suspended by the commission pending a hearing. Formal or informal hearings are held by the commission, testimony taken, and decisions and orders issued, subject to review in the courts.

RATES

Rate-making principles developed by commissions and courts, especially those involving property rights and rights of utilities and

consumers as against each other, apply in general to irrigation as well as to other public services. Irrigation rates, however, involve many features distinguished by the nature and background of the industry, and with the past 15 years' experience in mind it is quite obvious that such rates can not be viewed altogether in the same light as those of some other industries. The following statement summarizes the principles and policies actually applied in irrigation rate and service cases and therefore of particular interest to irrigation companies. Many of these cases arose in California,¹⁵ and the others in Washington, Oregon, Idaho, Nevada, Wyoming, Nebraska, and Texas.

ITEMS OF RETURN

Rates are fixed to provide for (1) efficient operation and maintenance of irrigation works; (2) a depreciation annuity to cover eventual replacement of units not included in annual maintenance expenditures; and (3) a fair return on valuation of plant.

Extraordinary expenses, such as repair of damage due to disastrous floods, and reconstruction to overcome water shortages, as well as the loss in revenue resulting from necessary discontinuance of irrigation service, are properly chargeable to operation and maintenance, but as they are not incurred annually they are amortized over a series of years. Reasonable legal expenses are included, except damages paid as the result of negligence. Expenditures incurred in defending water rights are either amortized over a definite term or included in the rate base as part of the cost of water rights. Taxes are a part of operation cost. Past operation losses, including deficits incurred during the development stage, are allowed to be recouped to some extent and in some cases only, depending upon circumstances, but usually are excluded from consideration in irrigation cases because of the difficulty of providing for even current items.

The actual maximum rate of return on valuation, or owners' profit, is usually set at 6 to 8 per cent. Commissions, for good reason, seldom announce fixed policies applicable to all classes of utilities but determine each case on its merits. In these irrigation cases there are usually so many limiting circumstances that the maximum allowable return on valuation means little. This return on valuation comprises the following items: Interest on indebtedness incurred in developing the system, interest on the depreciation annuity in case the sinking-fund method is followed, dividends and additions to surplus.

ITEMS NOT INCLUDED IN RATES

Rates do not cover additions to capital, such as the cost of improvements and extensions to the irrigation system or retirement of bonded indebtedness. If this were not true, the State would be in the position of forcing ratepayers to provide capital and then to pay interest on it. Capitalization of voluntary donations from consumers is a different matter. Of course the owners may devote part of their return on valuation to such purposes if they choose.

¹⁵ For a complete statement of principles applicable to all classes of utilities in California, see (13).

The rule has often been announced that present consumers shall not be required to pay a full return on investment or even the entire cost of maintenance of an irrigation system built largely in excess of their needs, particularly if the principal reason for overbuilding was to promote land sales. Nor will irrigation consumers be saddled with land-development expenses not covered by the purchase price of land.

As shown under "Valuation for rate-making purposes" (p. 29), rates do not include a return on property not useful in the public service.

REASONABLENESS

Every rate must pass the test of reasonableness, which means that it must be as fair as possible to all whose interests are involved. Such a thing, of course, can not be determined by any definite formula. To be fair to the utility owner, the rate should provide for all running and replacement expenses and a return on investment higher than a creditor of the same project would demand, but must not be such as to invite destructive competition from individual pumping or other projects. Fairness to the consumer, on the other hand, requires that he be not penalized for sparseness of settlement of the irrigation project, inefficiency and extravagance in operation, or inadequacy of service. To accomplish this, commissions in a number of cases have allowed as reasonable operation expenditures sums considerably less than the companies have actually been spending. The rate in any case should not exceed the value of service to the user, which depends finally upon his ability to pay, and can not do so if the project is to operate on a sound basis. That determination of reasonableness must be predicated upon operation experience, use of water, and economic conditions obtaining over a series of years rather than in any single year applies with great force to an irrigation utility.

APPORTIONMENT AMONG CONSUMERS

The irrigation utility as a privately owned organization can not compel nonpatrons to become consumers or to pay rates without voluntary application for service, even though they may be benefiting substantially from proximity to the canal system.

Actual consumers must be treated without discrimination, whether or not they hold preferred contracts. Commissions, in fact, have not hesitated to modify or entirely abrogate utility contracts where it was necessary to remove discrimination or to raise all rates uniformly.

Rates may, however, be apportioned among classes of consumers without violating the rule against discrimination, but on the contrary really to remove discrimination. For example, occasional or "opportunistic" water users are sometimes required to pay higher rates than regular patrons, particularly where the added expense of serving occasional users is material. In at least one proceeding the California commission allowed lower rates for a time to persons who had made initial payments for "water rights," by approximately the annual interest on such payments, but later removed the differential owing to continued dissatisfaction over two classes of rates. Preferential rates have also been allowed users under the following cir-

stances: On laterals owned and operated by themselves; on the gravity unit of a project containing supplemental pumping units; and on portions of a project for which only one source of water supply was available, whereas other portions had two.

A fundamental rule is that consumers in one department of a utility's activities, such as electricity, may not be burdened with losses sustained in another department, such as irrigation.

BASIS

Commissions have leaned toward rates based upon measured quantities of water delivered, rather than flat rates per acre, because of the added incentive toward economy in use. The beneficial effect of this policy is apparent in sections where irrigation is recognized as essential to most profitable crop production, but is seriously questioned where irrigation is primarily of supplemental value and farmers are not yet wholly converted to its use. In a few cases rate differentials have been based upon character of crops grown, particularly on systems serving both rice and general crops, on account of the relatively heavy applications of water required for rice. Rates of several companies have allowed lower charges for water if used prior, say, to July 1, with a view toward encouraging early use while the supply is relatively plentiful. Seasonal rates, for quantities delivered at regular rotation intervals, have also been set lower than rates for delivery on demand on the same system, because of the lower cost of rotation deliveries.

PROBLEM OF PROVIDING ADEQUATE REVENUE

Commissions can not guarantee adequate revenue, but at the most can give only reasonable assurance of a minimum annual income. Liens on land are generally out of the question. Not only is no case known to the author in which a utility has been authorized by a regulatory commission to require continuous liens as prerequisites to service, but it is very doubtful if such a proposal for the benefit of outside capital would be viewed favorably. Liens existing from preregulation days have been left undisturbed in some cases, but usually apply to only part of the users and therefore assure only a minimum income. Furthermore, contracts for long periods, such as 10 years, are regarded as unreasonable prerequisites to service. With a view to assuring a fairly dependable minimum income, commissions at various times have authorized the following: Contracts for short periods, such as one to three years, with flat rates per acre; contracts for short periods, with stand-by or readiness-to-serve charges and additional quantitative charges based upon actual use; and payments in advance of the irrigation season. Beyond such provisions, all the commission can do is to set rates which on the basis of probable demand for water will provide the necessary financial return.

An assured minimum income is distinctly preferable to the utter uncertainty that might otherwise prevail; but while it may enable the company to operate, it can not be expected to provide in addition for depreciation and owners' profits. Hence, while the company's minimum operating income may be assured for one or two seasons

in advance, the added margin required for these other purposes may be lacking in any year. Abundant experience shows this to be a very real contingency.

The only way to eliminate the deficit, as discussed heretofore under "Insufficiency of annual rates" (p. 9), is to anticipate it or include it in subsequent years' rates. Irrigation-utility losses have been due so generally to inability of users to pay that commissions have seldom if ever included past losses in current irrigation rates. They have, however, fixed rates to meet conditions obtaining over a series of years, to the extent of ability of consumers to pay such charges.

VALUATION FOR RATE-MAKING PURPOSES

The first test of value is whether the property is actually used and useful in the public service; second, the extent to which this applies to the particular customers whose rates are involved. For example, levees used to protect a ditch system are valued at only part cost if they also protect lands of the holding company, and the cost of canals used for both power and irrigation is allocated to the two services. Likewise, the value of a system built for hydraulic-mining purposes and now used entirely for irrigation will be measured by its usefulness to irrigation consumers only.

Among the more important questions involved in irrigation-utility valuation proceedings, aside from valuation of overheads, which presents no very distinctive irrigation features, are the following:

PHYSICAL WORKS

In measuring the value of physical works for rate-making purposes, some commissions use historical cost undepreciated and others reproduction cost minus accrued depreciation. The California Railroad Commission leans to historical cost or fair original cost as the controlling factor, with due regard to other factors involved, estimating the reasonable investment where actual original figures are not available. The Texas Board of Water Engineers, on the other hand, arrives at present value by ascertaining or estimating original cost, adding to each item an appreciation factor to allow for increased prices of materials and labor and deducting from this result the percentage computed for accrued depreciation. In States following the reproduction theory, little or no allowance is made for depreciation of long-lived concrete structures. Seasoned earth ditches, which may be kept in perfect condition by annual maintenance work and which really improve with age, are not depreciable but occasionally require an allowance for obsolescence.¹⁵

¹⁵ The United States Supreme Court decision of May 20, 1929, in the so-called "O'Fallon Valuation Cases" (The St. Louis & O'Fallon Railway Co. and Manufacturers' Railway Co., *appts.*, v. United States et al., No. 131), 73 L. ed. 457, holding that the Interstate Commerce Commission, in giving no consideration to reproduction costs, had failed to carry out the congressional mandate that due consideration be given "to all the elements of value recognized by the law of the land for rate-making purposes," arose under the recapture provisions of the transportation act of 1920. The extent to which this decision will affect valuation of public-utility properties by State commissions for rate-making purposes is a matter for the future to determine. So far as irrigation companies are concerned, the ability of consumers to pay under present economic conditions is a vital factor in limiting the rates fixed under even the system of valuation most favorable to the irrigator.

LAND AND RIGHT OF WAYS

Land is valued at present-day prices rather than original cost. Land in the form of right of ways is valued by various methods, some cases using the present value of adjoining property; others the value of dry land plus severance damages, especially if the land on one side of the canal is high and rough; and others original cost, with no allowance for right of ways granted free. Right-of-way easements—for example, for pipe lines—are valued at cost.

WATER RIGHTS

Water-right valuations have caused much controversy. The first consideration in such cases involves location of title to the water rights, that is, whether title vests in company or in consumers; the second, a determination as to what, if any, intangible value attaches to water rights held by the company.

In jurisdictions in which water rights belong as a matter of law to landowners rather than the utility, no allowance for their value has been made in any irrigation-rate case known to the author, beyond the actual cost incurred by the company in connection with such water rights. Intangible water-right values have been ignored in some cases, and have been definitely refused consideration by the commissions of Nevada, Idaho, and Nebraska, as well as by the Federal court in a rate case arising under the Colorado State laws.¹⁷

In States in which the company may, as a matter of law, hold title to the water rights, it is recognized that water rights actually held by a company have value, particularly in localities where high market values generally prevail. Yet even in those cases commissions appear very reluctant to assign values substantially in excess of the actual cost of acquisition of the rights, largely because of the peculiar nature of a water right as a grant from the State of use of a limited natural commodity. In California, for example, water rights must be valued in rate-fixing cases because of a decision of the United States Supreme Court, which, however, did not decide the principle on which the valuation should be measured.¹⁸ The railroad commission, therefore, considers their value, but either includes it in a lump sum representing the entire rate base or allows it as a separate item based upon cost of acquisition and protection or on an amount not greatly exceeding such cost. The practical effect of this policy, then, is really not greatly different from that of commissions in States which consider that water rights belong to the user.

¹⁷ *Pioneer Irr. Co. v. Board of Comrs. of Yuma County, Colo.*, 236 F. 790. On appeal from this decision, the circuit court of appeals declined to express an opinion upon this point, but based its decision on other grounds. (251 Fed. 264.) The United States Supreme Court, in another rate case arising under the Colorado law, *City and County of Denver et al. v. Denver Union Water Co.*, 38 S. Ct. 278, 248 U. S. 178, 193, had before it the same question—namely, whether under the Colorado State laws and court decisions the water rights belonged to the public-service company and therefore should be given substantial value in rate-fixing proceedings—but found it unnecessary to pass upon the question inasmuch as the rates in controversy were held to yield an inadequate return, "even excluding from consideration the disputed water rights." The court stated: "The question is one of great consequence and is not free from difficulty. It ought not to be passed upon unless the exigencies of the case require it."

¹⁸ *San Joaquin and Kings River Canal & Irrigation Co. v. County of Stanislaus*, in the State of California, 233 U. S. 454.

Whether water rights have been adjudicated or not is an element to be considered in allowing value beyond actual cost. Action of the Texas Board of Water Engineers in refusing to place a value on water rights in irrigation rate cases was determined by the fact that water rights had not been adjudicated, the question of quantity being considered too uncertain to justify an attempt to fix the value.

In view of the definite aversion to placing substantial values upon water rights, beyond cost of acquisition, so generally shown by State commissions in irrigation rate fixing orders, it is deemed unnecessary to discuss further the various elements of value which advocates of water-right valuations urge for consideration.

ADVANCES FROM CONSUMERS

Capitalization of donations or advances from consumers is a matter on which practices differ somewhat, although the prevailing view seems to be that it will ordinarily be permitted. It has been favored in some recent instances on the theory that property so acquired is as much in the public service as though paid for out of the utility's capital funds, can not be withdrawn from public service, and must, on the contrary, be maintained and eventually replaced by the utility.¹⁹ The California commission allowed such capitalization in certain early cases but has refused it in some recent ones, using as the rate base for one postwar extension the \$526,000 actually spent by the utility and excluding \$309,000 donated by consumers, mainly because the actual cost exceeded reasonable present value on account of rushed construction at peak prices. The reason for rushing the work was to benefit users on this one extension; therefore the extra cost was considered not a proper charge against users on other portions of the system.

Initial payments for "water rights" have been disregarded in adjusting rate bases of several California companies, these being regarded rather as advance payments on rates. The Nebraska commission required purchasers of rights in a system which was eventually to belong to the users, and in which they therefore had an equity, to pay no return on the investment, and annual renters to pay a return on only the portion allocated to themselves.

Whether profits from land sales will be offset against the irrigation investment of a land and water company depends, apparently, upon the circumstances in each case, such as representations to land purchasers, prices paid, and what payments were supposed to cover, with due regard to the fact that legitimate real-estate profits, plus a reasonable return on the irrigation investment, can not be denied to a company that has acted in good faith. The Oregon commission declined to allow a return on value of such a system (which, however, the courts afterwards held to be not a public utility), the initial cost of which "was plainly reflected in the prices at which land was sold."

SERVICE

Service regulation applies to practices and requirements of the utility relating to its service to consumers but does not extend to

¹⁹ See, for example, (7).

questions of management or other internal affairs. The most important features follow:

EXTENSION, LIMITATION, AND ABANDONMENT OF SERVICE

Where specifically authorized by statute, commissions may and do require utilities to extend their facilities to reach new consumers within the area to which the water supply has been dedicated, even when to do so new outlays of capital are necessary. The California commission, however, refused to order extensions to persons who demanded exorbitant prices for a right of way. Extensions and reconstructions of canals will not otherwise be ordered unless clearly justified by the water supply and probable returns on the investment. Development of additional water will be required by the commission, if practicable, where the present supply proves insufficient for the area of service.

Limitation of utility service is a most important regulatory power, exercised for the purpose of protecting existing consumers from impairment of their water supply. Fairness to both utility and consumers, present and prospective, demands a thorough analysis of the water supply and distribution facilities before an order restricting service may be issued. Distribution of surplus water, however, has been allowed to new users on the distinct understanding, with necessary legal safeguards, that such users may share only in the surplus when available without impairing the prior rights of regular consumers to the normal supply.

A utility can not be compelled to operate at a continued loss. Abandonment of service, however, is not optional with the utility, but must have prior authorization of the commission based upon full presentation of the facts. This is an important determination, for if refused it may mean confiscation of the utility's property, and if granted, loss of the consumers' water supply and resulting confiscation of their property. Consequently commissions have made several such orders conditional upon finding other sources of water supply for consumers. As a matter of fact, abandonment questions seldom arise except in case of very small projects, such as those built in connection with subdivisions of small tracts, for investments in irrigation systems of any considerable size are such that owners can better afford to carry them at a loss for years pending eventual sale to the water users.

PREVENTION OF DISCRIMINATION

Discrimination in service is tolerated no more than in rates. Companies in specific instances have been ordered to cease the following discriminatory practices: Fulfillment of contracts granting preferential rights to water during shortage; installation of distribution facilities at the expense of some users and not others; requiring users to maintain and operate at their own expense certain laterals and not others, under rates applying uniformly to all laterals; giving preferences to users who are also stockholders of the company. Contracts for free service have been sanctioned where the consideration was an actual transfer of users' water rights to the company, but not where it was money payments or work performance, the former contracts being considered private and the latter public.

EFFICIENCY OF SERVICE

Utilities are charged with the duty of taking all practicable means of rendering efficient service, including prevention of tampering with the water supply and prosecution of offenders. The California commission on several occasions has expressed the view that to give most efficient service, utilities should operate and maintain all laterals to the point of serving the individual consumer; but has not required utilities to take control of private laterals unless rates sufficient to cover cost of operation and a return on capital outlay appeared feasible. Companies in some cases have been ordered to put canals and structures in shape to render more satisfactory service. That this rule works both ways is indicated by authorization to one company to measure water at the intake of a private lateral rather than at the land, where such lateral had not been cleaned. Commissions of Texas and California have either recommended the rotation method of water delivery or based rates upon its operation where such method appeared most economical, and have strongly urged installation of some practicable system of measurement. Companies serving both domestic and irrigation consumers have been allowed to provide certain hours during which water may not be used for irrigation. A rule that land must be properly prepared for irrigation has been held reasonable.

SECURITY ISSUES AND CONSTRUCTION

In a number of States the approval of commissions having jurisdiction over rates of irrigation companies is required before they may undertake new construction and extensions, and in a few States before they may issue securities. Security issues of public utilities are usually exempt from provisions of the "blue-sky" laws, even where not supervised by utilities commissions, in view of the regulatory power exercised over other major activities.

Regulation of irrigation-utility securities is of practical importance mainly in California, and extends in that State to securities payable more than one year from date and to the refunding of notes maturing in less than one year, being independent of the limitations of indebtedness provided by the general laws governing corporations. The commission's function is not so much to determine the excellence of investment in a proposed issue of securities as to make reasonably certain that the utility will receive value and will translate it into service at reasonable cost to consumers. That done, the soundness of the investment is as well assured as the State can make it without guaranteeing the securities, which it specifically refuses to do.

The California Railroad Commission's attitude toward feasibility of a proposed irrigation enterprise (2) is that promoters who propose to expend their own money in developing the country shall not be required to submit complete proof of final success but that those who ask the commission to authorize bonds for sale to the public, "to some extent on the faith of the commission's authorization," must demonstrate feasibility.

ACCOUNTING

Utility commissions having jurisdiction over irrigation companies are all authorized to provide for uniform systems of accounts and annual reports and in several States are specifically empowered to require individual companies to set up depreciation accounts to which a definite portion of the annual income is chargeable.

The chief purpose of a uniform accounting system is to provide the commission with complete and accurate information regarding a utility's financial transactions. This purpose is fully realized in case of an old utility only after appraisal of its properties, due to diversity in bookkeeping methods practiced before the era of commission control. Utilities are forbidden to keep accounts other than those prescribed by the State or Federal Government, with the obvious design of preventing falsification of accounts for rate-making or other purposes. Most of the controversies over accounting methods have arisen over allocation of expenditures to capital and operating accounts.

The depreciation account is of considerable importance, particularly to a company operating pumping plants or other equipment of fairly definite life. Commissions in rate orders almost invariably estimate the amount of annual depreciation and provide in the rate set-up for an annuity to cover it, which must be expended in conformity with the commission's orders. As a rule this annuity may be invested in extensions and betterments to the company's own system, unless the commission has reason to doubt the good faith or good judgment of utility officers, in which case a cash depreciation reserve fund must be created. Investing in the business operates to the company's advantage, for it permits a return on investment and forms the basis for a later bond issue to make actual replacements, whereas a cash fund yields a low rate of interest and may necessitate borrowing at a higher rate on short-term notes to make replacements. The experience of some irrigation companies has been that the depreciation annuity has necessarily been used in some years to make up operation deficits, the companies hoping to repair their finances before replacements should become necessary.

WHAT PUBLIC REGULATION HAS ACCOMPLISHED

Regulation of rates and service of utilities has grown from the public demand for protection against unreasonable charges and practices and has carried with it protection to the utilities themselves against destructive competition and continuance of unreasonably low contract rates. So far as irrigation companies are concerned, public regulation has been of possibly greater value to utility investors than to consumers. Thus, while it is decidedly to the advantage of consumers to have the irrigation system serving them operated satisfactorily, which can not be done if rates are insufficient, and while their water supply has been protected in more than one case against unwarranted diversion to new consumers, nevertheless it is a fact that irrigation-rate revisions have usually been upward and have frequently involved nullification of inadequate contract rates. Private-contract companies, faced by mount-

ing operating costs, have had only one way out—sale of the system to the water users at the best price obtainable—but public utilities have had help from the State in adjustments to meet new economic conditions. Furthermore, creditors of utilities whose securities require State approval benefit to whatever extent the commission analyzes the necessity for and the soundness of the issue. Such analyses, in the case of the irrigation companies under consideration, seem to have been beneficial to the creditors.

Rate regulation will not guarantee 6 or 8 per cent to investors. It is simply a method of adjusting charges with a view to doing justice to utility owners and farmers alike, and is powerless to effect an adequate return in the face of conditions which render it uneconomic or impossible for farmers to pay sufficiently high rates. Taking the industry as a whole, therefore, public regulation has not made possible a desirable return on irrigation investments, nor has it stimulated the growth of irrigation utilities. What it has done, for the water users, has been to improve the character of service on a number of irrigation systems and to protect consumers against discrimination and exploitation; and for utility owners, to make possible a continuance in operation notwithstanding existence of ruinous contract provisions and to effect such returns as existing economic conditions have justified.

APPENDIX

PROFITS OF CALIFORNIA IRRIGATION UTILITIES

Table 2 has been compiled from all published annual reports of the California Railroad Commission in order to show aggregate capitalization, operating finances, net profits and losses, and dividends declared on capital stock, of irrigation utilities in that State. The financial condition of these preponderant California companies, as shown in this table, is considered quite representative of the average condition of irrigation utilities prevailing throughout the West.

TABLE 2.—Aggregate capitalization, operating finances, profits, losses, and dividends of irrigation utilities reporting to California Railroad Commission deriving 25 per cent or more of total water revenue from sales for irrigation

Year	Capitalization				Total operating revenues	Total operating expenses	Companies reporting net incomes				
	All companies		Incorporated companies				Number	Total capital stock and proprietors' investments ¹	Ratio of total irrigation earnings to total revenues	Total net incomes	
	Number	Total capital stock and proprietors' investments ¹	Number	Total capital stock ¹							
		Dollars	Dollars	Dollars	Dollars	Dollars	P. ct.	Dollars			
1913	63	26,530,008	58,25,030,178	5	1,558,920	1,558,512	1,173,502	23	9,668,308	83	234,609
1914	55	38,117,716	55,28,117,716			1,410,350	1,144,412	22	7,147,070	59	389,840
1915	56	32,442,752	56,32,442,752			1,552,207	1,158,598	22	12,509,300	60	372,042
1916	57	30,032,407	57,29,032,497			1,623,136	1,223,782	19	20,961,400	59	570,115
1917	61	26,914,705	61,26,914,705			1,632,527	1,353,601	24	16,531,719	70	545,320
1918	64	30,134,061	64,30,134,061			2,012,502	1,381,390	21	7,206,843	67	435,850
1919	67	31,337,114	67,30,561,889	1	775,225	2,487,260	2,024,708	26	9,917,650	69	570,205
1920	59	31,045,008	59,30,269,873	1	775,225	2,431,172	2,060,502	26	7,782,123	38	374,811
1921	65	30,355,057	65,29,331,265	0		1,023,522	2,434,007	2	2,235,870	31	6,004,342
1922	61	27,271,275	61,26,263,035	10	1,007,337	2,307,606	1,929,711	30	7,054,100	60	367,131
1923	61	27,090,766	61,26,630,768	12	1,453,028	2,344,161	1,931,284	34	9,133,201	44	603,562
1924	62	26,254,522	62,24,850,190	16	1,398,362	2,176,921	1,772,577	28	6,124,503	52	450,351
1925	60	27,343,204	60,25,943,875	18	1,390,410	2,336,682	1,900,304	32	7,981,134	55	460,070
1926	58	27,602,815	58,25,444,230	11	245,570	2,170,596	1,564,583	20	7,953,285	72	190,572
Average	61	28,608,501	61,27,920,210	12	1,155,210	2,047,424	1,612,920	28	9,853,936	75	424,734

¹ Exclusive of several systems owned by power companies whose reported balance sheets do not segregate the irrigation investment.

² Exclusive of years 1914 to 1920, inclusive.

³ This figure in each case is the ratio of yearly averages, rather than the average of yearly ratios.

TABLE 2.—Aggregate capitalization, operating finances, etc.—Continued

Year	Companies reporting net losses					Companies paying dividends						
	Number	Total capital stock and proprietors' investments ¹	Ratio of total irrigation earnings to total revenues	Total net losses	Excess of total net incomes over total net losses ²	Ratio of excess incomes to total capital stock and proprietors' investments	Number	Total capital stock	Ratio of total irrigation earnings to total revenues	Total net incomes	Total dividends	Ratio of total dividends to total capital stock
1913.....	35	10,900,350	79	312,478	-78,860	-0.30	1	1,612,400	95	147,004	72,012	4.47
1914.....	32	20,958,010	80	348,802	40,064	.15	3	1,197,550	94	96,095	79,161	6.61
1915.....	33	10,921,762	75	253,201	119,441	.37	4	6,106,400	89	118,057	111,880	1.83
1916.....	37	8,350,307	85	333,369	236,746	.79	2	1,500,000	99	107,615	85,000	6.61
1917.....	27	10,382,005	78	149,728	305,502	1.47	5	1,895,500	95	131,561	130,050	6.61
1918.....	33	22,807,218	72	206,284	139,572	.46	4	1,015,000	94	81,659	130,780	6.11
1919.....	41	24,419,595	68	451,894	127,311	.49	4	2,512,000	96	100,687	110,380	4.39
1920.....	33	23,262,075	85	486,291	-11,450	-.36	3	2,200,000	86	97,849	145,000	6.58
1921.....	34	22,359,745	84	441,336	-124,205	-.41	3	2,182,200	94	6,893	69,119	3.17
1922.....	31	10,317,175	77	238,313	145,788	.55	2	2,000,000	45	65,339	49,010	2.48
1923.....	26	17,030,795	72	269,458	424,124	1.67	6	4,108,480	30	347,751	230,902	5.38
1924.....	34	18,129,030	82	303,144	83,267	.24	3	2,636,367	79	92,849	51,958	2.08
1925.....	35	10,348,100	77	257,424	112,652	.52	5	3,776,623	69	89,597	73,593	1.05
1926.....	30	17,729,530	87	183,892	6,770	.03	4	3,573,000	72	223,040	78,035	2.18
Average.....	33	18,749,893	78	315,403	100,331	.35	4	2,636,751	72	116,653	100,814	1.82

¹ Exclusive of several systems owned by power companies whose reported balance sheets do not segregate the irrigation investment.

² Minus sign (-) denotes excess of losses.

³ 1 company reported net loss of \$53,545.07; net deducted from total net incomes.

⁴ 2 companies reported net losses totaling \$93,781.45; net deducted from total net incomes.

⁵ 1 company reported net loss of \$504.52; net deducted from total net incomes.

⁶ This figure in each case is the ratio of yearly averages, rather than the average of yearly ratios.

Many companies reporting to the commission showed earnings from sales of water for purposes other than irrigation—such as commercial, industrial, and municipal purposes—thus necessitating an arbitrary classification of companies for inclusion in Table 2. The only practicable basis of segregation is the relative volume of irrigation sales; and as several important irrigation systems contribute 25 to 40 per cent of the total water revenue of companies owning them, the criterion followed in preparing this table is that 25 per cent or more of water revenue must be derived from irrigation sales. Comparatively few of these companies derived less than 50 per cent of water revenue from irrigation sales. There were 5 such companies in 1926 and 15 in 1919, the average for the 10 years ended with 1926 being 9 companies, or about 15 per cent of all companies included for those years. Fluctuations in this group are due in part to changes in relative proportions of irrigation and other water sales.

Attention is called again to the fact that irrigation utilities and domestic-water utilities are not to be confused. Of the many companies in California supplying water primarily for domestic and industrial purposes, those appearing in this table are only the relatively few which also do substantial irrigation businesses. Certain of the more important ones so included owe their good financial condition in large measure to existence of profitable domestic-water markets.

Companies reporting to the commission, but afterwards shown to be not under their jurisdiction, are not included.

EXPLANATION OF TABLE 2

Figures shown for total capital stock do not necessarily represent actual value. In several cases heavy unamortized discounts are shown in reported balance sheets as offsets to nominal capitalization, and one system capitalized at \$10,000,000 was subjected to foreclosure in 1927 and recapitalized at

\$750,000. On the other hand, funded debts, stock assessments, and advances from consumers usually represent value not expressed by the nominal capitalization; and as shown in footnote 1, the investment in several systems owned by power companies is not reported. In the absence of complete valuations, the figures on capitalization in this table are probably the best tangible expression of total value that can be made.

Unincorporated companies were required to report to the railroad commission each year. Their finances, however, were not summarized in the commission's reports for 1914 to 1918, inclusive, or with one exception in 1919 and 1920. Yearly averages for unincorporated companies in this table therefore exclude the years 1914 to 1920, inclusive.

"Total operating revenues" consist of earnings from all water sales, and also profits on merchandise sales and on piping and connections, the latter being important in the case of very few of the companies considered herein. "Total operating expenses" consist of (1) maintenance and operation of properties and works concerned with storing, developing, and distributing water; (2) collection and promotion of business expense; (3) general expense; (4) taxes; and (5) amortization of capital, including depreciation. The columns on revenues and expenses, together with those on capitalization, give some indication of the aggregate size of plant and volume of business transacted.

"Net income" is the amount available for paying dividends or for additions to surplus after deducting operating expenses (including depreciation charges), interest on indebtedness, and miscellaneous items from the total revenue. The sum of "Companies reporting net incomes" and "Companies reporting net losses" does not always reach that of "All companies," inasmuch as some companies either reported no balance sheet or actually had neither an income nor a loss for a given year.

"Total revenues," as used in the columns "Ratio of total irrigation earnings to total revenues," consist of (1) total operating revenues and (2) income from all additional sources, such as land sales, oil royalties, etc. In 1923 one company showed an actual loss from operation of the system but received a total net income of \$296,701 (mainly from land operations), from which it wiped out an accumulated deficit of \$135,245 and paid a 26.5 per cent dividend on its capital stock.

One company reporting a net loss in 1917 and a net income each subsequent year and paying dividends in 1922 to 1926, inclusive, has not segregated irrigation from other accounts since 1916. Estimates of ratio of irrigation earnings to total revenues, however, were provided by company officials and used in this table. Ratios of irrigation to total revenues thus affected, as shown in the table, are therefore approximate, but undoubtedly deviate but slightly from actuality.

Returns to utility owners are briefly analyzed under "Insufficiency of annual rates" (p. 9).

LITERATURE CITED

- (1) CALIFORNIA, LAWS, STATUTES, etc.
1913. AN ACT PROVIDING FOR THE REGULATION OF WATER COMPANIES, DEFINING THEIR POWERS AND DUTIES, DEFINING THE POWERS AND DUTIES OF THE RAILROAD COMMISSION WITH REFERENCE THERETO, AND DEFINING THE CONDITIONS UNDER WHICH SUCH WATER COMPANIES BECOME SUBJECT TO THE PROVISIONS OF THE PUBLIC UTILITIES ACT AND THE RAILROAD COMMISSION OF THE STATE OF CALIFORNIA. Calif. Statutes 1913, ch. 80. ([Amended.] *In* Statutes and Amendments to the Code, ch. 172. 1923.)
- (2) CALIFORNIA. RAILROAD COMMISSION.
1913. IN THE MATTER OF THE APPLICATION OF THE EMPIRE WATER COMPANY FOR AN ORDER AUTHORIZING ISSUE OF BONDS, AND IN THE MATTER OF THE APPLICATION OF EMPIRE WATER COMPANY FOR PERMISSION TO CONSTRUCT A HYDROELECTRIC PLANT NEAR COYOTE CREEK, SAN DIEGO COUNTY, CALIFORNIA. Calif. Railroad Com. Decisions 3: 673-675. (Decision 984.)
- (3) _____
1915. IN THE MATTER OF THE APPLICATION OF JAMES A. MURRAY AND ED FLETCHER, CO-PARTNERS DOING BUSINESS UNDER THE FIRM NAME AND STYLE OF CUYAMACA WATER COMPANY, AND LA MESA, LEMON GROVE AND SPRING VALLEY IRRIGATION DISTRICT FOR AN ORDER ESTABLISHING THE VALUE OF THE PROPERTY OF THE CUYAMACA WATER COMPANY AND AUTHORIZING SAID CUYAMACA WATER COMPANY TO CONVEY SAID PROPERTY TO SAID DISTRICT. Calif. Railroad Com. Decisions 7: 334-390. (Decision 2531.)
- (4) _____
1917. IN THE MATTER OF THE APPLICATION OF MADERA CANAL AND IRRIGATION COMPANY FOR AN ORDER AUTHORIZING INCREASES IN RATES CHARGED FOR WATER SOLD FOR IRRIGATION. Calif. Railroad Com. Decisions 13: 528-545. (Decision 4478.)
- (5) ERVIN, G.
1919. IRRIGATION UNDER THE PROVISIONS OF THE CAREY ACT. U. S. Dept. Agr., Off. Sec. Circ. 124, 14 p.
- (6) IDAHO. LAWS, STATUTES, etc.
1919. THE COMPILED STATUTES OF IDAHO. 2 v. Boise, Idaho.
- (7) IDAHO PUBLIC UTILITIES COMMISSION.
[1924]. ELEVENTH ANNUAL REPORT OF THE PUBLIC UTILITIES COMMISSION OF THE STATE OF IDAHO FROM JULY 1, 1923, TO JUNE 30, 1924. 310 p. Boise, Idaho.
- (8) KINNEY, C. S.
1912. A TREATISE ON THE LAW OF IRRIGATION AND WATER RIGHTS AND THE ARID REGION DOCTRINE OF APPROPRIATION OF WATERS . . . Ed. 2, rev. and enl. to Oct. 1, 1912, 4 v. San Francisco.
- (9) TEELE, R. P.
1927. THE ECONOMICS OF LAND RECLAMATION IN THE UNITED STATES. 329 p. Illus. Chicago and New York.
- (10) TEXAS. LAWS, STATUTES, etc.
1925. REVISED CIVIL STATUTES OF THE STATE OF TEXAS . . . 1925. v. 2.— I to W, art. 7596. Austin, Texas.
- (11) UTAH. LAWS, STATUTES, etc.
1917. THE COMPILED STATUTES OF THE STATE OF UTAH. 1987 p. Salt Lake City, Utah.
- (12) WHEAT, C. I., VAUGHAN, R. L., and CASSIDY, R. B.
1927. RAILROAD COMMISSION OF THE STATE OF CALIFORNIA. DIGEST OF DECISIONS, v. 1-29, 1912-1927, WITH LIST OF ALL CASES THAT HAVE BEEN THE SUBJECT OF COURT ACTION. 577 p. San Francisco.
- (13) WIEL, S. C.
1911. WATER RIGHTS IN THE WESTERN STATES . . . Ed. 3, rev. and enl. to June 1, 1911, 2 v. San Francisco.

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March 12, 1930

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